Software Release Notice
Acquired Software

1. Software Name and Project Number: SCALE — Software Version: 5.1
   Standardized Computer Analyses for Licensing Evaluation

2. Software Function: NRC-developed licensing evaluation code for criticality safety, radiation shielding, and spent fuel characterization and decay heat calculations.

3. Summary of Actions:
x New Software ❑ Update to Existing Software ❑ Software Retirement

4. Software Installation

4a. Computer Platform(s): Pentium 4 or later — 4b. Operating System(s): Windows
4c. Programming Language(s): FORTRAN

4d. Installation Testing:
x Passed — Performed by: Razvan Nes — Testing Performed On: Spock machine
Description of Testing Performed: See attached SCALE 5.1 document "Getting Started with SCALE 5.1 / ORIGEN-ARP 5.1 for Windows". Documented with compare_output.txt file attached to this SRN. All test problems run and compared to expected output. RNN 7/6/07

4e. Archive Copy:
x Enclosed ❑ Not Available, Why:

Installation Performed by: IMS	Date: 6/2007

Remarks:

5. Software Assessment

Validation Status:
❑ Full Validation ❑ Limited Validation Date of Validation: N/A
x Not Validated, Explain: NRC-endorsed software
Exempt from validation per TOP-018 RNN 7/6/07.

Software User: Razvan Nes; Oleg Povetko, Lane Howard; free individual license for users (NRC contractors) via the Radiation Safety Information Computational Center (RSICC) at http://rsicc.ornl.gov .	Date: 6/2007

Remarks:

1. Validation not required, as per CNWRA TOP-018, Revision 10, Section 4.2.3 for acquired software approved and endorsed by the U.S. NRC for use in regulatory reviews.

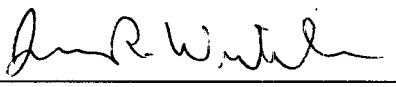
2. NRC endorsement of the SCALE code package is documented in a number of NRC Standard Review Plans and Regulatory Guides:

NUREG-1567, "Standard Review Plan for Spent Fuel Dry Storage Facilities," Spent Fuel Project Office, U.S. NRC, Washington, DC, March 2000. Section 7.5.1 endorses use of the SCALE ORIGEN module for spent nuclear fuel source term analyses. Section 7.5.4.1 endorses use of SCALE for shielding analyses. Section 8.4.4.1 endorses use of SCALE for criticality safety analyses.

NUREG-1536, "Standard Review Plan for Dry Cask Storage Systems," Spent Fuel Project Office, U.S. NRC, Washington, DC, January 1997. Sections 5.4 and 6.4 endorse use of SCALE for shielding and criticality, respectively.

NUREG-1617, "Standard Review Plan for Transportation Packages for Spent Nuclear Fuel" Spent Fuel Project Office, U.S. NRC, Washington, DC, March 2000. Sections 5.5.4.1 and 6.5.3.3 endorse use of SCALE for shielding and criticality analyses.

3. The attached "SCALE Validation/Benchmark Reports" from the SCALE code website http://www.ornl.gov/sci/scale/validation. htm includes a number of NUREG documents available at this website in all three areas of SCALE analyses (criticality safety, radiation shielding, and spent fuel characterization and decay heat).

6. Approval	
Manager: 	Date: 7/2/07
Remarks:	

7. QA Verification	
SRN Number: 425	
Verified by: 	Date: 1/6/2007
Remarks:	

Test Problem result comparison to expected results — Installation EST. RSB 7/6/09

compare_output.txt

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      0.999 + or - 0.010
     ***
k5smp18.out:       ***        best estimate system k-eff
      1.0096 + or - 0.0044
***** C:\SCALE5.1\OUTPUT\K5.TABLE
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k5smp18.out:       ***        best estimate system k-eff
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compare_output.txt

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SCALE

Standardized Computer Analyses for Licensing Evaluation

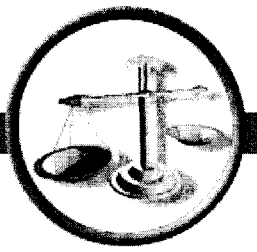
SCALE Validation & Benchmarks

Criticality Safety Reports

Criticality Safety Validation Input Files

Radiation Shielding Reports

Spent Fuel Characterization and Decay Heat Reports



SCALE Validation/Benchmark Reports

Standardized Computer Analyses for Licensing Evaluation

SCALE Validation Reports – Criticality Shielding

Criticality Safety

CENTRM Validation
ORNL/TM-2004/66
(The input files from this report are available to download here.)

KENO-VI Validation
ORNL/TM-2004/60
(The input files from this report are available to download here.)

Validation and Comparison of KENO V.a and KENO-VI
ORNL/TM-2001/110

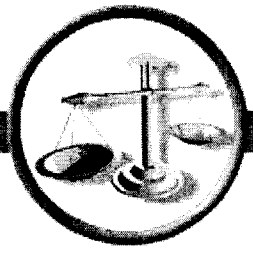
Experience with the SCALE Criticality Safety Cross-Section Libraries
NUREG/CR-6686, ORNL/TM-1999/322
(This report documents the performance of the five SCALE criticality safety cross-section libraries for seven different types of systems. It provides information on the background and ORNL's experience with each library an recommendations on the use of the libraries for particular types of applications.)

Criticality Benchmark Guide for Light-Water-Reactor Fuel in Transportation and Storage Packages
NUREG/CR-6361, ORNL/TM-13211
(Updated SCALE 5 versions of these input files are available to download here.)

Guide to Verification and Validation of the SCALE-4 Criticality Safety Software
NUREG/CR-6483, ORNL/TM-12834
(The results in this report were obtained with SCALE-4.2.)

Validation of the SCALE Broad Structure 44-Group ENDF/B-V Cross-Section Library fo Use in Criticality Analyses
NUREG/CR-6102, ORNL/TM-12460
(The results in this report were obtained with SCALE-4.2.)

Return to the SCALE Validation / Benchmark Reports



SCALE Download

Standardized Computer Analyses for Licensing Evaluation

SCALE 5 and 5.1 Criticality Safety Validation Input Files

CENTRM Validation

Windows File: centrm-validation.exe

Unix File: centrm-validation.tar.gz

Readme File: centrm-kenovi.readme

KENO-VI Validation

Windows File: kenovi-validation.exe

Unix File: kenovi-validation.tar.gz

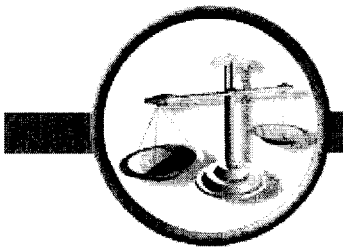
Readme File: centrm-kenovi.readme

NUREG/CR-6361 LWR Fuel Validation Cases

Windows File: nureg-cr-6361.exe

Readme File: nureg-cr-6361.readme

Return to SCALE Validation



SCALE Validation/Benchmark Reports

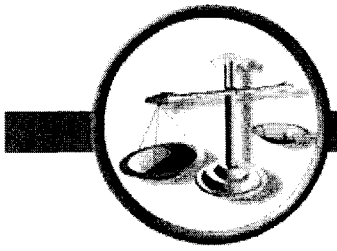
Standardized Computer Analyses for Licensing Evaluation

SCALE Validation / Benchmark Reports

Radiation Shielding

Guide to Verification and Validation of the SCALE-4 Radiation Shielding Software
NUREG/CR-6484, ORNL/TM-13277

Return to the SCALE Validation / Benchmark Reports



SCALE Validation/Benchmark Reports

Standardized Computer Analyses for Licensing Evaluation

SCALE Validation / Benchmark Reports

Spent Fuel Characterization and Decay Heat

Updates to the ORIGEN-S Data Libraries Using ENDF/B-VI, FENDL-2.0, and EAF-99 Data
ORNL/TM-2003/118

Isotopic Analysis of High-Burnup PWR Spent Fuel Samples From the Takahama-3 Reactor
ORNL/TM-2001/259

Strategies for Application of Isotopic Uncertainties in Burnup Credit
ORNL/TM-2001/257

MOX Cross-Section Libraries for ORIGEN-ARP
ORNL/TM-2003/2

ORIGEN-ARP Cross-Section Libraries for Magnox, Advanced Gas-Cooled, and VVER Reactor Designs
ORNL/TM-2003/263

Validation of the SCALE System for PWR Spent Fuel Isotopic Composition Analyses
ORNL/TM-12667

An Extension of the Validation of the SCALE (SAS2H) Isotopic Predictions for PWR Spent Fuel
ORNL/TM-13317

Validation of SCALE (SAS2H) Isotopic Predictions for BWR Spent Fuel
ORNL/TM-13315

Benchmark of SCALE (SAS2H)Isotopic Predictions of Depletion Analyses for San Onofre PWR MOX Fuel
ORNL/TM-1999/326

ARP: Automatic Rapid Process for the Generation of Problem-Dependent SAS2H/ORIGEN-S Cross-Section Libraries
ORNL/TM-13584

Technical Support for a Proposed Decay Heat Guide Using SAS2H/ORIGEN-S Data
NUREG/CR-5625, ORNL-6698

Verification and Validation of the ORIGEN-S Code and Nuclear Data Libraries
RC-1429, COG-I-95-150
(Atomic Energy of Canada Limited (AECL) has approved posting of this document on the Oak Ridge National Laboratory SCALE website with the understanding that it has not been edited for wide publication. This report is not to be listed in abstract journals. If it is cited as a reference, the source from which copies may be obtained should be given as: Scientific Document Distribution Office (SDDO), AECL, Chalk River, Ontario, Canada K0J 1J0.)

Return to the SCALE Validation / Benchmark Reports