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**Borehole Summary Report  
for Five Ground-Water  
Monitoring Wells Constructed  
in the 1100 Area**

R.W. Bryce  
S.M. Goodwin

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May 1989

Prepared for the U.S. Department of Energy  
under Contract DE-AC06-76RLO 1830

Pacific Northwest Laboratory  
Operated for the U.S. Department of Energy  
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BOREHOLE SUMMARY REPORT FOR FIVE  
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Richland, Washington 99352

## SUMMARY

This report contains the data collected during the installation and initial sampling of five ground-water monitoring wells between the 1100 Area and Richland City water supply wells. The five **wells** were installed to provide for early detection of contaminants and to provide data that may be used in making decisions on the management of the North **Richland** Well Field and recharge basins.

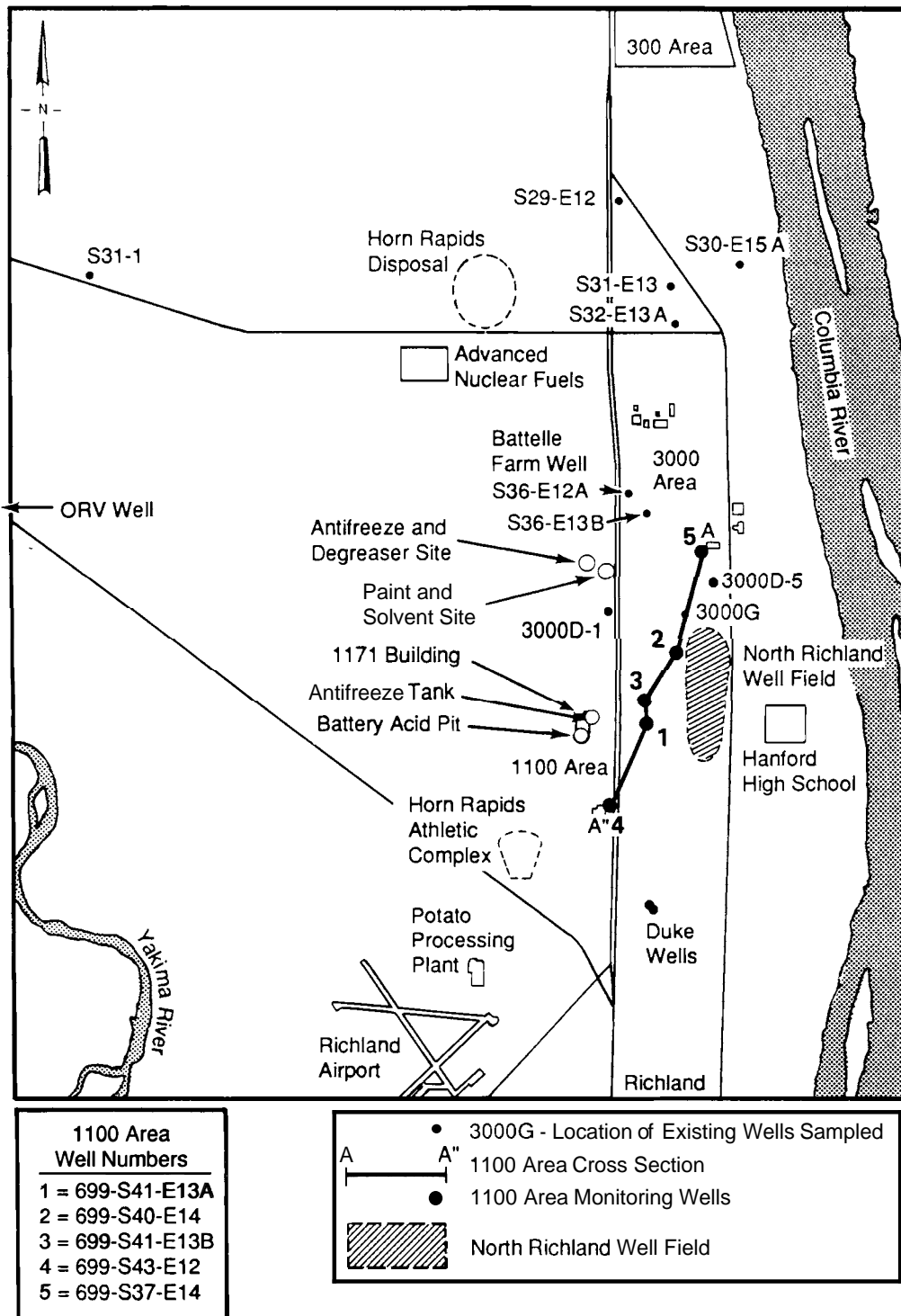


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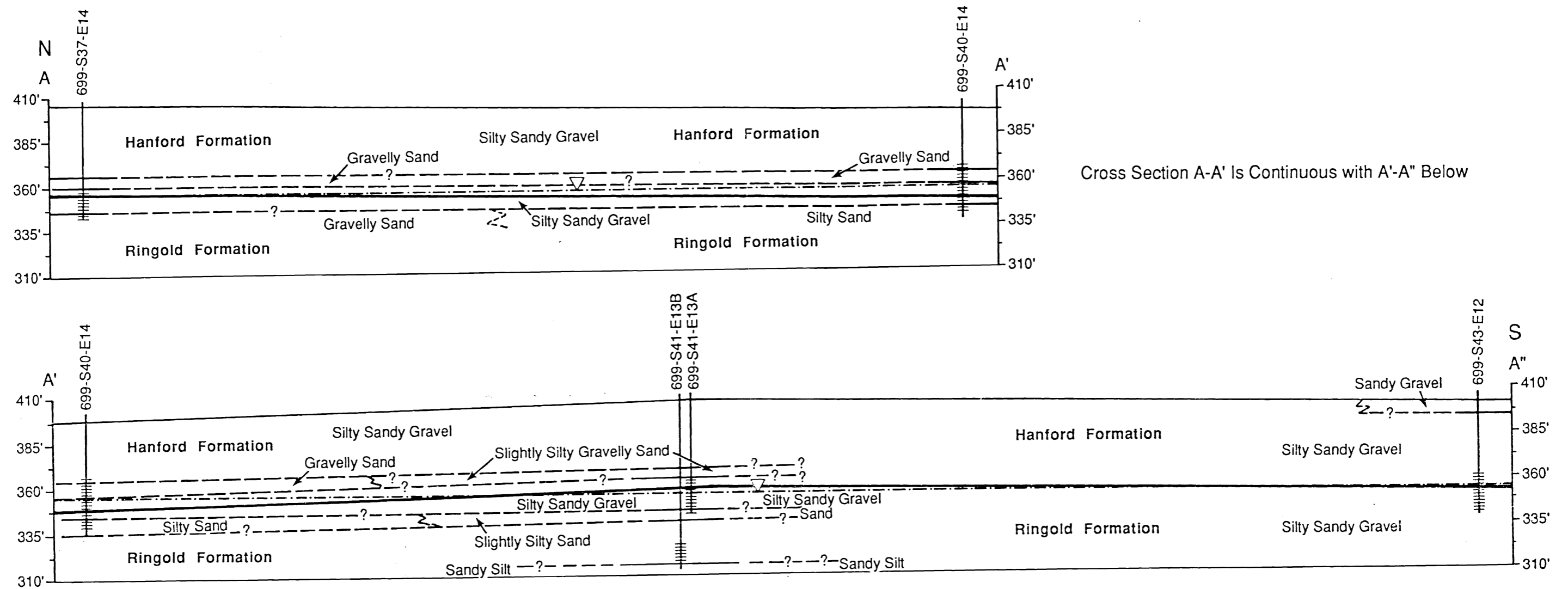
The Hanford Site, operated for the U.S. Department of Energy (DOE) by Westinghouse Hanford Company, consists of several "areas" that accommodate various activities. The 1100 Area, one of the areas near the city of Richland, has been used for maintenance activities. Waste disposal sites in the 1100 Area received unknown quantities of liquid and solid waste between 1950 and 1985. While the types and quantities of waste are not documented, they are known to include spent battery acid, antifreeze, used motor oils, solvents, degreasers, paints, and paint thinners. These disposal sites are in proximity to wells that supply water to Richland. Five monitoring wells were installed between the waste disposal sites and the wells supplying water to Richland to detect contaminants in the ground water, should they exist, before they reach the water supply wells. Background information on the waste sites and water supply wells and a plan for installation of the new wells are presented in Bryce (1989). This document presents the data gathered during the construction of the monitoring wells and the analytical results of the initial sampling of ground water from the wells.

The water supply wells of concern include the Duke Wells, the North Richland Well Field, and well 3000D-5 (Figure 1). The locations of the five new monitoring wells are shown in Figure 2. Wells 1 and 3 are located between the North Richland Well Field and two waste disposal sites: the Battery Acid Pit and the site of the exhumed waste antifreeze storage tank. The Battery Acid Pit received an estimated 15,000 gal of battery acid and is considered the site with the highest potential to impact the quality of the ground water. These two monitoring wells are located some distance from the recharge ponds to increase the chance that representative ground water (i.e., unaffected by the recharge ponds) will be collected. This location will also provide water-level elevation data that will help determine the direction of ground-water flow between the waste sites and the water supply wells. Well 1 will intercept contaminants near the top of the aquifer; well 3 will intercept contaminants that have migrated to a depth near the bottom of the aquifer.

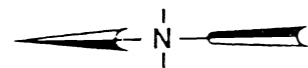
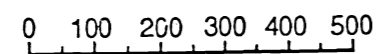


**FIGURE 1. Map of the 1100 Area**

# Cross Section of the 1100 Area Environmental Monitoring Wells 1988



Scale in Feet



Vertical Exaggeration = 4x

### Legend

- Well (with Screened Interval)
- Water Table (October 1988)
- Formation Contact (Approx.)
- Facies Contact
- Approximate Facies Contact

FIGURE 2 Cross Section of the 1100 Area Environmental Monitoring Wells, 1988

Well 2 is located close to the North Richland Well Field and midway between the Battery Acid Pit and Antifreeze Tank to the south and the Paint and Solvent Site and Antifreeze and Degreaser Site to the north. This well was completed at the top of the aquifer because contaminants, if present, will most likely be found there and the top of the aquifer is tapped by the water supply wells of the North Richland Well Field. This location provides water-level elevation data that may be used to characterize the impact recharge and withdrawal of ground water in the North Richland Well Field has on the local ground-water flow system.

Well 4 is located south of the other wells, between the waste disposal sites and the Duke Wells. During periods when a ground-water mound existed beneath the recharge ponds in the North Richland Well Field, ground water may have flowed south from the vicinity of the Battery Acid Pit and the Antifreeze Tank toward the Duke Wells. A well at this location assisted in determining if flow to the south did occur by allowing the collection of water-table elevation data and ground-water samples for chemical analysis.

Well 5 is located north of the well field to sample ground water in the vicinity of Well 3000D-5. Although the ideal location of this well would be between well 3000D-5 and the Paint and Solvent Site and Antifreeze and Degreaser Site, the land in this area is not accessible to the DOE. The well was therefore drilled to the north of the water supply well of interest, because wells 3000D-1 and 3000-G are south of the well and disposal sites and are available for sample collection there.

## RESULTS

The following sections summarize well construction and ground-water sampling activities at each well site. A geologic cross section summarizing geologic data gathered from these wells is presented in Figure 2. Supporting data, including the Well Completion/Inspection Form, as-built drawing, sample pump installation form, geophysical logs, and geologic logs for each well, are presented in Appendixes A through E. Well survey data (location and elevation) are presented in Appendix F; results of ground-water analyses are presented in Appendix G.

### WELL 1 (699-S41-E13A)

Drilling at well 699-S41-E13A began October 7, 1988, and reached a total depth of 67 ft below ground surface on October 12, 1988. The sediments encountered were primarily silty sandy gravels and slightly silty gravelly sands. The Ringold Formation was tentatively identified at 50 ft below ground surface; this assumption was based on changes in drilling rates, soil color, basalt percentages, and increased field reactions to 10% HCl. Additional laboratory analyses would be necessary to further define the formation contact. Static water level during well completion was 53.25 ft below ground surface.

Well 699-S41-E13A was completed at a depth of 62.8 ft below ground surface. Final well materials include 15.65 ft of 20-slot Johnson Division type 304 stainless steel screen (4 in. dia) and 50 ft of 4 in. Johnson Division type 304 stainless steel casing. Factory-welded stainless steel casing centralizers were located 7.15, 27.15, 57.55, and 65.65 ft below land surface. The annular seal consists of a 16-30 mesh Colorado silica sand pack along the screened interval to 3.65 ft above the top of the screen, 6.3 ft of Enviro-plug bentonite pellets, <sup>(a)</sup> 18.83 ft of 8-20 mesh granular bentonite crumbles, 17.07 ft of Portland cement grout, and an air-entrained concrete seal that reaches 1.3 ft below ground surface. The casing was pulled back with the Bucyrus Erie 22W cable-tool drill rig that drilled the borehole.

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(a) Manufactured by Wyo-Ben, Inc., Billings, Montana.

The estimated volume of water added to the borehole during drilling is 120 gal; the estimated volume of water removed during the two-phase development process is 1287 gal. Water added to the borehole during drilling was obtained from the Richland municipal water supply in the 3000 Area and was stored onsite in 55-gal steel drums. Field monitoring for contamination was performed by geologists and radiation protection technologists from Pacific Northwest Laboratory (PNL). No contamination was detected, so the vadose zone was not sampled for hazardous constituents.

Well development consisted of bailing the completed well with the cable-tool rig and dart bailer until the water was essentially sediment free; continued development was performed with a 1.5-hp submersible pump. The well was considered developed when water samples were consistently below the 5-NIU criteria specified in the Technical Enforcement Guidance Document (EPA 1986); water samples were analyzed with a Hach Portable Turbidimeter. Development water was discharged to the ground after receiving acceptable results from a rapid water analysis sent to U.S. Testing Company, Inc. (UST), on October 12, 1988. No aquifer test was performed. The HydroStar<sup>(a)</sup> pump was installed on November 3, 1988; this completed construction activities at well 699-S41-E13A.

#### WELL 2 (699-S40-E14)

Drilling at well 699-S40-E14 began October 3, 1988, and reached a total depth of 62.44 ft below ground surface on October 6, 1988. The sediments encountered were primarily silty sandy gravels and gravelly sands. The middle Ringold member was encountered at approximately 52 ft below ground surface; static water level during well completion was 44.43 ft below ground surface.

Well 699-S40-E14 was completed at a depth of 59.5 ft below ground surface. Final well materials include 25.95 ft of 10-slot Johnson Division type 304 stainless steel screen (4 in. dia) and 35 ft of 4-in. Johnson

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(a) HydroStar is a tradename of Instrumentation Northwest, Inc., Redmond, Washington.

Division type 304 stainless steel casing. Factory-welded stainless steel casing centralizers were located at 34.5, 53.5, and 59.5 ft below ground surface. The annular seal consists of a 20-40 mesh Colorado silica sand pack along the screened interval to 3.40 ft above the top of the screen, 6.85 ft of Enviropug bentonite pellets, 3.45 ft of 8-20 mesh granular bentonite crumbles, 16.45 ft of Portland cement grout, and an air-entrained concrete seal that reaches 3.4 ft below ground surface. The casing was pulled back with the Bucyrus Erie 2W cable-tool drill rig that drilled the borehole.

The estimated volume of water added to the borehole during drilling is 120 gal; the estimated volume of water removed during the two-phase development process is 689 gal. Water added to the borehole was obtained from the Richland municipal water supply in the 3000 Area and was stored onsite in 55-gal steel drums. Field monitoring for contamination was performed by PNL geologists and radiation protection technologists. No contamination was detected, so the vadose zone was not sampled for hazardous constituents.

Well development consisted of bailing the completed well with the cable-tool rig and dart bailer until the water was essentially sediment free; continued development was performed with a 1.5-hp submersible pump. The well was considered developed when water samples were consistently below the 5NTU criteria (EPA 1986); water samples were analyzed with a Hach Portable Turbidity meter. Results from a rapid water analysis sent to UST on October 6, 1988, indicated that the development water could be discharged to the ground; however, because of the proximity of the North Richland Well Field, the development water was contained. No aquifer test was performed. The HydroStar pump was installed on November 3, 1988; this completed construction activities at well 699-S40-E14.

### WELL 3 (699-S41-E13B)

Drilling at well 699-S41-E13B began October 3, 1988. The well was drilled to a depth of 95 ft below ground surface by October 12, 1988. The sediments encountered were primarily silty sandy gravels with the final 9 ft of drilling in sandy silt and clay. The middle Ringold member was



encountered at approximately 50 ft below ground surface; static water level during well completion was 52.90 ft below ground surface.

Well 699-S41-E13B was completed at a depth of 86.85 ft below ground surface. Final well materials include 10.3 ft of 20-slot Johnson Division type 304 stainless steel screen (4 in. dia) and 78 ft of 4-in. Johnson Division type 304 stainless steel casing. Factory-welded stainless steel casing centralizers were located at 36.55 and 76.55 ft below ground surface. The annular seal consists of a 16-30 mesh Colorado silica sand pack along the screened interval to 4.55 ft above the top of the screen, 28.15 ft of bentonite grout, 25.20 ft of bentonite slurry, 15.85 ft of Portland cement grout, and an air-entrained concrete seal that reaches 2.8 ft below ground surface. The casing was pulled back with the Bucyrus Erie 60L cable-tool drill rig that drilled the borehole.

The estimated volume of water added to the borehole during drilling is 150 gal; the estimated volume of water removed during the two-phase development process is 1968 gal. Water added to the borehole was obtained from the Richland municipal water supply in the 3000 Area and was stored onsite in 55-gal steel drums. Field monitoring for contamination was performed by PNL geologists and PNL radiation protection technologists. No contamination was detected, so the vadose zone was not sampled for hazardous constituents.

Well development consisted of bailing the completed well with the cable-tool rig and dart bailer until the water was essentially sediment free; continued development was performed with a 1.5-hp submersible pump. The well was considered developed when water samples were consistently below the 5-NTU criteria (EPA 1986); water samples were analyzed with a Hach Portable Turbidimeter. Development water was discharged to the ground after receiving acceptable results from a rapid water analysis sent to UST on October 12, 1988. No aquifer test was performed. The HydroStar pump was installed on November 3, 1988; this completed construction activities at well 699-S41-E13B.

#### WELL 4 (699-S43-E12)

Drilling at well 699-S43-E12 began October 13, 1988. The well was drilled to a depth of 61.75 ft below ground surface by October 20, 1988. The sediments encountered were primarily silty sandy gravels and sandy gravels. The middle Ringold member was encountered at approximately 50 ft below ground surface; static water level during well completion was 48.20 ft below ground surface.

Well 699-S43-E12 was completed at a depth of 58.0 ft below ground surface. Final well materials include 16.0 ft of 20-slot Johnson Division type 304 stainless steel screen (4 in. dia) and 45 ft of 4-in. Johnson Division type 304 stainless steel casing. Factory-welded stainless steel casing centralizers were located at 22 and 52.6 ft below ground surface. The annular seal consists of a 16-30 mesh Colorado silica sand pack along the screened interval to 4.65 ft above the top of the screen, 5.92 ft of Volclay<sup>(a)</sup> bentonite pellets, 11.75 ft of 8-20 mesh granular bentonite crumbles, 16.70 ft of Portland cement grout, and an air-entrained concrete seal that reaches 3.0 ft below ground surface. The casing was pulled back with the Bucyrus Erie 22W cable-tool drill rig that drilled the borehole.

The estimated volume of water added to the borehole during drilling is 160 gal; the estimated volume of water removed during the two-phase development process is 1068 gal. Water added to the borehole was obtained from the Richland municipal water supply in the 3000 Area and was stored onsite in 55-gal steel drums. Field monitoring for contamination was performed by PNL geologists and radiation protection technologists from Westinghouse Hanford Company. No contamination was detected, so the vadose zone was not sampled for hazardous constituents.

Well development consisted of bailing the completed well with the cable-tool rig and dart bailer until the water was essentially sediment free; continued development was performed with a 1.5-hp submersible pump. The well was considered developed when water samples were consistently below the 5-NTU

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(a) Volclay is a registered trademark of American Colloid Company, Arlington Heights, Illinois.

criteria (EPA 1986); water samples were analyzed with a Hach Portable Turbiditymeter. Results from rapid water analysis sent to UST on October 20, 1988, indicated that the development water could be discharged to the ground; however, because of the proximity of the 1166 Building parking area, the water was contained. No aquifer test was performed. The HydroStar pump was installed on November 4, 1988; this completed construction activities at well 699-S43-E12.

#### WELL 5 (699-S37-E14)

Drilling at well 699-S37-E14 began October 3, 1988. The well was drilled to a depth of 62.5 ft below ground surface by October 10, 1988. The sediments encountered were primarily silty sandy gravels. The middle Ringold member was encountered at approximately 50 ft below ground surface; static water level during well completion was 51.17 ft below ground surface.

Well 699-S37-E14 was completed at a depth of 63.0 ft below ground surface. Final well materials include 15.75 ft of 20-slot Johnson Division type 304 stainless steel screen (4 in. dia) and 50 ft of 4-in. Johnson Division type 304 stainless steel casing. Factory-welded stainless steel casing centralizers were located at 27.25 and 57.75 ft below ground surface. The annular seal consists of a 16-30 mesh Colorado silica sand pack along the screened interval to 3.35 ft above the top of the screen, 5.73 ft of Volclay bentonite pellets, 19.79 ft of 8-20 mesh granular bentonite crumbles, 15.18 ft of Portland cement grout, and an air-entrained concrete seal that reaches 3.2 ft below ground surface. The casing was pulled back with the Bucyrus Erie 22W cable-tool drill rig that drilled the borehole.

The estimated volume of water added to the borehole during drilling is 150 gal; the estimated volume of water removed during the two-phase development process is 788 gal. Water added to the borehole was obtained from the Richland municipal water supply in the 3000 Area and was stored onsite in 55-gal steel drums. Field monitoring for contamination was performed by PNL geologists and radiation protection technologists. No contamination was detected, so the vadose zone was not sampled for hazardous constituents.

Well development consisted of bailing the completed well with the cable-tool rig and dart bailer until the water was essentially sediment free; continued development was performed with a 1.5-hp submersible pump. The well was considered developed when water samples were consistently below the 5NTU criteria (EPA 1986); water samples were analyzed with a Hach Portable Turbiditymeter. Development water was discharged to the ground after receiving acceptable results from a rapid water analysis sent to UST on October 12, 1988. No aquifer test was performed. The HydroStar pump was installed on November 3, 1988; this completed construction activities at well 699-S37-E14.

#### RESULTS OF GROUND-WATER SAMPLE ANALYSIS

Results of the analysis of ground-water samples from the five new wells are presented in Appendix H. The samples were collected on November 7, 1988. The reported results were determined by UST under an analytical support contract to PNL. Results for all constituents were below those allowable under drinking water standards. A single volatile organic constituent (methylene chloride) was detected in three of the samples. Methylene chloride is not expected to be present in the ground water at the site, and its presence in the samples may have indicated that the samples were contaminated with methylene chloride. The wells were resampled on November 11 and 14 and analyzed by PNL. Methylene chloride was below detection in these samples, indicating samples collected November 7 were contaminated with this constituent during the sampling process.

Ground-water samples collected on November 7, 1988, from each well were also analyzed by PNL using a gas chromatography/electron capture detection/flame ionization detector with attached purge and trap on November 9, 1988. Trace concentrations of several volatile organic constituents were observed during this analysis, although all concentrations were well below the maximum contaminant level identified by the U.S. Environmental Protection Agency.

## REFERENCES

Bryce, R. W. 1989. Well Installation and Ground-Water Sampling Plan for the 1100 Area Environmental Monitoring Wells. PNL-6815, Pacific Northwest Laboratory, Richland, Washington.

EPA. 1986. Resource Conservation and Recovery Act (RCRA) Ground-Water Monitoring Technical Enforcement Guidance Document. OSWER 99S0.1, U.S. Environmental Protection Agency, Washington, D.C.

**APPENDIX A**

**GEOPHYSICAL AND GEOLOGIC LOGS FOR WELL 1 (699-S41-E13A)**

## APPENDIX A

### GEOPHYSICAL AND GEOLOGIC LOGS FOR WELL 1 (699-S41-E13A)

This appendix contains the Well Completion/Inspection Report, as-built diagram, notes from the sampling pump installation, the natural gamma log, and the geologists' logs for well 1 (699-S41-E13A) in the 1100 Area.





**AS-BUILT DIAGRAM**

Well Number (#1) 699-541-E13A Geologist S.M. GOODWIN TFEEL Page 1 of 1

Reviewed by *J.E. Mathan* Date 11-7-88

Construction Data		Depth in Feet	Geologic/Hydrologic Data			
Description	Diagram		Diagram Litho.	Lithologic Description		
21' 6" OF 10" CARBON STEEL SURFACE CASING W/ DRIVE SHOE (REMOVED)		5		SILTY SANDY GRAVEL		
		10		" " "		
		15		" " "		
		20		" " "		
		25		SLIGHTLY SILTY GRAVELLY SAND		
68' OF 8" CARBON STEEL CASING W/ DRIVE SHOE (REMOVED)		30		" " "		
		35		" " "		
		40		" " "		
		45		SILTY SANDY GRAVEL		
50' OF 4" STAINLESS STEEL TYPE 304 CASING		50		BENGOLD CONTACT @ 50'		
		55		" STATIC H <sub>2</sub> O @ 53.25'		
		60		" " "		
15.65' OF 20 SLOT STAINLESS STEEL TYPE 304 SCREEN (4" DIA.)		65		SAND		
COMPLETION SYMBOLS:						
/// CONCRETE PAD						
/// CEMENT GROUT						
/// GRANULAR BENTONITE						
*** BENTONITE PELLETS						
. . . SAND PACK						
( ) CASING CENTRALIZER						
= CASING JOINT						
				DRILL DEPTH = 67'		
				COMPLETION DEPTH = 62.8'		

10/20/88

SAMPLING PUMP INSTALLATION IN  
GROUND-WATER MONITORING WELLS

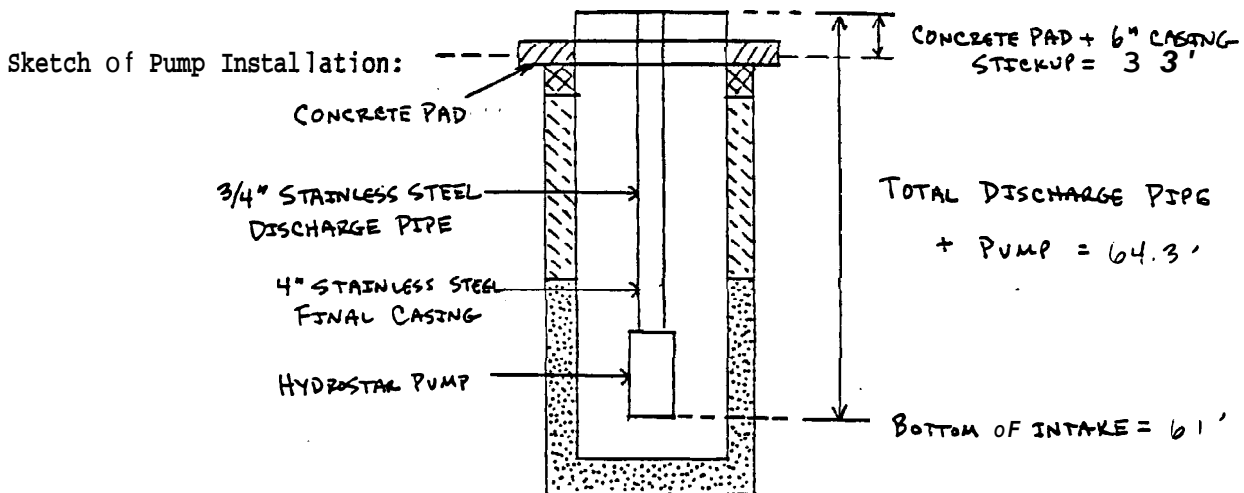
Site: 1100 AREA  
 Monitoring Well Number: (#1) 699-541-E13A  
 Depth to Water: 54.7'  
 Depth to Bottom: 62.87'      Reported Depth to Bottom: 62.8'  
 Pump Type: Positive Displacement Piston  
 Pump Model: Hydrostar HS-8001  
 Date Installed: 11/3/88  
 Installed By: KEH; OLIN AMOS, LOUIS WATKINS, LENNY CORDON

Pump Discharge Pipe Description:

6 10' SECTIONS OF 3/4" STAINLESS STEEL DISCHARGE PIPE  
 1 2' SECTION OF 3/4" STAINLESS STEEL DISCHARGE PIPE  
 2' SECTION IS BETWEEN 10' & 12' (FROM PUMP BASE PLATE)

Additional Comments:

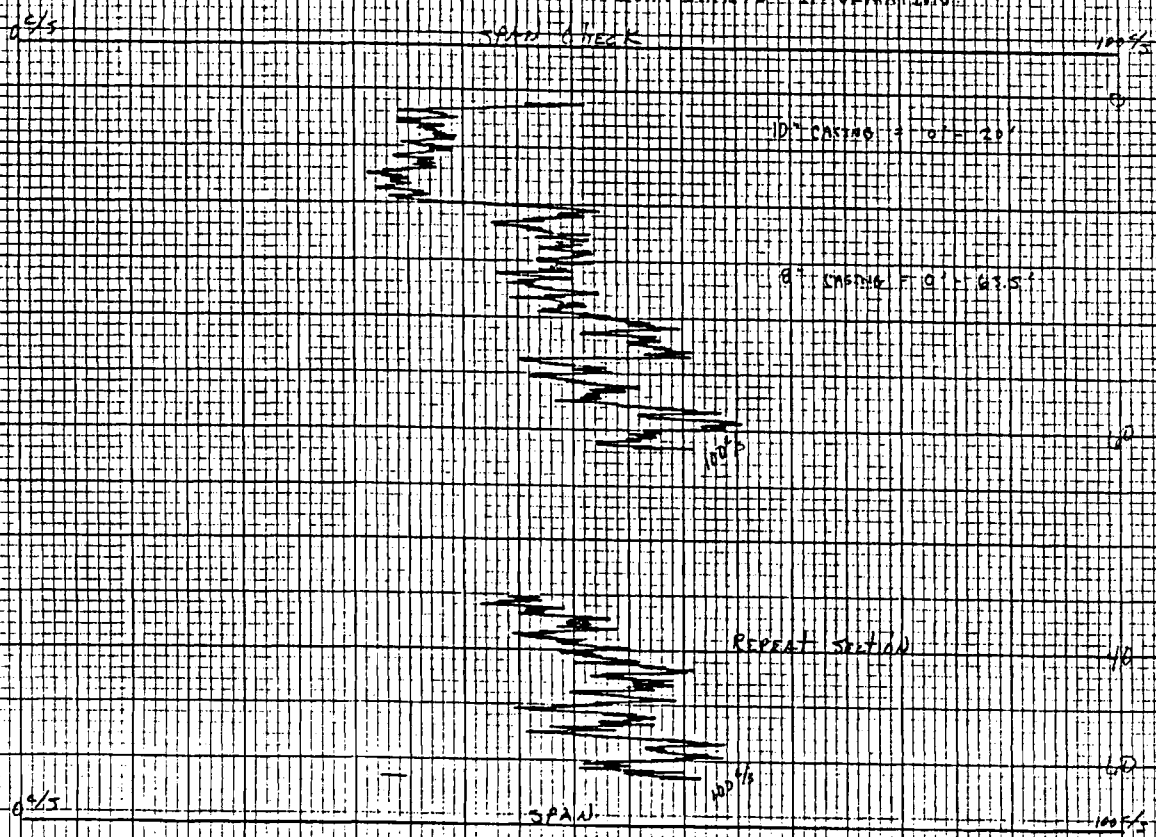
HYDROSTAR PUMP LENGTH = 2.3', ALL JOINTS WERE TAPED WITH TEFLON  
 DRILLS WORE COTTON GLOVES DURING INSTALLATION



Completed By: Shaun Ford      Date: 11/3/88

27 FEBRUARY  
 Well 699-34-A13A Drilled Depth 67' Interval Logged 63'-2'  
 Log Type NATURAL GAMMA Date 10-12-80 Casing SES 847109  
 Logged By W.R. McLaughlin - PHE Log Interval (Feet) 50'  
 Logging Service Symbol 100% Scale Factor 3  
 Vertical Error 20' Log Logging Speed 15'/MINUTE  
 Source Strength NA Spool Length NA  
 Remarks REP. PROCEDURE CW-6 REV-2  
 FRODO SERIES CG 27A 97

THIS NATURAL GAMMA LOG IS FOR QUALITATIVE INDICATION ONLY. THE TRACE  
 HAS NOT BEEN CALIBRATED TO PROVIDE QUANTITATIVE INFORMATION.



DRILL LOG		BY S M. Goodwin	Rig 22	Number (#1) 699-541-E13A	Computer Number N/A	Project or Work Order No 1100 AREA
		Date 7 OCTOBER 1986	#22 11101	Depth 0' to 5'	Subcontract No N/A	
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Calcite, Etc	Time	Drilling Comments
				DRILLED 12 LIN CARBON; RIG HAS BEG. STEAM	0830	SETTING
				CLEANED AT 1100 AREA MECHANIC'S SHOP		
				APPEARS VISIBLY CLEAN (Both PIC d-haes)		
				BEGAN DRILLING w/ CORE BARREL & JMS.	0915	STARTED DRILLING
	5'	D	(AlkH <sub>2</sub> O) Moist	SILTY SANDY GRAVEL (35% gravel, 55% sand, 10% silt).	0940	Switching to Hand Tool
				7% VCS, 10% CP, 8% MP, 5% FP, 5% VFA, 5% VCS, 10% CS, 15% MS,	0947	Waiting for supplies
				20% FS, 5% VES, 10% silt. Very poorly sorted. (Gravel) - 90% basalt	0955	Delivering supplies
				10% qtz & Si-rich, SA-WR. (Sand) - 15% basalt, 85% qtz, qtrite,		
				and Si-rich rock fragments, and feldspar, SA-SR. Dry color: 0.5Y 5/2		
				(grayish brown). No reaction to 10% HCL. Unconsolidated, pH=8.8		
				Added 21'6" of 10" casing (including drive shoe)	1020	weld, casing
					1120	Drilling
					12-1230	lunch
					1235	Drilling
REMARKS						
21'6" 7 OCTOBER 1986 <i>Shu Min Goodwin</i>						

A.7

DRILL LOG		Date	BY	Rig	Well Number	Computer Number	Project or Work Order No.	Subcontract No.	Drilling Comments	Total Casing Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time
10'	H	10/2/58	S. M. Gammal T.G. Moore	Ba 222	(#1) 699-541-E13A	N/A	1100 Ave	N/A	Sieved w/ DIRT		Wet	Silty SANDY GRAVEL: 40% GRAVEL, 50% SAND	1500	
									DRILLING			10% MVD, 5% GP, 15% MP, 15% FP, 5% VP, 10% VCS, 15% CS, 10% MS, 10% FS, 5% VFS	1505	
									SHUT DOWN RIG			10% MVD, VERT ROOTLY SAND GRAVEL NE 60%	1520	
									HAND: DIRM 0.1			BAKALT, 10% ALT. VOLCANICS, 20% QUARTZITE, 10%	1525	
									Spec & IN THIS			GRAVELS; OBTAIN MARKING SA TO WT, FINESS		
									(11.7 EV PAGES)			LY AT LEAST VERT OR SANDY GRAVEL. SANDS ARE		
									RPT SURVEY			100% BAKALT, 100% QUARTZ, PLAC, d-D-PTCL;		
									NORMATIVE DESCRIPTION			A TO SA. WET DOWN IS 5 Y 1/2 (OILY GRM);	1530	
												NEW GATE IS 5 Y 6/2 (LT. OILY GRM), NO		
												RY. TO 100% HCL. UNCALCULATED. INCREASE TO		
												GRAVELS; LESS BAKALT IN GRAVELS & MORE		
												IN SANDS. GEO. SAMPLES TAKEN.		

282

Allen W. Mohr  
7 October 1968

A.8

By S. M. Goodwin	Date 10 OCT 1986	Fig 86 22w	# 72-1410	Well Number (#1) 699-S41-E13A	Computer Number N/A	Project or Work Order No. 1100 M&M	Subcontract No. N/A
				Depth 10' to 20'			

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				DRILLSTK IS LTM CORROD		SCOURING PIZ
						DARTUNG
				11.7 EV PADS! SPAN SET AT 3.6 CALUMARCO	0730	(CALUMARCO 11w)
				w/ Benzene Gas		
	15'	H	WET	SALT SANDY GRAVEL: 35% GRAVEL, 55% SAND, 10% MUD. 5% CP, 10% M, 12% F, 8% V, 15% VCS, 15% CS, 13% NS, 7% FS, 5% VFS, 10% MUD.	0750	SAMPLED W/ DMPT BASALT, 0.7PM
				Very poorly sorted GRAVELS ARE 60% BASALT,		(SCOR. & BONDING)
				5% VCS. Porphyry, 25% QUARTZ, 10% GRAVELS; OBTAIN CLASTS SR TO WR, SIZES UP TO FINE GRADES (AT LST). SANDS ARE 45% BASALT, 55% QUARTZ, PLNG, CHRT,		
				Q-2ITE; VA TO SA. WGT COLM IS SY 1/2 LOUVE (GRN); DM COLM IS SY 7/2 (LT GRN). UNCONSOL- IDARCO. LESS GRAVEL THAN 10' SAMPLE GCS. GRAVELS. FACIL. FR. TO 10%. HERE IS SLIGHT.		
	20'	H	WET	SALT SANDY GRAVEL: 30% GRAVEL, 60% SAND, 10% MUD. 5% CP, 10% M, 9% F, 6% V, 13% VCS.	0810	SAMPLED W/ DMPT BASALT

REMARKS: *At the time of drilling to October 1986*

A.9

By S.M. Goodway	Date 15 October 1966	# 22-11101	Well Number 699-541-E13A (#1)	Depth 20' to 20'	Computer Number N/A	Project or Work Order No. 1100 NPCA
						Subcontract No. 11/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
20'	H		Wet	(cont.) 17% GS, 15% MS, 10-1% S, 5% VS, 10% MUP. Very poorly sorted. GRAVELS ARE 50% BREAST 5% MESSY. VOLCANICS, 30% QUARTZITE, 15% GRANITES; ORIGINAL QZ. SR TO WK. SANDS ARE 40% BASALT, 60% QUARTZ, PLG, Q-ZNK, H (GRT); DRY COLOR IS GR 7/2 (LT GRAY). UNCONSOLIDATED. LESS BREAST & GRAVEL. GSD. SAMPLES TRANS. FR. TO 100% HEL IS SLIGHT. DRYEST SMELLED SOMETHING "SWEET" - LIKE BUANT	0915	Chl. Gns. faintly off spec.
				PLANT; P TO SA. WEST GRAY IS SY 4/2 LOUVE	0920	FRAGMENT TO WELD WELDING & DRIVE
				UNCONSOLIDATED. LESS BREAST & GRAVEL. GSD.		FINE
				SAMPLES TRANS. FR. TO 100% HEL IS SLIGHT.	0945	RUNNING B. PRESSURE
8" CHIML				DRYEST SMELLED SOMETHING "SWEET" - LIKE BUANT	1015	HAD
20' 6" w/ Drive SPIRE				SUGAR "COMING OUT OF TUBE, (LITICUS W/ 11.7	1020	WELDING B"
16' 11 1/2"				(V HAD, 0 FR OUT OF BOREHOLE (CALCINATION		
37' 5 1/2"				10.2 (SPAN = 5.08); PRESSED UP 1 PPM FROM BOREHOLE. I DIDN'T GET AN ANYTHING USUAL		
				COMMON OUT OF BOREHOLE; FINESS COULD HAVE		
				DISAPPEARED BEFORE I WAS ABLE TO TAKE		
				PHENOLICS, WITH CONTINUED TO MONITOR; DETECTED		
				WHICH SUGGESTS ME IF THE SAMPLES ANYTHING USUAL.		

REMARKS: All the work to October 1965

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 (S 85)

A.10

DRILL LOG		By S. M. Goodwin	Rig B/C 72w	Well Number (#1) 699-541-E13A	Computer Number N/A	Project or Work Order No. 1100 AREA
		Date 10 OCTOBER 1988	# 22-111101	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
				ADDED 16 1/2" OF 6" CARBON STEEL CASING	1050	DRAWING
	25'	H	WET	SLIGHTLY SILTY GRAVELLY SAND: 20% GRAVEL, 70% SAND, 10% MUD, 5% MP, 8% FP, 7% VF, 8% VCS, 20% CS, 27% MS, 10% FS, 5% VFS, 10% MUD. VERY POORLY SORTED. GRAVELS ARE 60% BASALT, 5% ASSORT. VOLCANICS, 20% QUARTZITE, 15% GRANITES; SA TO R. SANDS ARE 45% BASALT, 55% QUARTZ, Q-RICH, 1 FLAG; A TO SA. WET COLOR IS 5Y 4/2 (OLIVE GRAY); DRY COLOR IS 5Y 7/2 (LT. GRAY). RX. TO 10% HCL IS SLIGHT. UNCONSOLIDATED. LESS GRAVEL, MORE MS THAN 20'. (60% SAMPLES TAKEN.	1115	SAMPLED W/ DMT BARREL, 1 PPA OFF SECS W/ 10.7 EV PACE
					1120	DRAWING
					1140	HND; 0 PPA OFF SECS 1 1/2 BONEHOLE.
	30'	H	WET	SLIGHTLY SILTY GRAVELLY SAND: 15% GRAVEL, 75% SAND, 10% MUD. 3% MP, 6% FP, 6% VF, 5% VCS, 20% CS, 35% MS, 10% FS, 5% VFS, 10% MUD. POORLY SORTED. GRAVELS ARE 60% BASALT, 5% OTHER VOLCANICS, 20% QUARTZITE, 15% GRANITES;	1145	SAMPLED W/ DMT BARREL
					1150	DRAWING
REMARKS:						
Sha. M. Goodwin 10 OCTOBER 1988						

A.11



DRILL LOG		By S. M. Goodwin	Rig DJE 22W	Well Number (#1) 699-541-E13A	Computer Number N/A	Project or Work Order No. 1100 AFA
		Date 10 October 1985	# 22-14100	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'	H	WET	(CONT.) SA TO R. SANDS ARE 40% BASALT, 60% QUARTZ, PLNG., 1 Q-RICH; A TO SA. WET COLOR IS 5Y 4/3 (OLIVE), DRY COLOR IS 5Y 7/2 (LI. GRAY). Rx. TO 10% HCL IS VIGOROUS. UNCONSOLIDATED. MORE SANDS; INCREASE IN MED. SANDS. GEO. SAMPLES TAKEN. 0 PPM OF SEDS + IN HOLE. (10.2 EV PROBE)	1200/ 1230	LUNCH
					1235	DRILLING
	35'	H	WET	SLIGHTLY SILTY GRAVELLY SAND: 20% GRAVEL, 70% SAND, 10% MUD. 1% CP, 5% ME, 8% FP, 6% VFP, 8% VCS, 30% CS, 20% MS, 7% FS, 5% VES, 10% MUD. VERT POORLY SORTED. GRAVELS ARE 50% BASALT, 10% ALKALIC VOLCANICS & PORPH., 25% QUARTZ, 15% GRANITES; SR TO WR. SANDS ARE 45% BASALT, 55% QUARTZ, PLNG., 1 Q-RICH RY. FRAGS; A TO SA. WET COLOR IS 5Y 4/3 (OLIVE), DRY COLOR IS 5Y 7/2 (LI. GRAY). Rx. TO 10% HCL IS VIGOROUS. UNCONSOLIDATED.	1320	SAMPLED w/ DART
					1325	PREPARE TO WELD
					1335	WELDING 8"
REMARKS:						
M. H. Boat 10 October 1985						

A.12



BY S.M. Goodwin	DATE 11 OCTOBER 1986	WELL NUMBER #1) 699-541-E13A	COMPUTER NUMBER N/A	PROJECT OR WORK ORDER NO. 1100 MHA	SUBCONTRACT NO. N/A
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Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
46' 6 1/4"				DRILLER IS LHM CORRAL	0700	SEWING MACHINE
8' 6 1/4"				8' 6 1/4" - 8" - CARBIDE STEEL CHISEL POINT	0710	DRILLING
55' 3/4"				CASING = 55' 3/4"	0800	FORWARD WELD
45'	ii	Wet		Silty SANDY GRAVEL: 50% GRAVEL, 42% SAND, \$1- MUD, 5% CO, 1% GP, 1% IP, 1% VIF, 10% VCS, 15% CS, 10% MS, 1% FS, 3	0830	SAMPLE TO BE

				10% VCS, 15% CS, 10% MS, 1% FS, 3		EV PASTE - 100
				VCS, 8% MUD, VERY FINE SAND, GRAVELS		100 AT 5.08)
				AVE 60% BASALT, 5% ALT. VOLCANICS, 20% GRAVEL		1 DETAIL
				15% GRANULICS - ORIGINAL RY. SP TO WP.		
				SANDS ARE 100% BASALT, 60% GRAVEL, PLNG.		
				2-2' OF GLUAT, A TO SP. WEST COLOR IS SY		
				1/3 (OULE); DEW COLOR IS SY 7/2 (LT GRM)		
				Ry. in 10% HCC IS VIGOROUS, WASHINGTON IRID.		
				INTERMEDIATE IN GRAVEL, DEGRADED TO SAND		
				1 MUD (NO. SAMPLES TAKEN)		

REMARKS: 11 OCTOBER 1986

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water A6000 021 (5-85)

DRILL LOG		By Teel / Gendron	Rig B-2000 22 1400	Well Number (111) 699-541-E13A	Computer Number N/A	Project or Work Order No. 110.0 P.C.
		Date 10-11-88		Depth 50' 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
	50	H	Wet	MILKY SANDY GRAVEL (46% gravel, 46% sand, 8% mud) 15% MP, 20% CP, 11% VFP, 8% VCS, 8% CS, 12% MS, 12% FS. 6% VFS, 8% mud. Poorly sorted. (Gravels) - 60% basalt, 10% andesite, porphyry, and other volcanics, 10% quartzite and other Si-rich, 20% qtz, qtzite, chert. R-WR. (Sand) - 60% basalt, 40% qtz, qtzite, and Si-rich. WET COLOR IS 5Y 4/2 (OLIVE BROWN). DRY COLOR IS 5Y 7/2 (LT. GRAY). RX. TO 10% HCL IS VISBOURUS.	0725	SAMPLED w/ DART BARRIER 0 PPM OFF SCOS.
					0950	PREPARING TO 110'; 1 PPM FROM BARRIER (10.7 EV PPM) 0 PPM OFF SCOS
	55' 3/4"			600. SAMPLES TAKEN. UNCONSOLIDATED DRILLING,	1000	WELDING 3" CASING
	8' 11 1/4"			8' 11 1/4" OF 6" CARBON STEEL CASING; FINAL	1050	FINISHED WELL
	64' at 6"			6" = 64'	1100	DRILLING
	55'	H	WET	SILTY SANDY GRAVEL: 40% GRAVEL, 52% SAND, 8% MUD, 2% CP, 13% MP, 15% FP, 10% VFP, 10% VCS, 17% CS, 13% MS, 7% FS, 5% VFS, 8% MUD. VERY POORLY SORTED. GRAVELS ARE 55% BASALT 10% OTHER VOLCANICS & VOLC. PORPHYRY, 20% QUARTZITE 15% GRANITICS; ORIGINAL RX = SRTONE. SANDS ARE 45% BASALT, 55% QUARTZ & Q-RICH FRAGG.; PLAG; SA TO SR. WET COLOR IS 5Y 4/2	1135	SAMPLED w/ DART BARRIER, 0 PPM OFF SCOS. w/ 10.2 PROBE. DRILLING LUNELL DRILLING
REMARKS:						

Alan H. Jourd. 11 OCTOBER 1988

A.15

3 of 11

Project or Work Order No. 1188 NCA	Computer Number N/A	Well Number (#1) 699-S41-E13A	Fig BE 22-	By Goodman	Date 11 October 1986
		Depth 55' to 69.5'	# 22-14101		
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'	H	Wet	(CONT.) (LOWE GRAN.) ; DRILL COLUMN IS 5 1/2" (1.00 METERS) R. TO 100% H.C. IS NEARLY UNCONSOLIDATED.		
				LESS GRAVEL THAN 50'		
	~58'			DRILLING SLOW; IN GRASSES & GRAVEL. DRILLING AT 1140.		HAND; 0 PPT OFF SIPS & III HOLE 10.2 EV
	60'	H	WET	SILTY SANDY GRAVEL: 45% GRAVEL, 47% SAND, 6% MUD. 2% CR, 10% MR, 16% FR, 15% VFR, 10% VCS, 15% CS, 15% MS, 11% FS, 3% VCS, 6% MUD. VERT. ROOTS SOILED. GRAVELS ARE 15% BASALT, 15% AIRCED VOLCANICS & PORPHYRY, 35% QUARTZITE, 25% GRANITES, 10% META. GNEISS & GNEIST; QUARTZAL RV. SP TR WR. SANDS ARE 100% BASALT, 3% MASH, 7% AIRCED VOLCANICS, BOLD GRANITE & Q-RICH; H TO SP. WET COLUMN IS 2.5 Y 1/4" (LOWE BROWN); DR COLUMN IS 2.5 Y 1/4" (LOWE GRAY). R. TO 10% H.C.	1445	DRILLING SHUT DOWN P.C. DONE FOR DAY
REMARKS:						

John W. Jones - 11 October 1986

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 (S 85)

A.16



DRILL LOG		BY S.M. OODWIN	Rig BE 22w	Well Number (#1) 699-541-E13A	Computer Number N/A	Project or Work Order No. 1100 NPLA
		Date 12 OCTOBER 1986	# 22-14101	Depth 62.5' TO 66'		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 IN CORRAL	0700	SEALING P.C.
				D/W = 55.25' - 1.65' STACKUP = 53.60'	0710	
				(PWL 300' E. NRE # 12176). ~9' OF	0715	PREPARING TO
				H <sub>2</sub> O, WILL DRILL ~2' TO REACH T.D		WELD
	64'			HAND: SPAN AT 3.7 ON 11.7 EV PROBE	0725	YIELDING 8"
	4'			ADDED 4" OF 8" CASING; TOTAL 8" = 68'	0745	FINISHED WELD
	68' OF 8"				0750	DRILLING
	67'			PERFORMED STRAIGHTNESS TEST USING 22' OF	0855	STRAIGHTNESS
				6" S.S. CASING; CASING WENT DOWN HOLE		TEST
				A. RESUMED W/ FEED.		
	66'	H	WET	SAND: 3% GRAVEL, 89% SAND, 8% MUD, 1% FP,	0905	SAMPLED W/ DWT
				2% VFP, 3% VCS, 40% CS, 31% MS, 10%		BALANCE, 0 PPM
				FS, 5% VFS, 8% MUD. MODERATELY WET SAND.		UFF SCDS 1.11
				SANDS ARE 5% BASALT, 5% MICA, 3% ALT. VOLC.		BORAX (11.7
				1 OTHER LY. FRAGS, 87% QUARTZ, PLAG., 1 Q-RPH,		EV PROBE)
				SA TO SR. WGT COLON IS 2.54 5/2 (GRAYISH BROWN);	0910	CLEANING OUT HOLE,
				DRY COLON IS 2.54 7/2 (LT. GRAY RY. TO 10% HCL		DRILLER SAYS HE'S
				IS VERBONOUS UNCONSOLIDATED SANDS INCREASED.		IN HEAVING SANDS.
REMARKS: Geo. SAMPLES TAKEN.						

Alvin Hill, Jr. 12 October 1986

A.18

A.19

DRILL LOG		By S. M. Goodwill	Rig BE 220	Well Number (#1) 699-S41-E13A	Computer Number N/A	Project or Work Order No. 1100 AREA
		Date 12 October 1986	# 22 11101	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
				SWITCHED TO SAND PUMP; TRYING TO SIGNALIZE FORMATION BY BARING OUT SANDS.	0950	BARING WELL
				GEOPHYSICAL LOGGING W/ NATURAL GRAMMA PROBE; INTERVAL FROM 63' - 2' LOGGED BY VERN McBRIDE, PH.D.	0950	GEOPHYSICAL LOG
					1005	DRILLING
					1010	BARING
					1015	BREAKING DOWN TOOL STRING
				D/B = 64.9' + 2.05' TRIP - 1.85' STACKUP = 65.1'	1025	T.D.
					1050	Rigging-up tools for backpulling.
				OBTAINED H <sub>2</sub> O SAMPLES FOR RAPID ANALYSIS BY U.S. TESTING	1120	H <sub>2</sub> O SAMPLES
					1125	PREPARING 10 SET STAINLESS CASING
					1135	SETTING STAINLESS
				D/B INSIDE 4" STAINLESS CASING = 65.4' B.L.S.	1155	D/B
REMARKS:						
Job No. 1000 12 October 1986						



DRILL LOG		By S. M. Goodwin	Rig 25 230	Well Number (#1) 699-541-E13A	Computer Number N/A	Project or Work Order No. 1100 AREA
		Date 12 October 1955	" 22-11101	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
				SET STAINLESS CASING INSIDE BOREHOLE.		
				① 15.65' of 20 SLOT STAINLESS STEEL 304 SCREEN (10 4' & 5.25' SECTIONS - 5' SECTION IS ON BOTTOM), BOTH SCREENS w/ CENTRALIZERS.		
				② 2 20' SECTIONS OF TYPE 304 4" STAINLESS STEEL CASING (1 w/ CENTRALIZER)		
				③ 1 10' SECTION OF TYPE 304 4" STAINLESS STEEL CASING (w/ CENTRALIZER)		
				④ 1 2' SECTION OF TYPE 304 4" STAINLESS STEEL CASING.		
				TOTAL SCREEN + CASING = 67.65'		
				VERTICAL O-RINGS ARE ON ALL JOINTS; CENTRALIZERS STARTING AT BOTTOM OF HOLE, 5' FROM BOTTOM, 75' FROM BOTTOM, & ~7' FROM LAND SURFACE.		
					1200/1231	LUNCH
				D/W = 48.6'; I ASSUME THAT THE H <sub>2</sub> O ADDED TO BACKPRESSURE THE HEAVING SANDS HAS NOT REACH EQUILIBRIUM. WE WILL USE THIS A.M.'S	1235	D/W
REMARKS:						
John N. / Jol. 12 OCTOBER 1955						

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 EA GOODWIN	Rig DE 220 #22-14101	Well Number 1) 699-541-E13A	Computer Number 1A	Project or Work Order No 1160 N/A	
			Date 12 OCTOBER 1988	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 of 53.6'. To OBTAIN 10' of H <sub>2</sub> O				
				IN THE SCREEN, WE WILL ADD SILICA SAND (16-30 MESH) TO THE BOTTOMS OF				
				FT STAINLESS CASING ~2. FINAL D/B				
				OF STAINLESS SHOULD BE AT ~63.6				
				= 63.7', 10' OF H <sub>2</sub> O EXPOSED TO SCREEN.			1310	D/B
2 BAG	SAND			ADDED 1/2 100 LB BAG OF 16-30 MESH SILICA SAND TO POSITIVE CASING & SCREEN. REMOVED 2' SECTION OF 4" S.S CASING FROM TOP TOTAL CASING + SCREEN = 65.65'; UPPERMOST CENTRALIZER IS NOW 8' BELOW LAND SURFACE				
				Added 1.5 bags of 16-30 sand			1455	
				D/BOTTOM (inside 4" casing) = 67.47 - 4.4 = 63.07				
				D/sand = 63.80' + 2.4 - 4.4 = 61.80' 6.1.5,				
				Pulled 8" casing to 62.9' b.l.s.			1520	
				D/sand = 63.54 + 2.40 - 5.50 = 60.44			1530	D o ~ + C. V. D. A. 1
a bags 16-30 total!				REMARKS				
				John H. Dowd: 12 OCTOBER 1988				

A.21

DRILL LOG			By S.S. Teel	Rig BE 22W 22-14101 Lin Cordgn	Well Number (#1) 699-541-E13 A	Computer Number N/A	Project or Work Order No. 1100 Ave.
			Date 10-13-88	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
						0700	
2 BAGS				Added 2 bags of 16-30 sand		0730	
				$D/sand = 53.0' + 2.10 - 5' = 50.10' \text{ b.l.s.}$			
				(PUL 200' STEEL TAPS # L300-04)		0738	Pulling Casing
				Pulled 8" casing to 55'-1.5' = 53.5 b.l.s.		0745	
				$D/sand = 53.4' \text{ b.l.s.}$		0806	
2 BAGS				Added 3 100 LB. BAGS of 16-30 MESH COLORADO SAND		0808	ADDING SAND
3				SAND; D/B = 40.5'		0820	PULLING 8"
5 BAGS				D/B = 43.3'; Bottom of 8" = 49.4'		0824	D/B
1/2				Added 1/2 100 LB. BAG of 16-30 SAND; D/B = 41.6'		0830	ADDING SAND
5 1/2 BAGS				PULLED ~1', Bottom of 8" = 48.45'		0833	PULLING 8"
				D/B = 41.95'		0835	D/B
5 1/2				Bottom of 8" = 45', D/B = 45'		0840	PULLING 8"
1/4				Added 1/4 of 100 LB. BAG 16-30 SAND; D/B = 43.5'		0850	ADDING SAND
5 3/4				19.5' of SAND PACK; 3.77' ABOVE TOP OF SCREEN		0900	CUTTING 8"
2						0910	WELDING ENDS
7 3/4 BAGS SAND TOTAL				Added 4 50 LB. BUCKETS of 1/4" ENVIRONMENTAL BRINE		0920	ADDING PELLETS
				PELLETS; D/B = 34.15'; 10.95' OVERLAP			
REMARKS:							
Alvin H. Teel 13 OCTOBER 1988							

A.22

S.S. TEEL †

7 of 4

DRILL LOG		By G. M. Goodwin	Rig B.C. 2200	Well Number (#1) 699-541-E13A	Computer Number N/A	Project or Work Order No. 1103 MFA
		Date 13 OCTOBER 1966	# 27-11/101	Depth COMP. 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
4 Buckets	PELLETS				0930	PULLING 8" CASING
				BOTTOM OF 8" = 39.2'	0950	WELCHING FAN
				D/B (PELLETS) = 37.2' ; 6.3' of BENTONITE PLUG IN PLACE.	0955	D/B
					1000	ADDING CRUMBLES
6 bags	of 8-20			ADDED 6 50 LB. BAGS OF 8-20 MESH GRANULAR BENTONITE CRUMBLES ; D/B = 20.1'	1007	D/B
					1005	PULLING 8" CASING
				Pulled 8" casing to 33.56' b.l.s.		
				D/crumbles = 28.3 + 2.40 - 3.9 = 26.8' b.l.s.		
+3				Added 3 bags of 8-20 Mesh Bentonite		
<u>9</u>				D/crumbles = 19.27 + 2.40 - 3.9 = 17.77		
+1				Added 1 bag of 8-20 Mesh Bentonite		
10	BAGS CRUMBLES			D/crumbles = 16.4 + 2.40 - 3.9 = 14.9		
				Pulled 8" casing to 23.21 (10" casing @ 20' b.l.s.)	1115	
				D/crumbles = 24.52 + 2.40 - 3.85 = 23.07	1125	D/B
+2				Added 2 bags of 8-20 Mesh		
<u>12</u>				D/crumbles = 18.7 + 2.40 - 3.85 = 17.25		
+1				Added 1 bag of 8-20		
13	bags of 8-20			D/crumbles = 14.55' b.l.s.		
REMARKS:						

*Sheila M. Goodwin* 13 OCTOBER 1966

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 Teel/Godwin	Rig BE 2201 72 "1101	Well Number (#1) 69-541-E13A	Computer Number N/A	Project or Work Order No 1100/1100
		Date 10 12 88	Depth Completion To		Subcontract No N/A	
Total Casing	Depth	Droll Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc	Time	Drilling Comments
				Pulled remaining 8" casing	1145	
					1200	Lunch
				1/2 Bentonite Slurries = 12.47' + 2.10' (tape) - 1.5' (stick)	1235	
				= 13.37' b.i.s.		
					1248	Breaking-down tools
				INSIDE 4" SS CASING w/ 3/4" DIAMETER	1330	BAILING WELL,
				DART BARRIER LENGTH OF BARRIER IS 17'4"		RECEIVED WORD FROM
				(FROM TOP TO TOP) VOLUME = 5 GALLONS.		BOB BRYCE, PNL
				PROTECTIVE CAP HAS BEEN PLACED OVER THE		THAT H <sub>2</sub> O COULD
				10" CASING ANNULUS TO PREVENT H <sub>2</sub> O FROM		BE DISCHARGED TO
				ENTERING CASING & HYDRATING THE BENTONITE		GROUND (AS PER RESULTS
				CAVITIES (BETWEEN 10" & 4" FINAL CASING)		FROM RAPID H <sub>2</sub> O ANAL.)
				BAILING RATE: 1 BAIL / 45 SECONDS H <sub>2</sub> O TURBID,	1340	
				~ 2 TABLESPONS FINE SANDS / 5 GALLON BUCKET.	1345	STOP BAILING
					1400	BAILING
				H <sub>2</sub> O TURBID & ~ 1 TABLESPON V.F. & F SANDS / 5 GAL.	1410	
					1415	STOP BAILING
					1430	BAILING
REMARKS						
Also the final 13 Oct. 1988						

A.24

DRILL LOG		By (Siddons)	Fig BE 22W	Well Number (#1) 699-541-E13A	Computer Number N/A	Project or Work Order No. 1100 A/C/T
		Date 13 Oct 1988	# 22-11/11	Depth DEV. 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
				DRILLER FINISHING OUT PAPERWORK	1440	STOP BAILING
				D/B = 62.65' w/ STEEL PIPE. TOTAL CASING d	1445	D/B
				SCREEN (4") = 65.65' - 3' S.G. STRUKUP = 62.65'.		
				DRILLER SAYS THAT HE HAS BAIRED ~8" OF		
				SEDS. FROM BOTTOM OF 4", 4" CASING IS		
				CLEAN NOW.		
				H <sub>2</sub> O TURBID, BUT HAS BSG+ CLEANING. ~ 1 TABLESPOON	1505	BAILING WELL
				SAND / 5 GALLON BUCKETS (VCS & FC).	1515	STOP BAILING
					1530	Done For Day
				BAIRED 40 MINUTES ; BAIRED ~ 267 GALLONS H <sub>2</sub> O		
REMARKS:						
<i>Alvin M. Stool</i> 13 OCTOBER 1988						

A.25

DRILL LOG		By S M Goodman	Rig BE 22w	Well Number (#1) 699-541-E13A	Computer Number N/A	Project or Work Order No 1100 AEA
		Date 14 October 1986	# 22 14101	Depth DEV. 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
				DRILL IS L.D. CORROD	0700	SCHEMATIC P
				BAILING RATE = 1 BAIL / 45 MIN	0710	BAILING WELL W/
				VOLUME = 5 GALLONS		DART BARGE TO
						DEVELOP SAND PACK
				(1/2) TURBID ~ 1 TABLESPOON FINE SAND + V.F SAND	0725	
				IN 5 GAL. BUCKET		
				, , + ~ 2 TEASPOON SAND / 5 GAL	0740	
				H <sub>2</sub> O TURBID + ~ 1 TEASPOON SAND / GAL BUCKET;	0755	
				SANDS ARE ALMOST ENTIRELY FROM THE HEAVING		
				OF THE MIDDLE RINGOLD; VERY LIGHT		
				SAND PACK HAS BEEN WASHING THROUGH THE 20		
				SLOT SCREEN (~3-5%)		
				1/4 TURBID + ~ 1/2 TEASPOON SAND / 5 GAL BUCKET	0830	STOP BAILING
					0840	BAILING
					0850	STOP BAILING
				~1/4 TEASPOON F D M SANDS / 5 GALLON BUCKET, HASN'T	0900	BAILING
				PROCESSED FOR QUITE SOME TIME H <sub>2</sub> O STILL TURBID	0910	FINISHED BAILING
				RECOMMEND CONTINUING DEVELOPMENT BY PUMPING		
REMARKS BARSO 110 MINUTES; BARSO ~ 733 GALLONS H <sub>2</sub> O TOTAL H <sub>2</sub> O BARSO = 733 + 267 = 1000 GALLONS Shu Ri... Jm C. 14 October 1986						

A.26

DRILL LOG		By S M Goodwin	Rig BE 22W	Well Number (#1) 699-541-E13A	Computer Number N/A	Project or Work Order No 1100 AEST
		Date 14 OCTOBER 1988	# 22-11101	Depth COMP. 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/B = 18.37' (TOP of BEGINNING CRUMBLES)	0950	MIXING GROUT
						GROUT
				USED 5 94LB BAGS OF PORTLAND CEMENT, 30 GALLONS	1005	POURING GROUT
				POTABLE H <sub>2</sub> O, ~ 1% (BY VOLUME) ALUMINUM		
				2 @ - (8 AL AL ADDON - IN 10' PRESENT CIRCUMFERENCE		
				D/B = 1.8' BELOW LAND SURFACE, BOTTOM of 10"	1010	D/B
				CARBON STEEL CASING - 20'	1012	WELDING PULVER HEAD
					1025	PULLING 10" (CASING)
					1100	CUTTING 10"
				D/B = 7.10', BOTTOM of 10" CASING = 13'	1110	D/B
					1130	MIXING GROUT
						GROUT
				Mix ≈ 15 gal. water / 3 bags cement / 1 pt AlO <sub>3</sub> /	1140	POURING GROUT
				1/2 gal bentonite slurry	1150	WELDING PULLER
				D/GROUT = 1 ft above 1.5.	1200/1230	LUNCH
					1235	WELDING PULLER
					1245	PULLING 10"
					1310	CUTTING 10"
REMARKS						
M.A. Chambers 10/14/88						

A.27





DRILL LOG		By S. M. Goodwin	Rig B-22W	Well Number (#1) 699 541 E13A	Computer Number N/A	Project or Work Order No. 1102 AREA
		Date 17 December 1985	# 27-11101	Depth (COMP. 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
				DRILLED IN LOW GROUT	0700	SEISMIC PIG
				D/B (CEMENT GROUT) = 9'9", BOTTOM OF 10" = 8'	0715	WORKING ON GROUT
				ADDED CEMENT GROUT (2 94 LB BAGS OF PORTLAND CEMENT, 10 GALLONS H <sub>2</sub> O, 1% ALUMINUM POWDER);	0800	ADDING CEMENT GROUT
				D/B = 1.5'	0805	WELDING PULL ■ ■
				AFTER REMOVED 10" CASING FROM GROUND, WE	0815	PULLING 10"
				FOUND THAT THE CEMENT GROUT HAD EXPANDED	0830	10" CASING FREE
				& IS .5" BELOW GROUND SURFACE. REMOVED GROUT	0840	BRACING DOWN
				DOWN TO 1.3' BELOW GROUND SURFACE. DIFFICULT		RTG.
				DIGGING BECAUSE OF FORMATION COBBLES. WELL	0945	TAKING RE IN BC
				(SAVE AS IS UNTIL FURTHER NOTICE.		STEAM CLEANED
				D/W = 56.9' - 2.8' STICKUP = 54.1' (PNL 300 E. TYPE	1000	D/W
				# 12176)		
				D/B = 63.25' x 2.3W TAPS - 2.8 STICKUP = 60.45'	1000	D/B
				(PNL 300 STEEL TYPE # L300-04). 87' OF		
				SCREEN EXPOSED TO AQUIFER.		
				SPOKE W/ M.A. CHAMNESS, PNL. SHE HAS SUGGESTED	1540	
				THAT DURING CASING BACKPULL A PORTION OF		

BM @ S

*Alan L. - Goodwin* 17 DECEMBER 1985

A.29





A.32

DRILL LOG		By S.M. Goodwin	Rig No R 12	Well Number (41) 699-S41-E13A	Computer Number r2/A	Project or Work Order No 1100 AREA					
		Date 26 October 1968		Depth Comp. 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				
				ARME CONCRETE TRUCK POURING CONCRETE PAD;		0800	POURING CONCRETE				
				POURING AIR-ENTRAINED CONCRETE BATCH			PAD				
				IS ATTACHED BELOW ESTIMATED							
				VOLUME = 1/2 YARD. INSTALLED 4 PROTECTIVE							
				POSTS (1 REMOVED) & PROTECTIVE 6"							
				SS CASING IS 2 1/2' ABOVE 1" CASING.							
				URNEY MARKER PLACED		0830	FINISHED w/ PAD.				
				AGG SI	CLM SI	AXA SI	AXB SI	AXC SI	AGG 4	AGG 6	CIM 1
				50 LB	0 LB	0.0 OZ	0.0 OZ	0 OZ	1.90 %	0.25 %	
									9450 LB	11850 LB	2820 LB
									2450 LB	11250 LB	2820 LB
				AXA I	AXB I						
				100 %							
				115.0 OZ	28.0 OZ						
				115.0 OZ	28.0 OZ						
				50 LB	0 LB	0.0 OZ	0.0 OZ	0 OZ			
REMARKS											
<p>W/c 50 Counter 220a</p> <p>Ala. H. Good 26 October 1968</p>											



DRILL LOG		By S H GOODWIN	Rig NO RIG	Well Number (#1) 699-541-E13A	Computer Number N/A	Project or Work Order No 1100 AFSA
		Date 2 NOVEMBER 1966		Depth DEV. TO		Subcontract No /M
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc	Time	Drilling Comments
				USING A 1.5 HP. SUBMERSIBLE GRUNDFOS PUMP	1015	TOTALIZED
				ID DEVELOP WELL BY OVERPUMPING. PUMP		5480 GALLONS:
				COLUMN IS SET AT BOTTOM OF 1" INTAKE		FLOW METER STI-
				~1' FROM BOTTOM OF PUMP COLUMN		STALLED FOR PUMP
				H <sub>2</sub> O IS BEING PUMPED ON THE GROUND:		%Lee;--
				CONSTITUENTS ARE BELOW DRINKING H <sub>2</sub> O		
				STANDARDS		
				= 58.0' (PNE F. MKE # 1201, FROM TOP	1020	D/W
				OF TREMIE PNE)		
					1022	PUMP ON
				PUMPING LOTS OF AIR; TURNED VALVE DOWN.	1023	
				VALVE IS ~ 1/2 OPEN.		
				D/W = 58.6', H <sub>2</sub> O SLIGHTLY CLOUDY & SOME	1024	)))@
				4 SANDS IN BUCKETS (~1/4 TEAS.)		
				BUCKET: 5 GALLONS / 55 SECONDS	1026	5.1 GAL/MIN
				METER: 10 GALLONS / 1.58 MIN. H <sub>2</sub> O SLIGHTLY	1028	5.1 GAL/MIN
				CLOUDY, NO SEDIMENTS		
				D/W = 59.3'; 13' OF DRAWDOWN	1030	D/W
REMARKS						
<i>Arthur H. J. J. 2 Nov. 1966</i>						

A.34



DRILL LOG		By S. M. Goodwin	Rig No Pig	Well Number (H1) 699-541 E13A	Computer Number N/A	Project or Work Order No. 1100 AREA
		Date 2 November 1966		Depth DEV. 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
				METER: 10 GAL / 2.00 MIN. ; H <sub>2</sub> O CLEAR NO SEGS.	1033	5.0 GAL / MIN
				H <sub>2</sub> O SAMPLE: NTU = 3.7	1035	
				D/W = 59.3'	1036	D/W
				BUCKET: 5.73 GALLONS / 1.15	1038	4.6 GAL / MIN.
				H <sub>2</sub> O SAMPLE: 2.3 NTU	1039	5.0 GAL / MIN
				D/W = 59.2' ; METER: 10 GALLONS / 1.59 MIN.	1042	D/W
					1045	PUMP OFF
					1050	PUMP ON
				BUCKET: 5.73 GALLONS / 1.23 MINUTES	1052	4.1 GAL / MIN
				D/W = 59.0'	1054	D/W
				H <sub>2</sub> O SLIGHTLY CLOUDY & VERY LITTLE SEGS.	1055	
				METER: 10 GAL. / 2.10 MINUTES	1056	4.6 GAL / MIN
				H <sub>2</sub> O SAMPLE: 3.4 NTU	1100	
				D/W = 58.95' ; 10 GAL. / 2.11 MINUTES	1101	D/W ; 4.6 GAL / MIN
					1105	PUMP OFF
					1110	PUMP ON
				BUCKET: 5.73 GAL / 1.13 MINUTES	1111	4.7 GAL / MIN
				H <sub>2</sub> O SAMPLE = 5.6 NTU	1112	
REMARKS:						
<i>Steve Hill</i> 2 Nov. 1966						

A.35



DRILL LOG		By S. M. Goodwin	Rig N 72	Well Number (#1) 6 - 541 - E13A	Computer Number N/A	Project or Work Order No. 1100 AREA
Total Casing	Depth	Drill Method	We 1/Dy Sa mple	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Cali Etc.	Time	Drilling Comment
				D/W = 59 2' , 1.2 ● F 1 MW mil	1113	D/W
				METER 10 GALLONS / 2 DW MINUTES	1114	4.8 GAL / MIN
				H <sub>2</sub> O SAMPLE : 7.4 NTU	1117	
					1119	PUMP OFF
					1123	PUMP ON
				D/W = 50'	1124	D/W
				METER 10 GALLONS / 2.12 MIN.	1125	4.5 GAL / MIN
				H <sub>2</sub> O SAMPLE 5.2 NTU	1126	
				D/W = 59 2' H <sub>2</sub> O SAMPLE 5 NTU	1128	D/W
				H <sub>2</sub> O SAMPLE - 3.2 NTU	1133	
				H <sub>2</sub> O SAMPLE = 2.3 NTU ; H <sub>2</sub> O SAMPLES ARE	1135	
				BELOW 5 NTU LIMIT. H <sub>2</sub> O SAMPLES ANAL-	1136	PUMP OFF,
				YZEO W/ HACH PORTABLE TURBIDIMETER.		TOTALIZED PUMPS
						5710 GALLONS.
				TOTAL MINUTES PUMPED = 60		
				AVERAGE PUMP RATE = 4.78 GAL / MIN		
				ESTIMATED VOLUME PUMPED = ~287 GALLONS		
				(TOTALIZED GALLONS PUMPED = 230)		
REMARKS						
Allen H. Hood 2 Nov 1966						

A.36

DRILL LOG		By 5 M O'DOWD	Rig (PANE)	Well Number (#1) 699-541-E13A	Computer Number N/A	Project or Work Order No 1100 AREA
		Date 3 NOVEMBER 1985	Depth PUMP SET 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/B = 64' + 2.17' TAPE - 3.3' STACKUP + PAD = 62.87' (PNL 310' INCH - 1380 13)	0920	D/B
				D/W = 58.0' - 3.3' STACKUP + PAD = 54.7' (PNL E. INCH # 12021)	0925	D.W.
				8.17' of H <sub>2</sub> O EXPOSED TO SCREEN, WE WERE SET — HYDROSPIN PUMP 6' BELOW PRESENT		
				KEH DRILLERS ARE TAPING ALL JOINTS w/ TEFLON TAPE. DRILLERS ARE WEARING COTTON GLOVES (CLEAN) & WORKSPACE IS COVERED w/ CLEAN GROUND TAPE. DRILLERS ARE INSPECTING PUMP PUMP COLUMN FOR INTEGRITY. PUMP & PIPE WERE BROUGHT ON SITE IN PROTECTIVE CONTAINERS & REMOVED JUST BEFORE INSTALLATION	0930	PREPARING PUMP FOR INS  LL--
				MATERIALS USED	0950	INSTALLING HYDROSPIN
				6 10' SECTIONS of 3/4" DISCHARGE PIPE		
				1 7' " " "		
				1 HYDROSPIN PUMP ; LENGTH = 2.3'		
				TOTAL = 64.3' PIPE + PUMP.		
REMARKS						
 3 NOVEMBER 1985						

A.37



099-541-E13A

DRILL LOG		By <i>Glover</i>		Rig No Rig	Well Number <i>1100-<del>1</del> 1</i>	Computer Number N/A	Project or Work Order No. <i>1300 AFEA</i>
		Date <i>11-4-88</i>		Depth <i>PUMP TEST TO</i>		Subcontract No. <i>N/A</i>	
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.		Time	Drilling Comments
				<i>Hydrostar pump checkout performed</i>		<i>0755</i>	
				<i>pumping time to lift water initially from bottom of well = 15 sec.</i>			
				<i>pumping rate at ~60 strokes/min = 5.1 GPM</i>			
				<i>System shows very little leakdown indicating pipe joints well sealed</i>			
				<i>11-4-88 D.W. Glover</i>			
REMARKS:							

A.39

APPENDIX B

GEOPHYSICAL AND GEOLOGIC LOGS FOR WELL 2 (699-S40-E14)

## APPENDIX B

### GEOPHYSICAL AND GEOLOGIC LOGS FOR WELL 2 (699-S40-E14)

This appendix contains the Well Completion/Inspection Report, as-built diagram, notes from the sampling pump installation, the natural gamma log, and the geologists' logs for well 2 (699-S40-E14) in the 1100 Area.

WELL COMPLETION/INSPECTION REPORT					
Specification No. <u>HS-V-50005</u> Rev. No. <u>A</u>			Well No. <u>699-540-E14</u> Temp. Well No. <u>2</u>		
Project <u>1100 AREA ENVIRON. MONITORING VISUALS</u>			Coordinates <u>N 265592.8 E 2709354.0</u>		
Location <u>1100 AREA WELL # 2</u>			Casing Elev. <u>402.85'</u> Ground Elev. <u>399.84'</u>		
Drilling Co. <u>KATSEA ENGINEERING / HANCOCK</u>			DRILLING METHOD		
Driller <u>LNU BOBOD</u>					
Other (companies) <u>NONE</u>			Rotary - Air <u>N/A</u> Mud <u>N/A</u>		
Geologist(s) <u>S.M. GOODWIN</u>			Cable Tool <u>D 0'-7'</u> H <u>7'-62.44'</u>		
<u>S.S. TEEU</u>			Drilling Fluid <u>DILLING SUPP. 4</u>		
			Other <u>NONE</u>		
GEOPHYSICAL LOGGING		COMPLETION DATA		AQUIFER TESTING	
Sondes	Interval	Date	Drilled Depth	Type <u>N</u>	
<u>NAT. GAMMA</u>	<u>20' - 2'</u>	<u>10/6/98</u>	<u>62.44'</u>	Length of Test <u>4.5</u>	
			Completed Depth <u>59.5'</u>	Volume Pumped	
			Date Started <u>10/3/98</u>	Drawdown	
			Date Completed <u>11/3/98</u>	Date of Test	
			Static Water Level/Date <u>44.43/10/17/98</u>		
INSPECTION RESULTS					
CLEANING			MATERIAL STORAGE/PACKING		
Inspection Method <u>VISUAL</u>			Inspection Method <u>VISUAL</u>		
Acceptance Criteria <u>SECT 7.1</u>			Acceptance Criteria <u>AS PER SECT 7.3</u>		
	Accept	Reject	Accept	Reject	Date
Drilling Tools/Rig	<u>SML</u>		<u>SML</u>		<u>10/3/98</u>
Temporary Materials	<u>SML</u>		<u>SML</u>		<u>10/3/98</u>
Permanent Materials	<u>SML</u>		<u>SML</u>		<u>10/5/98</u>
SCREEN			LUBRICANTS/ADDITIVES		
Type	Length	Slot Size	Inspection Method <u>VISUAL</u>		
<u>4" STAINLESS STEEL TYPE 304</u>	<u>5.35'</u>	<u>10</u>	Acceptance Criteria <u>AS PER SECT 7.2</u>		
<u>4" STAINLESS STEEL TYPE 304</u>	<u>20.6'</u>	<u>10</u>	Identify <u>SML</u> Accept <u>SML</u> Reject <u>SML</u> Dare <u>10/3/98</u>		
Depth (s)			Additives <u>NONE</u> <u>SML</u> <u>10/3/98</u>		
<u>59.5'</u>	<u>54.15'</u>		Lubricants <u>FOOD OIL</u> <u>SML</u> <u>10/3/98</u>		
<u>54.15'</u>	<u>33.56'</u>				
Inspection Method <u>MEASURED W/ STEEL TAPE</u>			STRAIGHTNESS TEST		
Acceptance Criteria <u>SECT 4.2.3</u>			Inspection Method <u>22' OF 6" SS CASING DOWN HOLE</u>		
Accept	<u>SS</u>	Reject <u>SS</u> Date <u>10/17/98</u>	Acceptance Criteria <u>AS PER SECT 6.3</u>		
			Accept <u>SS</u> Reject <u>SS</u> Date <u>10/16/98</u>		
CASING (permanent)			WELL PROTECTION		
Type	Size	Placement	Inspection Method <u>VISUAL</u>		
<u>STAINLESS STEEL TYPE 304</u>	<u>4"</u>	<u>33.55' - 1.45'</u>	Acceptance Criteria <u>SECT. 4.2.9 + 4.2.10</u>		
Inspection Method <u>MEASURED W/ STEEL TAPE</u>			Accept <u>SML</u> Reject <u>SML</u> Date <u>10/26/98</u>		
Acceptance Criteria <u>SECT. 4.2.4</u>			Protective Posts <u>SML</u> <u>10/26/98</u>		
Accept	<u>SS</u>	Reject <u>SS</u> Date <u>10/17/98</u>	Locks <u>SML</u> <u>10/28/98</u>		
ANNULAR SEAL					
Inspection Method <u>PNL STEEL TAPE / ENG. TAPE</u>			Acceptance Criteria		
Type	Interval	Volume	Accept	Reject	Date
<u>20-40 MESH SILICA SAND PACK</u>	<u>62.44' - 30.15'</u>	<u>10.92 FT<sup>3</sup></u>	<u>SML</u>		<u>10/19/98</u>
<u>1/4" ENVELOPING BENTONITE PELLETS</u>	<u>30.15' - 23.3'</u>	<u>2.48 FT<sup>3</sup></u>	<u>SML</u>		<u>10/18/98</u>
<u>8-20 MESH GRANULAR BENTONITE</u>	<u>23.3' - 19.95'</u>	<u>1.78 FT<sup>3</sup></u>	<u>SML</u>		<u>10/19/98</u>
<u>CEMENT GROUT</u>	<u>19.95' - 3.4'</u>	<u>13.49 FT<sup>3</sup></u>	<u>SML</u>		<u>10/19/98</u>
OTHER (initial if performed)					
<u>N/A</u> Well Abandonment	<u>N/A</u> Downhole TV Inspection	<u>SML</u> Complete As-Built Diagram,			
<u>SML</u> Well Development		Driller's/Geologist's Logs			

REVIEWED BY J.L. McLean 11-7-98

For all blanks mark N/A if not applicable.

**AS-BUILT DIAGRAM**

699-540-E14

Well Number 1100 AREA (#2) Geologist GOODWIN, T L Page 1 of 1

Reviewed by [Signature] Date 11-7-88

Construction Data		Depth in Feet	Geologic/Hydrologic Data	
Description	Diagram		Diagram Litho.	Lithologic Description
21' 3/4" OF 10" CARBON STEEL SURFACE CASING W/ DRIVE SIDE (REMOVED)		5		SILTY SANDY GRAVEL
		10		" " "
		15		" " "
		20		" " "
65' OF 5" CARBON STEEL CASING W/ DRIVE SIDE (REMOVED)		25		" " "
		30		" " "
		35		GRAVELLY SAND
		40		STATIC "H <sub>2</sub> O @ 44.43' 10/17/88
35' OF 4" STAINLESS STEEL TYPE 304 CASING		45		SILTY SANDY GRAVEL
		50		SLIGHTLY SILTY GRAVELLY SAND
	55	SILTY SAND		
	60	" "		
25.95' OF 10 SLOT STAINLESS STEEL TYPE 304 SCREEN (4" DIA.)			RINGOLD CONTACT @ 52'	
			DRILLED DEPTH = 62.44'	
			COMPLETION DEPTH = 59.5'	
COMPLETION SYMBOLS:				
	CONCRETE PAD			
	CEMENT GROUT			
	BENTONITE GROUT			
	BENTONITE PELLETS			
	SAND PACK			
	CASING JOINT			
	CASING CENTRALIZER			



SAMPLING PUMP INSTALLATION IN  
GROUND-WATER MONITORING WELLS

site: 1100 AREA

Monitoring Well Number: (#2) 699-540-E14

Depth to Water: 47.10'

Depth to Bottom: 59.12'      Reported Depth to Bottom: 59.5'

Pump Type: Positive Displacement Piston

Pump Model: Hydrostar HS-8001

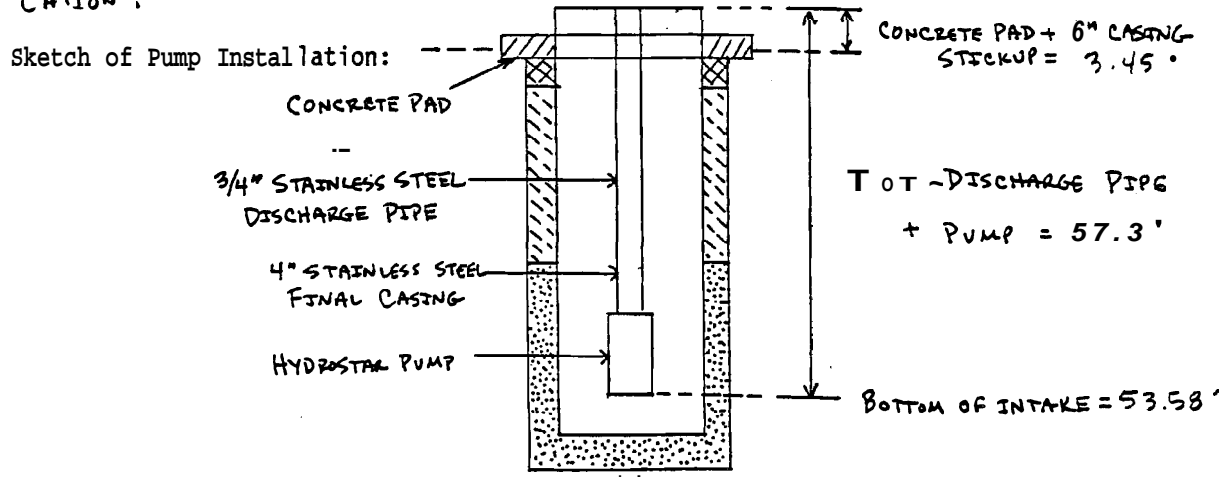
Date Installed: 11/3/88

Installed By: K&H: OLM AMOS, LOUIS WATKINS, LENNY COROON

Pump Discharge Pipe Description:

- 5 10' SECTIONS OF 3/4" STAINLESS STEEL DISCHARGE PIPE
  - 1 3' SECTION OF 3/4" " " " "
  - 1 2' SECTION OF 3/4" " " " "
  - 2' & 3' SECTIONS ARE BETWEEN 10' - 15' BELOW PUMP BASE PLATE
- Additional Comments:

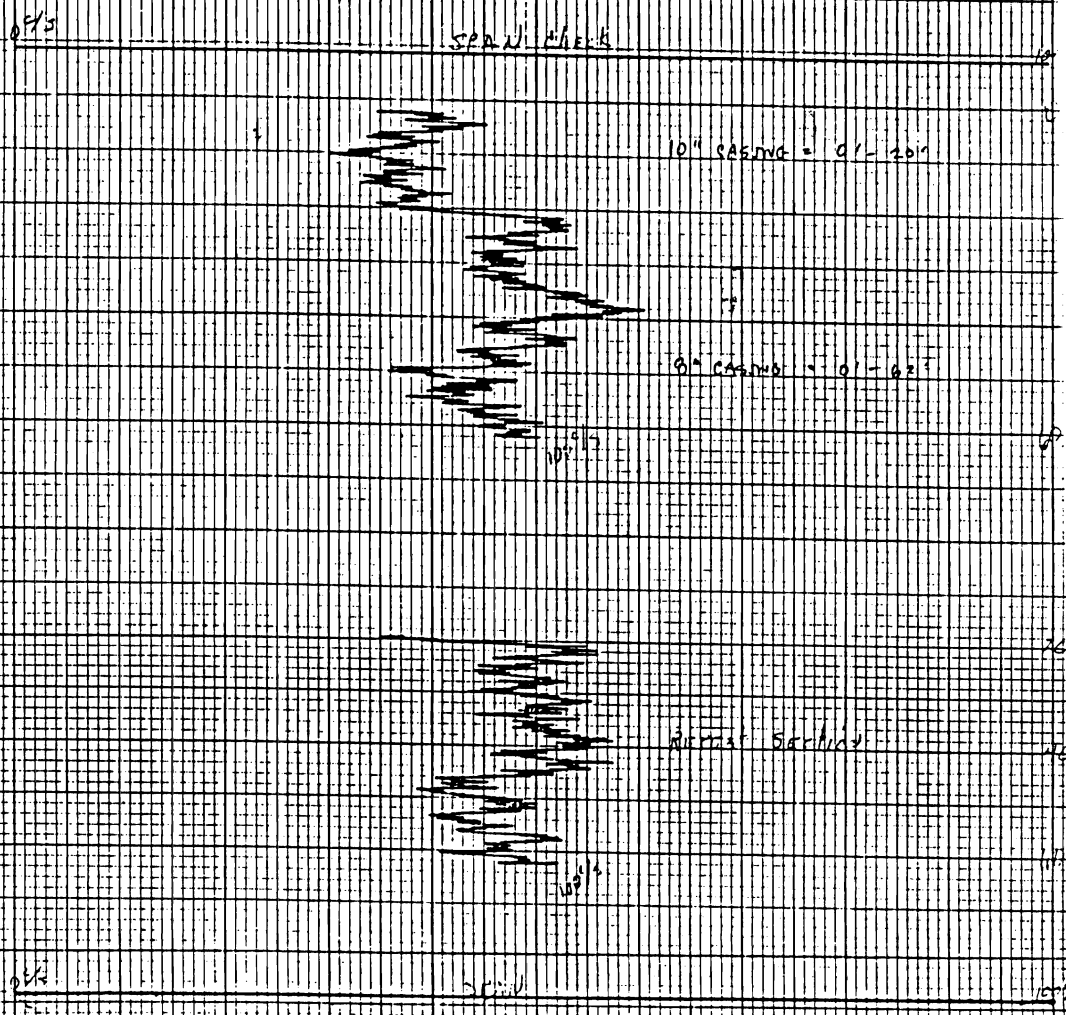
HYDROSTAR PUMP LENGTH = 2.3'; ALL JOINTS WERE TAPED WITH TEFLON. DRILLERS WORE CLEAN COTTON GLOVES DURING INSTALLATION.



Completed By: Shanley Ford      Date: 11/3/88

Well	299-340-8V	Drilled Depth	62.44'	Interval Logged	27-33'
Log Type	GA	Gamma	10.6	casing Size	10 1/2"
Logged By	J. L. Williams	Date	10/14	Water Level Depth	44.43'
Logging Scale Sensitivity	100%	Scale Constant	1		
Vertical Scale	20%/ft	Logging Speed	15'/min		
Source Strength	NA	Spool Length	NA		
Remarks	REF PROCEDURE G10-G REV. 2 PROBE SER. # CG 27A 97				

THIS NATURAL GAMMA LOG IS FOR QUALITATIVE INDICATION ONLY. THE PROBE HAS NOT BEEN CALIBRATED TO PROVIDE QUANTITATIVE INFORMATION.







DRILL LOG		By S. M. GOODWIN	Rig BE 220	Well Number (# 2) 699-540-F14	Computer Number N/A	Project or Work Order No. 1100 AREA
		Date 3 OCT. 1965	# 22-11101	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
	5'	D	SM	(CONT) RK. TO HEL SLIGHT ON FINES. UNCONSOLIDATED.		
				GEO. SAMPLE TAKEN (2 PINTS); NOT REPRESENTATIVE DUE TO AMOUNT OF BUBBLES	1020	WELDING DRIVE
				PRESENT. MOISTURE SAMPLE TAKEN. PH METER ISN'T CALIBRATING PROPERLY; SAVING SAMPLE FOR PH TEST.	1100	SHOE ON 10" CASING WAITING FOR DATA SUPPLY H <sub>2</sub> O
					1115	WELDING ON BIT
12 1/4"	10"			DUG STARTER HOLE TO ~7' & BACKFILLED AROUND CASING. 2 1/4" OF 10" CASING w/ DRIVE SHAFT	1135	DRIBBING STARTER HOLE w/ BACKHOLE
					1200	LUNCH
					1230	END LUNCH
					1300	H <sub>2</sub> O MAINT. STARTED DRILLING
	10'	H	WET	SILTY SANDY GRAVEL: 40% GRAVEL, 48% SAND, 12% MUD. 2% VCP, 8% CP, 10% MP, 15% FP, 5% VFP, 10% VCS, 18% CS, 10% MS, 5% FS, 5% VFS, 12% SILT (MUD), VERY POORLY SORTED. GRAVELS ARE 60% BASALT, 25% Q-ZIRK, 15% GRANITE	1430	SAMPLED w/ DART BAILEY DRILLING
REMARKS:						
Sha. Ho. No. 3 Oct. 1965						

B.9

DRILL LOG		By S. M. GOODWIN	Rig BE 22W	Well Number (# 2) 699-540-E14	Computer Number N/A	Project or Work Order No 1100 APCN
		Date 3 OCT. 1988	22-14100	Depth 10' to 10'		Subcontract No /A
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc	Time	Drilling Comments
	10'	H	WET	(10' CONT) ORIGINAL RX SR TO WF SANDS ARE 50% BASALT. 50% QUARTZ, PLAG, & Q-ZONE; VA TO SR WET COLOR IS SY 4/2 (ONE GRAY) DRY COLOR IS SY 6/2 (17 ONE GRAY) RX TO 10% HCL - SLIGHT UNCONSOLIDATED GEO. SAMPLES TAKEN: REPRESENTATIVE SAMPLE WOULD CONTAIN GRAVELS & LOW DRILLING EV PROB; 0 PPM OFF SECS. & ABOVE 90 = 1500 HND READINGS Hole. 3-4 PPM 10" CASING. 1525 DONE FOR DAY		
				USED 20 GALLONS DRILL SUPPLY H <sub>2</sub> O TODAY.		
REMARKS						
<i>John W. Smith</i> 3 OCTOBER 1988						

B.10

DRILL LOG		By	Rig	Well Number	Computer Number	Project or Work Order No.
		S S Teal	B.E 2211	J 699-540-E14		1107 A/S 32
		Date	22-14101	Depth	N/A	Subcontract No.
		10-4-88	Lin Cordova	12' To 15'		N/A
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size. Color, Roundness, Caliche, Etc.	Time	Drilling Comments
013.00					0700	Driller arrives
					0725	Drilling
	15'	H	Wet	JILTY SANDY GRAVEL (47% gravel, 45% sand, 8% mud)	0735	
				5% CP, 20% MP, 15% FP, 7% VFP, 5% VCB, 10% CS, 15% MS,		
				10% FS, 5% VFS, 8% mud. (Gravel) - 40% basalt (fresh),		
				10% andesite and other volcanic, 10% granite, 40% quartz = Orig. work: use RSR		
				(sand) - 50% basalt, 50% quartzite, Si-rich rk fragments, and		
				trace green ret. A-R. Wet color: 2.5Y 1/2 (dark grayish brown),		
				Dry color: 2.5Y 1/2 (light gray). No reaction to 10% HCl. (Droptail		
				original surface probably VCB to small rubble. Grain size		
				representative. Poorly sorted.		
				S.M. Goodwin arrives and checks well w/ HNU (10.2 probe),	0806	
				No detectable readings. Calibration details in log for well # 3.		
REMARKS:						
S.S Teal 10-4-88						

B.11

DRILL LOG		By S.S. Teel	Rig G-100	Well Number #27 699-540-E14	Computer Number 111A	Project or Work Order No.
		Date 10-4-88		Depth 15' To 20'		Subcontract No. 111A
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
	20'	H	Wet	MULTY SANDY GRAVEL (47% gravel, 25% sand, 28% mud) 15% CP, 10% MP, 15% FP, 7% JFP, 5% UCS, 10% CS, 15% MS, 10% FS, 5% JFS, 2% mud (silt and clay). (Gravel) - 65% Basalt, 5% andosite, porphyry, and other volcanic, 5% igneous (incl. granite + schist?), 5% Si-rich met., 20% qtz, qtzite and chert. Orig. surf. ore BR-WR. (Sand) - 65% basalt, 35% qtz, qtzite chert, and other Si-rich rock fragments, A-P, net color: as 1/2 (dark grayish brown). Dry color: 2.5V 1/2 (14 brownish gray), slight HCL reaction. Unconsol. Grain sizes somewhat rep. (better than previous sample). Poorly sorted		Sample 17' 20" 1/2
21' 3/4"	21' 3/4"			Added 21' 3/4" of 2" (including section of drive shoe)	1030	Adding to log
22' 6"	22' 6"			Added 22' 6" of 2"	1040	Nothing above the mud
23' 3/4"	23' 3/4"				1015	APT souvenyrs
						(Nothing above the mud)
					1045	ting
					1110	
					1125	Drilling
					1115	Driving 20mins
					1150	Bailing
					1200/1230	Lunch
					1230	Drilling
31' 3/4"	31' 3/4"					

REMARKS: The pH for yesterday's 5' sample was measured at

S.S. Teel  
10-4-88

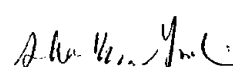
B.12



DRILL LOG		By	Rig	Well Number	Computer Number	Project or Work Order No.
		S. S. Teel	BE 22W	(#2) 699-540-E11	N/A	1100 Area
		Date	22-14101	Depth		Subcontract No.
		10-4-88	Lin Gordon	20' To 30'		N/A
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
31'6"	25'	H	Wet	SILTY SANDY GRAVEL (47% gravel, 45% sand, 8% mud) 19% VCP, 4% CP, 18% MP, 17% FP, 7% VFP, 5% UCS, 5% CS, 12% MS, 13% FS, 10% UFS, 8% mud (silt + clay). Poorly Sorted. (Gravel) - 65% basalt, 10% andesite and other volcanics, 10% granite and other Si-rich, 15% qtzite, trace mafic-rich breccia. R-WR. (Sand) - 40% basalt, 60% qtz, qtzite, & Si-rich. A-R. Wet color: 2.5R 3/2 (very dark grayish brown). Dry Color: 2.5Y 4/2 (light brownish gray). Slight HCL reaction. Unconsol. Grain sizes somewhat rep. (whole CP).	1250	
	30'	H	Wet	SILTY SANDY GRAVEL (45% gravel, 47% sand, 8% mud) 7% MP, 20% FP, 18% VFP, 5% UCS, 12% CS, 15% MS, 10% FS, 5% UFS, 8% mud (silt + clay). Mod. poorly sorted. (Gravel) - 75% basalt and other volcanics, 25% qtz, qtzite, granite, and other Si- rich. SR-WR. (Sand) - 40% basalt, 60% qtz, qtzite, chert, and other Si-rich rock fragments. A-SR. Wet color: 2.5YR 4/2 (dark grayish brown). Dry color: 2.5Y 7/2 to 4/2 (light gray to light brownish gray).	1341	Checked well w/ HNU (calibrated 11.7 eV probe) Reading = .02 to .04 inside casing.
31'6" 10				No reaction to 10% HCL. Unconsolidated. Grain sizes not representative Gravels are too broken-up to tell max grain size.		
41'6"				Added 10' of 8"	1345	Working Casing
REMARKS:				S. S. Teel 10-4-88		

B.13



DRILL LOG		By S. M. Goodman	Rig BC 22W	Well Number (#2) 699-540-E14	Computer Number N/A	Project or Work Order No. 1100 MESA
		Date 5 October 1988	#22-14101	Depth 34' 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
				DRILLER IS LHM CAROLAN	0700	SERVICING RIG
					0710	DRAWING
	20'	H	WKT	GRAVELLY SAND: 20% GRAVEL, 72% SAND, 6% MUD. 3% MP, 10% FP, 7% VFP, 15% VCS, 25% CS, 20% MS, 7% FS, 5% VFS, 8% MUD. VERY POORLY SORTED. GRAVELS ARE 50% BASALT & OTHER VOLCAN- ICS, 25% GRANITES, 20% Q-ZONE, 5% ASSORT. METAL; A TO P, WITH FRESH SURFACES SAND ARE 4% BASALT, 60% QUARTZ, PLAG, & Q-ZONE; A TO SA. WET COLOR IS 2.5 YR 4/2 (DRY. GRANITE BEANS); DRY COLOR IS 2.5 YR 6/2 (LT BROWNISH GRAY). SLIGHT PY. TO 10% HCL. UNCONSOLIDATED. SAMPLE MUCH FINER THAN 30' & LESS BASALT. GEO. SAMPLES TAKEN.	0715	SAMPLED w/ 1" DIA BARREL
					0720	DRAWING
	40'	H	WKT	GRAVELLY SAND: 15% GRAVEL, 77% SAND, 8% MUD 2% MP, 7% FP, 5% VFP, 7% VCS, 20% CS, 35% MS, 10% FS, 5% VFS, 8% MUD. POORLY SORTED. GRAVELS ARE 35% BASALT, 30% QUARTZITE,	0745	SAMPLED w/ 1" DIA BARREL
					0750	WELDING 8" P.A.W.
REMARKS:						
 5 OCTOBER 1988						

B.15

DRILL LOG		By S M. Goodwin	Rig BE 72	Well Number (42) 699-540-E14	Computer Number N/A	Project or Work Order No. 1100 NP21
		Date 5 OCTOBER 1966	# 22-11101	Depth 46' 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
	46'	H	WET	(CONT.) 25% GRANITICS, 10% ALTERED VOLCANICS & PORPHYRY, A TO WP. SANDS ARE 30% BASALT, 70% QUARTZ, Q-25C, (HEAVY) & PLAG; SA TO SR. WET COLOR IS 2.5 YR 4/2 (DARK GRAYISH BROWN); DRY COLOR IS 2.5 YR 6/2 (LI. BROWNISH GRAY). SLIGHT RX. TO 10% HCL UNCONSOLIDATED. LESS BASALT & LESS GRAVEL; SANDS ARE BETTER SORTED. GEO. SAMPLES TAKEN.		
41'6"						
10'1"				ADDED 10'1" OF 8" CARBON STEEL CASING;	0846	FINISHED WELL
51'7"				TOTAL 8" CASING = 51'7"	0850	DRILLING
				CALIBRATED HNU W/ 11.7 EV PROBE; SPAW SET AT 2.92.	0910	HNU CALIBRATION
	45'	H	WET	SILTY SANDY GRAVEL: 35% GRAVEL, 57% SAND, 8% MUD, 10% MP, 15% FP, 10% VFP, 10% VCS, 15% CS, 22% MS, 5% FS, 0% VFS, 8% MUD. VERY POORLY SORTED. GRAVELS ARE 45% BASALT, 10% ALTERED VOLCANICS, ANDESITE, & PORPHYRY,	0915	SAMPLED W/ DART BAILER; CHECKED W/ HNU & 11.7 EV PROBE. 0-2 P.M. OFF SEVS. 1 J.I. HOLE.
REMARKS:						
<i>Alva W. Hood</i> 5 OCTOBER 1966						

B.16

DRILL LOG		By S.M. Goodman	Rig DE 22w	Well Number (# 2) 100 @ 45' - 54' - E14	Computer Number N/A	Project or Work Order No. 1100 N/A
		Date 5 OCTOBER 1985	# 72-14101	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
	45'	H	WET	(CONT) 25% GRANULES, 20% QUARTZITE; ORIGINAL RX. SA TO WR. SANDS ARE 35% BASALT, 65% QUARTZ, PLAG, 0-2% d CITGRT; A TO SA. WET COLOR IS 2.5 Y 4/2 (DRK. GRAYISH BROWN); DRY COLOR IS 2.5 Y 6/2 (LT. BROWNISH GRAY). RX. TO 10% HCL IS MODERATE. UNCON- SOLIDATED. LARGE INCREASE IN GRAVELS & SLIGHT INCREASE IN BASALT. LARGEST P. SIZE = SMALL CUBES. GEO. SAMPLES TAKEN.	0918	DRILLING
	51' 7"			HIT H <sub>2</sub> O AT ~46'; BARRELING MUD & H <sub>2</sub> O	0950	WELDING CASING
	+ 10'			ADDED 10' of 10" CARBON STEEL CASING, TOTAL	1110	FINISHED WELL
	= 61' 7"			10" = 61' 7"	1115	DRILLING
	50'	H	WET	SLIGHTLY SILTY GRAVELLY SAND. 10% GRAVEL, 80% SAND, 10% MUD. 3% FP, 7% VFP, 10% VCS, 25% CS, 20% MS, 10% FS, 5% VFS, 10% MUD. POORLY SORTED. GRAVELS ARE 35% BASALT, 5% VOLCANIC PORPH & ANDUSITE, 1/10% QUARTZITE, 30% GRANULES; A IS WIL	1130	SAMPLED W/ DART BAILER. 0 RPM OFF SECS. & IN HOLE (11.7 EV)
REMARKS:						
<i>Shirley, Lane</i> 5 OCTOBER 1985						

B.17

4 of 4

DRILL LOG		By S M Goodwin	Rig BE 22	Well Number (#2) 699-540-E14	Computer Number 13/A	Project or Work Order No 1145 A/A
		Date 5 OCTOBER 1986	#22-14101	Depth ' to 54'		Subcontract No 13/A
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, etc	Time	Drilling Comments
	50'	H	WET	(PART) ORIGINAL GRAVELS UP TO AT LEAST 50'. SANDS ARE 25% BASALT, 75% QUARTZ. PLNG, CHEAT, Q-ZONE, A TO SA WGT COLOR IS 2.5 x 4/2 (DARK GRAY BLK). DRY COLOR IS 2.5 x 6/2 to 7/2 (LT GRAY TO LT. BLK GRAY) NO OBVIOUS RT. IS 10% HCL UNCONSOLIDATED. MORE SAND & LESS BASALT TITAN 45' GEO. SAMPLES TAKEN.		
					1200	LUNCH
					1230	
					1235	DRILLING
				DRILLER TO 1ST AND; HURT BACK AT ~12:00 WHEN MOVING 100 LB BAGS OF I I SAND.	1250	STOP DRILLING
				DRILLER BACK W/ ICE PACK FOR LOWER BACK.	1315	DRILLING
				COLOR PLNG; PROBABLY KINGOLD FM AT ~52' WELDING UP BIT DREW THROUGH MIDDLE CONGLOMERATE UNIT	1430	BUILDING UP BIT; HIT KINGOLD FM.
				Driller is trying to drill ahead of the casing so the water level can be checked 1st thing in the morning.	1515	
					1530	End of Day
REMARKS						
Allen H. Smith 5 OCTOBER 1986						

B.18

DRILL TOE		By J.S. Teel	Rig BF 2201	Well Number (#2) 699-540-EK1	Computer Number N/A	Project or Work Order No. 1100 N/A
		Date 10-6-88	?? 11101 6in (cord)	Depth 54' 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
					0700	Drilling
				Under 51.58' - 6' (stick-up) - 45.58' v.l.o.	0705	
					0710	Drilling
				Backwash 1110 (calibrated 100% w/pebbles). Loading 0.0	0720	
	55'	H	wet	VERY SAND (85% sand, 15% silt/clay) - fine to medium grained, well sorted, well rounded, (silt/clay).		SAMPLED w/ DIRT
				blended - 5" for 4 inches, 25% at 100% (silt/clay).	0730	DRILLING
				Unconsolidated, Much finer grained than previous.	0810	WELDING (CASH)
61' 7"				Dry color: yellow (light green), A.R. No reaction to 10% HCL		
8' 3 1/2"				Added 8' 3 1/2" of 8" CARBON STEEL CASING, 100%	0910	FINISHED WELD
69' 10 1/2"				6" CASING = 69' 10 1/2"	0915	DRILLING
				Adding 30 Gallons of H <sub>2</sub> O TO BACKPRESSURE	0925	MOL--!, WAKA
				FORWARD; SANDS ARE HEAVING UP		
				CASING.		
					0940	Working on bit.
					0950	Drilling

REMARKS:

S. Steel  
10-6-88

B.19

DRILL LOG		By S S. Coel	Rig BE 22W	Well Number (#?) 699-540-E14	Computer Number N/A	Project or Work Order No. 1100-1000
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
	60'		Wet	SILTY SAND (trace gravel, 75% sand, 25% mud). trace FP, VFP, 2% URS, 8% CS, 15% MS, 20% FS, 40% UFS, 50% mud. Mod-well sorted. 50% trash + malice, 20% gls, quartz, chert and (pink. material: 1" - dark olivine py), (trace: 5% (light gray). A-SR. No reaction to 10% HCL. Unconsolidated, similar to previous.	1110	
69' 10 1/2"	4' 10 1/2"			TOTAL 6' = 65'	1020	CUTTING 8"
65'						
				Performing straightness test. Straightness tester consists of minimum o.d. 6 3/8" stainless steel casing, 21' 6" long. Passes to bottom with no problem.	1037	
				Vern McGhan, PNH, arrives and begins geophysical logging. Natural Gamma: 60' - 0'	1150	
				The Neutron and Density logs were not run because the rods were not available.		
REMARKS: S S. Coel 10-6-88						

B.20













DRILL LOG		By S.S. Teel	Rig BE 2201 22-14101	Well Number (#2) 649-540-E14	Computer Number N/A	Project or Work Order No. 1100 Area
		Date 10-17-88	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
				Setting-up rig. Preparing to set screen. Rig was steam cleaned according to Olin Amos, KEH. Visually the rig looks clean.	1130	
					1200/1230	Lunch
				Setting 4" casing	1245	
				1 - 20.6' section of 10 slot stainless steel screen		
				1 - 5.35' section of 10 slot " " "		
				1 - 20' section of stainless steel casing		
				1 - 10' section of " " "		
				1 - 5' " " " " "		
				* 1 - 2' " " " " "		
				Centralizers: 6" off of bottom		
				25' from bottom		
				Bottom of 5' section of stainless		
REMARKS: * REMOVED 2' Screen Wiped S.S WAS PAIRED 3', S.S. Teel 10-17-88						

B.26

DRILL LOG		By <u>S. M. Goodwin / S.S. Teel</u>	Rig <u>BE 22W</u>	Well Number (# 2) <u>699-540-E14</u>	Computer Number <u>N/A</u>	Project or Work Order No. <u>1100 Area</u>
		Date <u>10-17-88</u>	<u>22-14101</u>	Depth <u>Completion To</u>		Subcontract No. <u>N/A</u>
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				D/BOTTOM = $63.67 + 2.35$ (Tape) - 3.5' (stick-up) = 62.52' b.l.s.	1410	
				Total stainless = 66.02'		
				D/water = $47.78 - 3.5'$ (stick-up) = 44.43 b.l.s. (18.09' of water inside screen)		
				Will raise the stainless up $\approx 3'$ so that there is 15' of water inside the screen		
1 BAG	SAND			Added 1 100 LB. BAG of 20-40 MESH SAND; D/B (SAND) = 57.95'; SAND WAS ADDED TO PLACE 4" S.G. SCREEN & CASING IN $\sim 15'$ of H <sub>2</sub> O.	1500	ADDING SAND
				D/B = 59.55' (INSIDE 4" STAINLESS); 15.12' of H <sub>2</sub> O EXPOSED TO SCREEN.	1505	D/B (STAINLESS)
					1510	ADDING SAND
1				Added 2 100 LB. BAGS OF 20-40 MESH SILICA SAND;	1515	D/B
2				D/B = 44.75'	1520	PULLING 8" CASING
= 3 BAGS				PULLED 8" CASING 1.5'; WILL GET D/B IN A.M.	1525	SHUT DOWN RIG
				REMOVED 2' SECTION OF 4" S.G. CASING; TOTAL	1530	DONE FOR DAY
				4" CASING = 35' + 25.95' of SURGEON		
				= 60.95' (SCREEN & CASING)		
REMARKS:						

*John W. Teel* 17 OCTOBER 1988

B.27

DRILL LOG			By S. M. Goodwin	Rig BE 22w	Well Number (#2) 699-540-E14	Computer Number N/A	Project or Work Order No. 1100 MEA
			Date 18 OCTOBER 1966	#22-14101	Depth COMP. 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
				DRIVER IS LFN CARBON		0700	SEVICING P/L
						0715	PULLING 8"
				Bottom of 8" = 60.4' ; D/O (SAND) = 51.3'		0745	D/B
				9.6' of OVERLAP.		0750	PULLING 8"
				Bottom of 8" = 56.6' ; D/B (SAND) = 54.40'		0800	CUTTING 8" CASING
				2.2' of OVERLAP.		0810	ADDING SAND
2 1/4	BAGS SAND			ADDED 2 1/4 100 LB. BAGS OF 20-40 MESH SAND;		0815	
				D/B = 44.05'. 12.55' OF OF OVERLAP.		0825	PULLING 8"
				D/B = 47.96' ; BOTTOM OF 8" = 51.4'		0835	D/B
				3.42' of OVERLAP.		0837	ADDING SAND
2 1/4				ADDED 1 100 LB BAG OF 20-40 SAND; D/B = 44.06'		0840	D/B
<del>1</del>				7.35' of OVERLAP.		0845	PULLING 8"
= 3 1/4	SAND					0855	CUTTING 8"
				D/B = 44.15' ; PULLED 8" CASING 4'. BOTTOM		0905	D/B
				OF 8" = 47.1' ; 2.95' OF OVERLAP.		0910	ADDING SAND
						0915	PULLING 8"
				D/B = 37.7' ; BOTTOM OF 8" = 42.1'. 4.4' OF		0940	D/B
				OVERLAP.		0945	ADDING SAND
REMARKS:							
<i>Shelley Goodwin</i> 18 Oct. 1966							

B.28

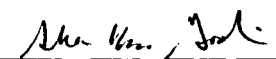


DRILL LOG		By S. M. Goodwin Date 18 OCT. 1986	Rig BE 22W # 22-14101	Well Number (42) 699-540-E14 Depth COMP To	Computer Number 1A	Project or Work Order No. 1100 A-101 Subcontract No
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
3 1/4				ADDED 3 100 LB. BAGS OF 20-40 MESH SAND;	0950	D/B
3				D/B = 24.90'. 12.4' of overlap.	0957	PULLING 8"
= 6 1/4	SAND			BOTTOM OF 8" = 36.95, D/B = 28.55'	1000	CUTTING 8"
				8.4' of overlap.	1010	PULLING 8"
				BORNE 8" = ~?..cls'; D/B = 30.5'	1030	D/B
				3.05' of overlap.	1035	PULLING 8"
6 1/4				BOTTOM OF 8" = 32.45; D/B = 31.3'	1040	D/B
+ 1/4				1.42' of overlap.	1042	ADDING SAND
= 6 3/4	BAGS SAND			ADDED 1/2 100 LB. BAG OF 20-40 MESH SAND;	1045	D/B
+ 3 (10/17/86)				D/B = 27.85'. 4.60' of overlap.	1047	PULLING 8"
= 9 3/4	BAGS TOTAL			BOTTOM OF 8" = 30.35'; D/B = 30.15'	1055	D/B
				0.2' of overlap. 29.4' of sand; 3.45'	1057	ADDING PELLETS
				ABOVE TOP OF SCREEN.		
				ADDED 4 50 LB. BUCKETS OF 1/4" ENVELOPING BENT-	1100	D/B
				ONING PELLETS; D/B = 22.25', 8.1' of overlap	1105	WORKING ON CURVE
					1115	PULLING 8"
				D/B (PELLETS) = 21.05'; PELLETS ARE 1.2' HIGHER	1125	D/B
				TAKING PREVIOUS D/B AFTER 3' PULL.		

REMARKS:

Allen H. J. 10 OCTOBER 1986

B.29

DRILL LOG			By S M GORDWIN	Rig BE 22w	Well Number (#2) 699-540-E14	Compuator Number N/A	Project or Work Order No 1100 ALCA
			Date 13 OCTOBER 1980	#22-11101	Depth COMP. 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
			(CONT.)	BOTTOM OF 8" CASING = 27.35'. CASING HAS BEEN		1130	WELDING EAR
				PULLING HARD. W/SL JAC CASING W/ NEXT BACKWALL		1 *	PULLING 6"
				TO DETERMINE IF PELLETS HAVE BRIDGED.			
4 BULLETS PELLETS				D/B (PELLETS) = 21.7'; BOTTOM OF 8"		1150	D/B
	TOTAL			CASING = 26.1', 4.4' OF OVERLAP.			
				PELLETS DROPPED .65' W/ 1' PULL.		1200/1230	LUNCH
						1235	PULLING 5"
						1300	CUTTING 5"
				BOTTOM OF 8" = 24.1', D/B (PELLETS) = 23.3'		1305	D/B
				0.8' OF OVERLAP.			
						1312	ADDING CRUMBLES
2 BAGS CRUMBLES				ADDED 2 50 LB. BAGS OF 8-20 MESH CRUMBLES,		1315	D/B
1 1/2				D/B = 18.12'		13	ADDING CRUMBLER
= 2 1/2 BAGS	TOTAL			ADDED 1/2 50 LB BAG OF 8-20 MESH CRUMBLES:		1318	D/B
				D/B = 14.3' 7 8' OVERLAP.		1325	PULLING 6"
				8" CASING REMOVED; BOTTOM OF 10" = 19.95'		1340	8" FREE
				D/B = 19.85'. ~.1' OF OVERLAP.		1350	WELDING EAR
				D/B (INSIDE 4") = 59.35' (1.9' STICKUP)		1355	D/B
REMARKS.							
 13 OCT. 1980							

B.30

DRILL LOG			By S. M. GOODWIN	Rig BE 22W	Well Number (#2) 699-540-E14	Computer Number N/A	Project or Work Order No. 1100 AREA
			Date 18 OCT. 1986	# 22-14101	Depth COMP. 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
5 Bags	Cement			USED 5 94 LB. BAGS OF PORTLAND CEMENT, 40 GALLONS H <sub>2</sub> O, + ~1% ALUMINUM POWDER (BY VOLUME) D/B (CEMENT GROUT) = 4' B.L.S.		1400	MIXING CEMENT GROUT
						1415	POURING GROUT
				BACKPULLING W/ DEADPULL 1 RIG, 2 FALLS WELDED		1420	PULLING 10"
				IN, ONE BROKE W/ BACKPULL. 10" IS TIGHT IN HOLE.		1430	BROKE EAR OFF 10"
						1450	PULLING 10"
				BOTTOM OF 10" = 8.6' ; D/B (GROUT) = 10.3'		1500	D/B
				1.7' OF OPEN HOLE. HOLE IS STAYING		1505	CLEANING UP SITE
				OPEN ; WILL CONTINUE W/ GROUT IN A.M.		1530	DONE FOR DAY
REMARKS:							
<i>John H. ...</i> 18 OCT 1986							

B.32

DRILL LOG		By S. M. GOODWIN	Rig BE 22W	Well Number (#2) 699-540-E14	Computer Number N/A	Project or Work Order No. 1100 N/A
		Date 19 OCTOBER 1966	#22-14101	Depth COMP. TO DEV.		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 LSN CARBON	0700	SERVING PZ
					0715	PROBLEMS STARTING GROUTER
				BOTTOM OF 10" = 8.6' ; D/B (GROUT) = 10.3'	0750	MIXING CEMENT GROUT
				D/B = 8" B.L.S. ; USED 5 94 LB. SACKS OF PORTLAND CEMENT, 25 GALLONS H <sub>2</sub> O, 1% ALUM- INUM POWDER (BY VOLUME).	0805	PULLING GROUT
					0812	PULLING 10"
					0815	10" FREE
				D/B (CEMENT GROUT) = 3.4' B.L.S.	0820	D/B
					0825	CLEANING GROUTER
				USING 3 1/2 O.D. x 17' LONG DART BARREL. VOLUME = ~5.5 GALLONS. BAILING H <sub>2</sub> O INTO 55 GALLON DRUMS. BRINGING UP 1 BARREL / 45 SEC.	0850	BAILING WELL
				H <sub>2</sub> O CLEARING FAST ; ~1/8 TONS. SILT & VF SANDS ; VERY LITTLE SAND PACK. ~150 GALLONS BARREL	0910	
				H <sub>2</sub> O SLIGHTLY TURBID & 1/8 TONS. SAND PACK & MUD. ~75 GALLONS BARREL.	0925	
				H <sub>2</sub> O SLIGHTLY TURBID, ~1/16 TONS. SAND PACK & FINES	0945	DONE BAILING
REMARKS: TOTAL VOLUME BAILED = ~385 GALLONS (FILLED 7 55 GALLON DRUMS) BAILED 55 MINUTES S.M.G. 19 OCT. 1966						



DRILL LOG		By S. M. Gindoff	Rig No 216	Well Number (#2) 699-540-EH	Computer Number N/A	Project or Work Order No. 1150 AREA
		Date 26 OCTOBER 1985		Depth 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
				ACME CONCRETE TRUCK IS POURING CONCRETE PAD, CONCRETE AIR-ENHANCED REFER TO U #1 FOR BATH SLIP (10/26/85). ESTIMATED VIBRATION OF CONCRETE = 12 D. INSTALLED 4 PROTECTIVE POSTS & 6" ADJECIVE S.S. CASING WAS PLACED 2 1/2" ABOVE THE TOP OF 4" CASING. BRASS SURVEY MARKER PLACED.	0830	POURING PAD
					0900	FINISHED WITH PAD.
REMARKS:						
<i>Allen H. Gindoff</i> 26 OCTOBER 1985						

B.34



B.36

DRILL LOG		By S. M. Goodwin	Rig No. 21C	Well Number (12) 699-540-E14	Computer Number N/A	Project or Work Order No. 1100 AREA
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				DATE 2 NOVEMBER 1986		Subcontract No. N/A
				USING A 1.5 H.P. GRUNDFOS SUBMERSIVE PUMP TO DEVELOP WELL BY OVERPUMPING. PUMP COLUMN IS SET AT BOTTOM OF 4", INTAKE IS ~1.5' FROM BOTTOM OF PUMP COLUMN. H <sub>2</sub> O IS BEING PUMPED INTO A WATER TRENCH TO PREVENT RECHARGE OF MUNICIPAL WATER VEINS W/ DEPLETION OF WATER. H <sub>2</sub> O CONSTITUENTS ARE BELOW DRINKING H <sub>2</sub> O STANDARDS.	0915	TOTALIZED READS 5230 GALLONS
				D/W = 50.8' (PWL E. TYP 4 12021, FROM TOP OF TRENCH PIPE)	0920	D/W
				FLOW RATES ARE FROM FLOW METER; 10 GALLONS PUMPED / 49.11 SEC. D/W = 50.9'	0925	PUMP ON
				H <sub>2</sub> O SAMPLE = 0.87 NTU; CLEAR & CLEAN. VERY LITTLE SEDIMENTS.	0926	
				D/W = 50.9'	0927	D/W; 12.2 GAL/MIN
				METER: 10 GAL / 47.9 SEC.	0929	
				H <sub>2</sub> O SAMPLE = 0.57 NTU	0930	D/W
					0931	12.5 GAL/MIN
					0934	
REMARKS:						
<i>Mike Hill, J. Dool. 11/2/86</i>						

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 110 RJC	Well Number (# 2) 699-540-E14	Computer Number N/A	Project or Work Order No. 1103 AREA
		Date 2 NOVEMBER 1986		Depth DEV. 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
					0935	PUMP OFF
				10 GALLONS / 47.21 SEC ; 12.7 GAL / MIN	0940	PUMP ON
				H <sub>2</sub> O SAMPLE : 0.56 NTU ; D/W = 50.9'	0941	D/W
				D/W = 50.8' ; PUMP RATE = 10 GAL / 46.87 SEC.	0943	D/W ; 12.8 GAL / MIN
					0944	PUMP OFF
					0947	PUMP ON
				H <sub>2</sub> O SAMPLE = 1.1 NTU ; D/W = 50.8'	0948	D/W
				PUMP RATE = 10 GAL / 46.71 SEC.	0949	12.8 GAL / MIN.
				H <sub>2</sub> O SAMPLE = 0.46 NTU ; ACCEPTABLE LIMIT	0950	
				IS BELOW 5 NTU.	0952	PUMP OFF
				RATE = 10 GAL / 46.80 SEC ; 12.6 GAL / MIN.	0955	PUMP ON
				D/W = 50.8'	0956	D/W
				RATE = 10 GAL. / 46.73 SEC ; D/W = 50.8'	0958	12.8 GAL / MIN
				TOTALIZER READS 5520 GALLONS	1000	PUMP OFF
				H <sub>2</sub> O SAMPLES ANALYZED w/ HACH PORTABLE		
				TURBIDIMETER.		
REMARKS: TOTAL MINUTES PUMPED = 24 MINUTES AVE. PUMP RATE = 12.66 GAL / MIN						
TOTAL VOLUME PUMPED = ~ 304 GALLONS Shu. h. Prod. 11/2/86						

B.37

DRILL LOG.		By S M GOODWIN	Rig CRANE	Well Number (#2) 699-540-E14	Computer Number N/A	Project or Work Order No 1100 AREA
		Date 3 NOVEMBER 1988		DEPTH PUMP SET 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/B = 60.4' + 2.17' TANK - 3.45' STICKUP + PAD	1230	D/B
				- 59.12' (PIL 300' INCH # L300 IS)		
				D/W - 5055' - 3.45' STICKUP + PAD = 47.10'	1235	D/W
				(ad ~ 181F # 12021) (~, 0.01 H <sub>2</sub> O EXPOSED TO SCREEN WITH SET HYDROSTAT PUMP ~7-8' PART D/W		
				KEH DRILLERS HAVE PLACED A CLEAN GROUNDWATER FUN LAYING O W PUMP & PIPE. DRILLERS ARE WEARING CLEAN COTTON GLOVES. MATERIALS WERE REMOVED FROM PROTECTIVE CONTAINERS AS NEEDED. PUMP & DISCHARGE PIPES WERE INSPECTED BEFORE INSTAL- ATION, DRILLERS TIGHTENED JOINTS & TAPPED THEM W/ TEFLON.	1240	
				MATERIALS USED:	1300	INSTALLING PUMP.
				5 10' SECTION of 3/4" STAINLESS PIPE		
				1 3' " " "		
				1 2' " " "		
				3' HYDROSTAT PUMP		
REMARKS						
S.M. Goodwin 3 Nov. 1988						

B.38

DRILL LOG		By S. M. Goodwin	Rig CRANE	Well Number (#2) 699-540-E14	Computer Number N/A	Project or Work Order No. 11UD NCA
		Date 3 November 1986		Depth PUMP SET 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
				TOTAL PIPE + PUMP = 57.3'		
				INTAKE OF HYDRASTIC PUMP IS AT 53.58';		
				6.45' BELOW PRESENT D/W, 5.54' FROM D/B.		
				CUT PUMP ROD 2 1/2' ABOVE TOP OF PUMP MOUNT	1325	CUTTING PUMP ROD
					1330	BEVELING + THREADING PUMP ROD.
					1335	FINISHED INSTALLING PUMP.
				BASE PLATE FOR THE HYDRASTIC IS TOO LARGE TO	1340	
				ALLOW PLACEMENT OF LOCKING WEL CAP. KEH		
				WILL GRIND DOWN PLATE IN ORDER TO PLACE		
				CAP ON WELL.		
				KEH WAS ABLE TO PLACE CAP, BUT IT IS VERY	1342	PUMP IS READY FOR
				TIGHT. PLATE WILL STILL NEED GRINDING		TESTING
REMARKS:						
<i>Sheldon Goodwin</i> 3 Nov. 1986						

B.39

DRILL LOG		By <i>Glover</i>		Rig No RSG	Well Number <i>1100-2 694-54-E14</i>	Computer Number N/A	Project or Work Order No. <i>1100 NACA</i>
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.		Time	Drilling Comments
				<i>Hydrostar pump check out performed</i>		<i>0710</i>	
				<i>pumping time to lift water from bottom of well on initial startup = 15 sec.</i>			
				<i>pumping rate at ~60 strokes/min = 5.1 gpm</i>			
				<i>System shows very little leakdown indicating pipe joints are sealed well.</i>			
				<i>Note: Cap on well fits very tight - RPTs will have problems removing it to sample well.</i>			
				<i>11-4-88</i>			
				<i>D.W. Glover</i>			
REMARKS:							

B.40

APPENDIX C

GEOPHYSICAL AND GEOLOGIC LOGS FOR WELL 3 (699-S41-E13B)

## APPENDIX C

### GEOPHYSICAL AND GEOLOGIC LOGS FOR WELL 3 (699-S41-E13B)

This appendix contains the Well Completion/Inspection Report, as-built diagram, notes from the sampling pump installation, the natural gamma log, and the geologists' logs for well 3 (699-S41-E13B) in the 1100 Area.

WELL COMPLETION/INSPECTION REPORT					
Specification No. <u>HS-V-5005</u> Rev. No. <u>A</u>			Well No. <u>099-541-E13B</u> Temp. Well No. <u>#3</u>		
Project <u>1100 AREA ENVIR. MONITORING WELL</u>			Coordinates <u>N 364364.3 E 2308243.7</u>		
Location <u>1100 AREA WELL #3</u>			Casing Elev. <u>410.10'</u> Ground Elev. <u>407.25'</u> <small>(BRASS CAP)</small>		
Drilling Co. <u>KAISER ENGINEERING / HANFORD</u>			<b>DRILLING METHOD</b> Rotary - Air <u>N/A</u> Mud <u>N/A</u> Cable Tool <u>D</u> <u>N/A</u> <u>H 0' - 95'</u> Drilling Fluid <u>DRILL SUPPLY H<sub>2</sub>O</u> Other <u>NONE</u>		
Driller <u>FELIX MURPHY</u>					
Other (companies) <u>NONE</u>					
Geologist(s) <u>S.M. GOODWIN</u> <u>S.S. TEEL</u> <u>T.J. GILMORE</u>					
<b>GEOPHYSICAL LOGGING</b>		<b>COMPLETION DATA</b>		<b>AQUIFER TESTING</b>	
Sondes	Interval	Date	Drilled Depth	Type	
	<u>NA 94' - 2'</u>	<u>10/12/86</u>	<u>95'</u>	<u>N/A</u>	
			Completed Depth	Length of Test	
			<u>86.85'</u>		
			Date waded	Volume Pumped	
			<u>10/3/86</u>		
			Date Completed	Drawdown	
			<u>11/3/86</u>		
			Static Water Level/Date	Date of Test	
			<u>52.9' 10/20/86</u>		
INSPECTION RESULTS					
<b>CLEANING</b>			<b>MATERIAL STORAGE/PACKING</b>		
Inspection Method <u>VISUAL</u>			Inspection Method <u>VISUAL</u>		
Acceptance Criteria <u>As per Sect. 7.1</u>			Acceptance Criteria <u>As per Sect. 7.3</u>		
	Accept	Reject	Date	Accept	Reject
Drilling Tools/Rig	<u>SML</u>		<u>10/3/86</u>		
Temporary Materials	<u>SML</u>		<u>10/3/86</u>		
Permanent Materials	<u>SML</u>		<u>10/3/86</u>		
<b>SCREEN</b>			<b>LUBRICANTS/ADDITIVES</b>		
Type	Length	Slot Size	Inspection Method <u>VISUAL</u>		
<u>4" STAINLESS STEEL TYPE 304</u>	<u>10.3'</u>	<u>20</u>	Acceptance Criteria <u>As per Sect. 7.1 &amp; 7.2</u>		
Depth(s)			Identify		
<u>86.85' - 76.55'</u>			Accept	Reject	Date
			<u>NONE</u>	<u>SML</u>	<u>10/3/86</u>
			Lubricants	<u>FOOD OIL</u>	<u>SML</u>
					<u>10/3/86</u>
Inspection Method <u>MEASURED w/ STEEL TAPE</u>			<b>STRAIGHTNESS TEST</b>		
Acceptance Criteria <u>SECT. 4.2.3</u>			Inspection Method <u>12" x 6" 95' CASING DOWN HOLE</u>		
Accept	<u>SML</u>	Reject	Acceptance Criteria <u>SECT. 8.1</u>		
			Accept	Reject	Date
			<u>SML</u>		<u>10/11/86</u>
<b>CASING (permanent)</b>			<b>WELL PROTECTION</b>		
Type	Size	Placement	Inspection Method <u>VISUAL</u>		
<u>STAINLESS STEEL TYPE 304</u>	<u>4"</u>	<u>76.55' - 145'</u>	Acceptance Criteria <u>SECT. 4.2.9 &amp; 4.2.10</u>		
Inspection Method <u>MEASURED w/ STEEL TAPE</u>			Accept		
Acceptance Criteria <u>As per Sect. 4.2.4</u>			Protective Posts	Reject	Date
Accept	<u>SML</u>	Reject	<u>SML</u>		<u>10/26/86</u>
			Locks	<u>SML</u>	<u>10/28/86</u>
ANNULAR SEAL					
Inspection Method <u>MEASURED w/ PNL STEEL TAPE</u>			Acceptance Criteria		
Type	Interval	Volume	Accept	Reject	Date
<u>16-30 MESH SILICA PACK</u>	<u>95' - 72.0'</u>	<u>6.33 FT<sup>3</sup></u>	<u>SML</u>		<u>10/13/86</u>
<u>BENTONITE GROUT</u>	<u>72.0' - 43.85'</u>	<u>20.25 FT<sup>3</sup></u>	<u>SML</u>		<u>10/14/86</u>
<u>BENTONITE SLURRY</u>	<u>43.85' - 18.65'</u>	<u>10.4 FT<sup>3</sup></u>	<u>SML</u>		<u>10/17/86</u>
<u>CEMENT GROUT</u>	<u>18.65' - 2.8'</u>	<u>15.0 FT<sup>3</sup></u>	<u>SML</u>		<u>10/17/86</u>
OTHER (initial if performed)					
<u>N/A</u> Well Abandonment	<u>N/A</u> Downhole TV Inspection	<u>SML</u> Complete As-Built Diagram, Driller's/Geologist's Logs			
<u>SML</u> Well Development					

REVIEWED BY J.L. McShan 11-7-88

For all blanks mark N/A if not applicable.

**AS-BUILT DIAGRAM**

699-541-E13B

Well Number 100 AREA (#3) Geologist S.M. GOODRICH, FEE Page 1 of 1  
GILMORE

Reviewed by J.L. McPherson Date 11-7-88

Construction Data		Depth in Feet	Geologic/Hydrologic Data	
Description	Diagram		Diagram Litho.	Lithologic Description
20' 2 1/2" of 10" CARBON STEEL SURFACE (CASING W/ DRNG SHOE (REMOVED))		5		SILTY SANDY GRAVEL
		10		" " "
		15		" " "
		20		" " "
		25		" " "
99' 5" of 8" CARBON STEEL CASING W/ DRNG SHOE (REMOVED)		30		" " "
		35		" " "
		40		" " "
		45		" " "
		50		" " "
78' of 4" STAINLESS STEEL TYPE 304 CASING		55		" " "
"		60		" " "
"		65		" " "
"		70		" " "
"		75		" " "
10.3' of 20 SLOT STAINLESS STEEL TYPE 304 SCREEN (4" DIA.)	80	" " "		
	85	" " "		
	90	" " "		
	95	" " "		
COMPLETION SYMBOLS:				
	CEMENT PAD			
	CEMENT GROUT			
	BENTONITE SLURRY			
	BENTONITE GROUT			
	SAND PACK			
	CASING JOINT			
	CASING CENTRALIZERS			
				DRILLER DEPTH = 95'
				COMPLETION DEPTH = 86.85'

CASING CENTRALIZERS



SAMPLING PUMP INSTALLATION IN  
GROUND-WATER MONITORING WELLS

Site: 1100 AREA

Monitoring Well Number: (H3) 699-S41-E13B

Depth to Water: 54.25'

Depth to Bottom: 86.87'      Reported Depth to Bottom: 86.85'

Pump Type: Positive Displacement Piston

Pump Model: Hydrostar HS-8001

Date Installed: 11/3/98

Installed By: KEH: OLIN AMOS, LOUIS WATKINS, LENNY CORDON

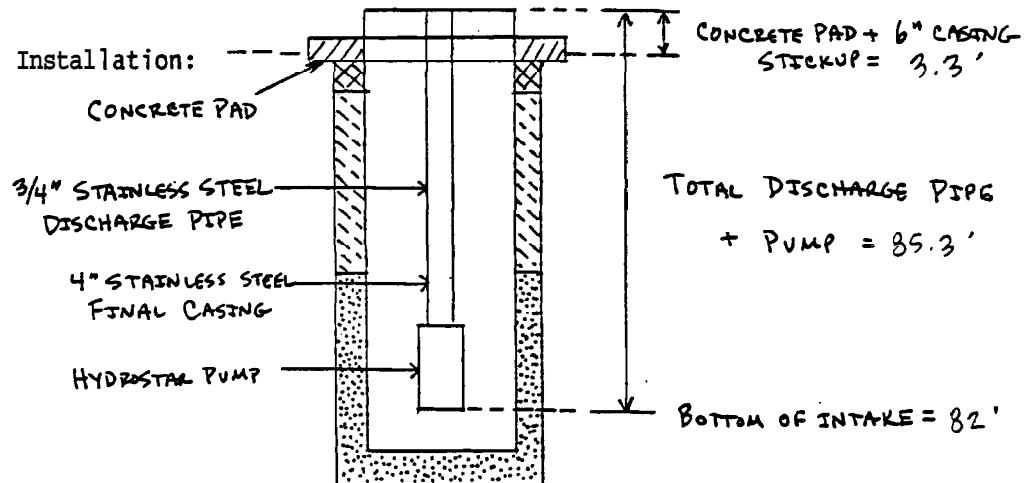
Pump Discharge Pipe Description:

- 8 10' SECTIONS OF 3/4" STAINLESS STEEL DISCHARGE PIPE
  - 1 3' SECTION OF 3/4" STAINLESS STEEL DISCHARGE PIPE
  - 1 2' SECTION OF 3/4" STAINLESS STEEL C PIPE
- 2' & 3' SECTIONS ARE BETWEEN 10' & 15' BELOW BASE PLATE

Additional Comments:

HYDROSTAR PUMP LENGTH = 2.3'; ALL JOINTS WERE TAPPED WITH TEFLON.  
DRILLERS WORE CLEAN COTTON GLOVES DURING INSTALLATION.

Sketch of Pump Installation:

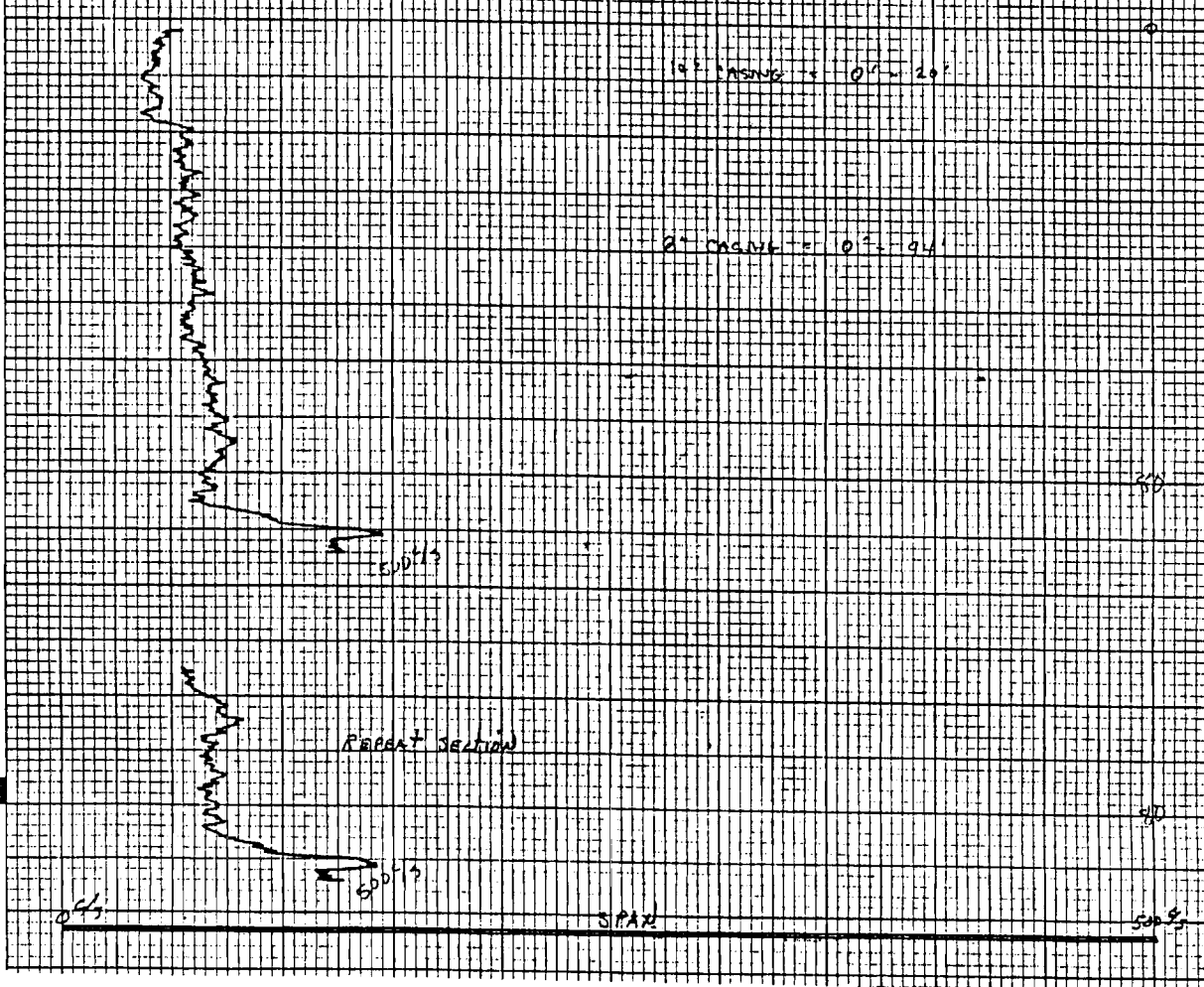


Completed By: Alan Na. Neal

Date: 11/3/98

#3	K. RICHARDS	Drilled Depth	95'	Interval Logged	74-2'
Well	659-341-F13B	Log Type	NAT. GAMMA	Date	10-12-98
Logged By	J.G. McEwen - PNA	Water Level (Depth)	SALT OF		
Logging St. Res. Sensitivity	500 CPS	Penetration	3		
Vertical Scale	20"/IN	Logging Speed	15'/MIN		
Spore Count	NA	Spore Length	NA		
Remarks	REF. PROFFERRE G10-G REV. 2 FIBER SECTION CG 27A 97				

THIS NATURAL GAMMA LOG IS FOR QUALITATIVE INDICATION ONLY. THIS LOG HAS NOT BEEN CALIBRATED TO PROVIDE QUANTITATIVE INFORMATION. SPAN CHECK



DRILL LOG		By S. M. Goodwin	Rig BE 60L	Well Number (#3) 699-541-E13B	Computer Number N/A	Project or Work Order No. 1100 AREA
		Date 3 OCTOBER 1986	#22-14100	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 FELIX MURPHY; DRILL RIG STEAM	0700	SETTING UP RIG
				CLEANED BY OLIV MANS. DID NOT OBSERVE	0715	SAFETY MEETING
				CLEANING, BUT RIG IS VISIBLY CLEAN.		W/ DRILLER
					0915	WELDING DRIVE SHAFT
						ON 10" CASING
					0945	DRILLING w/ HARD
						TOOL
	5'	H	WET	SILTY SANDY GRAVEL: 30% GRAVEL, 58% SAND,	1100	SAMPLED w/ BUCKET
				12% MUD, 5% CO, 5% MP, 10% FP, 10% VFP,		(BY HAND)
				10% VES, 25% CS, 15% MS, 4% FS, 4% VFS,	1105	DRILLING
				12% MUD: VERY POORLY SORTED GRAVELS ARE 60%	1115	SETTING IN 10"
				BASALT, 20% GRANITES, 20% Q-ZONE; DRIG -		CASING (20' 2 1/2")
				FINAL MATERIAL PROBABLY SR TO WR. SANDS	1130	DRILLING
				ARE 35% BASALT, 65% QUARTZ, PLAG, 1 Q-ZONE,	1200	LUNCH BREAK
				A TO SA. WET COLOR IS 5Y 5/2 (OLIVE GRAY);	1230	END FIND
				DRY COLOR IS 5Y 7/2 (LT. GRAY). UNCONSOLIDATED.	1240	DRILLER NEEDS
				NO RT. TO 10% HCL. SLOW DRILLING, SAMPLE		TOOLS; WGT TO
				SHOULD CONTAIN LARGER GRAVELS & COBBLES		WELL # 2
REMARKS:						
Alan H. Jani 3 Oct 1986						

C.7

DRILL LOG		By	Rig	Well Number	Computer Number	Project or Work Order No.
		S. M. Goodwin	BE 60C	(H3) 699-541-E13B	N/A	1100 AREA
		Date	#	Depth		Subcontract No.
		3 OCT. 1985	22-11150	5 To ~8'		N/A
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
	5'	H	WET	(CONT.) TO BE CONSIDERED REPRESENTATIVE. GEO. SAMPLES TAKEN.	1305	DRAWING
20' 2 1/2" + 10"				HNU READINGS w/ 11.7 eV PROBE: 0 PPM OFF SECS.,	1510	HNU
(w/ DRIVE SHAFT)				0-1 PPM IN HOLE (AROUND 10"). 10" TOO HIGH FOR	1530	DONE FOR DAY
				PENDING INSIDE. (CALIBRATION INFO. ON LOGS FOR		
				WELL #2.		
REMARKS:						
<i>Alan Van Jalli</i> 3 OCT 1985						

C.8

DRILL LOG		By S. M. Goodwin	Rig BE 60L	Well Number	Computer Number	Project or Work Order No
		Date 4 October 1966	# 22-14100	Depth 699.541-E13 To 70	N/A	1100 AREA
						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 FELIX MURPHY	0700	SCOURING PIC
					0715	DRAINING
				CALIBRATED HND W/ BENZENE GAS, USED 10 Z	0730	HND CALIBRATION
				EN PROBE A SET SPAN AT 5.72.		
	10'	H	WET	SILTY SANDY GRAVEL: 45% GRAVEL, 45% SAND,	0740	SAMPLED w/ DART
				10% MUD 10% CP, 15% MP, 10% FP, 10% VF.		BATER 3.0 PPM
				20% VCS, 10% CS 10% MS 3% FS, 2% VFS		OFF SECS d. IN
				10% MUD. VERY POORLY SORTED GRAVELS ARE 60%		HOLE w/ HND
				BASALT 20% QUARTZITE, 15% GRANITE, 15%	0745	DRAINING
				ALTERED VOLCANICS A META PX, UNBAKED PX		
				R TO WR SANDS ARE 45% BASALT, 50%		
				QUARTZ, PLAG + D-25% 5% ALTERED VOLC,		
				VA TO SA. WET COLOR IS GY 4/2 (OLIVE GRAY):		
				DRY COLOR IS GY 6/2/LT OLIVE & A? HCL PX. STRONG		
				UNCONSOLIDATED. SLOW DRILLING, DRILLING THROUGH		
				GRAVELS & COBBLES JUDGING FROM CHIPS IN		
				SAMPLE GED SAMPLES NOT REPRESENTATIVE		
				FORMATION		
REMARKS						
USED 25 GALLONS H <sub>2</sub> O DRILLING YESTERDAY						
						4 Oct 1966

C.9

DRILL LOG		By S. M. Goodwin	Rig BE 600	Well Number (# 3) 699-541-E13B	Computer Number N/A	Project or Work Order No. 1100 AP-1
		Date 4 October 1986	# 22-11/100	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
	15'	H	WET	SILTY SANDY GRAVEL: 40% GRAVEL, 50% SAND, 10% MUD. 5% CP, 15% MP, 10% FP, 10% VFP, 15% UCS, 17% CS, 13% MS, 3% FS, 2% VFS, 10% MUD. VERY POORLY SORTED. GRAVELS ARE 55% BASALT, 25% QUARTZITE, 15% GRANITE, 5% OTHER VOLCANIC + MESA, ORIGINAL RX. SR TO WR. SANDS ARE 45% BASALT, 55% QUARTZ, PLAG, + RX FRAGS; A TO SA. WET COLOR IS 5Y 4/2 (OLIVE GRAY); DRY 5Y 6/2 (LT. OLIVE GRAY) UNCONSOLIDATED. SLIGHT DECREASE IN GRAVEL + BASALT. GEN. SAMPLES; REF SAMPLE WOULD BE COARSER. STRONG RX. ID 10% HEL.	0935          0940	SAMPLED w/ DART BASIN; 0 PFA OFF SENS + BORE- HOLE w/ HAND 10.2 = V PROBE DRILLING
	20'	H	WET	SILTY SANDY GRAVEL: 30% GRAVEL, 60% SAND, 10% MUD. 2% CP, 10% MP, 10% FP, 8% VFP, 5% UCS, 20% CS, 20% MS, 10% FS, 5% VFS, 10% MUD. VERY POORLY SORTED. GRAVELS ARE 45% BASALT, 30% QUARTZITE, 20% GRANITE, 5% OTHER MESA; SR TO R. SANDS ARE	1015          1025	SAMPLED w/ DART BASIN. DRILLING
REMARKS:						
She Wn. Mark 4 October 1986						

C.10

DRILL LOG		By	Rig	Well Number	Computer Number	Protect or Work Order No
		S.M. - - 0	WRC 600 -	(#3) 699-541 = E138	N/A	1100 N/A
		Date	# 22-101100	Depth		Subcontract No
		4 OCTOBER 1966		20' TO 25'		N/A
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc	Time	Drilling Comments
	20'	H	WET	(CONT.) 40% BASALT (20% QUARTZ, PLAG, + Q-ZONE; A TO SA WET COLOR IS SY 4 1/2 (OLIVE GRAY). DRY - < SY 6 1/2 (LT OLIVE GRAY) ->. UNCONSOLIDATED GEO SAMPLES TAKEN. DECREASE IN BASALT & GRAVEL. FINER GRAINING IN SANDS STRONG RX TO 10%.		
	25'	H	WET	SILTY SANDY GRAVEL. 40% GRAVEL. 50% SAND 10% MUD 5% CR, 15% MF, 10% FF, 10% VFF 10% UCS, 10% CS, 70% MS, 5% FS 50% VFS 10% MUD VERY POORLY SORTED GRAVELS ARE 50% BASALT 25%, QUARTZITE, 70% GRANITES, 5% OTHER, UNGRAINED = SR TO WR. SANDS 45% BASALT, 55% QUARTZ, PLAG Q-ZONE & PHERIT A TO SA WET COLOR IS SY 4 1/2 (OLIVE GRAY); DRY COLOR IS SY 7 1/2 (LT GRAY) STRONG A+ TO 10% HT UNCONSOLIDATED, COARSER THAN 20' & MORE BASALT DRILLING 6' OF OPEN HOLE w/ THIS SAMPLE GEO SAMPLES	1105	SAMPLED w/ PART BARREL
					1110	DRILLING
					1200	LUNCH
REMARKS						

Shirley H. [Signature] 4 Oct 1966

C.11

DRILL LOG		By	Hig	Well Number	Computer Number	Project or Work Order No
		S M Goodwin	BC 602	(# 3) 699-541-E13B	N/A	110U AREA
		Date		Depth		Subcontract No
		4 October 1988	77-11100	25' to 30'		N/A
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc	Time	Drilling Comments
					1230	END LOG
					1235	DATING
				HAD 10' of OPEN HOLE ~ ~ USED (TO ~30') d	1310	PREPARING TO WELD
				1+ (10+ 2) WELL WELD ~ 1100 ON 3"		
				CASING & START RUNNING 2" DOWN HOLE.		
				TOOLS NEED CHANGED OVER TO 8" STRING		
				Added 17'10 1/2" of 8" casing		
				Added 16'11" F 8" casing	1340	Welding casing
					1440	WELDING
	30'	H	WET	SILTY SANDY GRAVEL (42% gravel, 50% sand, 8% mud)	1450	
				20% MP, 15% FP, 7% VFP, 3% VCS, 5% CS, 12% M2, 25% FS,		BATLED; HNU =
				5% VFS, 8% Mud (silt + clay), Poorly sorted (Gravel) - 50% basalt		D PPM OFF SEDS.
				10% altered volcanic ash & ashite, porphyry. 5% granite (diarite, 35%		d IN HOLE (11.7
				ytzite, chert, qtz, and other Si rich. Dry surf are SR WR,		E
				(Sand) - 35% basalt, 65% qtz, qtzite, chert, and other Si rich		
				fragments, A-SR. Wet color. SY 4/1 (dark gray). Dry color. SY 4/2		
	34' 9 1/2"	F 8"		No reaction 1/2 10 1/2 HCL. Unconso.		
REMARKS						
Alvin H. Jr. 4 Oct 1988						

C.12



1 of 3

DRILL LOG		By 3.S	Rig BE 60L 22-4100 Polix	Well Number (#3) 699-541-E13B	Computer Number N/A	Project or Work Order No.
		Date 10-5-88		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
34'9 1/2" 9'7 1/4"	8"				0700	friction rivets - Drilling
44'4 3/4"				Added 9'7 1/4" of 8" casing	0710	Working casing
					0815	Drilling
	35'	H	Wet	SILTY - SAND GRAVEL (40% gravel, 52% sand, 8% silt)	0910	
				15% MP, 15% FP, 10% VFP, 7% UCS, 10% CS, 20% MS, 10% FS,	0915	@hock - 2' HNU
44'4 3/4"	8"			5% MS, 8% mud. Poorly sorted. (Gravel) - 60% basalt, 10%		(calibrated 10.2 eV probe)
				altered volcanics, 30% quartz, chert, qtz, & other Si-rich rock fragments.		Undetectable caliche
				Orig. surfaces are SR-WR. (Sand) - 65% basalt, 35% qtz, quartz,		
				chert, and other Si-rich, A-SR. Wet color: 5Y 4/2 to 5Y 3/2		
				(olive gray to dark olive gray). Dry color: 5Y 4/2 (light olive gray).		
				Moderate reaction to 10% HCL. Unconsolidated. Similar to previous		
				except slightly coarser (sand portion) and slightly more basalt.		
				Largest orig grain size CP at minimum.		
REMARKS:						3.S. Teel 10-5-88

C.13

DRILL LOG		By	Rig	Well Number	Computer Number	Project or Work Order No.
		S.S. Teel	FE 60L	(#3) 699-541-E13 B	N/A	1100 Area
		Date 12-5-88	22-14100 Felix	Depth 410' 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' 11/4"	410'	H	Wet	SILTY SANDY GRAVEL (45% gravel, 50% sand, 5% mud)	0930	
				4% VCP (one whole VCP), 4% LP, 20% MP, 12% FP, 5% VFP, 5% UCS, 10% CS, 15% MS, 15% FS, 5% UFS, 5% mud.		
				Poorly sorted. (Gravel) - 50% basalt, 10% altered volcanics, 40% quartzite, chert, and other Si-rich rock fragments (~10%).		
				R-WR (on orig. surf.) (Sand) - 60% basalt, 40% qtz, qtzite, chert, and other Si-rich rock fragments. SA-SR.	1025	Stopped drilling - Driller went to get equipment.
				Wet color: SY 4/2 (olive gray), Dry color: SY 4/2 (light olive gray). No reaction to 10% HCl. Unconsolidated. Orig. max grain size probably VCP - small cobble.	1035	Delivering stainless steel casing to well. It is new and is in original plastic wrap.
					1050	Working on bit
					1120	Drilling
					1200/1230	LUNCH
				DRILLING SLOW; DRILLER SAYS THAT HE'S DRILLING Boulders. CHECKED SEGS & BOREHOLE w/HMU;	1235	DRILLING
				0 PPM IN HOLE & OFF SEGS. w/ 11.7 EV PPMSE.	1330	WELDING 8' CASING
REMARKS:						
Abu-Han Teel 5 OCT 1988						

C.14

DRILL LOG		By	Rig	Well Number	Computer Number	Project or Work Order No.
		S. M. Goodwin	BE 662	(# 3) 699-541-E13B	N/A	1100 AREA
		Date	# 22-14100	Depth		40' to ~49'
		5 OCTOBER 1968				
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
44' 4 3/4"				ADDSD 9' 5" of 8" CARBON STEEL CASING,	1415	FINISHED WELD
+ 9' 5"				TOTAL 8" CASING = 53' 9 3/4"	1420	DRILLING
53' 9 3/4"					1440	SAMPLED w/ DRIFT BARREL
	45'	H	WET	SILTY SANDY GRAVEL: 30% GRAVEL, 62% SAND, 8% MUD, 5% MP, 15% FP, 10% VF, 20% VS, 17% CS, 15% MS, 5% FS, 5% VFS, 8% MUD. VERY POORLY SORTED. GRAVELS ARE 50% BASALT, 5% OTHER VOLC., 25% QUARTZITE, 20% GRANITES; VA TO WA. ORIGINAL SIZES PROBABLY UP TO LARGE COBBLE. SANDS: 45% BASALT, 55% QUARTZ, PLAG., Q-ZONE 1 (LIGHT; VA TO SA. WET COLOR IS 5Y 4/2 (OLIVE GRAY); DRY COLOR IS 5Y 6/2 (LT. OLIVE GRAY). Rx TO 100% HCL IS SLIGHT. UNCONSOLIDATED, BUT SLOW DRILLING THROUGH COARSE MATERIAL.	1445	RPT SURVEYED; NO DET. CONTAMIN- ATION.
	~49'			H <sub>2</sub> O GOING OUT TO THE FORMATION QUICKLY; PROBLEMS MAKING MUD.	1515	BARREL WEL
					1520	RIG OFF
					1530	DONE FOR DAY
REMARKS: USED 40 GALLONS OF DRILL SUPPLY H <sub>2</sub> O TODAY						
Alan Van Hook 5 OCT. 1968						

C.15

DRILL LOG		By S.M. GOODWIN	Rig BE 60C	Well Number (#3) 699-541-E13B	Computer Number N/A	Project or Work Order No. 1100 MCA
		Date 6 OCTOBER 1985	#22-14100	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
				DRILLER IS LOUIS WATKINS; HNU SPAN SET AT	0700	SERVICING PIZ
				2.6 CALIBRATED W/ BENZENE CAS.	0710	DRILLING
	50'	H	WET	SILTY SANDY GRAVEL: 45% GRAVEL, 45% SAND,	0740	SAMPLED W/ DMT
				10% MUD, 5% CP, 10% MP, 15% FP, 15% VFP,		BATLER
				15% VCS, 10% CS, 10% MS, 5% FS, 5% VFS,	0745	DRILLING
				10% MUD. VERY POORLY SORTED GRAVELS:	0800	WEIGHING 10" CANNING
				40% BASALT, 5% ALT. VOLCANICS, 20%		Driller says Ringold @
				QUARTZITE, 25% GRANITES; A TO WR.		50'
				SANDS: 35% BASALT, 65% QUARTZITE, QUARTZ,		
				CHERT, PIAG.; VA TO SA. WET COLOR IS		
				5Y 3/2 (DARK OLIVE GRAY); DRY COLOR IS 5Y		
				6/2 (LT. OLIVE GRAY). UNCONSOLIDATED; SLOW		
				DRILLING THROUGH GRAVELS & COBBLES.		
				INCREASE IN GRAVEL SINCE 45'. (XO. SAMPLES		
	53' 9 3/4"			TAKEN.		
	8' 4"			ADDED 8' 4" OF 8" CARBON STEEL CANNING; 10 MIN	0920	FINESTOCK VIBRO
	62' 1 3/4"			8" CANNING = 62' 1 3/4"	0925	DRILLING
				0 DPM OF SEDS. & IN ANNULUS; 11.7 EV PRESS	0955	HNU RECORDS
REMARKS:						

*Mr. W. J. ...* 6 OCT 1985

C.16



DRILL LOG		By B.S. Teal	Rig BF 60L	Well Number (43) 699-541-E13B	Computer Number N/A	Project or Work Order No. 1100 Area
		Date 10-6-88	22-11100	Depth 60' 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
	60'	H	Wet	SLIGHTLY SILTY SAND (3% gravel, 82% sand, 15% silt), 2% FP, 1% VFP, 2% UCS, 15% CS, 15% MS, 30% FS, 20% VFS, 15% silt. Mod. well sorted. (Gravel) - 30% basalt, 10% other volcanics, 60% qtz, qtzite, chert, and Si-rich. Too broken up to tell orig. roundness. (Sand) - 15% basalt, 85% qtz, qtzite, chert, and other Si- rich. A-R. Wet color: 5Y 4/2 (olive gray). Dry color: 5Y 7/2 to 5Y 8/2 (light gray to light olive gray). No reaction to 10% HCl. Unconsolidated. Much finer grained than previous.	1100	
					1300	Drilling
				There is some confusion as to whether this well is "deep" or "shallow". The deep well was supposed to be started first but the drillers set-up and began drilling on the planned "shallow" well. S.M. Goodwin, Lead Geologist, checked with management before the drillers switched to 8" casing to see if they wanted to make this a deep well or continue as originally planned. No word to change this to a deep well was received and the driller switched to 8". Today at 12:30 Olin Amos, KEH foreman was notified by John Keller (from Clark Hodge) that this will be the "deep". This decision was	1400	
REMARKS: <p style="text-align: right;">B.S. Teal 10-6-88</p>						

C.18

DRILL LOG		By	Rig	Well Number	Computer Number	Project or Work Order No.
		S.S. Teal	BE 60L	(#13) 699-541-E13B	N/A	1100 Pcs
		Date	27-1100	Depth		Subcontract No.
				60' To 65'		N/A
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				made despite concerns by Olin Amos, Felix Murphy, KEH, and the geologists about potential problems with casing pull-back because there is only 20' of 10" casing in the hole (the deep wells were supposed to have ≈ 70' of 10" casing).		
	65'	H	Wet	SILTY SANDY GRAVEL (95% gravel, 45% sand, 20% mud) 4% CP, 11% MP, 13% FP, 7% VFP, 5% VC3, 14% CS, 14% NS, 7% FS, 5% VFS, 20% mud (silt + clay), (Gravel) - 25% basalt, 15% andesite, porphyry, and other volcanics, 15% granite + Si-rich igneous, 45% qtz, qtzite, and chert; minor met. Original surfaces are rounded to well rounded. Many basalt chips have weathering rinds and are chem. altered but there is also some fresh basalt. (Sand) - 10% basalt, 90% qtz, qtzite, chert, and Si-rich. A-R. Wet color: 5Y 4/2 (olive gray). Dry color: 5Y 4/2 to 5Y 5/2 (light gray to light olive gray). No reaction to 10% HCl. Less basalt and more gravel and silt than previous. Sample looks a lot like typical Middle Ringold.	1420	
					1445	Preparing to seal
					1530	End of Day
REMARKS:				S.S. Teal 10-6-88		

C.19

C.20

DRILL LOG		By	Rig	Well Number	Computer Number	Project or Work Order No.
		S.S. Teal	BE 60L	(#3) 699-541-E13B		1100 Area
		Date	77-14100	Depth	N/A	Subcontract No.
		10-7-88		65' to 70'		111A
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
66' 3/4"	of 8"			Added 5' 11" of 8"	0700	Driller arrives
5' 11"						-welding casing
72' 2 1/4"						
					0815	Driving Casing
					0830	Drilling
				Checked well w/ HNU (Calibrated 10.2 eV Probe). Readings = 0.0	0840	
					0841	Driving Casing
					0844	Drilling
					0940	Bailing
					0947	Waiting for supplies
					0955	Delivering Supplies
					1020	Welding
					1120	Drilling
	70'	H	Wet	SILTY SANDY GRAVEL (45% gravel, 45% sand, 10% mud). 5% CP, 15% MP, 15% FP, 10% VFP, 5% VS, 10% CS, 15% MS, 10% FS, 5% VFS, 10% mud (silt & clay). Poorly to very poorly sorted. (Gravels) - 35% basalt, 10% andesite, porphyry, and other misc. volcanics, 15% granite & Si-rich igneous, 50% Qtz, feldite, chert. SR-WR.	1140	Sample w/ Sand pump
REMARKS:						S.S. Teal 10-7-88

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. Goumont S.S. Teel		Rig BE 60L 27-11100 Felix Murphy	Well Number (#3) 699-541-E13B Depth 70' To 74'	Computer Number N/A	Project or Work Order No. 1100 Area Subcontract No. N/A
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.		Time	Drilling Comments
72' 2 1/4" 8 3"	of 8"			(70' continued) (Sand) - 5% brown H, 95% qtz, qzite, chert, & Si-rich rock fragments, SA-WR. Wet color: 2.5Y 7/2 - 7/4 (dark grayish brown to olive brown). Dry color: 2.5Y 7/2 (light gray). No reaction to 10% HCL.			
80' 7 1/4"						1200/1230	Lunch
80' 7 1/4" of 8"				Add 8' 5" of 8" casing 80' 7 1/4" of 8" Total		1235	Welding casing
						1420	FINISHED WELD
						1425	DRAINING
				HNU SURVEY w/ 11.7 PPM; 0 PPM HF SEDS., IN		1520	SHUT DOWN RIG
				HOLES d BETWEEN 10" d 8" CASING.		1530	DONE FOR DAY
						1535	RPT SURVEY;
							NOTHING DETECTABLE
REMARKS:							
Sha. W. J. J. 7 OCT. 1986							

C.21

DRILL LOG		By S.M. Goodwin	Rig BE 60L	Well Number (#3) 699-541-E13B	Computer Number N/A	Project or Work Order No. 1100 AREA
		Date 10 October 1968	#22-14100	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
				DRILLER IS FELIX MURPHY	0700	SEPARATING PIC
				HEAD CALIBRATED, 11.7 CU PAGES, SPAN AT 3.6	0715	DRILLING
	75'	H	WET	SILTY SANDY GRAVEL: 55% GRAVEL, 37% SAND, 8% MUD, 10% CP, 15% MP, 20% FP, 10% VFP, 5% VES, 10% CS, 15% MS, 4% FS, 3% VFS, 8% MUD. VERY POORLY SORTED GRAVELS ARE 20% BASALT, 15% ALTERED VOLCANICS, 25% GRANITICS, 40% QUARTZITE; UNBURNED = SA TO MID SANDS ARE 5% BASALT, 5% MIPA, 90% QUARTZ, PLAG, OTHER Si - RICH BY FRAG; A TO SA. WET COLOR IS 2.5 Y 4/4 (OLIVE BROWN); DRY COLOR IS 2.5 Y 6/2 (LT BROWNISH GRAY). RY TO 10% ILL IS SLIGHT. UNCONSOLIDATED. GEO SAMPLES TAKEN.	0735	SAMPLED w/ SAND PUMP; O RPM w/ 11.7 CU PAGE (SECS. A BOREHOLE)
					0800	PREPARING WELD
					0815	WELDING 3" CASING
	80' 7 1/4"				0850	FINISHED WELD
	+ 8' 11 1/4"			ADDED 8' 11 1/4" of 8" CARBON STEEL CASING; TOTAL 8'	0855	DRILLING
	= 89' 6 1/2" TOTAL			CASING = 89' 6 1/2"		
	80'	H	WET	SILTY SANDY GRAVEL: 65% GRAVEL, 30% SAND, 5% MUD, 15% CP, 20% MP, 20% FP, 10% VFP, 10% VES, 5% CS, 10% MS, 3% FS, 2% VFS, 5% SILT.	0905	SAMPLED w/ SAND PUMP
					0915	SHUT DOWN; CAL GAS FILLING PIC
REMARKS:						
						ALU HILL, DOW 10 OCTOBER 1968

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water A6000 021 (5 85)

DRILL LOG		By S. M. GOODWIN	Rig BE 60L	Well Number (*3) 699-541-E13B	Computer Number 13/A	Project or Work Order No. 1100 ACFA
		Date 10 OCTOBER 1966	# 22-11110	Depth 80' 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'	H	WET	(CONT.) VERY POORLY SORTED GRAVELS ARE 20% BASALT, 15% VARIOUS VOLCANICS, 40% QUARTZITE, 25% GRANITE; SA TO WR. SANDS ARE 5% BASALT, 90% SI-RICH RX FRAGS, QUARTZ, 1 PING, 5% MUD, A TO SA. WET COLOR IS 2.5 Y 4/4 (OLIVE BROWN); DRY COLOR IS 2.5 Y 6/2 (LT. BROWN GRAY). UNCONSOLIDATED. PY. TO 10% HELL IS VIBRONS. INCREASE IN GRAVEL & LESS FINES; SAMPLE POSSIBLY BUT REPRESENTATIVE. DRILLER LOST SOME FINES WHEN OBTAINING SAMPLE. GEO. SAMP. THROW.	0920	DRILLING
	85'	H	WET	SILTY SANDY GRAVEL: 52% GRAVEL, 40% SAND, 8% MUD. 2% VCP, 10% CP, 15% MP, 15% FP, 10% VFP, 10% VCS, 8% CS, 15% MS, 4% FS, 3% VFS, 8% SILT. VERY POORLY SORTED. GRAVELS ARE 20% BASALT 10% ASSORT. VOLCANICS, 10% MESH GNEISS, META. VOLC., 35% QUARTZITE, 25% GRANITES; SR TO WR.	1015 1020 1050	SAMPLED w/ SAND PUMP DRILLING PREPAILING IS YIELD 8' CASING
REMARKS:						
<i>Shu Hui</i> 10 OCTOBER 1966						

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 (6-86)

DRILL LOG		By G M Goodwin	Rig B.E. 60	Well Number (#3) 699-541-E13B	Computer Number N/A	Project or Work Order No 1100 AREA
		Date 10 October 1966	# 22-11100	Depth 85' to 90'		Subcontract No 131A
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc	Ttme	Drilling Comments
	85'	H	WET	(CONT) SANDS ARE 7% BASALT, 90% QUARTZ, PLAG.; Si-RICH RX FRAGS, 3% MICR. TO SA WET COLOR IS 2.5 Y 4/4 (OLIVE BROWN), DAY COLOR IS 2.5 Y 6/2 (LT BROWN GRAY). RX TO 10" HCL IS VIGOROUS. UNCONSOLIDATED LESS GRAVEL THAN 80' SAMPLE GEO SAMPLES ~ 1 US. ~	1105	WELDING 2'
	89' 7 1/4"			9' 9 3/4" OF 8" CARBON STEEL CASING	1140	FRICTION WELD
	9' 9 3/4"			8" CASING = 99' 5"	1145	DRAWING
	99' 5"				1242	LUNCH
					1235	DRAWING
	288'				1255	BROWN SILTS, LITTLE GRAVEL
	90'	H	WET	SANDY SILT. 4% GRAVEL. 45% SAND, 51% MUD (41% SILT 10% CLAY). 1% FP. 3% VFP, 3% JCS. 2% CS, 12% MS 13% FS 15% VFS, 51% O (SILT + CLAY). MODERATELY WELL SORTED GRAVELS ARE 20% BASALT. 10% OTHER VOLCANICS 70% QUARTZITE & GRANITE	1305	SAMPLED w/ DART BAREN; 0 PPM w 10.2 PROBE (SPEC & HCL)
					1310	DRAWING
REMARKS						
Alt. H <sub>2</sub> O. 10 OCTOBER 1966						

C.24

DRILL LOG		By S. M. Goodwin	Rig BE 60L	Well Number (#?) 699-541-E13B	Computer Number N/A	Project or Work Order No 1106 AREA
		Date 10 OCTOBER 1968	H 72-14100	Depth 90' 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
	90'	H	WET	(CONT) SANDS ARE 7% BASALT, 3% MICA, 90% QUARTZ & Q-RICH, A TO SA 1 COLUMN IS 2.5Y 5/2 (GRAYISH-BRN), DAT COLOR IS 2.5Y 7/2 (LT. GRAY) SLIGHT RX. 10% UNCONSOLIDATED. MUCH FINER SSC COULD BE GETTING INTO LOWER RINGOLD GED SAMPLES TAKEN		
	93'	H	WET	SANDY SILT 3% GRAVEL, 30% SAND, 67% SILT & CLAY CLAY % IS ~50% OF MUD FRAGMENT, SILTS = ~17% H <sub>2</sub> O IS SHUT OFF; DRILLED THIS TO ADD H <sub>2</sub> O TO DATA. I BELIEVE THIS CONFINING LAYER IS @ BOTTOM OF THE UNCONFINED AQUIFER, DATA THIS STOPPED DRILLING WITH BACKPULL TO FIND EXACTLY WHERE THE CONFINING LAYER BEGINS	1340 1345 1500 1520 1530	SAMPLED OFF DETU BIT STANDBY; CALLING PROJECT MANAGER WELDING PULLEN HEND BACK PULLING 10" CRASING SITTING DOWN PJC DONE FOR DAY
REMARKS						
<i>Alan H. Mark</i> 10 OCTOBER 1968						

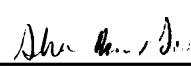
C.25

DRILL LOG		By S. M. GOODWIN	Rig DE 60C	Well Number (#3) 699-541-E13B	Computer Number N/A	Project or Work Order No. 1100 AREA
		Date 11 October 1986	H22-14100	Depth ~ 92' to 95.5'		Subcontract No. N/A
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				DATUM D FEEL MURPHY; CHANGING TOOLS TO TAKE A SPLIT-SPOON SAMPLE. RECEIVED WORD FROM G.V. LAST THAT WE WILL TAKE A SPLIT-SPOON SAMPLE FROM 93'-95'.	0700	PULLED BACK 8" CASING 2' 9" YESTERDAY P.M.
				D/B = 92' 2" + 2' 1/2" - 2' 7" STICKUP - 91' 7 1/2" (PUL 300' TAPES # (300-08))	1130	D/B
				CLEANING OUT HOLE WITH DIRT BAILEY	1135	BAJLING WELL
				CHECKED BARSO MARGINAL & HOLE W/ HNU, 0 PIM w/ 10.2EV PROBE.	1140	HNU
				D/B = 93' (MEASURED W/ TOOL STRING)	1145	D/B
	93'-94.5'			SAMPLING INTERVAL = 93'-94.5'. SAMPLED W/ SPLIT SPOON SAMPLER & TAP SLEEVES. DRILL STRING & TOOLS WEIGHT ~ 900 LBS. COUNTED 55 TOTAL BLOWS TO OBTAIN SAMPLE. RECOVERED 1.5' OF 2' SAMPLING SLEEVE.	1150	SAMPLING
					1200/1230	LUNCH
					1235	PREPARING 10 SAMPLE
					1250	SAMPLING
	94.5'-95.5'			SAMPLE INTERVAL = 94.5' - 95.5'; FILLED ONLY 1/2 OF TAP SLEEVE. COUNTED 65 BLOWS; TOOL WOULD NO LONGER ADVANCE. SLEEVE WAS SPLIT	1255	SAMPLE
REMARKS:						
Alan H. Jones 11 OCTOBER 1986						

C.26

DRILL LOG			By S. M. Goodwill	Rig BE 60L	Well Number (#3) 699-S41-E13R	Computer Number N/A	Project or Work Order No. 1100 AREA
			Date 11 Oct. 1985	#22-14100	Depth 95.5' to 95.5'	Subcontract No. N/A	
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.		Time	Drilling Comments
				(CONT.) ALONG SEAM UPON OPENING SPLIT SPOON SAMPLER TAPED UP SLEEVE & WELL TRANS-PORT SAMPLES TO LABORATORY REFRIGERATOR AT SIGMA V			
						1310	CHANGING TOOL STRING
				PERFORMED STRAIGHTNESS TEST w/ 22' OF 6" S.S. CASING; WENT DOWN HOLE & RETURNED WITH EASE.		1415	STRAIGHTNESS TEST
				D/B = 95' 4 3/4" + 2' 1/2" TUBE - 2' 7" STICKUP		1430	D/B
				= 94' 10 1/4" (PUL TUBE # L300-08)		1435	DRIVER DONE FOR DAY; WAITING FOR NEW TO BE GEO-PHYSICAL LOGGED.
REMARKS:							
<i>Shaw W. Hall</i> 11 OCTOBER 1985							

C.27

DRILL LOG			By S M Goodwin	Fig BE 602	Well Number (#3) 699-S41-E3B	Computer Number N/A	Project or Work Order No. 1105 MCA
			Date 2 October 1985	Sheet 122 of 1100	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
				GEOPHYSICAL LOGGING OF WELL BY JOHN M. GILM, PNL USED NATURAL GAMMA PROBE, LOGGED 94'-2" INTERVAL		0930	GEOPHYSICAL LOG
				BOTTOM OF 8" CASING = 5 1/2" WILL PULL BACK TO -87' TO GET WATER IN BOREHOLE		1010	PREPARING TO BACKPULL 8"
				LOUIS WATKINS IS FALLING IN FOR FELIX,		1050	Welding-on pull-in, he-l.
						1100	BACKPULLING 8"
						200/1230	LUNCH
						240	BACKPULLING 8"
				D/B = 876' (PNL 30" TAP # --10128) ; D/W = 532' (PNL E. TAP # 12176). BOTTOM		1325	FINISHED BACKPULL
				OF 8" CASING = 36.0'		1330	1st SAMPLES
1/4	SAND			D/B = 874.5' ; WILL ADD 1/2 5 GALLON BUCKETS SILICA SAND (4 30 MESH) TO ENSURE THAT WE ARE ABOVE SILT & CLAY CONTACT.		1345	D/B
				D/B = 866.5' AFTER ADDING SAND ; WE WILL SET STAINLESS STEEL CASING & SCREEN AT THIS DEPTH.		1350	D/R
						400	SETTING 1" S.S. CASING
REMARKS							
						 2 OCTOBER 1985	

C.28



DRILL LOG		By S.M. Goodwin	Rig BE 60L	Well Number (# 3) 699-S41-E13B	Computer Number N/A	Project or Work Order No 1108 N/A
		Date 12 OCTOBER 1986	# 22-14100	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
				FINISHING SETTING 4" STAINLESS STEEL TYPE 304 CASING	1445	
				PLACED IN HOLE :	1450	DONE FOR DAY
				① 1 10.3' SECTION OF 40 SLOT S.S. SCREEN		
				② 3 20' SECTIONS OF 4" STAINLESS STEEL CASING		
				③ 1 10' SECTION OF 4" STAINLESS STEEL CASING		
				④ 1 5' SECTION OF 4" STAINLESS		
				⑤ 1 3' SECTION OF 4" STAINLESS		
				TOTAL CASING & SCREEN = ; VITON		
				O-RINGS PLACED ON EACH JOINT		
				WELDED CENTRALIZERS ARE AT 1' & "		
				A 40' ABOVE -PI OF SCREEN		
REMARKS						
<i>Shu H. ...</i> 12 OCTOBER 1986						

C.29

C:30

DRILL LOG			By S. M. Goodwin	Rig BL 60L	Well Number (#3) 699-541-E13B	Computer Number N/A	Project or Work Order No. 1100 AREA
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.		Time	Drilling Comments
				DRILLER IS FELIX MURPHY		0700	STANDBY; WAITING FOR EQUIPMENT
				BOLT AND CENTRALIZER PLACED AT BOTTOM OF 10'		0830	
2 BAGS SAND				G.S. SECTION OF CASING		0900	ADDED 2 BAG SAND
				D/B (SAND) = 79.9' (PUL INP: 4" (3.0" - 0.8"))		0910	D/B
				D/B (INSIDE 4" CASING) = 86.95' BOTTOM OF 6"		0915	WELDING PULLER
				CASING = 86'		0930	PULLING 6"
						1005	CUTTING 6" CASING
				PULLED 6" CASING ~ 3.5'; BOTTOM OF 6" = 82.8'		1015	D/B
2				D/B (SAND) = 81.45' 1.35' OF OVERLAP.		1030	ADDING SAND
+ 3				ADDED 3 100 LB. BAGS OF 16-30 SILICA SAND;		1035	D/B
= 5 BAGS SAND				D/B = 68.95' 13.25' OF OVERLAP.		1040	WELDING END
						1050	PULLING 6"
						1100	WELDING PULLER
						1110	PULLING 6"
				BOTTOM OF 6" CASING = 77.1'		1120	CUTTING 6"
				D/B (SAND) = 72.45'; 4.65' OF OVERLAP.		1125	D/B
						1130	ADDING SAND
REMARKS:							
<i>Sheila Ann</i> 13 OCT. 1986							

DRILL LOG		By S. M. JOHNSON	Rig BE 600	Well Number (52) 699-541-13B	Computer Number N/A	Project or Work Order No. 1100 A/CAT
		Date 13 OCTOBER 1956	Depth 122-11100	Depth COAL 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
5 BAGS				D/B = 70.05' ; 7.05' of overlap. Added 1/2 100	1135	D/B
+ 1/2				1 lb. BAG of 16-30 Mesh SAND.	1140	WEIDING PULLER
= 5 1/2					1150	PULLING 8"
+ 1/4 (10/12)					1200/1230	LUNCH
= 5 3/4 BAGS TOTAL SAND					1235	WEIDING EAR
					1245	PULLING 8"
				PULLING 8" CASING 4' ; BOTTOM OF 8" = 73.1'	1255	CUTTING 8"
				D/B (SAND) = 72.0' ; 3.1' of overlap. TOP	1305	D/B
				of SAND PACK ; 14.95' of SAND PACK. SAND	1315	RUNNING TRUSS
				IS 4.65' ABOVE TOP OF SCREEN. BENTONITE		PIPE DOWN HOLE.
				GROUT WILL BE TAPPED DOWN HOLE TO		
				~ 2' ABOVE THE H <sub>2</sub> O TABLE.		
				USED A WESTERN POWER - GROVER IN MIX GROUT ;	1330	MIXING BENTONITE
				USED 1 100 LB. BAG OF POWDERED BIG HORN		GROUT
				BENTONITE + 50 GALLONS H <sub>2</sub> O. TOO LUMPY FOR	1345	POURING GROUT
				MARCH FUNNEL VISCOSITY.		
				D/B (GROUT) = 49.65' ; 20.4' of overlap.	1350	D/B
					1355	PULLING TRUSS
REMARKS:						
Alma W. Hall. 13 Oct. 1956						

C.31



DRILL LOG				By S. M. Goodwill	Rig BE 602	Well Number (#3) 699-541-E13B	Computer Number N/A	Project or Work Order No. 1105 APPA
				Date 14 October 1988	#22 11/100	Depth Camp 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
				DRILLER IS FELIX MURPHY			0700	STARTING JOB
							0720	WEAVING EAR
							0740	PULLING 8" CASING
							0810	CUTTING 8" CASING
				D/D (TOP OF GRout) = 69.45'; BOTTOM OF 8"			0815	D/B
				CASING = 70.15'. 0.70' OF OVERLAP.			0825	RUNNING TRENCH
				(PUL 300' TAPS # L-300-08)				PIPE
				USED 3/4 of 100 LB. BAG BIG HOEN POWDERED			0900	MIXING GRout
				BENTONITE & 40 GALLONS POTABLE H <sub>2</sub> O;			0915	PUMPING GRout
				VERY THICK, > 100 S/GUMI.			0930	REMOVING TRENCH
				D/B (GRout) = 43.15. 27' OF OVERLAP.			0940	D/B
							0945	WELDING PULVER
							1005	PULLING 8"
							1035	CUTTING 8"
				BOTTOM OF 8" CASING = 60.95'; D/D (GRout) = 54.45.			1045	D/B
				6.5' OF OVERLAP.			1050	RUNNING TRENCH
				MIXED 3/4 of 100 LB BAG POWDERED BENTONITE + 40 GAL. H <sub>2</sub> O			1105	MIXING GRout
				D/B = 41.05'; 19.90' OF OVERLAP			1120	D/B
REMARKS:								
Alan H. Stark 14 October 1988								

C.33

DRILL LOG		By S. M. Goodwin	Rig BE 60L	Well Number (#3) 699-541-E13 B	Computer Number N/A	Project or Work Order No. 1100 AREA
		Date 14 October 1958	# 22-14100	Depth COMP. 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
				DEADPULLING 8" CASING FROM BOREHOLE	1125	
					1135	CUTTING 8"
				BOTTOM of 8" = 50.6'; D/B (GROUT) = 45.6'	1140	D/B
				5' of OVERLINE.	1150	PULLING 8"
					1200/1230	LUNCH
				PULL 8" CASING 2 1/2'; BOTTOM of 8" CASING	1300	D/B
				= 48.1'. D/B (GROUT) = 44.65'	1305	PULLING 8"
				PULL 8" CASING 2'; BOTTOM of 8" = 46.1'	1310	D/B
				D/B = 43.85'. TUBE IS GETTING STUCK ON SIDES		
				of CASING; PROBLEMS GETTING AN ACCURATE D/B.		
				SPECS. ALLOW US TO ENTER SMT MUDING CRUMBS	1315	
				NOW THAT WE ARE ABOVE H <sub>2</sub> O TUBE OR CONTINUE		
				w/ GROUT. WE WILL CONTINUE TO ADD BENTONITE		
				GROUT TO PREVENT CRUMBS FROM BRIDGING ON		
				THE SIDES OF THE WET CASING.		
				Added bentonite slurry, DB (groud) at ~30', will add a little	1405	
				more to make sure there's enough for a 10' pull. ~10 gal		
				Added ~15 gal slurry, DB (groud) ~25' from top of casing		

REMARKS:

M.A. Channer, 10/14/58

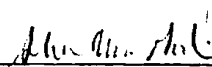
D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine \_\_\_\_\_ Standing Water

A 6000 021 (5-85)

C.34




C.36

DRILL LOG		By S. M. Goodman	Rig BS 602	Well Number (* 3) 699-541-E13B	Computer Number N/A	Project or Work Order No. 1105 AREA
		Date 17 OCTOBER 1986	# 22-14110	Depth COMP. 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
				DRILLER IS FELIX MURPHY	0700	SEARCHING 1/4"
					0715	WORKING AT 1/4"
				1 1/2" (BENTONITE SLURRY) = 29.65' ; BOTTOM	0730	D/B
				OF 8" = 33'. SWARTZ BATCH CONSISTS OF 20	0800	MIXING SLURRY
				GALLONS 1/2" ~ 10 LB. POWDERED BENTONITE, 17 LB. CRUMBS	0815	POURING SLURRY
				D/B (BENTONITE SLURRY) = 16.15' ; 16.85' OF OVERLAP.	0825	D/B
					0830	WELDING FANS
				6" CASING TIGHT ; CAN'T DEADPULL.	0840	PULLING 8"
					0900	WELDING PULLER HEAD
					0915	PULLING 8" PULLER
				D/B (SLURRY) = 17.5' ; PULLED 8' CASING	0950	D/B
				2.5'. BOTTOM OF 8" = 30.5'	0955	WELDING PULLER
					1005	PULLING 8"
					1015	CUTTING 8"
				D/B (SLURRY) = 18.23' ; BOTTOM OF 8" = 27.4'	1025	D/B
				PULLED 8' CASING 3' ; BOTTOM OF 8" = 24.4'	1030	DEADPULLING 8"
				D/B (SLURRY) = 20'	1035	PULLING 8"
				D/B (SLURRY) = 20.4' ; BOTTOM OF 8" = 23.3'	1040	D/B
REMARKS:						
 17 OCTOBER 1986						

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 BCE 600	Well Number (43) 699-541-E13B	Computer Number N/A	Project or Work Order No. 1100 AREA
		Date 17 OCTOBER 1986	H 22-14100	Depth COMP. 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
				PULLED 8" CASING 1' ; BOTTOM OF 6" = 27.3'	1045	PULLING 8"
				D/B (SLURRY) = 20.45'	1050	D/B
				ADDED 10 GALLONS OF BENTONITE SLURRY (10 GAL H <sub>2</sub> O,	1100	ADDED SLURRY
				~15 LBS. COBBLES, ~5 LBS. POWDERED BENTONITE)	1105	
				PULLED 8" CASING FREE FROM 10" SURFACE CASING;	1110	PULLING 8"
				BOTTOM OF 10" CASING = 19'		
				D/B (SLURRY) = 18.65' ; 0.35' OF OVERLAP	1120	D/B
				(D/B PREVIOUS TO PULLING 8" CASING FREE WASN'T	1125	RIGGING UP TO PULL
				POSSIBLE DUE TO AMOUNT OF SLURRY STICKING TO		10" CASING
				SIDES OF CASING)		
					1200/1230	Lunch
				Mixing grout. Mix consists of 5 bags Portland Cement,	1230	
				1 pt Al powder, 10 gal H <sub>2</sub> O.		
					1250	Pouring Grout
				D/Grout = 7.1' - 1.1' stick-up = 6.1'	1255	
				Bottom of 10" @ 19' 2 1/2"		
					1300	Pulling Casing
REMARKS:						
 17 OCTOBER 1986						

C.37

DRILL LOG		By Teel / Goodwin	Rig BE 60L	Well Number (#3) 699-541-E13 B	Computer Number N/A	Project or Work Order No. 1100 AICA.
		Date 10-17-88	27-11100	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
				Pulled 10" casing to 8'10" b.l.s.	1330	
				D/Grout = 10' b.l.s.		
					1340	Mixing Grout
				Used 4 94 LB. BAGS OF PORTLAND CEMENT, 40 GALLONS	1350	POURING CEMENT
				H <sub>2</sub> O & 1% BY VOLUME ALUMINA POWDER.		Grout
				D/B (CEMENT GROUT) = 0.5' B.L.S.	1355	PULLING 10"
					1420	REMOVED 10" CASING
				D/B (CEMENT GROUT) = 2.8' B.L.S. WITH DI FINAL	1425	D/B
				D/B TOMORROW A.M. TO DETERMINE IF GROUT	1430	DONE AT PJS FOR TRK
				HAS SETTLED.		DAL; WILL BAIL
						W/ RIG IN A.M.
REMARKS:						
Alu. H <sub>2</sub> O - Jant. 17 OCTOBER 1988						

C.38

DRILL LOG			By S. M. Goodwin	Rig BE 600	Well Number (#3) 699-541-E13B	Computer Number N/A	Project or Work Order No. 1100 AFA	
			Date 18 OCTOBER 1982	# 22-14100	Depth DEV. 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
				DRILLER IS FRANK MURPHY			0700	SERVICING PIZ
				D/B (MUDS 4") = 86.45' + 2.35' TMS - 1.9'			0720	D/B
				STICKUP = 86.9' (PML 300' TMS # L300-04)				
				D/W = 55.82' - 1.9' STICKUP = 53.92' (PML F. TMS # 12176)			0725	D/W
							0730	CLEANING CROWL
				USING A DART BAILER TO DEVELOP WELL; 3 1/2" I.D.			0800	BAILING VIEW
				A ~16' LONG, VOLUME = ~5.5 GALLONS.				
				BRINGING UP 1 BASKET / 45 SECONDS. H <sub>2</sub> O TURBID,			0815	
				BUT < 1 TABLESPOON SAND PACK & FINES PER 5 GALLON BUCKET.				
				BAILED 5 TIMES FROM TOP OF AQUICLUD TO BAIK IN SANDS & THEY WENT TO BOTTOM. < 1 TMS.			0850	
				SAND PACK IN BOTTOM OF 5 GAL. BUCKET. LOOKS GOOD!				
				BAILED FROM BOTTOM; ~1 TEASPOON SAND PACK IN 5 GALLON BUCKET. WILL CONTINUE BAILING.			0930	
				BAILED 3" FROM BOTTOM; ~1/2 TMS. SAND PACK & V.F. & C. SAND FROM FORMATION.			1010	
REMARKS:								
 18 OCTOBER 1982								

C.39





DRILL LOG		By S M Goodwin	Rig NO 212	Well Number (# 2) 699-541-E13A	Computer Number 10/A	Project or Work Order No 1100 AREA
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc	Time	Drilling Comments
				ACME CONCRETE TRUCK IS POURING CONCRETE	0815	POURING PAD
				PAD. CONCRETE IS AIR-ENCAINED; REFER		
				TO LOG FROM WELL #1 (10/26/85) FOR		
				BATCH MIXTURE ESTIMATED VOLUME OF		
				CONCRETE = 1/2 YARD INSTALLED 4	0845	FINISHED WITH
				PROTECTIVE POSTS & 6" PROTECTIVE S.S.		PAD.
				CASING IS 2 1/2' ABOVE TOP OF 4"		
				SURVEY MARKER PLACED.		
REMARKS						
Steve H. Goodwin 26 October 1985						

C.42

DRILL LOG		By	Rig	Well Number	Computer Number	Project or Work Order No.
		S. M. GOODWIN	No 216	(#3) 699-541-E13B	N/A	1100 AFAA
		Date		Depth		Subcontract No.
		28 OCTOBER 1965		DEV. To		N/A
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				D/W = 57.5'; D/W IS FROM TOP OF PREMISE PIPE (PUL E. PIPE # 12021)	0922	D/W
				USING A 1 1/2 H.P. GRUNDFOS SUBMERSIVE PUMP TO DEVELOP WELL; PUMP SET AT BOTTOM OF WELL, INTAKE IS ~ 1.5' FROM BOTTOM OF PUMP.	0925	PUMP ON
				D/W = 60.5'; PUMP RATE = 5.73 GAL / 27 SEC. H <sub>2</sub> O CLEAR & CLEAN, VERY LITTLE SEDS.	0927	D/W 12.73 GAL / MIN.
				D/W = 60.8'; 3.3' OF DRAWDOWN 5.73 GALLONS / 26.79 SEC; H <sub>2</sub> O SAMPLE = 6 NTU H <sub>2</sub> O CLEAR & CLEAN, NO SEDIMENTS	0930 0932	D/W 12.83 GAL / MIN.
				D/W = 61.05' 5.73 GALLONS / 26.75 SECONDS; H <sub>2</sub> O SAMPLE = 3.2 NTU	0935 0940	D/W 12.85 GAL / MIN.
				D/W = 61.0' 5.73 GALLONS / 26.30 SEC; H <sub>2</sub> O SAMPLE = 2.2 NTU	0941 0948	D/W 13.07 GAL / MIN.
				D/W = 60.9'; 3.4' OF DRAWDOWN	0949	D/W
					0950	PUMP OFF
				D/W = 57.8'; NEARLY RECOVERED.	0953	D/W
REMARKS: NTU MEASUREMENTS PERFORMED W/ HACH PATID TURBIDIMETER, PORTABLE H <sub>2</sub> O ANALYSIS MODEL. <i>Sha. Wm. Arndt</i> 28 OCTOBER 1965						

DRILL LOG		By S.M. Goodman	Rag No 23C	Well Number (43) 699-541-E13B	Computer Number N/A	Project or Work Order No IUD AREA
		Date 28 OCTOBER 1986	Depth DEV. 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 = 57.65'	0955	PUMP ON
				5.73 GALLONS / 25.76 SEC, H <sub>2</sub> O SAMPLE = 8.8 NTU	0957	13.35 GAL/MIN
				D/W = 60.9'	0959	D/W
				H <sub>2</sub> O = 2.9 NTU	1000	
					1002	PUMP OFF
					1004	PUMP ON
				5.73 GALLONS / 26.75 SEC; H <sub>2</sub> O SAMPLE = 6.9 NTU	1006	12.85 GAL/MIN
				D/W = 60.85'	1008	D/W
				H <sub>2</sub> O SAMPLE = 2.8 NTU	1009	
					1010	PUMP OFF
					1012	PUMP ON
				5.73 GALLONS / 26.13 SEC, H <sub>2</sub> O SAMPLE = 7.1 NTU	1014	13.15 GAL/MIN
				H <sub>2</sub> O SAMPLE = 2.8 NTU	1016	
				D/W = 60.75'	1018	D/W
				H <sub>2</sub> O SAMPLE = 1.9 NTU	1019	
				PUMPED WELL FOR 50 MINUTES; AVERAGE PUMP RATE 12.96 GAL/MIN. ESTIMATED VOLUME PUMPED = 648 GALLONS	1021	PUMP OFF
REMARKS PLACED LOCK ON WELL AFTER PUMPING						
Alex G. Jordan 28 OCTOBER 1986						

C.44



DRILL LOG		By S. M. GOODWIN	Rig CRANE	Well Number (H3) 699-541-E13B	Computer Number N/A	Project or Work Order No 1100 AREA
		Date 3 NOVEMBER 1988		Depth PUMP SET 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/B = 88' + 2.17' TAPE - 3.3' STICKUP & PAD	1015	D/B
				86.87' (PNE TAPE d ~ % nu(?) )		
				= 57.55' - 3.7' STICKUP & PAD = 54.25'	1020	D/W
				(PNE E TAPE # 12021)		
				LAYING GROUND TAPE & PREPARING TO BEGIN HYDROSPIN	1020	
				INSTALLATION		
				SCREENED INTERVAL IN THIS WELL IS 10'; WE		
				IN-SET THE PUMP 5' INTO THE SCREENED		
				INTERVAL		
				DRILLERS ARE INSPECTING PUMP & PUMP COLUMN	1025	PREPARING PUMP
				FOR INTEGRITY PUMP & PIPES ARE ON GROUND LEVEL,		INSTALLATION
				DRILLERS ARE WEARING CLEAN CLOTH GLOVES		
				DRILLERS ARE TIGHTENING JOINTS & TAPING THEM		
				W/ TEFLON. MATERIALS WERE REMOVED FROM		
				PREVIOUS COMMENTS AS NEEDED.		
				MATERIALS USED:		
				8 10' SECTIONS OF 3/4" STAINLESS PIPE		
				1 3' " "		
REMARKS				1 2.3' HYDROSPIN PUMP		

1100 AREA 3 NOVEMBER 1988

C.45

DRILL LOG		S. M. Goodwin 3 November 1988		Rig CRANE	Depth	Computer Number N/A	Project or Work Order No. 1100 AREA	Subcontract No. N/A
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc		Time	Drilling Comments	
				TOTAL MINS USED = 85.3' (PUMP + V)				
				INTAKE OF HYDROSIAM = 82' ; 5.80' ABOVE				
				BOTTOM OF T <sup>4</sup> , 5.15' BELOW TOP OF SCREEN				
						1045	INSTALLING HYDROSIAM	
					CUTTING PUMP ROD 2 1/2" ABOVE TOP OF PUMP MOUNT	1120	CUTTING ROD	
						1125	BEVELING & THREADING PUMP ROD	
					PUMP IS READY FOR TESTING	1130	FINISHED INSTALLING PUMP	
REMARKS								
Sha. Dr. / Dal. 3 November 1988								

C.46





**APPENDIX D**

**GEOPHYSICAL AND GEOLOGIC LOGS FOR WELL 4 (699-S43-E12)**

## APPENDIX D

### GEOPHYSICAL AND GEOLOGIC LOGS FOR WELL 4 (699-S43-E12)

This appendix contains the Well Completion/Inspection Report, as-built diagram, notes from the sampling pump installation, the natural gamma log, and the geologists' logs for well 4 (699-S43-E12) in the 1100 Area.



**AS-BUILT DIAGRAM**

Well Number 699-543-E12 1100 ARCA (H 4) Geologist TEEL GOODWIN Page 0 of 1  
 Reviewed by V.L. McEwan Date 11-8-88

Construction Data		Depth in Feet	Geologic/Hydrologic Data			
Description	Diagram		Diagram Litho.	Lithologic Description		
20' 5 1/2" of 10" CARBON STEEL SURFACE CASING W/ DRIVE SHOE (REMOVED)		5'		SANDY GRAVEL		
		10'		" "		
		15'		SILTY SANDY GRAVEL		
		20'		" " "		
64' 10" OF 8" CARBON STEEL CASING W/ DRIVE SHOE (REMOVED)		25'		" " "		
		30'		" " "		
		35'		" " "		
		40'		" " "		
45' OF 4" STAINLESS STEEL TYPE 304 CASING		45'		" " "		
		50'		STATIC H2O @ 48.2' B.L.S.		
		55'		RINGOLD CONTACT @ 50' B.L.S.		
		60'		" " "		
16' OF 20 SLOT STAINLESS STEEL TYPE 304 SCREEN (4" OM.)					DRILLED DEPTH = 61.75'	
					COMPLETION DEPTH = 58'	
COMPLETION SYMBOLS:						
///		CONCRETE PAD				
###	CEMENT GROUT					
////	GRANULAR BENTONITE					
x x x	BENTONITE PELLETS					
.....	SAND PACK					
— —	CASING JOINT					
○	CASING CENTRALIZER					

10/20/88



SAMPLING PUMP INSTALLATION IN  
GROUND-WATER MONITORING WELLS

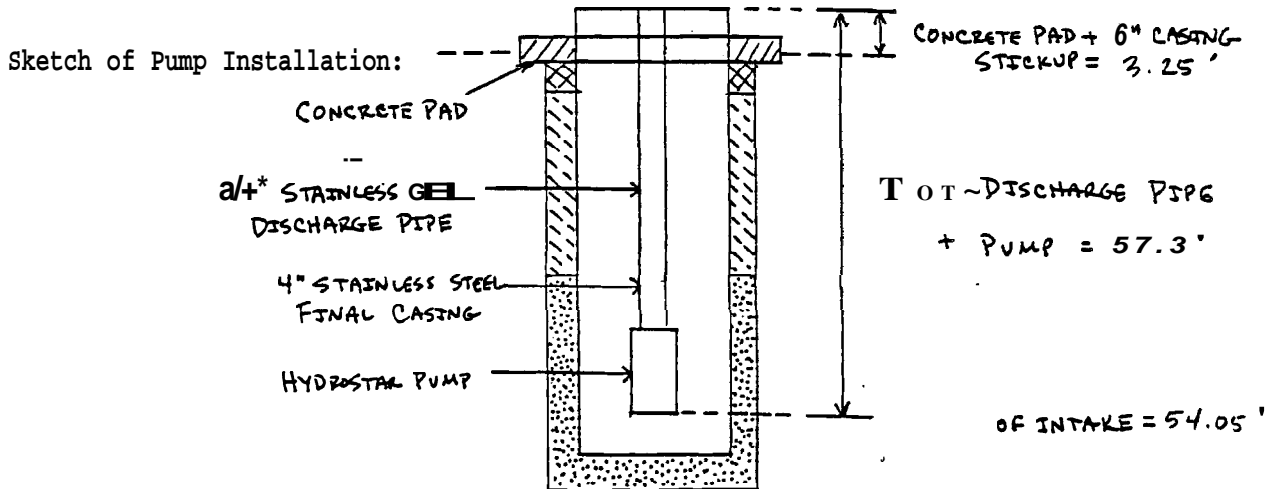
Site: I AREA  
Monitoring Well Number: (#4) 699-543-E12  
Depth to Water: 48.95'  
Depth to Bottom: 57.92' Reported Depth to Bottom: 58'  
Pump Type: Positive Displacement Piston  
Pump Model: Hydrostar HS-8001  
Date Installed: 11/4/88  
Installed By: KEH: OLIN AMOS CRAIG WAMSLEY. LENNY CORON

Pump Discharge Pipe Description:

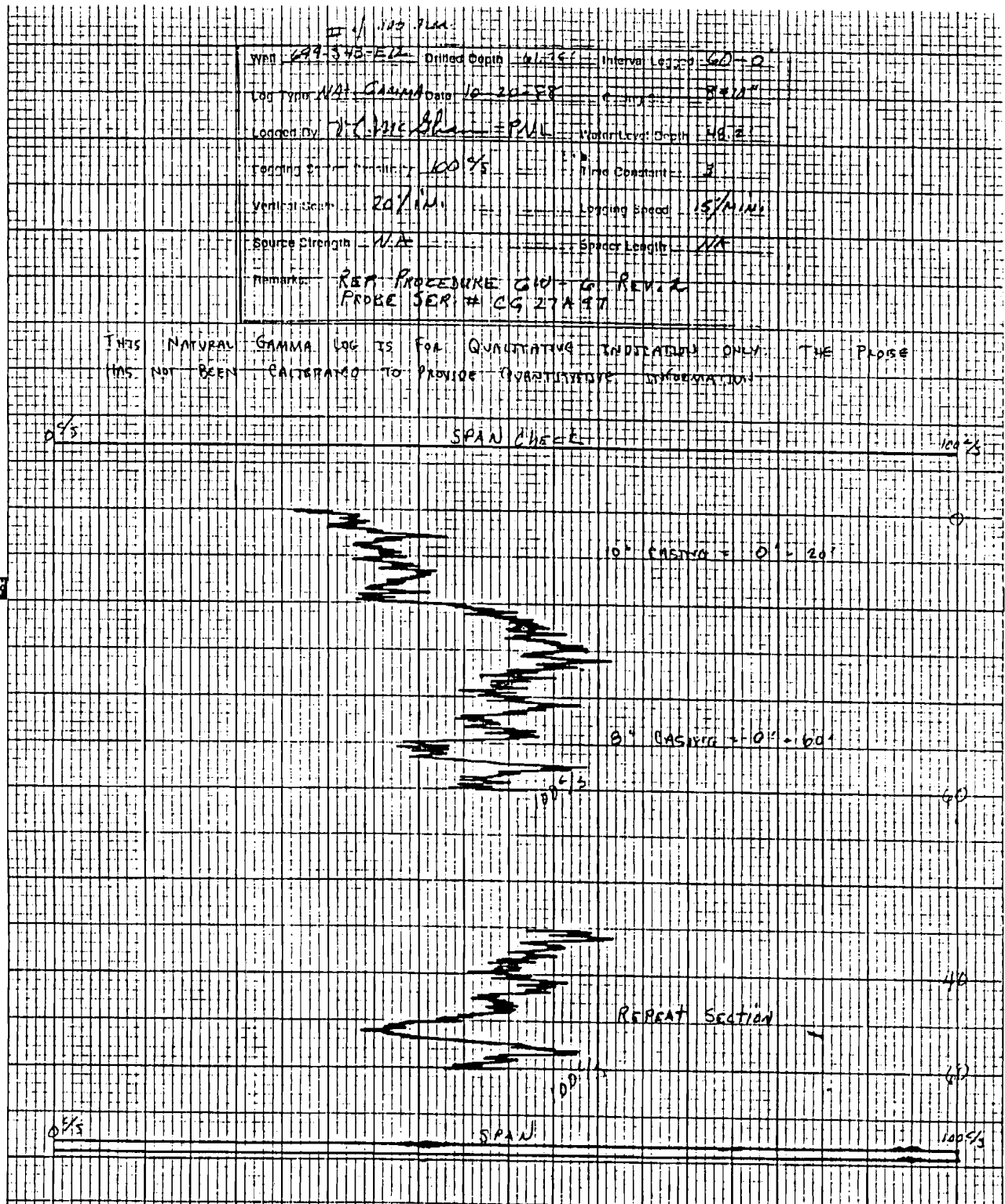
5 10' SECTIONS OF 3/4" STAINLESS STEEL DISCHARGE PIPE  
1 5' SECTION OF 3/4" STAINLESS STEEL DISCHARGE PIPE  
5' SECTION IS BETWEEN 10' & 15' BELOW PUMP BASE PLATE.

Additional Comments:

HYDROSTAR PUMP LENGTH = 2.3'; ALL JOINTS WERE TAPED WITH  
TEFLON. DRILLERS WORE CLEAN COTTON GLOVES.



Completed By: Sharon Ford Date: 11/4/88





DRILL LOG		By S.S. Teel	Rig BE 72W	Well Number (#4) 699-543-E12	Computer Number N/A	Project or Work Order No. 1100 Area
		Date 10-14-88	22-1410L	Depth 7' To 13'		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' 10"	0' 10"				0700	Driller arrives
						- Drilling
	10'	H	Wet	SANDY GRAVEL (50% gravel, 45% sand, 5% mud) 5% CP, 20% MP, 15% FP, 10% VFP, 10% VCS, 13% CS, 10% AS, 7% FS, 5% VFS, 5% mud (silt + clay). Poorly sorted. (Gravel) - 70% basalt, 10% andesite, porphyry, and other volcanics, 5% granite & Si-rich igneous, 15% qtz, qtzite, & chert. R-WR on orig. surfaces. (Sand) - 65% basalt, 35% qtz, & Si-rich rock fragments. A-R. Wet color: SY 5/1 to 4/1 (gray to dark gray). Dry color: SY 5/1 (light gray). Moderate reaction to 10% HCl. Unconsolidated. Original max grain size probably CP-VFP at this point. Sample is somewhat representative	0900	
	+ 11 1/2"				0910	Welding casing
	21' 11 1/2"				0955	Added 11' 1/2" of 10"
	- 1' 6"				1005	Driving casing
	20' 5 1/2"				1009/1030	Drilling
						Lunch
					1230	Drilling
				Cut 1' 6" of 10"		
REMARKS:				S.S. Teel 10-14-88		

D.8

DRILL LOG		By S S. Teal	Tag BG 22W	Well Number (#4) 699-543-E12	Computer Number	Project or Work Order No. 1100 Area
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc	Time	Drilling Comments
	15'	H	Wet	SILTY SANDY GRAVEL (45% gravel, 48% sand, 7% mud), 2% CP, 5% MP, 18% FP, 10% VFP, 5% UCS, 5% PS, 12% MS, 18% FS, 8% VFS, 7% mud. Poorly sorted. (Gravel) 65% basalt, 15% porphyry and other volcanics; 5% granitic Si-rich rock fragments, 5% qtz, qtzite, and chert. R-WR on orig. surfaces. (Sand) - 45% basalt, 25% qtz, qtzite, and Si-rich. A-SR. Wet color: 5Y 4/1 (dark gray). Dry color: 5Y 7/1 light gray. Slight reaction to 10% HCL. Unconsolidated. Similar to previous except more silt. Orig. max grain size VCP or larger. Sample is somewhat representative.	1	
				Calibrated HNU and checked well. Probe is 11.7 eV calibrated to benzene, span = 3.44. Reading at well head = 0.5	1425	
REMARKS						

D.9

S S. Teal  
10 14-88

DRILL LOG		By S.S.	Rig EE 224	Well Number Well Number 699-543-E12 699-543-E12	Computer Number N/A	Project or Work Order No 1100 Area
		Date 10-	22 1410Z	Depth 20' To 38'		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'	H	Wet	SILTY SANDY GRAVEL (48% gravel, 45% sand, 7% mud), 5% CP, 20% MP, 13% SP, 10% VFP, 7% VCS, 13% CS, 12% MS, 8% FS, 5% VFS, 7% mud, Poorly sorted. (Gravel) - 55% basalt (fresh), 15% andesite, porphyry, and other volcanics, 10% granite & other Si-rich ig., 20% qtz, qtzite, and chert. R-WR on orig. surfaces. (Sand) 75% basalt, 25% qtz, qtzite, chert, and other Si-rich rock fragments. A-SR. Wet color: SY 4/1 (dark gray). Dry color: SY 6/1 (gray). Slight reaction to 10% HCL. Unconsolidated. Very similar to previous. Grain sizes somewhat rep. Original max grain size = VCP or larger.	1450	Sample w/ Dart Bailer
					1520	Driller filling out logs cleaning up site
					1530	End of Day
REMARKS						
S S Teel 10 14 18						

D.10

DRILL LOG			By S.S. Teel	Rig BE 22W	Well Number (#1) 699-S43-E12	Computer Number N/A	Project or Work Order No. 1100 AFTI
			Date 10-17-88	22-14102	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
20' 5 1/2"	0' of 10'	total				0700	Driller arrives
							- Switching to 8" tools and preparing to run 8" casing.
				Calibrated HNU and checked well. Probe is 11.7 eV and is set at span of 3.66. Readings at well head = 0.0.		0800	
				Added 20' 6" of 2" casing (including drive shoe - not activated)			
				Added 9' 2" of 8" casing			
						1000	Drilling
	25'	H	Wet	SILTY SANDY GRAVEL (47% gravel, 47% sand, 6% mud) 2% CP, 14% MP, 18% FP, 13% VFP, 4% VCS, 11% CS, 11% MS, 14% FS, 7% VFS, 6% mud, Poorly sorted. (Gravel) - 55% basalt, 10% altered basalt and other rock fragments (green), 35% qtz, qtzite, chert and other Si-rich, SA-WR, on orig. surface. (Sand) - 75% basalt, 25% qtz, qtzite, chert, and other Si-rich rock fragments, A-R, Wet color: 5Y 4/1 - 5Y 3/1 (dark to v. dark gray)		1120	
	29' 2"			29' 2" of 8" casing			
REMARKS: S.S. Teel 10-17-88							

D.11





DRILL LOG		By 3 S. Teel	Rig BE22W	Well Number (#4) 699-543-E12	Computer Number	Project or Work Order No. 1100 Area
		Date 10-18-88	22-11102 Craighamsley	Depth 30' To 33'	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
37'8"					0700	Driller arrives
						- Drilling
				Calibrated HNU. Probe is 11.7eV and is calibrated to benzene with a span setting of 3.74	0740	
				Checked well w/ HNU. Reading = 0.0.	0750	
	20'	H	Wet	SILTY SANDY GRAVEL (47% gravel, 47% sand, 6% mud) 5% CP, 16% MP, 14% FP, 12% VFP, 5% UCS, 16% CS, 12% MS, 9% FS, 5% UFS, 6% mud. Poorly sorted. (Gravel) - 60% basalt, 15% altered basalt and other volcanics, 20% qtz, quartz, and chert, 5% Si-rich igneous/met rocks. NR on orig. surfaces. (son.) - 70% basalt, 30% qtz, quartz, chert, and other Si-rich, A-R. Wet color: 5Y 5/1 (gray). Dry color: 5Y 7/1 to 5Y 8/1 (gray to lt. gray). No reaction to 10% HCL. Unconsolidated. Max original grain size probably VCP to small cobble at minimum.	(Collected Yesterday)	
REMARKS: - Used 20 gal. Drilling - supply water yesterday						
						S.S Teel 10-18-88

D.13

DRILL LOG		By	Rig	Well Number	Computer Number	Protect or Work Order No
		S.S. Teel	BC 22W 22-14102	(H4) 699-543-E12	N/A	1100 Area
		Date		33' To 36'		Subcontract No
		10-18-88				N/A
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc	Time	Drilling Comments
37'8"	35'	H	Wet	SILTY SANDY GRAVEL (47% gravel, 47% sand, 6% silt). 5% CP, 18% MP, 14% FP, 10% VFP, 7% UCS, 16% CS, 14% MS, 7% FS, 3% VS, 6% mud. Mod-p, sorted. (Gravel) = 50% basalt. 25% altered basalt. andesite, and porphyry, 15% Qtz qtzite, and chert, 10% Si-rich ig/met rock fragments, trace caliche. SA-WR on original surfaces. (Sand) = 75% basalt. 25% Qtz. Qtzite, and Si-rich rock fragments. Wet color: 5Y 5/1 (gray). Dry color: 5Y 5/1 - 7/1 (light gray-gray). No reaction to 10% HCl. Unconsolidated. Similar to previous. Original Max grain size probably VCP to small cobble or larger.	0920	
					0950	Preparing to weld
37'8"						
+8'7"				Added 8'7" of 8" casing		
46'3"						
46'3"						
REMARKS						S.S. Teel 10-18-88

D.14

DRILL LOG		By SS Teel	Rig BC 22W	Well Number (#1) 699-543-E12	Computer Number N/A	Project or Work Order No 1100 111
		Date 10-18-88	22-14102	Depth 36' 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
46' 3"					1110	Drilling
					1200/1230	Lunch
					1230	
	40'	H	Wet	SILTY SANDY GRAVEL (48% gravel, 45% sand, 7% mud) 6% VCP, 8% CP, 15% MP, 12% FP, 7% UFP, 10% VCS, 15% CS, 10% MS, 5% FS, 5% UFS, 7% mud. Poorly to very poorly sorted. (Gravel) - 50% (fresh) basalt, 20% altered basalt, porphyry, andesite, 15% qtz, qtzite, and chert, 15% ig/met Si-rich rock fragments, trace breccia, trace rock fragments w/ caliche coatings. R WR on orig. surfaces. (Sand) - 75% basalt, 25% qtz, qtzite, chert, and Si rich, A-R. Wet color: 5Y 4/1 (dark gray), Dry color 5Y 6/1 (gray) slight reaction to 10% HCL. Unconsolidated. Max grain size probably small cobble at minimum. Sample somewhat representative (whole CP),	1250	Sample w/ Dart Railer
REMARKS						
9 S Teel 10-18-88						

D.15

DRILL LOG		BY S S. Teel	Rig BE 72 W	Well Number (# 41) 699-543-E12	Computer Number N/A	Project or Work Order No 1100 Areas
		Date 10-18 88	22 1410Z	Depth Y0' To 15'	Subcontract No N/A	
Total Coring	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc	Time	Drilling Comments
46'3"	45'	H	Wet	SILTY SANDY GRAVEL (45% gravel, 48% sand, 7% silt), 5% CP, 20% MP, 12% FP, 8% VFP, 8% VCS, 15% CS, 12% MS, 8% FS, 5% VS, 1% silt. Poorly sorted, (Gravel) - 65% basalt, 15% altered volcanics, andesite, porphyry, 20% qtz, qtzite, chert, and 19 Si-rich rock fragments. (Sand) - 75% basalt, 25% qtz, qtzite, chert, and Si-rich rock R-WR on orig. surfaces, Sands are A-R. Wet color: 5Y 5/1 to 5Y 4/1 (gray to dark gray). Unconsolidated. Similar previous. Max original grain size probably small cobble at minimum. fragments.	1405	Sample w/ Dart Bailer
					1410	Preparing to weld
46'3" + 9'3"				Checked well w/ HNU (11.7 eV probe). Reading = 0.0 Added 9'3" of 8" casing	1417	
55'6"						
					1530	End of Day End of Day
REMARKS				S S. Teel		
				10-18 88		

D.16

DRILL LOG		By S S Teel	Rig BE22W 22-14102	Well Number (#4) 699-543-E12	Computer Number N/A	Project or Work Order No. 1100 Arise
		Date 10-19 88	Craig Wansley	Depth 45' to 54'		Subcontract No. N/A
Total Coring	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche. Etc.	Time	Drilling Comments
55' 6"					0700	Driller arrives
						- Drilling
	50'	H	Met	SILTY SANDY GRAVEL (46% gravel, 47% sand, 7% mud) trace VP, 15% CP, 15% MP, 10% FP, 6% VP, 7% VP, 15% CP, 13% M3, 2% FS, 4% VFS, 7% mud, Poor - V. Poorly Sorted, (Gravel) - 60% basalt, 5% altered basalt and other volcanics, 35% qtzite, qtz, chert, granite, and other Si-rich rock fragments, trace caliche, R-WR on original surfaces, (sand) - 60% basalt, 10% qtz, qtzite, chert, and Si-rich rock fragments. Trace caliche. -R, Wet color: 5Y 1/2 (olivegray), Dry color: 5Y 6/2 (L. olive green) STRONG reaction to 10% HCL. Somewhat consolidated - casing will no longer 'follow'. Note: color change.	0800	Sample w/ Drive Barrel
				Calibrated HNU. Probe is 11.7eV and is calibrated to benzene with a span setting of 3.61.	0900	
				Checked well w/ HNU, Reading = 0.0	0903	
					0905	Bailing
					0915	Bailing up Bit
REMARKS:				S.S. Teel 10-88	0920	Driller left site to get equipment
					0925	Driller returns.

D.17

DRILL LOG		By S. W. Goodwin / S.S. Teel	Rig BE 2201 27-14102	Well Number (#1) 699-543-F12	Computer Number N/A	Project or Work Order No 1100 AREA
		Date 0-19-88	Craig Wamsley 54' 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
					0752	Building-up Bit
55' 6"					1100	WELDING 8" CASING
9' 4"				ADDED 9' 4" of 8" CARBON STEEL CASING; TOTAL	1200	FINISHED WELL
64' 10"				8" CASING = 64' 10"	1200/1230	LUNCH
					1235	DRILLING
				CALIBRATED HNU 1 10.2 EV RANGE TO BENZENE GAS;	1305	HNU CALIBRATION
				SPAN POT SET AT 5.7. 0 PPM OFF SURVEYED		
				SEDIMENTS.		
	55'	H	WET	SILTY SANDY GRAVEL: 45% GRAVEL, 17% SAND, 6% MUD.	1315	SAMPLED w/1000
				5% CP, 10% MP, 20% FP, 10% VFP, 7% VFS, 11% CS,		BALANCE; 0 PPM
				16% MC, 6% F, 1% VFS, 8% MUD. VCP + PDD.		OFF SCOS. w/10.2
				COILED. GRAVELS ARE 40% BASALT, 15% ALT. VOLCANICS		EV RANGE
				A POPPHY, 5% ASSORT METAMORPHICS, 23%	1320	DRILLING
				QUARTZITE, 17% GRANITES; ORIGINAL RX-SR TO WA.		
				SANDS ARE 30% BASALT, 10% ALT. VOLCANICS,		
				60% QUARTZ, PLG, Q-ZITE 1 (HGT); A TO SA.		
				WET COLOR IS SY 4/3 (OILY); DRY COLOR IS SY 7/3 (DARK		
				YELLOW), RT. TO 10% HCL IS MODERATE. SIGHTLY		
REMARKS:						
Alan H. Teel FT DIVISION 1988						

D.18

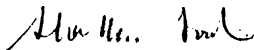
DRILL LOG		By S. M. Goodwin	Rig BE 72W	Well Number (41) 699-543-E12	Computer Number N/A	Project or Work Order No. 1140 N/A
		Date 19 October 1966	U 77-14107	Depth 55' to 59'		Subcontract No. N/A
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
	55'	H	WGT	(cont.) CONSOLIDATED, BUT NO CALICHE FOUND AT SECS. SIMILAR TO PREVIOUS SAMPLES; BASALT % DECREASING GEO. SAMPLES TAKEN.		
					1515	HOLE SURVEY, OFFM OFF SECS 1 TO HOLE (10.2 EV PROBE)
					1530	DONE FOR DAY
REMARKS:						
<i>Allen W. ...</i> 19 OCTOBER 1966						

D.19

DRILL LOG			By S Goodwin	Site BC 22W	Well Number (#4) 699-513-E12	Computer Number N/A	Project or Work Order No UD AREA		
			Date 20 October 1988	# 22-11102	Depth ~59 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	
				DRILLER IS CRAIG WANSLEY; I ASKED CRAIG TO WAIT UNTIL I GOT A D/W BEFORE STARTED TO DRILL THIS A.M. I DON'T KNOW HOW HE HIT LIA A I NEED AN ESTIMATION, DRILL DEPTH. WELL TRY GET A ROUGH ESTIMATION W/ DRILL STRING DOWN HOLE.			0705	DRILLING	
				ROUGH EST OF D/W = 52' (USED DRILL BITTER & E. MARK) WITH DRILL TO 63'			0710	D/W	
	60'	1	WET	SILTY SANDY GRAVEL: 15% GRAVEL, 15% SAND, 10% MUD, 3% CL, 10% MP, 15% FP, 7% VP, 5% ICS, 0% CS, 0% MS, 6% IS, 1% VFS, 0% UVD, VERY POORLY SORTED GRAVELS			0800	SAMPLED W/ DRILL BITTER	
				USE 30% BASALT, 15% ALT VOLCANICS & PORPHYRY, 5% METAMORPHICS, 30% QUARTZITE, 20% GRANITES, SR IN WR. SANDS ARE 15% BASALT, 10% ALT VOLCANICS, 75% QUARTZ, 2-LITE, TAG 1 HEAT: SAND SR, NET 200A BS 4			0805	DRILLING	
				1 1/2 OLIVE); DAY COLOR IS 5Y 6/3 (PALE OLIVE). STRONG PY, TO 10% UNCONSOLIDATED. (SEE BASALT MUD: MUD.			0815	DRILLER $\leq$ A1 K'S IN LAST 50 FT, STILL LOOKING SILTY SAND & GRAVELS W/ INCREASE IN SVES	
REMARKS				50 SAMPLES TAKEN					
				John Van Arndt 20 Oct 1988					

D.20



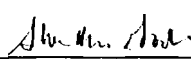
DRILL LOG		BY S M Goodwin	Rig BE 22w	Well Number (11) 699-543-E12	Computer Number N In	Project or Work Order No 1100 A55A
		Date 20 Oct 1985	# 22 14102	Depth ~62 TO TD		Subcontract No 11/11
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc	Time	Drilling Comments
				D/B = 65.65' - 4.1' STICKUP = 61.75' (PNC 300' TAKE # L300-01)	0820	D/B
				D/W = 52 2' - 4.1' STICKUP = 48.1' (PNC F TAKE # 12176) WITH STR HERE I DO STABILITY I, I, I ~ 13.65' OF H <sub>2</sub> O IN HOLE.	0825	O/W
				PASSED 22' 6" G S CASING DOWN HOLE - CASING WENT DOWN HOLE & RETURNED EASILY	0850	'STABILITY TEST
				VEAN MCGILVER PNL, LOGGED HOLE FROM 0'-60' w/NATURAL GAMMA PROBE	0900	GEOPHYSICAL LOG
				D/W = 52 2' - 2' STICKUP = 48 2'	0930	FINISHED LOGGING
				OBTAINED H <sub>2</sub> O SAMPLES RAPID ANALYSIS BY U.S. TESTING Co.	0932	CURTING 8" CASING
					0935	D/W
					0946	H <sub>2</sub> O SAMPLES
					0956	BREAKING DOWN TUBES
					1201/1230	LUNCH
				CASING A SCREENS ALL HAD PLUMBING PLASTER A THROU. VISUALLY INSPECTED ALL CASING & SCREENS: OKAYED FOR USE.	1235	SETTING STAINLESS STEEL CASING
					1300	REG OUT OF FUEL
REMARKS						
 20 OCTOBER 1985						

D.21

DRILL LOG			BY S.M. Goodwin	Rig D.C. 22w	Well Number	Computer Number	Project or Work Order No.
			Date OCTOBER 1968 <td># 22-11102 <td>Depth (41) 644-543-E12 COALP To</td> <td>N/A</td> <td>1100 ALCA</td> </td>	# 22-11102 <td>Depth (41) 644-543-E12 COALP To</td> <td>N/A</td> <td>1100 ALCA</td>	Depth (41) 644-543-E12 COALP To	N/A	1100 ALCA
							Subcontract No. N/A
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.		Time	Drilling Comments
				MATERIALS USED: (ALL 4" FINAL CASING)		1400	FINISHED SETTING
				1 10.6' 20 SLOT S.S. SCREEN (304)			STAINLESS CASING
				1 5.4' 20 SLOT S.S. SCREEN (TYPE 304)		1405	PTF SAVEREED OUT
				2 20' SECTIONS OF S.S. CASING (304)			SOIL SAMPLES;
				1 5' SECTION OF S.S. CASING (304)			NO DET. CONTAMINANT.
				TOTAL CASING & SCREEN = 61'			
				UTTER D-RINGS WERE ON EACH JOINT. DRILLERS			
				USED COTTON GLOVES WHILE PLACING CASING.			
				CENTRALIZER WERE 5' + 36' ABOVE BOTTOM OF			
				4" CASING			
				D/W = 48.2' B.L.S.		1410	D/W
						1420	ADDING SAND
1 BAG	SAND			ADDED 1 100 LB. BAG OF 16-30 MESH SAND		1422	D/B
				1 PLACED CASING, BOTTOM OF 4" S.S. IS AT		1425	ADDING SAND
1				58'			
2				ADDED 2 100 LB. BAGS OF 16-30 MESH SAND;			D/B
3 BAGS	SAND			D/B = 48.95'. BOTTOM OF 6" = 60.7			
REMARKS: 11.85' OF OVERLINE							

Shirley Ann 20 OCT 1968

D.22

DRILL LOG		By S M Goodwin	Rig BE 220	Well Number #41) 699-543-E12	Computer Number N/A	Project or Work Order No 100 APCA
		Date 20 Oct. 1986	#22-14102	Depth 3 MP. 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
3 BAGS	SAND				1430	PREPARING TO BACKPOW 8"
					1440	TRND TO DEADPOW 8"; NOT MOVING
					1445	WELDING TUBING HEAD
					1455	PULLING 8"
				PULLED 8" CASING 5.5'; BOTTOM OF 8" = 55.2'	1515	FINISHED PULL
				WILL GET D/B IN A.M. AFTER 8" IS CUT	1520	CLEANING
					1530	Done For 1/11.
REMARKS:						
 20 Oct. 1986						

D.23

DRILL LOG		By S.M. Gb	Rig Bx 22w	Well Number (41) 699-543-E12	Computer Number J/A	Project or Work Order No 100 Area
		Date 21 October 1986	#22 14/02	Depth Camp. To	Subcontract No J/A	
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness Caliche, Etc	Time	Drilling Comments
				>MUSE IS CRAIG WANSLEY	0700	PULLING 8"
				>W = 50.1 - 23. STEELUP = 47.8' (PML F 2270)	0720	>W
				>B = 53.05' ; BOTTOM OF 8" = 55.2'	0725	D/B
				2 15' X OVERLAP. BOTTOM OF 4" = 57.25'	0740	ADDING SAND
				ADDED 2 100 LB BAGS OF 16 30 SILICA SAND,	0745	>B
				>B = 44.2' ; 11' X OVERLAP.	0750	PULLING 8"
				D/B (SAND) = 47.75 ; BOTTOM OF 8" = 50.2'	0755	D/B
				2 0.2' X OVERLAP	0757	ADDING SAND
				ADDED 2 100 LB BAGS OF 16 30 MESH SAND,	0800	D/B
				>B = 39.05' ; 1.5' X OVERLAP	0815	PULLING 8"
				D/B (SAND) = 43.35' ; BOTTOM OF 8" = 45.2'	0813	D/B
				15' OF OVERLAP.	0817	ADDING SAND
				2 100 LB BAGS OF 16 20 MESH SAND,	0820	D/B
				>B = 34.05' ; 1.15' X OVERLAP	0825	PULLING 8"
				>B (SAND) = 39.20' ; BOTTOM OF 8" = 39.20'	0840	D/B
				D/B (4") = 56.85' ; 1.05' ; 1" STAINLESS	0850	NEW SAND
				HAS BEEN MOVING U & PULLS	0900	ADDING SAND
REMARKS						
A.M. Gb. 21 Oct. 1986.						

D. 24

DRILL LOG			By S. M. GORDON	Rig R.C. 2700	Well Number (H1) 699-543-E12	Computer Number N/A	Project or Work Order No. 1100 A2/A
			Date 21 OCTOBER 1986	H 22 14102	Depth COALP. 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
9				D/B (SAND) = 35.05'; BOTTOM OF 8" = 39.20'		0905	D/B
				4.15' OF OVERLAP. (AREA ADDING 1 100 LB		0905	PULLING 8"
10		BAGS TOTAL		BAGS OF 16-30 MESH SAND)			
				D/B (SAND) = 37.35'; BOTTOM OF 8" = 38.2'		0920	D/B
				0.95' OF OVERLAP. FINISHED W/ SAND PACK.		0925	ADDING PELLETS
		11 BUCKETS PELLETS		ADDED 4 50 LB. BUCKETS OF 1/4" VOLCANIC BATHING		0930	D/B
		TOTAL		TABLETS; D/B = 27.10'		0933	PULLING 8"
				D/B (PELLETS) = 31.45'; BOTTOM OF 8" = 31.7'		0945	CUTTING 8"
				.25' OF OVERLAP. 5.90' OF PELLETS; FINISHED			D/B
				W/ PELLETS		0950	ADDING GRANULES
7		BAGS CRUMBLES		ADDED 7 50 LB. BAGS OF 8-20 MESH AMERICAN COLONO		0955	D/B
				(Co. GRANULAR BENTONITE CRUMBLES; D/B = 14.25'		1000	PULLING 8"
				17.35' OF OVERLAP.			
				D/B (CRUMBLES) = 21.65'; BOTTOM OF 8" = 24.7'		1015	D/B
				3.05' OF OVERLAP.		1017	ADDING CRUMBLES
2				D/B = 15.85'; ADDED 2 50 LB. BAGS OF 8-20 CRUMBLES.		1019	D/B
9		BAGS TOTAL		8.85' OF OVERLAP.		1025	PULLING 8"
						1040	8" FREE FROM HOLES

REMARKS:

John H. Jordan 21 OCTOBER 1986

D.25

D.26

DRILL LOG			By S. M. Goodwill	Rig BE 22...	Well Number (#1) 694-543-E12	Computer Number N/A	Project or Work Order No. 1100 ARSA
			Date 21 October 1988	Depth #22-14102	Depth Camp. 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
				Bottom of 10" CASING = 14.70' ; D/B (COLUMNS)		1045	D/B
				= 14.70'		1100	MIXING GROUT
							GROUT
				USED 6 94 LB. BAGS OF PORTLAND CEMENT, 36		1120	POURING GROUT
				GALLONS H <sub>2</sub> O & 1% ALUMINUM POWDER.		1125	D/B
				D/B = 16.5' ; GOING OUT INTO FORMATION.			
				D/B (GROUT) = 17.55' ; STILL SETTLING		1135	D/B
						1140	PULLING 10"
				Bottom of 8" = 18.7' ; D/B (GROUT) = 17.65'		1145	D/B
						1150	STOP FOR LUNCH
				USED 6 94 LB BAGS OF PORTLAND CEMENT,		1220	MIXING GROUT
				36 GALLONS OF H <sub>2</sub> O & 1% ALUMINUM POWDER		1240	POURING GROUT
				D/B (GROUT) = 10.55' ; 8.15' OF OVERLINE. Poured		1247	D/B
				BATCH & ORIGINAL D/B WAS 1' ABOVE GROUT		1250	PULLING 10" CASING
				LEVEL, DROPPED DOWN TO PRESENT D/P WITHIN			
				SECONDS.			
				D/B (GROUT) = 14.3' ; Bottom of 10" = 13.3'		1300	D/B
				1' OF OPEN HOLE ; LOSING LOTS OF GROUT TO THE		1305	MIXING GROUT
REMARKS:				FORMATION.			

John H. Goodwill 21 OCT. 1988

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)



D.28

DRILL LOG		By S. M. Goodwin	Rig B6 22 w	Well Number (41) 699-543-E12	Computer Number N/A	Project or Work Order No. 1102 AREA
		Date 24 OCTOBER 1968	# 22-14102	Depth COMP. 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
				DRILLER IS CRAIG WANSLEY	0700	STANDBY; WAITING FOR CEMENT
				D/B (CEMENT GRAV) = 10.05'	0800	CEMENT APPLIED
					0810	PROBLEMS W/ CEMENT; STANDBY.
				USED 6 94 LB. BAGS OF PORTLAND CEMENT, 35 GALLONS H <sub>2</sub> O & 1% ALUMINUM POWDER.	0840	MIXING GROUT
				D/B (GROUT) = 2' B.L.S.	0850	POURING GROUT
				D/B (CEMENT GROUT) = 3' B.L.S. ; FINAL DEPTH.	0855	PULLING 10"
					1000	10" CASING FREE FROM HOLE
					1005	CLEANING CANNON
				D/B (INSIDE 4") = 58.3' + 2.05' TAKE - 3' STICKUP	1025	D/B
				= 57.35 (PUL 300' TAKE & (300-09).	1030	PREPARING TO BAIL
				61' of 5.4.4" - 3' STICKUP = 58' D/B ; 0.05' OF MATERIAL IS AT BOTTOM OF 4"	1040	BAILING WELL; PERMISSIBLE TO
				USING DART BAILER TO DEVELOP WELL; 16' x 3 1/2" O.D. VOLUME OF H <sub>2</sub> O = ~5 GALLONS. BAILING RATE = 1 x / 45 SECONDS.	1055	DISCHARGE H <sub>2</sub> O TO GROUND LEVELS LESS THAN DRINKING H <sub>2</sub> O STANDARDS.

REMARKS:

24 OCTOBER 1968  
*Alan Han*

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)



2 of 2

DRILL LOG		By S.M. Goodwin	Rig P.E. 22 1/2	Well Number (4 1/2) 699-543-E12	Computer Number N/A	Project or Work Order No 1100 N/A
		Date 24 October 1988	Depth 22 11/16	Depth 1 1/2' 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
				H <sub>2</sub> O TURBID & ~ 2 TEASPOON SAND PACK / 5 GALLON BUCKETS	1100	
				H <sub>2</sub> O TURBID BUT CLEARING. ~ 1/2 TEASPOON SAND PACK & FINES FROM FORMATION IN 5 GALLON BUCKETS (1/2 SILICA / 1/2 FORMATION)	1120	
				H <sub>2</sub> O CLEARING & ~ 1" o.f. SAND & FORMATION. CLEARING UP QUITE FAST!	1135	
				H <sub>2</sub> O SOMEWHAT TURBID & CONTAINS SILTS. BUT NO SILICA SAND PACK WITH CONTINUE DEVELOPMENT w/ SUBMERSIVE PUMP AT A LATER DATE	1200 1200/1230	LUNCH
				BASED WELL 80 MINUTES. TOTAL VOLUME OF H <sub>2</sub> O BASED ~ 533 GALLONS.	1240	BREAKING DOWN RTG
A						
REMARKS						
Steve M. Goodwin 24 Oct, 1988						

D.29





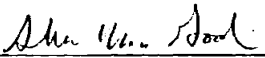
DRILL LOG			By S. H. Goodwin	Rig 10 R72	Well Number Well Number (4) 699-543-E12 Depth (4) 699-543-E12 Dev. To	Computer Number J/A	Project or Work Order No 100 N/A-- Subcontract No J/A
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc		Time	Drilling Comments
				D/W = 52.6' (FROM TOP OF TRENCH PIPE, 210 E. TAPES # 1211)		1300	
				DEVELOPING NEW W/ 15 H.P. SUBMERSIBLE GRINDFOS PUMP. PUMP SET AT BOTTOM OF 4" CASING. INTAKE ~1.5' ABOVE BOTTOM PIPE COLUMN			
						1305	PUMP ON
				D/W = 52.95'; .25' W/ DRAWDOWN. H <sub>2</sub> O CLEAR & CLEAN, CLEARING U FAST. IS BEING PUMPED INTO A TANKER TRUCK DUE TO PROXIMITY OF PARKING LOT. A VOLUME OF H <sub>2</sub> O PUMPED. 1/2 SAMPLES ARE OBTAINED FROM VALVE OFF DISCHARGE LINE. PUMP RATE IS READ FROM FLOW METER & CHECKED BY PERIODICALLY FILLING A CALIBRATED 5.73 GALLON BUCKET.		307	D/W
				10 SAMPLES / 41.92 SEC		1310	4.31 GAL/MIN
				H <sub>2</sub> O CLEAR & CLEAN. FEW SAND GRAINS IN 5 GALLON BUCKET. D/W = 52.8'		311	
				5.73 GALLONS / 34.98 SEC NTU = .3 H <sub>2</sub> O CLEAR & CLEAN.		1312	D/W
						315	7.8 GAL/MIN
REMARKS							
Shirley Goodwin 1 Nov. 1988							

D.32

DRILL LOG		By S. M. Goodwin	Rig No. R12	Well Number (#4) 699-543-E12	Computer Number N/A	Project or Work Order No. 1100 A00A
		Date 1 NOVEMBER 1988	Depth DEV. 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 GALLONS / 41.26 SEC	1316	14.54 GAL/MIN
				D/W = 52.8' ; 0.2' OF DRAWDOWN	1320	D/W
				H <sub>2</sub> O SAMPLE : NTU = 1.3	1323	
					1325	PUMP OFF
					1330	PUMP ON
				10 GALLONS / 41.29 SEC	1331	14.53 GAL/MIN.
				H <sub>2</sub> O SAMPLE : NTU = 5.7	1332	
				D/W = 52.8'	1333	D/W
				10 GALLONS / 41.81 SEC	1334	14.35 GAL/MIN.
					1335	PUMP OFF
					1340	PUMP ON
				10 GALLONS / 41.33 SEC. ; H <sub>2</sub> O SAMPLE = 5.9 NTU	1341	14.52 GAL/MIN
				5.73 GALLONS / 29.05 SEC	1342	11.84 GAL/MIN
				D/W = 52.8'	1343	D/W
				H <sub>2</sub> O SAMPLE : NTU = 2.5	1345	
				10 GALLONS / 41.49 SEC. ; D/W = 52.8'	1346	D/W ; 14.46 GAL/MIN
					1347	PUMP OFF
					1350	PUMP ON
REMARKS:						
<i>Shirley Goodwin</i> 1 NOV. 1988						

D.33

D.34

DRILL LOG		By S. H. Goodwin	Rig ND RTG	Well Number (#1) 699-543-E12	Computer Number N/A	Project or Work Order No. 1100 AFA
		Date 1 Nov. 1968		Depth Dev. 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 GALLONS / 41.11 SEC	1351	14.6 GAL / MIN.
				H <sub>2</sub> O SAMPLE : NTU = 4.8	1352	
				D/W = 52.8'	1353	D/W
				H <sub>2</sub> O SAMPLE : NTU = 2.6	1354	
				WELL IS CONSIDERED DEVELOPED ; SAMPLES ARE BELOW THE ACCEPTABLE LIMIT OF 5 NTU. USED A HACH PORTABLE TURBID - IMETER FOR H <sub>2</sub> O ANALYSES.	1355	PUMP OFF
				TOTAL TIME PUMPED = 37 MINUTES		
				TOTAL VOLUME PUMPED = ~535 GALLONS (AVE. PUMP RATE = 14.47 GAL / MIN ; ASSUME FLOW METER IS MORE ACCURATE THAN BUCKET METHOD DUE TO TURBULENCE IN DISCHARGE LINE.)		
REMARKS:						
 1 Nov. 1968						

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. Goodman	Reg CPANG	Well Number (#4) 699 543-E12	Computer Number N/A	Project or Work Order No. 1100 AREA
		Date 4 NOVEMBER 1988		Depth PUMP SET TO		Subcontract No. N/A
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Exh Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				D/B = 59' + 2.17' TIME - 3.25' STICKUP = 57.92' (PNC 300' TUBE # L300-13)	0845	D/B
				D/W = 52.2' - 3.25' STICKUP = 48.95' (PNC E. TUBE 12021). 8.97' OF H <sub>2</sub> O EXPOSED TO THE SCREEN.	0850	D/W
				KEH DRILLERS HAVE PLACED A CLEAN GROUND TARP FOR LAYING DOWN PUMP DISCHARGE PIPE. DRILLERS ARE WEARING CLEAN COTTON GLOVES MATERIALS WERE REMOVED FROM PROTECTIVE CONTAINERS AS NEEDED. PUMP & PIPES WERE INSPECTED BY DRILLERS BEFORE INSTALLATION; ALL JOINTS WERE TIGHTENED & TAPED WITH TEFLON MATERIALS USED:		PREPARING TO SET HYDROSTAR PUMP
				5 10' SECTIONS OF 3/4" STAINLESS STEEL PIPE		
				1 5'		
				1 HYDROSTAR (PUMP); 2.3' Caw&		
				TOTAL PUMP & PIPE = 57.3'		
REMARKS						

*Shanley Ford* 4 NOVEMBER 1988

D.35





699-543-E12

DRILL LOG		By <i>Glover</i>	Rig No 236	Well Number <i>1100-4</i>	Computer Number N/A	Project or Work Order No. <i>1100 ARCA</i>
		Date <i>11-4-88</i>		Depth <i>PUMP TEST TO</i>		Subcontract No. <i>N/A</i>
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				<i>Hydrostar pump check-out performed</i>	<i>0950</i>	
				<i>pumping time to lift water on initial <del>water</del> startup = 15 sec</i>		
				<i>pumping rate at ~ 60 strokes/min = 5.1 gpm</i>		
				<i>system shows very little leakdown indicating pipe joints well sealed.</i>		
				<i>11-4-88 D.W. Glover</i>		
REMARKS:						

D.37

**APPENDIX E**

**GEOPHYSICAL AND GEOLOGIC LOGS FOR WELL 5 (699-S37-E14)**

## APPENDIX E

### GEOPHYSICAL AND GEOLOGIC LOGS FOR WELL 5 (699-S37-E14)

This appendix contains the Well Completion/Inspection Report, as-built diagram, notes from the sampling pump installation, the natural gamma log, and the geologists' logs for well 5 (699-S37-E14) in the 1100 Area.

WELL COMPLETION/INSPECTION REPORT					
Specification No. <u>HS-V-50005</u> Rev. No. <u>A</u>		Well No. <u>699-537-E14</u> Temp. Well No. <u>#5</u>			
Project <u>1100 AREA ENVIR. MONITORING PROJECT</u>		Coordinates <u>N 368061.4 E 2309401.0</u>			
Location <u>1100 AREA</u>		Casing Elev. <u>409.28'</u> Ground Elev. <u>405.38'</u> (BASE CAP)			
Drilling Co. <u>KATZER ENGINEERING/HANFORD</u>		DRILLING METHOD			
Driller <u>CRAIG WAUSLEY</u>		Rotary - Air <u>N/A</u> Mud <u>N/A</u>			
Other (companies) <u>NONE</u>		Cable Tool <u>D</u> <u>N/A</u> <u>H 0'-62'6 1/2"</u>			
Geologist(s) <u>S.S. TEEU</u>		Drilling Fluid <u>DRUM SUPPLY 420</u>			
<u>S.M. GOODWIN</u>		Other <u>NONE</u>			
<u>M.A. PHAMNESS</u>					
GEOPHYSICAL LOGGING			COMPLETION DATA		AQUIFER TESTING
Sondes	Interval	Date	Drilled Depth	<u>62.5'</u>	Type <u>N/A</u>
<u>Natural Gamma</u>	<u>62' - 2'</u>	<u>10/11/88</u>	Completed Depth	<u>63.0'</u>	Length of Test
			Date Started	<u>10/2/88</u>	Volume Pumped
			Date Completed	<u>11/3/88</u>	Drawdown
			Static Water Level/Date	<u>51.17'/10-11-88</u>	Date of Test
INSPECTION RESULTS					
CLEANING			MATERIAL STORAGE/PACKING		
Inspection Method <u>VISUAL</u>			Inspection Method <u>VISUAL</u>		
Acceptance Criteria <u>SECT. 7.1.4 7.3</u>			Acceptance Criteria <u>SECT. 7.3</u>		
	Accept	Reject	Date	Accept	Reject
Drilling Tools/Rig	<u>SML</u>		<u>10/3/88</u>	Mtl. Handling/Storage	<u>SML</u>
Temporary Materials	<u>SML</u>		<u>10/3/88</u>	Material Packing	<u>SML</u>
Permanent Materials	<u>SML</u>		<u>10/5/88</u>		<u>10/6/88</u>
SCREEN			LUBRICANTS/ADDITIVES		
Type	Length	Slot Size	Inspection Method <u>VISUAL</u>		
<u>Stainless Steel TYPE 304</u>	<u>5.25'</u>	<u>20</u>	Acceptance Criteria <u>SECT. 7.2</u>		
<u>STAINLESS STEEL TYPE 304</u>	<u>10.5'</u>	<u>20</u>	Identify Accept Reject Date		
Depth(s)			Additives	<u>NONE</u>	<u>SML</u>
<u>63.0' - 57.75'</u>			Lubricants	<u>FOOD OIL</u>	<u>SML</u>
<u>57.75' - 47.25'</u>					<u>10/3/88</u>
					<u>10/3/88</u>
Inspection Method	<u>Visual</u>		STRAIGHTNESS TEST		
Acceptance Criteria	<u>SECT. 4.2.3</u>		Inspection Method <u>22' of 6" casing down hole</u>		
Accept	<u>SST</u>	Reject	Acceptance Criteria <u>SEC. 8.3 of SPECS</u>		
			Accept	<u>MAC</u>	Reject
					Date <u>10/10/88</u>
CASING (permanent)			WELL PROTECTION		
Type	Size	Placement	Inspection Method <u>VISUAL</u>		
<u>Stainless Steel</u>	<u>4"</u>	<u>47.25' - 72.75'</u>	Acceptance Criteria <u>SECT. 4.2.10 + 4.2.9</u>		
			Accept Reject Date		
Inspection Method	<u>Visual</u>		Protective Posts	<u>SMG</u>	<u>10/26/88</u>
Acceptance Criteria	<u>SECT. 4.2.4</u>		Locks	<u>SML</u>	<u>10/29/88</u>
Accept	<u>SST</u>	Reject			
ANNULAR SEAL					
Inspection Method <u>Visual</u>		Acceptance Criteria <u>SECT. 4.2.6 - 4.2.9</u>			
Type	Interval	Volume	Accept	Reject	Date
<u>16-20 Columbia Silica Sand</u>	<u>52.57' - 43.90'</u>	<u>9.9 FT<sup>3</sup></u>	<u>SST</u>		<u>10/11/88</u>
<u>1/4" Bentonite Pellets</u>	<u>43.90' - 38.17'</u>	<u>1.86 FT<sup>3</sup></u>	<u>SST</u>		<u>10/11/88</u>
<u>8-20 mesh Bentonite Crumblies</u>	<u>38.17' - 18.38'</u>	<u>9.23 FT<sup>3</sup></u>	<u>SST</u>		<u>10/12/88</u>
<u>Cement Grout</u>	<u>18.38' - 3.2'</u>	<u>10.1 FT<sup>3</sup></u>	<u>SMG</u>		<u>10/20/88</u>
OTHER (initial if performed)					
<u>N/A</u> Well Abandonment	<u>N/A</u> Downhole TV Inspection	<u>SML</u> Complete As-Built Diagram,			
<u>SML</u> Well Development		Driller's/Geologist's Logs			

REVIEWED BY V.L. Mathan 11-8-88

For all blanks mark N/A if not applicable.

**AS-BUILT DIAGRAM**

Well Number (#5) 699-S37-E14 Geologist TEEL GOODWIN Page 1 of 1  
CHAMNESS

Reviewed by J.L. McShan Date 11-8-88

Construction Data		Depth in Feet	Geologic/Hydrologic Data			
Description	Diagram		Diagram Litho.	Lithologic Description		
20' 8" of 10" carbon steel casing		5		SILTY SANDY GRAVEL		
SURFACE CASING WITH DRIVE SHOE (REMOVED)		10		" " "		
		15		" "		
		20		" "		
		25		" "		
50' of 4" STAINLESS STEEL TYPE 304 CASING		30		" "		
		35		" "		
		40		GRAVELLY SAND		
		45		SILTY SANDY GRAVEL		
63 1/4" of 8" carbon steel casing WITH DRIVE SHOE (REMOVED)		50		" " RINGOLD CONTACT @ 50' 2.15		
		55		" " STATIC H2O @ 51.17' B.L.S.		
		60		SANDY GRAVEL		
15.75' OF 20 SLOT STAINLESS STEEL TYPE 304 SCREEN (4" DIA.)				TD = 62' 6 1/2"	DRILLCO DEPTH = 62' 6 1/2"	
					COMPLETION DEPTH = 63'	
COMPLETION SYMBOLS:						
		CONCRETE PAD				
		CEMENT GROUT				
		GRANULAR BENTONITE				
		BENTONITE PELLETS				
		SAND PACK				
	CASING JOINT					
	CASING CONTACTED					

0/11/8

SAMPLING PUMP INSTALLATION IN  
GROUND-WATER MONITORING WELLS

Site: 1100 AREA

Monitoring Well Number: (#5) 699-537-E14

Depth to Water: 53.3'

Depth to Bottom: 63.10' Reported Depth to Bottom: 63.0'

Pump Type: Positive Displacement Piston

Pump Model: Hydrostar HS-8001

Date Installed: 11/3/88

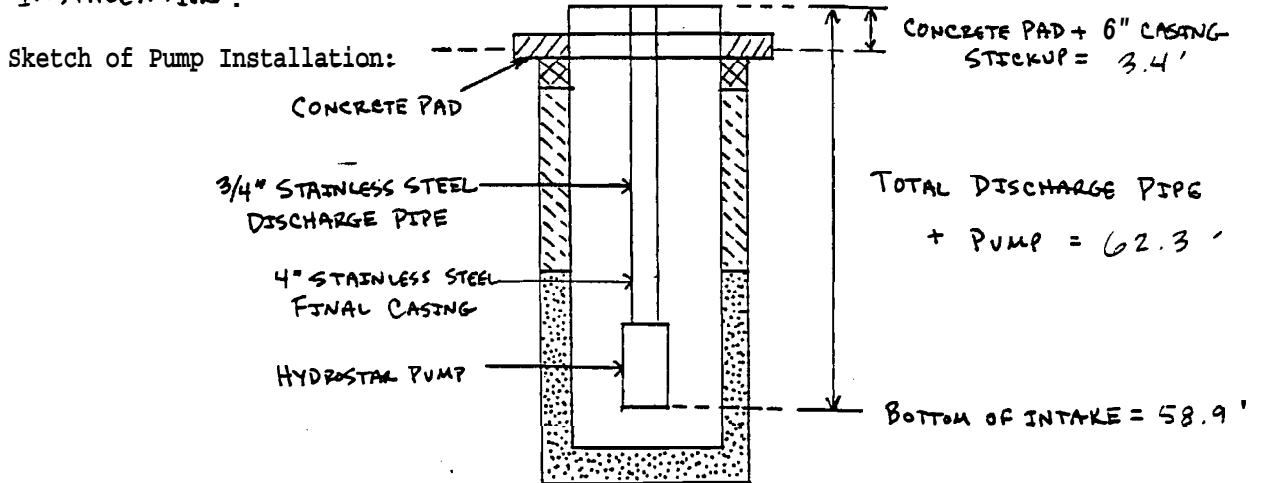
Installed By: KEH: OLIN AMOS LOUIS WATKINS, LENNY CORDON

Pump Discharge Pipe Description:

6 10' SECTIONS OF 3/4" STAINLESS STEEL DISCHARGE PIPE.

Additional Comments:

HYDROSTAR PUMP LENGTH = 2.3'; ALL JOINTS WERE TAPED WITH TEFLON. DRILLERS WORE CLEAN COTTON GLOVES DURING INSTALLATION.



Completed By: Shannon Wood Date: 11/3/88



By S. M. Godwin	Date 10/22/1968	Fig BE 220	Well Number (#5) 699-E37-EN	Computer Number N/A	Project or Work Order No. 110B AREA
					Subcontract No. N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
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				DRILLER IS CRAIG WANSLEY; RIG HAS BEEN	0745	SETTING UP RIG
				STEM CLEANED ACCORDING TO KAISER RIG	0800	SAFETY MEETING
				LOOKS VISIBLY CLEAN.		W/DRILLER
					1000	STRAIGHTENING TOOLS
				DUG STARTER HOLE 2 1/2' BY HAND.	1100	DIGGING STARTER
						HOLE
					1200	LUNCH
					1230	END LUNCH, WAITING FOR WELDER.
					1315	WELDED ON DRIVE
						SHOULDER TO 10" CASING
					1400	WORKING ON DRIVE
					1530	DATE FOR DAY

REMARKS: *Mr. M. ... 3 October 1968*

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



DRILL LOG			By S. M. Goodwin	Rig BE 22W	Well Number (#5) 699-537-E14	Computer Number N/A	Project or Work Order No. 1100 AREA	
			Date 4 OCTOBER 1966	# 22-14102	Depth 2 1/2' 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 J. CRAIG WAMSLEY		0700	DIGGING STARTER	
							HOLE DEEPER	
				DUG STARTER HOLE TO ~ 3'		0730	BUILDING UP DRILL BIT	
10' of 10" casing				FELLSO IN AROUND 10" (CASING TO GROUND LEVEL); PLACED 10' of 10" CARBON STEEL (CASING IN) HOLE.		0830	STANDING UP 10" CASING IN HOLE	
	5'	H	WET	SILTY SANDY GRAVEL (47% gravel, 45% sand, 8% mud)		0900	DRILLING	
				12% MP, 20% FP, 15% VFP, 4% VCS, 5% CS, 15% MC, 15% FS, 6% UFS, 8% mud (sil + clay), Poorly sorted, (Gravel) - 75% basalt (fresh), 25% qtz, qtzite, granite, and other Si-rich incl. andesite (?) and porphyry. Orig. surfaces appear to be R-WK. (Sand) - 40% basalt, 60% qtz, qtzite, and other Si-rich rock fragments. A-SA. Wet color: 2.5Y 4/2 (dark grayish brown). Dry color: 2.5Y 4/2 (light brownish gray).		1130	SAMPLE	
				No reaction to 10% HCL, largest grain size originally at least CP.		1135	PAUL TWISTED IN DIRT BARRIER, WILL HAVE TO UNTWIST TO GET SAMPLE WORKING ON BARRIER	
						1200/1230	Lunch	
						1230	Drilling	
REMARKS:							S.S. Teal 10-4-88	

E.8

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



DRILL LOG			By S. M. Goodwin	Rig BE 22w	Well Number (#5) 699-537-E14	Computer Number N/A	Project or Work Order No. 1100 AREA
			Date 5 OCTOBER 1988	# 22-14102	Depth 8' 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		0700	SERVICING TRIG
						0710	DRILLING
						0800	Building-up bit. Is now down to depth for the 10' sample but the bailer won't hold the mud.
				STILL NEED A BAIER THAT WILL PICK UP THE MUD;		1000	WAITING FOR BAIER
				TALKED TO FOREMAN, EXPECT DELIVERY SOON.			
	10'	H	Wet	SILTY SANDY GRAVEL (42% gravel, 50% sand, 8% silt) 4% CP, 15% MP, 15% FP, 8% VFP, 2% VCS, 13% CS, 15% MS, 12% FS, 8% VFS, 8% silt, Poorly sorted. (Gravel) - 60% basalt, 35% qtz, qtzite, chert, and Si-rich ig/met. rock fragments, 5% altered volcanics. F-WR (Sand) - 60% basalt, 40% qtz, qtzite, chert, and other Si-rich. Wet color: 5Y 7/2 to 5Y 3/2 (olive gray to dark olive gray). Dry color: 5Y 7/2 (light gray). Slight reaction to 10% HCL. Unconsolidated. Largest original grain size probably VCP to small cobbles.		1040	Very slow drilling
REMARKS: USED 30 GALLONS H <sub>2</sub> O DRILLING YESTERDAY							
						S.S. Teed	10-5-88

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

DRILL LOG		By	Rig	Well Number	Computer Number	Project or Work Order No.
		S.S. Teal	BE 220	(#5) 699-537-E14	N/A	1100 Area
		Date	22-11102 (Craig Wansley)	Depth		
		10-5-88		15' to 20'		N/A
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
20' 8"	of 10"				1200/1250	Lunch
	15'	H	Wet	SILTY SANDY GRAVEL (40% gravel, 50% sand, 8% mud), 10% MP, 17% FP, 13% VFP, 7% UCS, 13% CS, 13% MS, 12% FS, 5% VFS, 8% mud. Poorly sorted. (Gravel) - 60% basalt, 10% andesite and other altered volcanics, 30% gtz, qtzite, chert, and Si-rich rock fragments, R-WR. (Sand) - 60% basalt and other volcanics, 40% gtz, qtzite, chert, and other Si-rich. A-SR. Wet color: 5Y 4/2 (olive gray). Dry color: 5Y 6/2 (light olive gray). No reaction to HCL. Check w/ HNU (10.2 eV probe). Reading = 0.0.	Unconsol.	
	20'	H	Wet	SILTY SANDY GRAVEL (41% gravel, 50% sand, 6% mud) 8% CP, 12% MP, 14% FP, 10% VFP, 5% UCS, 15% CS, 13% MS, 12% FS, 5% VFS. <sup>6% mud (SiH + chert)</sup> Med-poorly sorted. (Gravel) - 50% basalt 15% other volcanics (andesite - some w/ small rims and var stages of alt., also minor porphyry and breccia), 35% gtz, qtzite, chert and Si-rich igneous (minor), trace caliche. <sup>SR-WR</sup> (Sand) - 60% basalt, 40% gtz, qtzite, chert, and Si-rich. A-SR. Wet color: 5Y 4/2 (olive gray). Dry color: 5Y 6/2 (light olive gray). Moderate reaction to 10% HCL. Unconsolidated.	1425 1430	Preparing to switch to 8" casing.
20' 2"	of 10"			Max original grain size probably VFP - small cobble.		

E.11

REMARKS:

S.S. Teal  
10-5-88



DRILL LOG		By S. M. GOODWIN	Rig BF 22w	Well Number (#5) 699-537-E14	Computer Number N/A	Project or Work Order No. 1100 AREA
		Date 6 October 1966	# 22-14102	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
00' 8"				DRIVER IS CRAIG WANSLEY	0700	SERVING RIG
+ 9' 11"					0715	DRILLING
= 30' 7"				Added 9' 11" of 8" casing; TOTAL 8" = 30' 7"	0815	WELDING 8" CASING
					0930	FINISHED WELDING
					0935	DRILLING
	25'	H	WET	SILTY SANDY GRAVEL: 45% GRAVEL; 47% SAND,	1045	SAMPLED W/ DART
				8% MUD. 5% CP, 10% MP, 15% FP, 15% VFP,		BARREL
				17% VCS, 10% CS, 10% MS, 5% FS, 5% VFS,	1050	DRILLING
				8% MUD. VERY POORLY SORTED. GRAVELS ARE	1125	WELDING 8" CASING
				45% BASALT, 10% ALTERED VOLCANICS &	1200/ 1230	LUNCH
				PORPHYRY, 25% QUARTZITE, 20% GRANITES;		
				ORIGINAL MATERIAL SA TO WR. SANDS ARE		
				50% BASALT, 50% QUARTZ, PLAG., Q-ZONE &		
				(IKAT; VA TO SA. WET COLUMN IS 5 1/2 (OILY		
				GRA); DRY COLUMN IS 2.5 1/2 (LT. OLIVE GRAY) SLIGHT		
				RY. TO 10% HCL. UNCONSOLIDATED. LESS BASALT,		
				SLIGHT INCREASE IN MUD. GEO. SAMPLES		
				TAKEN.		
REMARKS:						
Sha H. J. J. 6 OCT. 1966						

E.13



DRILL LOG		By S M. Goodman	Rig BE 22w	Well Number (# 5) 699-537-E14	Computer Number N/A	Project or Work Order No 1160 AREA
		Date 6 OCTOBER 1986	# 22-14102	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
	35'	H	WET	(CONT.) BASALT, 5% ALTERED VOLCANICS & PORPHYRY, 30% QUARTZITE, 25% GRANITES, ORIGINAL SA WR SANDS 35% BASALT, 65% QUARTZ, PLAG., CHERT, Q-ZONE; NA TO SA. NO RX. TO 100% HCL. WET COLOR IS 5Y 4/1 (DARK GRAY); DRY COLOR IS 5Y 6/2 (LT OLIVE GRAY). UNCONSOLIDATED MUD GRAVEL & SLIGHT Δ IN DOWN (GEO SAMPLES TAKEN)	1425	DRILLING
	40'	H	WET	GRAVELLY SAND 15% GRAVEL, 77% SAND, 8% MUD. 1% CP, 3% MP, 6% FP, 5% VF, 15% VCS, 30% CS. 22% MS, 5% FS, 5% VES, 8% MUD. POORLY SORTED GRAVELS ARE 40% BASALT, 10% ALTERED VOLCANICS & PORI, 25% GRANITES 25% QUARTZITE, ORIGINAL RX SA TO WR SANDS ARE 35% BASALT 5% ALTERED VOLC. 60% QUARTZ, PLAG., CHERT, Q-ZONE, A 10 SA. WET COLOR IS 5Y 4/1 (DARK OLIVE GRAY), DRY COLOR IS 5Y 6/2 (LT OLIVE GRAY) NO OBVIOUS RX TO 10% C UNCONSOLIDATED INCREASE	1505 1510 1525 1530	SAMPLED w/ DART BARREL QUIT DRILLING, CLEANING UP DONE FOR RPT SURVEY, NO DET CONTAMIN- ATION 0 PPM w/ HNO OFF SECS & IN HOLE. (117 CV PAGE)
REMARKS						

E.15

Shu 46-1101 6 OCTOBER 1986





DRILL LOG		By S. M. GOODWIN	Rig BE 220	Well Number (45) 699-537-E14	Computer Number N/A	Project or Work Order No. 1100 AREA
		Date 7 OCTOBER 1966	# 22-11100	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
				DRILLED BY CRAIG WANSLEY	0700	SERVICING RIG
					0715	PREPARING TO WELD
	40' 6"				0730	WELDING 8" CASING
+	8' 7 1/2"			ADDED 8' 7 1/2" OF 8" CARBON STEEL CASING;	0830	FINISHED WELD
=	49' 1 1/2"			TOTAL 8" CASING = 49' 1 1/2"	0840	DRILLING
				SPAN SET AT 3.76 ; 0 PPM OFF BAILED SEDIMENTS.	0930	HNU
				11.7 EV PIGE CALIBRATED TO BZONE		
	45'	H	WET	SILTY SANDY GRAVEL: 30% GRAVEL, 62% SAND, 8% MUD, 9% CP, 7% MP, 10% FP, 10% VFP, 15% VCS, 20% CS, 15% MS, 7% FS, 5% VES, 8% MUD. VERY POORLY SORTED GRAVELS ARE 4% BASALT, 15% ALTERED VOLCANICS & PORPHYRY, 25% QUARTZITE, 20% GRANITES; ORIGINAL RX. SA TO WA. SANDS ARE 35-6 BASALT, 10% ALT. VOLCANICS, 55% QUARTZ, PLAG., QUARTZITE & CLAY, MINOR MICA; A TO SR. WET COLOR IS 5Y 4/3 (OLIVE); DRY COLOR IS 5Y 6/3 (PALE OLIVE). MODERATE RX. TO 10% HCL. UNCONSOLIDATED. MORE GRAVEL & UNALTERED VOLCANICS.	0940	SAMPLED w/ DART BAILER; 1 PPM w/ HNU OFF SEGS.
REMARKS:						

E.17

John H. ... 7 October 1966

E.18

DRILL LOG		By	Rig	Well Number	Computer Number	Project or Work Order No.
		S. M. GOODWIN	BE 22W	(+S) 699-537-E14	N/A	1100 AREA
		Date	# 22-14102	Depth		Subcontract No.
		7 OCTOBER 1966		45' TO 50'		N/A
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
	45'	H	WET	(CONT.) D IN RT. TO HCL & SLIGHT D IN COLOR.		
				Geo. SAMPLES TAKEN. COULD BE GETTING IN TO		
				RINGOLD FM.	1030	BAILED PEA-SIZED GRAVELS
					1100	BAILING LARCA GRAVELS (M-VCP)
					1130	HND OPEN OFF SCUS, 1 PPM IN BOREHOLE
	~49'			HIT RINGOLD FM AT ~49'; SLIGHT CHANGE IN COLOR	1140	RINGOLD FM.
	50'	H	WET	SILTY SANDY GRAVEL: 35% GRAVEL, 53% SAND, 12% SILT & CLAY (CLAY = 4%). 3% CD, 7% MP, 15% FP, 10% VFP, 10% VCS, 15% CS, 15% MS, 7% FS, 6% VFS, 12% SILT & CLAY. VERY POORLY SORTED. GRAVELS ARE 40% BASALT, 15% ALT. VOLCANICS (POSSIBLY META. - PREDOMINATELY GREEN RX; SOME APPEAR TO BE CHLORITIZED ANDRESITE, OTHERS LOOK LIKE THEY ARE PREDOMINATELY CRIDGIE & QUARTZ.), 30% QUARTZITE, 15% GRANITES;	1145	SAMPLED W/ PART BAIKER, 0 PPM W/HND OFF SCUS & IN BOREHOLE
					1150	PREPARING TO WELD LUNCH
					1200/1230	
					1235	WORKING ON DRILL BIT
					1315	DRILLING
REMARKS:						
Sheel Min. Mudd. 7 OCTOBER 1966						

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

DRILL LOG		By S M Goodwin	Rig BE 22w	Well Number (#5) 699-537-E14	Computer Number N/A	Project or Work Order No. 1100 AREA
		Date 7 October 1988	#22-1412	Depth 50' to ~53'	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'	H	WET	(CONT.) ORIGINAL Rx. SA TO WA. SANDS ARE 35% BASALT, 10% ALT. VOLCANICS, 55% QUARTZ, Q-RICH + PLAG. VA TO SA WET COLOR: MUD = 5Y 5/2 (OLIVE GRAY), CLAY = 5Y 7/3 (PALE YELLOW); DRY COLOR: MUD = 5Y 7/2 (LIGHT GRAY), CLAY = 5Y 8/3 (PALE YELLOW). MODERATE Rx TO 10% HCL. SLIGHTLY CONSOLIDATED. SLIGHT COLOR D, D IN CONSOLIDATED; BELIEVE WE ARE IN RINGOLD (MUDRE), BUT NOT THE DISTINCT OLIVE GRAY → BRONNISH COLOR D. POSSIBLY LOOKING AT REWORKED + REDEPOSITED RING- OLD FM. GEO. SAMPLES TAKEN.		
				1 PPM OF SEGS.; 0 PPM IN BOREHOLE + BETWEEN 10" + 8" CASING. (11.7 SV PRBE).	1400	HND
					1415	PREPARING TO WELD 8"
49' 1 1/2"					1415	WELDING 8" CASING
7' 10"				ADDED 7' 10" OF 8" CARBID SIZED CASING; TOTAL 8"	1445	FINISHED WELD
56' 11 1/2"				CASING = 56' 11 1/2"	1455	DRAWING
					1530	END OF DAY
REMARKS:						
Sha. M. Goodwin 7 Oct 1988						

E.19

DRILL LOG		By M.A. Channess	Rjn E. 220	Well Number	Computer Number	Project or Work Order No
		Date 10/10/88	Date 11-22-14102	Depth	NA	Subcontract No. DA
Total Casing	Depth	Drill Method	Wet/Dry Sample	Well Number 50		Time
				LITHOLOGIC DESCRIPTION Grain Size, Color, Roundness, Cariche, Etc.		
56 11/2" of 8"				37-55	7:35	...
					8:20	...
					9:50/8:50	...
	55	A	wet	SILTY SANDY GRAVEL: 35% gravel, 55% sand, 10% mud zone in clasts could be up to 5%, probably mostly basalt. 2% vsp, 5% vsp 0.2% vsp, 0.2% vsp, 0.2% vsp, 2% vsp, 0.1% vsp, 0.2% vsp, 5% vsp. 10% mud. VPS. Basalt - 10% basalt 5% quartzite 45% greenish 0% red. & red. (P) - NR, v/2 of the ju & quartz have seen 1: staining (rusty color). Sand - 40% calc. 40% atz. 20% rk frags (including dk ju). A SR wet color - 5/4 1/2 (olive gray), dry - 2/4 1/2 (lt. olive gray). Difficult to determine composition because of the rubble. El. rxn to HCl. Small black nests, subrounded but varying amt. of weathering. Similar to first sample	9:45	...
18 5"					10:25	...
45 1/2" of 3"					1:20	...
REMARKS:						
M.A. Channess 10/10/88						

E. 20

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

E.21

DRILL LOG		By MA Chammes	Rig BE 220	Well Number (#5) 694-537-E14	Computer Number	Project or Work Order No. 1100 Area
		Date 10/10/88	#22-1110Z (Gray Wavelay)	Depth 55' To 102' 6 1/2"	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
65' 4 1/2"	0' 85"					
	60'	H	wet	<p>SANDY GRAVEL: 45% gravel, 50% sand, 5% mud. (10% vcf, 15% cp, 10% mp, 5% fp, 5% vfp, 20% vcs, 20% cs, 5% vcs, 3% fs, 2% vfs, 5% mud). PS-VPS. Gravel - 25% basalt, 5% quartzite, 60% ign. + metam., 10% sed. + others, A(?) - UR. Sand - 20% basalt, 55% qtz, 25% rk frags, including dk ign. etc. VA SR. May be some Fe staining of qtz rich gravels. Wet color - 5Y4/2 (olive gray), dry - 5Y6/1 (lt gray to gray). Slight to med rxn in UR. Drilling a little easier, prob. because there are no boulders. Looks like Kingold. Less basalt, more ign. and definitely well-rounded.</p>	<p>1140 1200/1230 1210 1300</p>	<p>gravel % estimate of original size quit for lunch. 0 ppm w/ HNU they have hit H<sub>2</sub>O at ~61' HNU = 0 ppm</p>
				<p>At depth of ~62', when hole is below bottom of casing, can bail 3 or 4 full bailers of water, bailer ~12' long, before the amount of water starts to decrease.</p>	1400	
				<p>D/W = 53' 2" from top of casing, stickup = 2'; ∴ E/W 51' 2" from ground surface</p>	1430	
	-			<p>ground surface</p>	1455	
REMARKS:				<p>62' 2" + 2' 4 1/2" extra on tape - 2' stickup = 62' 6 1/2" from ground surface</p>		

MA Chammes 10/10/88

DRILL LOG		By M.A. Chambers	Rig 6822u	Well Number (H5) 699-537-E14	Computer Number	Project or Work Order No. 1100 Area
		Date 10/10/88	#22-1102 Craig Womley	Depth 62'6 1/2" To 62'6 1/2"	11A	Subcontract No. 11A
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				With DW at 51'2" and DB at 62'6 1/2", have 11'4 1/2" of hole below the water table. Need to set screen at least 10' into the water, so this should be fine.		
				Straightness test using 20' of 6" stainless steel was ok	1500	
				Need to measure DB & DW first thing, then take samples with teflon bucket. If driller does not bail, water will be more clear, but not as "fresh".		
				Shannon & I think the 20 slot screen w/ 16/30 sand will be alright for this well		
					1510	quit for day
REMARKS:						
MA Chambers 10/10/88						

E.22

DRILL LOG			By S. S. Teal	Rig BE 2201 22-11102 Craig W. Taylor	Well Number (#5) 699-537-E14 Depth 62' 6 1/2"	Computer Number N/A	Project or Work Order No. 1100 Area 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	Driller arrives
						0703	Geologist arrives
				$D/Water = 53' 3 1/2" - 2' 1 1/2" (stick-up) = 51' 2"$		0730	
				$D/Bottom = 62' 1 3/4" + 2' 4 1/2" (tape) - 2' 1 1/2" (stick-up)$ $= 62' 4 3/4"$		0735	
				Bailing a few times to bring in fresh water so a H <sub>2</sub> O sample can be taken.		0740	
				Took water sample for rapid analysis		0755	
				Driller breaking-down tools and preparing to set stainless steel casing and screen (4")		0800	
				Vern McGhan, PNL arrives and runs the geophysical log. Natural Gamma: 62' - 2'		0845	
				The Neutron and Density logs were not run because the sources have not been released.			
						0915	Breaking-down tools
				$D/Bottom = 62' 1" + 2' 4 3/4" (tape) - 2' 1 1/2" (stick-up)$ $= 62' 4 1/4" \quad \text{w/ PNL steel tape } 3000'$		0950	
REMARKS:  S-S Teal 10-11-88							

E.23



DRILL LOG		By S. S. Teel	Rig BE 220 22-14102 Craig Winstley	Well Number (#S) 699-S37-E14 Depth TD To	Computer Number N/A	Project or Work Order No. 1100 Arca Subcontract No. N/A
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
				Setting stainless steel casing and screen: (4" dia.)	1000	
				1 - 10.5' section of 20 slot screen		
				1 - 5.25' section of 20 slot screen		
				2 - 20' sections of stainless steel casing		
				1 - 10' section .. " " "		
				Total stainless = 65.75'		
				$D_{\text{Bottom}} = 63'4" + 2'4\frac{3}{4}" (\text{tape}) - 3'2" = 62'6\frac{3}{4}"$	1025	
1 BAG	SAND			Added 1 bag 16-30 sand	1033	
				$D_{\text{sand}} = 58'7" + 2'4\frac{3}{4}" - 2'1\frac{1}{2}" = 58'10\frac{1}{4}"$		
1				Added 1 bag of 16-30		
1				$D_{\text{sand}} = 54' + 2'4\frac{3}{4}" - 2'1\frac{1}{2}" = 54'3\frac{1}{4}"$	1042	
2 BAGS	SAND			Pulled 8" casing 5' (bottom @ 58'4\frac{1}{2}" )	1125	
				$D_{\text{sand}} = 58'2" + 2'4\frac{3}{4}" - 3' = 57'6\frac{3}{4}"$		
				(Casing has dropped $\approx 6"$ during backpulling. Casing is pulling very easily).		
2					1140	Preparing to allow.
2				Added 2 bags of 16-30 Sand	1155	
4 bags of 16-30					1200 / 1230	Lunch
REMARKS: <p style="text-align: right;">S.S. Teel 10-11-88</p>						

DRILL LOG		By S.S. Teel	Rig 2222W	Well Number (#5) 699-537-E14	Computer Number N/A	Project or Work Order No. 1130 Area
		Date 10-11-88	Craig	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
4 1/2 bags of 16-30		30		D/sand = 49' b.l.s.	1230	
					1235	Pulling casing
				Pulled 8" casing to 52' 10 1/2" (56' 11 1/2" weld exp.)	1240	
				D/sand = 54' 5 1/2" + 2' 4 3/4" - 4' 1" = 52' 9 1/4" b.l.s.	1250	Cutting casing
1 1/2 bags				Added 3 bags of 16-30 sand	1306	
7 bags of 16-30				D/sand = 41' 10" + 2' 4 3/4" - 4' 1" = 40' 1 3/4" b.l.s. with PNL steel tape 20004		
					1310	Welding on casing to straight-line casing
				Straight-lined casing to 46' 1 1/2". Casing will not budge. - Tapping on casing w/ jars	1320	
				Bottom of 2" @ 46' b.l.s.	1340	Cutting casing
7				D/sand = 46' 7 1/4" + 2' 4 3/4" - 3' = 46' b.l.s.		
1				Added 1 bag of 16-30		
8 bags sand				D/sand = 42' 6" + 2' 4 3/4" - 3' = 41' 10 3/4"		
REMARKS:						
					S.S. Teel	
					10-11-88	

E.25

E.26

DRILL LOG		By S.S. Tool	Rig BE 22W 22-14102	Well Number (H.S.) 699-537-E14	Computer Number N/A	Project or Work Order No. 1100 Area
		Date 10-11-88	Craig	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
				Pulled 8" casing to 43' b.l.s.	1430	
				$D/\text{sand} = 47' + 2.4 - 5.5 = 43.9'$		
				Added 2 buckets of "4" pellets		
				$D/\text{pellets} = 39.9' \text{ b.l.s.}$		
				Added 1 bucket of pellets		
				$D/\text{pellets} = 40.7 + 2.4 - 5.5 = 37.6' \text{ b.l.s.}$		
	3 buckets of pellets				1448	Pulling Casing
				Pulled casing to 38.4' b.l.s. (40' 6" well exposed)	1505	
					1510	Cutting Casing
				$D/\text{pellets} = 37.87 + 2.4 - 2.1 = 38.17$		
				Ready to add bentonite crumbles		
REMARKS:				S.S. Tool 10-11-88		

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

DRILL LOG			By S.S. Teal	Rig BE 22W	Well Number (45) 699-537-E14	Computer Number N/A	Project or Work Order No. 1100 Area	
			Date 10-12-88	22-14102 Craig	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	
						0700	Driller arrives	
							preparing to work	
6 bags	of 8-20			$\text{D/Bottom of 8" casing} = 38.4' \text{ (40'6" weld exposed)}$ Added 6 bags of 8-20 mesh bentonite crumbles. $\text{D/Bentonite} = 21' \text{ b.l.s. (P.M. steel tape: 30004)}$				
				Welding on Puller Head		0740		
				Pulled 8" casing to 26.78' b.l.s. (30.58' weld exposed)		0820		
				$\text{D/Bentonite} = 28.0'$				
16				Added 6 bags of 8-20 mesh bentonite crumbles		0840		
12 bags				$\text{D/Bentonite} = 13.8' + 2.4' \text{ (tape)} - 3.8' \text{ (stick-up)} = 12.4'$				
						0845	Welding Puller Head	
				Pulled 8" casing to 16.67' (Bottom of 10" @ 19.67')		0911		
				$\text{D/Bentonite} = 20.74 + 2.40 \text{ (tape)} - 4.0' = 19.14' \text{ b.l.s.}$		0930		
				Pulled remaining 8" casing				
1 bag				Added 1 bag of 8-20 Mesh granular bentonite				
13 bags	of 8-20			$\text{D/Bentonite} = 17.08' + 2.4' - 1.1' = 18.38'$				
				$\text{D/Bottom (inside 4" casing)} = 63.0' + 2.4' - 2.1' \text{ (stick-up)}$				
				$= 62.5' \text{ b.l.s. w/ P.M. steel tape 30004.}$				
REMARKS:							S.S. Teal 10-12-88	

E.28

DRILL LOG			By	Rig	Well Number	Computer Number	Project or Work Order No.
			S.S. Teel	BE 22W	(45) 699-537-E14	N/A	1100 Area
			Date	22-14102	Depth		Subcontract No.
			10/12/88	Craig Wansley	Completions To		N/A
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.		Time	Drilling Comments
				D/water = 53.89 - 2.9' (still-up) = 50.99' b.l.s.		1030	Breaking-down tests
				Approval was received from Rob Bryer, Project Manager, to discharge purge water to ground surface based on analysis results of water sample collected yesterday.			
				Bailer is 16.1' long and has a max i.d. of .27' (3 3/8") and is a dart type. Capacity of bailer ≈ 5 gal.		1110	Preparing to bail
						1140	Bailing
						1200/1230	Lunch
				Stop Bailing. Picking-up equipment from site. Total time bailing so far ≈ 40 min. Water is very turbid and contains ≈ 1 tbsp VFS and silt per 5 gal.		1245	
				Average bailing rate ≈ 5 gal/min		1315	Bailing
				Water is still turbid but contains ≈ 1 tsp or less silt - CS per 5 gal. The aquifer recovers quickly from each bailer because the amount drawn out is very consistent (≈ 5 gal). The amount of MS-CS varies from each bailer. Some bailers will be only silt while others will contain up to CS.		1350	
REMARKS:							S.S. Teel 10-12-88

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

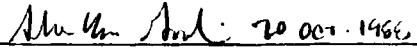
DRILL LOG		By	Rig	Well Number	Computer Number	Project or Work Order No
		S.S. Teel	BE 224	(#5) 699-537-EK	N/A	1100 Area
		Date	22 14102	Depth		Subcontract No
		10-12-88	Craig Hamley	P		N/A
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc	Time	Drilling Comments
				No change in character of water. A more efficient method will have to be used to further develop the well.	1400	
				Total time bailed $\approx$ 85 min		
				Total gallons bailed $\approx$ 78 gal		
				D/Bottom (inside 4" casing) = $63.33 + 0.40 = 2.9' = 62.83'$ b.l.s.		
REMARKS						S.S. Teel 10-12-88

E.29



DRILL LOG			By S. L. Goudwin	Rig BE 22w	Well Number (#5) 699-537-E14	Computer Number N/A	Project or Work Order No. 1100 AREA
			Date 19 October 1966	# 22-11101	Depth CUM. To	Subcontract No. N/A	
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Calcite, Etc.		Time	Drilling Comments
				RIG WAS NOT STEAM CLEANED; STEAM CLEANING		1030	SETTING UP RIG.
				WASN'T NECESSARY AS RIG WITH ONLY BE		1200/1230	LUNCH
				USED FOR BACKPULPING & NO TOOLS WITH GUNNER THE		1235	PREPARING TO BACK-
				BOREHOLE.			PULL 10"
						1250	STANDBY; WAITING
							FOR GROUT
				BOTTOM OF 10" CASING = 19.4' B.L.S.; D/B (BRINE) = 18.38'		1330	MIXING CEMENT
							GROUT
				D/B = 4.05' B.L.S.; USED 5 94 LB. BAGS OF PORTLAND		1400	POURING GROUT
				CEMENT, 30 GALLONS POTASSIUM H <sub>2</sub> O, & 1% ALUMINA		1405	BACKPULPING 10"
				POWDER IN CEMENT GROUT.			
						1420	CASING PULLING 10"
				D/B = 8.15'; BOTTOM OF 10" = 11.2'; ~3' OF		1445	D/B
				OVERLAY.		1450	PULLING 10"
				BOTTOM OF 10" = 9.25' B.L.S.; D/B (GROUT) = 8.95'		1455	CUTTING 10"
						1500	DONE FOR DAY
REMARKS:							
<i>Alan H. N...</i> 19 OCTOBER 1966							



DRILL LOG			By S. M. GOODWIN	Rig #22-14101	Well Number (H5) 699-537 E14	Computer Number N/A	Project or Work Order No 1100 AREA
			Date 20 OCTOBER 1965	Depth Comp. To		Subcontract No N/A	
Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Gran Size Color. Roundness, Caliche, Etc		Time	Drilling Comments
				DRIVEN IS LIVE CARBON		100	
				D/B (CEMENT GROUT) = 6.45' - .5' OF EXPANSION		0725	
				ONE NIGHT.		0730	MIXING GROUT
				USED 1/2 OF CEMENT GROUT BATCH; BATCH CONSISTED		0740	POURING GROUT
				OF 5 1/2 94 LB. BAGS OF PORTLAND CEMENT, 35			
				GALLONS H <sub>2</sub> O 1" 1/2 (BY VOLUME) ALUMINUM			
				POWDER			
				D/B (GROUT) = 1' B.L.S., BOTTOM @ 10 = 9.25'		0745	- o u 10* -
				D/B (CEMENT GROUT) = 3.2' B.L.S		0805	10" FREE FROM
							HOLE
						0810	BREAKING DOWN
							RTG
				= 54.55' - 2.7' STICKUP = 51.85' B.L.S		1020	D/W
				(INCL E TYPE # 12270)			
				D/B = 63.65' + 2.05' - 2.7' STICKUP = 63.0' B.L.S		1025	D/B
				(INCL 300' TYPE # L300-06)			
REMARKS:							
 20 OCT. 1965							

E.32

DRILL LOG		By S M GOODWIN	Rig NO RIG	Well Number Well Num (#5) 699-537-E14	Computer Number N/A	Project or Work Order No 1100 AREA
		Date 26 OCTOBER 1988		Depth Camp. 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
				ACME CONCRETE TRUCK IS POURING CONCRETE	0900	CONCRETE
				PAD: CONCRETE IS AIR-ENTRAINED REEFAL		PAD
				TO LOG FROM WEL #1 FOR PATCH SLIP		
				(10/26/88) ESTIMATED VOLUME OF CONCRETE		
				= 1/2 YARD. INSTALLED 4 PROTECTIVE POSTS		
				, 6" PROTECTIVE SS, WAS PLACED		
				2 1/2' ABOVE TOP OF 4" SURVEY MARKER		
				INSTALLED	0930	FINISHED WITH PAD.
REMARKS						
<i>Shirley J. J. 26 OCT 1988</i>						

E.33



DRILL LOG		By S.M. Goodwin	Rig NO 236	Well Number (WS) 699-537-E14	Computer Number N/A	Project or Work Order No. 1100 AREA
		Date 2 NOVEMBER 1966	Depth DEV. 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
				USING 1.5 H.P. SUBMERSIBLE GRUNDFOS PUMP TO DEVELOP WELL BY OVERPUMPING. PUMP SET AT BOTTOM OF 4" STAINLESS; INTAKE IS ~1.5' FROM BOTTOM OF PUMP COLUMN.		
				D/W = 56.9' (PIL E. TUBE # 12021, FROM TOP OF TRAPPIE PIPE)	1253	D/W
				TOTALTRCA READS 5710 GALLONS	1255	PUMP ON
				PUMP RATE: 5.73 GALLONS / 28.22 SEC.	1257	12.1 GAL / MIN.
				D/W = 56.8' , +.1'. H <sub>2</sub> O MUST BE SURGING.	1258	D/W
				10 GALLONS / 44.56 SECONDS (READ FROM FLOW METER)	1259	12.1 GAL / MIN.
				5.73 GALLONS / 26.45 SEC (BUCKET)	1300	12.0 GAL / MIN.
				H <sub>2</sub> O SAMPLE = 3.5 NTU; CLEAR, LITTLE SEDS.	1301	
				D/W = 56.8'	1302	D/W
				H <sub>2</sub> O SAMPLE = 2.3 NTU; (CLEAR + PLEAS)	1303	
				D/W = 56.9'; AT STATIC LEVEL	1304	D/W
				BUCKET; 5.73 GALLONS / 27.53 SEC.	1305	12.5 GAL / MIN.
				METER: 10 GALLONS / 48.14 SEC. H <sub>2</sub> O SAMPLE	1309	12.5 GAL / MIN.
				= 2.1 NTU	1310	PUMP OFF
REMARKS:						
<i>John W. ... 11/2/66</i>						

E.35

E.36

WELL LOG			By S. M. (2000111)	Rig 1) RIG	Well Number (45) 699 537 E14	Contract Number 1A	Project or Work Order No. 1100 AUA
			Date 2 NOVEMBER 1968	Depth DEN 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
						13:13	PUMP ON
				BUCKET 5.73 GAL / 27.03 SEC. (CLEAN + PUSAN)		13:14	12.7 GAL / MIN
				D/W = 56.9"		13:15	D/W
				METER 10 GALLONS / 48.34 SEC.		13:16	12.4 GAL / MIN
				H <sub>2</sub> O SAMPLE = 1.6 NTU		13:17	
						13:18	PUMP OFF
						13:21	PUMP ON
				BUCKET: 5.73 GALLONS / 26.28 SEC.		13:22	13.0 GAL / MIN
				H <sub>2</sub> O SAMPLE = 2.3 NTU; VERY CLEAN, NO SEDS		13:23	
				D/W = 56.85"		13:24	D/W
				METER 10 GALLONS / 47.91 SEC. H <sub>2</sub> O SAMPLE		13:25	12.5 GAL / MIN
				= 1.6 NTU			
				D/W = 56.85" METER = 10 GAL / 47.75 SEC		13:26	D/W; 12 GAL / MIN
				H <sub>2</sub> O SAMPLE 1.6 NTU, BELOW 5 NTU LIMIT		13:27	
				D/W = 56.85"		13:29	D/W
				H <sub>2</sub> O SAMPLES ANALYZED BY HACH PORTABLE		13:30	PUMP OFF
				TURBIDIMETER.			
BM ADKS MINUTES PUMPED = 29 MINUTES AVE PUMP RATE = 12.5 GAL / MIN VOLUME H <sub>2</sub> O PUMPED = ~363 GALLONS A. H. H. 1/2/68							

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

DRILL LOG		By S. M. Goodwin	Rig CRANE	Well Number (HS) 694-537-E11	Computer Number N/A	Project or Work Order No. 1100 AREA
		Date 3 November 1966		Depth PUMP SET 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/B = 64.33' + 2.17' TAPE - 3.4' STICKUP + PAD	1350	D/B
				= 63.10' (PNL 300' TAPE L300-13)		
				D/W = 56.7' - 3.4' STICKUP = 53.3' (PNL E. TAPE # 12021). 9.8' OF SCREEN EXPOSED TO AQUIFER. WILL SET PUMP INTAKE ~5' BELOW D/W.	1355	D/W
				KEH DRILLERS HAVE PLACED A CLEAN GROUND TAP DOWN FOR LAYING PUMP + DISCHARGE PIPE. THEY ARE WEARING CLEAN COTTON GLOVES + HAVE REMOVED THE NECESSARY MATERIALS FROM THEIR PROTECTIVE CONTAINERS. PUMP + PIPES WERE INSPECTED BY DRILLERS BEFORE INSTALLATION; ALL JOINTS WERE TIGHTENED + TAPED W/ TEFLON.	1356	PREPARING PUMP + PIPE
				MATERIALS USED:	1410	SETTING PUMP
				6 10' SECTIONS OF 3/4" STAINLESS PIPE		
				1 2.3' HYDROSTAT PUMP		
				TOTAL PIPE + PUMP = 62.3'		
REMARKS:						
Alan G. Goodwin 3 November 1966						

E.37



DRILL LOG		By Date	Rig	Well Number	Computer Number	Project or Work Order No
		Glover 11-4-88	N <sub>o</sub> RIG	1100-5 699-537-E14	N/A	1100 AMSA
				Depth PUMP TEST 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
				Hydrostar pump check performed	30	—
				pumping & me to 1; & water from bottom on initial test run = 25 sec.		
				pumping rate at ~ 60 strokes/min = 5.1 gpm		
				system shows very little leakdown indicating pipe joints are sealed.		
				11-4-88 D.W. Glover		
REMARKS						

E.39



APPENDIX F

WELL SURVEY DATA

APPENDIX F

WELL SURVEY DATA

The following pages contain the survey data for the five new wells drilled in the 1100 Area. Kaiser Engineers Hanford performed the surveying.

<b>KAISER ENGINEERS HANFORD</b>		<b>SURVEY DATA REPORT</b>		Request No. - 1 2   3   4   5   6																																																			
Project/W.O. No. 3 90916		Title 1100 AREA, 3000 AREA MONITORING WELLS		File No. W   E   U   C   -   1   1   1   8																																																			
KEH Job No. B 90916-11		Prepared By <i>Gary B. Wagner</i>		Date 11/18/88																																																			
				Reviewer <i>[Signature]</i> GRANT BRAZIL 1   2																																																			
DESCRIPTION OF WORK			ACCEPTABILITY (Within Plan Tolerance)		DISTRIBUTION																																																		
ESTABLISHED LAMBERT COORDINATES AND U.S.G.S			Yes <input type="checkbox"/>		Survey File <i>DR</i>																																																		
ELEVATIONS OF THE 5 NEW WELLS IN THE 1100/3000			No <input type="checkbox"/>		Field Project File <i>DR</i>																																																		
AREA			NA <input checked="" type="checkbox"/>		Rob Bryce 1																																																		
			TBO by		Clark Hodge 1																																																		
			Requestor <input type="checkbox"/>																																																				
SURVEY RESULTS AND COMMENTS																																																							
<p>LAMBERT PROJECTION WASHINGTON STATE PLANE COORDINATES (south zone) NORTH AMERICAN DATUM OF 1927 (U.S. Survey Feet)</p> <table border="1"> <thead> <tr> <th>WELL NO.</th> <th>(y) NORTHING</th> <th>(x) EASTING</th> <th>ELEVATIONS</th> <th>DESCRIPTIONS</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>364,331.0</td> <td>2,308,242.1</td> <td>407.71 410.56</td> <td>TOP OF BRASS CAP TOP OF CASING</td> </tr> <tr> <td>2</td> <td>365,592.8</td> <td>2,309,354.0</td> <td>399.84 402.85</td> <td>TOP OF BRASS CAP TOP OF CASING</td> </tr> <tr> <td>3</td> <td>364,364.3</td> <td>2,308,243.7</td> <td>407.25 410.10</td> <td>TOP OF BRASS CAP TOP OF CASING</td> </tr> <tr> <td>4</td> <td>362,273.0</td> <td>2,307,422.0</td> <td>402.83 405.60</td> <td>TOP OF BRASS CAP TOP OF CASING</td> </tr> <tr> <td>5</td> <td>368,061.4</td> <td>2,309,401.0</td> <td>405.38 408.28</td> <td>TOP OF BRASS CAP TOP OF CASING</td> </tr> </tbody> </table> <p>LAMBERT PROJECTION WASHINGTON STATE PLANE COORDINATES (south zone) NORTH AMERICAN DATUM OF 1983 (Meters)</p> <table border="1"> <tbody> <tr> <td>1</td> <td>111,031.8</td> <td>593,862.9</td> <td>SEE ABOVE</td> </tr> <tr> <td>2</td> <td>111,416.4</td> <td>594,201.8</td> <td>SEE ABOVE</td> </tr> <tr> <td>3</td> <td>111,041.9</td> <td>593,863.4</td> <td>SEE ABOVE</td> </tr> <tr> <td>4</td> <td>110,404.5</td> <td>593,612.9</td> <td>SEE ABOVE</td> </tr> <tr> <td>5</td> <td>112,168.8</td> <td>594,216.2</td> <td>SEE ABOVE</td> </tr> </tbody> </table>						WELL NO.	(y) NORTHING	(x) EASTING	ELEVATIONS	DESCRIPTIONS	1	364,331.0	2,308,242.1	407.71 410.56	TOP OF BRASS CAP TOP OF CASING	2	365,592.8	2,309,354.0	399.84 402.85	TOP OF BRASS CAP TOP OF CASING	3	364,364.3	2,308,243.7	407.25 410.10	TOP OF BRASS CAP TOP OF CASING	4	362,273.0	2,307,422.0	402.83 405.60	TOP OF BRASS CAP TOP OF CASING	5	368,061.4	2,309,401.0	405.38 408.28	TOP OF BRASS CAP TOP OF CASING	1	111,031.8	593,862.9	SEE ABOVE	2	111,416.4	594,201.8	SEE ABOVE	3	111,041.9	593,863.4	SEE ABOVE	4	110,404.5	593,612.9	SEE ABOVE	5	112,168.8	594,216.2	SEE ABOVE
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KEH-159.1 (6-84)

HANFORD PLANT COORDINATES OF NEW WELLS IN 1100/3000 AREA

Note: The coordinates of the 5 wells listed below were derived from a coordinate conversion equation and should be used only for the purpose of identification of the wells and for information only.

WELL NUMBER	SOUTHING	EASTING
1	41,004	12,811
2	39,745	13,927
3	40,970	12,813
4	43,060	11,986
5	37,276	13,980

APPENDIX G

RESULTS OF VOLATILE AND SEMIVOLATILE ORGANIC ANALYSES OF GROUND-WATER SAMPLES

APPENDIX G

RESULTS OF VOLATILE AND SEMIVOLATILE ORGANIC ANALYSES OF GROUND-WATER SAMPLES

This appendix contains the results of volatile and semivolative organic analyses conducted on samples from the five new monitoring wells in the 1100 Area. Table G.1 presents the results of volatile organic analyses of ground-water samples collected November 11 and 14, 1988. These analyses were conducted by Pacific Northwest Laboratory. The pages that follow present the results of the semivolatile organic analyses conducted by U.S. Testing Company, Inc.

TABLE G.1. Results of Volatile Organic Analyses

Constituent	Concentration <sup>(a)</sup>				
	Well 1	Well 2	Well 3	Well 4	Well 5
Methylene Chloride	<3	<3	t3	<3	<3
Chloroform	0.29	0.57	0.56	0.31	5.3
1,1,1-T <sup>(b)</sup>	t0.02	<0.02	0.03	0.02	0.35
Carbon Tetrachloride	t0.01	t0.01	<0.01	t0.01	<0.01
TCE <sup>(c)</sup>	0.03	<0.02	0.10	0.14	0.08
BDCM <sup>(d)</sup>	<0.01	0.03	t0.01	<0.01	0.15
PCE <sup>(e)</sup>	0.12	t0.01	0.22	0.02	0.13

- 
- (a) Concentrations in ppb.
  - (b) 1,1,1-T = 1,1,1-Trichloroethane.
  - (c) TCE = Trichloroethylene.
  - (d) BDCM = Bromodichloromethane.
  - (e) PCE = Perchloroethylene.

RAPID

Well # 1

SEMI-VOLATILE ORGANIC ANALYSIS (ABN)

ANALYSIS CODE: 732

UST-RD I.D.: 64065 DATE EXTRACTED: 11/7/88  
 CUST I.D.: 4971-D DATE ANALYZED: 11/10/88  
 ANALYST: KBA/SLM DILUTION:             
 ALIQUOT: 1000 ml MATRIX: water

MDL

COMPOUND	CODE	SOIL	WATER	FOUND	REPORTED
1,2-DICHLOROBENZENE	861	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
1,3-DICHLOROBENZENE	B62	< 1.0 ug/g	< 10 ppb		< 10 ppb
1,4-DICHLOROBENZENE	B63	< 1.0 ug/g	< 10 ppb		< 10 ppb
1,2,4-TRICHLOROBENZENE	C43	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
1,2,3-TRICHLOROBENZENE	C56	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
1,3,5-TRICHLOROBENZENE	C58	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
1,2,4,5-TETRACHLOROBENZENE	C37	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
1,2,3,4-TETRACHLOROBENZENE	C59	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
1,2,3,5-TETRACHLOROBENZENE	C60	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
PENTACHLOROBENZENE	C26	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
KEXACHLOROBENZENE	B89	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
HEXACHLOROPHENE	C54	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
NAPHTHALENE	C55	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
PHENOL	C57	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
TRIBUTYLPHOSPHATE	I21	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
KEROSENE	C79	< 1000 ug/g	< 10 ppm	ND	< 10 ppm

TENTATIVELY IDENTIFIED COMPOUNDS (>25% OF NEAREST I.S.)

COMPOUND	CODE	EST. CONC.
T1:		
T2:		
T3:		
T4:		
T5:		

DR79(62)-P8

DELIVERED NOV 11 1988

RECEIVED NOV 12 1988

11-12-88

Well #2

SEMI-VOLATILE ORGANIC ANALYSIS (AEN)

RAPID

ANALYSIS CODE: 732

UST-RD I.D.: 64066

DATE EXTRACTED: 11/7/88

CUST I.D.: 4972-D

DATE ANALYZED: 11/10/88

ANALYST: CF/JLM

DILUTION: —

ALIQOT: 1000 ml

MATRIX: water

COMPOUND	CODE	MDL		FOUND	REPORTED
		SOIL	WATER		
1,2-DICHLOROBENZENE	B61	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
1,3-DICHLOROBENZENE	B62	< 1.0 ug/g	< 10 ppb		< 10 ppb
1,4-DICHLOROBENZENE	B63	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
1,2,4-TRICHLOROBENZENE	C43	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
1,2,3-TRICHLOROBENZENE	C56	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
1,3,5-TRICHLOROBENZENE	C58	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
1,2,4,5-TETRACHLOROBENZENE	C37	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
1,2,3,4-TETRACHLOROBENZENE	C59	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
1,2,3,5-TETRACHLOROBENZENE	C60	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
PENTACHLOROBENZENE	C26	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
HEXACHLOROBENZENE	B89	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
HEXACHLOROPHENE	C54	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
NAPHTHALENE	C55	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
PHENOL	C57	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
TRI BUTYLPHOSPHATE	I21	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
KEROSENE	C79	< 1000 ug/g	< 10 ppm	ND	< 10 ppm

TENTATIVELY IDENTIFIED COMPOUNDS (>25% OF NEAREST I.S.)

COMPOUND	CODE	EST. CONC.
T1:		
T2:		
T3:		
T4:		
T5:		

DR79[62]-P8

DELIVERED NOV 11 1988

11-17-88



Well # 3

SEMI-VOLATILE ORGANIC ANALYSIS (ABN)

RAPID

ANALYSIS CODE: 732

UST-RD I. D.: 64067

DATE EXTRACTED: 11/7/88

CUST I. D.: 4973-17

DATE ANALYZED: 11/10/88

ANALYST: CI/JLM

DILUTION: \_\_\_\_\_

ALIQUOT: 1000 ml

MATRIX: water

COMPOUND	CODE	MDL		FOUND	REPORTED
		SOIL	WATER		
1, 2-DICHLORO BENZENE	B61	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
1, 3-DICHLORO BENZENE	B62	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
1, 4-DICHLORO BENZENE	B63	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
1, 2, 4-TRICHLORO BENZENE	C43	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
1, 2, 3-TRICHLORO BENZENE	C56	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
1, 3, 5-TRICHLORO BENZENE	C58	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
1, 2, 4, 5-TETRACHLORO BENZENE	C37	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
1, 2, 3, 4-TETRACHLORO BENZENE	C59	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
1, 2, 3, 5-TETRACHLORO BENZENE	C60	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
PENTACHLORO BENZENE	C26	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
HEXACHLORO BENZENE	B89	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
HEXACHLORO PHENE	C54	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
NAPHTHALENE	C55	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
PHENOL	C57	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
TRIBUTYLPHOSPHATE	I21	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
KEROSENE	C79	< 1000 ug/g	< 10 ppm	ND	< 10 ppm

TENTATIVELY IDENTIFIED COMPOUNDS (>25% OF NEAREST I. S.)

COMPOUND	CODE	EST. CONC.
T1:		
T2:		
T3:		
T4:		
T5:		

DR79(62)-P8

DELIVERED NOV 11 1988

LKI 11-12-88

Well # 4

SEMI-VOLATILE ORGANIC ANALYSIS (ABN)

RAPID

ANALYSIS CODE: 732

UST-RD I. D.: 64068

DATE EXTRACTED: 11/7/88

CUST I. D.: 4974-D

DATE ANALYZED: 11/10/88

ANALYST: KBD/JLW

DILUTION: \_\_\_\_\_

ALIQUOT: 1000 ml

MATRIX: water

COMPOUND	CODE	SOIL	WATER	FOUND	REPORTED
1, 2-DICHLOROBENZENE	B61	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
1, 3-DICHLOROBENZENE	B62	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
1, 4-DICHLOROBENZENE	B63	< 1.0 ug/g	c 10 ppb	ND	< 10 ppb
1, 2, 4-TRICHLOROBENZENE	C43	< 1.0 ug/g	c 10 ppb	ND	< 10 ppb
1, 2, 3-TRICHLOROBENZENE	C56	< 1.0 ug/g	c 10 ppb	ND	< 10 ppb
1, 3, 5-TRICHLOROBENZENE	C58	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
1, 2, 4, 5-TETRACHLOROBENZENE	C37	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
1, 2, 3, 4-TETRACHLOROBENZENE	C59	c 1.0 ug/g	< 10 ppb	ND	< 10 ppb
1, 2, 3, 5-TETRACHLOROBENZENE	C60	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
PENTACHLOROBENZENE	C26	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
HEXACHLOROBENZENE	B89	c 1.0 ug/g	c 10 ppb	ND	< 10 ppb
HEXACHLOROPHENE	C54	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
NAPHTHALENE	C55	< 1.0, ug/g	< 10 ppb		< 10 ppb
PHENOL	C57	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
TRI BUTYLPHOSPHATE	121	< 1.0 ug/g	< 10 ppb		< 10 ppb
KEROSENE	C79	< 1000 ug/g	< 10 ppm	ND	< 10 ppm

TENTATIVELY IDENTIFIED COMPOUNDS (>25% OF NEAREST L.S.)

COMPOUND	CODE	EST. CONC.
T1:		
T2:		
T3:		
T4:		
T5:		

DR79[62]-P8

DELIVERED NOV 11 1988

LK9  
11-10-88

Well # 5

SEMI-VOLATILE ORGANIC ANALYSIS (ABN)

RAPID

ANALYSIS CODE: 732

UST-RD I. D. : 64069

DATE EXTRACTED: 11/7/88

CUST I. D. : 4975-D

DATE ANALYZED: 11/10/88

ANALYST: CE/JLM

DILUTION: —

ALIQUOT: 1000 ml

MATRIX: water

MDI.

COMPOUND	CODE	SOIL	WATER	FOUND	REPORTED
1,2-DICHLOROBENZENE	B61	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
1,3-DICHLOROBENZENE	B62	c 1.0 ug/g	c 10 ppb	ND	< 10 ppb
1,4-DICHLOROBENZENE	B63	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
1,2,4-TRICHLOROBENZENE	C43	< 1.0 ug/g	c 10 ppb	ND	< 10 ppb
1,2,3-TRICHLOROBENZENE	C56	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
1,3,5-TRICHLOROBENZENE	C58	< 1.0 ug/g	c 10 ppb	ND	< 10 ppb
1,2,4,5-TETRACHLOROBENZENE	C37	c 1.0 ug/g	< 10 ppb	ND	< 10 ppb
1,2,3,4-TETRACHLOROBENZENE	C59	c 1.0 ug/g	< 10 ppb	ND	< 10 ppb
1,2,3,5-TETRACHLOROBENZENE	C60	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
PENTACHLOROBENZENE	C26	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
HEXACHLOROBENZENE	B89	< 1.0 ug/g	c 10 ppb	ND	< 10 ppb
HEXACHLOROPHENE	C54	< 1.0 ug/g	c 10 ppb	ND	< 10 ppb
NAFTHALENE	C55	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
PHENOL	C57	< 1.0 ug/g	c 10 ppb	ND	< 10 ppb
TRIBUTYLPHOSPHATE	I21	< 1.0 ug/g	< 10 ppb	ND	< 10 ppb
KEROSENE	C79	< 1000 ug/g	< 10 ppm	ND	< 10 ppm

TENTATIVELY IDENTIFIED COMPOUNDS (>25% OF NEAREST I.S.)

COMPOUND	CODE	EST. CONC.
T1:		
T2:		
T3:		
T4:		
T5:		

DR79[62]-P8

DELIVERED NOV 11 1988

11/12/88

APPENDIX H

RESULTS OF GROUND-WATER ANALYSES FROM NEW MONITORING WELLS

## APPENDIX H

### RESULTS OF GROUND-WATER ANALYSES FROM NEW MONITORING WELLS

This appendix contains the results of chemical and volatile organic analyses conducted on ground-water samples collected November 7, 1988, from five new monitoring wells in the 1100 Area.

**TABLE H.1. Results of Chemical Analyses Conducted  
by U.S. Testing Company, Inc.**

Constituent	Concentration <sup>(a)</sup>				
	Well 1	Well 2	Well 3	Well 4	Well 5
Nitrate	7.8 ppm	1 ppm	4 ppm	21.2 ppm	3 ppm
Chloride	4.9 ppm	0.9 ppm	8.1 ppm	43 ppm	2.1 ppm
Fluoride	<0.5 ppm	<0.5 ppm	<0.5 ppm	<0.5 ppm	<0.5 ppm
Sulfate	11.6 ppm	11.9 ppm	11.5 ppm	26.9 ppm	11.5 ppm
Phosphate	<1 ppm	<1 ppm	<1 ppm	<1 ppm	<1 ppm
TOX	<13	44	<8.0	59	61
TOC	<700	<600	<700	1.2 ppm	<600
TC	32.6 ppm	16.9 ppm	47.8 ppm	53.6 ppm	20.2 ppm
pH	7.6	7.6	7.5	7.6	7.8
Alkalinity	142 ppm	73 ppm	214 ppm	234 ppm	89.5 ppm
<u>Metals Analyzed by the Inductively Coupled Plasma Method</u>					
Zinc	<5	170	65.1	59.2	<5
Calcium	39.1 ppm	23.3 ppm	57.9 ppm	88.1 ppm	28.1 ppm
Barium	32.9	15.9	57.9	58.6	18.7
Cadmium	<2	<2	<2	<2	<2
Chromium	<10	<10	<10	<10	<10
Silver	<10	<10	<10	<10	<10
Sodium	7.76 ppm	2.43 ppm	16.60 ppm	24.70 ppm	4.50 ppm
Nickel	<10	<10	<10	<10	<10
Copper	<10	<10	<10	<10	<10
Vanadium	6.33	<5	<5	7.51	5.97
ALuminum	<150	<150	<150	<150	<150
Manganese	57.1	5.6	176	70.3	6.3
Potassium	4.81 ppm	1.18 ppm	5.86 ppm	8.37 ppm	2.29 ppm
Iron	<30	<30	36	34.3	<30
Magnesium	8.3 ppm	4.6 ppm	12.2 ppm	16.4 ppm	5.1 ppm
Beryllium	<5	<5	<5	<5	<5
Strontium	175	104	264	368	106
Antimony	<100	<100	<100	<100	<100
<u>Metals Analyzed by the Gas Furnace/Atomic Absorption Method</u>					
Arsenic	<5	<5	<5	<5	<5
Selenium	<5	<5	<5	<5	<5
Lead	<5	<5	<5	<5	<5
Thallium	<5	<5	<5	<5	<5
Mercury	<0.1	<0.1	<0.1	<0.1	<0.1

**TABLE H.1. (contd)**

Constituent	Concentration <sup>(a)</sup>				
	Well 1	Well 2	Well 3	Well 4	Well 5
<u>Pesticides</u>					
Endrin	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	<3	<3	<3	<3	<3
Toxaphene	<1.0	<1.0	<1.0	<1.0	<1.0
Alpha BHC	<0.1	<0.1	<0.1	<0.1	<0.1
Beta BHC	<0.1	<0.1	<0.1	<0.1	<0.1
Gamma BHC	<0.1	<0.1	<0.1	<0.1	<0.1
Delta BHC	<0.1	<0.1	<0.1	<0.1	<0.1
<u>Herbicides</u>					
Endrin	<2.0	<2.0	<2.0	<2.0	<2.0
<u>Ethylene Glycol</u>					
Ethylene Glycol	<10 ppm	<10 ppm	<10 ppm	<10 ppm	<10 ppm
<u>PCB</u>					
PCB	<1.0	<1.0	<1.0	<1.0	<1.0
<u>VOAs</u>					
Carbon Tetra- chloride	<5	<5	<5	<5	<5
Methone <sup>(b)</sup>	<10	<10	<10	<10	<10
1,1,1-T <sup>(c)</sup>	<5	<5	<5	<5	<5
1,1,2-T <sup>(d)</sup>	<5	<5	<5	<5	<5
TCE <sup>(e)</sup>	<5	<5	<5	<5	<5
PCE <sup>(f)</sup>	<5	<5	<5	<5	<5
Opxylen <sup>(g)</sup>	<5	<5	<5	<5	<5
Chloroform	<5	<5	<5	<5	<5
Methylene. chloride	12 <sup>(h)</sup>	72 <sup>(h)</sup>	<10	78 <sup>(h)</sup>	<10
M-xyle <sup>(i)</sup>	<5	<5	<5	<5	<5
Hexone <sup>(j)</sup>	<10	<10	<10	<10	<10
<u>ABNs</u>					
ABNs	<detect	<detect	<detect	<detect	<detect

(a) Concentrations are in ppb unless otherwise stated.

(b) Methone = Methylene ketone.

(c) 1,1,1-T = 1,1,1 Trichloroethane.

(d) 1,1,2-T = 1,1,2 Trichloroethane.

(e) TCE = Trichloroethylene.

(f) PCE = Perchloroethene.

(g) Opxylen = Ortho para xylene.

(h) Methylene chloride was below detection for samples collected November 11 and 14, 1988, and analyzed by PNL, indicating samples collected November 7, 1988, and analyzed by U.S. Testing and PNL were contaminated with methylene chloride during sample collection process.

(i) M-xyle = Meta xylene.

(j) Hexone = Methyl isobutyl ketone.

TABLE H.2. Results of Volatile Organic Analyses Conducted by Pacific Northwest Laboratory

VOAs	Concentration <sup>(a)</sup>				
	Well 1	Well 2	Well 3	Well 4	Well 5
Methylene Chloride	7(<3) <sup>(b)</sup>	44(<3) <sup>(b)</sup>	<3	48(<3) <sup>(b)</sup>	<3
Chloroform	0.30	0.25	0.57	0.28	4.2
1,1,1-T <sup>(c)</sup>	0.03	<0.02	0.02	0.04	0.31
Carbon Tetra- chloride	t0.01	t0.01	<0.01	<0.01	(0.01)
TCE <sup>(d)</sup>	0.02	<0.02	0.09	0.11	0.07
BDCM <sup>(e)</sup>	<0.01	<0.01	<0.01	<0.01	0.01
PCE <sup>(f)</sup>	0.11 (0.01)	0.20	0.02	0.12	

- (a) Concentrations are in ppb unless otherwise stated.
- (b) Methylene chloride was below detection for samples collected November 11 and 14, 1988, and analyzed by PNL, indicating samples collected November 7, 1988, and analyzed by U.S. Testing and PNL were contaminated with methylene chloride during sample collection process.
- (c) 1,1,1-T = 1,1,1-Trichloroethane.
- (d) TCE = Trichloroethylene.
- (e) BDCM = Bromodichloromethane.
- (f) PCE = Perchloroethylene.

Semivolatile organic constituents (ABNs) have varying detection limits. The raw data report for one sample is included in Appendix G to indicate the complete list of analyses and the detection limits.

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