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Author
Birkholzer, Jens T.

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Jens T. Birkholzer
Ernest Orlando Lawrence Berkeley National Laboratory (LBNL)
1 Cyclotron Road
Berkeley CA 94720
phone 5104867134, fax 5104865686, jtbirkholzer@lbl.gov

In geologic repositories for storage of nuclear wastes, the heat generated by the decay of the radioactive waste may result in rock temperatures high enough to cause boiling conditions in the subsurface, which gives rise to strongly altered flow processes. These flow processes are characterized by (1) vapor production in the superheated zone close to the heat source, (2) pressure-driven vapor transport away from the heat source, (3) condensation in cooler regions, and (4) reflux of the condensate back to the heat source. Since the magnitude of such flux perturbation is extremely hard to measure in the field, we propose a simple temperature-profile method that uses high-resolution temperature data for deriving such information. The energy that is transmitted by the vapor-water reflux processes creates a nearly isothermal zone maintained at about the boiling temperature, referred to as a heat-pipe signature. Characteristic features of the temperature profile, such as the differences in the gradients inside and outside of this zone, can be used to derive the approximate magnitude of the vapor and water fluxes, for both steady-state and transient conditions. We present the analytical basis for the proposed temperature-profile method, test the method in comparison with a semi-analytical solution of thermally-driven processes, and present a sample application using measured temperature profiles from an underground heater test.