

Open and Closed Vadose-Zone Water Reactions with Sideromelane and Simulated High-Level Nuclear Waste Glasses

MAURY MORGENSTEIN¹²³

¹**Anthropology Department, University of Oregon,
USA**

²**Geosciences Management International, Inc.,
Waldport, OR, USA**

³[³ Address and e-mail address 3]

The predominance of investigations concerning the dissolution of high-level nuclear waste glass in the Yucca Mountain, Nye County, Nevada proposed High-Level Nuclear Waste Repository focus on closed and semi-closed bath-type system reactions with simulated vadose water compositions. Under these conditions silica saturation and pH, in part, control the glass corrosion reactions. Flow through, open system cation-exchange reactions, as one would experience in natural environments, dominate the open literature for natural glass corrosion. This study looks at the differences between these avenues of research and the resulting glass corrosion models used to describe radionuclide release.

In order for seepage water to react with the high-level nuclear waste glass (such as simulated high-level nuclear waste glasses TDS-131 and TDS-165), the metal engineered barrier system (EBS) has to be breached. The three fundamental vadose seepage waters (calcium chloride, neutral, and alkaline) reacting with these EBS metals have different pH and compositions during and after these reactions. For Yucca Mountain there are four (4) different high-level nuclear waste glass compositions (Hanford, Savannah River, West Valley, and Idaho National Laboratory).