

June 22, 2009

## Quick Look Report

**Travel Dates:** May 30 to June 6, 2009

**Locations:** (1) Saclay, France, (2) Mol, Belgium, and (3) Karlsruhe, Germany

**Organizations/Committees:** (1) Commissariat à l'Énergie Atomique (CEA),  
(2) Nuclear Research Center, SCK.CEN,  
(3) Institute für Nukleare Entsorgung (INE) and Institute  
for Transuranium Element (ITU)

- Due to an unplanned French holiday on June 1, 2009, the meeting with Saclay staff was held in Sheraton Hotel at Paris De Gaulle Airport.

**Desired Outcomes:** Staff will exchange NRC views from ongoing HLW work and nuclear reactor experience with scientists of the institutes visited. These institutes are expected to have extensive experience in the selected areas. The obtained information will further our understanding of approaches to these critical areas within the international scientific community.

**Results Achieved:** The corrosion of nickel-based alloys partly including Alloy 22 was discussed with D. Feron of CEA, a leading French corrosion expert. He provided information regarding his work on long-term passivity, localized corrosion, and stress corrosion cracking of nickel-based alloys. Discussions covered more specifically (1) anodic sulfur segregation at the interface of passive film and base metal, (2) sulfur-induced stress corrosion cracking, (3) evidence of the conformance of chromium rich passive film, (3) silica deposit effects, (4) microbially-influenced corrosion, and (5) potential boron-induced accelerated corrosion.

The degradation process of high-level waste (HLW) glass was discussed with P. Van Iseghem and his associates of SCK.CEN, a leading Belgian glass scientist. They provided information regarding their work on the degradation processes of HLW glass. Discussion covered more specifically (1) most generally accepted glass dissolution models and (2) potential cracking during the glass dissolution.

The degradation process of spent nuclear fuel (SNF) was discussed with A. Loida and his associates of INE and V. Rondinella and his associates of ITU. They provided supplementary information for our understanding of the degradation processes of SNF. Discussion covered more specifically (1) SNF dissolution in the presence of iron oxides, (2) effects of hydrogen and radiolytic products on the dissolution, (3) effects of high burnup rim structure on the dissolution, and (4) electrochemical test methods.

The radionuclide transport in the engineered barrier system (EBS) and the geological media was discussed with B. Kienzler and his associates of INE. They provided information regarding their work on EBS transport of radionuclides, especially, plutonium and neptunium. Discussion covered more specifically (1) sorption and/or precipitation of radionuclides on iron oxides, (2) redox system and its effects on radionuclide transport, (3) desorption kinetics, and (4) future collaborated research in EBS radionuclide transport.

**Summary of Trip:** Staff met with other technical experts in corrosion studies of nickel-based alloys, assessments of the degradation processes of HLW glass and SNF, and assessments of radionuclide transport in EBS and geological media. The meetings were primarily to discuss and obtain information approaches to these subjects by this international scientific community. Corrosion resistance of Alloy 22 container, slow degradation of HLW glass and SNF, and radionuclide EBS transport are risk significant attributes to a robust EBS. More frequent information exchanges and potential collaborated studies were also discussed with these European workers.

**Next Steps:** Frequent information exchanges and potential collaborated studies were discussed with these European workers. These activities may involve the Center for Nuclear Waste Regulatory Analyses (CNWRA) and NRC RES.

**Policy Issues or Other Items of Commission Interest Raised** No policy issues were raised at the meetings. There are no other items of commission interest raised. Therefore, no Foreign Travel Report is planed

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