

Hydrothermal Brecciation in Active Geothermal Systems: Results from VC-1

DENNIS L. NIELSON and JEFFREY B. HULEN  
(University of Utah Research Institute, Salt Lake City, UT 84108)

Breccias formed through hydrothermal processes have often been described from both active and fossil geothermal systems. Examples of these breccias have been cored between depths of 826 and 856 m in Continental Scientific Drilling Program corehole VC-1 which was drilled immediately south of the structural margin of the Valles caldera, New Mexico. The hydrothermal alteration mineralogy and geothermometry of secondary fluid inclusions from these cored samples demonstrates that brecciation took place at temperatures up to 300°C. The common coexistence of vapor-rich and liquid-rich inclusions shows that breccia formation took place along a reference boiling point curve. The pressures which define this boiling point curve are determined by the least principal stress. These results are consistent with independent estimates of the least principal stress. This analysis provides a quantitative model for the formation of hydrothermal breccias resulting from boiling. The likely triggering mechanism for boiling is pressure reduction due to faulting.

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3. D. L. Nielson  
Earth Science Lab.  
Univ. of Utah  
Research Institute  
391-C Chipeta Way  
Salt Lake City, UT  
84108
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