Foreword

This special issue of *Nuclear Technology* features invited, peer-reviewed articles on the Standardized Computer Analyses for Licensing Evaluation (SCALE) software package, which is used worldwide for nuclear design and safety analyses. Computational analyses are essential to the effective design, safety, and licensing of nuclear facilities and materials, and the cost and limited availability of experimental facilities have led to increased reliance on analyses. The accuracy, reliability, usability, and availability of computational analysis tools, such as SCALE, that are used to perform these analyses are vital to the continued safe and effective use of nuclear technology. Equally important is that users and developers of the computational tools have a basic understanding of the underlying theory, methods of solution, intended use, and potential limitations. This special issue is intended to provide specifics on the key capabilities within the SCALE code system, which is developed, maintained, and distributed by the Oak Ridge National Laboratory.

Development of the SCALE code package was initiated in 1976 for the Nuclear Regulatory Commission to support regulatory activities related to the nuclear fuel cycle, with emphasis on out-of-reactor nuclear safety analyses involving spent nuclear fuel. The SCALE package was developed from the outset to be modular and was assembled with preexisting, established codes that performed multigroup cross-section self-shielding, criticality safety, radiation transport, isotopic depletion/decay, heat transfer, and other computations required for the supported applications. Over the past three decades, the capabilities in SCALE have significantly expanded to address a broader class of problems and reflect the varied needs of numerous sponsors. This special issue highlights the key capabilities present in Version 6 of the SCALE code package, which was publically released via the Radiation Safety Information Computational Center in February 2009. These capabilities include nuclear data processing, spent fuel characterization, lattice physics, criticality safety, sensitivity/uncertainty analyses, and radiation shielding.

The topics in this issue were selected to cover the key capability areas within the SCALE package, and the individual articles provide detailed technical information on the codes, underlying methods, implementation, and verification and validation. I hope that the papers will be of broad interest to the *Nuclear Technology* readership and serve as definitive references for the SCALE codes and capabilities the articles describe. I would like to express my gratitude to the authors, reviewers, and *Nuclear Technology* staff for their patience and efforts in preparing this special issue.

John C. Wagner
Reactor and Nuclear Systems Division, Oak Ridge National Laboratory
Guest Editor