GEOTHERMAL WATERS IN THE JEMEZ MOUNTAINS VOLCANIC REGION, NORTH-CENTRAL NEW MEXICO

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Three types of hydrothermal features occur at the land surface in the Jemez Mountains volcanic mass. (1) Warm springs, on flanks of young volcanoes in the ring-fracture zone of the caldera, imply moderate depth of water circulation but no contact with the hydrothermal reservoir at depth beneath the caldera. (2) Warm acidic-sulfate springs, associated solfataras, and altered ground (principally on the resurgent dome within the caldera) are believed to indicate the ascent of steam from depth through a zone of aeration. Water from these springs is not representative of that in the hydrothermal reservoir. (3) Outside the caldera, moderately mineralized warm springs flow from limestone that underlies the volcanic pile, which in turn stands astride the marginal fault zone of the Rio Grande graben. Water from these springs apparently has moved through the subsurface from the hydrothermal reservoir, and has cooled and been diluted along the flow path. Several moderately mineralized cold springs along the marginal fault zone and adjacent fault zones, most of them farther from the caldera where the limestone is at depth beneath sandstone, discharge water of similar quality.

STRATIGRAPHIC SIGNIFICANCE OF VOCANICLASTIC PARTINGS IN COAL

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Coal-forming environments are ideal for entrapment and preservation of volcaniclastic materials with minimal contamination by inorganic deteritus or disturbance after initial deposition. The occurrence and potential stratigraphic value of such partings in coals have been largely overlooked. This is probably related to failure to recognize volcaniclastic partings in the field.

In Tertiary, non-marine rocks of Alaska, taken as a model, such partings in coals are common and widespread. However, some experience is necessary to recognize them because they show wide variation in appearance and composition. Most weather to light colors and have sharp contacts with the enclosing coal. Others may be gray or rusty and have gradational boundaries or disrupted bedding. Glass and feldspar are sometimes altered to kaolinite or montmorillonite, giving rise to a clay matrix or clay pseudomophs. Secondary cementation, particularly by siderite, may drastically alter their composition and appearance.

Several components are suitable for dating: biotite, plagioclase, and hornblende by the K-Ar method; apatite, zircon, and glass by the fission-tract method. Attempts are currently being made to use these to improve stratigraphic understanding of the thick Tertiary section on the Kenai Peninsula, Alaska.

The potential stratigraphic value of such partings are many. For example, age-dating would permit long-range correlation of rock units, most importantly with their marine equivalents. Coal beds may contain the record of volcanism in a given area over an extended period of time, including location, mode of eruption, and magma compostion.