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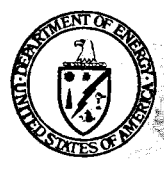
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# Geothermal Programs

Idaho  
Operations  
Office

COMPLETION REPORT:  
RAFT RIVER  
GEOTHERMAL INJECTION  
WELL SEVEN  
(RRGI-7)

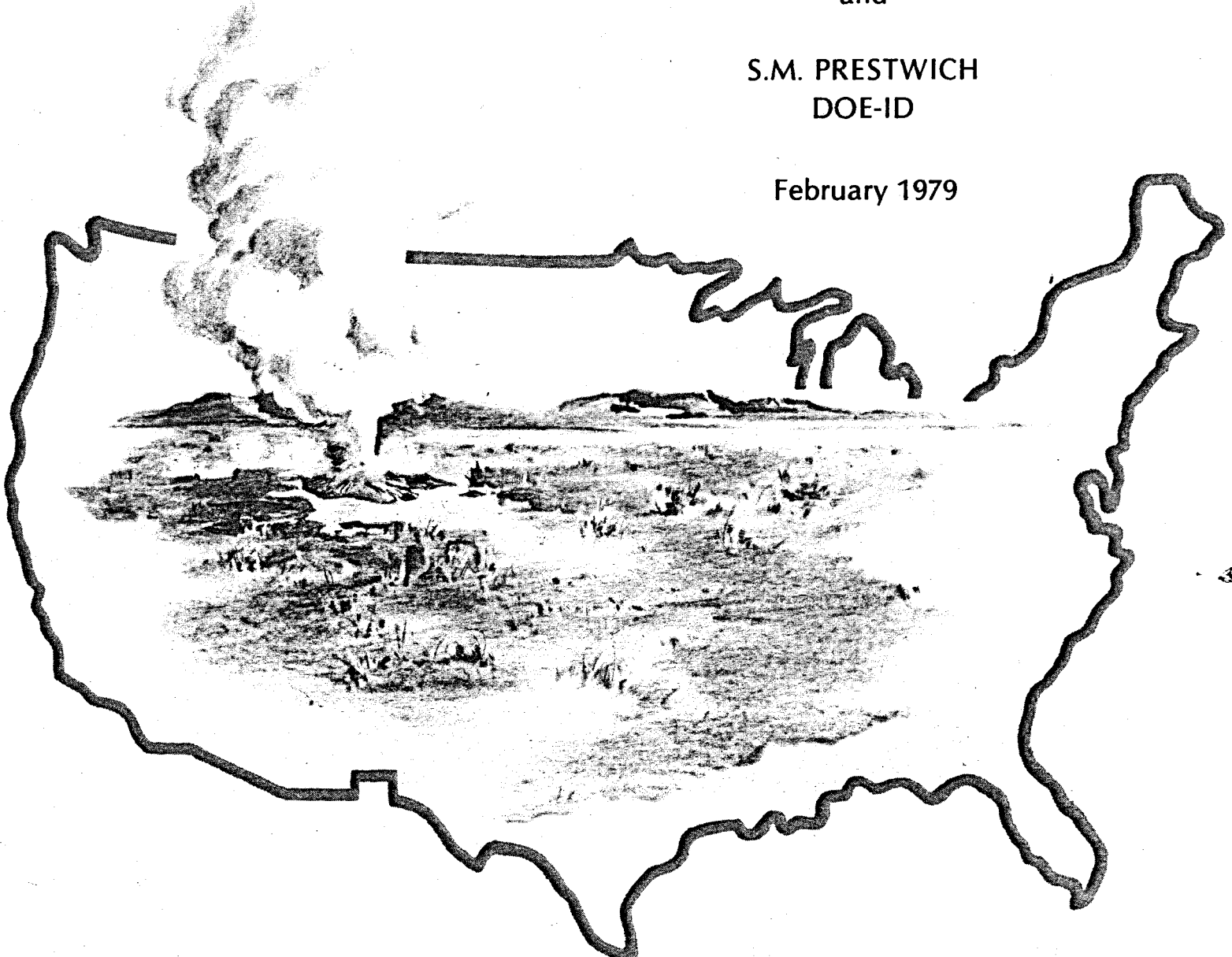


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DOE-ID

February 1979



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GEOTHERMAL INJECTION WELL SEVEN  
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February 1979

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RRGI-7  
Raft River Geothermal  
Injection Well

## ABSTRACT

Raft River Geothermal Injection Well Seven (RRGI-7) is an intermediate-depth injection well designed to accept injected water in the 600 to 1000 m (2000 to 3500 ft) depth range<sup>[a]</sup>. It has one barefoot leg, and it was drilled so that additional legs could be added later; if there are problems with intermediate-depth injection, one or more additional legs could be directionally drilled from the current well bore.

This report describes the drilling and completion of RRGI-7 and provides a brief summary of preliminary testing. It includes daily drilling reports, as well as records of logging, coring, and containment techniques used during drilling operations.

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[a] All depths are referenced from the Kelly Bushing, 430 cm (14 ft) above ground level, unless otherwise noted.

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COMPLETION REPORT:  
RAFT RIVER  
GEOTHERMAL INJECTION WELL SEVEN  
(RRGI-7)

I. INTRODUCTION

This report describes the drilling and completion of Raft River Geothermal Well Seven (RRGI-7). Previous Raft River wells established the feasibility of using the valley's resource for a 5-MW power plant, as well as for numerous nonelectrical applications. RRGI-7, planned as an injection well, will accept the spent geothermal fluid. This will prevent the pollution that surface disposal could cause.

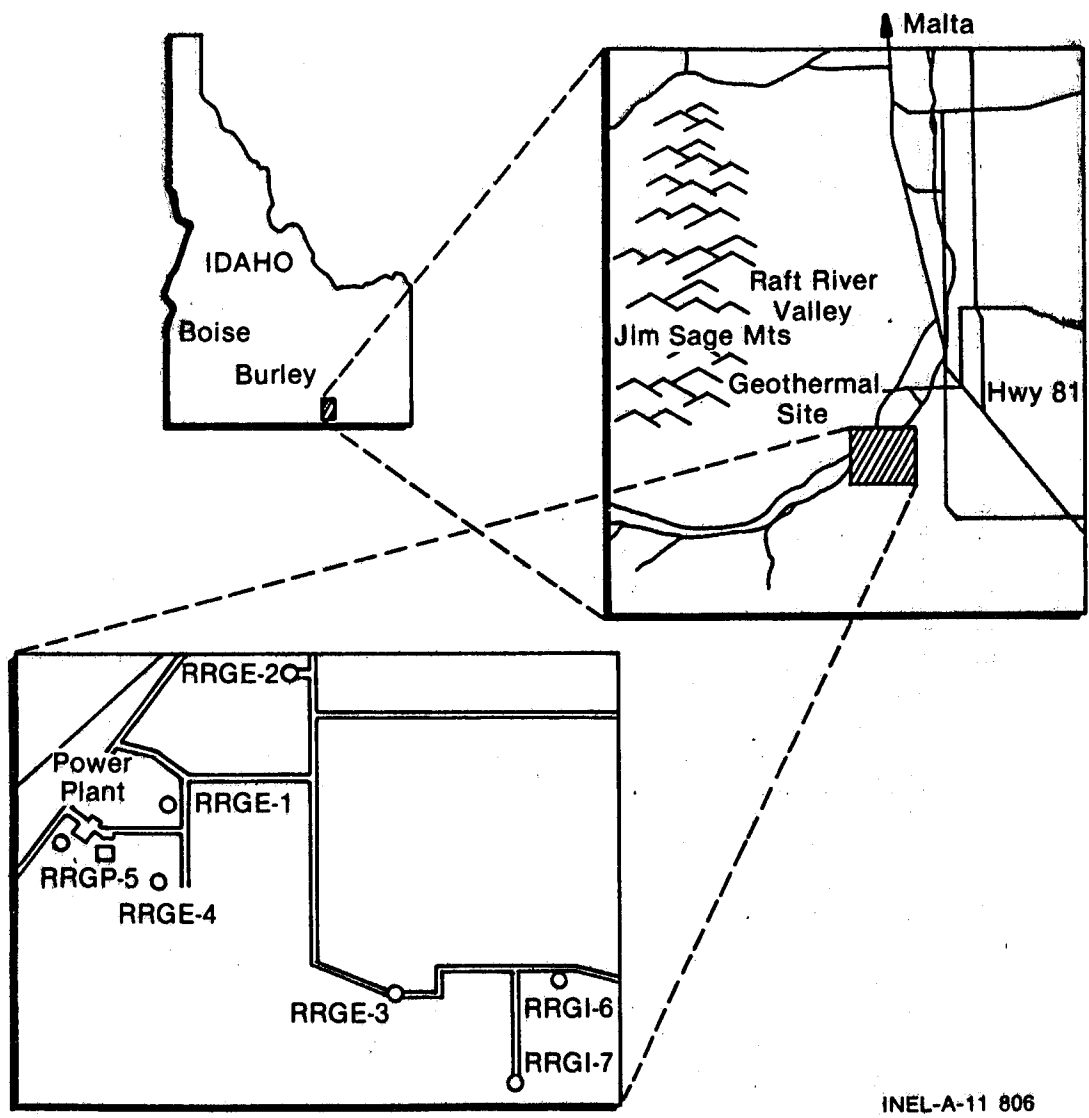
Colorado Well Service performed the drilling and completion of RRGI-7 under the direction of EG&G Idaho, Inc., and DOE-ID. The drilling supervision, subcontracted by EG&G, was conducted by an independent company, Energy Drilling Specialists of Denver, Colorado. Technical direction was supplied to the drilling subcontractor through the drilling supervisor. DOE-ID provided funding for the drilling operation, and EG&G provided budgeting and procurement administration.

RRGI-7 is located about 1/2 mile southeast of the RRGE-3 well (see Figures 1 and 2). This area was selected by DOE-ID as the site for all injection wells.

II. DRILLING SUMMARY

RRGI-7 well design incorporates multiple factors. The design provides for injection into the intermediate zone, in order to minimize near-surface groundwater contamination, to avoid cooling production aquifers, and to reduce well costs. It also provides for completion options: deepening and casing with 24-cm (9-5/8-in.) casing, or deepening with directionally drilled legs.

The drill site was completed prior to rig move-on. Site preparation included excavation of a fluid reserve pit; leveling, grading, and gravelling of the site; and construction of a road. A temporary water line from RRGE-3 to the site provided drilling water. The site measured about 76 x 76 m (250 x 250 ft).



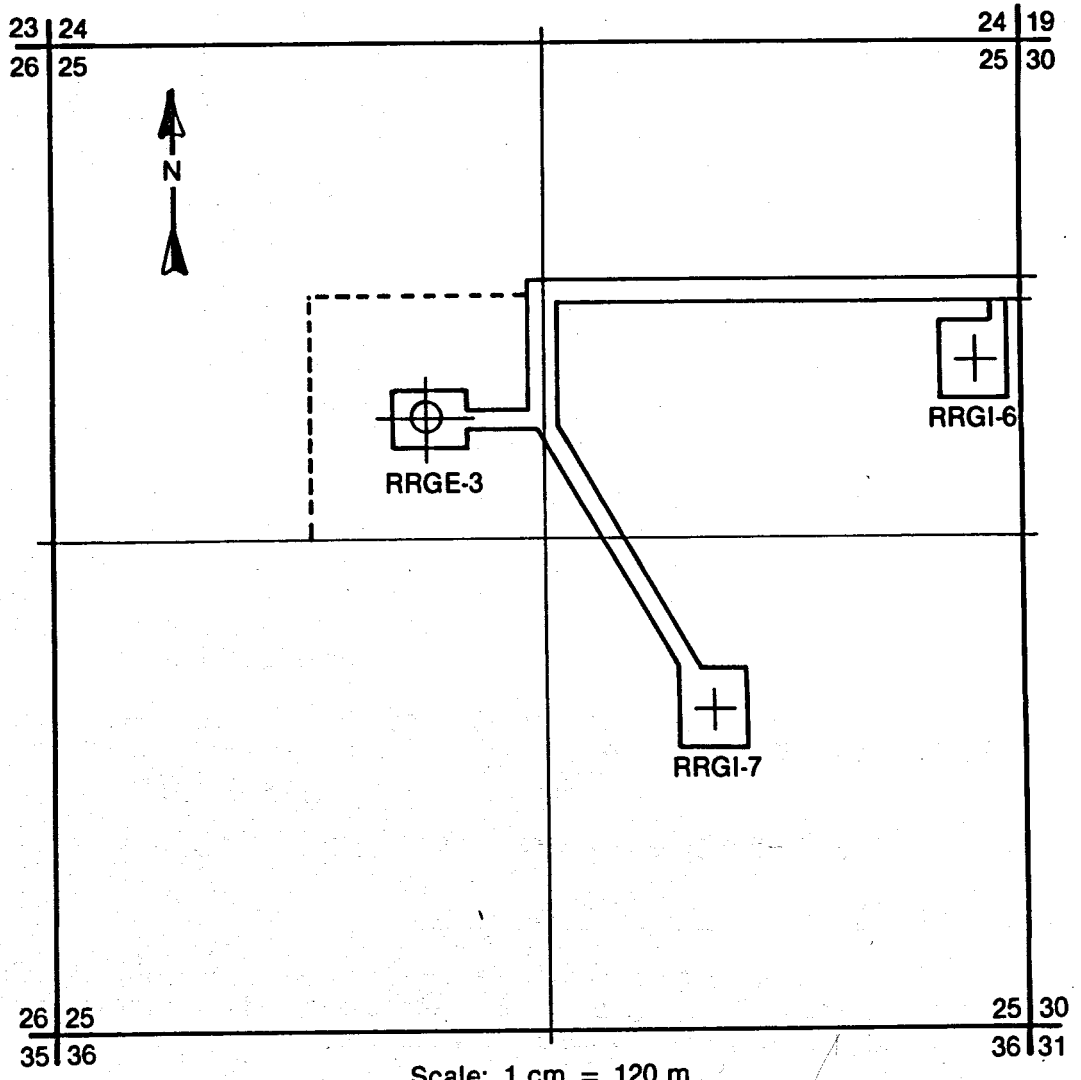
INEL-A-11 806

Fig. 1 Raft River geothermal site and location of wells.

Section 25

T-15-S

R-26-E



Scale: 1 cm = 120 m  
(1 in. = 1000 ft)

INEL-A-11 793

Fig. 2 Location survey.

Prior to rig move-on, the following work was performed. A dry-hole digger drilled a 66-cm (26-in.) diameter hole and set 46 m (150 ft) of 51-cm (20-in.) conductor pipe. This contractor cemented the pipe with plant-mix concrete. The dry-hole digger also drilled the rat and mouse holes. A subcontractor constructed a 2.4- x 2.4- x 3-m (8- x 8- x 10-ft) concrete-lined cellar around the conductor pipe.

Drilling began with a 44-cm (17-1/2-in.) diameter bit, using a low-solids mud. Minor problems with bit plugging developed upon encountering a gravel section. On July 19, 1978, at 7:00 P.M., drilling operations were shut down by the Idaho Department of Water Resources, because of environmental questions about RRGP-5 operations. Drilling resumed on July 21, 1978. At a depth of 610 m (2000 ft), the hole was logged. Fifty-one joints of 34-cm (13-3/8-in.), K-55, 81.1-kg/m (54-lb/ft) casing were run to a depth of 623 m (2044 ft). Cementing operations used 1600 sacks of Class-G cement with 11.5 kg/sack (25 lb/sack) kolite, 20% silica flour, and 8% D-53 with a slurry weight of 1.68 kg/L (12 lb/gal). While waiting on cement, the BOP was nipped up and pressure tested.

Drilling operations continued using a 31-cm (12-1/4-in.) bit, with water as the drilling fluid. After drilling to 1167 m (3828 ft), a 9-m (30-ft) core was cut with a 6-m (19-ft) recovery. Upon reentering the hole after coring, the hole had 18 m (60 ft) of fill. The hole was cleaned and logs were run.

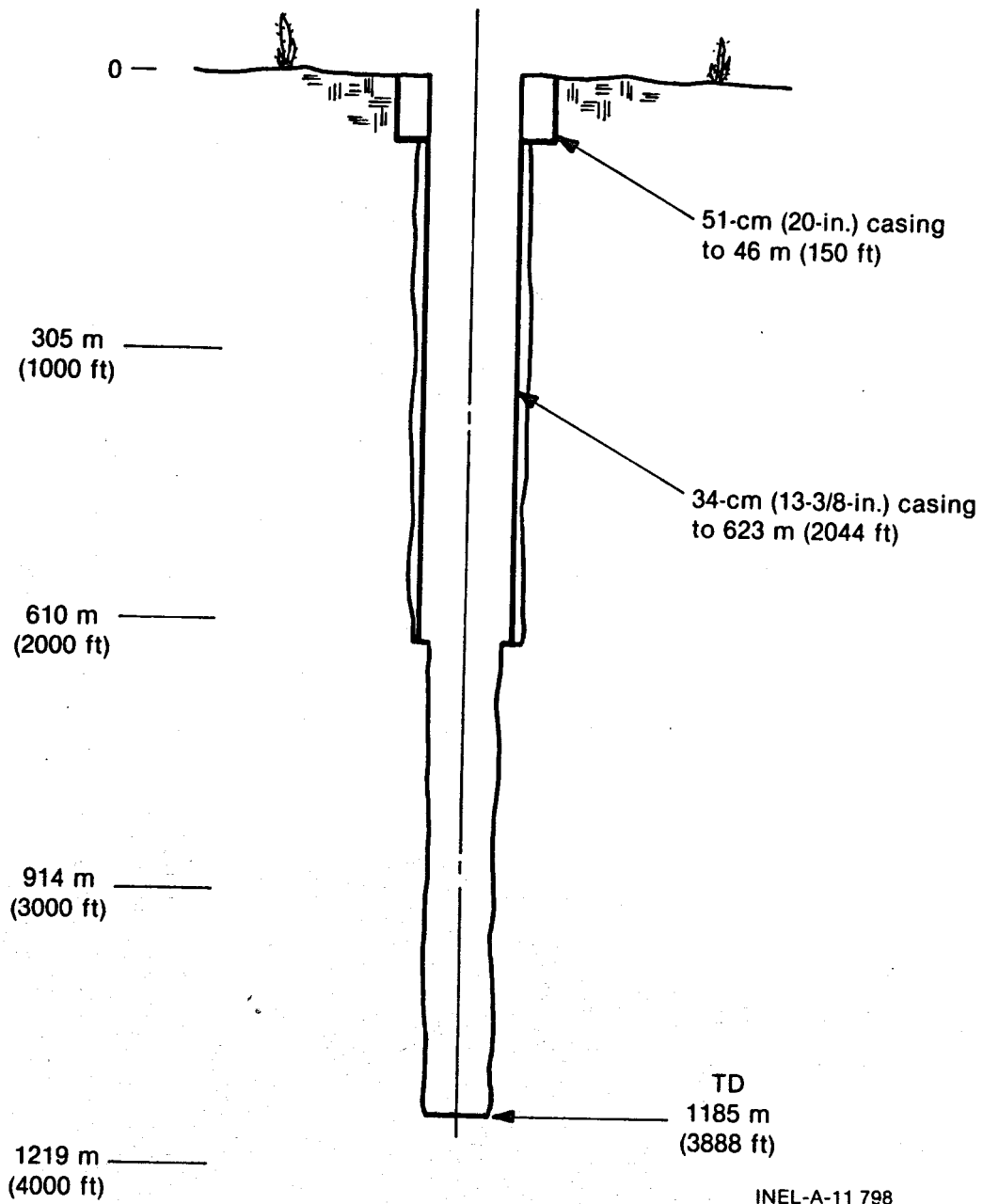
A short-term airlift flow test was conducted. Flows measured 24 to 30 L/sec (400 to 500 gpm). Upon recovery, water level stabilized at 9 m (28 ft). An injection test was conducted at 54 L/sec (850 gpm) for a half hour, and 28 L/sec (463 gpm) for 4 hours. A second airlift flow test was conducted for 9-3/4 hours at 33 L/sec (540 gpm), to remove all injected water and clean out the formation. Rigging-down operations then began.

Figure 3 shows the status of the subsurface well. Figure 4 provides a drilling and operations summary.

### III. SURFACE AND CONTAINMENT EQUIPMENT AND SERVICES

#### 1. CONTAINMENT EQUIPMENT - SURFACE HOLE

A 51-cm (20-in.) single-gate Shaffer blowout preventor (BOP) was installed between the 51-cm (20-in.) casing head and the drilling nipple for drilling the 44-cm (17-1/2-in.) hole to 625 m (2050 ft).



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Fig. 3 Subsurface well status.

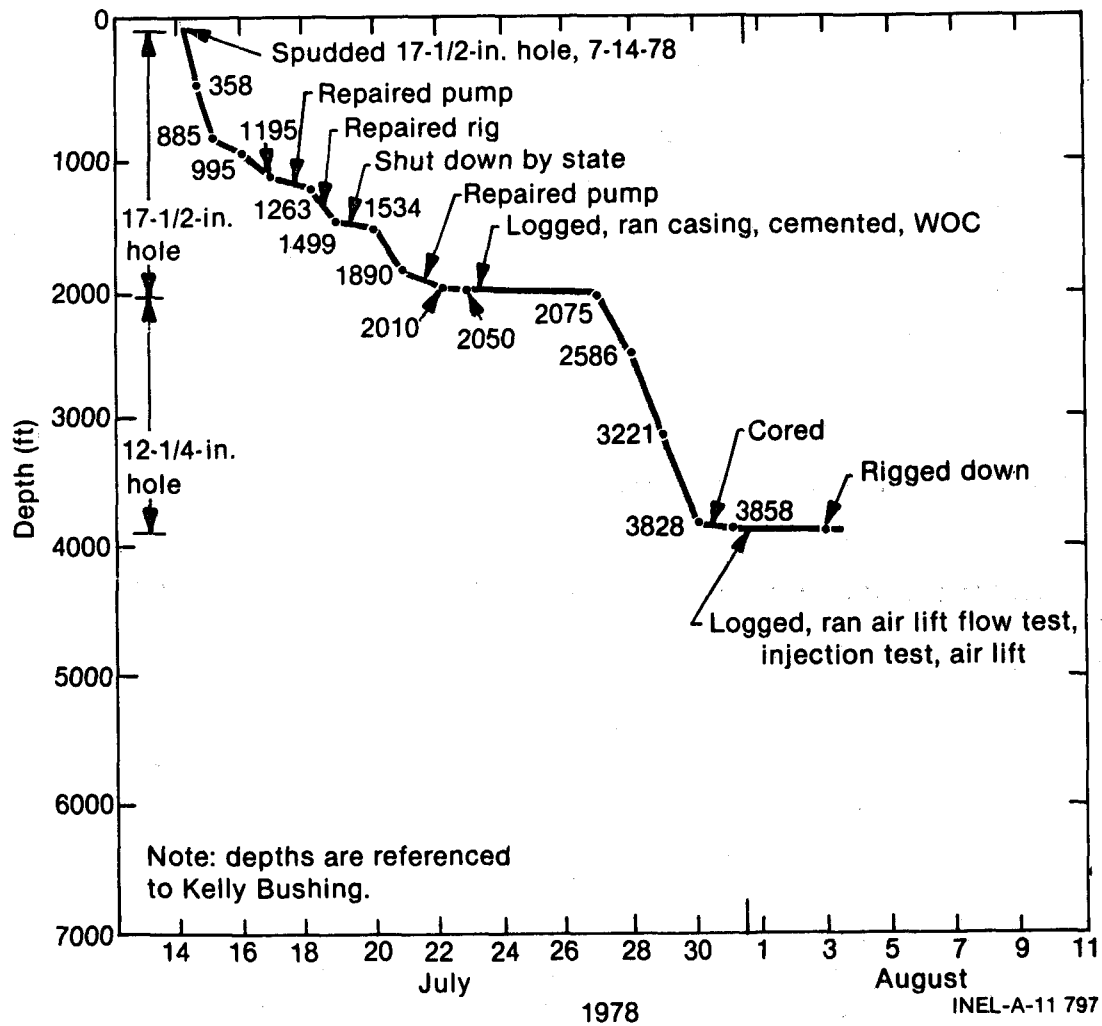


Fig. 4 Drilling and operations summary.

## 2. CONTAINMENT EQUIPMENT - PRODUCTION HOLE

After setting the 34-cm (13-3/8-in.) casing at 623 m (2044 ft), the following containment stack, (listed from expansion spool up) was used (see Figure 6).

- (1) WKM 51- x 30-cm (20- x 12-in.) expansion spool
- (2) WKM 30-cm (12-in.) master valve
- (3) Adaptor spool with flow nipple
- (4) Shaffer double-gate 30-cm (12-in.) BOP
- (5) Hydriil Type-GK 30-cm (12-in.) BOP
- (6) Grant 30-cm (12-in.) rotating head.

## 3. CELLAR

A subcontractor constructed a 2.4- x 3- x 2.4-m (8- x 10- x 8-ft) reinforced-concrete cellar to accommodate the BOP stack.

## 4. WELLHEAD

The permanent wellhead on this well consists of a standard WKM wellhead system. The casing head, with its 51-cm (20-in.) 14,000-kPa (2000-psi) API flange, is welded directly to the 51-cm (20-in.) well casing. The expansion spool mates to the 51-cm (20-in.) 14,000-kPa (2000-psi) API casing head flange on the bottom, and the 30-cm (12-in.) 2760-kPa (400-psi) ANSI flanged master gate valve on the top. Both sides of the expansion spool contain 7.5-cm (3-in.) valved outlets with 7.5-cm (3-in.) 14,000-kPa (2000-psi) API flanges.

A hanger spool mates with the master valve on the bottom and with a 20-cm (8-in.) 1860-kPa (600-psi) ANSI flanged power-seal gate valve on top. Above the power-seal gate valve is a 20-cm (8-in.) 1860-kPa (600-psi) ANSI tee (or cross).

For logging access into the well, a double-studded 20-cm (8-in.) 1860-kPa (600-psi) ANSI to 10-cm (4-in.) 930-kPa (300-psi) ANSI flanged gate valve is mounted above the double-studded flange. Figure 7 is a schematic view of the completed wellhead system, showing the expansion capabilities for the production casing and the packoff system. The packoff system is designed to be repacked under pressure. Expansion can be measured by monitoring the location of a 7-microcurie encapsulated Cobalt-60 radioactive source embedded in the top edge of the 34-cm (13-3/8-in.) casing.



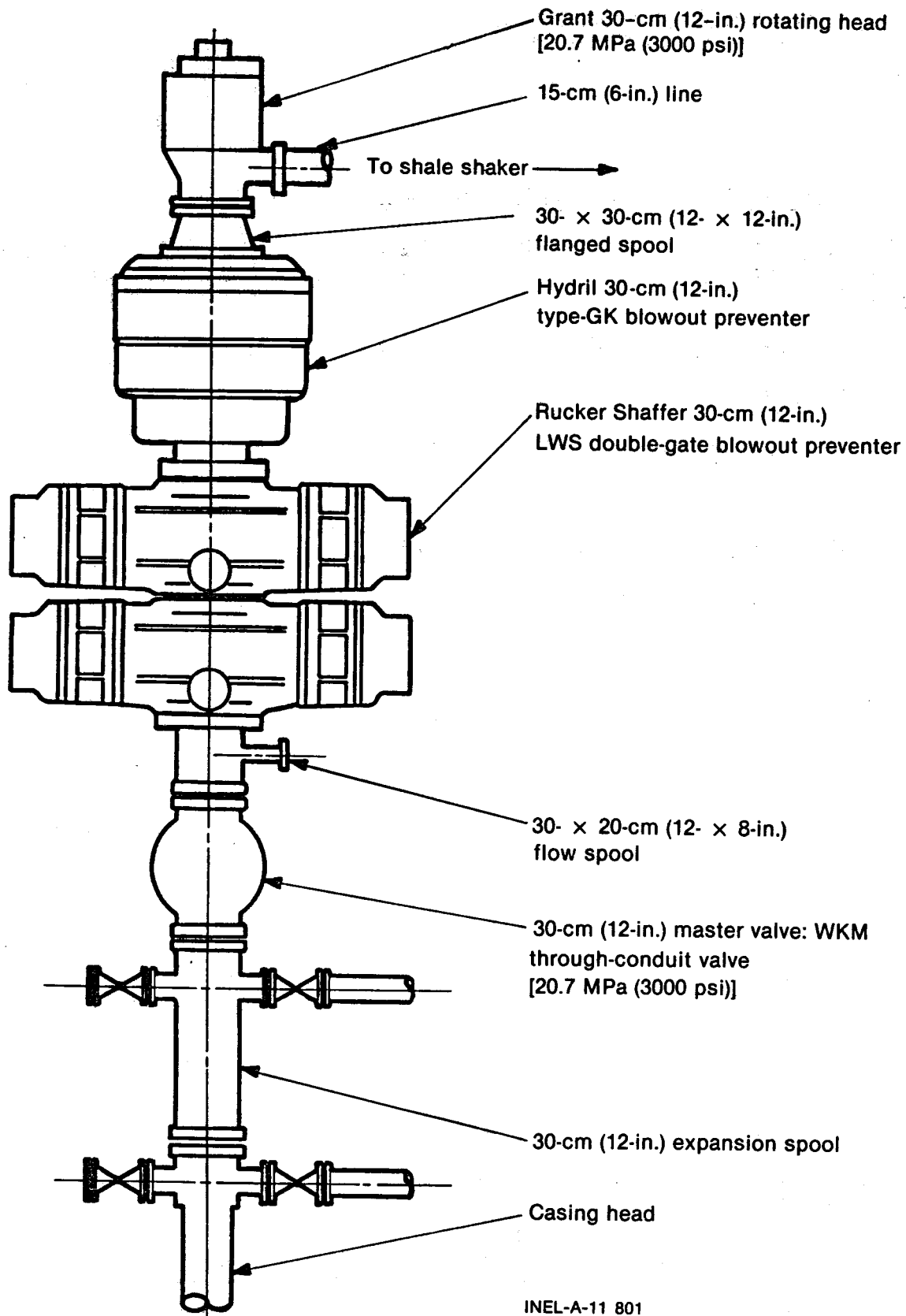


Fig. 5 Blowout preventer for drilling below the 34-cm (13-3/8-in.) casing shoe.

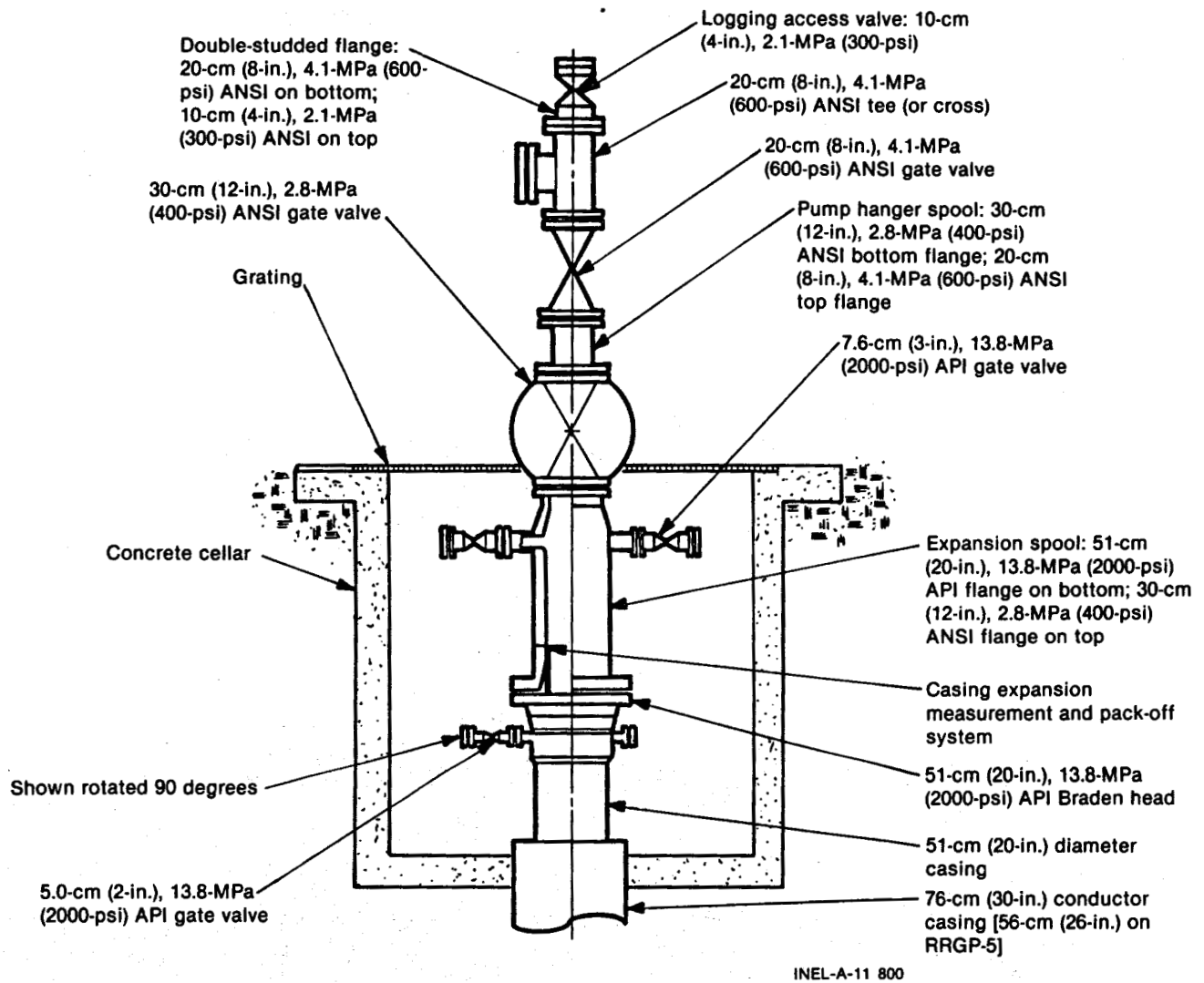


Fig. 6 Schematic diagram of completed wellhead.

## 5. DRILLING RECORDER

A six-pen recorder charted the weight on the derrick, the drilling rate, the rotary torque, the standpipe pressure, and the pump strokes on the number-one and number-two pumps during drilling.

## IV. DOWNHOLE EQUIPMENT AND SERVICES

### 1. SURFACE CASING

Four joints of 51-cm (20-in.) H-40 casing were welded at each joint, set, and cemented to a 46-m (150-ft) depth.

### 2. INTERMEDIATE CASING

Fifty-one joints of 34-cm (13-3/8-in.), 81.1-kg/m (54.5-lb/ft), K-55 casing, guide shoe, and float collar were run and cemented.

### 3. DRILL BIT SUMMARY

A dry-hole driller drilled the 66-cm (26-in.) conductor hole to set the 46 m (150 ft) of 51-cm (20-in.) conductor pipe.

The intermediate hole was drilled with three 44-cm (17-1/2-in.) Hughes bits: Bit 1, an OSCIG-Jet, was used to drill from 46 to 312 m (150 to 1025 ft) in 34.75 hours. Bit 2, an OWV-Jet, was used to drill from 312 to 457 m (1025 to 1499 ft) in 22.5 hours. Bit 3, an OSCIG-Jet, went to 625 m (2050 ft) in 20.25 hours. The 44-cm (17-1/2-in.) hole was then cased and cemented.

The 31-cm (12-1/4-in.) hole was drilled with two Smith SVH-Jet bits. Bit 4 went to 916 m (3004 ft) in 23.5 hours, and Bit 5 to 1167 m (3828 ft) in 26.5 hours. A rerun bit, number 6, was used for reaming, drilling, and cleaning to 1176 m (3858 ft).

### 4. CORING

One 9-m (30-ft) core from 1167 to 1176 m (3828 to 3858 ft) was cut using a 20- x 8.9-cm (7-7/8- x 3-1/2-in.) diamond-core bit. The drilling fluid was water. Six meters (19 ft) of the core were recovered.

## 5. DRILLING FLUID

Drilling began with a dispersed polymer with a weight average of 1.06 kg/L (8.9 lb/gal) and viscosity of 34 to 44 sec/L. At approximately 290 m (950 ft), the drilling fluid was changed to a low-solids mud. Mud properties averaged as follows:

Weight	1.1 kg/L (9.2 lb/gal)
Viscosity	39 sec/L
Plastic Viscosity	10 cP (0.01 Pa's)
Sand Content	6%

After the 34-cm (13-3/8-in.) casing was set, drilling continued to a total depth of 1176 m (3858 ft) with water pumped from RRGE-3. Overall drilling-fluid circulation throughout the drilling operation was good.

## 6. SAMPLES AND MUD LOGGING SERVICE

A mud-logging service was employed to monitor drilling fluid and cutting returns. This service monitored fluid temperatures (in and out), and hydrogen sulfide. Samples were taken at 6-m (20-ft) intervals. Samples indicated the zone of penetration was mostly gravel near the surface, underlain by lacustrine siltstone and sandstone of the Tertiary Raft River and Salt Lake formations. Readers of reports which have not been provided with copies of the lithologic logs may obtain copies by writing to the Office of Geothermal Energy, Idaho Operations Office, Department of Energy, 550 Second Street, Idaho Falls, ID 83401.

## 7. FORMATION TOPS

Formations were encountered at the following drilled depths [m (ft)]:

Alluvium	Surface
Raft River	155 (510)
Salt Lake	360 (1180)

## 8. CEMENTING

The 51-cm (20-in.) surface casing was cemented from 46 m (150 ft) to ground level using plant-mix concrete, with 9 kg (20 lb) of fine sand per sack of cement.

The 34-cm (13-3/8-in.) intermediate casing was cemented to 623 m (2044 ft) in a 44-cm (17-1/2-in.) hole using RFC Thixotropic cement. The drill crew established circulation to pretreat the hole. This was followed by 1600 sacks of Class-G cement, 11.5 kg (25 lb) of Kolite per sack of cement, 20% silica flour, and 8% D-53 with a slurry weight of 1.67 kg/L (14 lb/gal). Pumping started at 7:00 P.M. and was completed in 2 hours.

9. GEOPHYSICAL LOGGING PROGRAM

Various logs were run in the RRG1-7 well to determine the condition of the hole at different stages of the drilling operations. A listing of the logs, the intervals, and the lengths is shown in the following table.

TABLE I  
LOGS RUN ON RRG1-7

<u>Log</u>	<u>Type</u>	<u>Date</u>	<u>Shallowest Reading [m (ft)]</u>		<u>Deepest Reading [m (ft)]</u>		<u>Length [m (ft)]</u>	
1	Compensated Neutron	7-23-78	49	(160)	625	(2050)	576	(1890)
2	Dual Induction Focused Log	7-23-78	49	(160)	625	(2052)	577	(1892)
3	Borehole Compensated Acoustilog	7-23-78	49	(160)	626	(2055)	578	(1895)
4	Differential Temperature Log	7-24-78	30	(100)	626	(2054)	596	(1954)
5	Four-Arm Caliper Log	7-25-78	30	(100)	614	(2016)	584	(1916)
6	Epilog - Computer Log Analysis	8-3-78	46	(150)	625	(2050)	579	(1900)
7	Dual Induction Focused Log	8-1-78	622	(2040)	1155	(3788)	533	(1749)
8	Borehole Compensated Acoustilog	7-31-78	625	(2050)	1156	(3793)	531	(1743)
9	Differential Temperature Log	7-31-78	625	(2050)	1158	(3800)	533	(1750)
10	Compensated Densilog - Compensated Neutron	8-1-78	625	(2050)	1155	(3789)	530	(1739)
11	Compensated Densilog	8-1-78	625	(2049)	1157	(3796)	532	(1747)
12	Epilog - Computer Log Analysis	8-17-78	625	(2050)	1158	(3800)	533	(1750)

APPENDIX A

DAILY DRILLING REPORTS [a]

The following table contains excerpts from the notes recorded in the driller's IADC "Daily Drilling Report."

TABLE A-1

DAILY DRILLING REPORTS

<u>Date</u>	<u>Report</u>
June 24, 1978	Conductor was set. Rat and mouse holes drilled.
July 6, 1978	Cellar construction completed.
July 11 to 13, 1978	Rigged up Colorado Well Service Rig 75, a Cabot 750 with 34-m (112-ft) derrick [substructure 4.3 m (14 ft) above ground level].
July 14, 1978	Spudded. Drilled 44-cm (17-1/2-in.) hole from 37 to 109 m (120 to 358 ft), with a Hughes OSCIG-Jet bit. Pulled out of hole to unplug bit. Worked on pump. Ran back in hole.  Mud - dispersed polymer.  Bottom hole assembly - 6-point reamer Shock sub 9-m (30-ft) drill collar Stabilizer 9-m (30 ft) drill collar Stabilizer.
July 15, 1978	Drilled from 109 to 270 m (358 to 885 ft). Washed to bottom, worked pipe in hole. Serviced rig and worked on pumps. Reached gravel formation.  Mud - dispersed polymer wt. - 1.05 kg/L (8.8 ppg) vis. - 20 sec/1000 cm <sup>3</sup> .  Bottom hole assembly - 6-point reamer Shock sub 9-m (30-ft) drill collar Stabilizer 9-m (30-ft) drill collar Stabilizer.

[a] All depths are referenced from the Kelly Bushing, 4.3 m (14 ft) above ground level, unless otherwise noted.

TABLE A-I (cont.)

<u>Date</u>	<u>Report</u>
July 16, 1978	<p>Drilled from 270 to 303 m (885 to 995 ft). Repaired pump. Tripped out with a plugged bit, caused by gravelly formation. Tripped in hole and encountered 9 m (30 ft) of fill. Repaired mud line.</p> <p>Mud - low solids wt. - 109 kg/L (9.1 ppg) vis. - 42 sec/1000 cm<sup>3</sup>.</p> <p>Bottom hole assembly - 6-point reamer Shock sub 9-m (30-ft) drill collar Stabilizer 9-m (30-ft) drill collar Stabilizer.</p>
July 17, 1978	<p>Drilled from 303 to 364 m (995 to 1195 ft). Tripped for new bit. Pump broken, waited for parts.</p> <p>Mud - low solids wt. - 1.1 kg/L (9.2 ppg) vis. - 44 sec/1000 cm<sup>3</sup>.</p> <p>Bottom hole assembly - 6-point reamer Shock sub 9-m (30-ft) drill collar Stabilizer 9-m (30-ft) drill collar Stabilizer.</p>
July 18, 1978	<p>Waited on pump parts. Repaired pump. Repaired shale shaker. Drilled from 364 to 385 m (1195 to 1263 ft).</p> <p>Mud - low solids wt. - 1.2 kg/L (9.4 ppg) vis. - 39 sec/1000 cm<sup>3</sup>.</p> <p>Bottom hole assembly - 6-point reamer Shock sub 9-m (30-ft) drill collar Stabilizer 9-m (30-ft) drill collar Stabilizer.</p>
July 19, 1978	<p>Drilled from 385 to 457 m (1263 to 1499 ft). Repaired pump. Serviced rig. Tripped for new bit. At 7:00 P.M., the Idaho Department of Water Resources issued a cease and desist order to all drilling operations, due to environmental concerns for RRG-5 operations.</p>

TABLE A-I (cont.)

<u>Date</u>	<u>Report</u>
July 19, 1978 (cont.)	Mud - low solids wt. - 1.1 kg/L (9.2 ppg) vis. - 38 sec/1000 cm <sup>3</sup> .  Bottom hole assembly - 6-point reamer Shock sub 9-m (30-ft) drill collar Stabilizer 9-m (30-ft) drill collar Stabilizer.
July 20, 1978	State gave okay to drill ahead at 7:00 P.M. Drilled from 457 to 468 m (1499 to 1534 ft).  Mud - low solids wt. - 1.09 kg/L (9.1 ppg) vis. - 35 sec/1000 cm <sup>3</sup> .  Bottom hole assembly - 6-point reamer Shock sub 9-m (30-ft) drill collar Stabilizer 9-m (30-ft) drill collar Stabilizer.
July 21, 1978	Drilled from 468 to 576 m (1534 to 1890 ft). Worked on pump. Cleaned mud pits.  Mud - low solids wt. - 1.1 kg/L (9.2 ppg) vis. - 35 sec/1000 cm <sup>3</sup> .  Bottom hole assembly - 6-point reamer Shock sub 9-m (30-ft) drill collar Stabilizer 9-m (30-ft) drill collar Stabilizer.
July 22, 1978	Drilled from 576 to 613 m (1890 to 2010 ft). Waited on parts for pump, and repaired pump. Changed shale shaker screen.  Mud - low solids wt. - 1.09 kg/L (9.1 ppg) vis. - 39 sec/1000 cm <sup>3</sup> .  Bottom hole assembly - 6-point reamer Shock sub 9-m (30-ft) drill collar Stabilizer 9-m (30-ft) drill collar Stabilizer.



TABLE A-I (cont.)

<u>Date</u>	<u>Report</u>
July 23, 1978	<p>Drilled from 613 to 625 m (2010 to 2050 ft). Circulated and conditioned hole. A directional survey to 619 m (2000 ft) showed a 2% deviation. Tripped out and laid down bottom hole assembly. Rigged up and began running logs.</p> <p>Mud - low solids wt. - 1.09 kg/L (9.1 ppg) vis. - 39 sec/1000 cm<sup>3</sup>.</p> <p>Bottom hole assembly - 6-point reamer Shock sub 9-m (30-ft) drill collar Stabilizer 9-m (30-ft) drill collar Stabilizer.</p>
July 24, 1978	<p>Logged hole. Tripped in with bottom hole assembly and circulated.</p> <p>Mud - low solids wt. - 1.09 kg/L (9.1 ppg) vis. - 39 sec/1000 cm<sup>3</sup>.</p> <p>Bottom hole assembly - 6-point reamer Shock sub</p>
July 25, 1978	<p>Circulated to run casing. Tripped out of hole and laid down bottom hole assembly. Rigged up and ran 51 joints of 34-cm (13-3/8-in.), K-55, 81.1-kg/M (54.5-lb/ft), casing to 623 m (2044 ft). Rigged up cementers. Cemented with 1600 sacks of Class G cement with 11.5 kg/sack (25 lb/sack) kolite, 20% silica and 8% D-53. Started cementing at 7:00 P.M. Cement in place at 9:00 P.M. Cleaned out lines and started removing BOP.</p>
July 26, 1978	<p>WOC - Nippling up BOP.</p>
July 27, 1978	<p>Completed nippling up BOP. Pressure tested casing at 2100 kPa (300 psi). Ran in the hole, drilled out cement, and began drilling new hole with 31-cm (12-1/4-in.) bit to 632 m (2075 ft).</p> <p>Drilling fluid - Water.</p> <p>Bottom hole assembly - Shock sub.</p>

TABLE A-I (cont.)

<u>Date</u>	<u>Report</u>
July 28, 1978	<p>Drilled to 667 m (2189 ft) and pulled out of hole. Picked up bottom hole assembly. Cleaned pits. Reamed from 655 to 674 m (2150 to 2210 ft). Drilled to 788 m (2586 ft).</p> <p>Drilling fluid - Water.</p> <p>Bottom hole assembly - 6-point reamer Shock sub 9-m (30-ft) drill collar 3-point stabilizer 9-m (30-ft) drill collar Blade stabilizer.</p>
July 29, 1978	<p>Drilled to 982 m (3221 ft). Serviced rig and pumps. Ran deviation survey which showed a 3-1/2 degree deviation at 902 m (2960 ft). Tripped out for new bit. Washed and reamed to bottom.</p> <p>Drilling fluid - Water.</p> <p>Bottom hole assembly - 6-point reamer Shock sub 9-m (30-ft) drill collar 3-point stabilizer 9-m (30-ft) drill collar Blade stabilizer.</p>
July 30, 1978	<p>Drilled to 1167 m (3828 ft). Serviced rig. Cleaned mud pits. Circulated, in preparation to core.</p> <p>Drilling fluid - Water</p> <p>Bottom hole assembly - 6-point reamer Shock sub 9-m (30-ft) drill collar 3-point reamer 9-m (30-ft) drill collar Blade stabilizer.</p>
July 31, 1978	<p>Circulated and pulled out of hole. Picked up core-barrel and ran in hole. Cored 9 m (30 ft) and recovered 6 m (19 ft). Ran in hole with bit, reamer, and shock sub. Washed and reamed to total depth of 1176 m (3858 ft). Circulated. Ran a deviation survey which showed 5-1/2 degrees at 1176 m (3858 ft). Pulled out of hole and rigged up loggers. Started running logs.</p>

TABLE A-I (cont.)

<u>Date</u>	<u>Report</u>
August 1, 1978	Ran logs. Prepared and started air lift from 55 m (180 ft) down hole.
August 2, 1978	Conducted air lift, recovering 24 to 30 L/sec (400 to 500 gpm). Shut in well. Water level at 9 m (28 ft). Injected at 34 L/sec (850 gpm) with 1380 kPa (200 psi) for 1/2 hour, 28 L/sec (463 gpm) for 4 hours. Shut in well. Restarted air lift from 55 m (180 ft) downhole and recovered 33 L/sec (540 gpm) for 1-3/4 hours.
August 3, 1978	Continued air lifting for 8 more hours for a total of 9-3/4 hours. Laid down drill pipe and bottom hole assembly. Began rigging down operations at 2:00 P.M.

APPENDIX B

BIT RECORD

The following table provides a performance record for each of the bits used to drill RRG1-7. This information was obtained from the IADC "Daily Drilling Report."

**TABLE B-I**

**BIT RECORD**

Bit	Make	Size [cm (in.)]	Type	Serial Number	Jets	Depth Out [m (ft)]	Footage [m (ft)]	Hours	Weight [1000 kg (1000 lb)]	RPM	Pump Pressure [kPa (psi)]	SPM	Bit Condition T/B/G	Formation Remarks
1	Hughes	44 (17-1/2)	OSCIG-Jet	JLN67	Open	312 (1025)	267 (875)	34.75	7 (15)	60	2069 (300)	65	5/4/1/8	Drilled with low solids mud to 625 m (2050 ft)
2	Hughes	44 (17-1/2)	OWV-Jet	AA421	Open	457 (1499)	144 (474)	22.5	7 (15)	60	3448-5516 (500-800)	65	3/4/0	
3	Hughes	44 (17-1/2)	OSCIG-Jet	HV649	Open	625 (2050)	168 (551)	20.25	7 (15)	60	2758-5516 (400-800)	69	5/3/0	From 625 m (2050 ft) to TD with water
4	Smith	31 (12-1/4)	SUH-Jet	598DN	Open	916 (3004)	248 (814)	23.5	7 (15)	65	4138 (600)	50	7/3/1/8	
5	Smith	31 (12-1/4)	SUH-Jet	635CA	Open	1167 (3828)	251 (824)	26.5	7 (15)	65	5516 (800)	50	8/3/1/8	
6	Hycalog	20x9 (7-7/8 x 3-1/2)	CMHIP	17479		1176 (3858)	9 (30)	--	--	--	--	--	--	Cored 9 m (30 ft), recovered 6 m (19 ft)

APPENDIX C

CASING RECORD

The following table contains excerpts from notes recorded in the drilling superintendent's casing record notebook.

TABLE C-1

CASING RECORD [a]

<u>Joint</u>	<u>Measured Length</u> <u>[m (ft)]</u>	<u>Cumulative Length</u> <u>[m (ft)]</u>
1	12.4 (40.72)	12.4 (40.72)
2	11.1 (36.42)	23.5 (77.14)
3	12.4 (40.55)	35.9 (117.69)
4	12.5 (41.12)	48.4 (158.81)
5	12.3 (40.51)	60.8 (199.32)
6	12.7 (41.56)	73.4 (240.88)
7	12.1 (39.82)	85.6 (280.70)
8	12.3 (40.27)	97.8 (320.97)
9	12.4 (40.60)	110.2 (361.57)
10	12.1 (39.68)	122.6 (402.25)
11	12.2 (40.11)	134.5 (441.36)
12	12.6 (41.19)	147.1 (482.55)
13	12.4 (40.66)	159.5 (523.21)
14	12.3 (40.42)	171.8 (563.63)
15	12.5 (41.00)	184.3 (604.63)
16	12.1 (39.69)	196.4 (644.32)
17	12.5 (40.95)	208.9 (685.27)
18	12.4 (40.63)	221.3 (725.90)
19	12.5 (40.89)	233.7 (766.79)
20	12.6 (41.50)	246.4 (808.29)
21	12.5 (40.91)	258.8 (849.20)
22	12.6 (41.27)	271.4 (890.47)
23	12.5 (41.01)	283.9 (931.48)
24	12.8 (42.01)	296.7 (973.49)
25	11.7 (38.46)	308.4 (1011.95)
26	12.3 (40.46)	320.8 (1052.41)
27	12.3 (40.39)	333.1 (1092.80)
28	12.0 (39.37)	345.1 (1132.17)
29	12.3 (40.20)	357.3 (1172.37)
30	11.9 (39.06)	369.2 (1211.43)
31	12.5 (40.92)	381.7 (1252.35)
32	12.3 (40.41)	394.0 (1292.76)
33	12.2 (40.06)	406.3 (1332.82)
34	12.6 (41.22)	418.8 (1374.04)
35	12.6 (41.30)	431.4 (1415.34)
36	12.1 (39.85)	443.5 (1455.19)
37	12.6 (41.34)	456.1 (1496.53)
38	12.3 (40.38)	468.5 (1536.91)
39	12.1 (39.59)	480.5 (1576.50)
40	12.1 (39.62)	492.6 (1616.12)
41	12.2 (40.01)	504.8 (1656.13)
42	12.3 (40.45)	517.1 (1696.58)
43	12.6 (41.42)	529.7 (1738.00)
44	12.4 (40.68)	542.1 (1778.68)
45	11.7 (38.50)	553.9 (1817.18)
46	11.8 (38.60)	565.6 (1855.78)
47	12.1 (39.85)	577.8 (1895.63)
48	12.7 (41.78)	590.5 (1937.41)
49	12.2 (39.89)	602.7 (1977.30)
50	12.5 (41.09)	615.2 (2018.39)
51	12.4 (40.55)	627.6 (2058.94)

[a] All intermediate casing was 34 cm (13-3/8 in.) OD, 81.3 kg/m (54.5 lb/ft), ST&C, K-55, Range 3.

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