

Seminar Abstract

Initial Technical Lessons Learned following the Post-Quake, Post-Tsunami, Fukushima Dai-ichi, Units 1-6, Nuclear Power Plant Accident

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ABSTRACT

The Japanese Fukushima Dai-ichi (D1) and Dai-ni (D2) nuclear power station with 4 GE-BWRs (4 x Mark I type) units (U1-4) at one site and 2 BWR units (U5-6; 1 each, Mark I, Mark II) respectively co-located side-by-side on the north-central eastern coast of Japan withstood a 9.0 earthquake and a large-scale tsunami on March 11, 2011. All six units were constructed via a GE/Hitachi/Toshiba collaboration from 1967-1979. Two planned GE ABWRs due to begin construction in 2012 have recently been cancelled. In spite of the immediate shut down of all units (D1, U4 was shutdown at the time) based on ground-level acceleration and decay heat cooling for some 30-45 minutes, loss of offsite power by ingress of water into the earthquake-proof diesel generators' pit, initiated an event that can be broadly defined as loss-of-heat-sink, classified as a 'beyond design basis accident'. Further, along with decay heat cooling of the reactor core, all units faced additional, unanticipated challenge of decay heat cooling of spent fuel pool situated above the reactor core in proximity of both the core and containment building. In fact, for U1-4, the spent fuel pool is situated in a lightly-structured confinement building. The seminar will provide a quick overview of technical and some non-technical lessons learned based multiple media sources on what occurred and how the accident was managed.

Biosketch



Akira Tokuhiko is Professor of Mechanical and Nuclear Engineering at the University of Idaho. Dr. Tokuhiko has a Ph.D. in Nuclear Engineering (Purdue), MS in Mechanical Engineering (U. Rochester), B.S.E. in Engineering-Physics (Purdue) and 10 years of international experience in advanced reactor R&D (Paul Scherrer Institute and Japan Atomic Energy Agency), as well as experience at ANL and Battelle Columbus Laboratories. At PSI, he was part of the Simplified Boiling Water Reactor safety systems testing project and a separate effects test for direct contact condensation. At JAEA he developed ultrasonic velocimetry for liquid metal separate effects thermohydraulics experiment, as part of an effort to develop the Japanese sodium fast reactor. In recent years, he has worked on a number of DOE nuclear energy R&D projects; these are on the sodium fast reactor (high-fidelity experiments and simulations), Next Generation Nuclear Plant on graphite dust safety thermo-mechanics experiments, modeling and simulations, and experiments, modeling and simulations of the emergency cooling system. He was previously on the Mechanical and Nuclear Engineering faculty at Kansas State University and University of Missouri-Rolla. He was also Director of the UMR Reactor and Senior Reactor Operator. His interests are in reactor engineering and design, thermal-hydraulics, liquid metals, convective heat transfer, ultrasonic and laser-based velocimetry, modeling & simulation in coupled thermohydraulics and reactor physics (multiphysics), application of gel materials, facial and voice expression biometrics and energy dynamics modeling & simulations. To date he has 110+ archival journal and conference papers and now about 30 graduates.