FOREWORD

SPECIAL ISSUE ON THE SECOND INTERNATIONAL TOPICAL MEETING ON THE SAFETY AND TECHNOLOGY OF NUCLEAR HYDROGEN PRODUCTION, CONTROL, AND MANAGEMENT

Guest Editor

J. STEPHEN HERRING
Idaho National Laboratory

This issue of *Nuclear Technology* features selected papers from the Second International Topical Meeting on the Safety and Technology of Nuclear Hydrogen Production, Control, and Management (ST-NH_2), an embedded topical meeting held during the June 2010 meeting of the American Nuclear Society in San Diego, California. ST-NH_2 was cosponsored by the Environmental Sciences Division's Working Group on Nuclear Production of Hydrogen and by the Nuclear Installation Safety Division. Kevin O'Kula of Washington Safety Management Solutions was the technical program chair. The topical meeting was divided into two tracks: the production of hydrogen using nuclear energy and the control of hydrogen released in accidents or due to radioactive decay. Steve Herring of the Idaho National Laboratory was the technical program cochair for the production track, and Dana Powers of Sandia National Laboratories was the cochair for the control track. Ken Schultz of General Atomics and Ben Cross of Savannah River National Laboratory also assisted in organizing the topical.

Dan Keuter, retired Vice President of Entergy Nuclear, was the general chair and gave the keynote address, "Utility Production of Hydrogen from Nuclear Energy—Historical Perspective and Future Possibilities." Following the keynote address, three presentations reviewed the worldwide status of research on the nuclear production of hydrogen: Ibrahim Khamis and Atam Rao of the International Atomic Energy Agency presented "Hydrogen Production Using Nuclear Energy—Summary of Some International Programs and the IAEA HEEP Software," Shusaku Shiozawa of the Japan Atomic Energy Agency presented "The Current Status of the HTTR Project," and Jonghwa Chang of the Korea Atomic Energy Research Institute presented "Vision and Challenges for the Nuclear Hydrogen in Korea."

ST-NH_2 provided a forum for summarizing the results of the U.S. Department of Energy's Nuclear Hydrogen Initiative (NHI), which had concluded in September 2009, as well as to hear about ongoing research. The papers on the control and management of hydrogen during nuclear accidents are particularly important and relevant, given the role that hydrogen explosions played at Fukushima Daiichi following the March 11, 2011, tsunami.

The papers included in this special issue were selected by the ST-NH_2 technical program committee to capture the most noteworthy advances and new information in nuclear hydrogen work from around the world. In the production track, special emphasis was given to papers documenting the results of the NHI Integrated Laboratory Scale experiments. The authors were then invited to update their papers and to submit them for additional peer review for this special edition.

The papers selected for this issue are arranged to first discuss the control and management of hydrogen produced in accidents. We begin with a paper on the flammability limits of hydrogen/air mixtures followed by two papers on recombiners: the first models the ignition limits in hydrogen/steam/air mixtures and the second shows the development of an improved catalyst. The final paper in this set concerns modeling of hydrogen generation in radioactive waste containers.

The second set of papers deals with the production of hydrogen as an energy carrier. The production papers begin with an overview of hydrogen production in addressing energy security and climate change, and a second paper shows how hydrogen production can be a means of balancing the intermittent nature of renewables. The next paper describes progress on high-temperature electrolysis and coelectrolysis. The final three papers summarize the experiences of the General Atomics/Sandia/CEA group in the development of the sulfur-iodine cycle.

We believe that these selected papers provide the nuclear hydrogen community with a timely overview of progress on the nuclear and chemical technology, plant integration, and safety and environment fronts.