PRESENTATION TO
THE NUCLEAR WASTE TECHNICAL REVIEW BOARD

SUBJECT: TESTING OF THE SATURATED ZONE WITH REACTIVE TRACERS

PRESENTER: DR. BRUCE A. ROBINSON

PRESENTER'S TITLE AND ORGANIZATION: STAFF SCIENTIST
EARTH & ENVIRONMENTAL SCIENCES DIVISION
LOS ALAMOS NATIONAL LABORATORY
LOS ALAMOS, NEW MEXICO

PRESENTER'S TELEPHONE NUMBER: (505) 667-1910

REGISTRY HOTEL, DENVER, COLORADO
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Goals of the Reactive Tracer Study

- Demonstrate the applicability of laboratory sorption data for predicting field behavior
- Improve our understanding of transport processes in the saturated zone
- Evaluate the mobility of colloids in the saturated zone
Fracture Flow With Matrix Diffusion
Geometry for Solute Transport
Effect of Matrix Porosity

Chemical Analysis

$\phi = 0$

Concentration

Time, years

$0.001$

$0.01$

$0.05$

$0.1$

$10^0$

$10^1$

$10^2$

$10^3$

$10^4$

$10^5$
Effect of Groundwater Travel Time

Concentration

Time, years

$\tau_f = 1 \text{ yr}$

10

100
Two Well Recirculating Tracer Test

Fluid and Tracer in

Fluid and Tracer out

Sampling Port
Breakthrough Curves - Different Flow Rates

- 50 gpm
- 25 gpm
- 10 gpm

Dimensionless Concentration vs. Produced Volume, cubic meters
Sorbing Tracer Behavior

Normalized Concentration

Time, days

Conservative

$R=1, R'=5$

$R=5, R'=5$
Sorption of Lithium on Prow Pass Tuff

![Graph showing sorption of lithium on Prow Pass Tuff. The graph plots the logarithm of the concentration ratio against the logarithm of the concentration, with observed and predicted data points indicated. The graph includes symbols for observed and predicted lithium concentrations, as well as best estimate observed and predicted data.](image-url)
Colloid Transport Through Fractures
Current Status of the Project

- **Laboratory Studies**
  - Preliminary studies of Li sorption are complete.
  - Request for C-Well core samples has been approved, and isotherm experiments will be carried out when the samples are received.

- **Modeling**
  - Software development and qualification efforts are ongoing.
  - Parameter sensitivity studies are being refined and documented.

- **Field Experiments**
  - The collaboration with the USGS is in place.
  - Design calculations will be carried out once the software has been qualified for use.