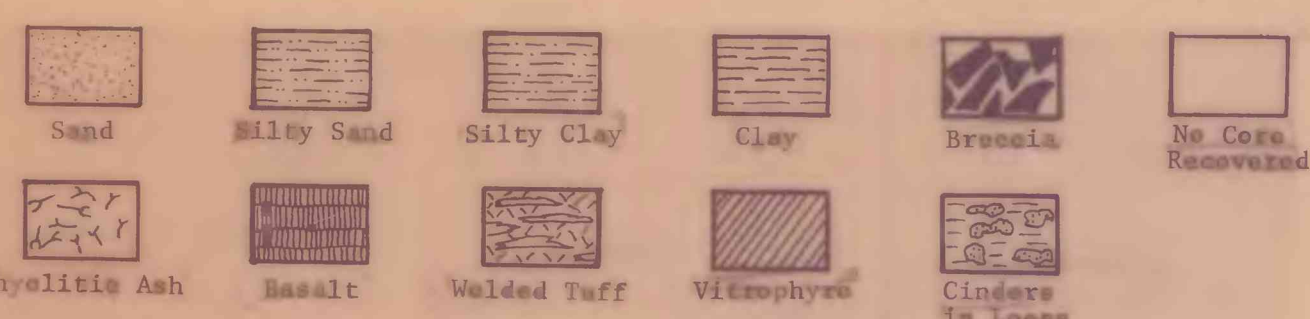


DRILLING DATA FROM EXPLORATION WELL 2-2A, NW¼, SEC. 15, T. 5 N., R. 31 E.,  
IDAHO NATIONAL ENGINEERING LABORATORY, BUTTE COUNTY, IDAHOBy  
David J. Doherty  
1979

## EXPLANATION



## Structures and Textures

- Vesicular
- Amygdaloidal
- Lithophysal
- Fossils
- Fractured
- Flow break (on left of column)

## Mineral and Lithologic Variations

- A Alteration (undetermined mineralogy)
- Ba Altered basalt fragments
- C Calcite
- Cl Clay (alteration product)
- Cs Calcite crystals in cavities
- F Iron oxide staining and alteration
- Op Opal
- P Palagonite
- S Silts and sands in fractures and openings within basaltic flows
- Sl Slickensides
- V Vapour phase crystallization
- X Thin ash bed

## DISCUSSION

The U.S. Department of Energy, in cooperation with the U.S. Geological Survey, drilled three exploration wells on the eastern Snake River Plain, Idaho, during the summer and fall of 1978. The wells were continuously cased, and range in depth from 3,000 ft (914 m) to 3,000 ft (914 m). The wells were drilled to obtain subsurface geologic information pertaining to geothermal exploration in three areas of the eastern Snake River Plain which have distinctly different types of geology.

Two of the wells are located on property of the Idaho National Engineering Laboratory (INEL), Idaho with the third well being located in Sugar City, Idaho (Babree and others, 1979).

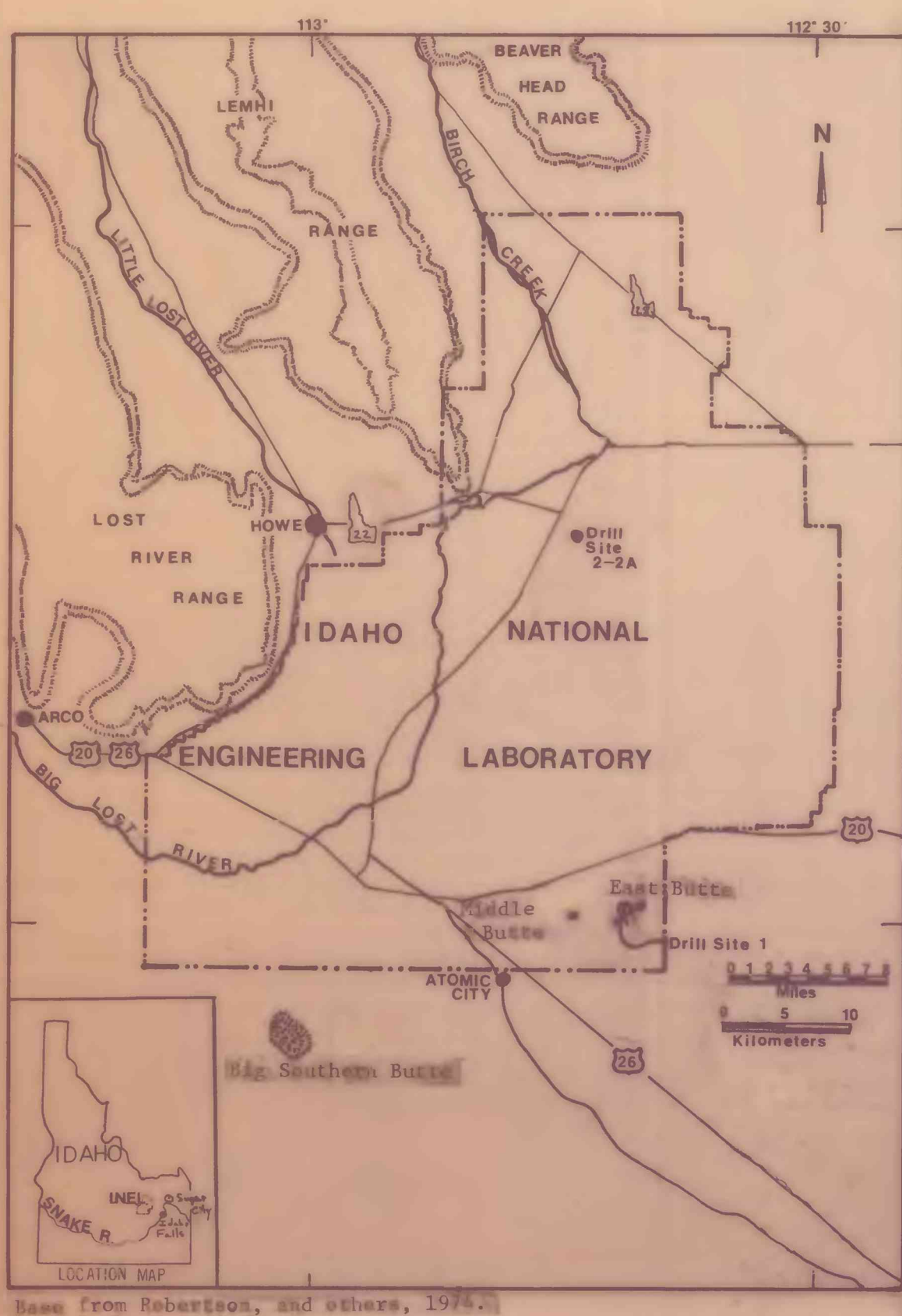
This preliminary report describes the lithology, and shows the temperature distribution, and geophysical logs of well 2-2A, located on the NW¼, sec. 15, T. 5 N., R. 31 E., Butte County, Idaho. The well was located by the U.S. Geological Survey to obtain subsurface information on 1) the character and distribution of basaltic lava flows and interbedded sediments, 2) the age of the rocks and sediments, 3) the nature and extent of alteration of the rocks, and 4) an estimate of the heat flow in the area.

Drilling on well #2 began June 13, 1978. At a depth of 412 ft (125 m), difficulties were encountered in drilling. A new well (2A) was drilled approximately 20 ft (6 m) east of the original well site, reaching a total depth of 3,000 ft (914 m) on September 23, 1978. The logs presented here are a composite of both wells (2 and 2A). The geology of the area near the well has been briefly described by Armstrong, Schoen, and Berrisclough (1974), Nace and others (1975), and Malde and others (1977); the subsurface geology is generalized by Babree (1984). K-Ar dates of some of the volcanic rocks on the Idaho National Engineering Laboratory are reported by Chase (1972), and National Engineering Laboratory (1979). Walker (1964) showed that the sedimentary portion of the stratigraphic section is primarily alluvial in origin, consisting of stream and lake deposits.

In well 2-2A the basaltic lava flows are similar in texture and general composition throughout the upper 2,000 ft (610 m). There are over 54 separate basaltic lava flows in the drill core from well 2-2A. They are generally fine to medium-grained, porphyritic, diktytaxitic olivine basalt. Phenocrysts include plagioclase and olivine in a groundmass of plagioclase, olivine, pyroxene, magnetite, ilmenite, and glass. Below about 1,900 ft (579 m), the basalt is hydrothermally altered and mineralized. This alteration and mineralization includes: filling of vesicles by calcite, zeolites, and serpentine; deposition of these same minerals along fractures; and serpentinization of the basalt, especially near some of the fractures. Many of the fractures show serpentinized slickensides. The clay-rich sediments in the lower 1,000 ft (305 m) of the well are also altered; evidence includes an overall greenish color to the clay-rich sediments, and the presence of altered grains of biotite and basalt.

At least 8 thin, rhyolitic air-fall ash beds are exposed in the drill core. The glass shards in these layers appear petrographically to be unaffected by the alteration. A crystal-poor, rhyolitic, lithophysal, densely welded ash-flow tuff, consisting of two flow units, occurs at a depth of 2,321 ft (708 m) to 2,558 ft (780 m). The lower flow unit consists of a black basal vitrophyre resting on a few feet of vitroclastic air-fall ash. The vitrophyre grades up into a densely welded, lithophysal, dehydrated ash-flow tuff. The upper flow unit consists of about 2 ft (0.6 m) of dehydrated densely welded ash-flow tuff. This ash-flow tuff is similar in texture and mineral content to ash-flow tuffs exposed at the southern end of the Lamb Range, as described by Ross (1961), Chase (1972), and Malde and others (1971).

Continuing studies on core and sediments from this well will improve their age, geochemistry, alteration, paleontology, magnetic properties, and possible correlations.



Base from Robertson, and others, 1974.

## INDEX MAP

Table 1.—Geophysical log information concerning drill hole 2-2A, located in the NW¼, sec. 15, T. 5 N., R. 31 E., Butte County, Idaho.

Log No.	Type	Date Logged	Feet	Meters
1	Temperature	9-22-78	0-2640	0-805
2	Temperature	9-24-78	2640-2990	805-911
3	Temperature	10-01-78	231-2414	67.5-737
4	Gamma	9-22-78	0-2640	0-805

1/ Logged by N. L. McCullough Co., Box 5185 W. Yellowstone Hwy., Casper, Wyoming 82601.

2/ Logged by Charles A. Brott and David D. Blackwell, Institute for the Study of Earth and Man, Geothermal Laboratory, 253 Heroy Building, Southern Methodist University, Dallas, Texas 75275.

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- Ross, C. P., 1961, Geology of the southern part of the Lamb Range, Idaho: U.S. Geological Survey Bulletin 1081-F, p. 189-260.
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## SCALE

DEPTH

IN

feet

meters

0 100 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900 2000 2100 2200 2300 2400 2500 2600 2700 2800 2900 3000

## TEMPERATURE LOGS

TEMPERATURE

°F

°C

80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290 300

## GAMMA LOG

GAMMA

LOG

A.P.I. Units

21 42 63

## LITHOLOGIC LOG

LITHOLOGIC

LOG

DEPTH

IN

feet

meters

0 100 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900 2000 2100 2200 2300 2400 2500 2600 2700 2800 2900 3000

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Note: To convert °F to °C, use the following formula: °C = 5/9 (°F - 32).