PRELIMINARY INTERPRETATION OF ELECTRICAL SOUNDED CURVES OBTAINED ACROSS THE SNAKE RIVER PLAIN FROM BLACKFOOT TO ARCO, IDAHO

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This report is preliminary and has not been edited or reviewed for conformity with U.S. Geological Survey standards.
Illustrations

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Figure 1. Index map.
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      2. VES 1, 2, 3, and 4.
      3. VES 5 and 6.
      4. VES 7 and 8.
      5. VES 9 and 10.
      6. VES 11 and 12.
      7. VES 13 and 14.
      8. VES 15.
      9. VES 16 and 17.
     10. VES 18, 19, and 20.
     11. VES 21 and 22.
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18. Cross section.
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During August 1971, the U.S. Geological Survey made 38 d-c resistivity soundings along a profile from Blackfoot to Arco, Idaho. The purpose of the survey was threefold: 1) determine the thickness of the basalt flows of the Snake River Group, which form the main aquifer in the Snake River Plain, 2) determine the nature of the materials underlying the basalt, and 3) estimate the depth to the high-resistivity basement rocks beneath the Snake River Plain.
The locations of the VES (vertical electrical sounding) stations are shown on figure 1. All the soundings were made with the Schlumberger AMNB array with electrode spacings (AB/2) often expanded to 12,000 feet. VES 8, VES 12, VES 24, VES 29, and VES 38 were expanded to larger electrode spacings (up to 58,000 feet) using bilateral equatorial arrays, and VES 19 was expanded to 68,600 feet using a unilateral equatorial array. VES 15 was expanded to 68,600 feet using a bilateral polar array; and VES 21 was expanded to 32,000 feet using a unilateral polar array. The observed VES curves are shown in figures 2 through 17. The apparent resistivity is plotted on the ordinate axis and the Schlumberger electrode spacing (AB/2 = half distance between current electrodes), the equatorial spacing (R = distance from one current electrode to center of potential dipole), and the polar dipole spacing (r = distance between centers of current and potential dipoles) are plotted on the abscissa axis.
Figure 18 shows the geoelectric section obtained from the preliminary interpretation of the VES curves using curve matching procedures (Kalenov, 1957; Orellana and Mooney, 1966). On this section there are five geoelectrical units. The 1,000-3,000 ohm-meter layer is interpreted as dry basalt. The 300-600 ohm-meter layer is interpreted as basalt saturated with fresh water. The 100-200 ohm-meter layer is interpreted as basalt flows intercalated with clayey sedimentary rocks. The 20-40 ohm-meter layer is interpreted as sedimentary rocks and/or rhyolitic ash-flow tuff. The geoelectric basement at the bottom of the section has a high resistivity, about 500 ohm-meters or more, and it may represent Paleozoic rocks.

The deep structural trough on the southeastern part of the profile is filled with materials having a resistivity of about 40 ohm-meters. The depth to the electric basement in that structure is estimated to be at least 20,000 feet. Whether this structural trough represents a caldera or a graben cannot be determined from the available VES data.

References


Figure 2. Observed curves for VES 1, VES 2, VES 3, and VES 4.
Figure 3. Observed curves for VES 5 and VES 6.
Figure 4. Observed curves for VES 7 and VES 8.
Figure 7. Observed curves for VES 13 and VES 14.

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Figure 8. Observed curves for VES 15.
Figure 10. Observed curves for VES 18, VES 19, and VES 20.
Figure 11. Observed curves for VES 21 and VES 22.
Figure 12. Observed curves for VES 23 and VES 24.
Figure 14. Observed curves for VES 26, VES 29, and VES 30.
Figure 18. Geoelectric section across the Snake River Plain, from Blackfoot to Arco, Idaho. Solid triangles and numbers designate location and number of VES stations. Solid circles above certain station numbers designate deep soundings made with equatorial or polar arrays.

**EXPLANATION**

- 1,000-3,000 Ωm
- 300-600 Ωm
- 100-200 Ωm
- 20-40 Ωm

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