



Preface

The 2004 Spent Fuel Workshop was held on April 19–20, 2004, in Lake Forest, IL, USA (about 30 miles north of Chicago). The workshop was attended by 37 participants from nine countries (Belgium, Canada, Germany, Finland, France, Sweden, Switzerland, and the United States), representing 20 organizations. The 2004 Spent Fuel Workshop was the first held in North America after five years overseas, and the first to be held in the USA in six years.

First convened in 1987, the Spent Fuel Workshop began as an ad hoc gathering of researchers studying spent fuel, especially its potential long-term behavior in a deep geological repository, and has been held more or less annually since. Workshop attendance has grown from an initial group of about 15 researchers, reflecting, in part, increased research efforts by several nations on the geologic disposal of spent fuel. Such growth also reflects our increased knowledge, as more fundamental processes of spent fuel corrosion have been examined. Topics discussed at the 2004 Spent Fuel Workshop included: (1) Evolution of Spent Fuel Prior to Water Access; (2) Spent Fuel Dissolution and the Near Field Environment; (3) Spent Fuel Oxidation and Corrosion Products; (4) Radionuclides in Spent Fuel; (5) Spent Fuel Dissolution; (6) and Radiolysis, as well as several programmatic overviews. The nine papers reproduced here represent a small subset of the 28 presentations made at the April 2004 workshop, as many workshop presentations represent only preliminary results. The papers presented here are, in a general sense, arranged in order from the more phenomenological to those papers which present models for use in performance assessment. They are:

'Gamma Radiolysis of NaCl Brine: effect of dissolved radiolysis gases on the radiolytic yield of long-lived products' by Kelm et al., 'The Effects of Alpha Radiolysis on UO₂ Dissolution Determined from batch Experiments with ²³⁸Pu-doped UO₂' by Stroes-Gascoyne et al., 'The inhibiting effects of hydrogen on the corrosion of uranium dioxide under nuclear waste disposal conditions' by Broczkowski et al., 'Radionuclide release from high burn-up spent fuel during corrosion in salt brine in the presence of hydrogen overpressure' by Loida et al., 'Leaching behaviour of unirradiated high temperature reactors (HTR) UO₂-ThO₂ mixed oxides fuel particles' by Alliot et al., 'Radiolytic modelling of spent fuel oxidative dissolution mechanism. Calibration against UO₂ dynamic leaching experiments' by Merino et al., 'Enhanced diffusion under alpha self irradiation in spent nuclear fuel: theoretical approaches' by Ferry et al., 'Spent Fuel radionuclide source term model for assessing spent fuel performance in geological disposal. Part I: Assessment of the Instant Release Fraction' by Johnson et al., and 'Spent Fuel radionuclide source term model for assessing spent fuel performance in geological disposal. Part II: Matrix alteration model and global performance' by Poinssot et al.

Beyond the Spent Fuel Workshop, these papers are also representative of the current research dynamism in this area due to the necessity of providing to the stakeholders scientific and technical data about one of the potential management options for spent fuel: direct disposal. Most of the current scientific issues related to the direct disposal in geological formations are covered here: evolution of spent fuel prior to the water access, radiolytic dissolution mechanism, influence of hydrogen. . .

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