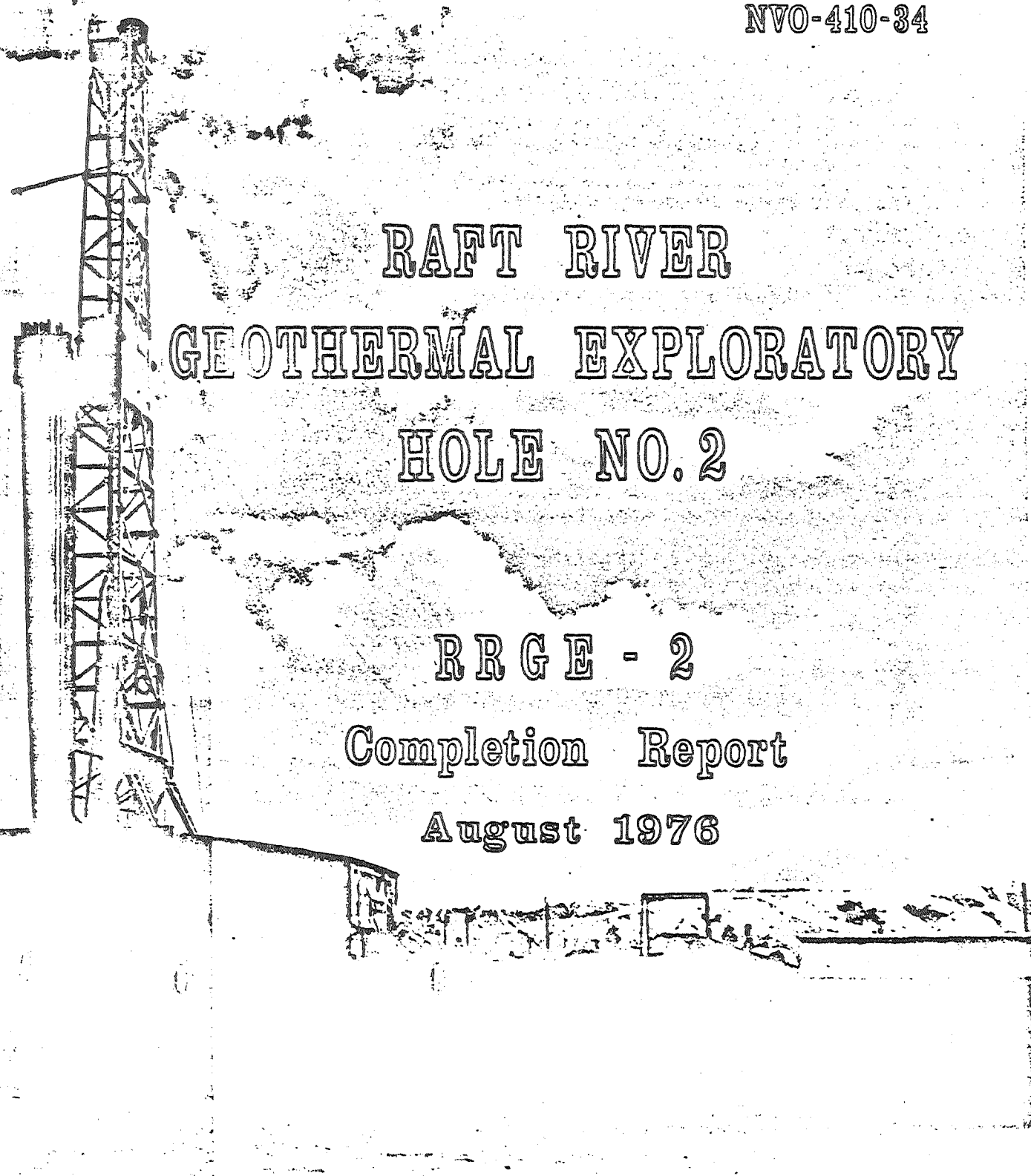


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NVO-410-34



RAFT RIVER  
GEOHERMAL EXPLORATORY  
HOLE NO. 2

RRGE - 2  
Completion Report  
August 1976

PREPARED BY  
REYNOLDS ELECTRICAL & ENGINEERING CO., INC.  
RENO, NEVADA

FOR  
U.S. ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION  
NEVADA OPERATIONS OFFICE

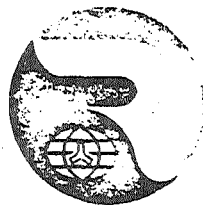
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IDO-10066  
NVO-410-34

RAFT RIVER  
GEOTHERMAL EXPLORATORY  
HOLE NO. 2

RRGE - 2  
Completion Report

Compiled by  
J. L. Speake



Reynolds Electrical & Engineering Co., Inc.

AN  EG&G COMPANY

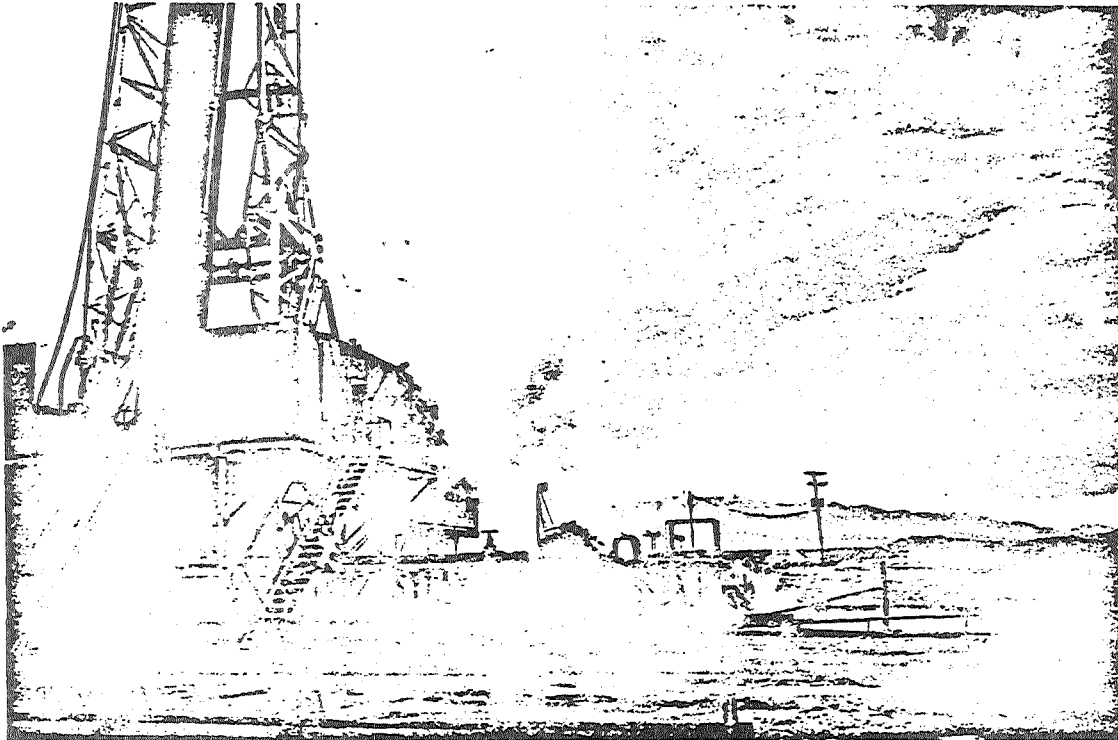
## ABSTRACT

The Raft River Geothermal Exploratory Hole No. 2 (RRGE-2) is the second exploratory hole drilled in the Raft River Valley location of the Idaho Geothermal R&D Project for the purpose of determining the existence of hot water in quantities suitable for commercial power generation and nonelectric applications. This well was drilled to a depth of 6,543 feet ground level to obtain additional geological information for evaluation of the deep geothermal reservoir system.

This report describes the drilling and completion of RRGE-2 and includes the daily drilling reports, drill bit records, casing records, and descriptions of the cementing, logging, coring and containment techniques employed during the drilling operation. A subsequent report, IDO-10067 will describe the planning, technology and testing of RRGE-2.

## ACKNOWLEDGEMENTS

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*RRGE-2. Shown here is the ERDA-owned drill rig with the hot water flashing into steam as the flowline discharges at the shale shaker.*



*RRGE-2. With the lapse of additional time during a flow test, the hot water is now flashing and flowing through the flowline into the drilling fluids reserve pit.*

COMPLETION REPORT - RRGE-2

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## I. INTRODUCTION

This report describes the drilling operation for the completion of the second deep geothermal exploratory hole drilled in the Raft River Valley of Southern Idaho. The operation is a continuation of the Idaho Geothermal R&D Project. (See Figures 1, 2, and 3 for location.)

The site for the Raft River Geothermal Exploratory Hole No. 2 (RRGE-2), one of several considered, was selected by the Idaho National Engineering-Laboratory (INEL). The RRGE-2 well was designed to intersect a deep geothermal circulation system and possibly confirm the existence of hot water in quantities potentially suitable for commercial power applications. Drilling operations were started in late April 1975 and were suspended at a total depth of about 6,000 feet on June 30, 1975. Limited flow testing, logging, and reinjection testing were performed before placing the ERDA drill rig on a standby secured status.

During the inactive period the drill rig was manned on a twenty-four-hour basis by watchmen. Assistance was provided to INEL by these watchmen in the performance of extensive flow testing, reinjection, logging, etc. Subsequent limited flow testing produced up to 800 gallons per minute with no back pressure at a maximum downhole temperature of 297°F. A flow line was installed between RRGE-1 and RRGE-2 and flow and injection tests were performed by INEL alternating between the two wells.

Reactivation of the drilling operations commenced in early March 1976 and the well was drilled an additional 555 feet to a total drilled depth of 6,543 feet from ground level. Coring, logging and flow testing were accomplished as directed by INEL.

The drilling and completion work on RRGE-2 was performed by Reynolds Electrical & Engineering Co., Inc. (REECo), under the direction of the U. S. Energy Research & Development Administration (ERDA), Nevada Operations Office (NV). Technical program requirements were provided by the Idaho National Engineering Laboratory (INEL), a prime contractor to ERDA, Idaho Operations Office (ID). The Manager, ID, was responsible for the coordination of all project-related activities between NV/REECo and ID/INEL and providing funding for the drilling operation. For the experimental data obtained from this hole, refer to IDO 10067.

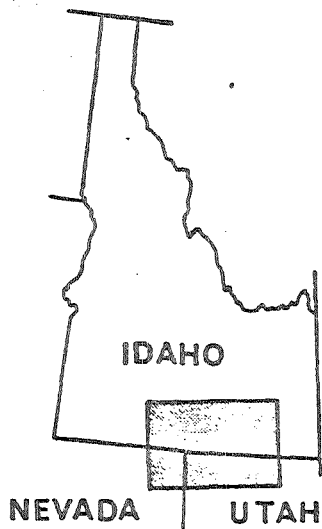
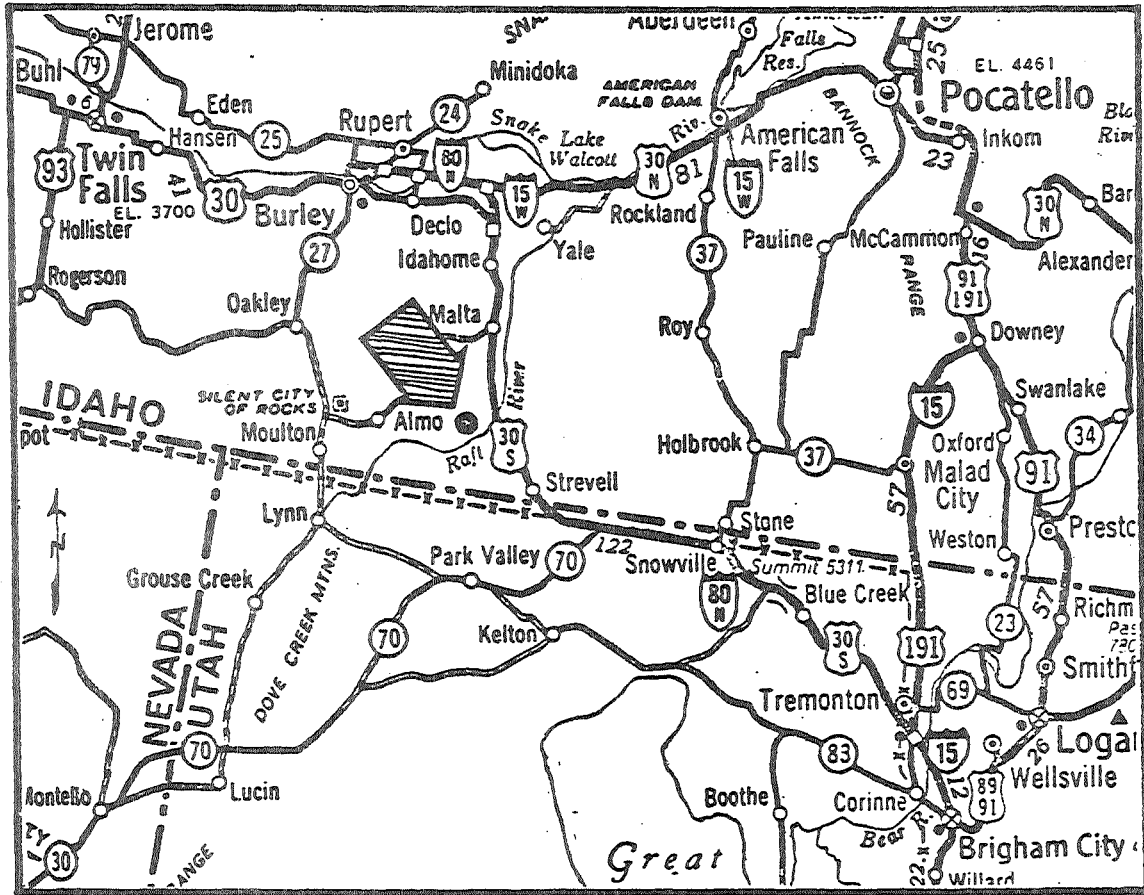


Figure 1. Idaho Geothermal R&D Project Site Location.

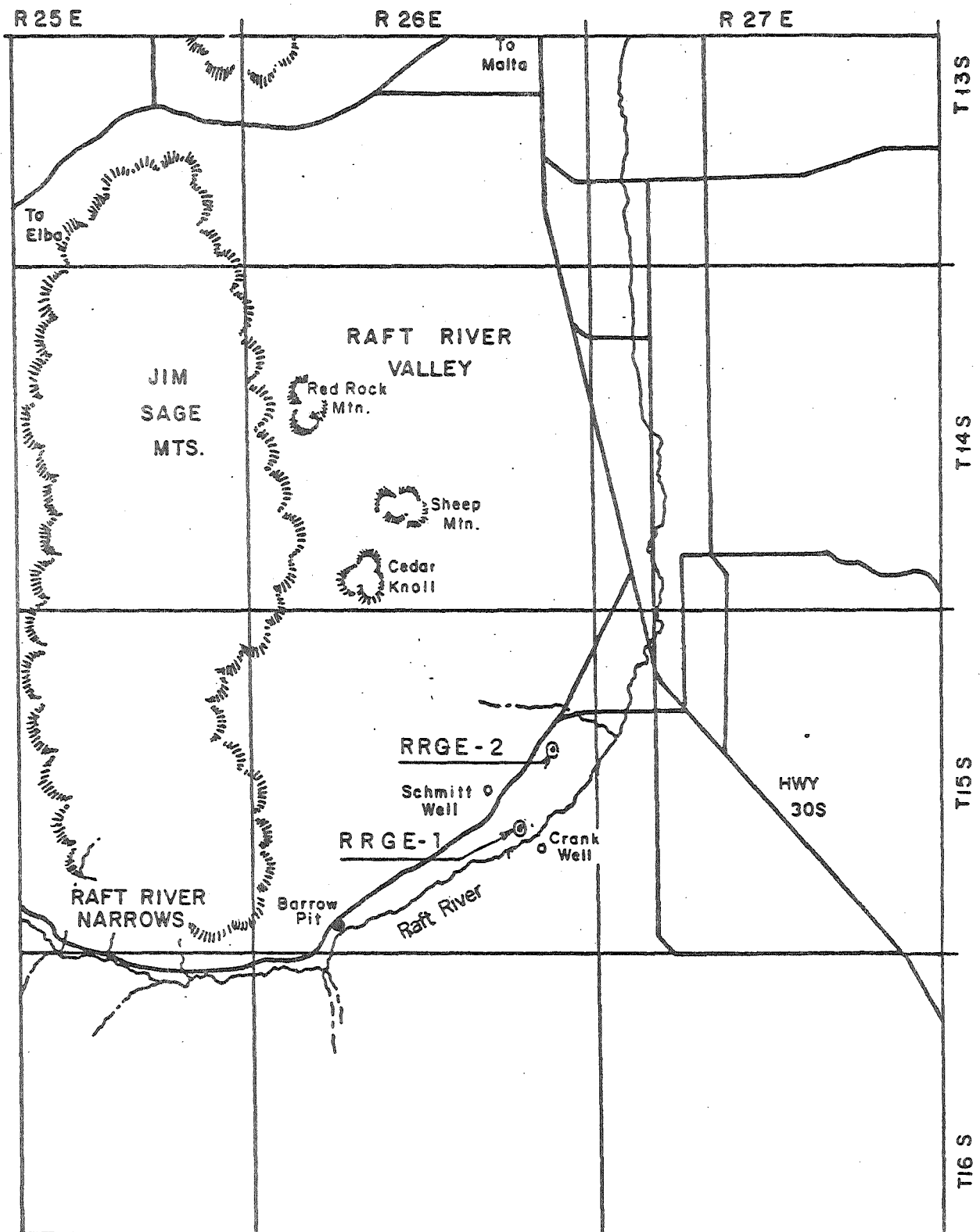


Figure 2. Raft River Valley with Drill Site Locations.



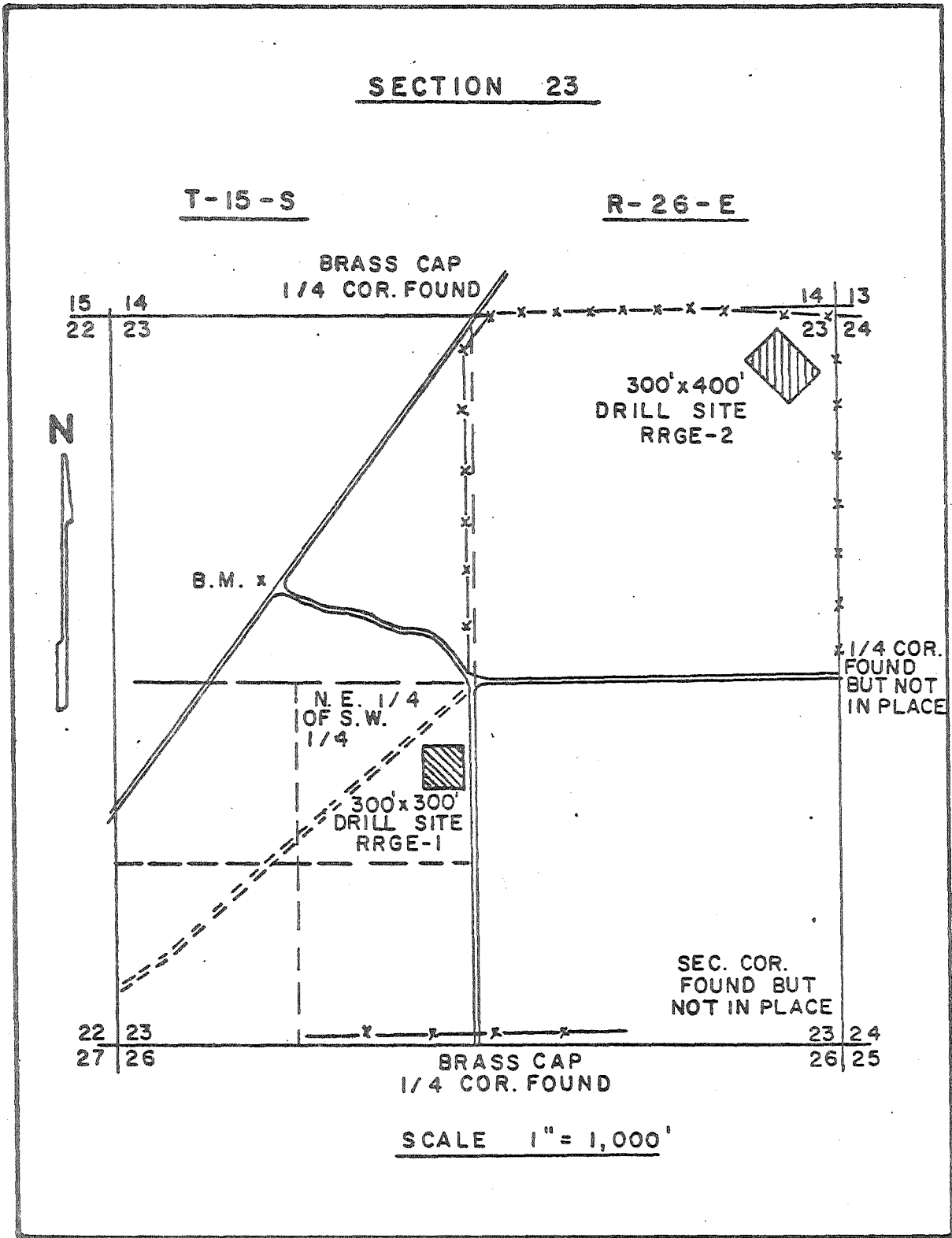


Figure 3. Location Survey and Coordinates.

## II. EXPLORATORY HOLE DRILLING

### 1. DRILLING SUMMARY

The drill site with approximate dimensions of 300 feet by 400 feet was prepared in order to accommodate the drill rig and supporting equipment. Preparation included site leveling and grading, installation of a concrete cellar, excavation of the fluid reserve pit and grading of road and storage surfaces adjoining the drill site. Water was provided for the drilling operations through a pipeline from RRGE-1 and a nearby irrigation well.

The conductor hole consisted of a 42-inch diameter hole drilled to 40 feet (from ground level) and 30-inch diameter corrugated metal conductor pipe was set at 40 feet and cemented with 18 cubic yards of plant mix concrete. An 8 foot by 10 foot by 6 foot deep concrete cellar was constructed around the conductor pipe.

The surface hole consisted of a 15-inch diameter hole drilled with mud to 923 feet (RKB)\* and reamed to 26 inches in diameter to 923 feet. A total of 23 joints of 20-inch, H-40, 94.0-lb/ft casing was landed at 904 feet (GL - ground level) and was cemented to the surface in two stages. The first stage cement top was tagged at 216 feet outside the casing. The second stage was cemented from 216 feet to the surface through 1.9-inch tubing down the annulus.

The production hole consisted of a 12-1/4-inch diameter hole drilled with mud to 3,072 feet. Core no. 1 was cut with a 7-7/8-inch diamond bit from 3,072 feet to 3,088 feet with 16 feet of core recovered. The cored interval was reamed to 12-1/4-inches and the same diameter hole was drilled from 3,088 feet to 3,720 feet. Core no. 2 was cut with a 7-7/8-inch diamond bit from 3,720 feet to 3,734 feet with 14 feet of core recovered. The cored interval was reamed to 12-1/4-inches and drilling continued to 4,217 feet. During the interval of 3,999 feet to 4,217 feet, approximately 400 barrels of mud were lost to the formation.

Core no. 3 was cut with a new 7-7/8-inch diamond bit from 4,217 feet to 4,227 feet with 10 feet of core recovered. The cored interval was reamed to 12-1/4-inches and drilling continued to 4,247 feet. The hole was circulated, logged and conditioned for a Drill Stem Test (DST). (During the drilled interval, approximately 5 barrels of mud per hour was lost to the formation.)

DST no. 1 was run with the packer set at 4,157 feet. Approximately 341 feet of drilling fluid and 859 feet of water were recovered during the test. Final flow pressure was 588 psi and final shut-in pressure was 1,673 psi.

Utilizing mud and lost circulation material, the 12-1/4-inch hole was reamed to 17-1/2-inches with two 17-1/2-inch hole openers (HO) from 920 feet to 4,247 feet. The hole was then circulated, conditioned, and logged in preparation for running casing. A total of 110 joints of 13-3/8-inch, 54.5, 61.0 and 68.0 lb/ft. casing with float shoe and DV Tool (see Section 4.2, Production Casing) were run

\*All depths (unless otherwise noted) are referenced to the rotary kelly bushing (RKB) which is 18 feet above ground level.

and set at 4,245' feet. Cement stage no. 1 included 334 barrels of slurry with 10 barrels of colored water and 23 barrels of mud flush preceding the slurry. The DV Tool was opened and the hole circulated in preparation for the next cement stage. Colored water and cement reached the surface. Cement stage no. 2 was also placed utilizing the colored water and mud flush. Cement was not displaced to the surface but logging to evaluate the results was deferred until later when other geophysical logging was scheduled.

While waiting on cement, rig maintenance was performed and the blowout preventor assembly was changed out and tested in preparation for drilling a 12-1/4-inch hole. Utilizing a 12-1/4-inch bit, cement was tagged at 2,418 feet, and drilled out to 2,453 feet. The DV collar was drilled out and the 13-3/8-inch casing pressure tested. The bottom plug was drilled out at 4,188 feet and 12-1/4-inch hole drilled to 4,370 feet. When drilling reached approximately 4,350 feet, the well started flowing.

Core no. 4 was cut, utilizing a rerun of core bit No. 2 (a 7-7/8-inch Christensen MC-20) from 4,370 to 4,376 feet with 18 inches of core recovered. An Amerada temperature bomb was run and, with the well flowing, a flow rate of 198 gpm and surface temperature of 206°F were recorded. The maximum temperature recorded during the run was 285°F.

The production hole drilling continued with the reaming of the out-of-gauge hole and the core hole from 4,335 to 4,376 feet and drilling of 12-1/4-inch hole down to 4,806 feet. At this point, an attempt to cut core no. 5 (utilizing core bit no. 3) was made with no success as the core barrel malfunctioned. A cement bond log, Amerada temperature bombs, flow testing, and water reinjection tests were run at this depth. The CBL which was run in the 13-3/8-inch casing indicated the top of cement to be at 1,550 feet and, because of this fact, a cement squeeze operation was ordered.

With an E-Z Drill bridge plug set at 1,561 feet (GL) and the squeeze packer set at various depths in a series of nine remedial cementing operations, the twenty-eight perforations between 870 feet (GL) and 1,548 feet (GL) were squeezed with 1,450 sacks of cement. Eight cement bond logs were run to verify the results of the remedial cementing and all cemented perforations were pressure tested to 300 psi.

The squeeze cement and E-Z drill bridge plug were drilled out of the casing and a 12-1/4-inch hole was drilled to 4,925 feet. While in the process of tripping out of the hole, a monel drill collar, two subs, a junk sub and bit #11 were twisted off and left in the hole. The fish was successfully recovered, and drilling of the 12-1/4-inch hole continued down to 6,006 feet (TD). The hole was circulated and conditioned and geophysical logs were run. An RTTS packer was installed and set and the perforations at 890 and 1,546 feet were again tested to 300 psi and were found to be satisfactory with exception of the perforations at 888 and 890 feet. (The magnitude of the leak as determined by INEL was insignificant in view of its planned operation.) The drill rig was placed in a standby-secured mode, and a drill rig watch was established with two men who assisted INEL in the flow testing, reinjection testing, and other operations required at the location.

After a standby-secured period of eight months, during which time INEL conducted numerous temperature, pressure and flow tests, the drilling operation was resumed and an 8-1/2-inch hole was drilled from 6,006 to 6,548 feet. During the first trip back in the hole, no fill was encountered to TD. A bottom hole core (core no. 6) was cut with an 8-1/2-inch diamond bit from 6,548 to 6,552 feet with no recovery. During this coring operation, out-of-gauge hole was reamed with the diamond bit from 6,460 to 6,548 feet. (The last 8-1/2-inch bit was 1/4 inch out of gauge.) Flow testing and temperature surveys were then run by INEL. Another 8-1/2-inch 3-cone button bit was utilized to ream out the hole from 6,460 to 6,552 and additional hole was drilled to 6,557 feet. The final core (no. 7) was then cut from 6,557 to 6,561 feet with one foot of recovery. The hole was then flow tested and logged by USGS and INEL.

While attempting to install the Baker "KB" production packer, it was discovered that the exposed end of the 13-3/8-inch casing had been damaged and had a minimum opening of 10 inches. A 12-1/4-inch tapered mill was used to successfully roll out the damaged casing end and the packer was installed at a depth of 1,224 feet (GL).

Rig down operations were then completed in preparation for the move to the next hole (RRGE-3).

A summary of the Daily Drilling Reports from mobilization through rig down is presented as Appendix A.

Figure 4 depicts the Drilling and Operations Summary and Figure 5 depicts the current Subsurface Well Status of RRGE-2.

## 2. FORMATION TOPS

The following are the formation tops encountered in RRGE-2.

<u>Formation</u>	<u>Drilled Depth (ft)</u>	<u>Sea Level Depth (ft)</u>
Alluvium	Surface	+4,845
Raft River	150	+4,695
Salt Lake	1,050	+3,795
Contact Metamorphosed Zone	4,664	+ 511
Elba Quartzite	4,752	+ 93
Quartz Monzonite (Intrusive)	4,988	- 143

See Figure 5, Subsurface Well Status, for formation tops as encountered in RRGE-2. (Formation data analysis was provided by INEL.)

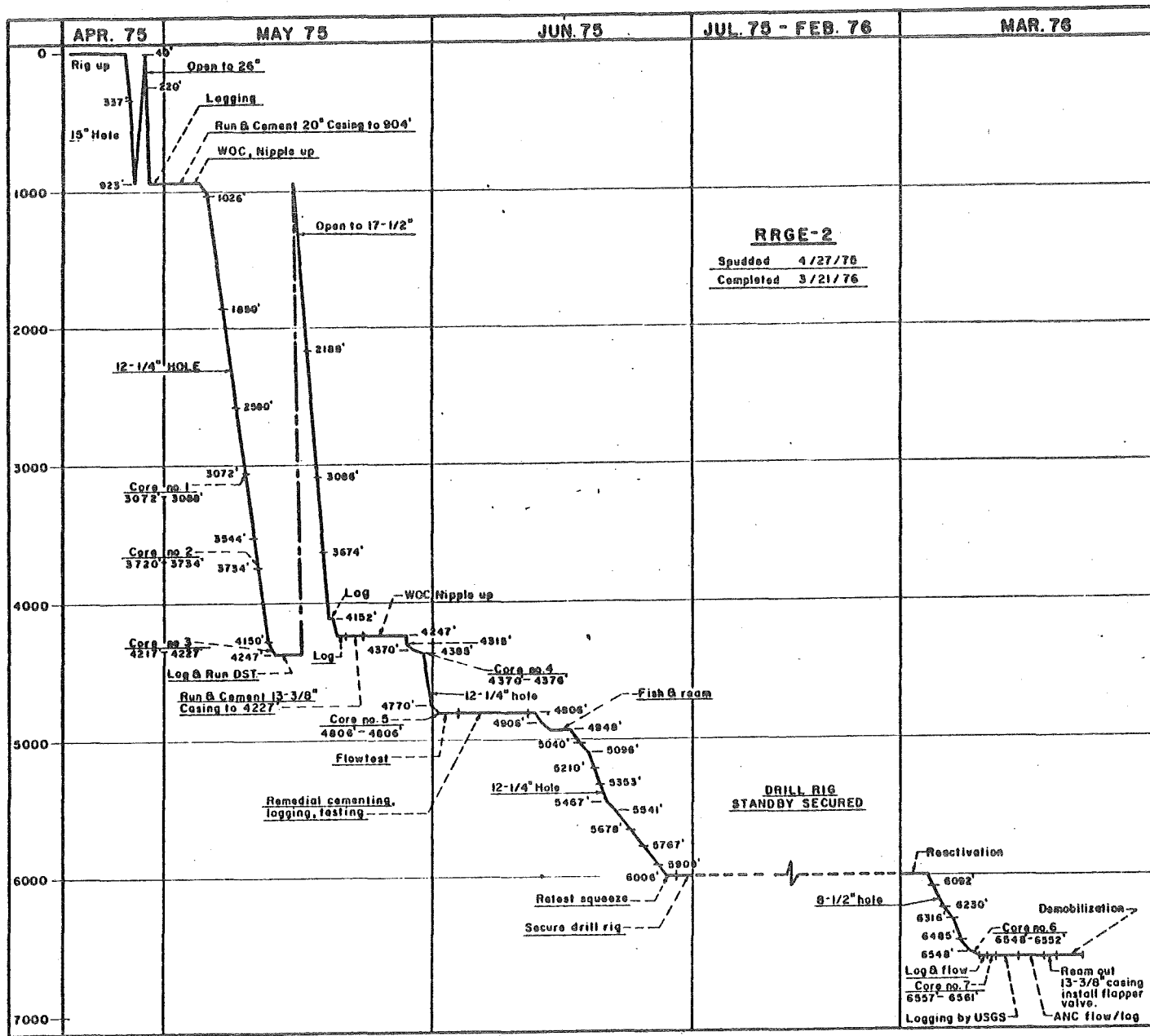


Figure 4. Drilling and Operations Summary.

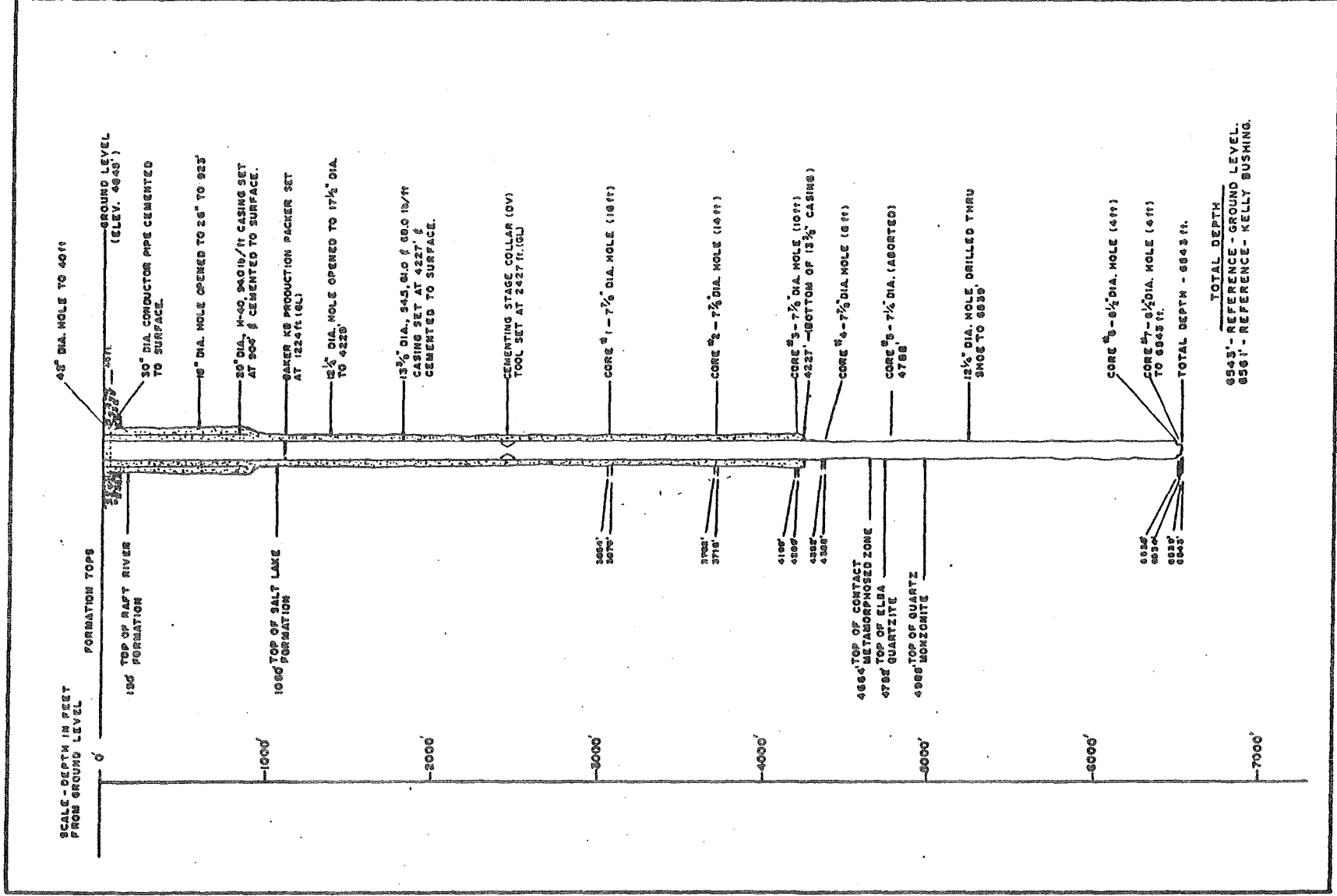


Figure 5. Subsurface Well Status RRGE-2.

### 3. SURFACE & CONTAINMENT EQUIPMENT AND SERVICES

#### 3.1 Containment Equipment - Surface Hole

Containment equipment was not required for the drilling of the 26-inch hole from the bottom of the 30-inch conductor pipe to the 20-inch casing setting depth of 923 feet.

#### 3.2 Containment Equipment - Production Hole

After the 20-inch surface casing was installed and cemented to the surface, it was cut off approximately 2 feet above the floor of the cellar, and a 20-inch slip-on-weld casing head was welded on the casing. Containment equipment was then installed and utilized for the remainder of the drilling operation. The containment equipment (listed in order of installation above the casing head) was installed as follows:

- a. Blind rams - size 20-inch; Shaffer Single Gate blow out preventor was bolted to the casing head.
- b. Flow spool - size 20-inch x 16-inch; bolted to the blind rams. Included an 8-inch flanged outlet for connection to the flow line.
- c. Rucker - Shaffer Double Gate LWS Blowout Preventor (BOP) - size 16-inch; bolted to the flow spool and equipped with 4-1/2 inch drill pipe and blind rams:
- d. Flanged Spool - size 16-inch x 12-inch; installed to provide connection between the double gate BOP and Hydril.
- e. Hydril Type GK Blowout Preventer - size 12 inch
- f. Grant Rotating Drilling Head - size 12 inch, series 900/16, high temperature model, complete with a 6-inch series 600/900 outlet flange and 4-1/2-inch hex kelly bushing. This unit is manufactured especially for use in geothermal drilling operations.

Figure 6 depicts the containment equipment as installed.

#### 3.3 Flow Testing Equipment

All flow testing of the well at various depths (as directed by INEL) was accomplished through the 8-inch flow line connected to the flow spool, size 20 x 16 inch, and installed in the containment stack between the blind rams and the double gate blowout preventor.

#### 3.4 Wellhead

The completion portion of RRGE-2 (accomplished by INEL after the blowout equipment was removed and the drill rig moved from the location) included the removal of the casing head from the 20-inch casing and replacement with a Brewster 20-inch casing head. Installed on this casing head were a Brewster double-flanged expansion spool, size 20 x 12 inch; a Brewster double-flanged gate valve, size 12 inch; and a double-flanged flow spool, size 12 inch, complete with one 8-inch flanged outlet.

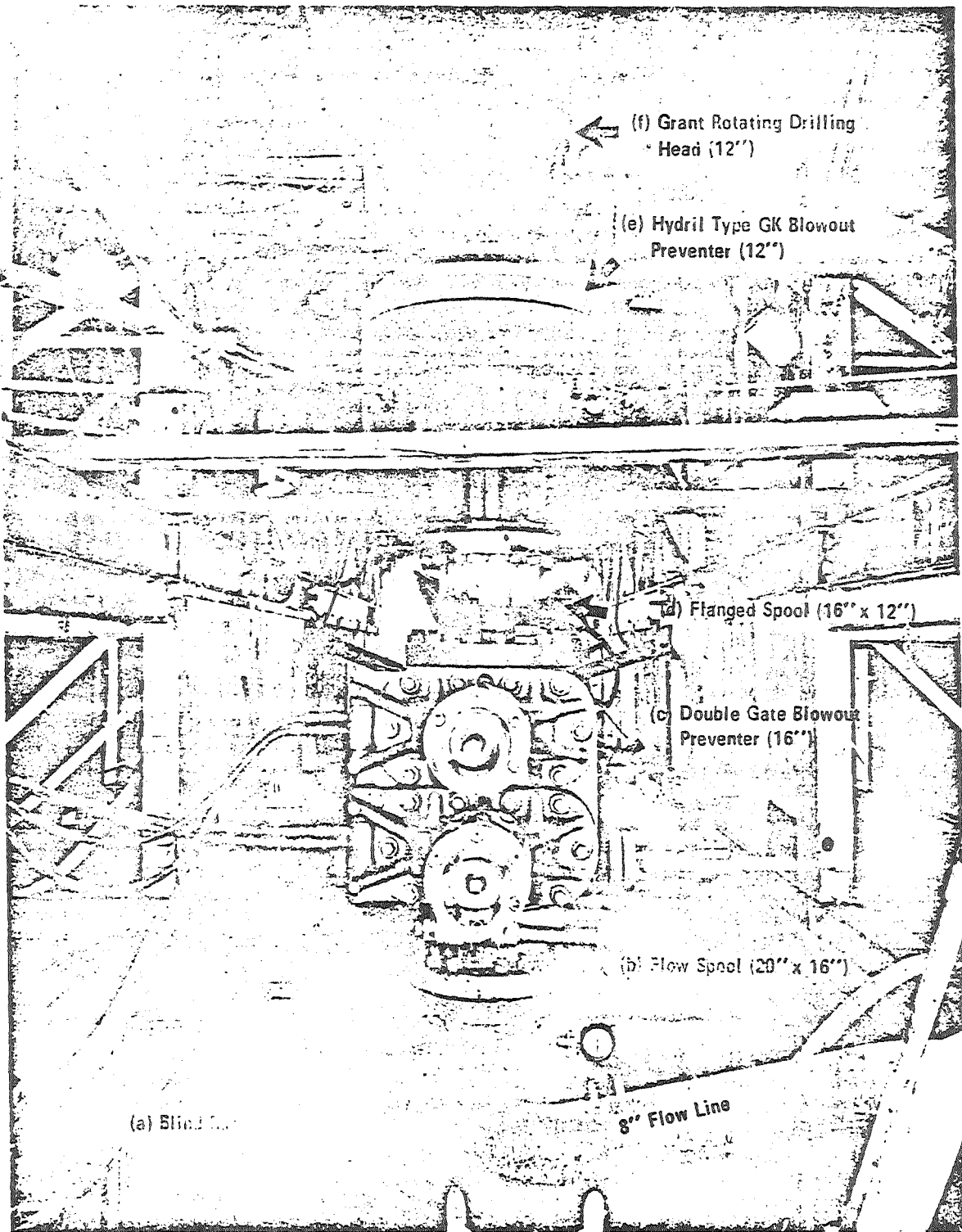


Figure 6. Containment Equipment (installed for the drilling of RRGE-2 from 904 to 6,543 feet).



### 3.5 Mud Logging Services

A mud logging service monitored drilling fluid and cutting returns from 904 feet (GL) (bottom of the 20-inch surface casing) to a depth of 4,988 feet (GL). This service monitored fluid temperatures (in and out), hydrogen sulfide and hydrocarbons. Lithologic characteristics were also determined by analyzing the drill cuttings at regular intervals.

### 3.6 Drilling Recorder

A Geograph drilling recorder was used on the drill rig while drilling from the surface to the total depth. This multi-pen recorder continuously indicated depth, penetration rate, bit weight and pump pressure.

## 4. DOWNHOLE EQUIPMENT & SERVICES

### 4.1 Surface Casing

Twenty-three (23) joints of 20-inch, H-40, 94.0 lb/ft., ST&C casing totaling 940.02 feet was landed at 904 feet (GL). A float collar was positioned one joint (39 feet) above the guide shoe and centralizers were positioned on the collar of each joint of casing except joint no. 1 where it was located in the middle. All casing ends were threaded and joined with couplings. A casing crew using power tongs and a recorder for measuring specified torque was used to run this casing. (Refer to Appendix B for the 20-inch Casing Record.)

### 4.2 Production Casing

One hundred-ten (110) joints of 13-3/8-inch, 54.5, 61.0, and 68.0 lb/ft ST&C casing totaling 4,263.42 feet were landed at 4,227 feet (GL). The 13-3/8-inch casing string configuration is listed as follows:

<u>No. Joints</u>	<u>Wall Thick (in)</u>	<u>Weight Lb/Ft.</u>	<u>Grade</u>	<u>Depth (GL)</u>		<u>Remarks</u>
				<u>From</u>	<u>To</u>	
97 thru 110		68.0	K-55	0	513.95	
48 thru 96	.38	54.5	H-40	513.95 -	2426.62	
-	-	-	-	2426.62 -	2429.54	DV Tool
25 thru 47	.43	61.0	K-55	2429.64 -	3328.23	
2 thru 24		68.0	K-55	3328.23 -	4192.91	
-	-	-	-	4192.91 -	4194.91	Float collar
1		68.0	K-55	4194.91 -	4224.28	
-	-	-	-	4224.28 -	4227.00	Guide Shoe

All casing ends were threaded and joined with couplings. A casing crew using the "JAM" (Joint Analyzed Makeup) System was employed to run the 13-3/8-inch casing. Refer to Appendix B for the 13-3/8-inch Casing Record.

### 4.3 Drill Bit Summary

The initial 42-inch conductor hole was drilled to 40 feet with a "rat hole" drill rig, and 30-inch conductor pipe was set and cemented to that depth.

The pilot hole for the surface pipe was drilled with mud from 40 feet to 923 feet with one 15-inch mill tooth retip bit in 19-1/2 rotating hours. The 15-inch hole was then reamed to 26 inches to a depth of 923 feet (in 19-1/2 rotating hours) and 20-inch surface casing was set and cemented to 904 feet (GL). A 17-1/2-inch hole opener (HO) was then used to clean out the casing. A 12-1/4-inch hole was drilled for the production casing with mud from 904 to 4,247 feet in 95 rotating hours with six 12-1/4-inch mill tooth bits. During this interval, three cores were taken using two Christensen CDP Type MC-20, 7-7/8-inch diamond bits. (Core no. 1 and 2 were taken with the same bit while core no. 3 was taken with a new bit.) The 12-1/4-inch hole was then opened to 17-1/2-inches from 920 to 4,247 feet in 86-3/4 rotating hours using three Grant hole openers.

The lower portion of the hole included a 12-1/4-inch hole drilled with water from 4,227 to 5,988 feet (TD-GL) in 248-1/4 rotating hours using thirteen 12-1/4-inch bits averaging 195 feet per bit. During this interval, two cores were taken: the first, core no. 4, a rerun of the core bit for core run no. 3 and the second, core no. 5, using a Christensen CDP Type MC-20, 7-1/4-inch diamond bit. The drilling activity was then placed on standby secured at a depth of 6,006 feet.

With the reactivation of the drilling operation, an 8-1/2-inch hole was drilled with water from 6,006 to 6,548 feet in 78-3/4 rotating hours using two 3-cone, button type J77 bits. Core no. 6 was then taken from 6,548 to 6,552 feet utilizing a Christensen CDP Type MC-23, 8-1/2-inch diamond bit. The last drill bit, a 3-cone, button bit, was utilized to ream the hole from 6,460 to 6,552 feet and drill additional hole to 6,557 feet. The last core (no. 7) was taken with a Christensen CDP MC-20, 8-1/2-inch diamond bit from 6,557 to 6,561 feet.

While attempting to install the production packer, it was discovered that the 13-3/8-inch casing was not full gauge at the very top. A 12-1/4-inch tapered mill was then used to roll out the top of the 13-3/8-inch casing (from a minimum opening of 10 inches to 12-1/4-inches diameter) to permit the installation of the production packer.

Details of the coring operations are depicted in the following section 4.4 and the complete bit record is presented as Figure 7 on the following page.

Core No.	Bit No.	Make	Type	Hole Depth		Feetage	Rotating Penetration		Drilling Operation		Pump Operation		Drilling Fluid		Remarks		
				In	Out		Hours	(Ft/hr)	Hr. (1000 lbs)	RPM	Pressure	SPM	Wt.	Vls.		W.L.	
	1	Smith	DSJ, Hilltooth (re-tip)	15"	40	920	880	19.50	45.13	10	60	850	-	9.3	48	-	Opened 15" hole Cleaned out cement
		Security	Hole Opener	26"	40	920	880	19.50	45.13	-	-	-	-	-	-	-	
	No #1	Grant	Hole Opener w/#2 bit	17 1/2"	460	920	460	12.50	36.80	-	-	-	-	-	-	-	
	2	Smith	DTJ, Hilltooth	12 1/4"	920	1,676	756	15.75	48.00	5/10	85	1,450	62	8.9	38	10.4	
	3	Smith	DGHJ, Hilltooth	12 1/4"	1,676	2,488	812	16.25	49.96	5/10	85	1,500	62	9.1	44	10.6	
	4	Smith	DGHJ, Hilltooth	12 1/4"	2,488	3,072	584	20.75	28.14	5/10	85	1,500	65	9.1	33	9.6	
	1	Christensen	CDP, Type HC-20	7 7/8"	3,072	3,088	16	1.00	16.00	12	28	550	30	9.0	26	10.8	Recovered 16'
	5	Smith	DGHJ, Hilltooth	12 1/4"	3,072	3,720	648	20.25	32.00	5/10	85	1,500	65	9.1	36	9.8	Recovered core hole 3072'-3088'
	2(RR#1)	Christensen	CDP, Type HC-20	7 7/8"	3,720	3,734	14	1.00	14.00	12	28	700	28	9.2	35	9.8	Recovered 14'
	6	Hughes	OMVJ, Hilltooth	12 1/4"	3,720	4,217	497	20.75	23.95	5/10	85	1,500	65	9.1	34	8.8	Recovered core hole 3720'-3734'
	3	Christensen	CDP, Type HC-20	7 7/8"	4,217	4,227	10	1.0	10.00	12	28	600	30	9.0	28	10.4	Recovered 10'
	5R	Smith	DGHJ, Hilltooth	12 1/4"	4,217	4,247	30	1.25	24.00	12	85	1,500	65	9.1	34	8.6	Recovered core hole 4217'-4227'
	No #1	Grant	Hole opener, Hilltooth	17 1/2"	920	2,282	1,362	23.25	58.50	10	85	300	65	8.9	36	10.0	Opened 12 1/4" hole
	No #2	Grant	Hole opener, Retip	17 1/2"	2,282	3,506	1,224	32.00	38.25	10	85	300	65	9.0	36	8.1	Opened 12 1/4" hole
	No #3	Grant	Hole opener, Soft Hilltooth	17 1/2"	3,506	4,152	646	26.50	24.38	10	85	300	65	9.2	37	8.6	Opened 12 1/4" hole
	No #2R	Grant	Hole opener, Retip	17 1/2"	4,152	4,247	95	5.00	19.00	10	85	300	65	9.1	34	8.6	Opened 12 1/4" hole
	7	Hughes	OMVJ, Hilltooth	12 1/4"	4,247	4,370	123	6.75	18.22	20	80	1,500	54	Water	-no mud	Drilled out cement, DV tool, shoe and sand	
	4(RR#3)	Christensen	CDP, Type HC-20	7 7/8"	4,370	4,376	6	1.00	6.00	12	36	650	32	Water	-no mud	Recovered 6'	
	8	Smith	F4, Button	12 1/4"	4,376	4,806	430	27.75	15.50	-	-	-	-	-	-	Recovered OG hole 4335'-4370', core hole 4370' - 4376'	
	5	Christensen	CDP, HC-20	7 1/4"	4,806	4,806	0	2.00	N/A	15	36	800	30	Water	-no mud	Barrel plugged - no recovery	
	9	Hughes	OMCJ, Hilltooth	12 1/4"	4,806	4,807	1	1.00	N/A	15	75	600	-	Water	-no mud	Drilled out cement, etc. 880' - 4806'	
	10	Hughes	OMCJ, Hilltooth	12 1/4"	4,807	4,807	0	1.00	N/A	5	75	600	-	Water	-no mud	Reamed hole 7'	
	11	Smith	F4 Button	12 1/4"	4,807	4,925	118	18.50	6.38	25	50	1,400	64	Water	-no mud	Reamed 4405'-4530' and 4631'-4925'	
	12	Hughes	OMCJ Hilltooth	12 1/4"	4,925	4,925	0	8.75	N/A	2	75	500	64	Water	-no mud	Reamed 4832'-4925'	
	13	Smith	9JS Button	12 1/4"	4,925	4,925	0	9.00	N/A	-	-	-	-	Water	-no mud		
	14	Smith	9JS Button	12 1/4"	4,925	5,042	117	20.00	5.85	35	45	1,400	64	Water	-no mud		
	15	Smith	9JS Button	12 1/4"	5,042	5,151	109	25.00	4.36	35	45	1,400	64	Water	-no mud		
	16	Smith	9JS Button	12 1/4"	5,151	5,353	202	28.00	7.21	40	45	1,450	65	Water	-no mud		
	17	Smith	9JS Button	12 1/4"	5,353	5,541	188	32.00	5.80	40	45	1,450	65	Water	-no mud		
	18	Hughes	RG7XJ Button	12 1/4"	5,541	5,767	226	34.75	6.50	40	45	1,400	60	Water	-no mud		
	19	Hughes	J-88, Button	8 1/2"	5,767	6,006	239	35.75	6.68	40	45	1,400	60	Water	-no mud	Reamed 5747'-5767'	
	20	Hughes	J-77, Button	8 1/2"	6,006	6,262	256	38.25	6.87	40	35	1,250	50	Water	-no mud		
	21	Hughes	J-77, Button	8 1/2"	6,262	6,548	286	40.50	7.06	40	35	1,400	60	Water	-no mud		
	6	Christensen	CDP, HC-23	8 1/2"	6,548	6,552	4	3.0	1.33	30	28	1,000	38	Water	-no mud	No recovery	
	22	Hughes	J-88, Button	8 1/2"	6,460	6,557	97	5.75	N/A	35	40	1,400	60	Water	-no mud	Reamed 6460'-6552'	
	7	Christensen	CDP, HC-20	8 1/2"	6,557	6,561	4	5.25	0.76	25	40	1,400	64	Water	-no mud	Recovered 1'	
	23		Tapered Mill	12 1/4"	-	-	-	-	-	-	-	-	-	-	-	Milled out top of casing	

Figure 7. Drill Bit Record.

#### 4.4 Coring

Seven cores were cut using a 6-3/4-inch by 4 inch core barrel. The first five cores were cut with the 60 foot core barrel while the last two were cut with a 30 foot core barrel. Two diamond bits, size 8-1/2-inch, two, size 7-7/8-inch, and one, size 7-1/4-inch were used to take the seven cores as follows:

#### CORING OPERATIONS RRGE-2

Core Run No.	Core Bit No.	Bit Size	Drilled Interval (KB)		Core Recovery		Drilling Fluid		
			From	To	(Ft)	%	Wt.	Vis.	W.L.
1	1	7-7/8"	3072	- 3088	16	100	Mud	- 9.0, 36,	10.0
2	1	7-7/8"	3720	- 3734	14	100	Mud	- 2.9, 35,	9.0
3	2	7-7/8"	4217	- 4227	10	100	Mud	- 9.0, 28,	10.4
4	2	7-7/8"	4370	- 4376	6	100	Water		
5	3	7-1/4"	4806	- 4806	0	0	Water		
6	4	8-1/2"	6548	- 6552	0	0	Water		
7	5	8-1/2"	6557	- 6561	1	25	Water		

Upon completion of core runs no. 6 and 7, the diamond bits (no. 4 and 5) were returned to the vendor to be held for a subsequent use on the Idaho R&D Project.

#### 4.5 Directional Control

A Sperry-Sun single-shot magnetic survey tool with a 0° to 6° range compass unit and thermal heat shield was used throughout the drilling operation down to 6,006 feet. Surveys of the hole deviation were not taken in the hole past 6,006 feet. A summary of the deviations recorded has been tabulated and is displayed as Figure 8, Drilling Deviation Summary, and Figure 9, Drilling Deviation Plot.

#### 4.6 Drilling Fluid Summary

A fresh water-based gel mud was used to drill and ream the surface hole to 923 feet and the production hole down to 4,247 feet. Mud weight was maintained at approximately 9.1 lbs. per gallon and viscosity at 35 sec/1000 cc. Plastic viscosity averaged 9.8 centipoises and sand content was maintained between 1 and 2 percent of total volume.

Fresh water without additives was used for all drilling and coring operations below 4,247 feet.

#### 4.7 Samples

Three sets of samples of drill cuttings were taken approximately every 10 feet by the mud logging representative between 923 feet and 4,247 feet. Below 4,247 feet two sets of drill cuttings were taken by the drill crew. Samples were collected in sample sacks and were delivered to INEL.

(K.B.) Measured Depth	Course Length	Drift Angle	Vertical Depth	True Vertical Depth	Course Deviation	Course Direction	Course Coordinates				Total Coordinates			
							North	South	East	West	North	South	East	West
1,047	127	0°40'	126.99	1,046.99	1.477	N41°W	1.114	-	-	0.9689	1.114	-	-	0.9689
1,171	124	0°30'	123.99	1,170.98	1.082	N18°W	1.029	-	-	0.334	2.143	-	-	1.3079
1,334	163	0°30'	162.99	1,333.97	1.422	N23°W	1.308	-	-	0.5556	3.451	-	-	1.8565
1,505	171	0°22'	170.99	1,504.96	1.094	S62°W	-	0.5136	-	0.9659	2.9374	-	-	2.8243
1,619	114	0°05'	113.99	1,618.95	0.1658	N58°W	2.878	-	-	0.1406	3.0252	-	-	2.9650
1,775	156	0°40'	155.98	1,774.93	1.815	S63°E	-	0.8239	1.617	-	2.2013	-	-	1.3480
1,914	139	1°10'	138.97	1,913.90	2.830	S68°E	-	1.060	2.624	-	1.413	-	1.276	-
2,039	125	1°00'	124.98	2,038.88	2.181	S7°E	-	2.164	0.2657	-	-	0.751	1.5417	-
2,157	118	1°25'	117.96	2,156.84	2.918	S50°E	-	1.875	2.235	-	-	2.626	3.7767	-
2,278	121	1°22'	120.96	2,277.80	2.886	S43°E	-	2.110	1.968	-	-	4.736	5.7635	-
2,403	125	1°20'	124.96	2,402.76	2.909	S37°E	-	2.323	1.750	-	-	7.059	7.5135	-
2,558	155	1°35'	154.94	2,557.70	4.284	S38°E	-	3.375	2.637	-	-	10.434	10.150	-
2,682	124	2°15'	123.90	2,681.60	4.872	S38°E	-	3.839	2.999	-	-	14.273	13.149	-
2,745	63	2°00'	62.96	2,744.56	2.200	S38°E	-	1.733	1.354	-	-	16.006	14.503	-
2,806	61	1°45'	60.97	2,805.58	1.863	S18°E	-	1.771	0.5756	-	-	17.777	15.078	-
2,963	157	2°15'	156.87	2,962.40	6.160	S1°E	-	6.159	0.1075	-	-	23.936	15.186	-
3,118	155	2°28'	154.85	3,117.25	6.677	South	-	6.677	-	-	-	30.613	15.186	-
3,241	123	2°28'	122.88	3,240.13	5.298	S24°W	-	4.839	-	2.154	-	35.452	13.032	-
3,366	125	3°07'	124.81	3,364.94	6.806	S29°W	-	5.952	-	3.299	-	41.404	9.733	-
3,490	124	2°40'	123.86	3,488.80	5.775	S28°W	-	5.099	-	2.711	-	46.503	7.022	-
3,613	123	3°25'	122.78	3,611.58	7.343	S41°W	-	5.541	-	4.817	-	52.044	2.205	-
3,736	123	3°15'	122.80	3,734.38	6.984	S45°W	-	4.938	-	4.938	-	56.982	-	2.733
3,829	93	3°45'	92.80	3,827.18	6.095	S39°W	-	4.736	-	3.835	-	61.718	-	6.568
3,952	123	3°00'	122.83	3,950.01	6.446	S41°W	-	4.864	-	4.228	-	66.582	-	10.796
4,076	124	3°50'	123.72	4,073.73	8.308	S48°W	-	5.559	-	6.174	-	72.141	-	16.970
4,170	94	3°30'	93.82	4,167.55	5.749	S49°W	-	3.771	-	4.338	-	75.912	-	21.308
4,330	160	2°47'	159.81	4,327.36	7.769	S55°W	-	4.456	-	6.36	-	80.368	-	27.672
4,424	94	2°40'	93.90	4,421.26	4.373	S54°W	-	2.570	-	3.538	-	82.938	-	31.210
4,640	216	2°30'	215.79	4,637.05	9.422	S50°W	-	6.056	-	7.218	-	88.994	-	38.428
4,772	132	1°25'	131.96	4,769.01	3.263	S82°W	-	0.454	-	3.231	-	89.448	-	41.659
4,797	25	1°35'	24.99	4,794.00	0.691	S80°W	-	0.120	-	0.681	-	89.568	-	42.340
4,954	157	1°25'	156.95	4,950.95	3.882	N59°W	1.999	-	-	3.328	-	87.569	-	45.667
5,100	146	1°45'	145.93	5,096.88	4.459	N56°W	2.493	-	-	3.696	-	85.076	-	49.363
5,250	150	1°37'	149.94	5,246.82	4.232	N65°W	1.789	-	-	3.835	-	83.287	-	53.198
5,450	200	1°5'	199.96	5,446.78	3.781	N85°W	0.330	-	-	3.767	-	82.957	-	56.965
5,639	189	0°20'	189.00	5,635.78	0.000	S29°W	-	0.000	-	0.000	-	82.957	-	56.965
5,828	189	1°12'	188.96	5,824.74	3.958	S50°W	-	2.544	-	3.032	-	85.501	-	59.997
6,006	178	1°12'	177.96	6,002.70	3.728	S50°W	-	2.396	-	2.856	-	87.897	-	62.853

Figure 8. Drilling Deviation Summary.

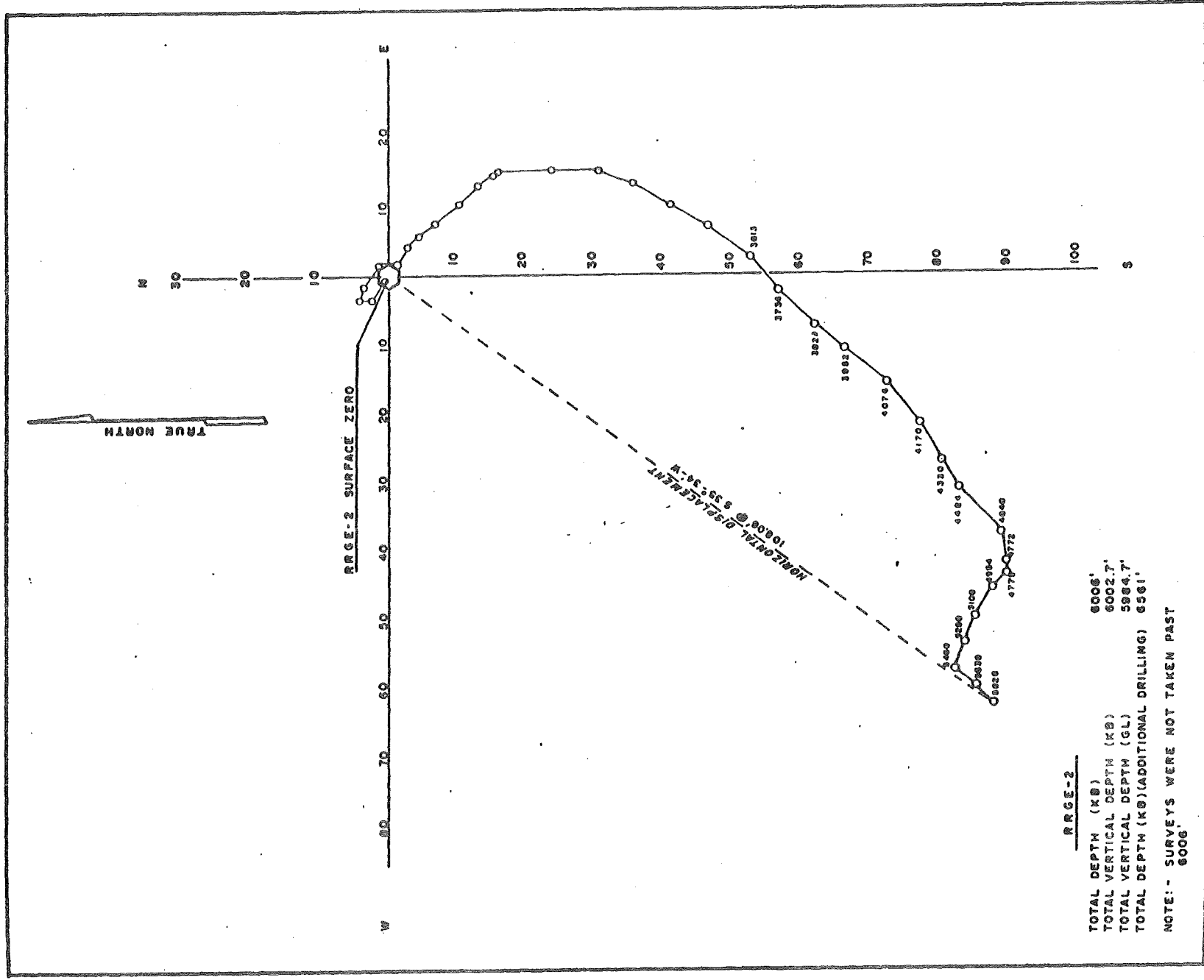


Figure 9. Drilling Deviation Plot.

#### 4.8 Logging Program

Various logs were run in the RRG-2 well to determine the condition of the hole at different stages of the drilling operations. A listing of the logs that were run and the logging interval are displayed as follows:

Date	Type Log	Logging Unit	Logged Interval	
			From	To
04-30-75	Temperature Caliper	Birdwell	30	899
		Birdwell	15	878
05-01-75	Cement Bond Log	McCullough	(Did not Work)	
05-12-75	Borehole compensated sonic Temperature	Schlumberger	870	4,228
		Schlumberger	780	4,228
05-13-75	Simultaneous compensated neutron-formation density	Schlumberger	870	4,227
05-19-75	Four-arm high resolution continuous dipmeter	Schlumberger	926	4,138
05-21-75	Caliper Three-dimensional Velocity	Birdwell	850	4,224
		Birdwell	30	1,300
06-02-75	Acoustic Cement bond Log-signature	Dresser-Atlas	0	4,200
06-03-75	Acoustic Cement bond Log-signature	Dresser-Atlas	0	4,200
06-05-75 thru 06-08-75	Acoustic cement bond log-8 runs	Dresser-Atlas	850	1,550
06-12-75	Acoustic cement bond log	Dresser-Atlas	0	1,532
06-27-75	Simultaneous compensated neutron- formation density Temperature Dual induction-Laterolog w/linear correlation log Borehole compensated sonic	Schlumberger	4,220	6,003
		Schlumberger	4,220	6,004
		Schlumberger	4,215	5,998
		Schlumberger	4,219	5,997

In addition to the above-listed logs, other logs were run in the hole utilizing the INEL or USGS logging truck. All records for the additional logs were maintained by INEL.

#### 4.9 Cementing

##### Surface Casing

The 904 feet of 20-inch, 94.0 lb/ft casing was cemented with 326 barrels (1,090 sacks) of 50/50 Pozmix with 60% (by weight) silica flour and 3% (by weight) calcium chloride (CaCl<sub>2</sub>). Twenty barrels of water were pumped ahead, the plug was dropped, and cementing started with the first 200 barrels containing inert coloring agent. With 185 barrels displaced, the cementing head was forced off of the 13-3/8-inch casing by pumping pressure. The head was replaced, and the casing pressured up to 1,200 psi with no movement of the cement. The pressure was released and the casing pulled on with movement of two inches. The casing was then pressured up to 600 psi and the cement would not move. The pressure was released and the top of cement was tagged with tubing at 216 feet on the outside of the casing. The final 216 feet was cemented down the annulus through 1.9 inch tubing with 286 sacks of the same mix as used in the original cementing operation (approximately 50 barrels).

### Production Casing

The 4,227 feet of 13-3/8-inch, 54.5, 61.0, and 68.0 lb/ft casing was cemented in two primary stages as follows:

STAGE #1 - 1,603 sacks of 50/50 Pozmix with the following composition by weight: 35% silica flour; .6% of HR-12; .75% of CFR-2; and .25% Diacel LWL. Total yield was 334 barrels of 14.28 pounds per gallon slurry. Dropped DV plug and displaced with 20 barrels of water ahead and 631 barrels of mud. Opened DV tool, circulated hole and got returns of colored water and cement at the surface.

STAGE #2 - 1604 sacks of 50/50 Pozmix with the following composition by weight: 35% silica flour; .4% of HR-12; .75% of CFR-2; and .25% of Diacel LWL. Total yield was 523 barrels of 14.28 pounds per gallon slurry. Cement was preceded by 10 barrels of colored water ahead of 23 barrels of mud. Dropped DV plug and displaced cement with 381 barrels of water. No returns to the surface. A cement bond log was run which indicated the cement top at 1,550 feet (GL), necessitating remedial cementing.

### Remedial Cementing (squeeze)

A total of nine separate squeezes, alternating with perforation of the casing at prescribed intervals or depths, were utilized in providing a remedial cementing operation of the 13-3/8-inch casing between the depths of 850 and 1,550 feet (GL). A table, Figure 10, Remedial Cementing Operation, found on the next page outlines each of the squeezes as performed.



50/50 Pozmix	CEMENT SQUEEZE									Totals	
	6/4 No. 1	6/5 No. 2	6/6 No. 3	6/6 No. 4	6/6 No. 5	6/7 No. 6	6/7 No. 7	6/8 No. 8	6/8 No. 9		
<b>CEMENT COMPOSITION</b>											
<u>Lead-in Slurry</u> Sacks of Cement	<u>By Weight</u>	100	100	100	-	150	-	100	100	50	700
Silica flour	35%	x	x	x	-	x	-	x	x	x	
HR-12	.4%	x	x	x	-	x	-	x	x	x	
CFR-2	.75%	x	x	x	-	x	-	x	x	x	
Diacel LWL	.25%	x	x	x	-	x	-	x	x	x	
CaCl <sub>2</sub>	4%	-	x	x	-	x	-	x	x	x	
<u>Tail-in Slurry</u> Sacks of cement		100	100	100	50	50	100	100	100	50	750
Silica flour	35%	x	x	x	x	x	x	x	x	x	
Diacel LWL	.25%	x	-	-	-	-	-	-	-	-	
CaCl <sub>2</sub>	3%	x	x	x	x	x	x	x	x	x	
<b>TOTAL SACKS</b>		200	200	200	50	200	100	200	200	100	1,450
Barrels of 15.2 lb./gal. Slurry		54	54	54	14	54	27	54	54	27	392
<b>PERFORATIONS</b>											
	<u>Ground Level</u>										
Perforated Zone:	From	1,546	1,413	1,298	1,298	1,148	1,148	1,046	944	870	
	To	1,548	1,415	1,300	1,300	1,150	1,150	1,048	946	872	
Number or perforations		4	4	4	-	4	-	4	4	4	28
<u>CEMENT TOP PER CBL</u>		1,470	1,354	1,238	1,228	1,132	1,132	1,005	916	852	

NOTE: Silica flour-fine silica sand; HR-12 - cement retarder; CFR-2 - Friction reducer; Diacel LWL - Water loss agent; CaCl<sub>2</sub> - accelator.

Figure 10. Remedial Cementing Operation.

COMPLETION REPORT

RRGE - 2, 1976 [100-10055]

## Appendix A

### DAILY DRILLING REPORTS

## DAILY DRILLING REPORTS - RRGE-2<sup>1</sup>

- April 19, 1975 Rigged down and loaded equipment with 3 crews (16 men) - 9 hours. Used 80-ton crane and 4 trucks. Assisted casing inspectors making inspection of 20-inch and 13-3/8-inch casing for RRGE-2. Trucks began moving rig and equipment to RRGE-2. Spread 20 sacks of gel on new location.
- April 20, 1975 Moved and rigged up with 3 crews (17 men) - 10 hours. Set subbases and mud pits. Removed equipment from sub-base. Repaired mud pits. Removed and repaired pump engines. Installed new boom line on crane. One crew worked 3 hours over.
- April 21, 1975 Moved and rigged up with 3 crews (17 men) - 10 hours. Levelled subbase and set draw works. Set derrick on floor and raised A-frame.
- April 22, 1975 Rigged up with 3 crews (17 men) - 9 hours. Installed drilling line and raised derrick. Finished moving equipment.
- April 23, 1975 Rigged up with 3 crews (16 men) - 8 hours. Assisted casing inspectors.
- April 24, 1975 Moved 6-5/8-inch drill pipe and 13-3/8-inch casing from RRGE-1 to RRGE-2 with 1 crew. Rigged up with 2 crews (1 crew worked 10 hours, 2 crews worked 8 hours). Fabricated flow line. Day shift operation.
- April 25, 1975 Installed water line from well to rig tank with 1 crew. Rigged up with 2 crews. Picked up drilling assembly. Finished flow line. 8-hour day shift operation. Checked RRGE-1 location every 3 hours.
- April 26, 1975 Waited on water - 8 hours. Miscellaneous rig up and clean up. Mixed spud mud - VIS-41, WT-89. Spudded in at 8:30 p.m. Drilled 15-inch hole from 40 feet to 100 feet with Bit #1, a Smith, 3-cone mill tooth, type DSJ, retip - 3-1/2 hours. 3 crews worked day shift. 1 crew for 8 hours, 1 crew for 9-1/2 hours and 1 crew doubled onto swing shift. Checked RRGE-1 location.
- April 27, 1975 Began rotating shift. Drilled and surveyed - 20-3/4 hours. Repaired no. 2 mud pump - 1 hour. Drilled 15-inch hole from 100 to 923 feet - 13 hours. Survey at 844 feet: 0° 15 minutes. Mud VIS-34-47, WT-9.0-9.4. Circulated for 1 hour, tripped out and laid down drill pipe. Checked RRGE-1.

<sup>1</sup>These reports represent data summarized from the actual Daily Drilling Reports based on the 24-hour period from midnight to midnight each day.

DAILY DRILLING REPORTS - RRGE-2

- April 28, 1975      Repaired break out cathead - 1 hour. Laid down drill collars, stabilizers and float sub. Picked up 26-inch hole opener and float sub and reamed 15-inch hole to 26 inches from 40 feet to 923 feet - 19-1/2 hours. Mud VIS-39-50, WT-9.1-9.3.
- April 29, 1975      Circulated for caliper log - 1 hour. Tripped out. Logged with USGS - 6 hours. Waited on logging truck - 16 hours. Moved casing from pipe yard to RRGE-2. 3 men doubled from graveyard to days. Day crew worked 11 hours.
- April 30, 1975      Waited on logging truck - 3-1/2 hours. Rigged up Birdwell and ran caliper and temperature logs - 4-1/2 hours. Tripped in with 26-inch hole opener and cleaned out 4 feet of fill. Circulated and conditioned hole. Tripped out and laid down hole opener. Rigged up Birdwell and ran caliper log. Ran 20 joints of H-40, 94 pound, 20-inch ST&C casing to 830 feet.
- May 1, 1975        Ran 3 joints of 20-inch casing for a total of 23 joints installed in the hole. Set at 904 feet from ground level with guide shoe on bottom joint and float collar on top of bottom joint. Put Halliburton weld on shoe and float. Ran 22 centralizers, one in the middle of the bottom joint and one on the collar of every joint. Ran one cement basket on top of twelfth joint at 414 feet from ground level. Circulated hole with mud with rig pump from 1:15 a.m. to 2:30 a.m. - pumped 20 barrels of water ahead from 2:43 a.m. to 2:48 a.m. Dropped bottom plug from 2:48 a.m. until 3:17 a.m. Cemented with 1,090 sacks of 50/50 Pozmix with 60% silica flour, 3% calcium chloride. The first 200 sacks had coloring in the cement. Pumped 326 barrels of slurry at 15.1 pounds per gallon from 3:19 a.m. until 4:09 a.m. Dropped top plug from 4:10 a.m. until 4:19 a.m. Displaced with 5 barrels of water and 180 barrels of mud with pump truck for 38 minutes. At 4:58 a.m. cement swedge blew out of casing at 185 barrels displacement at 450 psi. Replacement of swedge took 20 minutes. Pressured up to 1,200 psi. Unable to move cement. Released pressure and pulled on casing with rig from 72,000 pounds to 102,000 pounds. Moved casing 2 inches. Pressured up to 600 psi. Unable to move cement. Ran Amerada bomb and Boise Water Resources temperature survey. Tagged cement with tubing at 216 feet outside casing. Rigged up and ran cement bond log (CBL). Log did not work so released Logging unit.

DAILY DRILLING REPORTS - RRGE-2

May 2, 1975

Waited on bulk cement delivery - 11 hours. Rigged up and cemented stage no. 2 from 216 feet to surface through 1.9-inch tubing in the annulus. Welder cut off 20-inch casing and welded on the wellhead. Installed Cameron BOP. Nipped up flange and 20-inch Hydril. Unloaded truck from NTS.

May 3, 1975

Hooked up BOP controls and flow line. Loaded truck returning to NTS. Dressed 12-1/4-inch stabilizer. Loaded 8-inch drill collars on pipe rack. Pressure tested Cameron BOP to 300 psi. Set in table and floor and picked up tools.

May 4, 1975

Picked up tools and tagged cement at 460 feet. Drilled out plug. Drilled cement out of 20-inch casing with 17-1/2-inch stage hole opener to 920 feet - 11-1/2 hours. Jetted no. 1 shale pit while drilling out cement. Displaced mud and cement in hole with clean water. Measured out and took off hole opener and laid down 9 joints of drill pipe in derrick. Mixed low viscosity, low water loss, low solid mud for drilling 12-1/4-inch hole. 17-1/2-inch hole opener was Grant mill tooth above #2 12-1/4-inch bit.

May 5, 1975

Finished mixing mud and began drilling 12-1/4-inch hole. Drilled from 920 feet to 1,645 feet in 15-1/4 hours with bit #2, a Smith, DTJ type. Serviced rig and repaired union on stand pipe - 1 hour. Jetted pits while surveying. Survey at 1,505 feet: 0° 22 minutes; S 60° W. Mud VIS 33-43, WT 8.6-9.1.

May 6, 1975

Drilled 12-1/4-inch hole from 1,645 feet to 1,676 feet with #2 bit - 1/2 hour. Surveyed and circulated for trip. Deviation at 1,619 feet 0° 5 minutes; N 59° W. Tripped in with #3 bit, 12-1/4-inch Smith type DGHJ. Drilled from 1,676 feet to 2,488 feet - 16-1/4 hours. Serviced rig and jetted shale pit. Survey at 2,403 feet: 1° 20 minutes; S 37° E. Started trip out with bit #3. Average mud VIS 42, WT 9.1.

May 7, 1975

Completed trip for bit #4, a 12-1/4-inch Smith type DGHJ. Tripped in at 2:30 a.m. and circulated to clean bit. Drilled from 2,488 feet to 2,974 feet in 17-1/4 hours, rotating at 85 rpm with 5 to 10,000 pounds of weight on bit. Using pump no. 2 at 1,500 psi and 65 spm. Mud VIS 37, WT 9.1. Day shift changed out air control valve to transmission. Survey at 2,806 feet: 1° 45 minutes; S 18° E.

DAILY DRILLING REPORTS - RRGE-2

May 8, 1975

Drilled from 2,974 feet to 3,072 feet - 3-1/2 hours. Circulated for core no. 1. Tripped out for core barrel. Picked up and serviced core bit no. 1, a 7-7/8-inch CDP type MC-20 with a 6-3/4-inch barrel. Tripped in and cored from 3,072 feet to 3,088 feet in 1 hour. Tripped out with core no. 1. Recovered a full core (16 feet). Core bit no. 1 in good condition. Laid down coring tools and tripped in with bit #5, 12-1/4-inch Smith type DGHJ mill tooth. Reamed 7-7/8-inch core hole to 12-1/4 inches from 3,072 feet to 3,088 feet in 1/4 hour. Drilled 12-1/4-inch hole from 3,088 feet to 3,288 feet in 6 hours. Surveyed at 3,085 feet and 3,241 feet - no results. Survey at 3,118 feet: 2° 28 minutes; S (true). Mud VIS 34-36, WT 8.9 - 9.1.

May 9, 1975

Drilled 12-1/4-inch hole from 3,288 feet to 3,720 feet in 14 hours. Pulled up to survey. Off loaded corrosion test lab, flanges and valves. Ran surveys at 120-foot stations. Circulated to condition hole for core no. 2. Tripped out for coring tools.

May 10, 1975

Picked up and serviced core barrel. Tripped in with core run no. 2 (rerun of bit no. 1), 7-7/8-inch CDP type MC-20, circulated with mud and cored from 3,720 feet to 3,734 feet in 1 hour. Tripped out with core no. 2. Recovered full core (14 feet). Laid down coring tools and serviced rig. Tripped in with bit #6, 12-1/4-inch Hughes type OWVJ mill tooth. Reamed core hole to 3,734 feet and drilled 12-1/4-inch hole to 3,999 feet - 10-3/4 hours. Changed out Kelly saver sub. Deviation at 3,952 feet, 3° 0 minutes; S 41° W. Mud VIS 37-42, WT 9.2 - 9.3.

May 11, 1975

Drilled 12-1/4-inch hole from 3,999 feet to 4,217 feet 10 hours. Lost 400 barrels of mud. Circulated for 3 hours to condition hole for coring. Surveyed and tripped for coring tools. Picked up and serviced core barrel. Core run no. 3 (new core bit), 7-7/8-inch CDP type MC-20. Cored from 4,217 feet to 4,227 feet 1 hour. Recovered full core (10 feet). Laid down coring tools. Tripped in with rerun bit #5, a 12-1/4-inch Smith type DGHJ.

May 12, 1975

Finished trip and filled drill pipe with mud. Mixed mud 3 hours. Reamed core hole and drilled 12-1/4-inch hole from 4,227 feet to 4,247 feet 1-1/4 hours. Circulated with mud to condition hole for logging and sampling. Tripped out for logs. Rigged up to run logs. Logging unit down for repairs 5 hours, 9 hours running logs. Ran sonic, temperature and density-neutron logs. Lost mud at about 5 barrels per hour.

DAILY DRILLING REPORTS - RRGE-2

- May 13, 1975 Finished geophysical logging at 10:30 a.m. Reran caliper log on day shift after repairing tool for 1-1/2 hours on graveyard. Log still did not work. Tripped in to condition hole for drill stem test (DST) and to combat lost circulation. Tripped out and made up DST tool. Tripped in with DST tool and set packer at 4,157 feet. Tool opened at 11:04 p.m. and closed at 11:32 p.m.
- May 14, 1975 Continued drill stem test no. 1, opening and closing the tool twice, until 8:30 a.m. Pulled DST at 11:30 a.m. and tripped out. (DST no. 1 recovered 341 feet of drilling fluid and 859 feet of water.) The DST tools were broken down and loaded out during day shift. Swing shift began mixing mud and lost circulation material. Tested blow out preventer. Okay. Ran Amerada temperature bomb. Maximum temperature reading 245°. Tripped in with rerun bit #5, 12-1/4-inch Smith DGHJ, to circulate and condition hole. Added lost circulation material to mud.
- May 15, 1975 Continued mixing mud and lost circulation material and pumping it down the hole. Pulled out and laid down drill pipe. Stood 5 stands of drill pipe and the drill collars in the derrick. Replaced geolograph line and serviced rig. Picked up 17-1/2-inch Grant mill tooth hole opener, a rerun of H.O. no. 1, and tripped in to 920 feet. Opened 12-1/4-inch hole to 17-1/2 inches from 920 to 1,671 feet - 13-3/4 hours.
- May 16, 1975 Opened 12-1/4-inch hole to 17-1/2 inches from 1,671 feet to 2,282 feet in 9-1/2 hours drilling time. Tripped out for new hole opener. (H.O. no. 2, a 17-1/2-inch Grant retip.) Opened 12-1/4-inch hole to 17-1/2 inches from 2,282 to 2,660 feet in 10-1/2 hours. Average mud VIS 27, WT 8.8 - 9.0.
- May 17, 1975 Opened 12-1/4-inch hole to 17-1/2 inches from 2,660 feet to 3,506 feet - 21-1/2 hours. Part of the day shift crew unloaded drill pipe and casing from RRGE-1. Tripped out at 3,506 feet for a new hole opener.
- May 18, 1975 Completed round trip at 2:30 a.m. Using H.O. no. 3, a 17-1/2-inch Grant soft mill tooth, opened 12-1/4-inch hole to 17-1/2 inches from 3,506 feet to 4,054 feet in 20-1/2 hours. Mud VIS 37, WT 9.0 - 9.2.

DAILY DRILLING REPORTS - RRGE-2

May 19, 1975

Opened 12-1/4-inch hole to 17-1/2 inches from 4,054 feet to 4,152 feet - 6 hours. Circulated and conditioned hole for logs. Tripped out. H.O. no. 3 cones were locked. Rigged up and ran four-arm high resolution continuous dipmeter log. Log did not work. Tripped in with rerun H.O. no. 2 and reamed from 4,113 feet to 4,152 feet and circulated out fill. Opened 12-1/4-inch hole to 17-1/2 inches from 4,152 feet to 4,203 feet - 3 hours. Mud VIS 40, WT 9.2 - 9.3.

May 20, 1975

Opened 12-1/4-inch hole to 17-1/2 inches from 4,203 feet to 4,247 feet - 2 hours. Circulated to condition hole and tripped out for logging. Serviced rig and repaired drawworks transmission. Cleaned and painted subbase. Logging unit delayed by snow in Wells, Nevada. Ran in hole to circulate out 5 feet of fill. Circulated and conditioned hole while waiting on logging unit.

May 21, 1975

Continued to circulate and condition hole for logs. Tripped out and began logging at 11:45 a.m. Ran caliper log to 4,224 feet (GL) and CBL from 904 feet to surface. Strapped drill pipe in the hole, filled the drill pipe with mud, circulated and conditioned hole to run casing. Tripped out laying down 6-5/8-inch drill pipe.

May 22, 1975

Set back drill collars. Rigged up and ran 110 joints of 13-3/8-inch casing to 4,227 feet (GL). Set ball and started circulating for cement job at 4:00 p.m. Circulated with rig mud - 2 hours. Halliburton cemented stage no. 1 with 334 barrels of 14.28 pounds per gallon slurry: 50/50 Pozmix with 35% silica flour, .6% HR-12, .75% CFR-2, .25% LWL following 10 barrels of colored water and 23 barrels of mud flush. Dropped plug displaced with 20 barrels of water ahead and 631 barrels of mud. Bumped plug with 1,150 psi. Cement in place at 7:39 p.m. Checked float and dropped bomb to open DV tool at 2,444.62. Opened DV tool with 900 psi. Started circulating at 8:00 p.m. in preparation to cement stage no. 2. Got returns of colored water and cement at the surface.

May 23, 1975

WOC and conditioned hole - 8 hours. Welded nipple and valve on 20-inch casing. Began cementing stage no. 2 through the DV tool at 9:31 a.m. Pumped 10 barrels of colored water ahead of 23 barrels of mud - flush. Pumped 523 barrels of 14.28 pounds-per-gallon slurry: 50/50 Pozmix with 35% silica flour, .4% HR 12, .75%



DAILY DRILLING REPORTS - RRGE-2

- May 23, 1975  
(Continued) CFR-2, and .25% LWL. Dropped DV plug at 10:27 a.m. and displaced with 381 barrels of water; no returns after 10:32 a.m. CIP at 11:18 a.m. WOC - 12-3/4 hours. Set slips on casing - weight 254,000 pounds. Rigged up and ran Amerada temperature bomb. Painted subbase, cleaned and jetted mud pits.
- May 24, 1975 WOC - 24 hours. Ran Amerada bomb twice. Cleaned and painted rig. Repaired mud line and BOP equipment. Ran Idaho State digital readout temperature probe. Aborted run due to erratic results.
- May 25, 1975 WOC - 8 hours. Cut off casing head and 20-inch casing and lowered 2 feet in the cellar. Rewelded casing head. The 13-3/8-inch slips and pack-off would not fit casing head. Waited on type "AW" Cameron slips for WF casing head and pack-off rings - 16 hours. Changed out pipe rams on 16-inch BOP. Continued cleaning and painting rig. Repaired no. 2 mud pump.
- May 26, 1975 Waited on slips and pack-off rings - 14 hours. Set 13-3/8-inch slips in casing head and tightened pack-off ring. Cut off 13-3/8-inch casing and broke out cementing head. Stripped out 20-inch BOP. Prepared to install new BOP.
- May 27, 1975 Picked up 20-inch single gate BOP, 16-inch double gate BOP, and 12-inch Hydril. Nippled up BOP and set in rotating head. Pressure tested BOP and 13-3/8-inch casing to 300 psi. Laid down 6-5/8-inch Kelly and picked up 4-1/2-inch Kelly. Loaded casing tools, BOP, and Hydril on trucks. Made up tools and measured in on 4-1/2-inch drill pipe. Tagged cement at 2,418 feet. Broke circulation and drilled out cement and DV plug to 2,453 feet with bit #7, a 12-1/4-inch Hughes type OWVJ mill tooth.
- May 28, 1975 Drilled out DV collar and pressure tested 13-3/8-inch casing to 300 psi. Tagged cement of bottom plug at 4,188 feet. Drilled out cement and shoe to 4,247 feet. Hit sand at 4:30 a.m. and drilled 12-1/4-inch hole from 4,247 feet to 4,370 feet - 6-3/4 hours. Well started flowing at 4,350 feet. Circulated for 3-1/2 hours checking water flow and temperature. Tripped out with bit #7. Waited on core engineer - 6-1/2 hours. Well shut in pressure 130 psi. Pumped 400 barrels of cold water into the hole at 30 spm and 400 psi. Checked BOP and Hydril. Tightened drawworks brakes. Slipped and cut off 88 feet of drilling line.

DAILY DRILLING REPORTS - RRGE-2

May 29, 1975

Waited on core engineer - 3 hours. Picked up and serviced core barrel and tripped in with core run no. 4 (rerun bit no. 2), a 7-7/8-inch CDP type MC-20. Circulated and washed out 2 feet of fill to 4,370 feet. Cored from 4,370 feet to 4,376 feet in 1 hour and tripped out with core no. 4. Recovered 18 inches. Replaced stripper rubbers on Grant head and welded adapter for Amerada bomb sheave to 4-1/2-inch drill pipe. Ran Amerada temperature bomb to 4,300 feet and flow tested well. Flow rate 198 gpm, temperature 206° F. Filled mud pits with cold water and pumped 150 barrels in the hole. Rigged up and reran temperature bomb.

May 30, 1975

Ran Amerada bomb - 1-1/2 hours. Pumped cold water down hole. Tripped in with bit #8, a 12-1/4-inch Smith type F4 button bit. Well blew through drill pipe. Circulated to cool the hole. Reamed out-of-gauge 12-1/4-inch hole from 4,335 feet to 4,370 feet in 2-1/2 hours and 7-7/8-inch core hole from 4,370 feet to 4,376 feet in 1 hour. Drilled 12-1/4-inch hole from 4,376 feet to 4,666 feet - 13-1/2 hours. No results on 2 surveys due to hole temperature. Drill pipe float was not working. Water was flashing at shale shaker.

May 31, 1975

Drilled 12-1/4-inch hole from 4,666 feet to 4,806 feet - 10-3/4 hours. No results from survey at 4,680 feet. Jetted mud pits and changed rotating rubber. Circulated to condition hole for coring. Tripped out with bit #8. Drill pipe float not holding. Jetted cellar and prepared to replace drilling spool below BOP.

June 1, 1975

Set out spool and installed T-spool. Nipped up BOP. and welded flow line on 20-inch casing. Serviced core barrel and made up coring tools (core bit no. 3 a 7-1/4-inch CDP type MC-20). Dresser sleeve leaked. Magnafluxed 20-inch casing. Gussets from 30-inch surface casing were cracked. Made repairs with welder. Tripped in to circulate for core. Core barrel was plugged. Began trip out to unplug core barrel when it opened up.

June 2, 1975

Circulated for core run no. 5 (using core bit no. 3) - 1-1/2 hours. Attempted to take core at 4,806 feet. Float would not close. Tripped out with core run no. 5. Stopped during trip to pump cool water downhole. No recovery on core no. 5. Broke down coring tools and rigged up and ran CBL without centralizer. (Tool indicated cement top at 80 feet.)

DAILY DRILLING REPORTS - RRGE-2

June 2, 1975  
(Continued)

Ran Amerada temperature bomb. Flow tested with bomb at 4,792 feet. Flow rate was 550 gpm with bomb at 4,792 feet. Flow rate was 550 gpm and maximum temperature 280°F. Rigged up and ran CBL with tool centralizer. Cement top 1,550 feet. Graveyard shift doubled to days to load out casing, drill pipe, and heaters from RRGE-1. Swing shift loaded a truck with drill pipe and stabilizers for NTS.

June 3, 1975

Finished running cement bond log. Ran water reinjection test from 3:15 a.m. to 6:30 a.m. Increased mud pump speed by 20 strokes every 10 minutes to 100 spm. After 55 minutes, speed was increased to 120 spm and then decreased by 20 strokes every 10-20 minutes. Well pressures increased from 87 psi at zero spm to 235 psi at 120 spm and then decreased to 48 psi at zero spm. Flow tested well for 7 hours while INEL made movies of the steam, the rig, and the location from the ground and from the air. Average flow 550 gpm, maximum flow 632 gpm at 205°F. Injected cold water down the hole at 20 spm. Cleaned up location and repaired mud pits.

June 4, 1975

Waited on bridge plug 2-1/2 hours. Made up E-Z Drill bridge plug to wire line with Baker setting tool. Set bridge plug at 1,561 feet GL (1,579 feet KB). Made up and ran RTTS tool and set at 541 feet (KB). Pressured up on bridge plug to 500 psi for 5 minutes and bled off pressure. Bridge plug was not holding. Tripped out with RTTS tool and tripped in to bridge plug with 12-1/4-inch bit. Set 40,000 pounds on bridge plug. Bridge plug held in place. Tripped out with bit and ran back in to bridge plug with RTTS tool. Set 50,000 pounds on bridge plug. Bridge plug held in place. Pulled up one stand to 1,515 feet and closed RTTS tool. Pressured up to 1,000 psi to test bridge plug. Bridge plug held. Tripped out with RTTS packer and rigged up perforator. Perforated 4 shots between 1,546 feet and 1,548 feet (GL). Tripped in and set RTTS packer at 1,414 feet. Pumped through perforations 2 bpm at 750 psi. No returns to surface. Cemented squeeze #1 with 200 sacks of cement: 100 sacks 50/50 Pozmix with 35% silica flour, .4% HR12, .75% CFR-2 and .25% LWL; 100 sacks 50/50 Pozmix with 35% silica flour, .25% LWL and 3% CaCl<sub>2</sub>. Staged last 3 barrels. Cement in place 11:30 p.m. Unseated and circulated around RTTS packer and reversed out. Left 40 feet of cement inside casing.

DAILY DRILLING REPORTS - RRGE-2

June 8, 1975

Set RTTS packer at 847 feet and pumped 10 barrels of water @ 2 bpm, 400 psi. No returns to surface.

Cemented squeeze #8 with 200 sacks of cement: 100 sacks 50/50 Pozmix (no gel) with 35% silica flour, .4% HR12, .75% CFR-2, .25% LWL and 4% CaCl<sub>2</sub> in mix water; 100 sacks 50/50 Pozmix with 35% silica flour and 3% CaCl<sub>2</sub>. Displaced the 54 barrels of 15.2 pounds slurry with 26 barrels of water, staging last 2 barrels. CIP 4:30 a.m. Packer released and reset at 1,000 psi - 1-1/2 hours. Ran CBL - cement top inside casing 930 feet - outside no results. Ran in with 12-1/4-inch bit (rerun) and polished cement inside casing 930 feet to 942 feet. Ran CBL to 938 feet. Still did not show outside. Tripped in and drilled out cement from 942 feet to 956 feet. Circulated, cleaned, and tripped out for log. Ran CBL - cement top inside at 933 feet and outside at 916 feet. Perforated casing with 2 shots at 870 feet and 2 shots at 872 feet (GL). Set RTTS packer at 753 feet for injection test pumping 20 barrels of water at 1 bpm, 1,000 psi. No returns.

Cemented squeeze #9 with 100 sacks: 50 sacks 50/50 Pozmix (no gel), 35% silica flour, .4% HR12, .75% CFR-2, .25% LWL, with 4% CaCl<sub>2</sub> in mix water; 50 sacks 50/50 Pozmix (no gel), 35% silica flour and 3% calcium chloride. 27 barrels of 15.2 pounds slurry displaced with 29 barrels of water. CIP 10:30 a.m. Released packer and reversed out. No cement.

June 9, 1975

Tripped out and laid down RTTS tool. Ran CBL. Cement top inside casing at 882 feet and outside at 852 feet (GL) (into annulus between 13-3/8-inch and 20-inch casing). Unbolted BOP and raised to check rubber pack-off ring. Worn out. Replaced pack-off rubber and reinstalled BOP equipment. Flanged up steam tank on 8-inch flow line. WOC.

June 10, 1975

WOC 12-1/2 hours. Tripped in with bit #9, 12-1/4-inch Hughes type OWCJ and tagged cement at 880 feet. Pressured up on BOP through drill pipe with 300 psi. Drilled out cement from 880 feet to 890 feet and from 911 feet to 948 feet. Tripped to check drill pipe. Ran in and drilled out cement to 1,105 feet. Pressure tested perforations at 888-890 feet and 962-964 feet with 300 psi.

DAILY DRILLING REPORTS - RRGE-2

June 11, 1975

Pressure tested perforations at 1,066 feet. With bit #9, drilled out cement from 1,105 feet to 1,199 feet. Pressure tested perforations at 1,168 feet. Drilled out cement from 1,199 feet to 1,356 feet. Pressure tested perforations at 1,316 feet to 1,318 feet. Bled off pressure. Drilled out cement from 1,356 feet to 1,480 feet. Tested perforations at 1,431 feet to 1,433 feet. Drilled out cement from 1,480 feet to 1,560 feet, and hit junk at 1,530 feet. Circulated for test and tripped out. Laid down Monel collar and picked up RTTS tool. Ran in and tagged top of cement at 1,562 feet. Set packer at 1,553 feet for first test. Tested perforations at 1,537 feet with 300 psi.

June 12, 1975

Tested perforations - 4-1/2 hours. All held 300 psi except perforations at 962 feet to 964 feet. Pressure dropped from 300 psi to 128 psi in 15 minutes. Tripped out and laid down RTTS tool. Ran CBL - cement top 850 feet. Repaired no. 1 pump and no. 2 engine - 2 hours. Picked up 12-1/4-inch tools (bit #9) and measured in to 1,560 feet (KB). Drilled out cement to bridge plug at 1,579 feet. Drilled out bridge plug to 1,583 feet. Hot water flowing - float would not hold. Chased plug to 4,340 feet. Drilled out E-Z Drill plug to 4,400 feet. Pushed plug to 4,717 feet. Drilled on plug and reamed out-of-gauge hole. Drilled on junk at 4,806 feet.

June 13, 1975

Drilled 12-1/4-inch hole from 4,806 feet to 4,807 feet and tripped out. Tripped in with bit #10, 12-1/4-inch Hughes type OWCJ, and reamed from 4,800 feet to 4,807 feet in 1-1/4 hours. Tripped for new bit. Tripped in to 4,785 feet and reamed out-of-gauge hole 1 hour to 4,807 feet with bit #11, 12-1/4-inch Smith F4 button. Drilled to 4,861 feet in 8-1/2 hours. Survey at 4,772 feet: 1° 25 minutes; S 82° W.

June 14, 1975

Drilled 12-1/4-inch hole 4,861 feet to 4,925 in 10 hours. Closed well for shut-in pressure test - 42 psi. Pumped cold water downhole for trip. Water flowing back through drill string. Stopped trip to pump cold water downhole. Twisted off box of Monel collar and left Monel collar, 2 subs, a junk sub, and bit #11 in the hole. Ran in with 9-5/8-inch overshot and tried to get over fish. Top of fish at 4,893.75 feet (KB). Tripped out and dressed overshot. Laid down overshot. Replaced rubber on rotating head and drilling line. Waited on bigger overshot.

DAILY DRILLING REPORTS - RRG-2

- June 15, 1975 Waited on fishing tools - 7-3/4 hours. Finished slipping drilling line. Jetted cellar and pits. Unloaded fishing tools. Picked up 10-5/8-inch Bowen overshot and tripped in hole. Recovered fish. Laid down fish and overshot. Ran in with bit #12, 12-1/4-inch, Hughes mill tooth type OWCJ, and reamed tight hole 4,405 feet to 4,530 feet. Hole in gauge to 4,681 feet. Reamed to 4,700 feet (total reaming 4-1/2 hours).
- June 16, 1975 Reamed to 4,925 feet in 4-1/4 hours and tripped for new bit. Dressed reamer with new button rollers, pins, and bottom blocks. Made up reamer and bit #13, 12-1/4-inch Hughes X55R button, and ran in to 4,832 feet. Reamed out-of-gauge hole to 4,925 - 9 hours. Tripped for bit. Waited on bit - 1 hour. Dressed reamer with new button rollers. Ran in with reamer and bit #14, 12-1/4-inch Smith 9JS button. Pumped in water to cool hole.
- June 17, 1975 Tripped in to 4,925 feet and drilled 12-1/4-inch hole to 5,002 feet in 10 hours. Circulated for samples - 1/2 hour. Drilled 12-1/4-inch hole to 5,040 feet in 9-1/2 hours.
- June 18, 1975 Drilled 12-1/4-inch hole 5,040 feet to 5,042 feet in 1/2 hour and tripped out for bit. Dumped junk sub and checked reamer. Pumped in water to cool hole. Tripped in with bit #15, 12-1/4-inch Smith 9JS button, and filled the drill pipe. Bit plugged. Tripped out. Drill collars were plugged. Flow tested for 2 hours @ 590 gpm, 104 psi shut-in pressure. Tripped in with bit #15 and drilled from 5,042 feet to 5,070 feet in 8 hours.
- June 19, 1975 Drilled 12-1/4-inch hole from 5,070 feet to 5,151 feet - 17 hours. Tripped for new bit. Checked reamer and added two 8-inch drill collars. Tripped in with bit #16, 12-1/4-inch Smith 9JS button, and reamed from 5,130 feet to 5,151 feet in 1/2 hour.
- June 20, 1975 Drilled 12-1/4-inch hole from 5,151 feet to 5,328 feet in 23-1/2 hours.
- June 21, 1975 Drilled 12-1/4-inch hole from 5,328 feet to 5,353 feet in 4-1/2 hours and tripped for new bit. Jetted pits for flow testing and changed roller in reamer. Flow tested 1-1/2 hours @ 567 gpm, shut-in pressure 82 psi. Pumped cold water downhole and tripped in with bit #17, 12-1/4-inch Smith 9JS button. Drilled from 5,353 feet to 5,423 feet in 11 hours.

DAILY DRILLING REPORTS - RRGE-2

- June 22, 1975 Drilled 12-1/4-inch hole from 5,423 feet to 5,541 feet in 21 hours. Circulated for samples and tripped out.
- June 23, 1975 Finished trip out. Jetted pits for flow test. Flow tested for 1/2 hour at 592 gpm, shut in pressure 88 psi. Ran Amerada temperature bomb. Temperature at 5,200 feet 289°, temperature at 5,541 feet 283°. Pumped cold water downhole and tripped in with bit #18, 12-1/4-inch Hughes RG7XJ button. Reamed from 5,533 feet to 5,541 feet in 1/4 hour. Drilled 12-1/4-inch hole from 5,541 feet to 5,629 feet in 14 hours.
- June 24, 1975 Drilled 12-1/4-inch hole from 5,629 feet to 5,767 feet in 20-1/2 hours. Circulated for samples and tripped out for new bit.
- June 25, 1975 Finished trip. Flow tested for 1/2 hour @ 590 gpm, shut-in pressure 85 psi. Ran Amerada temperature bomb. Cut off 140 feet of drilling line. Dressed reamer and cleaned out junk sub. Made up bit #19, 12-1/4-inch Hughes J-88 button, junk sub and reamer. Ran in to 5,747 feet and filled drill pipe. Reamed from 5,747 feet to 5,767 feet and drilled 12-1/4-inch hole to 5,852 feet in 13 hours.
- June 26, 1975 Drilled 12-1/4-inch hole from 5,852 feet to 6,006 feet in 22-3/4 hours. Circulated to condition hole for logs.
- June 27, 1975 Tripped out with bit #19. Flow tested for 3/4 hour @ 575 gpm. Rigged up and ran geophysical logs for 15-1/4 hours. Ran compensated neutron-formation density, borehole compensated sonic, dual induction-laterolog w/linear correlation log and temperature log. Made up RTTS tool and ran in to 979 feet. Water was flowing out drill pipe. Pumped water down annulus to cool hole. Set RTTS tool at 979 feet and pressure tested perforations from 888 feet to 964 feet with 300 psi on the back side. Held okay.
- June 28, 1975 Set RTTS packer at 1,604 feet and pressured up to 300 psi on the back side to test all perforations from 888 feet to 1,548 feet. Pressure loss 300 psi to 71 psi in one hour. Set packer at 1,509 feet to test perforations from 888 feet to 1,433 feet. Pressure loss to 85 psi in 1/2 hour. Set packer at 1,415 feet to test perforations

DAILY DRILLING REPORTS - RRG-2

June 28, 1975  
(Continued)

from 888 feet to 1,318 feet. Pressure loss to 65 psi in 1/2 hour. Set packer at 1,042 feet to test perforations at 888 feet to 964 feet. Pressure loss to 65 psi in 1/4 hour. Set packer at 979 feet to test same perforations. Pressure loss to 59 psi in 10 minutes. Set packer at 853 feet, above all perforations. Held okay. Ran back in to 979 feet and set packer. Packer would not hold. Pumped cold water to cool hole and tripped out. Repaired RTTS packer and replaced rubbers. Ran in and set packer at 823 feet. Tested packer above perforations. Pressure dropped from 325 psi to 200 psi in 10 minutes. Set tool at 978 feet. Pressure dropped from 300 psi to 95 psi in 1/4 hour. Replaced rotating rubber and pumped water down annulus to cool hole. Set packer at 919 feet to test perforations at 888 feet to 890 feet. Pressure dropped from 300 psi to 250 psi in 10 minutes. Set packer at 979 feet, pressure loss 300 psi to 85 psi in 10 minutes. Well shut-in pressure 84 psi.

June 29, 1975

Pumped cold water downhole and tripped out. Laid down RTTS tools. Made up Monel drill collar, bit and tools, and tripped in for surveys. Surveyed for 6-1/2 hours. Tripped out and laid down drill pipe. Prepared to lay down drill collars.

June 30, 1975

Laid down drill collars. Closed and locked blind rams. Unhooked rented accumulator and hooked up NTS accumulator. Broke down and drained Kelly hose, cleaned up rig floor and snubbed blocks to subbase. Jetted cellar and pits. Drained and serviced pumps. Loaded and secured equipment in the tool house. Set watch on rig.

July 1, 1975

Rig secured. 2 men watching rig.

July 2, 1975  
thru  
July 8, 1975

Drill rig watch, periodically checking RRG-1.

July 9, 1975

Drill rig watch. Closed single gate BOP. Connected gauge and sample catches on 8-inch flow line. Opened BOP for flow test. Flow tested 2:00 p.m. to 6:30 p.m. Flowed 800 gpm at 258°F. Shut in pressure 130 psi. Pinched down flow line valve to produce 50 gpm flow to add water in reserve pit for injection test.

July 10, 1975

Drill rig watch. Flowed well @ approximately 50 gpm 7-1/2 hours. Increased water supply in reserve pit. Flowed well @ 660 gpm - 1-1/2 hours. Maximum temperature 262°F. Injection test started at 9:00 a.m.



DAILY DRILLING REPORTS - RRGE-2

July 10, 1975  
(continued) 9:00 - 11:40 a.m. - injected @ 40 spm @ 9.5 gal./stroke  
11:40 - 12 noon - injected @ 60 spm @ 9.5 gal./stroke  
12:00 - 12:20 p.m. - injected @ 160 spm @ 9.5 gal./stroke  
12:20 - 12:35 p.m. - injected @ 135 spm @ 9.5 gal./stroke  
  
Shut-in pressure before injection - 135 psi; after injection - 107 psi.

July 11, 1975 Drill rig watch. Flowed well 4-1/2 hours.

July 12, 1975  
thru  
July 15, 1975 Drill rig watch, periodically checking RRGE-1.

July 16, 1975 Drill rig watch. Replaced 4-inch vent with 6-inch vent line on top of separator. Installed 2-inch drain line in bottom of separator. Removed butterfly valve and orifice flange from 8-inch flow line to the mud pits and installed in the 8-inch flow line between the well and separator (assisted by Hillco Welders) - 2-1/2 hours. Flowed well 10:30 to 12:00 a.m. @ 180 gpm.

July 17, 1975 Drill rig watch. Flowed well 9-1/2 hours @ 780 gpm. Flow pressure 30 psi, maximum temperature 267°F. Flowed well 5-1/2 hours @ 100 gpm to build volume in reserve pit for injection test.

July 18, 1975  
thru  
July 19, 1975 Drill rig watch. Flowed well continuously @ 100 gpm.

July 20, 1975 Drill rig watch. Flowed well 16 hours @ 100 gpm. Increased flow to 250 gpm at 4:00 p.m. - 8 hours.

July 21, 1975 Drill rig watch. Flowed well @ 250 gpm - 8 hours. Started flow testing at 10:00 a.m.

July 22, 1975  
thru  
August 7, 1975 Drill rig watch. Ran flow tests of RRGE-2 for 17 days. Recorded pressure readings at well head, upstream and downstream from orifice. Also recorded the millivolt readings from the chart recorder attached to a thermocouple. (All calculations and readings from this period of time were given to INEL.)

August 8, 1975 Drill rig watch. Amerada bomb with recorder in hole (left upon completion of flow testing). Well closed in 12:00 to 5:00 p.m. Closed blind rams.

DAILY DRILLING REPORTS - RRGE-2

- August 9, 1975  
thru  
August 19, 1975  
Drill rig Watch. Well shut in. Recorded well head pressure each day at 12:00 noon: 8/9 - 140, 8/10 - 140, 8/11 - 138, 8/12 - 136, 8/13 - 134, 8/14 - 133, 8/15 - 133, 8/16 - 132, 8/17 - 131, 8/18 - 131, 8/19 - 131.
- August 20, 1975  
Drill rig watch. Opened hole at 11:00 a.m. Ran Amarada temperature survey #1 - 282°F. 2 hours. Ran pressure survey for 6-1/2 hours Amarada bomb #2 to 4,800 feet with well flowing @ 200 gpm. Pressure reading downhole - 2,089.7 psi; dropped to 2,057.7 psi at 11:00 p.m. because of opened flowline @ 200 gpm. Ran Amarada pressure survey #3.
- August 21, 1975  
Drill rig watch. Amarada bomb #3 in hole with well closed in at 1:00 a.m. Pulled Amarada bomb #3 and closed in blind rams at 8:30 a.m. Opened 8-inch flow line and flowed well @ 800 gpm from 8:30 a.m. to 10:00 a.m. Closed well at 10:00 a.m.
- August 22, 1975  
thru  
August 25, 1975  
Drill rig watch. Recorded well head pressure each day at 12:00 noon: 8/22 - 142, 8/23 - 136, 8/24 - 134, 8/25 - 133.
- August 26, 1975  
Drill rig watch. Off loaded truck from INEL as follows: Two tower sections, one chain hoist (5-ton manual), one electric chain hoist, two ladders, one box nuts/bolts, two well head flanged spools.
- August 27, 1975  
thru  
September 1, 1975  
Drill rig watch. Recorded well head pressure each day at 12:00 noon: 8/27 - 131, 8/28 - 131, 8/29 - 130, 8/30 - 129, 8/31 - 129, 9/01 - 129
- September 2, 1975  
Drill rig watch. Moved well head platform to RRGE-1 and rigged up with forklift.
- September 3, 1975  
Drill rig watch. Ran 6-inch irrigation pipe from RRGE-2 reserve pit to irrigation ditch and rigged up work-over tower at RRGE-1 location - 8 hours.
- September 4, 1975  
Drill rig watch. Installed electric winch and Christmas tree on RRGE-1 well head with forklift - 8 hours.
- September 5, 1975  
Drill rig watch. Rigged up and ran resistance and single point potential log. Opened blank flange at 9:30 a.m. Pulled log and closed rams at 3:30 p.m. - 8 hours.
- September 6, 1975  
thru  
September 10, 1975  
Drill rig watch. Recorded well head pressure at 12:00 noon each day: 9/6 - 132, 9/7 - 129, 9/8 - 128, 9/9 - 128, 9/10 - 127.
- September 11, 1975  
Drill rig watch. Moved tool house to water well location from RRGE-1 location - 4 hours. Forklift right rear hub was broken.

DAILY DRILLING REPORTS - RRGE-2

- September 12, 1975 Drill rig watch. Rigged up and ran single point potential and resistance log to 6,000 ft. - 8 hours. Performed repairs to log truck winch. Log pressure tool had electrical troubles. Ran pressure and temperature probe. Pressure at 5,200 feet with no flow - 2,298.2 psi - 5-1/2 hours. Flowed well 2-1/2 hours @ 225 gpm. Differential pressure reading 10.5. Well head pressure 137 psi with probe in hole. Checked RRGE-1 recording instruments five times.
- September 13, 1975 Drill rig watch. Temperature and pressure probe in hole at 5,200 feet. Flowed well @ 225 gpm - 12-1/2 hours. Shut in well at 12:25 p.m. with probe in hole for 5 hours. Came out of hole with probe from 5:30 to 7:30 p.m. Well head pressure readings: 12:00 midnight - 142; 8:00 a.m. - 138; 12:00 noon - 135; 3:15 p.m. - 152; 5:00 p.m. - 151.
- Checked RRGE-1 recording instruments five times.
- September 14, 1975 Drill rig watch. Worked on temperature and pressure probe - 1 hour. Moved log truck to RRGE-1, rigged up lubricator and log truck and logged well (temperature and pressure probe) to 1,000 feet - 5-1/2 hours. Ran probe in RRGE-1 to 1,000 feet - 1 hour. Opened RRGE-2 well at 7:00 p.m. and flowed well @ 916 gpm.
- September 15, 1975 Drill rig watch. Flowed RRGE-2 well @ 800 gpm with temperature and pressure probe in RRGE-1 - 16 hours. Installed irrigation pipe and pump at the reserve pit to remove water. Reduced flow rate to 400 gpm at 4:00 p.m. and continued to flow well.
- September 16, 1975 Drill rig watch. Continued to flow RRGE-2 well @ 400 gpm with probe in RRGE-1. Pumped water out of reserve pit. Checked instruments at RRGE-1 several times.
- September 17, 1975 Drill rig watch. Continued to flow RRGE-2 @ 400 gpm. Closed in same on RRGE-2 at 6:00 p.m. Checked instruments at RRGE-1 eight times.
- September 18, 1975 Drill rig watch. Checked instruments at RRGE-1 eight times.
- September 19, 1975 Drill rig watch. Temperature and pressure probe lowered in RRGE-1 from 1,000 to 3,700 feet at 3:00 p.m. Pulled probe at 10:30 p.m. to check for malfunction - 1-1/2 hours.
- September 20, 1975 Drill rig watch. Pulled probe - 1 hour. Installed temperature and pressure probe to 1,000 feet at 10:50 a.m. Pulled because of malfunction at 1:00 p.m. Installed probe in RRGE-1 again to 1,000 feet at 4:35 p.m. Flowed RRGE-2 at 10:30 p.m. @ 400 gpm. Checked instruments at RRGE-1 eight times.

DAILY DRILLING REPORTS - RRGE-2

- September 21, 1975 Drill rig watch. Flowed RRGE-2 @ 400 gpm - 8 hours. Pulled probe from RRGE-1 at 12:15 p.m. and reinstalled at 5:00 p.m. (malfunction). Flowed RRGE-2 @ 300 gpm. Continued to pump water from the reserve pit. Checked instruments at RRGE-1 eight times.
- September 22, 1975 Drill rig watch. Continued to flow RRGE-2 @ 400 gpm with probe in RRGE-1. Pumped water from reserve pit - 12 hours.
- September 23, 1975 Drill rig watch. Continue to flow RRGE-2 @ 400 gpm. Pulled probe from RRGE-1 at 11:30 p.m. - not working. Pumped water from reserve pit - 12 hours.
- September 24, 1975 Drill rig watch. Continued to flow RRGE-2 @ 400 gpm. Performed repairs to probe. Installed at 2:30 a.m. - not working. Repaired the water pump at reserve pit - 8-1/2 hours. Installed probe in RRGE-1 at 12:00 noon. Pumped water from reserve pit 5:00 to 11:00 p.m. - 6 hours. Checked instruments at RRGE-1 several times.
- September 25, 1975 Drill rig watch. Continued to flow RRGE-2 @ 400 gpm with  
and probe at 1,000 feet in RRGE-1. Pumped water from reserve  
September 26, 1975 pit - 12 hours. Checked instruments at RRGE-1 several times.
- September 27, 1975 Drill rig watch. Continued to flow RRGE-2 @ 400 gpm. Pulled probe from RRGE-1 at 9:45 a.m. to change cross over connection in log. Ran probe back in hole at 1:45 p.m. Pumped water from reserve pit - 12 hours. Checked instruments at RRGE-1.
- September 28, 1975 Drill rig watch. Continued to flow RRGE-2 @ 400 gpm.  
thru Pumped water from reserve pit - 12 hours each day. Checked  
October 6, 1975 instruments at RRGE-1 several times.
- October 7, 1975 Drill rig watch. Continued to flow RRGE-2 @ 400 gpm. Lowered probe in RRGE-1 to 4,500 feet at 10:30 a.m. Pumped water from reserve pit - 12 hours. Checked instruments at RRGE-1 twice.
- October 8, 1975 Drill rig watch. Continued to flow RRGE-2 @ 400 gpm. Pulled probe from RRGE-1 at 11:00 a.m. for repairs. Ran back in hole to 1,000 feet at 12:15 p.m. Continued to flow well. Pulled probe again at 5:15 p.m. and ran back in to 1,000 feet at 5:45 p.m. Pumped water from reserve pit - 12 hours. Checked instruments at RRGE-1 twice.
- October 9, 1975 Drill rig watch. Continued to flow RRGE-2 @ 400 gpm. Checked instruments at RRGE-1 twice. Pumped water from reserve pit - 12 hours. Probe not working.

DAILY DRILLING REPORTS - RRGE-2

- October 10, 1975 Drill rig watch. Continued to flow RRGE-2 @ 400 gpm. Pulled probe from RRGE-1 at 10:30 a.m., repaired it and ran back in the hole to 1,000 feet at 12:30 a.m. Pumped water from the reserve pit - 12 hours. Checked instruments at RRGE-1 twice.
- October 11, 1975 Drill rig watch. Continued to flow RRGE-2 @ 400 gpm. Pumped water from reserve pit - 16 hours. Checked instruments at RRGE-1 twice.
- October 12, 1975 Drill rig watch. Continued to flow RRGE-2 @ 400 gpm. Pulled probe from RRGE-1 at 6:15 p.m. - 3/4 hour. Pumped water from reserve pit - 16 hours. Checked instruments at RRGE-1 twice.
- October 13, 1975 Drill rig watch. Continued to flow RRGE-2 @ 400 gpm. Rigged up USGS logging truck on RRGE-1. Broke two temperature probes. Pumped water from reserve pit - 16 hours. Checked instruments at RRGE-1 twice.
- October 14, 1975 Drill rig watch. Continued to flow RRGE-2 @ 400 gpm. Pumped water from reserve pit - 16 hours. Checked instruments at RRGE-1 twice.
- October 15, 1975 Drill rig watch. Continued to flow RRGE-2 @ 400 gpm. Rigged up and ran no. 2 motor on no. 2 mud pump. Flowed well into reserve pit and mud pump tanks. Rigged up hoses and valves to the plug on the 12-inch pipe installed between RRGE-2 to RRGE-1 (3,900 L. ft.) for pressure test. 2 hours. Filled pipe with water from mud pump no. 2 at 20 spm - 3 hours. With air bled out of pipe, pressured up to 100 psi. Relieved pressure to repair leaks on inlet plug. Pressured up pipe to 50 psi. Exceeded pressure and blew out joint of 12-inch pipe. Shut down and repaired pipe - 2 hours. Pumped water from reserve pit - 16 hours. Checked instruments at RRGE-1 twice.
- October 16, 1975 Drill rig watch. Continued to flow RRGE-2 @ 400 gpm. Rigged up USGS logging truck at RRGE-1. Closed RRGE-2 at 2:00 p.m. and ran temperature survey - stopped at 3,562 feet. Rigged up and logged for 8-1/2 hours. Pressure tested 12-inch pipe at 100 psi for two hours - held okay. Checked instruments at RRGE-1 twice.
- October 17, 1975 Drill rig watch. Well closed in. Checked instruments at RRGE-1 twice.
- October 18, 1975 and  
October 19, 1975 Drill rig watch. Well closed in. Checked instruments at RRGE-1 twice each day. Installed 1-1/2-inch water line between RRGE-1 and RRGE-2. Installed steering spindle on forklift.

DAILY DRILLING REPORTS - RRGE-2

- October 20, 1975 Drill rig watch. Well closed in. Loaded out INEL trailer. Completed repairs to forklift.
- October 21, 1975  
thru  
October 29, 1975 Drill rig watch. Well closed in. Checked instruments at RRGE-1 twice each day. Rigged up reserve pit diesel pump three hours and ran pump two hours to catch water samples on 10/22. Drained rig water pumps and all lines on 10/24. Installed water lines to RRGE-2 rig and trailer - 5 hours on 10/25. Loaded out two truck loads of 6-5/8-inch drill pipe for NTS (48 joints per truck) on 10/29.
- October 30, 1975 Drill rig watch. Well shut in. Checked instruments at RRGE-1 twice. While moving tool shed with forklift on RRGE-1 location, hit power line and broke it. Temperature probe in RRGE-1 at 150 feet at 6:00 p.m. Chart instruments drive not working in logging truck. Pulled temperature probe from hole at 11:30 p.m.
- October 31, 1975 Drill rig watch. Checked instruments at RRGE-1 twice. Ran flow meter tool in RRGE-1 at depths down to 500 feet. Flowed RRGE-1 @ 43 gpm for 10 minutes with flow meter in hole. Pulled flow meter at 12:30 p.m. - 4-1/2 hours. Loaded out two trucks to NTS with the following:
- |                                      |          |
|--------------------------------------|----------|
| 6-3/4 - 4-1/2 IF Steel Drill Collars | - 20 ea. |
| 4-1/2 IF Pick-up Subs                | - 5 ea.  |
| 6-3/4 - 4-1/2 IF Monel Drill Collars | - 2 ea.  |
| 5-5/8 FH Drill pipe                  | - 4 ea.  |
| 6-5/8 FH Otis Sub                    | - 1 ea.  |
| 4-1/2 IF Elevators                   | - 1 ea.  |
- November 1, 1975 Drill rig watch. Rigged up USGS logging truck on RRGE-1 and ran single point and caliper logs - 10 hours.
- November 2, 1975 Drill rig watch. USGS ran caliper and gamma log in RRGE-1 to 5,000 feet.
- November 3, 1975 Drill rig watch. USGS logging truck ran temperature log in RRGE-1 to 5,000 feet. Pulled log out of hole and rigged down USGS truck. Rigged up INEL logging truck to run pressure log. Stripper head did not work; log was not run. Checked instruments at RRGE-1 twice.
- November 4, 1975 Drill rig watch. Ran INEL pressure survey log in RRGE-1 to 4,700 feet at 12:00 noon. Checked instruments at RRGE-1 twice.
- November 5, 1975 Drill rig watch. Removed work-over tower from RRGE-1 while INEL pressure survey log still in hole at 4,700 feet. Placed logging cable on oil saver. Checked instruments twice.

## DAILY DRILLING REPORTS - RRGE-2

- November 6, 1975 Drill rig watch. Continued INEL pressure survey log in RRGE-1 at 4,700 feet. Checked instruments twice. USGS removed from the location (with INEL approval) the following: 40 sacks - gel; 10 sacks - quick vis; and 4 sacks of lime.
- November 7, 1975 Drill rig watch. Continued INEL pressure survey log until 12:00 noon. Rigged down truck.
- November 8, 1975 Drill rig watch. Rigged up crane and USGS logging truck on RRGE-1. Ran gamma log to 4,900 feet - 8 hours. Ran neutron log in hole to 4,900 feet - 8 hours.
- November 9, 1975 Drill rig watch. Rigged down USGS logging truck from RRGE-1 and moved to RRGE-2 - 2 hours. Rigged up USGS truck and ran temperature and caliper logs to 6,000 feet. Removed caliper log, ran gamma log to 6,000 feet. Pulled log above blind rams into lubricator and shut down at 9:00 p.m. Checked instruments at RRGE-1 twice.
- November 10, 1975 Drill rig watch. Ran USGS logs as follows: #1 - gamma gamma log; #2 - gamma neutron log; #3 - normal log; #4 - flow meter log. All logs were run to 6,000 feet. Flow increased at 5,960 feet; no flow below 5,960 feet. Off loaded 8-inch flow line with forklift at RRGE-1.
- November 11, 1975 Drill rig watch. Rigged up USGS televiewer log. Did not work; rigged down 1:30 a.m. Shut off instruments at RRGE-1 at 10:30 a.m.
- November 12, 1975 Drill rig watch. Rigged up INEL logging truck on RRGE-1 and ran flow meter log from 8:00 to 9:30 a.m. Log did not work. Rigged down truck 9:30 to 12:00 noon.
- November 13, 1975 Drill rig watch. Removed well head Christmas tree and rigged up Schlumberger logging truck on RRGE-1 to log and run pack off plug in hole - 1 hour. Ran caliper log to 1,000 feet. Removed logging tool, removed lubricator riser from well head. INEL work crane boom line not working so shut down logging operations at 1:00 p.m. RRGE-2 well flowing @ 60 gpm.
- November 14, 1975 Drill rig watch. Flowed RRGE-2 @ 60 gpm through 2-inch line for tests. Ran Schlumberger caliper log in RRGE-1 to 1,000 feet. Set Baker plug at 800 feet at 12:00 noon. Rigged down Schlumberger logging truck. Tried to close 20-inch master valve - would not close. Valley Construction crew began installation of 8-inch flow line between RRGE-1 and 2.

DAILY DRILLING REPORTS - RRGE-2

- November 15, 1975 thru  
November 17, 1975 Drill rig watch. Flowed RRGE-2 @ 60 gpm. Off loaded well head Christmas tree from truck at RRGE-1 at 8:00 a.m. (11/17). Removed main valve and Braden head from RRGE-1. Off loaded truck from Bartlesville, Oklahoma, containing pump, instruments and well parts at RRGE-1. Gave ten sacks of Magco-bar barite to USGS (per INEL).
- November 18, 1975 Drill rig watch. Flowed RRGE-2 @ 60 gpm. Off loaded 10 each joints of 4-1/2 inch casing at RRGE-1 location for INEL. Moved other materials inside the fence at the location. Began work on the RRGE-1 casing head.
- November 19, 1975 Drill rig watch. Flowed RRGE-2 @ 20 gpm. Welder installed 20-inch Brewster well head on RRGE-1. Rigged up Colorado Well Service rig on RRGE-1 to install pump. Gave USGS 15 sacks of barite and 5 sacks of gel (per INEL).
- November 20, 1975 Drill rig watch. Flowed RRGE-2 @ 20 gpm. Installed Brewster Christmas tree on RRGE-1 and ran 6 joints of 4-1/2-inch casing for spear, picked up REDA pump and 4 joints of 8-5/8-inch casing with Colorado Well Service rig. Parish Oil Tool ran casing until 6:30 p.m.
- November 21, 1975 Drill rig watch. Flowed RRGE-2 @ 20 gpm. Parish ran 11 joints of 8-5/8-inch casing in RRGE-1 with Colorado Well Service rig. Set Brewster 8-5/8-inch master valve on last joint. Casing in the hole with REDA pump electric line, probe and sensor tube. Temperature and pressure line strapped to 9-5/8-inch casing. Ran stinger through Baker packer plug 7 feet to Brewster master valve. Bolted master valve to Christmas tree. Tested pump 3/c power cord. One conductor did not work. Stopped operation at 5:30 p.m.
- November 22, 1975 Drill rig watch. Flowed RRGE-2 @ 20 gpm. Unbolted master valve on RRGE-1, pulled stinger up through Baker packer plug 2 feet, inspected pump power cord and discovered short in cord just below master valve. Repaired cord and ran stinger back down through plug. Replaced master valve and tested power cord - test okay. Valley Construction connected 8-inch flow line to master valve on RRGE-1 and started flowing well through pipe to reserve pit on RRGE-2 @ 600-700 gpm without pump - (7:30 p.m.) Turned on REDA pump, flowed well from 1,000 to 1,200 gpm from 8:00 to 8:30 p.m. Shut in well at 9:00 p.m. Pump tested - okay.
- November 23, 1975 and  
November 24, 1975 Drill rig watch. Flowed RRGE-2 @ 20 gpm. Rigged down Colorado Well Service rig from RRGE-1 on 11/24.



DAILY DRILLING REPORTS - RRGE-2

- November 25, 1975 Drill rig watch. Flowed RRGE-2 @ 40 gpm. Moved supply shed inside fence for INEL.
- November 26, 1975 Drill rig watch. Flowed RRGE-2 @ 40 gpm. Gave USGS 10 sacks of gel and 10 sacks of Barite (per INEL).
- November 27, 1975 Drill rig watch. Flowed RRGE-2 @ 40 gpm.  
thru  
November 30, 1975
- December 1, 1975 Drill rig watch. Flow RRGE-2 @ 40 gpm. Gave USGS 20 sacks of gel and 50 sacks of barite (per INEL).
- December 2, 1975 Drill rig watch. Flowed RRGE-2 @ 40 gpm. Home Plumbing hooked up 8-inch flow line from RRGE-2 to RRGE-1. Gave USGS 20 sacks of gel and 40 sacks of barite (per INEL).
- December 3, 1975 Drill rig watch. Flowed RRGE-2 @ 40 gpm. Well shut in at 10:00 a.m. to work on 8-inch flow line on RRGE-2 with Hillco welder. Moved flash tank closer to rig with forklift. Gave USGS 108 sacks of gel and 89 sacks of barite (per INEL).
- December 4, 1975 Drill rig watch. Hooked up 8-inch flow line from flash tank to shaker mud tank with forklift and Hillco welder on RRGE-2 location. Broke 3/4-inch valve fitting on well head causing a flow of hot water. Master valve leaked and water leaked through 3/4-inch hole. Welded 2-inch pipe over the leak and plugged it. Home Plumbing crew worked on RRGE-1 location.
- December 5, 1975 Drill rig watch. Flowed RRGE-2 for 8 hours to fill reserve pit for water injection test.
- December 6, 1975 Drill rig watch. Rigged up for water injection test on  
and  
December 7, 1975 RRGE-2 location.
- December 8, 1975 Drill rig watch. Finished rigging up for water injection test. Jetted and cleaned pits 1, 2 and 3. Started test at 9:00 p.m. Ran no. 1 and no. 2 mud pumps - 8 hours each.
- December 9, 1975 Drill rig watch. Water injection test terminated at 3:30 p.m. Opened flow from RRGE-1 to RRGE-2 reserve pit @ 300 gpm. Started Reda pump on RRGE-1 pumping water to RRGE-2, pumped 1500 gpm the first half hour and 1000 gpm the second half hour. Flowed well @ 300 gpm from RRGE-1 to RRGE-2. Ran no. 1 mud pump 15-1/2 hours and no. 2 mud pump 8 hours.

DAILY DRILLING REPORTS - RRGE-2

- December 10, 1975 Drill rig watch. Well flowed @ 300 gpm from RRGE-1 to RRGE-2 - 8 hours. Ran no. 1 mud pump for 9 hours. Started Reda pump on RRGE-1 and pumped water @ 1050 gpm. Started water injection test with mud pump at 1200 hours on RRGE-2. Pumped water from RRGE-1 to RRGE-2 reserve pit. Shut down Reda pump at 3:00 p.m. Ran water injection test on RRGE-2 with mud pump, terminated injection test at 11:00 p.m.
- December 11, 1975 Drill rig watch. Set back Kelly and drained Kelly hose and mud lines, mud pumps, mud tanks, and trash pump. Opened all valves. H. D. Mechanic Service blew out no. 2 meter on no. 2 pump and checked out meters on no. 1 and no. 2 pumps. Pumps okay. Rig secured.
- December 12, 1975 Drill rig watch. Flowed 8-inch flow line from RRGE-1 to  
thru RRGE-2 @ 40 gpm to keep line hot.  
December 15, 1975
- December 16, 1975 Drill rig watch. Flowed RRGE-1 to RRGE-2 through 8-inch flow line. Relocated loggers trailer.
- December 17, 1975 Drill rig watch. Continued flowing well. Ran water injection test on RRGE-1 flowing water to RRGE-2 reserve pit. Rigged up to pump water back into RRGE-2 hole from reserve pit. Ran test on Reda pump on RRGE-1, pumped water @ 700 gpm from RRGE-1 to RRGE-2 reserve pit. Pumped water from reserve pit to mud tanks with trash pump and downhole RRGE-2 with mud pump. Ran no. 1 mud pump 11 hours and trash pump 6 hours. Changed oil filter in both engines of no. 1 mud pump.
- December 18, 1975 Drill rig watch. Pumped water from reserve pit back into RRGE-2 with no. 1 pump. Pumped water downhole on RRGE-2 from reserve pit to lower water level in pit. Ran no. 1 mud pump and trash pump 17 hours each. Changed filters and oil in both engines of no. 2 mud pump, and motor and hydraulic system on forklift. Drained pump and lines and secured pumps. Continued to flow RRGE-1 through 8-inch flow line to RRGE-2 reserve pit to keep 8-inch flow line hot.
- December 19, 1975 Drill rig watch. Changed oil and filters on trash pump motor.
- December 20, 1975 Drill rig watch. Continued to flow RRGE-1 through 8-inch  
and flow line to RRGE-2 reserve pit to keep 8-inch flow line  
December 21, 1975 hot.

DAILY DRILLING REPORTS - RRGE-2

December 22, 1975 Drill rig watch. Offloaded lumber, nails, and joint hangers from Valco. Inc. for INEL.

December 23, 1975 Drill rig watch. Continued to flow RRGE-1 through 8-inch  
thru flow line to RRGE-2 reserve pit.  
December 31, 1975

January 1, 1976 Drill rig watch. Continued to flow RRGE-1 to RRGE-2  
thru through 8-inch flow line to keep line hot.  
January 5, 1976

January 6, 1976 Drill rig watch. Ran no. 1 mud pump 28 hours to pump  
and water from RRGE-2 reserve pit back in RRGE-2 hole. Worked  
January 7, 1976 on trash pump.

January 8, 1976 Drill rig watch. Continued to flow RRGE-1 to RRGE-2  
thru reserve pit.  
January 14, 1976

January 15, 1976 Drill rig watch. Rigged up to run flow test log with  
INEL logging truck. Ran log in hole at 1:00 p.m. - log  
did not work. Closed hole at 2:00 p.m., rigged down log-  
ging truck. Flowed hole.

January 16, 1976 Drill rig watch. Continued to flow hole 8 hours, stopped  
flowing RRGE-1 because of leak in 8-inch flow line.

January 17, 1976 Drill rig watch. Rig secured.  
and  
January 18, 1976

January 19, 1976 Drill rig watch. Repaired short in electrical line from  
generator to rig. Continued to flow RRGE-1 to RRGE-2  
reserve pit.

January 20, 1976 Drill rig watch. Continued to flow RRGE-1 through 8-inch  
flow line to RRGE-2 reserve pit to keep line hot. Rigged  
up INEL logging truck to run logs at 9:00 a.m. Logging  
instruments did not work. Rigged down truck and shut in  
well at 3:00 p.m.

January 21, 1976 Drill rig watch. Continued to flow RRGE-1 to RRGE-2  
and reserve pit. Checked well head pressure twice daily.  
January 22, 1976

January 23, 1976 Drill rig watch. Rigged up to pump water from reserve  
pit to tanks to inject water downhole in RRGE-2. In-  
jected water with mud pump to empty reserve pit. Ran  
no. 1 mud pump and trash pump 12 hours each.

DAILY DRILLING REPORTS - RRGE-2

- January 24, 1976 Drill rig watch. Continued injecting water with mud pump to empty reserve pit. Drained pump and mud lines. Flowed RRGE-1 to RRGE-2 reserve pit. Ran no. 1 mud pump and trash pump 10 hours each.
- January 25, 1976 Drill rig watch. Continued flowing well RRGE-1 to RRGE-2 reserve pit.
- January 26, 1976  
thru  
January 29, 1976 Drill rig watch. Continued to flow RRGE-1 to RRGE-2 reserve pit to keep 8-inch flow line hot. Checked well head pressure on RRGE-1 and RRGE-2 twice daily.
- January 30, 1976 Drill rig watch. Continued to flow RRGE-1 through 8-inch flow line to RRGE-2 reserve pit. From 10:15 a.m. to 3:00 p.m. rigged up USGS logging truck and ran collar locator. Located collars at 122 and 81 feet below top of blind ram. Pumped water from RRGE-1 reserve pit to RRGE-2 reserve pit. Checked well head pressure twice daily.
- January 31, 1976 Drill rig watch. Continued to pump water from RRGE-1 reserve pit to RRGE-2 reserve pit with 2-inch centrifugal pump - 24 hours.
- February 1, 1976 Drill rig watch. Flowed RRGE-1 through 8-inch flow line to RRGE-2 reserve pit.
- February 2, 1976 Drill rig watch. Continued to flow well. Rigged up to inject water in RRGE-2 from reserve pit. Started Reda pump on RRGE-1 at 9:00 a.m. Pumped downhole on RRGE-2 at 12:00 noon with no. 1 and no. 2 mud pumps (78 spm, 200 psi, 709 gpm). Pumped water with Reda pump from RRGE-1 to RRGE-2 reserve pit, and downhole with no. 1 and no. 2 mud pumps on RRGE-2. Ran no. 1 and no. 2 mud pumps and trash pump 12 hours each.
- February 3, 1976 Drill rig watch. Pumped water with Reda pump from RRGE-1 to RRGE-2 reserve pit @ 900 gpm. Pumped water with no. 1 and no. 2 mud pump downhole from reserve pit. Ran no. 1 mud pump 24 hours, and no. 2 mud pump 8 hours. No. 1 motor on no. 2 pump was down. Ran trash pump 24 hours.
- February 4, 1976 Drill rig watch. D&J Diesel mechanic worked on no. 1 motor on no. 2 mud pump. Continued pumping water with Reda pump from RRGE-1 to RRGE-2 reserve pit, and with mud pumps downhole from reserve pit. Ran no. 1 mud pump 24 hours, no. 2 mud pump 8 hours, and trash pump 24 hours.

DAILY DRILLING REPORTS - RRGE-2

- February 5, 1976 Drill rig watch. Continued pumping water. Received 868 gallons of diesel and 285 gallons regular gas.
- February 6, 1976 Drill rig watch. Continued pumping water. Secured pump test at 1:00 p.m. Secured water injection at 3:00 p.m. Set back Kelly, drained mud lines and pumps. Flowed RRGE-1 to RRGE-2 reserve pit.
- February 7, 1976  
thru  
February 16, 1976 Drill rig watch. Continued flowing well. Received 2 Hughes 8-1/2-inch bits on 2/10.
- February 17, 1976 Drill rig watch. Continued to flow well. Hooked up pump to 8-inch flow line, pumped water from RRGE-1 reserve pit to RRGE-2 reserve pit.
- February 18, 1976  
thru  
February 24, 1976 Drill rig watch. Continued pumping water from RRGE-1 reserve pit to RRGE-2 reserve pit. Changed oil filter in trash pump 2/18. D&J Diesel mechanic put new blower on no. 2 mud pump on 2/23.
- February 25, 1976 Drill rig watch. Continued pumping water. Rigged up to mix mud for Martin Rathole Drilling Co. at 8:00 a.m. and mixed 80 sacks of gel (200 barrels of 60 vis mud) for RRGE-3 location. Ran no. 2 mud pump to mix mud and loaded truck as requested by INEL. INEL ran flow test on RRGE-1 location flowing water from RRGE-1 to RRGE-2 reserve pit @ 250 gpm. Martin Rathole Drilling drilled rathole, mouse hole, and conductor pipe hole on RRGE-3 location. Started running 20-inch casing at 11:00 p.m. Ran no. 2 mud pump 10 hours for Martin Rathole Drilling and 6 hours for INEL. Injected water from reserve pit to tanks and downhole on RRGE-2, 55 spm @ 500 gpm - 175 psi.
- February 26, 1976 Drill rig watch. Martin Rathole Drilling ran 20-inch casing on RRGE-3, landed casing at 1:30 a.m. 128 feet of 20-inch casing landed at 125 feet. Loaded water trucks with no. 2 mud pump for cement job 1:00 to 3:00 a.m. Cemented 128 feet 41.5 lb./ft. casing with 375 sacks of 4% CaCl<sub>2</sub>. CIP at 6:00 a.m. - 50 feet of cement inside casing. Injected water downhole on RRGE-2 location with no. 2 mud pump to lower level in reserve pit. INEL ran flow test on RRGE-1. Injected water downhole on RRGE-2 with no. 2 mud pump for 6 hours. Ran no. 2 mud pump 2 hours for cement job on RRGE-3 conductor pipe. Ran no. 2 mud pump 16 hours injecting water downhole on RRGE-2.

DAILY DRILLING REPORTS - RRGE-2

- February 27, 1976 Drill rig watch. Continued injecting water downhole on RRGE-2 for 8 hours. Stopped pumping, changed oil and filters in motors on no. 2 mud pump. Changed brake blocks on drill rig. INEL ran flow test on RRGE-1, @ approximately 250 gpm.
- February 28, 1976 Drill rig watch. INEL continued running flow test on RRGE-1 @ 250 gpm. Completed installation of new brake blocks on drill rig.
- February 29, 1976 Drill rig watch. INEL continued flow test on RRGE-1 @ 250 gpm.
- March 1, 1976 Drill rig watch. INEL continued flowing RRGE-1 @ 250 gpm into RRGE-2 reserve pit. Injected water from reserve pit into RRGE-2 using mud pump no. 2. Acidized 20-inch Shaffer gate valve and closed valve. NTS transfers (4 men) and supervision traveled to Idaho.
- March 2, 1976 Reactivation. Began rig-up operations. Repaired and connected water and electrical lines; greased mud line valves; installed vee-door and side curtains; connected water line to 400-barrel water tank; changed out 8-inch drill collars for 6-inch drill collars; repaired BOP accumulator; opened 20-inch Shaffer master valve; serviced rig and repaired all air leaks; cleaned compound, changed oil and repaired oil pump to draw works. INEL continued flowing RRGE-1 into RRGE-2 reserve pit. Pumped out reserve pit with trash pump - 8 hours. Worked 19 men, 8 hours each. Unloaded two line trucks with drill collars, traveling blocks and miscellaneous supplies from NTS. Drill rig watch by one man - 12 hours.
- March 3, 1976 Reactivation. Began rotating shift and continued rig-up operations. Thawed out, connected and repaired water lines and hoses; leveled cat walk and pipe racks; thawed out oil lines in draw works; changed sprocket in oil pump and changed rotating head. Picked up and started in the hole with bit #20 (a Hughes, 3-cone, button, type J77, size 8-1/2 inch), stabilizer, and 21 each 6-inch drill collars. Replaced cat line. Tested BOP Hydril and performed repairs; worked 16 men 8 hours each. INEL continued flowing RRGE-1 @ 250 gpm into RRGE-2 reserve pit.

DAILY DRILLING REPORTS - RRGE-2

March 4, 1976

Reactivation. Continued rig-up operations through end of day shift. Measured 4-1/2-inch drill pipe and picked up from rack. (Total of 172 joints.) Pumped out mud pits into the reserve pit with trash pump. Drained trash pump and lines from reserve pit. Hooked up Kelly hose and water lines and picked up Kelly. Tagged bottom at 6:30 p.m. at 6,006 feet. No fill encountered in trip. Drilled from 6,006 to 6,034 feet in 5-1/2 hours. Martin-Decker weight indicator not functioning properly. Contacted vendor to service and calibrate. INEL continued flowing RRGE-1 @ 250 gpm into RRGE-2 reserve pit.

March 5, 1976

Drilled 8-1/2-inch hole from 6,034 to 6,125 feet in 12 hours. Shut down for repairs to weight indicator for 2-3/4 hours. Drilled 8-1/2-inch hole from 6,125 to 6,178 feet in 9-1/4 hours. INEL continued flowing RRGE-1 into RRGE-2 reserve pit. Pumped out reserve with trash pump - 8 hours.

March 6, 1976

Drilled 8-1/2-inch hole from 6,178 to 6,262 feet - 11-1/2 hours. Installed new rod packing in mud pump no. 2 on left side - 3/4 hour. Pumped water in hole for trip - 3/4 hour. Broke Kelly and checked flow back, pumped water down annulus - 1-1/4 hour. Pumped water in pits - 1-3/4 hours. Pumped water down drill pipe to cool string and tripped for new bit - 7-1/2 hours. Filled drill pipe and reamed 5 feet of hole (out of gauge) with bit #21, a Hughes, 3-cone, button, type J77, size 8-1/2 inch. INEL continued flowing RRGE-1 @ 250 gpm into RRGE-2 reserve pit. Pumped out reserve with trash pump - 8 hours.

March 7, 1976

Drilled 8-1/2-inch hole from 6,262 to 6,435 feet - 21-1/2 hours. Welder repaired leak in mud line.

March 8, 1976

Drilled 8-1/2-inch hole from 6,435 to 6,548 feet (TD) - 18-1/2 hours. Made connection at 6,500 feet - 1/2 hour. Circulated for trip and to cool hole, tripped out, laid down reamer and bit and picked up core tools - 5 hours. (Bit #21 made 286 feet in 40 rotating hours.) INEL continued flowing RRGE-1 @ 250 gpm into RRGE-2 reserve pit.

March 9, 1976

Completed making up coring assembly - 2-1/2 hours. Tripped in with coring tools for core run no. 6 and broke circulation - 3-1/2 hours. Reamed out-of-gauge hole from 6,460 to 6,548 feet in 4 hours with diamond core bit and assembly. (Bit #21 was 1/4 inch out of gauge.) The core bit was an 8-1/2-inch CDP type, MC-23 diamond. Cored from 6,548 to 6,552 feet in three hours. Pumped cool water

DAILY DRILLING REPORTS - RRG-2

March 9, 1976  
(Continued)

downhole, tripped out and laid down core barrel in 6 hours. No recovery from core run no. 6. Performed repairs to the breakout cathead - 3/4 hour. Rigged up INEL logging truck, closed Hydril and pipe rams on 4-1/2 inch IF lubricator, opened blind rams and assisted ANC in running temperature survey - 5 hours. Transite flow line from RRG-1 to RRG-2 burst open near steel line at RRG-2 location. INEL stopped flow from RRG-1 for repairs to flow line.

March 10, 1976

ANC completed running temperature survey. Closed in well and flow tested for 9-1/4 hours. INEL reran temperature survey - 5 hours. Tripped in hole with bit #22, a Hughes, Type 88, 3-cone, button, size 8-1/2 inch, and reamed hole from 6,460 to 6,552 feet - 8 hours.

March 11, 1976

Drilled 8-1/2-inch hole from 6,552 to 6,557 feet, circulated and conditioned hole in preparation for taking core - 2-3/4 hours. Tripped out, pumped water in hole - 4 hours. Removed reamer, junk sub and one drill collar - 1 hour. Closed blind rams. Serviced core barrel and tripped in hole - 3-1/2 hours. Reamed and washed to bottom from 6,542 to 6,557 feet. Cut core no. 7 from 6,557 to 6,561 feet with one foot of recovery - 5-1/4 hours. The bit for core run no. 7 was an 8-1/2-inch CDP type MC-20, diamond bit. Tripped out with core no. 7, pumped cold water in hole, unloaded and serviced core barrel, and laid it down - 3-1/2 hours. Rigged up to log, closed Hydril on 6-5/8-inch lubricator, broke Kelly hose and drained mud lines, and rigged up USGS logging truck - 3 hours.

March 12, 1976

Completed rigging up USGS logging truck and assisted in logging operations for 24 hours. A caliper, flow meter, televiwer and gamma log were run.

March 13, 1976

Continued to run USGS logs with well shut in - 9-1/2 hours. Opened well at 9:30 a.m. and began running temperature survey log. Well flowing 214°F @ 361 gpm at 6,561 feet TD. Completed flow meter log at 7:00 p.m. and ran caliper log from 7:00 to 9:00 p.m. Ran televiwer log 9:00 p.m. to 12:00 midnight. Logging instrument not working properly.

March 14, 1976

Repaired televiwer and ran in hole for 6 hours. The remainder of day was utilized flow testing hole while running temperature survey. Differential pressure, temperature and well head pressure were recorded at various times throughout the day. INEL logging truck ran temperature survey from 9:00 to 10:00 p.m. Opened blind rams at 11:00 p.m.



DAILY DRILLING REPORTS - RRGE-2

March 15, 1976

Completed INEL temperature survey and rigged down logging truck - 4-1/4 hours. Changed out stripper rubbers in rotating head - 3/4 hour. Tripped in the hole in preparation for laying down 4-1/2-inch drill pipe - 4-1/4 hours. Tripped out of the hole laying down drill pipe, drill collars, Kelly and swivel - 7-1/2 hours. Shut well in and recorded well head pressure at various times during the day. Offloaded 9-5/8-inch casing for RRGE-3 from line truck - 1 hour. Rigged up INEL logging truck and ran temperature survey - 5 hours.

March 16, 1976

Moved 4-1/2-inch drill pipe from racks and set out racks and cat walk - 4-1/2 hours. Unbolted 8-inch line and removed, drained mud lines, jetted cellar, and laid down rat hole - 3-1/2 hours. Rigged up INEL logging truck, ran temperature survey and rigged down - 11 hours. Temperatures recorded: 6,000 feet - 278°F; 6,280 feet - 276°F; and 6,561 feet (TD) - 278°F. Shut well in at 10:30 p.m. and rigged up Dresser Atlas to run ring gauge. Flowed well - 19 hours. Recorded differential pressure at various times during the day.

March 17, 1976

With well shut in, rigged up to run ring gauge and collar locator. Adapter sleeve from Dresser-Atlas would not match Baker flapper plug, so it was modified by a machine shop in Burley. While going in the hole, the Baker flapper valve would not pass through the top of the 13-3/8-inch casing. Cold water was pumped in the hole and then an attempt was made to run a 12-1/4-inch bit in the casing with no success. A 9-7/8-inch bit with a 12-1/4-inch stabilizer was picked up with one joint of 4-1/2-inch drill pipe and run in the casing. The trip in stopped at the upset on the stabilizer indicating the casing to be approximately 10 inches. After some rigging down was accomplished, orders were received to prepare to mill out the casing. The Kelly and swivel were picked up and rotating rubber installed on the Kelly. Preparations were made to pick up tapered mill.

March 18, 1976

Unloaded 12-1/4-inch tapered mill from truck, milled out 13-3/8-inch casing, pulled mill out and broke down tools from 12:00 midnight to 4:00 a.m. Waited on contractor to run gauge ring and collar locator - 10-1/2 hours. Rigged up truck and ran ring to 1,350 feet (GL) - 2 hours. Ran collar locator in 1,350 feet - 2 hours. Set Baker flapper valve to 1,224 feet (GL) in 13-3/8 inch casing and rigged down truck - 1 hour. Removed hydraulic hoses from BOP, closed BOP, jetted cellar and pits, set rotary table out and began rigging down BOP equipment - 4-1/2 hours.

DAILY DRILLING REPORTS - RRGE-2

March 19, 1976

Rig down operations started on day shift. Disconnected waterline, drained pump, and removed BOP equipment from cellar. Prepared derrick for lowering operation. Disconnected and rolled up electrical lines. Removed mud pump engines from skids. Disconnected and drained all mud lines and hoses. Drained trash pump and broke out irrigation line. Dug up and picked up 4-inch waterline to water tank. Worked 4 crews (21 men) - 10 hours.

March 20, 1976

Rig down operations. Laid derrick down at 9:00 a.m. Removed drawworks motor and compound from subbase and laid A-frame down with INEL crane. Installed new drive chain on mud pump no. 1. Set mud pumps and mud pits out for movement to RRGE-3. Installed extensions on 10 ton forklift. Worked 4 crews (20 men) - 10 hours.

March 21, 1976

Rig down operations. Removed derrick and drawworks from subbase. Began loading trucks with equipment for move to RRGE-3. Worked 4 crews (19 men) - 10 hours.  
NOTE: NTS mechanic made drill rig inspection for certification 3-18-76 thru 3-21-76.

LAST REPORT

All activity transferred to RRGE-3.

**Appendix B**  
**CASING RECORD**

RRGE-2  
 CASING RECORD  
 SURFACE CASING - 20 INCH O.D., 94 lb/ft, H-40  
 Date Installed - May 1, 1975

Joint No.	Measured Length (ft.)	Cumulative Length (ft.)	Remarks
	1.35	1.35	Differential fill guide shoe
1	39.10	40.45	Centralizer in Middle
	1.77	42.22	Differential fill float collar
2	41.66	83.88	Centralizer on collar
3	42.23	126.11	Centralizer on collar
4	35.39	161.50	Centralizer on collar
5	38.46	199.96	Centralizer on collar
6	41.35	241.31	Centralizer on collar
7	43.26	284.57	Centralizer on collar
8	36.75	321.32	Centralizer on collar
9	42.48	363.80	Centralizer on collar
10	42.83	406.63	Centralizer on collar
11	42.35	448.98	Centralizer on collar
12	42.26	491.24	Centralizer on collar; Cement Basket on Top of Joint
13	40.16	531.40	Centralizer on collar
14	41.89	573.29	Centralizer on collar
15	41.66	614.95	Centralizer on collar
16	43.11	658.06	Centralizer on collar
17	36.17	694.23	Centralizer on collar
18	37.95	732.18	Centralizer on collar
19	41.83	774.01	Centralizer on collar
20	39.15	813.16	Centralizer on collar
21	42.84	856.00	Centralizer on collar
22	40.82	896.82	Centralizer on collar
23	43.20	940.02	Landing Joint

Total casing length: 940.02 feet  
 Casing setting depth: 904.00 feet (G.L.)

RRGE-2  
CASING RECORD  
PRODUCTION CASING - 13 3/8-INCH O.D.  
Date Installed - May 22, 1975

Joint No.	Weight	Measured Length (ft.)	Cumulative Length (ft.)	Remarks
1	68 lb/ft	2.72	2.72	Differential fill guide shoe Centralizer Middle Differential fill float collar
		29.37	32.09	
		2.00	34.09	
2	68 lb/ft	40.40	74.49	
3	68 lb/ft	41.09	115.58	Centralizer
4	68 lb/ft	38.90	154.48	
5	68 lb/ft	40.19	194.67	
6	68 lb/ft	39.24	233.91	Centralizer
7	68 lb/ft	39.29	273.20	
8	68 lb/ft	40.88	314.08	
9	68 lb/ft	38.54	352.62	Centralizer
10	68 lb/ft	41.45	394.07	
11	68 lb/ft	38.25	432.32	
12	68 lb/ft	40.30	472.62	Centralizer
13	68 lb/ft	38.70	511.32	
14	68 lb/ft	41.41	552.73	
15	68 lb/ft	40.88	593.61	Centralizer
16	68 lb/ft	37.04	630.65	
17	68 lb/ft	39.94	670.59	
18	68 lb/ft	40.43	711.02	Centralizer
19	68 lb/ft	41.51	752.53	
20	68 lb/ft	40.89	793.42	
21	68 lb/ft	38.57	831.99	Centralizer
22	68 lb/ft	38.56	870.55	
23	68 lb/ft	31.99	902.54	Centralizer
24	68 lb/ft	32.24	934.78	
25	61 lb/ft	28.03	962.81	
26	61 lb/ft	29.32	992.13	Centralizer
27	61 lb/ft	31.92	1,024.05	
28	61 lb/ft	38.52	1,062.57	
29	61 lb/ft	36.61	1,099.18	Centralizer
30	61 lb/ft	39.88	1,139.06	
31	61 lb/ft	38.31	1,177.37	
32	61 lb/ft	31.56	1,208.93	Centralizer
33	61 lb/ft	37.18	1,246.11	
34	61 lb/ft	39.11	1,285.22	
35	61 lb/ft	40.37	1,325.59	Centralizer
36	61 lb/ft	38.13	1,363.72	Cement Basket
37	61 lb/ft	40.11	1,403.83	
38	61 lb/ft	31.48	1,435.31	Centralizer
39	61 lb/ft	40.51	1,475.82	
40	61 lb/ft	40.87	1,516.69	
41	61 lb/ft	40.81	1,557.50	Centralizer
42	61 lb/ft	39.95	1,597.45	
43	61 lb/ft	39.74	1,637.19	
44	61 lb/ft	40.17	1,677.36	Centralizer
45	61 lb/ft	40.44	1,717.80	
46	61 lb/ft	39.51	1,757.31	Centralizer
47	61 lb/ft	40.15	1,797.46	
--	---	2.92	1,800.38	DV Tool
48	54.5 lb/ft	38.26	1,838.64	
49	54.5 lb/ft	37.21	1,875.85	Centralizer
50	54.5 lb/ft	40.02	1,915.87	
51	54.5 lb/ft	40.03	1,955.90	
52	54.5 lb/ft	39.75	1,995.65	Centralizer
53	54.5 lb/ft	38.72	2,034.37	
54	54.5 lb/ft	40.98	2,075.35	
55	54.5 lb/ft	39.65	2,115.00	Centralizer

RRGE-2  
 CASING RECORD  
 PRODUCTION CASING - 13 3/8-INCH O.D.  
 Date Installed - May 22, 1975

Joint No.	Weight	Measured Length (ft.)	Cumulative Length (ft.)	Remarks
56	54.5 lb/ft	37.44	2,152.44	
57	54.5 lb/ft	37.59	2,190.03	
58	54.5 lb/ft	40.12	2,230.15	Centralizer
59	54.5 lb/ft	41.67	2,271.82	
60	54.5 lb/ft	40.41	2,312.23	
61	54.5 lb/ft	40.45	2,352.68	Centralizer
62	54.5 lb/ft	40.98	2,393.66	
63	54.5 lb/ft	39.76	2,433.42	
64	54.5 lb/ft	39.89	2,473.31	Centralizer
65	54.5 lb/ft	38.29	2,511.60	
66	54.5 lb/ft	38.47	2,550.07	
67	54.5 lb/ft	41.13	2,591.20	Centralizer
68	54.5 lb/ft	39.73	2,630.93	
69	54.5 lb/ft	39.10	2,670.03	
70	54.5 lb/ft	35.28	2,705.31	Centralizer
71	54.5 lb/ft	35.53	2,740.84	
72	54.5 lb/ft	40.33	2,781.17	
73	54.5 lb/ft	37.75	2,818.92	Centralizer
74	54.5 lb/ft	39.61	2,858.53	
75	54.5 lb/ft	38.67	2,897.20	
76	54.5 lb/ft	38.32	2,935.52	Centralizer
77	54.5 lb/ft	40.44	2,975.96	
78	54.5 lb/ft	34.14	3,010.10	
79	54.5 lb/ft	40.11	3,050.21	Centralizer & Cement Basket
80	54.5 lb/ft	39.88	3,090.09	
81	54.5 lb/ft	39.27	3,129.36	
82	54.5 lb/ft	38.00	3,167.36	Centralizer
83	54.5 lb/ft	40.78	3,208.14	
84	54.5 lb/ft	36.00	3,244.14	
85	54.5 lb/ft	39.38	3,283.52	Centralizer
86	54.5 lb/ft	42.43	3,325.95	
87	54.5 lb/ft	35.39	3,361.34	
88	54.5 lb/ft	38.04	3,399.38	Centralizer
89	54.5 lb/ft	40.12	3,439.50	
90	54.5 lb/ft	40.51	3,480.01	
91	54.5 lb/ft	35.19	3,515.20	Centralizer
92	54.5 lb/ft	40.09	3,555.29	
93	54.5 lb/ft	39.44	3,594.73	
94	54.5 lb/ft	40.74	3,635.47	Centralizer
95	54.5 lb/ft	37.70	3,672.67	
96	54.5 lb/ft	40.38	3,713.05	
97	68.0 lb/ft	39.74	3,752.79	Centralizer
98	68.0 lb/ft	38.92	3,791.71	
99	68.0 lb/ft	37.88	3,829.59	
100	68.0 lb/ft	37.88	3,867.47	Centralizer
101	68.0 lb/ft	40.80	3,908.27	
102	68.0 lb/ft	40.71	3,948.98	
103	68.0 lb/ft	39.04	3,988.02	Centralizer
104	68.0 lb/ft	37.74	4,025.76	
105	68.0 lb/ft	40.24	4,066.00	Centralizer
106	68.0 lb/ft	40.37	4,106.37	
107	68.0 lb/ft	41.16	4,147.53	
108	68.0 lb/ft	38.79	4,186.32	
109	68.0 lb/ft	36.58	4,222.90	
110	68.0 lb/ft	40.52	4,263.42	Landing Joint - Cut Off 36.42' to Ground Level

Total Casing Length - 4,263.42 feet  
 Casing Setting Depth - 4,227.00 feet (G.L.)

NOTE: All 61.0 and 68.0 lb/ft casing type K-55; all 54.5 lb/ft casing type H-40.

DISTRIBUTION LIST FOR NVO-410-34  
RAFT RIVER GEOTHERMAL EXPLORATORY HOLE NO. 2

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