Department of Energy
Washington, DC 20585

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Mr. Joseph J. Holonich, Director
Repository Licensing and Quality
Assurance Project Directorate
Division of High-Level Waste Management
Office of Nuclear Material Safety
and Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Holonich:

Enclosed for your information are one set of recently released U.S. Geological Survey technical publications relative to ground water flow modeling entitled, "A Modular Finite-Element Model (MODFE) for Areal and Axisymmetric Ground-Water Flow Problems," prepared in three parts as follows:

Part 1: Model description and user's manual, Open File Report 90-194, by Lynn J.Torak;

Part 2: Derivation of finite-element equations and comparisons with analytical solutions, Techniques of Water-Resources Investigations (TWRI), Book 6, Chapter A4, by Richard L. Cooley; and

Part 3: Design philosophy and programming details, Open-File Report 91-471, by Lynn J. Torak.

These reports document a new program--MODFE, a MODular Finite Element model--for simulating steady- or unsteady-state, areal, and axisymmetric flow of ground water in a heterogeneous anisotropic aquifer. Parts 1 and 3 are being processed to be published in the future as TWRIs.

Physical processes that can be represented by MODFE include (1) confined flow, unconfined flow (using the Dupuit approximation), or a combination of both; (2) leakage through either rigid or elastic confining units (the latter case gives rise to what is referred to as transient leakage); (3) specified recharge or discharge at points, along lines, or areally; (4) flow across specified-flow, specified-head, or head-dependent boundaries; (5) decrease of aquifer thickness to zero under extreme water-table decline and increase of aquifer thickness from zero as the water table rises; and (6) head-dependent fluxes from springs, drainage wells, leakage across riverbeds or confining units combined with aquifer dewatering, and evapotranspiration.

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The finite-element method involves subdividing the two-dimensional spatial region into a network of subregions, called elements. The spatial element shapes used in this model are triangles and the elements are assumed to have been selected small enough that at any instant of time the true variation of head within each element is approximately linear.

Should you have any questions in this regard, please contact Sharon Skuchko of my office at (202) 586-4590.

Sincerely,

John P. Roberts
Acting Associate Director for
Systems and Compliance
Office of Civilian Radioactive
Waste Management

3 Enclosures: as stated

cc w/o Enclosures:
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