ASTM PAPERS-FOREWORD

This Seminar* on Accelerated Testing of Materials in Spent Nuclear Fuel and High Level Waste Storage Systems focused on the role and understanding of accelerated testing to qualify materials for spent nuclear fuel (SNF) and storage of vitrified HLW and repository systems, noting the conclusions and issues raised in the Jan 26–27, 2005 seminar; it also included a workshop on surveillance and performance evaluation systems.

The identification of related important alteration mechanisms to qualify[1] materials used for HLW glass and spent nuclear fuel interim dry storage systems and repositories was also addressed. The ability of the cask materials used in interim storage, and the components of the engineered barrier system (waste form, waste package, backfill, etc) used in repository disposal to contain and control radionuclide release, and maintain criticality control and shielding capability was discussed. Materials related to the interim storage and transport (such as polymers, coatings, and storage cask shielding materials) and the geologic disposal (such as metallic engineered barrier materials, spent fuel and HLW glass waste forms, waste form shielding and criticality materials and backfill) are considered.

Papers by Messrs Issard et al., Mizia et al., and Pierce et al. appear in this issue of Nuclear Technology. Other titles and abstracts are given in the program abstract reference.*

In addition, a workshop was held to discuss the conceptual feasibility of material systems to implement ongoing operating surveillance and performance evaluation using the capabilities of "smart materials" with an appropriate detection system to transmit and interpret the information on the condition of the waste form or barrier system. The smart material (SM) could be a "coupon" external to the waste form or barrier system or the SM could be embedded in the barrier materials or placed on the waste forms. The SM concept and associated detection system should be based on established physical, chemical, and mechanical processes. Characteristics like corrosion depth, nuclide mobilization/migration, stress levels, and moisture need to be monitored with a particular "ppm" sensitivity. Corrosion potentials, eddy current testing, visual profilometry range energy relations, luminescence, stress sensors, radiation spectroscopy, photoelectric effect, nanomaterials, embedded radioactive and/or light stimulated materials and other phenomena can be considered.

The ASTM International Subcommittee C26.13 appreciates this publication. Our goal is to improve the understanding of the safety and confidence in high level nuclear waste storage.

Guest editors:
Ed Kuhn, Consultant
Dick Blauvelt, Chairman ASTM Subcommittee C26.07
Gary Smith, Chairman ASTM Subcommittee C26.13

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[1] By qualification, we mean the establishment of a scientific and engineering basis and understanding of material performance to support regulatory requirements and the licensing process. For example, by combining the understanding of alteration mechanisms with appropriate accelerated testing programs, a credible monitoring and failure prediction capability is possible. The real goal is to be able to detect incipient failures long before serious degradations unfold in time blocks that provide confidence to society. [*Materials Partial Special Issue: Introduction*. Nucl. Technol. Vol 155, No. 2, p. 119, 2006.]

*Program and Abstracts, Second Seminar on Accelerated Testing of Materials in Spent Nuclear Fuel and High Level Waste Storage Systems, sponsored by ASTM Committee C26 on Nuclear Fuel Cycle and Subcommittee C26.13 on Spent Fuel and High Level Waste, January 31–February 1, 2008, Tampa FL. Contact ASTM C26 Staff Manager Joe Koury (610) 832-9804.