



Microscale Characterization of Corroded Nuclear Fuel Deposits From a Cracked Fuel Rod in Forsmark Unit 1, Sweden

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Abstract

Yellowish precipitates detected on a spacer surface near a cracked fuel rod at Forsmark Unit 1, Sweden, were investigated using a suite of microanalytical techniques to determine their morphology, chemical composition, and radionuclide speciation. The analyses revealed a diverse range of particles dominated by uranium (U) phases containing fission products and transuranium radionuclides. By correlating the experimental results with calculated radionuclide inventories, the deposits were attributed to corroded fuel fragments released as fine aggregates during reactor operation, followed by oxidation of U.

These findings provide new insights into fuel corrosion, deposition processes, and radionuclide composition in leaked fuel assemblies. Improved understanding of fuel dissolution following fuel failure can support more reliable assessments of fuel damage and the formation and composition of corrosion products in intermediate- and high-level radioactive waste.