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Monitoring the Behavior of Cementitious and Glass Waste Form in Disposal Conditions: Lysimeter Testing

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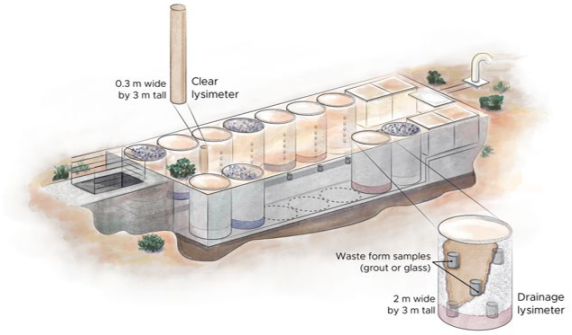

A critical factor in predicting the disposal performance of nuclear waste forms is ensuring high confidence that a link exists between waste form behavior in accelerated laboratory testing and in real-world conditions of the disposal site. Modelling can be used to establish this link, however there is no better substitute than data collected in representative disposal conditions. Lysimeter testing can be used to study waste form behavior in disposal environments. One such experiment is underway at the Hanford Site to generate waste form performance data to support the disposal of waste forms in the Integrated Disposal Facility (IDF), a near-surface burial facility located on the Hanford Site. This lysimeter experiment serves as a test platform for the IDF. Results from the test are expected to improve model descriptions of contaminant mobility, reduce uncertainties about the representativeness of laboratory results in the IDF performance assessment (PA), improve stakeholder confidence in the safe disposal of treated waste at the IDF, and facilitate the adoption of informed facility designs.

Two types of waste forms are under evaluation in individual, large (2m × 3 m) drainage lysimeters: glass and cementitious waste forms. Technetium-99 and iodine-127 were added as tracers in the cementitious waste forms to monitor contaminant mobility along with other contaminants (e.g. Cr, NO_3). Glass waste forms contain Re and Mo tracers. The experiment is now in its third full year of operations, with 9 lysimeter cells installed. Each lysimeter cell is monitored by soil gas measurements and analysis of soil pore water and drainage water. A series of buried sensors measure temperature, soil water content, and soil water tension. Multiple waste forms are placed at each location in the lysimeter to study the aging of the samples during emplacement. This presentation will cover data collected to date on both glass and cementitious waste forms and compare to previous modeling projections.