

## SCALE PUBLICATIONS

### SCALE General

*SCALE: A Modular Code System for Performing Standardized Computer Analyses for Licensing Evaluation*, Vols. I-III, NUREG/CR-0200, Rev. 4 (ORNL/NUREG/CSD-2/R4), April 1995. Available from Radiation Shielding Information Center at Oak Ridge National Laboratory as CCC-545.

Stephen M. Bowman, Cecil V. Parks, and S. Kay Martin, "Maintaining SCALE as a Reliable Computational System for Criticality Safety Analysis," *Trans. Am. Nucl. Soc.* **72**, 198 (1995).

S. M. Bowman, *OFFSCALE: A PC Input Processor for the SCALE Code System, The CSASIN Processor for the Criticality Sequences*, NUREG/CR-6182, Vol. 1 (ORNL/TM-12663/V1), November 1994.

S. M. Bowman, *OFFSCALE: A PC Input Processor for the SCALE Code System, The ORIGNATE Processor for ORIGEN-S*, NUREG/CR-6182, Vol. 2 (ORNL/TM-12263/V2), November 1994.

C. V. Parks, L. M. Petrie, J. Mannes Schmidt, J. L. Bartley, "SCALE-4: An Updated Version of the Modular Code System for Performing Standardized Computer Analysis For Licensing Evaluation," *Proceedings of ANS/ENS International Topical Meeting on Advances in Mathematics, Computations, and Reactor Physics*, April 28-May 1, 1991, Pittsburgh, PA.

C. V. Parks, "Overview of the SCALE-4 Code System," Presented at Seminar on SCALE-4 and Related Modular Systems for the Evaluation of Nuclear Fuel Facilities and Package Design Featuring Criticality, Shielding, and Heat Transfer Capabilities, September 17-19, 1991, OECD NEA Data Bank, Saclay, France.

C. V. Parks, "SCALE-4: An Improved Computational System for Spent-Fuel Cask Analysis," *Proceedings of the 9th International Symposium on the Packaging and Transportation of Radioactive Materials*, June 11-16, 1989, Washington, DC, CONF-890631, Vol. 3, pp. 1545-1552.

C. V. Parks, *Summary Description of the SCALE Modular Code System*, NUREG/CR-5033 (ORNL/CSD/TM-252), Martin Marietta Energy Systems, Inc., Oak Ridge Natl. Lab., December 1987.

C. V. Parks, "Application of SCALE to Analysis of Spent Fuel Casks," *Proceedings of the IAEA International Symposium on the Packaging and Transport of Radioactive Materials (PATRAM '86)*, IAEA-SM-286/62P, Vol. 2, pp. 385-393, Davos, Switzerland, June 16-20, 1986.

C. V. Parks and R. M. Westfall, *History and Overview of the SCALE System*, "Workshop on the SCALE-3 Modular System," Saclay, France, 24-27 June 1986, **Newsletter of the NEA Data Bank No. 33**, pp. 5-19, October 1986.

## **SCALE Shielding**

S. M. Bowman, "SCALE-PC Shielding Analysis Sequences," *ANS 1996 Radiation Protection and Shielding Division Topical Meeting*, Cape Cod, Massachusetts, April 21-25, 1996.

B. L. Broadhead and C. V. Parks, "Overview of SCALE System Shielding Capabilities," *Trans. Am. Nucl. Soc.* **73**, 360-61 (1995).

J. S. Tang and B. L. Broadhead, "Applications of SAS4 Monte Carlo Shielding Sequence to Deep-Penetration Problems," *Trans. Am. Nucl. Soc.* **73**, 361-63 (1995).

J. S. Tang and B. L. Broadhead, "Development and Application of the Automated Monte Carlo Biasing Procedure in SAS4," *Proc. Seminar on Advanced Monte Carlo Computer Programs for Radiation Transport*, April 27-29, 1993, Centre d'Etudes, Saclay, France.

B. L. Broadhead, J. S. Tang, and C. V. Parks, "SAS1 and SAS4, Two New Shielding Analysis Sequences for Spent Fuel Casks," *Proc. Seminar on SCALE-4 and Related Modular Systems for the Evaluation of Nuclear Facilities and Package Design Featuring Criticality, Shielding and Transfer Capabilities*, Saclay, France, September 17-19, 1991, pp. 210-221.

B. L. Broadhead, C. V. Parks, "SCALE-4 Shipping Cask Shielding Applications," *Proc. Seminar on SCALE-4 and Related Modular Systems for the Evaluation of Nuclear Facilities and Package Design Featuring Criticality, Shielding and Transfer Capabilities*, Saclay, France, September 17-19, 1991, pp. 33-46

B. L. Broadhead, "An Overview of the QADS Code," *Proc. Seminar on SCALE-4 and Related Modular Systems for the Evaluation of Nuclear Facilities and Package Design Featuring Criticality, Shielding and Transfer Capabilities*, Saclay, France, September 17-19, 1991, pp. 163-174.

B. L. Broadhead, J. S. Tang, C. V. Parks, "SAS1 and SAS4, Two New Shielding Analysis Sequences for Spent Fuel Casks," *Proc. Seminar on SCALE-4 and Related Modular Systems for the Evaluation of Nuclear Facilities and Package Design Featuring Criticality, Shielding and Transfer Capabilities*, Saclay, France, September 17-19, 1991, pp. 210-221.

## **SCALE Criticality**

D. F. Hollenbach, L. M. Petrie, N. F. Landers, *KENO-VI: A General Quadratic Version of the KENO Program*, ORNL/TM-13011, 1996.

D. F. Hollenbach, S. M. Bowman, L. M. Petrie, and C. V. Parks, "New Enhancements to SCALE for Criticality Safety Analysis," *Presented at ICNC'95, Fifth International Conference on Nuclear Criticality Safety*, Albuquerque, NM, September 17-21, 1995.

C. V. Parks, R. Q. Wright, and W. C. Jordan, *Adequacy of the 123-Group Cross-Section Library for Criticality Analyses of Water-Moderated Uranium Systems,* NUREG/CR-6328 (ORNL/TM-12970), 1995.

S. M. Bowman, *OFFSCALE: A PC Input Processor for the SCALE Code System, The CSASIN Processor for the Criticality Sequences,* NUREG/CR-6182, Vol. 1 (ORNL/TM-12663/V1), November 1994.

M. D. DeHart and S. M. Bowman, *Validation of the SCALE Broad Structure 44-Group ENDF/B-V Cross-Section Library for Use in Criticality Safety Analyses,* NUREG/CR-6102 (ORNL/TM-12460), September 1994.

C. V. Parks, "The SCALE Criticality Safety Analysis Sequences: Status and Future Directions," *Trans. Am. Nucl. Soc.* **68(A)**, 237-238 (1993).

D. F. Hollenbach, L. M. Petrie, and N. F. Landers, "KENO-VI: A Monte Carlo Criticality Program with Generalized Quadratic Geometry," Proc. ANS 1993 Topical Meeting on Physics and Methods in Criticality Safety, September 19–23, 1993, Nashville, Tennessee.

Stephen M. Bowman, "OFFSCALE: PC Input Processor for SCALE-4 Criticality Sequences," *Proceedings of Seminar on SCALE-4 and Related Modular Systems for the Evaluation of Nuclear Fuel Facilities and Package Design Featuring Criticality, Shielding, and Heat Transfer Capabilities,* OECD NEA Data Bank, Saclay, September 17-19, 1991.

L. M. Petrie, N. F. Landers, N. M. Greene, and C. V. Parks, "New SCALE-4 Features Related to Cross-Section Processing," Presented at Seminar on SCALE-4 and Related Modular Systems for the Evaluation of Nuclear Fuel Facilities and Package Design Featuring Criticality, Shielding, and Heat Transfer Capabilities, September 17-19, 1991, OECD NEA Data Bank, Saclay, France.

W. C. Jordan, C. V. Parks, L. M. Petrie, "An Improved Dancoff Correction Factor for the SCALE Code System," *Trans. Am. Nucl. Soc.* **56**, 324-325, June 1988.

C. V. Parks, L. M. Petrie, N. F. Landers, and J. A. Bucholz, *Computational Methods for Criticality Safety Analysis within the SCALE System,* "Workshop on the SCALE-3 Modular System," Saclay, France, 24-27 June 1986, **Newsletter of the NEA Data Bank No. 33**, pp. 31-44, October 1986.

### **SCALE Source Terms/Decay Heat**

L. C. Leal, O. W. Hermann, C. V. Parks, "Automatic Rapid Processing SCALE/SAS2H-Produced Parameter-Dependent Cross Sections for ORIGEN-S," *Trans. Am. Nucl. Soc.* **70**, 356-358 (1994).

S. M. Bowman, *OFFSCALE: A PC Input Processor for the SCALE Code System, The ORIGNATE Processor for ORIGEN-S,* NUREG/CR-6182, Vol. 2 (ORNL/TM-12263/V2), November 1994.

O. W. Hermann, J. P. Renier, and C. V. Parks, *Technical Support for a Proposed Decay Heat Guide Using SAS2/ORIGEN-S Data*, NUREG/CR-5625 (ORNL-6698), Martin Marietta Energy Systems, Inc., Oak Ridge Natl. Lab., September 1994.

C. V. Parks, "Overview of ORIGEN2 and ORIGEN-S: Capabilities and Limitations," *Proc. of Third International Conference on High Level Radioactive Waste Management*, Las Vegas, NV, April 12-16, 1992, Vol. 1, pp. 57-63.

Stephen M. Bowman, "ORIGNATE-PC Input Processor for ORIGEN-S," 1991 International High-Level Radioactive Waste Management Conference, Las Vegas, Nevada, April 12-16, 1992.

Stephen M. Bowman, "ORIGNATE: PC Input Processor for ORIGEN-S," *Proceedings of Seminar on SCALE-4 and Related Modular Systems for the Evaluation of Nuclear Fuel Facilities and Package Design Featuring Criticality, Shielding, and Heat Transfer Capabilities*, OECD NEA Data Bank, Saclay, September 17-19, 1991.

C. V. Parks, O. W. Hermann and B. L. Broadhead, "The SCALE Analysis Sequence for LWR Fuel Depletion," *Proc. of ANS/ENS International Topical Meeting*, Pittsburgh, PA, April 28-May 1, 1991, pp. 10.2 3.1-10.2 3-14.

O. W. Hermann and C. V. Parks, "SAS2H: The SCALE-4 Analysis Sequence for LWR Fuel Depletion," Presented at Seminar on SCALE-4 and Related Modular Systems for the Evaluation of Nuclear Fuel Facilities and Package Design Featuring Criticality, Shielding, and Heat Transfer Capabilities, September 17-19, 1991, OECD NEA Data Bank, Saclay, France.

C. V. Parks, O. W. Hermann, and J. C. Ryman, *Evaluation of Spent Fuel Isotopics, Radiation Spectra, and Decay Heat Using the SCALE Computational System*, "Workshop on the SCALE-3 Modular System," Saclay, France, 24-27 June 1986, **Newsletter of the NEA Data Bank No. 33**, pp. 96-124, October 1986.

C. V. Parks, J. S. Tang, O. W. Hermann, J. A. Bucholz, and M. B. Emmett, *Shielding Analysis Methods Available in the SCALE Computational System*, "Workshop on the SCALE-3 Modular System," Saclay, France, 24-27 June 1986, **Newsletter of the NEA Data Bank NO. 33**, pp. 45-66, October 1986.

## **SCALE Validation**

S. M. Bowman, R. Q. Wright, M. D. DeHart, C. V. Parks, and L. M. Petrie, "Recent Validation Experience with Multigroup Cross-Section Libraries and SCALE," *ICNC '95 Fifth International Conference on Nuclear Criticality Safety, Albuquerque, N.M., September 17-21, 1995*.

B. L. Broadhead, J. S. Tang, R. L. Childs, C. V. Parks, H. Taniuchi, *Evaluation of Shielding Analysis Methods in Spent Fuel Cask Environments*, EPRI TR-104329, Electric Power Research Institute, May 1995.

O. W. Hermann, S. M. Bowman, M. C. Brady, and C. V. Parks, *Validation of the SCALE System for PWR Spent Fuel Isotopic Composition Analyses*, ORNL/TM-12667, March 1995.

Stephen M. Bowman, Mark D. DeHart, and Cecil V. Parks, "Validation of SCALE-4 for Burnup Credit Applications," *Nucl. Tech.* **110**, 53 (April 1995).

M. D. DeHart, O. W. Hermann, and C. V. Parks, "Validation of SCALE Depletion Methods for PWR Spent Fuel Isotopic Characterization," *Trans. Am. Nucl. Soc.* **73**, 361-63 (1995).

O. W. Hermann, J. P. Renier, and C. V. Parks, *Technical Support for a Proposed Decay Heat Guide Using SAS2/ORIGEN-S Data*, NUREG/CR-5625 (ORNL-6698), Martin Marietta Energy Systems, Inc., Oak Ridge Natl. Lab., September 1994.

M. D. DeHart and S. M. Bowman, *Validation of the SCALE Broad Structure 44-Group ENDF/B-V Cross-Section Library for Use in Criticality Safety Analyses*, NUREG/CR-6102 (ORNL/TM-12460), September 1994.

S. M. Bowman and H. Taniuchi, "Burnup Credit Validation of SCALE-4 Using Mixed-Oxide Critical Experiments," *Trans. Am. Nucl. Soc.* **68(A)**, 241, San Diego, California, June 20-24, 1993.

W. C. Jordan, *Validation of SCALE 4.0—CSAS25 Module and the 27-Group ENDF/B-IV Cross-Section Library for Low-Enriched Uranium Systems*, ORNL/CSD/TM-287, February 1993.

S. M. Bowman, R. Q. Wright, H. Taniuchi, and M. D. DeHart, "Validation of SCALE-4 Criticality Sequences Using ENDF/B-V Data," *1993 Topical Meeting on Physics and Methods in Criticality Safety*, Nashville, Tennessee, September 19-23, 1993.

M. B. Emmett, "Validation and Verification of the ORNL Monte Carlo Codes for Nuclear Safety Analyses," *Proc. ANS 1993 Winter Meeting*, November 14-19, 1993, San Francisco, California.

O. W. Hermann, M. C. Brady, C. V. Parks, "Validation of Spent Fuel Isotopics Predicted by the SCALE-4 Depletion Sequence," *Trans. Am. Nucl. Soc.* **64**, 147-149 (1991).

S. M. Bowman and Cecil V. Parks, "Validation of SCALE-4 for LWR Fuel in Transportation and Storage Cask Conditions," *ANS Meeting*, Washington, D.C., November 11-15, 1990.

W. C. Jordan, N. F. Landers, and L. M. Petrie, "Validation of KENO V.a Comparison with Critical Experiments," ORNL/CSD/TM-238 (1986).

R. M. Westfall and J. R. Knight, "SCALE System Cross Section Validation with Shipping-Cask Critical Experiments," *Trans. Am. Nucl. Soc.* **33**, 368 (1979).

## **Burnup Credit**

M. D. DeHart, *Sensitivity and Parametric Evaluations of Significant Aspects of Burnup Credit for PWR Spent Fuel Packages*, ORNL/TM-12973, May 1996.

M. D. DeHart and S. M. Bowman, *Analysis of Fresh Fuel Critical Experiments Appropriate for Burnup Credit Validation*, ORNL/TM-12959, October 1995.

B. L. Broadhead, M. D. DeHart, J. C. Ryman, J. S. Tang, and C. V. Parks, *Investigation of Nuclide Importance to Functional Requirements Related to Transport and Long-Term Storage of LWR Spent Fuel*, ORNL/TM-12742, Lockheed Martin Energy Systems, Inc., Oak Ridge Natl. Lab., June 1995.

Stephen M. Bowman, Mark D. DeHart, and Cecil V. Parks, "Validation of SCALE-4 for Burnup Credit Applications," *Nucl. Tech.* **110**, 53 (April 1995).

M. D. DeHart, *SCALE-4 Analysis of Pressurized Water Reactor Critical Configurations: Volume 1–Summary*, ORNL/TM-12294/V1, March 1995.

S. M. Bowman, O. W. Hermann, and M. C. Brady, *SCALE-4 Analysis of Pressurized Water Reactor Critical Configurations: Volume 2–Sequoyah Unit 2 Cycle 3*, ORNL/TM-12294/V2, March 1995.

S. M. Bowman and O. W. Hermann, *SCALE-4 Analysis of Pressurized Water Reactor Critical Configurations: Volume 3–Surry Unit 1 Cycle 2*, ORNL/TM-12294/V3, March 1995.

M. D. DeHart, *SCALE-4 Analysis of Pressurized Water Reactor Critical Configurations: Volume 4–Three Mile Island Unit 1 Cycle 5*, ORNL/TM-12294/V4, March 1995.

O. W. Hermann, S. M. Bowman, M. C. Brady, and C. V. Parks, *Validation of the SCALE System for PWR Spent Fuel Isotopic Composition Analyses*, ORNL/TM-12667, March 1995.

S. M. Bowman and H. Taniuchi, "Burnup Credit Validation of SCALE-4 Using Mixed-Oxide Critical Experiments," *Trans. Am. Nucl. Soc.* **68**(A), 241, San Diego, California, June 20-24, 1993.

S. M. Bowman, O. W. Hermann, and M. C. Brady, "Burnup Credit Validation of SCALE-4 Using Light Water Reactor Criticals," *Trans. Am. Nucl. Soc.* **68**(A), 243, San Diego, California, June 20-24, 1993.

## **General Shielding**

B. L. Broadhead, "Shielding Analyses: The Rabbit vs the Turtle?" *Proc. of Radiation Protection & Shielding 1996 Topical Meeting, Advances and Applications in Radiation Protection and Shielding*, Vol. 1, 322 (1996).

C. V. Parks and B. L. Broadhead, "Review of Criticality Safety and Shielding Analysis Issues for Transportation Packages," PATRAM'95, Las Vegas, NV, December 3-8, 1995.

Stephen M. Bowman and B. L. Broadhead, "Dose Rates in the ABWR Upper Drywell for a Dropped Fuel Bundle Accident," *Trans. Am. Nucl. Soc.* **73**, 364-66 (1995).

M. B. Emmett, "Status of the MORSE Multigroup Monte Carlo Radiation Transport Code," *Proc. Seminar on Advanced Monte Carlo Computer Programs for Radiation Transport*, April 27-29, 1993, Centre d'Etudes, Saclay, France

### **General Criticality**

C. V. Parks, W. C. Jordan, L. M. Petrie, and R. Q. Wright, "Use of Metal/Uranium Mixtures to Explore Data Uncertainties," *Trans. Am. Nucl. Soc.* **73**, 217-18 (1995).

D. F. Hollenbach, L. M. Petrie, and H. L. Dodds, "Vectorization Methods Development for a New Version of the KENO V.a Criticality Safety Code," *Nucl. Sci. Eng.* **116**, 147-164 (1994).

### **General Source Terms/Decay Heat**

O. W. Hermann, *SAS2H Input for Computing Core Activities of 4.5, 5.0, and 5.5 Weight % <sup>235</sup>U Fuel for Sequoyah Nuclear Plant*, ORNL/M-3739, August 1994.

O. W. Hermann and R. Salmon, "Borosilicate Glass ( $\alpha,n$ ) Sources Used with ORIGEN-Type Calculations," *Proc. 1992 International High-Level Radioactive Waste Management Conference*, April 12-16, 1992, Las Vegas, Nevada

### **SCALE Heat Transfer**

C. V. Parks, G. E. Giles, K. W. Childs, and C. B. Bryan, *Heat Transfer Analysis Capabilities of the SCALE Computational System*, "Workshop on the SCALE-3 Modular System," Saclay, France, 24-27 June 1986, **Newsletter of the NEA Data Bank No. 33**, pp. 67-95, October 1986.