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COMPARISON OF STABLE AND UNSTABLE ISOTOPIC COMPOSITIONS FROM THERMAL GROUND WATERS IN THE SOUTHERN IDAHO BATHOLITH AND ADJACENT SNAKE RIVER PLAIN

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Published and unpublished isotopic data have been analyzed to evaluate potential relationships between thermal ground water systems in the southern Idaho Batholith, in the boundary fault zone near Boise, Idaho, and in the adjacent Snake River Plain. D/18O data were evaluated with respect to the equation $\delta\ ^{2}H = \delta^{18}O + d$, where d is the deuterium excess (nominally 10 for meteoric water). An unexpectedly wide range of d values were calculated for the various ground water regimes. Calculated values are +9 for cold ground water systems in granite, +7.1 for thermal systems in granite, -1.5 for thermal systems in the boundary fault zone, and -6 for thermal systems in the Snake River Plain. $\delta^{18}O$ shifts due to thermal equilibration with host rocks were only observed in 6 of 83 data sets.

Radiocarbon "ages" were estimated for 21 samples. Maximum estimated mean residence times were approximately 12,000, 17,000 and 23,000 years for batholith, fault zone, and Snake River Plain systems, respectively. Mixing with anthropogenic carbon and with younger ground water was evident in many analyses.

Preliminary interpretation of the data suggests these related conclusions: 1) thermal systems in the batholith and the plain were recharged under different paleoclimatic conditions, their waters have distinct stable isotopic compositions, and the systems are not hydraulically connected; 2) thermal ground waters in the fault zone may be a mix of parent thermal waters from the batholith and from the Snake River Plain with the largest component from the Plain; and 3) thermal waters have generally not been heated above 100 C°, and circulation depths are limited.