DEPARTMENT OF THE INTERIOR
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SHEET 1 OF 2
LITHOLOGIC LOGS

DEEP DRILLING DATA RAFT RIVER GEOTHERMAL AREA, IDAHO

STANDARD AMERICAN OIL CO., MALTA, NAF, AND STREVELL PETROLEUM TEST BOREHOLES

by

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DISCUSSION

The southern Raft River Valley near Bridge, Idaho has long been known as a thermal area (Stearns and others, 1938, p. 170). In 1971, an area southwest of Bridge was designated the Frazier Known Geothermal Resource Area (Frazier KGRA) by the U.S. Geological Survey (Godwin and others, 1971). A geochemical reconnaissance of thermal water in Idaho by the U.S. Geological Survey (USGS) in 1972 (Young and Mitchell, 1973) indicated a reservoir temperature near 300°F (150°C) for the Raft River geothermal anomaly.

The U.S. Energy Research and Development Administration (now the Department of Energy), as a result of proposals by the Raft River Rural Electric Cooperative, became interested in the Raft River Valley as a potential site for an experimental binary-fluid geothermal power plant. During the summer of 1973 the USGS, in cooperation with ERDA, began an integrated geologic, geophysical, geochemical, and hydrologic exploration program in southern Idaho. This program was designed to provide a scientific framework for appraising a potential geothermal resource and to test the applicability of various geologic, geophysical, geochemical, and hydrologic techniques to the study of geothermal resources.

To obtain the physical data necessary to evaluate these various techniques a drilling program was begun in the spring of 1974. A total of 34 auger holes were drilled to depths of about 100 ft (30 m) (Crosthwaite, 1974), and in cooperation with the Idaho Department of Water Administration, 5 continuously cored wells to depths ranging from 250 ft to 1,423 ft (76 m to 434 m) (Crosthwaite, 1976). The first Raft River geothermal exploratory borehole (RRGE #1), drilled in early 1975 (REECo, 1975; Covington, 1977a), confirmed the presence of hot water (295°F; 146°C) in quantities (600 gal/min; 38 L/sec) suitable for a medium temperature experimental binary-fluid geothermal power plant. Since then RRGE #2 (REECo, 1976; Covington, 1977b) and RRGE #3 (Covington, 1977c; Covington, 1977d) have been drilled by ERDA in the Raft River geothermal anomaly. All three wells can produce more than 350 gal/min (22 L/sec) sustained flow with temperatures above 295°F (146°C).

During the early stages of the USGS-ERDA integrated geothermal exploration program three test boreholes were drilled in the Raft River Valley for petroleum by Standard American Oil Company. Shortly after completion of this drilling and just before the deep geothermal drilling by ERDA, Standard American Oil Co. kindly provided the USGS with cuttings and well logs from the three test boreholes. The information from these boreholes was used for initial interpretations of geophysical data and of the subsurface geology of the Raft River basin (Williams and others, 1976).

The only data available to us on the drilling procedure is from the drilling logs; no particular problems are noted nor is there any indication of core having been taken. Geophysical logs were provided only for the Naf (Griffith-Simplot #1) borehole, but access to the Malta (Griffith-Wight #1) borehole has been granted. The USGS borehole geophysics research project has logged the Malta borehole and the first set of logs are presented in this report.

MALTA BOREHOLE

DATA SUMMARY

Drilling period:	November 20-December 12, 1973	
Surface elevation:	4,687 ft	1,428 m
Kelly bushing elevation:	4,697 ft	1,431 m
Total depth:	6,787 ft	2,068 m
Artesian flow:	Unknown	
Maximum temperature:	198°F	92.4°C
Surface casing:	635 ft	193 m
Core:	None	

TOP OF FORMATION

Precambrian(?)--Quartzite of Yost	5,490 ft	1,673 m
Precambrian(?)--Unnamed dolomitic marble	6,070 ft	1,850 m
Precambrian(?)--Schist of the Upper Narrows	6,375 ft	1,943 m

GEOPHYSICAL LOGS

Log	Logged interval feet	meters
Caliper	625-4,845	190-1,507
Gamma	625-4,950	190-1,509
Normal Resistivity-64 inch	4,140-4,900	1,262-1,493
Normal Resistivity-16 inch	625-4,900	190-1,493
Spontaneous Potential	625-4,900	190-1,493
Temperature	surface-4,950	surface-1,509

NAF BOREHOLE

DATA SUMMARY

Drilling period:	June 1-July 9, 1974	
Surface elevation:	5,045 ft	1,538 m
Kelly bushing elevation:	5,055 ft	1,541 m
Total depth:	4,065 ft	1,239 m
Artesian flow:	None	
Maximum temperature:	140°F	60°C
Surface casing:	1,050 ft	320 m
Core:	None	

TOP OF FORMATION

Quaternary--Raft Formation	470 ft	143 m
Tertiary--Salt Lake Formation	860 ft	262 m

GEOPHYSICAL LOGS

Log	Date	Run	Logged interval feet	meters
Gamma	7-10-74	1	1,050-4,010	320-1,222
BHC Acoustilog	7-10-74	1	1,050-4,010	320-1,222
Dual Induction Focused Log	7-10-74	1	1,053-4,017	321-1,224

STREVELL BOREHOLE

DATA SUMMARY

Drilling period:	September 15-October 22, 1973	
Surface elevation:	5,282 ft	1,610 m
Kelly bushing elevation:	5,292 ft	1,613 m
Total depth:	6,981 ft	2,128 m
Artesian flow:	None	
Maximum Temperature:	Unknown	
Surface casing:	712 ft	217 m
Core:	None	
Geophysical Logs:	Unknown	

TOP OF FORMATION

Tertiary--Salt Lake Formation	520 ft	158 m
Pennsylvanian--Oquirrh Formation	1,130 ft	344 m
Ordovician--Fish Haven(?) Dolomite	2,250 ft	686 m
Ordovician--Eureka Quartzite	3,010 ft	917 m
Ordovician--Pogonip Group	3,430 ft	1,128 m
Cambrian(?)--Quartzite of Clarks Basin	3,755 ft	1,144 m
Precambrian(?)--Schist of Stevens Spring	3,960 ft	1,207 m
Precambrian(?)--Quartzite of Yost	4,480 ft	1,365 m
Precambrian(?)--Unnamed dolomitic marble	4,860 ft	1,481 m
Precambrian(?)--Schist of the Upper Narrows	5,240 ft	1,597 m

EXPLANATION

Quaternary--Raft Formation: Massive beds of light-colored clay and silt and thin-bedded calcareous quartzose silt and sand that is cross-bedded locally. Conglomerate or gravel occurs at the base of the formation in many places (Trimble and Carr, 1976). The Raft Formation in the Raft River Basin is primarily gravel containing clasts of Tertiary volcanic rock, Paleozoic limestone, and Precambrian quartzite derived from the surrounding mountains. These gravels are interbedded with light-colored calcareous silts and sands. The Raft Formation-Salt Lake Formation contact is placed arbitrarily at the base of dominantly gravel strata.

Tertiary--Salt Lake Formation: Gray to light-green thin-bedded to massive, tuffaceous siltstone and sandstone with minor beds of conglomerate. In the western part of the Raft River Basin the Salt Lake Formation is divided by a volcanic member at Jim Sage Mountain into upper and lower members (Williams and others, 1976).

Upper member (Tsu) is gray to light-green tuffaceous siltstone and sandstone, and minor buff to gray conglomerate.

Volcanic member at Jim Sage Mountain (Tsj) consists of rhyolite flows separated in many places by a vitrophyre breccia. The flows are black glassy and red-brown porphyritic-aphanitic calc-alkali rhyolite containing phenocrysts of oligoclase-andesine, pigeonite, and locally minor quartz. The vitrophyre breccia consists of black glass clasts a few cm to 2 m in diameter in a yellow and orange matrix of hydrated glass (Williams and others, 1976).

Lower member (Tsl) is gray and white thin-bedded to massive tuffaceous sandstone with light-green interbeds of claystone and siltstone and minor conglomerate.

Pennsylvanian--Oquirrh Formation (Compton, 1975): Sandstone and limestone with minor veinlets of sparry calcite and chert nodules; limestone is medium to light gray, pink, or tan, and fine to very finely crystalline; sandstone is mainly pink to buff, fine to very fine grained, and calcareous.

Ordovician--Fish Haven(?) Dolomite (Compton, 1975): Laminated medium-gray to massive cream colored, fine to very fine crystalline dolomite, with a few thin mica schist units.

Ordovician--Eureka Quartzite (Compton, 1975): Clean, uniform milky white to clear vitreous, fine to very fine grained quartzite with a few thin layers of sericite and muscovite schist.

Ordovician--Pogonip Group (Compton 1975): Light- to medium-gray, some white finely sucrose marble with units of medium gray dolomite marble at top and base. Layers of muscovite schist, phlogopite schist, quartzite, and quartz-mica schist are scattered throughout.

Cambrian(?)--Quartzite of Clarks Basin (Compton, 1975): Light- to medium-gray and white, poorly sorted, fine- to medium-grained quartzite. Some beds slightly dolomitic. Thin layers of muscovite schist throughout.

Precambrian(?)--Schist of Stevens Spring (Compton 1975): Quartzose and slightly feldspathic, calcitic and dolomitic marble, ranging from light to dark gray with numerous laminae and thick layers of quartz-muscovite schist and dolomite quartz-muscovite schist. Thin beds of gray, very fine grained quartzite and siltite in the lower half.

Precambrian(?)--Quartzite of Yost (Compton, 1972): Light gray, white, or pink, very fine to medium grained, poorly sorted, feldspathic