

FOREWORD

SPECIAL ISSUE ON SAFEGUARDS

Guest Editor

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This issue of *Nuclear Technology* features papers from the *International Conference on the Nuclear Fuel Cycle: Sustainable Options & Industrial Perspectives (GLOBAL 2009)*, which was held in Paris, France, September 6–11, 2009. The *GLOBAL* conference series is an international forum focused on scientific and technical developments in the nuclear fuel cycle, and it provides an excellent opportunity to review and discuss national decisions and policies affecting nuclear energy. Participants include leaders in industry and academia, research and development institutions, national regulatory bodies, and the International Atomic Energy Agency (IAEA), among others.

The papers selected for this issue are from Track 9 of *GLOBAL 2009*, which was titled “Developments in Nuclear Nonproliferation Technologies, Policy and Implementation.” Specifically, the papers are from the sessions in Track 9 on “Proliferation Resistance and Physical Protection (PR&PP) Assessment Methods,” “Design and Implementation of Safeguards,” and “Denaturing Plutonium to Reduce its Attractiveness.” Also included in this issue are a few other related new papers.

According to the 2002 IAEA report “Proliferation Resistance Fundamentals for Future Nuclear Energy Systems” (IAEA STR-332) and adopted by numerous subsequent studies pertaining to assessing the nuclear proliferation threat of civilian nuclear energy systems (NESs), *proliferation resistance* is defined as “. . . that characteristic of a nuclear system that impedes the diversion or undeclared production of nuclear material, or misuse of technology, by the States in order to acquire nuclear weapons or other nuclear explosive devices.”

Furthermore, IAEA STR-332 states that “The degree of proliferation resistance results from a combination of, *inter alia*, technical design features, operational modalities, institutional arrangements and safeguards measures.”

Among the design requirements for future nuclear energy systems—such as improved safety and reliability, sustainability, and economics—is demonstrably robust proliferation resistance. Two prominent and internationally adopted methodologies for evaluating the proliferation resistance of nuclear energy systems are the IAEA International Project on Innovative Nuclear Reactors and Fuel Cycles (INPRO) and the Generation IV International Forum (GIF) PR&PP Evaluation Methodology. Proliferation resistance evaluation performed in the early stages of design provides opportunities to recognize and incorporate system design improvements, to investigate more efficient and effective safeguards approaches, and to identify and pursue worthwhile nuclear energy and safeguards technology development.

The papers included in this special issue were selected to demonstrate the advances and to discuss the remaining challenges for proliferation resistance evaluation and for design and implementation of safeguards technology and approaches. The authors were invited to update their *GLOBAL 2009* papers and to submit them for additional peer review for this special edition.