Radiation Safety Information Computational Center

Oak Ridge National Laboratory
Post Office Box 2008
Oak Ridge, Tennessee 37831-6003
Managed by
UT-Battelle, LLC
for the U.S. Department of Energy
under contract DE-AC05-00OR22725

phone 865-574-6176 fax 865-241-4046
email PDC@ORNL.GOV
www http://rsicc.ornl.gov/

Timothy E. Valentine, Ph.D. - RSICC Director

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"A room without books is like a body without a soul."

–Marcus Tullius Cicero

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CHANGES TO THE RSICC CODE AND DATA COLLECTION

There are three updates to the RSICC catalog for those individuals that may be interested.

PSR-618/Visual Editor 6.1

Visual Editor 6.1: MCNPX/6 Visual Editor Computer Code was contributed by Schwarz Software & Consulting, Richland, Washington, USA. MCNPX/6 Visual Editor is a program that can set up and run Monte Carlo N-particle® (MCNP®) calculations. The user interface allows a user to specify a simple geometry configuration, selected from specific source geometries, and locations. Once these parameters are specified, a complete MCNP® input file will be generated that can be run from within MCNPX/6 Visual Editor. The output file can also be viewed directly from MCNPX/6 Visual Editor. MCNPX/6 Visual Editor is designed to create simple geometries with sources and tallies.

A menu-driven graphical interface that allows a user to dynamically create the input file for MCNP®. As each element is added to the input file, the input file is completely regenerated to include this new element. The resulting input file can then be run using the MCNP® code installed on the user's computer, either within MCNPX/6 Visual Editor or at the command prompt. Users are required to purchase and install MCNP® as a separate package from RSICC.

The package is transmitted on one CD which includes executable, documentation and reference material; C++; Windows operating systems. (P618PCX8600).

CCC-834/SCALE 6.2.3

Oak Ridge National Laboratory, Oak Ridge, Tennessee, contributed an updated version of the SCALE code system, which is a widely used modeling and simulation suite for nuclear safety analysis and design that is developed, maintained, tested, and managed within the Reactor and Nuclear Systems Division (RNSD) of the Oak Ridge National Laboratory (ORNL). SCALE provides a comprehensive, verified and validated, user-friendly tool set for criticality safety, reactor physics, radiation shielding, radioactive source term characterization, and sensitivity and uncertainty analysis. Since 1980, regulators, licensees, and research institutions around the world have used SCALE for safety analysis and design. SCALE provides an integrated framework with dozens of computational modules, including three deterministic and three Monte Carlo radiation transport solvers selected based on the user's desired solution strategy. SCALE includes current nuclear data libraries and problem-dependent processing tools for continuous energy and multigroup neutronics and coupled neutron-gamma calculations, as well as activation, depletion, and decay calculations. SCALE includes unique capabilities for automated variance reduction for shielding calculations, as well as sensitivity and uncertainty analysis. SCALE's graphical user interfaces assist with accurate system modeling and convenient access to desired results. SCALE is bundled with AMPX to generate cross section data libraries from ENDF formatted nuclear data evaluations.

SCALE 6.2.3 provides numerous minor enhancements relative to SCALE 6.2.1 All licensed users of SCALE 6.2, SCALE 6.2.1 and SCALE 6.2.2 are encouraged to contact scalehelp@ornl.gov for the SCALE 6.2.3 patch.

Please visit the SCALE website for more information at: http://scale.ornl.gov.

This package is distributed on 9 DVDs for Windows, Linux and MacOS systems. Package C00834MNYCP05 includes executables for Linux, MacOS and Windows 7+ systems; documentation and sample problems for verification. (See abstract for details.) Package C00834MNYCP04 includes the items listed above plus source files and CMake build configuration scripts. Export control regulations restrict the distribution of source code. If restrictions apply, RSICC will send the executable-only version. Please order the package you prefer, and we will honor your preference if possible. Executables require the Java runtime environment for installation. For compilation Intel ifort, icc and icpc 15, GNU/GCC 4.8.3, CMAKE 2.8.12. Reference: Fortran 90 and C/C++; Windows PCs, Linux, and MacOS X [Package ID: C00834MNYCP04 (source package) and C00834MNYCP05 (executable-only package)].

CCC-841/MMS3D

CCC-841/MMS3D: Method of Manufactured Solutions for 3D one-group SN Equations with escalating order of non-smoothness. MMS3D was contributed North Carolina State University, Raleigh, North Carolina. MMS3D is a program for creating method of manufactured solutions with escalating order of non-smoothness for the one-group SN equations in a homogeneous domain. The smoothness of the manufactured solution is set by boundary conditions that can be specified in the input file as polynomials. The boundary conditions and a uniform auxiliary source Q are used to compute the analytical angular flux solution for a problem without scattering. This solution is the manufactured solution. For using it in problems with scattering, the scattering cross section is set, and a distributed source q is computed such that the solution to the SN equation with scattering is the previously computed angular flux. The code computes reference solutions for Cartesian meshes. It does so by

computing the Legendre polynomial moments of the angular flux solution, scalar flux solutions, distributed source, and inflow boundary fluxes for each cell and relevant face.

The reference solution is available in analytical form. The Legendre moments of the angular flux, scalar flux, distributed source and inflow boundary fluxes are integrated analytically from these expressions. For this purpose, the singular characteristic line and the singular planes must be tracked through the Cartesian geometry. On each side of the singular planes distinct analytical expressions of the solution and sources are presents so in elements intersected by the singular planes, the contributions to the integral over the elements must be accumulated separately. More details of the computational algorithm are included in the theory references that are included with the code.

MMS3D is distributed on one CD ROM and includes readme files, source files, documentation and sample problem input/output files. Fortran90; Linux, MacOS and Windows (C841MNYCP00).

Single User Multi-Organization License Agreement

In order to support the use of RSICC software by multi-national organizations and international collaborations, RSICC now offers our customers the option to request a Single User Multi-Organization Software License Agreement. The Single User Multi-Organization Software License Agreement addresses issues regarding the “re-export” of software and data packages obtained from RSICC because under Federal export control regulations our customers cannot “re-export” the code to another person in another country.

This agreement is intended to allow our customers to specify additional foreign locations for which they may be approved to utilize RSICC software. In general, the default option will be the standard single user license agreement for the country in which the customer resides and is employed. The following defines the requirements for use of this license agreement.

This SUMO software license agreement is only available for individuals that receive software directly from RSICC. In addition, the point of contact (host or system administrator) at the additional foreign location(s), must be licensed directly from RSICC and must agree to abide by the policies associated with host/server/cluster systems that are summarized following this announcement.

To apply for this license the customer must first register with RSICC and provide full and complete information. When submitting their request, the customer must provide the following information in the COMMENTS section of the request form for each applicable package:

- full name and email address of the point of contact (POC),
- the full name of the organization at which the software will be used, and
- the complete address (no post office boxes) of the organization under which additional access is being requested.

Individuals that would like to utilize this service must have a valid reason for needing this access and provide such justification to RSICC in the END USE statement as well. If this information is not included in the END USE statement, then the customer’s request will only be considered for the standard single user license agreement.

When processing the request, RSICC staff will verify that the designated POC(s) has a valid license for the same version of software that is being requested by the applicant and verify that the POC obtained the package directly from RSICC. If the POC, did not obtain the package directly from RSICC,

the POC will need to register with RSICC, apply and be approved for the package before the applicant's request can be processed.

The requests will be reviewed for each designated location and a decision will be rendered as to whether or not a license is granted. If an organization or location is denied, then the customer will be notified and may be limited to the standard single user license agreement for their own organization.

Exceptions:

Persons that have any citizenship of or are located in countries that are not listed in Appendix A of 10 CFR 810 are not permitted to utilize the Single User Multi-Organization License Agreement.

Fees:

The customer making the request for the single user multi-organization software license will be required to pay the cost recovery fee for each location at which they are approved. In addition, the POCs at the other foreign locations that have not obtained the software directly from RSICC will have to obtain the software from RSICC and pay the applicable fee.

Host/Server/Cluster Guidance

Software obtained from RSICC is export controlled under the jurisdiction of the U.S. Department of Energy, 10 CFR 810, or the U.S. Department of Commerce, 15 CFR 730-744. Additionally, RSICC distributes this software under guidance issued by the U.S. Department of Energy's Office of Nonproliferation and Arms Control. The distribution and use of RSICC software is restricted and controlled under these regulations and guidelines. Individuals that request the software must be cleared through both an export control and a nonproliferation review process prior to the individual being granted a license to receive software for a specific end use.

The software distributed by RSICC is licensed to individual requestors (Licensee) under a single-user license agreement while employed at the organization listed on the license forms and cannot be transferred to any other individual or entity. The Licensee is responsible for the control, management and protection of the software. The Licensee is responsible for compliance with U.S. export control requirements (laws and regulations) and the terms of the license agreement. This includes preventing access to the software by any individual or entity (including IT staff) as such access may be deemed an export control violation. Individual Licensees should protect the software, documentation, and installation accordingly. Neither the software nor manuals should be posted to the Internet or otherwise be made publicly available. Any and all system administrators that are assisting with the installation and maintenance of a licensed code(s) or that would otherwise have access to a licensed code(s) that is placed on a stand-alone system and/or server/cluster must also be licensed for the exact version of the software that is placed on these systems. Individuals whose duties are only that of a System Administrator are not authorized to be users of the licensed codes(s).

System administrators and/or hosts should implement standard and customary account access and/or file permissions such that only the licensed individuals may access the program. This should include identity and access management, such as multi-factor authentication, to ensure software is kept secure from unauthorized access. Please note that the single-user license agreement is code and version specific. The Licensee must be licensed for the specific version to which they are granted access. For example, an individual with a license only for MCNP5 should not be permitted access to MCNP6.1. Additionally, some individuals are only licensed for the executable versions of the code(s), and the system administrator(s) must ensure that such individuals do not have access to the source code.

Therefore, it is recommended that the source code be removed after installation of the program(s) and furthermore procedures must be implemented such that control software is not lost via decommissioned storage media.

Network, server, parallel, cluster, or similar installations outside of the United States may not be within a country NOT listed in Appendix A of 10 CFR 810 (see table below) nor occur at facility identified as an entity under 15 CFR 744.

RSICC software may be hosted on a server, cluster or high-performance computing system with the following conditions:

1) Each server/cluster operator must designate one individual responsible for oversight of the use of RSICC software on the server/cluster. This individual will be responsible for communicating and reporting to RSICC on an annual basis regarding the users of the cluster/server.

2) Each and every system administrator that would have access to any form (source or executable) must register, request, **and** be approved for the software with RSICC for the version to which they would have access.

3) An authorized and approved system administrator may install and maintain the software and must ensure that the software is not distributed or shared with those who do not have a specific license for the version to which they would have access. System administrators are required to utilize protocols that limit access to the software. Users should only be granted access and use of software to which they have a specific license, e.g. users that have a license for SCALE 6.1 should NOT be granted access to SCALE 6.0 or SCALE 6.2.

4) System administrators are not permitted to provide access to RSICC software to individuals **NOT** located within the same country as the server/cluster unless the Licensee has an approved Single User Multi-Organization License Agreement from RSICC.

5) Individuals with citizenship or multiple citizenships that include a country not listed in Appendix A of 10 CFR 810 **may be granted** access to RSICC software on a server/cluster, if the individual **has been approved** for access to the software by the U. S. Department of Energy's Office of Nonproliferation and Arms Control.

6) Under no circumstances should an individual with citizenship or multiple citizenships that include a country **NOT** listed in Appendix A of 10 CFR 810 be granted access to RSICC software on the server/cluster, if that individual has **NOT** been approved by the U.S. Department of Energy's Office of Nonproliferation and Arms Control. Additionally, under no circumstances should an individual located at an entity identified under 15 CFR 744 be granted access to RSICC software on the server/cluster.

7) Individuals that have been only granted access to RSICC's secure cloud server **MAY NOT** be granted access to any other server/cluster.

8) When a Licensee requests access to RSICC software on a server/cluster, the system administrator must follow the following process:

(a) The system administrator will require that the Licensee provide proof of a license by requiring that the Licensee provided an electronic copy of either the Single User License Agreement or the Single User Multi-Organization License Agreement. System administrators cannot provide access to anyone located in another country unless that individual has an approved Single User Multi-Organization License Agreement from RSICC and the organization of the system administrator is listed on the SUMO License Agreement.

(b) As of February 1, 2015, RSICC's single user and export control agreements were restricted to the specific end use provided in the request and to the Licensee's installation (employer, organization,

or university) when making the request. The system administrator must ensure that the Licensee's current installation is the same as that on the license agreements.

(c) If the Licensee's current installation is NOT the same as that on license agreements, then access should be denied until the Licensee has updated license agreements with RSICC. This will require the Licensee to update their registration with RSICC and submit a new request with RSICC. The Licensee should not be granted access to the software until they have been authorized. Please note that some approvals are location and organization specific.

9) The system administrator will maintain records of the Licensees that are utilizing the server/cluster and send a record to RSICC (rsic@ornl.gov) that include the Licensee's full name, RSICC customer identification number, installation, and the codes to which the Licensee has access on the system. This information must be provided when the system administrator makes the first request to RSICC to provide such services and must be updated annually by sending updated information to RSICC no later than November 30 of each calendar year. The record should include the customer's full name, RSICC customer number, customer installation as well as request numbers and software package name and identifier for which they are accessing on the cluster.

Server/cluster operators that agree to comply with these conditions may install RSICC software on the server/cluster that are within their corporate/institutional ownership, physical control, and the individual country identified.

END USE STATEMENT

Customers are strongly encouraged to provide full and complete information regarding the intended end use of the software being requested. End use statements that specify that the code is for research, training or educational activities are not sufficient. RSICC's regulators need to know explicitly for what purpose you intend to use the codes and detail needs to be provided. Requests that lack sufficient detail will be rejected.

REGISTRATION REQUIREMENTS

RSICC does not permit individuals to "pre-register" or "pre-order" software for use at a temporary or alternate location. The single user license and export control agreements are specific to the individual's end use and the location at which the software will be used. During the registration process, individuals are required to provide the name of the institution at which they will use the software, an institutional mailing address and an institutional e-mail address. As an example, students that work at a location other than their university are required to update their registration with RSICC and submit a new request for any software that they intend to use after they have begun work at the new location.

SINGLE-USER LICENSE AGREEMENT REVISED

The single-user license agreement has been revised to address concerns regarding changes in end-use and/or employment of individuals that have received packages from RSICC. In some instances, individuals obtain approvals from our Federal regulators for use of software packages for very specific purposes or while employed or associated with specific organizations. To address this concern, the single-user license agreement has been modified to indicate that the license is only valid for the end-use as stated in the Licensee's request and only while associated with the organization under which the request is being made. After February 1, 2015, the individual's single-user license would no longer be valid if they change their end-use or are no longer associated with the organization for which they obtained the original license. In these cases, the individual would need to submit a new request to RSICC for the package for the new end-use or the new affiliation.

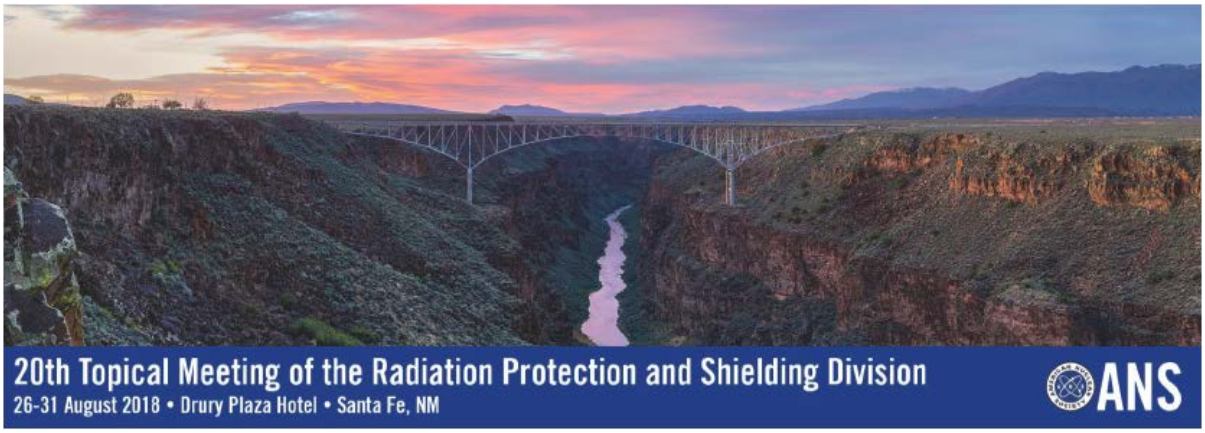
SCIENCE EDUCATION PROGRAMS AT OAK RIDGE NATIONAL LABORATORY

Looking for an internship or post-graduate opportunity at Oak Ridge National Laboratory? The Science Education Programs at Oak Ridge National Laboratory provide paid opportunities for undergraduates, grad students, recent graduates, and faculty to participate in high-quality research alongside world-class scientists to solve real-world problems. Opportunities are available for internships and co-ops, research appointments, and sabbaticals. You can access all available opportunities through the website at http://www.orau.org/ornl. The Talent and Opportunity System allows you to create a profile, and then answer only 5 or 6 questions for each program or job posting for which you apply. All levels of participants from undergraduates to faculty are encouraged to publish research papers with their mentors. Please browse through the Research Profiles on the different participants and their research experiences at the right-hand side of the bottom of the web site listed above. Also, there is a video of research participants at ORNL sharing their thoughts on how access to world-class research facilities and staff has catapulted their careers in science and technology. You can find it on YouTube at http://ow.ly/2EQLz.

CONFERENCES, TRAINING COURSES, SYMPOSIA

RSICC attempts to keep its customers and contributors advised of conferences, courses, and symposia in the field of radiation protection, transport, and shielding through this section of the newsletter. Should you be involved in the planning/organization of such events, feel free to send your announcements and calls for papers via email walkersy@ornl.gov with "**Conferences for RSICC Newsletter**" in the subject line by the 15th of each month. Please include the announcement in its native format as an attachment to the message. Please provide a website address for the event if one is available. Every attempt is made to ensure that the links provided in the Conference and Calendar sections of this newsletter are correct; however, if the links become unavailable, please call the point of contact for the event.

CONFERENCES



20th Topical Meeting of the Radiation Protection and Shielding Division

This meeting will be held **August 26-31, 2018** in Santa Fe, New Mexico. Please visit the website http://rpsd2018.ans.org/ for more information. If questions, please contact Michael Rising, LANL at mrising@lanl.gov.

27th International Conference Nuclear Energy for New Europe

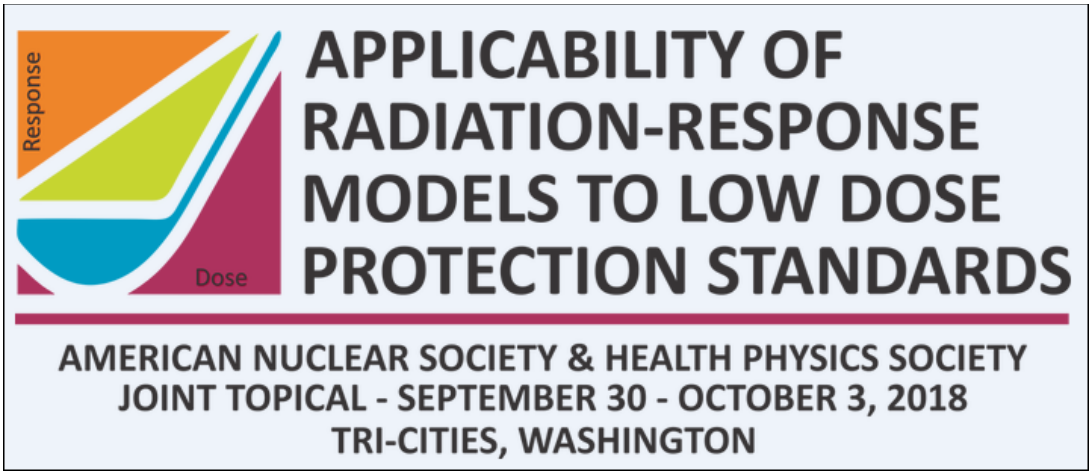
The Nuclear Society of Slovenia in association with the Jožef Stefan Institute, Nuclear Training Centre (ICJT), cordially invites you to attend the 27th International Conference

Nuclear Energy for New Europe. The conference will be held in Portorož from **September 10-13, 2018**. The conference is an annual meeting of professionals dealing with different aspects of nuclear energy from all around Europe and worldwide. The primary objective of the meeting is to foster international cooperation amongst professionals active in nuclear research and educational institutions, nuclear vendors, utilities and regulatory bodies. Portorož, literally "Port of Roses", is a coastal resort in the southwestern Slovenia, and is one of the country's largest tourist areas. It belongs to the coastal municipality of Piran, located in the north of Adriatic Sea.

For more details on this conference, please visit website at http://www.nss.si/nene2018/.

PHYTRA4

The Fourth International Conference on Physics and Technology of Reactors and Applications will be held **September 17-19, 2018,** in Marrakech, Morocco. This conference will be organized by the Moroccan Association for Nuclear Engineering and Reactor Technology (GMTR) with the collaboration of the National Centre for Energy, Sciences and Nuclear Techniques (CNESTEN) and the Moroccan Agency for Nuclear and Radiological Safety and Security (AMSSNuR) after the resounding success which the previous editions had met. Please see their website for more information at http://phytra4.gmtr.ma/.



American Nuclear Society & Health Physics Society Joint Topical

The American Nuclear Society and Health Physics Society are co-sponsoring a scientific conference on "Radiation Response Models to Low Dose Protection Standards," in Pasco, Washington, **September 30 - October 3, 2018**. For additional information contact Alan Waltar, conference chair, alan.waltar@gmail.com, or Darrell Fisher, technical program co-chair, at darrell.fisher@versantphysics.com.

NURER 2018

The 6th International Conference on Nuclear and Renewable Energy Resources (NURER2018) will be held **September 30 - October 3, 2018,** in Juju, Korea. This is recognized as one of the major international conferences for the exchange of information on scientific, engineering, and other technical aspects of innovative nuclear and renewable energy science and technology. For more details on this conference, please visit their website at http://nurer2018.org.

SATIF-14

The 14th workshop on Shielding aspects of Accelerators, Targets and Irradiation Facilities (SATIF-14) will be held at HICO (http://www.crowncity.kr/hico/en/main/main.do), Gyeongju, Korea from **October 30 - November 2, 2018** and hosted jointly by Korea Multi-purpose Accelerator Complex (KOMAC) and Pohang Accelerator Laboratory (PAL). Please visit the website for SATIF-14 (http://pal.postech.ac.kr/satif14/) for more information. If questions, please contact the event coordinator, Dr. Sung-Kyun Park at skpark4309@kaeri.re.kr.

ANIMMA 2019

ANIMMA 2019 is the sixth of a series of conferences devoted to endorsing and promoting scientific and technical activities based on nuclear instrumentation and measurements. It will be held **June 17-21, 2019,** in Portoroz, Slovenia. The main objective of ANIMMA conference is to unite, consolidate and organize an international network of scientific researchers and experts from industry, research institutes, universities dealing with nuclear instrumentation and measurement methodology activities (R&D, Innovation and applications). Application fields: Fundamental physics, Fusion

diagnostics and technology, Nuclear Power Reactors Monitoring and Control, Research reactors, Nuclear fuel cycle, Decommissioning, dismantling and remote handling, Safeguards, homeland security, Severe accident monitoring, Environmental and medical sciences, Education, training and outreach.

For more details on this conference, please visit website at http://www.animma.com/.

TRAINING COURSES

LANL MCNP6 Class Schedule

Website: https://laws.lanl.gov/vhosts/mcnp.lanl.gov/classes/classinformation.shtml

Aug 6-10, 2018 Los Alamos, NM	Criticality Calculations with MCNP6 Non-US citizens must register by 2018-05-14 | Mon 10:00 - Fri 12:00	$1800 or $1500*
Aug 13-17, 2018 Los Alamos, NM	Introduction to MCNP6 –FULL-- Non-US citizens must register by 2018-05-21 | Mon 10:00 - Fri 12:00	--FULL--
Aug 20-24, 2018 Los Alamos, NM	Variance Reduction with MCNP6 Non-US citizens must register by 2018-05-28 | Mon 10:00 - Fri 12:00	$1800 or $1500*
Nov 27-29, 2018 Los Alamos, NM	Using NJOY to Create MCNP® ACE Files & Visualize Nuclear Data Non-US citizens must register by 2018-09-03 | Tues 10:00 - Fri 5:00	$1200 or $900*
Dec 3-7, 2018 Los Alamos, NM	Introduction to MCNP6 Non-US citizens must register by 2018-09-10 | Mon 10:00 - Fri 12:00	$1800 or $1500*

MCNP6 Training

For more information, see the website: http://mcnpvised.com/train_mcnp.html

Current Classes			
Date (Click Date for Info)	**Class**	**Course Content**	**Location**
September 10-14, 2018	**Intermediate MCNP6 Workshop**		**Seattle, WA**
October 22-26, 2018	**MCNP6 Intermediate Workshop**	**To see an outline for the course, Click Here.**	**Paris, France**

Beginning/Advanced Visual Editor Training

For more information, see the website: http://mcnpvised.com/train.html

Click Date for Info)	**Workshop** (40 Cont. Ed. credits through American Academy of Health Physics. Click here for AAHP Site. Class number is 2008-00-026 for Vised classes and 2011-00-022 for MCNPX Team Workshops)	**Level of Difficulty**	**Workshop Content**	**Location**
July 9-13, 2018	**Intermediate MCNP6 Using Nucwiz**		**Detailed Description**	**Prague, Czech Republic**
July 16-20, 2018	**Advanced Visual Editor with Applications in Mesh Tallies and Variance Reduction**		Detailed Description	**Prague, Czech Republic**
July 30 - August 3, 2018	**Advanced MCNP® Training with Applications for Nuclear Reactor Decommissioning**		**Custom for Ulsan National Institute of Science and Tech.**	**Ulsan, South Korea**
September 17-21, 2018	**Intermediate MCNP6 Using Nucwiz**		**Detailed Description**	**Richland, WA**
September 24-28, 2018	**Beginning Visual Editor**		Detailed Description	**Las Vegas, NV**
October 1-5, 2018	**Advanced Visual Editor with Applications in Mesh Tallies and Variance Reduction**		Detailed Description	**Las Vegas, NV**
October 15-19, 2018	**Beginning Visual Editor** **The NEA handles registration for this workshop.**		Detailed Description	**Paris, France**

SCALE Users' Group Workshop

SCALE Training Courses – Fall 2018

Training is provided by developers and expert users from the SCALE team. Courses provide a review of theory, description of capabilities and limitations of the software, and hands-on experience running problems of varying levels of complexity.

All attendees MUST be licensed SCALE 6.2.1 users. SCALE 6.2.1 is available from ORNL/RSICC in the USA, the OECD/NEA Data Bank in France, and the RIST/NUCIS in Japan.

All currently scheduled SCALE Courses are described below.

Date	Course Name and Description	Location	Cost
October 15 – 19, 2018	**Sensitivity and Uncertainty Analysis for Criticality Safety Assessment and Validation Course** Sensitivity and uncertainty analysis methods provide advanced techniques for code and data validation including the identification of appropriate experiments, detailed quantification of bias and bias uncertainty, identification of gaps in available experiments, and the design of new experiments. The Sampler sequence within SCALE provides a flexible tool for quantifying uncertainties due to manufacturing tolerances as well as composition and dimensional uncertainties in criticality safety assessments. This 5-day training class provides a foundation on sensitivity and uncertainty analysis and applies these methods to criticality safety validation applications, as well as instruction on the use of Sampler for uncertainty quantification. Topics covered include: • The TSUNAMI sensitivity and uncertainty analysis techniques for determining the sensitivity of the k-eff eigenvalue to cross section uncertainties using both multigroup and continuous-energy physics. • SCALE's comprehensive cross section covariance data library, which is applied to these sensitivity coefficients to estimate the data-induced uncertainty in k-eff. • The TSUNAMI-IP code, which determines the correlation between benchmark and application	ORNL Oak Ridge, TN USA	$2000*

	systems in terms of their shared sources of data-induced uncertainty. • The USLSTATS trending analysis tool, which uses similarity coefficients from TSUNAMI-IP (among other parameters) to estimate the computational bias and bias uncertainty for design and licensing applications. • The TSURFER data adjustment tool, which uses generalized linear least squares to adjust nuclear data parameters to minimize discrepancies between computed predictions and the results of integral experiments; these adjustments can then be used to estimate bias and bias uncertainty in design and licensing applications. • The SAMPLER code for uncertainty assessment, which randomly samples nuclear data and/or system compositions and dimensions to quantify the uncertainty in system k-eff. This course will cover the theoretical basis for these analysis techniques and will also conduct exercises for attendees to familiarize themselves with these tools. It is recommended that attendees are familiar with the KENO Monte Carlo code or are experienced SCALE users, although these are not necessary prerequisites.		
October 22 – 26, 2018	**SCALE/TRITON Lattice Physics and Depletion** SCALE supports a wide range of reactor physics analysis capabilities. SCALE reactor physics calculations couple neutron transport calculations with ORIGEN to simulate the time-dependent transmutation of various materials of interest. TRITON is SCALE's modular reactor physics sequence for a wide variety of system types. Attendees of this course will learn how to use TRITON for depletion analysis. The TRITON training material is centered around using the NEWT 2-D transport module for 2-D depletion analysis and briefly touches on 3-D depletion analysis. The course will instruct users on the use of KENO in place of NEWT for 3-D Monte Carlo-based depletion; however, KENO is not covered in depth within this course. Additional applications of TRITON are incorporated into the training, including the creation of ORIGEN libraries for rapid spent fuel characterization calculations, defining appropriate unit cell calculations of various reactor types for cross section processing, performing restart calculations, and performing uncertainty analysis of reactor physics calculations using Sampler. No prior knowledge of SCALE is required.	ORNL Oak Ridge, TN USA	$2000*
October 29 – November 2, 2018	**SCALE/ORIGEN Standalone Fuel Depletion, Activation, and Source Term Analysis** This is a hands-on class that covers the use of ORIGEN for isotopic depletion, decay,	ORNL Oak Ridge, TN	$2000*

	decay heat, and radiation source-terms calculations. The course features the use of the Fulcrum consolidated SCALE graphical interface and Fulcrum plotting capabilities for displaying nuclear data and results. The class includes solving activation, spent fuel, and nuclear safeguards and security analyses. This class provides an introduction to the ORIGAMI tool for convenient characterization of spent nuclear fuel with radially and axially varying burnup. Advanced applications including simulation of chemical processing, continuous feed and removal are also covered. No prior knowledge of SCALE is required.	USA	
November 5 – 9, 2018	**SCALE Criticality Safety and Radiation Shielding** This course provides instruction on the use of the KENO-VI Monte Carlo code for criticality safety calculations and the MAVRIC (Monaco with Automated Variance Reduction using Importance Calculations) shielding sequence with 3-D automated variance reduction for deep-penetration problems. KENO-VI is a 3D eigenvalue Monte Carlo code for criticality safety and Monaco is a 3D fixed-source Monte Carlo code for shielding analysis. Both codes use the SCALE Standard Composition Library and the SCALE Generalized Geometry Package (SGGP), which allows for versatile modeling of complex geometries and provides convenient, efficient methods for modeling repeated and nested geometry configurations such as lattices. The MAVRIC sequence is based on the CADIS (Consistent Adjoint Driven Importance Sampling) methodology. For a given tally in a Monte Carlo calculation that the user wants to optimize, the CADIS method uses the result of an adjoint calculation from the Denovo 3D deterministic code to create both an importance map for weight windows and a biased source distribution. MAVRIC is completely automated in that from a single user input, it creates the cross sections (forward and adjoint), computes the adjoint fluxes, creates the importance map and biased source, and then executes Monaco. An extension to the CADIS method using both forward and adjoint discrete ordinates calculations (FW-CADIS) is included in MAVRIC so that multiple point tallies or mesh tallies over large areas can be optimized (calculated with roughly the same relative uncertainty). Both KENO and Monaco use ENDF/B-VII.0 or ENDF/B-VII.1 cross-section data distributed with SCALE to perform continuous energy (CE) or multigroup (MG) calculations. Both codes can also be used with the Fulcrum consolidated SCALE user interface and KENO3D for interactive model setup, computation, output review, and 3-D visualization. Instruction is also provided on the SCALE material input and resonance self-shielding capabilities and the data visualization capabilities within Fulcrum for visualizing fluxes, reaction rates, and cross-section data as well as mesh tallies. KENO-VI and MAVRIC can be applied together to perform an integrated criticality accident alarm	ORNL Oak Ridge, TN USA	$2000*

	system (CAAS) analysis. No prior knowledge of SCALE is required.		

***Full-time university students can register at a reduced rate. Both professional and student registration fees are discounted $200 for each course over one.*

FOREIGN NATIONAL VISITORS TO ORNL - *Payment MUST be received at least one week prior to attending the training course. All foreign national visitors must register 40 days before the start date of the training course they plan to attend.*

For more information regarding these courses, visit the SCALE training website at https://www.ornl.gov/scale/scale-training.

Safety Analysis Report for Packaging (SARP)

Shielding/Criticality Analyst Course

Developed and Conducted by Oak Ridge National Laboratory

Radioactive Material Package Shielding Evaluation and Nuclear Criticality Safety Evaluation Training

The U.S. Department of Energy (DOE) Packaging Certification Program (PCP), Office of Packaging and Transportation, is offering a Safety Analysis Report for Packaging (SARP) shielding and nuclear criticality safety (NCS) course for SARP analysts.

The **SARP Analyst Course** is scheduled for **September 17 - 21, 2018** at the National Transportation Research Center, Oak Ridge National Laboratory, Oak Ridge, TN. This course will provide detailed training on the radioactive material package shielding analyses and NCS evaluation fundamentals needed by analysts/practitioners (i.e., safety analysts and/or technical reviewers) to prepare and/or review technical analyses for the SARP documentation. The Analyst Course also provides an overview of regulations and guidelines in addition to detailed in-class exercises associated with the package shielding and NCS analyses. Regarding the in-class exercises, analysis teams will be faced with "staged" SARP examples in which important decision processes in the generation of a SARP will be demonstrated and discussed. The registration cost for all students is $2000. Those interested can register for the course at the following website https://utconferences.eventsair.com/2018-safety-analysis-report-for-packaging-sarp-analyst-course/sarp/Site/Register.

Please contact the ORNL SARP Course Point-of-Contact if you have questions about the course. Douglas G. Bowen, Oak Ridge National Laboratory, bowendg@ornl.gov,(865) 576-0315.

SYMPOSIA

2018 CALENDAR

June

2018 American Nuclear Society (ANS) Annual Meeting, June 17-21, 2018, Philadelphia, Pennsylvania. Website: http://www.ans.org/meetings/c_1.

July

HPS 63rd Annual Meeting, July 15-19, 2018, Cleveland. Ohio. Website: http://hps.org/meetings/meeting46.html.

26th International Conference on Nuclear Engineering - ICONE, July 22-26, 2018, London, England. Website: http://www.asme.org/events/icone.

August

20th Topical Meeting of the Radiation Protection & Shielding Division of ANS (RPSD-2018), August 26-31, 2018, Santa Fe, New Mexico. Website: http://rpsd2018.ans.org.

September

Pacific Basin Nuclear Conference, September 30-October 5, 2018, San Francisco, California. Website: http://pbnc.ans.org.

November

IEEE Nuclear Science Symposium, November 11-17, 2018, Sydney, Australia. Website: http://www.nssmic.org/2018/.

2018 American Nuclear Society (ANS) Winter Meeting, November 11-15, 2018, Orlando, Florida. Website: http://www.ans.org/meetings/c_1.

2019 CALENDAR

June

2019 American Nuclear Society (ANS) Annual Meeting, June 9-13, 2019, Minneapolis, Minnesota. Website: http://www.ans.org/meetings/c_1.

October

2019 - 19th International Conference on Emerging Nuclear Energy Systems Meeting, October 6-9, 2019, Bali, Indonesia. Website: http://portal.fmipa.itb.ac.id/icenes2019