

## WM2009 Conference Panel Report

### **Panel Session 63 - Progress in Radwaste Systems for New Nuclear Power Plants**

Panel Reporter: Jay Maisler, Enercon Services, USA

Panelists included:

- Jay Maisler, Senior Consultant, Enercon Services, Inc.
- Sean Bushart, Program Manager, EPRI
- Brian McIntyre, US EPR Design Certification Project Manager, AREVA NP
- Jean-Claude Dehmel, Senior Health Physicist, US Nuclear Regulatory Commission

Jay Maisler started the Panel Session with an update on progress for licensing new nuclear plants in the US. In order to satisfy continued growth in demand for electricity and to replace aging power plants in the US, additional base load capacity must be installed. Two technologies are viable for this purpose: coal and nuclear power plants. Economics and public opinion now make nuclear power an attractive alternative. Nuclear power supports goals for reducing carbon emissions as these plants do not contribute greenhouse gas emissions. As of the end of 2008, seventeen combined license applications were submitted and accepted by the NRC. Mr. Maisler provided an overview of the combined license application process, which streamlines the process used to license the current US fleet of NPPs. NRC's review of these applications includes consideration of the radioactive waste management features. The Panelists discussed industry activities related to radioactive waste processing and operation in the new nuclear plants, new plant design, and regulatory experience from application reviews.

Sean Bushart discussed EPRI's LLW new plant activities. Dr. Bushart noted two objectives of these activities: 1) Implement operating experience, lessons learned, and advanced technologies in the design, construction, and operation of new NPPs; and 2) Liquid processing strategy flexibility and solid waste minimization. The benefits from achieving these objectives include improved operations, dose exposure reduction, waste volume reduction, environmental protection, and cost savings. EPRI has studied LLW radioactive waste systems for the Westinghouse AP1000 and GE Hitachi ESBWR. These studies resulted in three recommendations for advanced nuclear plant designs: 1) plants shall be designed to support, but not dictate, 100% recycle of processed liquids; 2) radioactive waste systems should be designed to support 5 days/8 hours a day, single shift staffing for routine operations; and 3) radioactive waste processing system will be composed of mobile/skid-mounted components. In the future, EPRI plans to study design certification documents for the AREVA EPR and Mitsubishi USAPWR. These additional design studies, coupled with industry experience from combined license applications will be considered in technical support for detailed design and design implementation.

Brian McIntyre provided an overview of the AREVA EPR reactor design. In 1989, Framatome and Siemens agreed on development of a common next generation PWR. Design efforts through the 1990 have resulted in the first order to construct a European EPR in Finland in 2003. EPRs are also under construction in France and have been ordered by Taiwan. An application for design certification was submitted to the NRC in 2007. Mr. McIntyre commented that the EPR is an evolutionary design based on existing PWR construction experience, R&D, operating experience, and "lessons learned." Improvements to safety include reduced occupational exposure and LLW, increase design margins, increased redundancy and physical separation of safety trains, reduced core damage frequency, and accommodation of severe accidents and external hazards with no long-term local population effect.

Operations are also improved by reducing generation cost by at least 10%, simplifying operations and maintenance, and a 60-year design life for the EPR. Mr. McIntyre discussed the major design features, the reactor coolant system, and plant layout. In summary, the EPR design is evolutionary, most features are typical of operating PWRs, features are included to improve safety, critical systems are protected from external events, human factors improvements are included, and plant systems, structures, and components enhance reliability.

Jean Claude Dehmel presented an overview of NRC staff observations from their review of radioactive waste topics in design certification and combined license applications for NPPs. Mr. Dehmel identified issues concerning incomplete information in these applications related to regulations and guidance, system designs, combined license “Information Items,” dose assessment, and the request for additional information process. Some examples of issues NRC has encountered regarding regulations and guidance include, inaccurate regulatory and guidance references, application of conceptual design requirements provided under 10 CFR 52.47(a)(24) and (25), and how applicants treat guidance in Regulatory Guides and the NRC Standard Review Plan (for license applications). System design features and system interfaces were sometimes incomplete. Performance criteria for adsorption and filtration media did not address current technological capabilities. Combine license applicant “Information Items” did not completely address confirmation of performance of adsorption and filtration media or performance of process and radiation monitoring systems. Other issues were identified with the basis for liquid and gaseous effluent source terms and radioactive source term development approach and models. With regard to applicant responses to NRC requests for additional information, Mr. Dehmel commented that resolved responses were not included in design certification documents or FSAR updates. In some cases, resolution of one request for additional information effectively voided the closure of a prior request for additional information.

The Panel discussion and interaction with the audience highlighted the evolutionary nature of the new plant licensing process in the US is evolving. Advancements in radioactive waste processing and system operation have been considered in the new plant design. The US industry is working through a new licensing process. This process presents challenges to the industry for submittal of quality applications that provide NRC reasonable assurance that the next generation of nuclear plants will be constructed and operated safely.