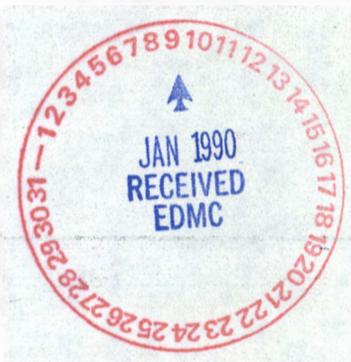


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RHO-BWI-LD-37
Informal Report

Drilling History Of The Extension By Coring Of Borehole DC-7

T. S. Clawson
R. K. Ledgerwood
L. D. Diediker



Prepared for the United States
Department of Energy
Under Contract DE-AC06-77RL01030



Rockwell International

Rockwell Hanford Operations
Energy Systems Group
Richland, WA 99352

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DRILLING HISTORY OF THE
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Basalt Waste Isolation Project

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INTRODUCTION

Coring operations in Borehole DC-7 were completed in June 1980 by the Boyles Brothers Drilling Company, Spokane, Washington, under subcontract to Rockwell Hanford Operations (Rockwell), Richland, Washington. Rockwell's Basalt Waste Isolation Project (BWIP) personnel furnished continuous supervision of the core drilling activities and geologic core logging for the borehole. Rockwell's Materials Function personnel were responsible for contract management.

Borehole DC-7 is located about 13 miles north of Richland, Washington on the Hanford Site (Figure 1). Ground surface elevation at the well site is 543 feet above mean sea level. Geographical coordinates of the well casing are N420,174 and E2,280,448 of the Washington State Grid System and lat. 46°28'49"N, long. 119°23'12" W.

Borehole DC-7 was originally drilled by a rotary drilling rig to a depth of 4,102 feet with a diameter of 8-5/8 inches (Fenix & Scisson, 1977). Borehole DC-7 was a companion hole to Core Hole DC-8 (Fenix & Scisson, 1978) and was primarily drilled for hydrologic test and cross-hole vertical transmissivity measurements. Additional geohydrologic data on the lower Grande Ronde Basalts were needed from this site. It was, therefore, decided to deepen DC-7 by coring approximately 900 feet of core.

CONCLUSIONS AND RECOMMENDATIONS

Relatively few permeable zones were encountered in the cored portion of DC-7; therefore, coring operations were completed in less than the amount of time projected. Limited hydrologic testing during drilling was done and no cementing or borehole repair was required. Few drilling problems beyond short runs, due to highly fractured rock, were encountered.

Scheduling of future coring operations in equivalent depths should reflect the probable reduction in permeable zones and reduced requirements for hydrologic testing and hole repair.

DRILLING AND CORING OPERATIONS

Two strings of intermediate casing were run in Borehole DC-7 to facilitate coring below the 8-5/8-inch-diameter open hole portion (Figure 2). A string of 4-1/2-inch casing with an attached packer was run from ground surface to 4,087 feet and set in tension. Three-and-one-half-inch casing was then run from ground surface to the bottom of the hole at a nominal depth of 4,100 feet. These operations were started on February 19, 1980 and completed on March 2, 1980.

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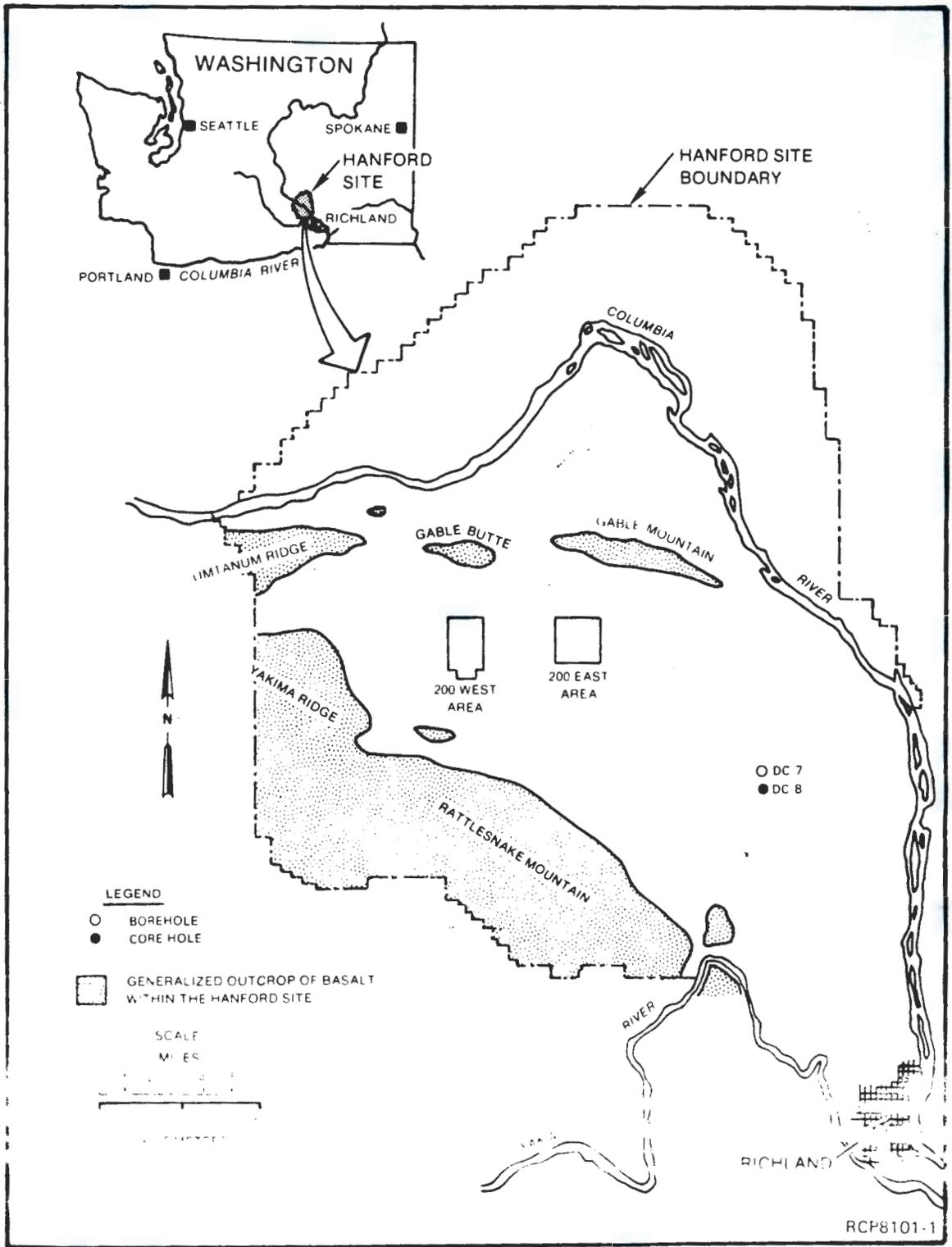
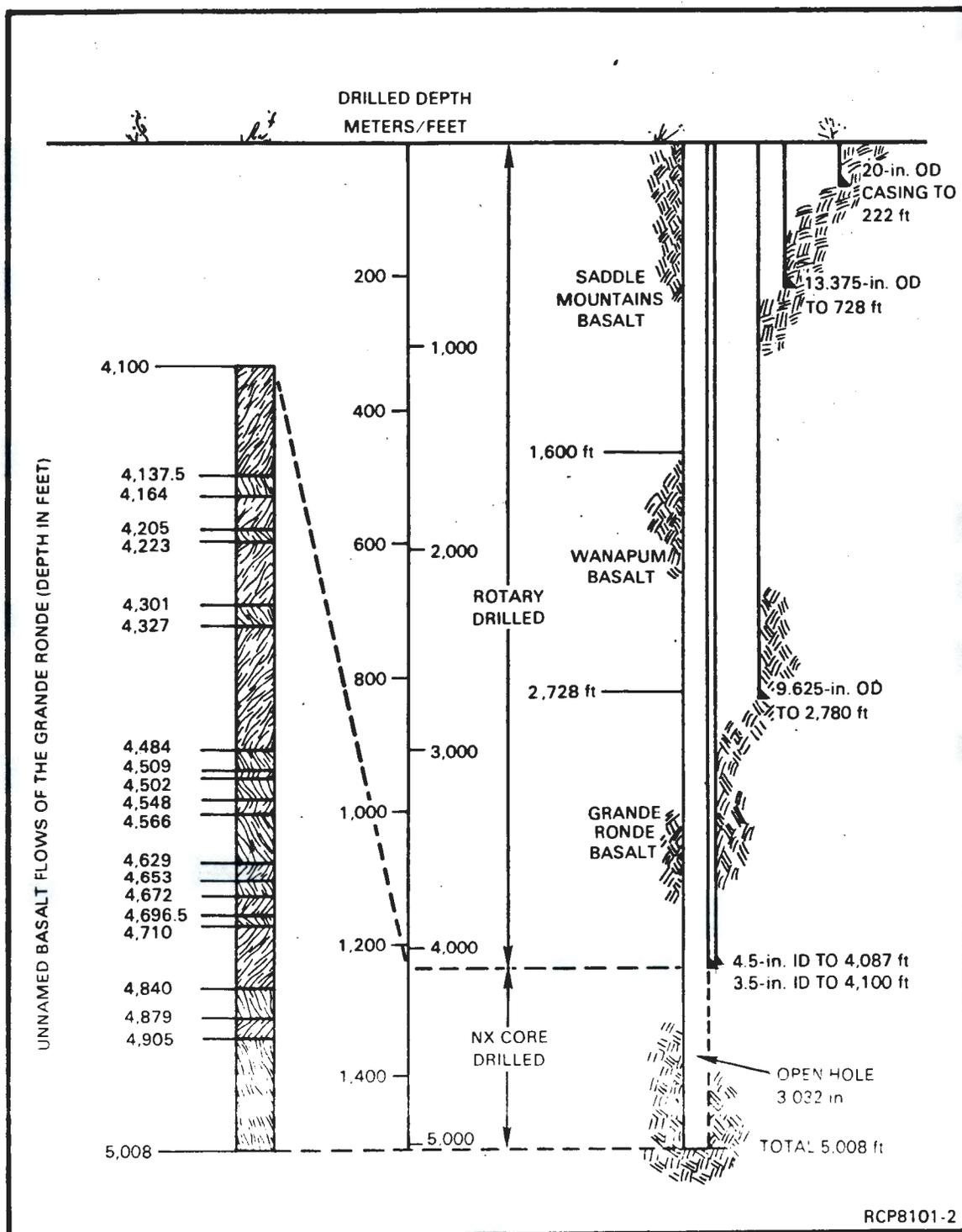


FIGURE 1. Location of Borehole DC-7 and Core Hole DC-8.



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FIGURE 2. As-Built Diagram for Borehole DC-7 (Includes Cored Portion).

A Chicago Pneumatic Model 50 (CP-50) coring rig under subcontract SA-635 with the Boyles Brothers Drilling Company, Spokane, Washington, was then rigged up over the hole. Coring began March 19, 1980 at a measured depth of 4,102 feet and continued to 5,008 feet below ground surface using wireline NX (3.032-inch-diameter) diamond core bits. Total depth was reached on June 9, 1980. No lost circulation zones were encountered during drilling and no penetrated zones required cementing. Drilling was halted for 20 days (April 8 through 28, 1980) to allow hydrological testing and geophysical logging operations to be conducted and a 5-day shut-down resulted from the tephra fallout of the May 18, 1980 eruption of Mount St. Helens. No drilling problems were encountered with the exception of some short core runs caused by fractured rock blocking off the core barrel. Total core recovery was 99.3% (see Figure 3 and Appendices A and B).

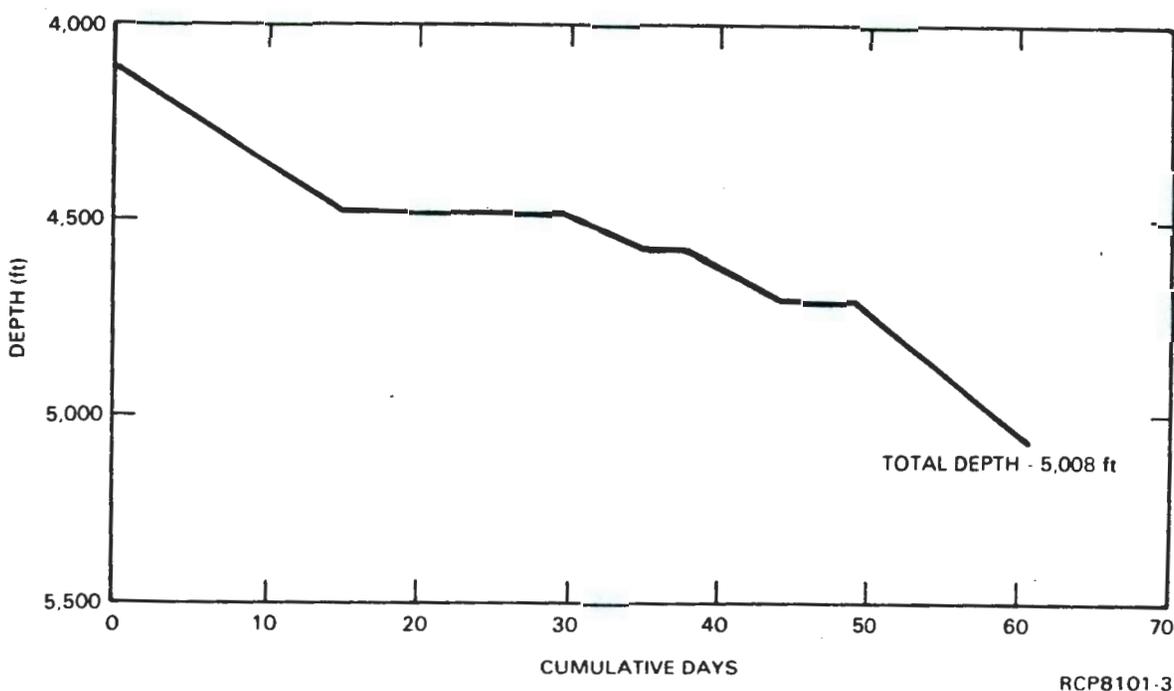


FIGURE 3. Coring Progress Curve for the Coring Portion of Borehole DC-7.

All drilling and coring operations were recorded on Shift Report of Operations forms (see Figure 4 for a sample form). Record copies of this form are on file with the BWIP Records Retention Center, Peoples Bank Building, Richland, Washington.

GEOLOGIC LOGGING

Borehole DC-7 is structurally located near the lowest point of the junction of the Pasco and Cold Creek synclines in an area of no or very little dip (Myers/Price et al., 1979, Plate III-4a). The approximate elevation of the top of the basalt surface is 159 feet below sea level. The basalts are overlain by sediments of the Ringold and Hanford Formations with the contact between the two sedimentary formations undetermined.

The core from DC-7 was geologically logged immediately after drilling. Geologic logging consisted of a description of the lithology, mineralogy, and fracture pattern visible from direct examination of the core. Flows encountered were relatively uniform, aphanitic to finely phaneritic, (having a texture with no evident or evident developed crystals less than 1 millimeter in size). Flow thickness ranged from 11 to 157 feet. An oxidized flow was encountered from 4,509 to 4,520 feet with the rock having a bright reddish-brown color. No chemical variations were seen in preliminary X-ray fluorescence analyses; all of the flows appear to be low magnesium oxide chemical types of the Schwana Sequence (Figure 5). Petrographic, additional geochemical, and paleomagnetic analyses of the DC-7 core samples are a part of continuing BWIP studies and will be reported separately.

Lithologic descriptions of the rock penetrated during drilling appear in Appendix C. An as-built diagram showing the casing schedule and associated stratigraphy is shown in Figure 2. The stratigraphy of the upper part of DC-7 was developed from rotary drilling data (Fenix & Scisson, 1977) and from core derived from nearby Core Hole DC-8 (Fenix & Scisson, 1978). Figure 6 is a plot based on the two deepest points measured on directional borehole surveys of DC-7 and DC-8 compared to the ground surface coordinates of the well casings. This plot shows that the bottom of the boreholes are separated by approximately 70 feet horizontally and one foot vertically. Core from the extension of DC-7 can, therefore, be considered correlative to that of DC-8.

Original geologic logs and color photographs of the core are on file in the BWIP Records Retention Center, Peoples Bank Building, Richland, Washington. The core is stored in the BWIP Sample Repository, 2101M Building, 200 East Area, Richland, Washington.

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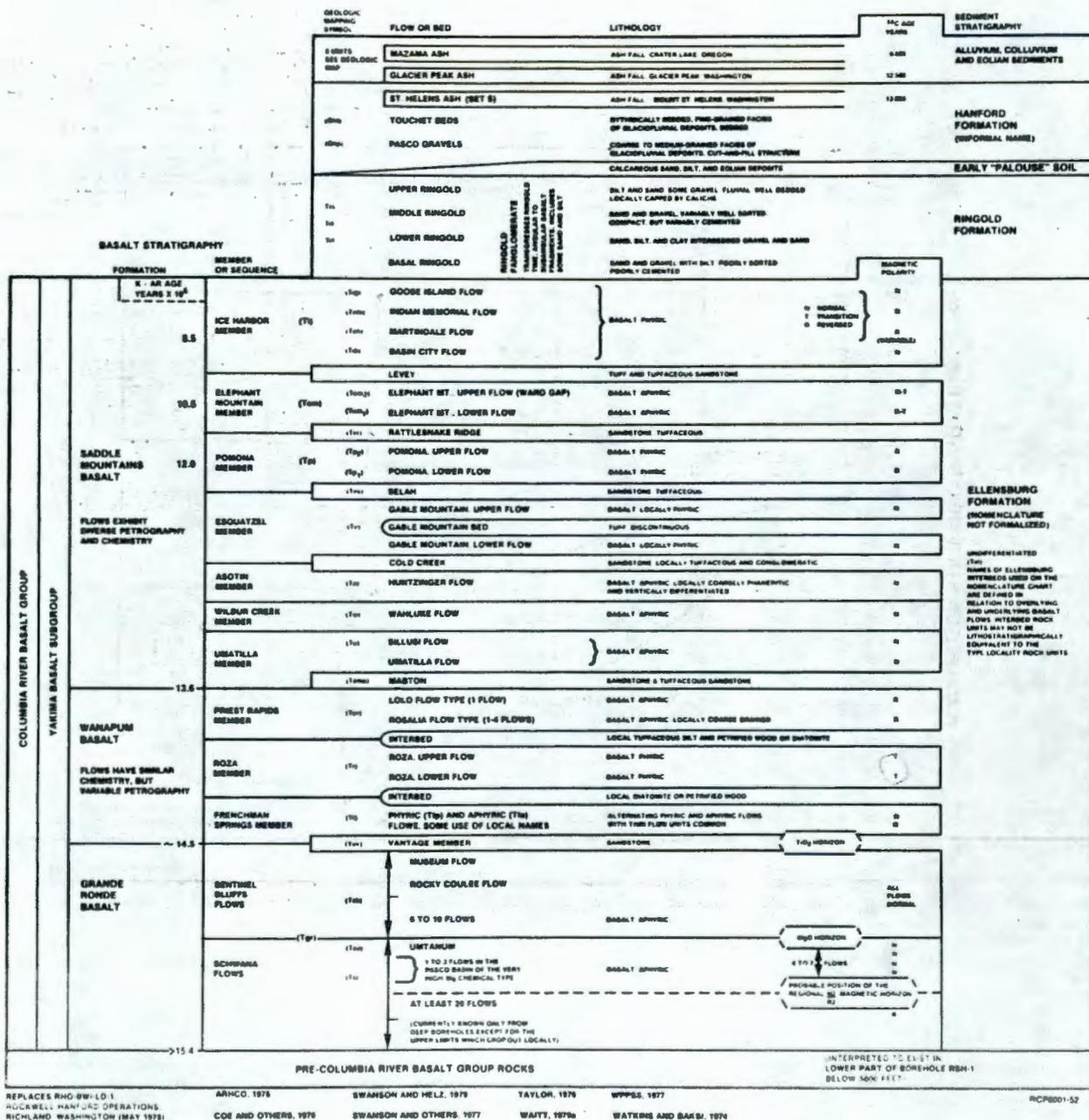


FIGURE 5. Pasco Basin Stratigraphic Nomenclature.

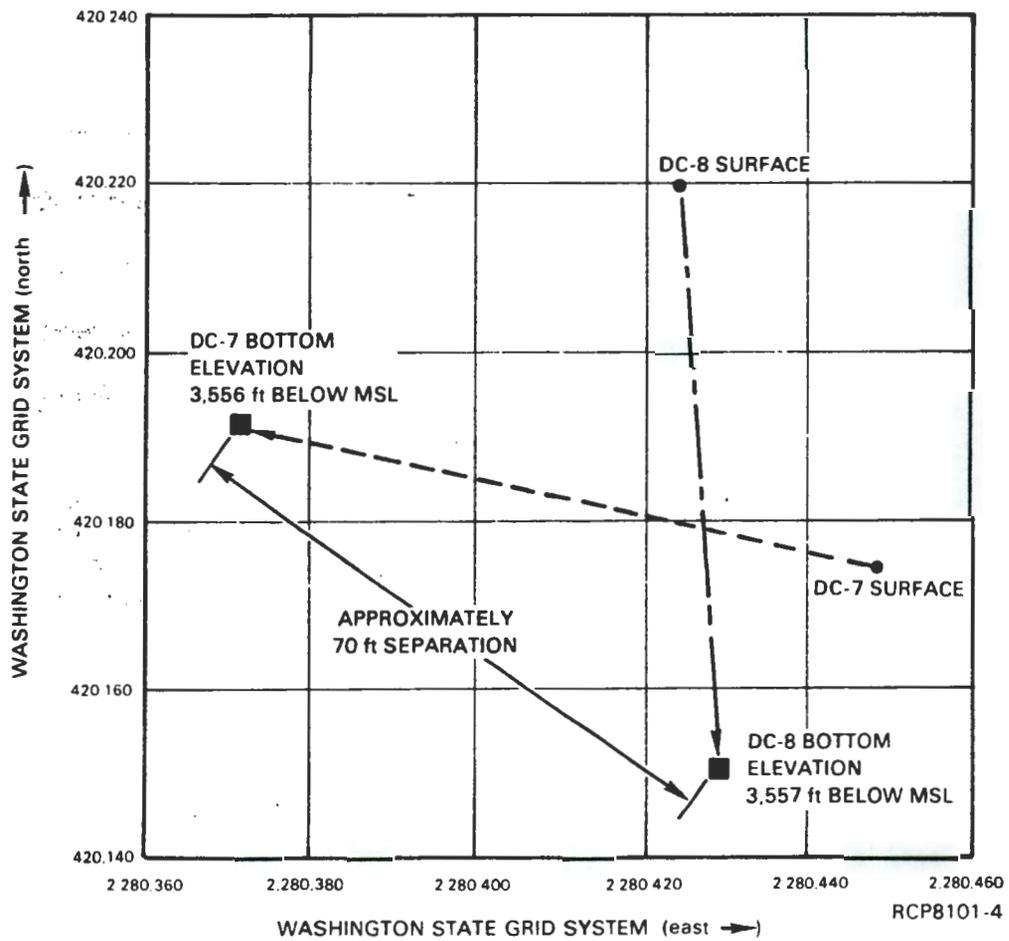


FIGURE 6. Ground Surface and Borehole Bottom Plot of Borehole DC-7 and Core Hole DC-8.

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HYDROLOGIC TESTING

Only one hydrologic test was conducted during coring operations on Borehole DC-7. Drilling was stopped at 4,493 feet and a packer set at 4,110 feet on April 8, 1980. The test zone was swabbed for water sampling and briefly pulse tested. The interval was found to have low permeability and test results were inconclusive. Drilling was resumed on April 28, 1980 and no additional tests conducted because of the low apparent permeability of the entire cored section. The zone tested will be included as a part of the continuing BWIP hydrologic test program on DC-7 and DC-8 using straddle packers and long-term tests. Results will be reported separately.

GEOPHYSICAL LOGGING

Two series of geophysical logs were run in the cored portion of DC-7 by Pacific Northwest Laboratory (under Rockwell subcontract). One run was made April 7, 1980 inside the drill rods from 3,802 feet to the then total depth of 4,463 feet. The second run was made June 11, 1980 after completion of the hole. This logging run covered all of the open hole section from 4,102 to 5,008 feet. Tools used were:

- Caliper (Calp)
- Natural Gamma (NatY)
- Neutron-Epithermal Neutron (NN)
- Gamma Gamma (Y-Y).

Copies of the logs are on file in the BWIP Records Retention Center, Peoples Bank Building, Richland, Washington.

REFERENCES

- Fenix & Scisson, Inc., 1977, Hole History Rotary Hole DC-7 Hanford, Washington, December 1977, RHO-BWI-C-1, Rockwell Hanford Operations, Richland, Washington.
- Fenix & Scisson, Inc., 1978, Drilling History Core Hole DC-8 Hanford, Washington, October 1978, RHO-BWI-C-29, Rockwell Hanford Operations, Richland, Washington.
- Myers, C. W./S. M. Price, et al., 1979, Geologic Studies of the Columbia Plateau: A Status Report, RHO-BWI-ST-4, Rockwell Hanford Operations, Richland, Washington.

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APPENDIX A
CORING RECORD

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Rockwell Hanford Operations
Energy Systems Group

CORING RECORD

Hole: DC-7

Contractor: Boyles Brothers

Core Size: 1.875 in.

Sheet 1 of 5

Date	Shift	Core No.	Interval		Core Recovered			Core Time Min.	Accumulative			Remarks
			From	To	Ft.	%	Longest Piece		Ft. Drilled	Core Recovered	%	
3/19/80	1	1	4,102	4,114	12	100		120	12	12	100	
3/19/80	1	2	4,114	4,120	6	100		60	18	18	100	
3/20/80	1	3	4,120	4,137	17	100		190	35	35	100	
3/21/80	1	4	4,137	4,157	20	100		150	55	55	100	
3/21/80	1	5	4,157	4,165	8	100		120	63	63	100	
3/21/80	1	6	4,165	4,183	18	100		180	81	81	100	
3/24/80	1	7	4,183	4,203	20	100		165	101	101	100	
3/24/80	1	8	4,203	4,212	9	100		90	110	110	100	
3/24/80	1	9	4,212	4,223	11	100		95	121	121	100	
3/25/80	1	10	4,223	4,243	20	100		150	141	141	100	
3/26/80	1	11	4,243	4,259	16	100		160	157	157	100	
3/27/80	1	12	4,259	4,275	16	100		150	173	173	100	
3/27/80	1	13	4,275	4,277	2	100		20	175	175	100	Core Barrel Blocked
3/27/80	1	14	4,277	4,280	3	100		75	178	178	100	Core Barrel Blocked
3/28/80	1	15	4,280	4,283	3	100		90	181	181	100	Core Barrel Blocked
3/28/80	1	16	4,283	4,298	15	100		140	196	196	100	
3/28/80	1	17	4,298	4,303	5	100		45	201	201	100	Core Barrel Blocked
3/31/80	1	18	4,303	4,320	17	100		190	218	218	100	
3/31/80	1	19	4,320	4,322	2	100		30	220	220	100	Core Barrel Blocked
3/31/80	1	20	4,322	4,328	6	100		90	226	226	100	
4/1/80	1	21	4,328	4,343	15	100		190	241	241	100	
4/1/80	1	22	4,343	4,363	20	100		200	261	261	100	

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Rockwell Hanford Operations
Energy Systems Group

CORING RECORD

Hole: DC-7

Contractor: Boyles Brothers

Core Size: 1.875 in.

Sheet 2 of 5

Date	Shift	Core No.	Interval		Core Recovered			Core Time Min.	Accumulative			Remarks
			From	To	Ft.	%	Longest Piece		Ft. Drilled	Core Recovered	%	
4/2/80	1	23	4,363	4,382	19	100		200	280	280	100	
4/2/80	1	24	4,382	4,388	6	100		90	286	286	100	Core Barrel Blocked
4/3/80	1	25	4,388	4,403	15	100		150	301	301	100	
4/3/80	1	26	4,403	4,423	20	100		180	321	321	100	
4/4/80	1	27	4,423	4,443	20	100		120	341	341	100	
4/4/80	1	28	4,443	4,463	20	100		140	361	361	100	
4/7/80	1	29	4,463	4,475	12	100		105	373	373	100	
4/8/80	1	30	4,475	4,479	4	100		45	377	377	100	Core Barrel Blocked
4/8/80	1	31	4,479	4,493	14	100		120	391	391	100	Stop for Hydrology Testing
4/29/80	1	32	4,493	4,501	8	100		90	399	399	100	Core Barrel Blocked
4/29/80	1	33	4,501	4,502	0.6	60		15	400	399.5	99.9	Core Barrel Blocked
4/30/80	1	34	4,502	4,503	0.5	50		15	401	400	99.8	Core Barrel Blocked
4/30/80	1	35	4,503	4,504	1	100		15	402	401	99.8	Core Barrel Blocked
4/30/80	1	36	4,504	4,509	5	100		60	407	406	99.8	Core Barrel Blocked
5/1/80	1	37	4,509	4,515	6	100		90	413	412	99.8	Core Barrel Blocked
5/1/80	1	38	4,515	4,523	8	100		90	421	420	99.8	Core Barrel Blocked
5/1/80	1	39	4,523	4,543	20	100		120	441	440	99.8	
5/2/80	1	40	4,543	4,545	2	100		45	443	442	99.8	Chuck Slipping
5/2/80	1	41	4,545	4,557	12	100		120	455	454	99.8	Chuck Slipping
5/2/80	1	42	4,557	4,562	5	100		60	460	459	99.8	Chuck Slipping
5/2/80	1	43	4,562	4,563	1	100		10	461	460	99.8	Chuck Slipping
5/5/80	1	44	4,563	4,575	12	100		120	473	472	99.8	Chuck Slipping

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CORING RECORD

Note: DC-7

Contractor: Boyle Brothers

Core Size: 1.875 in.

Sheet 3 of 5

Date	Shift	Cor. No.	Interval		Core Recovered			Core Time Min.	Accumulative			Remarks
			From	To	Ft.	%	Longest Piece		Ft. Drilled	Core Recovered	%	
5/5/80	1	5	4,575	4,582	7	100		60	480	479	99.8	Chuck Slipping
5/5/80	1	6	4,582	4,585	3	100		30	483	482	99.8	Chuck Slipping
5/9/80	1	7	4,585	4,586	1	100		10	484	483	99.8	Checking Out New Chuck
5/12/80	1	8	4,586	4,595	9	100		75	493	492	99.8	Core Barrel Blocked
5/12/80	1	9	4,595	4,603	8	100		90	501	500	99.8	Core Barrel Blocked
5/12/80	1	10	4,603	4,611	8	100		60	509	508	99.8	Core Barrel Blocked
5/13/80	1	11	4,611	4,619	8	100		105	517	516	99.8	Core Barrel Blocked
5/13/80	1	12	4,619	4,630	11	100		150	528	527	99.8	Core Barrel Blocked
5/13/80	1	13	4,630	4,639	9	100		100	537	536	99.8	Core Barrel Blocked
5/14/80	1	14	4,639	4,641	2	100		10	539	538	99.8	Core Barrel Blocked
5/14/80	1	15	4,641	4,651	10	100		150	549	548	99.8	Core Barrel Blocked
5/14/80	1	16	4,651	4,653	2	100		25	551	550	99.8	Core Barrel Blocked
5/14/80	1	17	4,653	4,663	10	100		150	561	560	99.8	Core Barrel Blocked
5/15/80	1	18	4,663	4,679	16	100		195	577	576	99.8	Core Barrel Blocked
5/15/80	1	19	4,679	4,693	14	100		180	591	590	99.8	Core Barrel Blocked
5/16/80	1	20	4,693	4,703	10	100		90	601	600	99.8	Core Barrel Blocked
5/16/80	1	21	4,703	4,716	13	100		150	614	613	99.8	Core Barrel Blocked
5/27/80	1	22	4,716	4,734	18	100		270	632	631	99.8	
5/27/80	1	23	4,734	4,759	15	100		150	647	646	99.8	Core Barrel Blocked
5/28/80	1	24	4,749	4,768	19	100		180	666	665	99.9	
5/28/80	1	25	4,768	4,777	9	100		120	675	674	99.9	Core Barrel Blocked
5/28/80	1	26	4,777	4,782	5	100		75	680	679	99.9	Core Barrel Blocked

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Rockwell International

Rockwell Hanford Operations
Energy Systems Group

CORING RECORD

Hole: DC-7

Contractor: Boyles Brothers

Core Size: 1.875 in.

Sheet 4 of 5

Date	Shift	Core No.	Interval		Core Recovered			Core Time Min.	Accumulative			Remarks
			From	To	Ft.	%	Longest Piece		Ft. Drilled	Core Recovered	%	
5/29/80	1	67	4,782	4,790	8	100		80	688	687	99.9	Core Barrel Blocked
5/29/80	1	68	4,790	4,800	10	100		120	698	697	99.9	Core Barrel Blocked
5/29/80	1	69	4,800	4,815	15	100		180	713	712	99.9	Core Barrel Blocked
5/29/80	2	70	4,815	4,823	8	100		115	721	720	99.9	Core Barrel Blocked
5/30/80	3	71	4,823	4,842	19	100		260	740	739	99.9	
5/30/80	3	72	4,842	4,862	20	100		220	760	759	99.9	
5/30/80	1	73	4,862	4,882	20	100		195	780	779	99.9	
5/30/80	1	74	4,882	4,895	13	100		150	793	792	99.9	Core Barrel Blocked
5/30/80	2	75	4,895	4,899	4	100		35	797	796	99.9	Core Barrel Blocked
5/30/80	2	76	4,899	4,905	6	100		55	803	802	99.9	Core Barrel Blocked
6/2/80	1	77	4,905	4,914	5	56		120	812	807	99.4	Core Barrel Blocked
6/2/80	1	78	4,914	4,923	9	100		150	821	816	99.4	Core Barrel Blocked
6/2/80	1	79	4,923	4,935	12	100		135	833	828	99.4	Core Barrel Blocked
6/3/80	1	80	4,935	4,943	8	100		80	841	836	99.4	Core Barrel Blocked
6/3/80	1	81	4,943	4,956	13	100		180	854	849	99.4	Core Barrel Blocked
6/3/80	1	82	4,956	4,963	7	100		75	861	856	99.4	Core Barrel Blocked
6/4/80	1	83	4,963	4,965	1	50		60	863	857	99.3	Mismatch
6/5/80	1	84	4,965	4,968	3	100		60	866	860	99.3	Core Barrel Blocked
6/5/80	1	85	4,968	4,971	3	100		60	869	863	99.3	Core Barrel Blocked
6/5/80	1	86	4,971	4,979	8	100		120	877	871	99.3	Core Barrel Blocked
6/6/80	1	87	4,979	4,990	11	100		170	888	882	99.3	Core Barrel Blocked
6/6/80	1	88	4,990	5,001	11	100		150	899	893	99.3	Core Barrel Blocked

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APPENDIX B

BIT RECORD

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APPENDIX C
LITHOLOGIC DESCRIPTIONS OF THE CORE

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FORMATION	MEMBER (ft)	FLOW OR BED (ft)	FOOTAGE	LITHOLOGY
GRANDE RONDE BASALT	SCHAWANA SEQUENCE	FIRST FLOW (4,102-4,137.5)	4,102-4,119	BASALT; DARK GRAY, APHANITIC, NUMEROUS HIGH- AND LOW-ANGLE FRACTURES, PYRITE AND QUARTZ PRESENT IN FRACTURES.
			4,119-4,120	BASALT; HIGHLY FRACTURED, PYRITE AND LIGHT-BROWN CLAY PRESENT IN FRACTURES.
			4,120-4,123	BASALT; DARK GRAY, APHANITIC, FEW WELL-HEALED FRACTURES AND SOME DISCING.
			4,123-4,130	BASALT; DARK GRAY, APHANITIC, SOME HIGH-ANGLE FRACTURES WITH OXIDATION RINDS TO 20 mm.
			4,130-4,137.5	BASALT; DARK GRAY, DENSE, FEW MEDIUM-ANGLE FRACTURES.
		SECOND FLOW (4,137.5-4,164)	4,137.5-4,147	BASALT; VESICULAR, ALTERED, VESICLES LESS THAN 5 mm, VESICLES FILLED WITH BLACK GLASS, SILICA, AND GREEN CLAY.
			4,147-4,148	BASALT FLOW BRECCIA, HEALED WITH SILICA AND GREEN CLAY.
			4,148-4,155	BASALT; DARK GRAY, SOME MEDIUM-ANGLE FRACTURES, GREEN CLAY AND PYRITE PRESENT IN FRACTURES. ← 4150
			4,155-4,164	BASALT; SLIGHTLY OXIDIZED, NUMEROUS HIGH-ANGLE FRACTURES, PYRITE AND BROWN CLAY PRESENT IN FRACTURES.
		THIRD FLOW (4,164-4,205)	4,164-4,165	BASALT; VESICULAR, HIGHLY ALTERED.
			4,165-4,178	BASALT; VESICULAR, SLIGHTLY ALTERED, SOME FRACTURES PARTIALLY MINERALIZED AND HEALED, VESICLES LESS THAN 10%. ← 4167
			4,178-4,179	BASALT; VESICULAR, SOME SMALL BRECCIATED FRACTURES.
			4,179-4,186	BASALT; DARK GRAY, APHANITIC, SCATTERED AMYGDALES, SOME PYRITE IN FRACTURES.
			4,186-4,191	BASALT; DARK GRAY, GLASSY, SCATTERED AMYGDALES.
			4,191-4,195	BASALT; DARK GRAY, APHANITIC.
			4,195-4,205	BASALT; DARK GRAY: VESICULAR.

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FORMATION	MEMBER (ft)	FLOW OR BED (ft)	FOOTAGE	LITHOLOGY
GRANDE RONDE BASALT	SCHAWANA SEQUENCE	FOURTH FLOW (4,205-4,223)	4,205-4,206	BASALT FLOW BRECCIA; ALTERED, SLIGHTLY VESICULAR, NUMEROUS HIGH- AND LOW-ANGLE FRACTURES, GREEN CLAY PRESENT IN FRACTURES.
			4,206-4,212	BASALT; DARK GRAY, APHANITIC, NUMEROUS LOW- AND MEDIUM-ANGLE FRACURES, SLICKEN-SIDES AND ALTERATION IN FRACTURES.
			4,212-4,217	BASALT; DARK GRAY, SLIGHTLY VESICULAR, NUMEROUS HIGH- AND LOW-ANGLE FRACTURES.
			4,217-4,220	BASALT; DARK GRAY, SLIGHTLY VESICULAR.
			4,220-4,223	BASALT; GRAY, SLIGHTLY VESICULAR, HIGHLY FRACTURED AT LOW ANGLES, GREEN CLAY IN FRACTURES.
		FIFTH FLOW (4,223-4,301)	4,223-4,237	BASALT; BRECCIATED, SLIGHTLY ALTERED, SCATTERED VESICLES TO 10%.
			4,237-4,245	BRECCIA; ALTERED, GRAY BASALT MATRIX WITH VESICULAR CLASTS.
			4,245-4,248	BASALT; APHANITIC, SLIGHTLY VESICULAR, GREEN CLAY AND SILICA IN VESICLES.
			4,248-4,255	BASALT; GRAY, APHANITIC, SOME LOW-ANGLE FRACTURES, SCATTERED VUGS LESS THAN 6 mm (MOST WITH OXIDATION RINDS TO 4 mm), GREEN CLAY AND SILICA IN AMYGDALES.
			4,255-4,264	BASALT; LIGHT GRAY, APHANITIC, FEW HIGH-ANGLE FRACTURES, FRACTURES FILLED WITH SILICA.
			4,264-4,266	HIGH-ANGLE FRACTURE (5 mm) FILLED WITH WHITE SILICA AND SOFT WHITE ZEOLITE.
			4,266-4,291	BASALT; GRAY, APHANITIC, EXTENSIVE DISCING (UP TO 15/FOOT).
			4,291-4,298	BASALT; GRAY, APHANITIC, FEW LOW-ANGLE FRACTURES (NO DISCING), SILICA AND BROWN CLAY IN FRACTURES.
			4,298-4,301	BASALT; SLIGHTLY ALTERED, SLIGHTLY AMYGDALOIDAL.

FORMATION	MEMBER (ft)	FLOW OR BED (ft)	FOOTAGE	LITHOLOGY
GRANDE RONDE BASALT	SCHAWANA SEQUENCE	SIXTH FLOW (4,301-4,327)	4,301-4,303	FLOW BRECCIA; WELL INDURATED, FEW LOW-ANGLE FRACTURES, GREEN CLAY AND SILICA IN FRACTURES.
			4,303-4,315	BASALT; AMYGDALOIDAL, SLIGHTLY ALTERED.
			4,315-4,320	BASALT; GRAY, FINELY PHANERITIC, NUMEROUS HIGH-ANGLE FRACTURES WITH BLACK FILLING.
			4,320-4,322	BASALT; BADLY BROKEN, SILICA AND BROWN CLAY IN FRACTURES.
			4,322-4,326	BASALT; GRAY, FINELY PHANERITIC, NUMEROUS HIGH-ANGLE FRACTURES WITH BLACK FILLING.
			4,326-4,327	BASALT; SLIGHTLY AMYGDALOIDAL, SLIGHTLY ALTERED.
		SEVENTH FLOW (4,327-4,484)	4,327-4,328	BASALT; REDDISH BLACK, AMYGDALOIDAL WITH SILICA, RUBBLY, SLIGHTLY ALTERED.
			4,328-4,348	BASALT; VUGULAR, VUGS ARE IRREGULAR LESS THAN 20 mm AND CONTAIN SILICA AND GREEN CLAY.
			4,348-4,363	BASALT; LIGHT GRAY, SOME LOW-ANGLE FRACTURES CONTAINING GREEN CLAY AND PYRITE, SCATTERED SILICA BANDED WITH ZEOLITES AND GREEN CLAY.
			4,363-4,369	BASALT; GRAY, NUMEROUS HIGH- AND LOW-ANGLE FRACTURES, GREEN CLAY ON FRACTURES, SCATTERED AMYGDULES (LESS THAN 20 mm) OF SILICA.
			4,369-4,409	BASALT; LIGHT GRAY, PHANERITIC, SCATTERED VUGS WITH SILICA OR GREEN CLAY, FEW LOW-ANGLE FRACTURES, SOME DISCING FROM 4,388-4,390 (15 DISCS/FOOT) AND FROM 4,390-4,409 (LESS THAN OR EQUAL TO 10 DISCS/FOOT).
			4,409-4,424	BASALT; GRAY, FINELY PHANERITIC, OCCASIONAL LOW-ANGLE FRACTURE, OCCASIONAL GREEN AMYGDULE, HIGH RQD.

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FORMATION	MEMBER (ft)	FLOW OR BED (ft)	FOOTAGE	LITHOLOGY
GRANDE RONDE BASALT	SCHAWANA SEQUENCE	SEVENTH FLOW (4, 327-4, 484)	4,424-4,479	BASALT; LIGHT GRAY, FINELY PHANERITIC, SLIGHTLY DIKTYTAXITIC, HIGH RQD FROM 4,462-4,479 LONG, PLANAR, HIGH-ANGLE FRACTURES <0.3 mm WITH GREEN OR BLACK CLAY.
			4,479-4,484	BASALT; LIGHT GRAY, APHANITIC, AT 4,482-4,484 5% VESICLES AT 60 DEGREES TO CORE AXIS.
		EIGHTH FLOW (4, 484-4, 509)	4,484-4,487	BASALT; VESICULAR FLOW-TOP BRECCIA, ALTERED, LARGE CLASTS.
			4,487-4,496	BASALT; LIGHT GRAY, APHANITIC, SCATTERED VUGS FILLED WITH SILICA AND WHITE FIBROUS ZEOLITE.
			4,496-4,509	BASALT; LIGHT GRAY, APHANITIC, SOME DISCING 10-12/FOOT.
		NINTH FLOW (4, 509-4, 520)	4,509-4,510	BASALT; DARK GRAY, VESICULAR, SLIGHT REDDISH COLORATION.
			4,509-4,514	BASALT; BRIGHT REDDISH BROWN, VESICULAR AND VUGGING, VUGS FILLED WITH SILICA AND WHITE ZEOLITE.
			4,514-4,520	BASALT; BRIGHT REDDISH BROWN, DENSE, NO VESICLES.
		TENTH FLOW (4, 520-4, 548)	4,520-4,530	BASALT; DARK BROWN SOME REDDISH-BROWN COLORATION, VESICULAR, SOME VESICLES FILLED WITH SILICA OR WHITE, FIBROUS ZEOLITE.
			4,530-4,536	BASALT; DARK GRAY TO BLACK, APHANITIC, VESICULAR, VESICLES FILLED WITH SILICA AND WHITE ZEOLITE, HAIRLINE FRACTURES 6 INCHES TO 1 FOOT VERY WELL HEALED WITH SILICA.
			4,536-4,545	BASALT; DARK GRAY, SLIGHTLY RUBBLY 4,542-4,545, 10% PARTICLES WITH SILICA CLAY, DISCING 10 DISCS/FOOT.
			4,545-4,548	BASALT; LIGHT GRAY, APHANITIC.

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FORMATION	MEMBER (ft)	FLOW OR BED (ft)	FOOTAGE	LITHOLOGY
GRANDE RONDE BASALT	SCHAWANA SEQUENCE	ELEVENTH FLOW (4,548-4,566)	4,548-4,552	BASALT; GRAY, APHANITIC, ALTERED, VESICULAR, SOME VESICLES FILLED WITH SILICA, GREEN CLAY OR WHITE ZEOLITE.
			4,552-4,557	BASALT; GRAY, APHANITIC, SCATTERED VUGS (20 mm OR LESS) WITH SILICA, WHITE ZEOLITE, AND BLUE CLAY.
			4,557-4,566	BASALT; GRAY, APHANITIC, SLIGHTLY RUBBLY, LESS THAN 10% AMYGDULES WITH BLUE CLAY.
		TWELFTH FLOW (4,566-4,629)	4,566-4,578	BASALT; SLIGHTLY ALTERED; VESICULAR (30%), FEW VESICLES FILLED WITH GREEN CLAY.
			4,578-4,586	BASALT; DARK GRAY, GLASSY, MANY LOW- AND HIGH-ANGLE FRACTURES, SCATTERED AMYGDULES WITH SILICA AND GREEN CLAY.
			4,586-4,626	BASALT; LIGHT GRAY, APHANITIC, DISCING, LESS THAN OR EQUAL TO 12-18 DISCS/FOOT, SOME VERTICAL FRACTURES 4,620-4,626 FEET.
			4,626-4,629	BASALT; LIGHT GRAY, APHANITIC, SCATTERED AMYGDULES WITH GREEN CLAY (LESS THAN 2 mm).
		THIRTEENTH FLOW (4,629-4,653)	4,629-4,634	BASALT; DARK GRAY, VESICULAR (10%), SLIGHTLY ALTERED, MOST VESICLES FILLED WITH GREEN CLAY OR SILICA.
			4,634-4,641	BASALT; GRAY, SCATTERED AMYGDULES WITH GREEN CLAY OR SILICA, OCCASIONAL LOW-ANGLE FRACTURE.
			4,641-4,653	BASALT; GRAY, FINELY PHANERITIC, DISCING 12-18 DISCS/FOOT.
		FOURTEENTH FLOW (4,653-4,672)	4,653-4,658	BASALT; GLASSY, VESICULAR (15%), SLIGHTLY ALTERED, MOST VESICLES FILLED WITH GREEN CLAY OR SILICA.
			4,658-4,665	BASALT; GRAY, APHANITIC, DENSE, SCATTERED AMYGDULES WITH SILICA.
			4,665-4,670	BASALT; GRAY, APHANITIC, DENSE, FEW FRACTURES ALL WELL HEALED.
			4,670-4,672	BASALT; GRAY, VESICULAR (15%)

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FORMATION	MEMBER (ft)	FLOW OR BED (ft)	FOOTAGE	LITHOLOGY
GRANDE RONDE BASALT	SCHAWANA SEQUENCE	FIFTEENTH FLOW (4,672-4,696.5)	4,672-4,680	BASALT; DARK GRAY TO BLACK, VESICULAR (30%), ALTERED.
			4,680-4,695	BASALT; LIGHT GRAY, FINE TO MEDIUM PHANERITIC, DENSE, OCCASIONAL AMYGDULE, WITH SILICA OR WHITE ZEOLITE.
			4,695- 4,696.5	BASALT; GRAY, VESICULAR (10%).
		SIXTEENTH FLOW (4,696.5-4,710)	4,696.5- 4,702.5	BASALT; GRAY, VESICULAR, ALTERED, MOST VESICLES FILLED OR LINED WITH GREEN CLAY OR SILICA.
			4,702.5- 4,710	BASALT; DARK GRAY, APHANITIC, SOME DISCING WITH 10-12 DISCS/FOOT, OCCASIONAL AMYGDULE WITH OXIDATION RINDS UP TO 10 mm.
		SEVENTEENTH FLOW (4,710-4,840)	4,710-4,715	BASALT; LIGHT GRAY, VESICULAR, SLIGHTLY ALTERED.
			4,715-4,736	BASALT; BLACK, BRECCIA, VESICULAR CLASTS, SCORIACEOUS IN PLACES, WELL INDURATED.
			4,736-4,745	BASALT; BLACK, BRECCIA, VESICULAR, SLICKENSIDES (4,736) SHEET VESICLES, WELL INDURATED.
			4,745-4,755	BASALT; GRAY, BRECCIA, ALTERED IN FRACTURES, SCATTERED VESICLES, VESICLES FILLED WITH SILICA OR GREEN CLAY, WELL INDURATED, CALCITE PRESENT IN MATRIX.
			4,755-4,790	BASALT; GRAY, BRECCIA, APHANITIC, VESICULAR MATRIX, 4,792-FOOT HIGH-ANGLE FRACTURES (SLICKENSIDED), 4,776-4,778 ZONE OF NUMEROUS HIGH-ANGLE FRACTURES WITH POLISHED SURFACES.
			4,790-4,795	BASALT; DARK GRAY, GLASSY.
			4,795-4,802	BASALT; DARK GRAY TO BLACK, VESICULAR, VESICLES LINED WITH BLACK CLAY OR SILICA, DIKTYTAXITIC.
			4,802-4,810	BASALT; GRAY, APHANITIC, AMYGDALOIDAL, AMYGDULES FILLED WITH GREEN CLAY, SILICA, AND WHITE ZEOLITE.

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FORMATION	MEMBER (ft)	FLOW OR BED (ft)	FOOTAGE	LITHOLOGY:
GRANDE RONDE BASALT	SCHAWANA SEQUENCE	SEVENTEENTH FLOW (4,710-4,840)	4,810-4,824	BASALT; DARK GRAY, APHANITIC, DISCING 12-18 DISCS/FOOT.
			4,824-4,840	BASALT; DARK GRAY, FINELY PHANERITIC, DENSE, HIGH RQD.
		EIGHTEENTH FLOW (4,840-4,879)	4,840-4,848	BASALT: BLACK, VESICULAR, MODERATELY ALTERED, VESICLES LINED WITH BLUE CLAY AND SILICA.
			4,848-4,861	BASALT; LIGHT GRAY, APHANITIC, FEW LOW-ANGLE FRACTURES.
			4,861-4,863	BASALT; BAKED ZONE, ALTERED, SLIGHTLY BRECCIATED.
			4,863-4,879	BASALT; LIGHT GRAY, FINELY PHANERITIC, FEW LOW- TO MODERATE-ANGLE FRACTURES WITH CLAY FILLING.
		NINETEENTH FLOW (4,879-4,906)	4,879-4,880	BASALT; FLOW BRECCIA, WELL INDURATED.
			4,880-4,886	BASALT; LIGHT GRAY, VUGULAR, VUGS LINED WITH SILICA OR GREEN CLAY.
			4,886-4,889	BASALT; BRECCIA WELL HEALED WITH QUARTZ, SLIGHTLY ALTERED.
			4,889-4,896	BASALT; DARK GRAY, GLASSY, VESICULAR, FEW LOW- TO MODERATE-ANGLE FRACTURES WELL HEALED WITH QUARTZ.
			4,896-4,899	BASALT; BRECCIA, SILICIFIED.
			4,899-4,905	BASALT; LIGHT GRAY, APHANITIC, FRACTURED, HIGH- AND LOW-ANGLE FRACTURES.
		TWENTIETH FLOW (4,905-5,008)	4,905-4,923	BRECCIA, VESICULAR CLASTS, ASH OR PUMICE MATRIX, SOME MATRIX IS SILICIFIED, ALTERED, RUBBLY.
			4,923-4,943	BASALT; LIGHT GRAY, APHANITIC, FREQUENT VUGS FILLED WITH SILICA, VUGS ENCIRCLED BY TWO CONCENTRIC ALTERATION RIMS (TO 10 mm).
			4,943-4,948	BASALT; DARK GRAY, FINELY PHANERITIC, DISCING 6-8 DISCS/FOOT.

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FORMATION	MEMBER (ft)	FLOW OR BED (ft)	FOOTAGE	LITHOLOGY
GRANDE RONDE BASALT	SCHWANA SEQUENCE	TWENTIETH FLOW (4,905-5,008)	4,948-4,987	BASALT; LIGHT GRAY, APHANITIC, DISCING 12-18 DISCS/FOOT, SOME VERTICLE FRACTURES LESS THAN 0.3 mm THROUGH DISCED AREA.
			4,987-5,008	BASALT; DARK GRAY, FINELY PHANERITIC, DENSE SCATTERED LOW- AND HIGH-ANGLE FRACTURES.

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WELL COMPLETION REPORT

Well Number DC-7
 Former Designation _____
 Computer Number _____

SURVEY DATA

Coordinates N 14910.37
W 14838.54
 Casing Elevation 544.83
 Date Surveyed 5/24/78

COMPLETION DATA

Completion Depth 4097' Date Drilled 10/19/77 to 12/2/77
 Static Water Depth _____ Date Modified _____ to _____
 Date Destroyed _____

DRILL METHOD

Air Rotary
 Mud Rotary
 Cable Tool
 Auger
 Core
 Other _____

CASING DEPTH

	-	
9-5/8"	0'	- 2780.96'
13-3/8"	0'	- 728.24'
20"	0'	- 221.90'
	FROM	TO
	-	-
	-	-

4098300

PERFORATION

Type None
 Depths _____ Schedule _____

SCREEN

Type None
 Length _____
 Slot Size _____
 Depths _____

GROUT

Interval	Surface	Volume
221.90'	Surface	640 cu.ft.
728.24'	Surface	575 cu.ft.
2780.96'	Surface	1200 cu.ft.

ROCK SAMPLES

Interval 5'
 Analyses EDX
 Logged by F&S-Rockwell
 Data Custodian Rockwell
 Storage Location 2101M

WATER SAMPLES

Interval None
 Analyses _____
 Data Custodian _____

WELL PURPOSE

Hydrologic Testing

COMMENTS

WELL CUSTODIAN

W. H. Price

Name W. H. Price Department Site
 Section Drilling & Testing Company Rockwell

Rockwell Hanford Operations		SURVEILLANCE REPORT		Page <u>1</u> of <u>2</u>
To Don Moak Name Title Manager-Drill/Testing Company RHO Location PBB 3rd floor		From: Name Bruce Slonecker Title Q.A.E. Company RHO Location PBB 5th floor		Surveillance Report Number L-33-27
		Reference Documents RHO-BWI-MA-4 Basalt Operating Procedures		Project Number <u>WBS-L-33</u> Area <u>600</u> Location <u>DC-15, DC-7/8</u>
<input type="checkbox"/> Satisfactory <input checked="" type="checkbox"/> Unsatisfactory <input type="checkbox"/> Unsatisfactory corrected Immediately		DISTRIBUTION <u>Gail Hunt</u> <u>B.D. Slonecker</u> <u>J. Baker</u> <u>S. Baker</u> <u>M.F. Nicol</u> _____		Status: <u>A</u>
Item No.	ACTIVITIES OBSERVED			
	<p>Performed a surveillance of Borehole Physical Security, section C-2.9 of the Basalt Operating Procedures Manual.</p> <p>Boreholes observed for compliance were DC-15 and DC-7/8.</p> <p>Locations: DC-15--Several areas were found to be out of compliance with the procedure, specifically;</p> <ol style="list-style-type: none"> 1. No protective capping was evident. The procedure requires a cap or cover to be placed upon the borehole and securely locked or spot welded. ref. sub-section 5.1.3, 5.1.4. 2. Drill sites that are freely accessible to the public shall be fenced. ref. sub-section 5.2.2. 			
	Initiator <i>B.D. Slonecker</i> B.D. Slonecker	<i>MAN</i> Date 2-26-82	Release 3-5-82	Date MAR 5 1982 Stamp 
	ACTION TAKEN/PLANNED			
	<ul style="list-style-type: none"> o As stated in Surveillance Report L-33-29, Section C-2.9 of MA-4 is being reviewed and rewritten. Detailed security needs for each new borehole will be stated in the test procedures. o Upon completion of a borehole, security items such as cyclone fencing or extrusion alarms are no longer needed. Means of covering the casing with a locked cap or a welded plate are being looked into. 			
Commitment Date <u>3-11-82</u>		Action Party <i>DM</i>		Date <u>3-8-82</u>
RESPONSE EVALUATION		FOLLOW-UP EVALUATION		ROCKWELL
Initials <u>BDS</u> Date <u>3-8-82</u>		<input checked="" type="checkbox"/> Adequate <input type="checkbox"/> Inadequate		<input type="checkbox"/> Adequate <input type="checkbox"/> Inadequate
Response Verification and/or Closure <i>Bruce Slonecker</i>			Date <u>5-21-82</u>	

8300985

An exterior intrusion alarm system was evident for trailer security purposes.

Location DC-7/8-- The boreholes were covered/plugged with test equipment preventing insertion of extraneous material into the boreholes.

Areas out of compliance with procedure requirements are the following;

1. Site was not fenced. Drill sites that are freely accessible to the public shall be fenced with cyclone fencing as part of the site preparation. ref.. sub-section 5.2.2.
2. No exterior intrusion alarm system was evident for trailer security. ref. sub-sec. 5.2.4.

The above listed items are unsatisfactory and require action or response by 3-12-82.

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