

Tracer Injection Tests in a Fracture Dominated
Geothermal System

W. F. DOWNS (EG&G Idaho, Inc., Idaho Falls, ID 83415)
 R. E. McAtee (EG&G Idaho, Inc., Idaho Falls, ID 83415)
 R. M. Capuano (University of Utah Research Inst.,
 Salt Lake City, UT 84108)
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The first phase of a Department of Energy (DOE) sponsored Hydrothermal Injection Program was conducted at the Raft River KGRA in southern Idaho. The test method used consisted of a series of "Huff-Puff" tests in which tracer inoculated solutions are injected into the reservoir during the "Huff" phase and the concentrations of these tracers are monitored in the backflowing fluid during the "Puff" phase.

The test well, RRG-5, was chosen because an analysis of sonic televiewer logs indicate that the reservoir is a fracture network. The primary chemical tracer in all tests is the injection fluid from RRG-3 which has a specific conductivity of 8,000 $\mu\text{mho/cm}$ as opposed to the fluids native to RRG-5 at 2,700 $\mu\text{mho/cm}$. The RRG-3 fluid was inoculated with a different tracer or series of tracers for each test. Three of the tracers we tried, I^- as NaI , Br^- as NaBr and B^{3+} as borax, seem to be conservative and have recovery rates near 100%. Three others, Mg^{2+} as MgCl_2 , fluorescein and rhodamine B, either adsorb on the reservoir material or, as in the case of Mg^{2+} , react with the host rock.

Three test series were run for a total of nine tests. The first test series consisted of "Huff-Puff" tests in which the secondary tracers were injected either continuously or as high concentration slugs. The test using slugs indicate that the tracer arrival time during backflow is independent of the injection time. The second test series introduced a quiescent period between injection and backflow and indicated that there was little or no natural hydrologic flow through the system. The final test was an unsuccessful well-to-well breakthrough experiment.

1. Spring Meeting
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3. Corresponding Address

Dr. W. F. Downs
EG&G Idaho, Inc.
P.O. Box 1625
Idaho Falls, ID 83415
(208) 526-8005
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