RAMPED UP!

RAMP NEWSLETTER – FALL 2024
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INSIDE THIS ISSUE

2024 April RAMP Meeting in South Korea	1-2
RAMP Team Highlights	2-3
VARSKIN+ Updates	4
SIERRA ATD	5
Introducing RASCAL 5.0	6
International Partners	7
RAMP by the Numbers	8
2025 Spring User Group Meeting Announcement	8
Upcoming 2024 User Group Meeting Schedule	9

U.S. Nuclear Regulatory Commission
Rockville, MD

U.S. NRC RAMP website:
https://ramp.nrc-gateway.gov/

2024 Spring International RAMP User Group Meeting in Seoul, South Korea

The 2024 International Radiation Protection Computer Code Analysis and Maintenance Program (RAMP) User Group Meeting was held April 16-19, at Jung-gu, Seoul, South Korea. It was hosted by the Korea Institute of Nuclear Safety (KINS) and the United States (US) Nuclear Regulatory Commission (NRC). The meeting was attended by 75 registered participants, instructors, and staff. RAMP members from 4 countries, including France, Canada, Ghana, and United Arab Emirates all joined the South Koreans and Americans.

The Radiological Assessment System for Consequence Analysis (RASCAL) code was featured prominently at this meeting. The national emergency response (ER) frameworks from multiple countries were presented individually and discussed. President Sok Chul Kim of the KINS presented on the South Korean national ER framework. Afterwards, Mr. Jeff Kowalczik of the NRC presented on the US national radiological ER framework. Mr. Kowalczik later hosted training sessions for RASCAL. Ms. Thuy Nguyen of the Canadian Nuclear Safety Commission (CNSC) also presented on the Canadian framework for radiological ER and was followed by Mr. Emmanuel Quentric of the Institut de Radioprotection et de Sûreté Nucléaire (IRSN) on the French perspective.

Other ER topics included lessons learned from Fukushima Daiichi and a presentation by the International Atomic Energy Agency (IAEA) representative, Mr. Frederic Stephani, on their intergovernmental role in ER. (cont. on page 2)

Spring Meeting cont.

Training and state-of-practice of codes such as NRCDose3, RADTRAN, Turbo FRMAC, and the new SIERRA framework were also featured. Dr. Jonathan Napier of Pacific Northwest National Laboratory (PNNL) hosted an introduction to NRC RADTRAN, followed by example exercises and a seminar on future research. Turbo FRMAC also received an introduction and example demonstrations by health physicists Mr. Brian Hunt and Ms. Autumn Kalinowski of Sandia National Laboratories (SNL). The RAMP team would like to thank all participants who made the latest meeting a success!

Panel discussion on radiological emergency response assessment and prognosis.

Dr. Stephanie Bush-Goddard and Jeong Wan Kwon

Team Highlights

Computer Scientist – Samuel Edwards

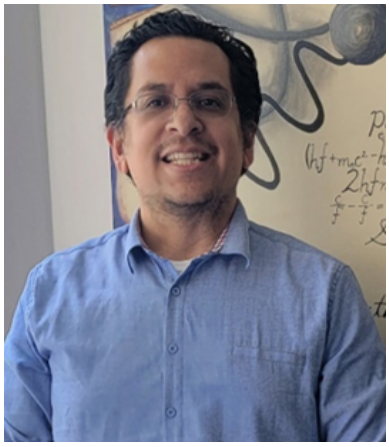
Sam received his bachelor's degree in mathematics from Gettysburg College and his master's degree in computer science from Johns Hopkins University. After graduating from Gettysburg College, he worked for the Parsons Corporation as a Research Scientist investigating applications of unsupervised machine learning on sparse datasets for the US Army at Aberdeen Proving Ground, MD.

After his time with the US Army, he worked as an Associate Professional Staff at the Johns Hopkins Applied Physics Laboratory performing analysis on simulation data to support requirements development and debugging various modeling tools and simulations.

Sam joined the NRC in March 2024; he is the resident computer scientist for both the RAMP program and the Radiation Protection Branch in the Office of Research. His tasks include managing the RAMP website, overseeing the development and testing of the RAMP codes, and leading Section 508 compliance testing.

Team Highlights cont.

Health Physicist - Marcos Vicente



Marcos received his bachelor's degree in physics from the University of Maryland, Baltimore County (UMBC) and his master's degree in Nuclear and Radiological Sciences from the University of Florida (UF).

After college, he worked as a Health Physicist for the US Army Communications and Electronics Command (CECOM), Directorate for Safety at Aberdeen Proving Ground, MD. His duties with the US Army included providing health physics support as one of the Army National Guard's (ARNG's) Radiation Safety consultants for their NRC Licensed, General Licensed, and exempt radioactive commodities. He trained soldiers to become Radiation Safety Officers, managed CECOM's Radiation Sample Analysis and Calibration Laboratory, and performed onsite State Radiation Safety Program audits across all ARNG states.

U.S. Army Communications-Electronics Command

Marcos joined the NRC in June 2024; he is the new international liaison officer for the international RAMP agreement members, and he will soon be managing RAMP.

Health Physicist – Samuel Hanson, PhD

NC State University

Sam received his doctorate in nuclear engineering from North Carolina State University in April 2024. His graduate research was in radiation hardness assurance and shielding for spacecraft electronics. Sam also possesses a Graduate Certificate in Health Physics from North Carolina State University and a bachelor's degree in Applied Physics from Ohio University. Sam was first hired as an NRC summer intern in May 2022 and stayed on as a Co Op for the following two years in the Office of Research.

Sam converted to full time staff from a Student Co Op position in June 2024. He is the newest health physicist in the Radiation Protection Branch (RPB) in the Office of Research. Sam has begun working in various RAMP activities including serving as Assistant Contracting Officer's Representative for RASCAL, beta testing an updated PIMAL MCNP GUI, and overseeing RAMP membership applications and registration. Sam is being trained to take over RPB's Abnormal Occurrence Report.

VARSKIN+ v1.3

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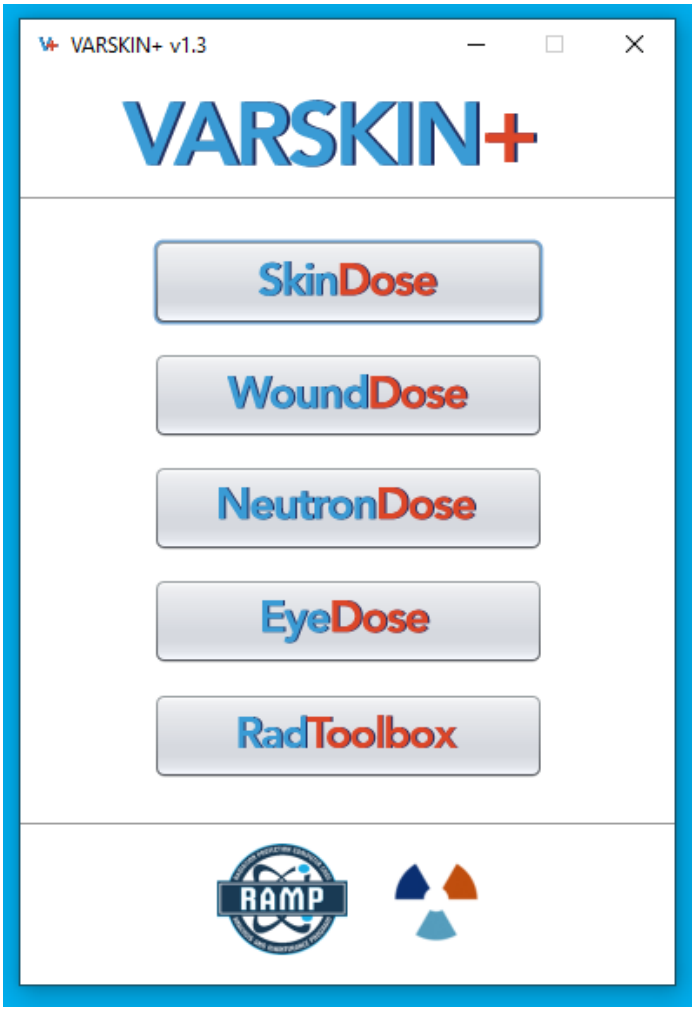

VARSKIN+ 1.3 central control panel with newest module for Radiological Toolbox.

VARSKIN is an essential tool developed by the US NRC for evaluating radiation doses to the skin resulting from exposure to radiation emitted from hot particles or other contamination on/near the skin. VARSKIN allows simulations of point, disk, cylinder, sphere, slab, and syringe sources from predefined source configurations. With the inclusion of the plus sign in VARSKIN+, three new physics modules were introduced: (1) wound dosimetry; (2) neutron dosimetry; and (3) eye dosimetry. Skin and wound dosimetry implement a new alpha dosimetry model for shallow skin assessments. VARSKIN+ can be used to perform wound dose assessments if the metabolic modeling and dosimetry methods are consistent with NRC regulations.

The newest update, VARKSIN+ v1.3, now includes the Radiological Toolbox module. The Radiological Toolbox provides users with access to data of interest in radiation safety as well as protection of workers and members of the public. The data include dose coefficients for intakes of radionuclides, external exposure to radionuclides distributed in environments, and for exposures to photon/neutron radiation fields. Users may also find other supportive data including interaction constants and coefficients for alpha, beta, gamma, and neutron radiations; nuclear transformation data; biological; radiological; and physiological data. There is also supplemental information on various related topics.

Additional updates were added to VARKSIN+ v1.3 and the code's dose calculation modules. Both WoundDose and SkinDose modules were revised to enhance the accuracy of alpha dose calculations via adjustment of the tissue density. Also, VARSKIN+ v1.3 expands its functionality and user base by being available in German (Dutch), Akan, and Korean languages. In addition to be it being already available in English, Spanish, French, and Ukrainian.

SIERRA ATD

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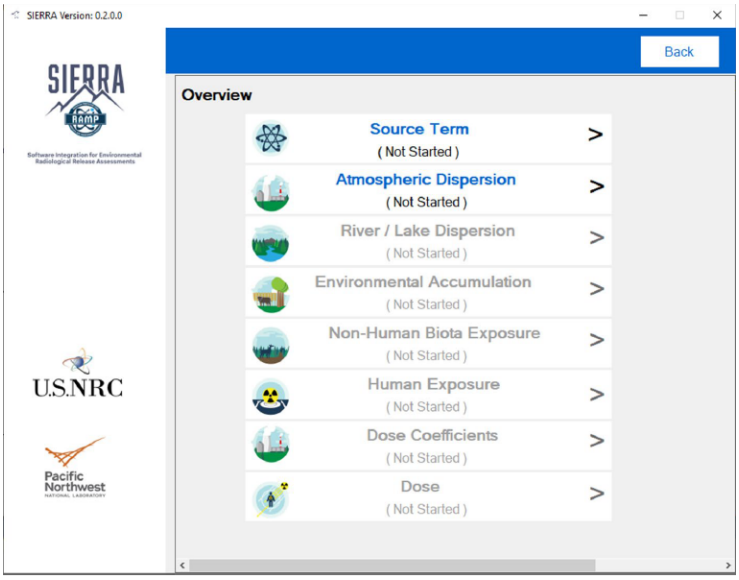
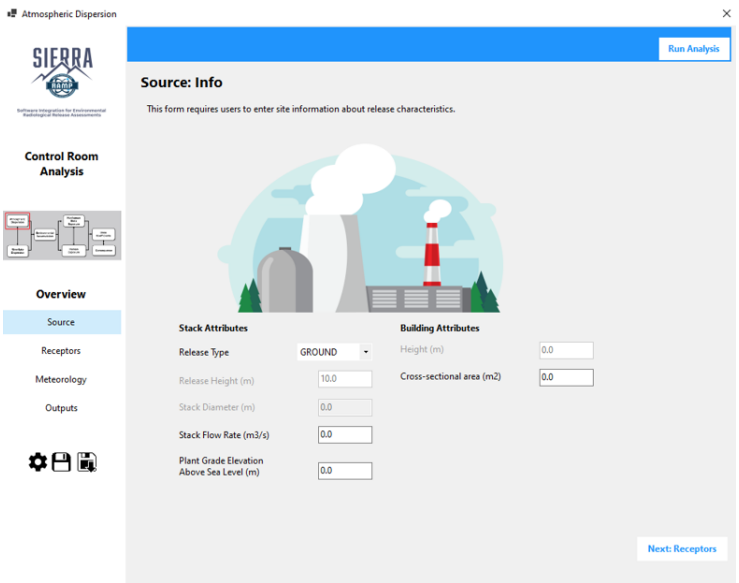


SIERRA central control panel with modules for source term and ATD available.



SIERRA source term module with customization for stack and building attributes.

NRC RAMP is leading code consolidation activities, as efforts are being made in code modernization and preparation for non-light water reactor fleets. NRC RAMP is excited to announce the upcoming release of Software Integration for Environmental Radiological Release Assessments (SIERRA). SIERRA will be released in phases. The first phase will focus on atmospheric transport and diffusion. This will be called SIERRA Atmospheric Transport and Diffusion (ATD) module and is expected to be released October 2024.

SIERRA ATD is responsible for evaluating releases in cases of design-based accidents (from 100s of meters to 10 km), as well as normal effluent releases for sensitive receptors and populations up to 80 km. This module consolidates the scientific functions of ARCON, PAVAN, and XOQDOQ into a single user interface. SIERRA ATD will allow users to estimate relative concentrations based on hourly meteorological data for all three codes, rather than use joint frequency distributions (which reduces data fidelity). SIERRA ATD has been released to beta testers and is currently undergoing testing per the software quality assurance plan.

Following development of the SIERRA ATD, the next two phases of the modernization effort will be focused on development of the normal effluent source term and environmental pathways modules. More information will be shared with the RAMP User Group community as updates are available.

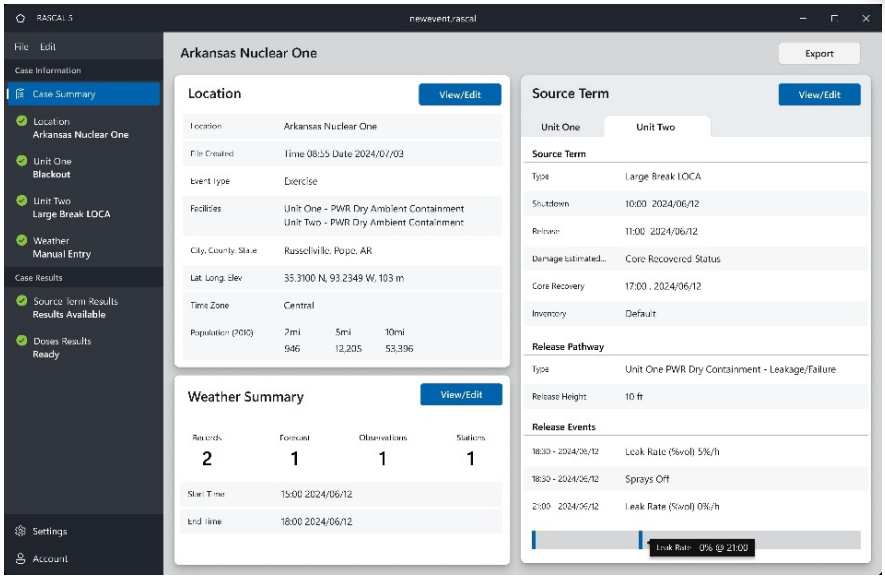
RASCAL MODERNIZATION

RAMP NEWSLETTER – FALL 2024

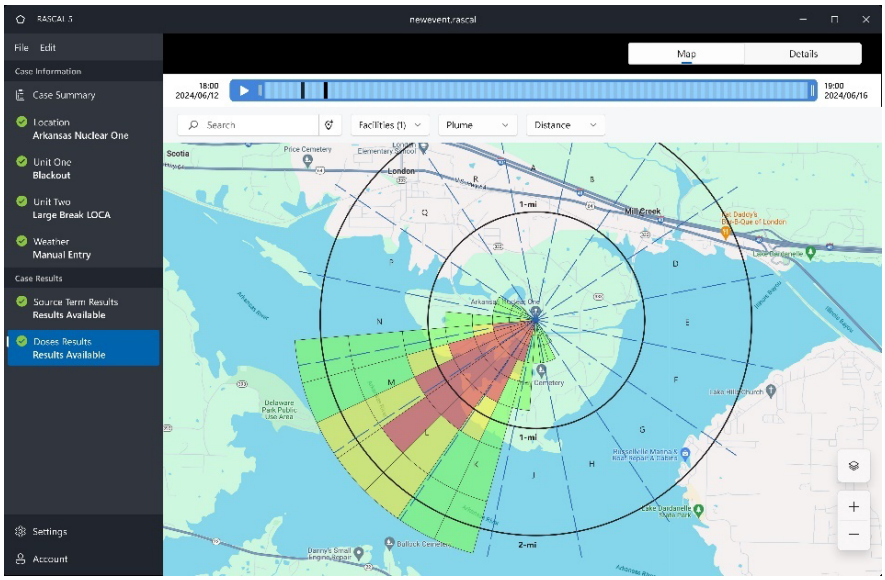
The NRC RAMP team began development of RASCAL 5.0 earlier this year with the primary goals of updating the Graphical User Interface (GUI) and addressing code modernization requirements. The RASCAL 4.3.4 GUI is currently written in an outdated language and is restrictive in functionality due to age. This effort aims to not only code the GUI in a modern, supported programming language, but also to revisit the design to address user needs such as navigation and information presentation. Overall, the revision intends to improve the flow of the code from start to finish, making it comfortable to use for both new and returning users.

In addition to the GUI updates, the developers will undertake an effort to modernize the entirety of the code, bringing it up to current standards and improving efficiency. During this process, the team will address potential code improvements where requested features could be added to RASCAL. This work is currently being performed at PNNL with an estimated completion date towards the end of 2026.

Included are images of the proposed design, but please remember the code is early in development and subject to modifications.



Currently proposed Case Summary Dashboard for RASCAL 5.0



Currently proposed Doses Results for RASCAL 5.0

International Partners

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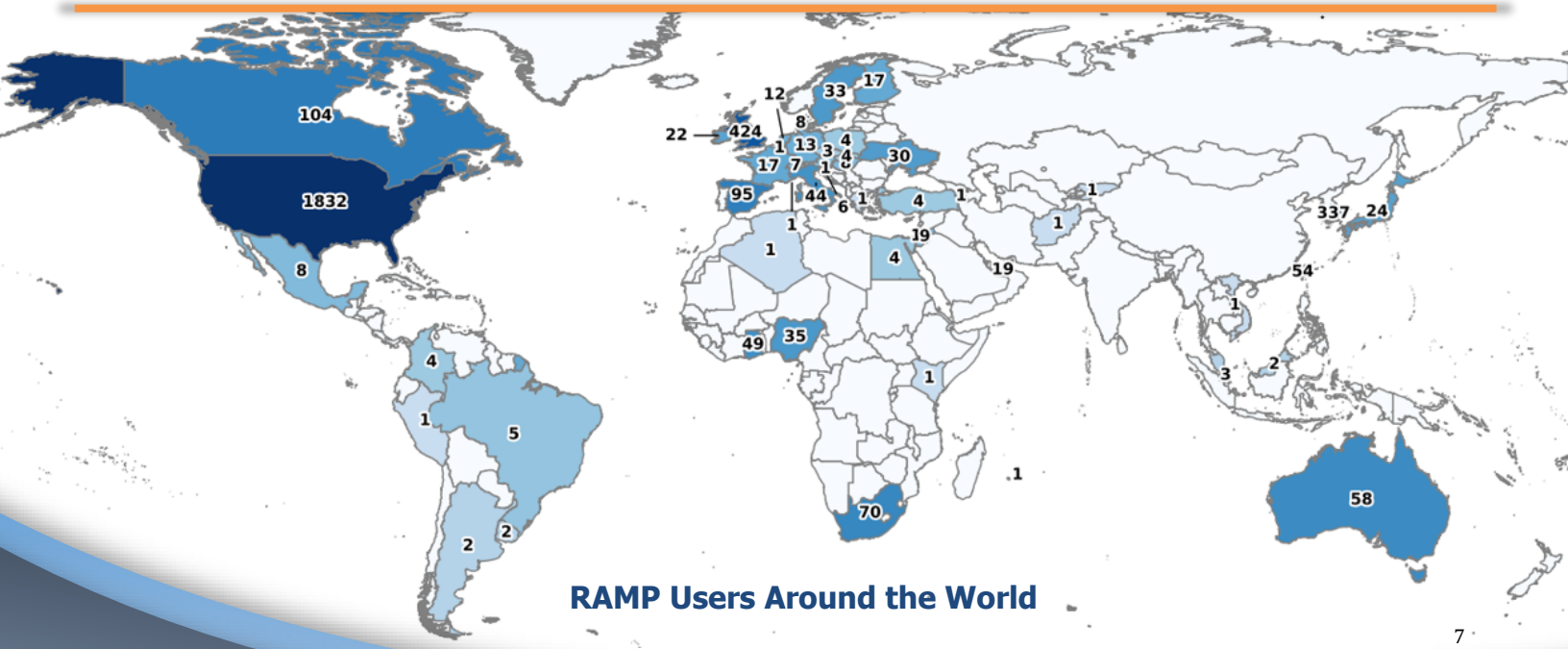
The RAMP program has approximately 3384 active members, of which approximately 1300 are international users from 49 different countries. International participation is crucial to RAMP as it provides feedback on code limitations, contributes to quality assurance of RAMP codes, and enables the NRC to improve upon the RAMP codes. The program currently has 12 international agreements with Australia, Canada, France, Ghana, Italy, Mexico, Nigeria, Poland, South Africa, South Korea, Spain, Ukraine, and United Arab Emirates.

Please join us in recognizing Canada and South Korea for renewing their RAMP agreements!

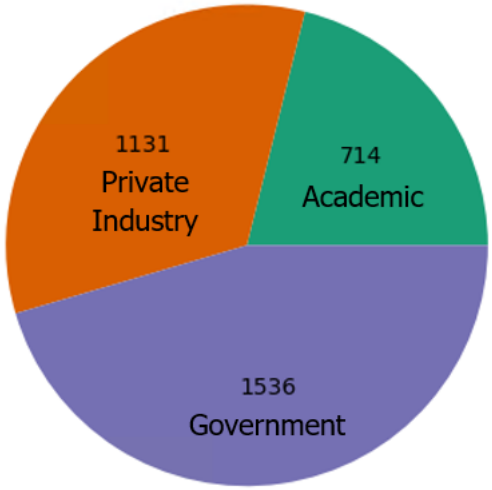


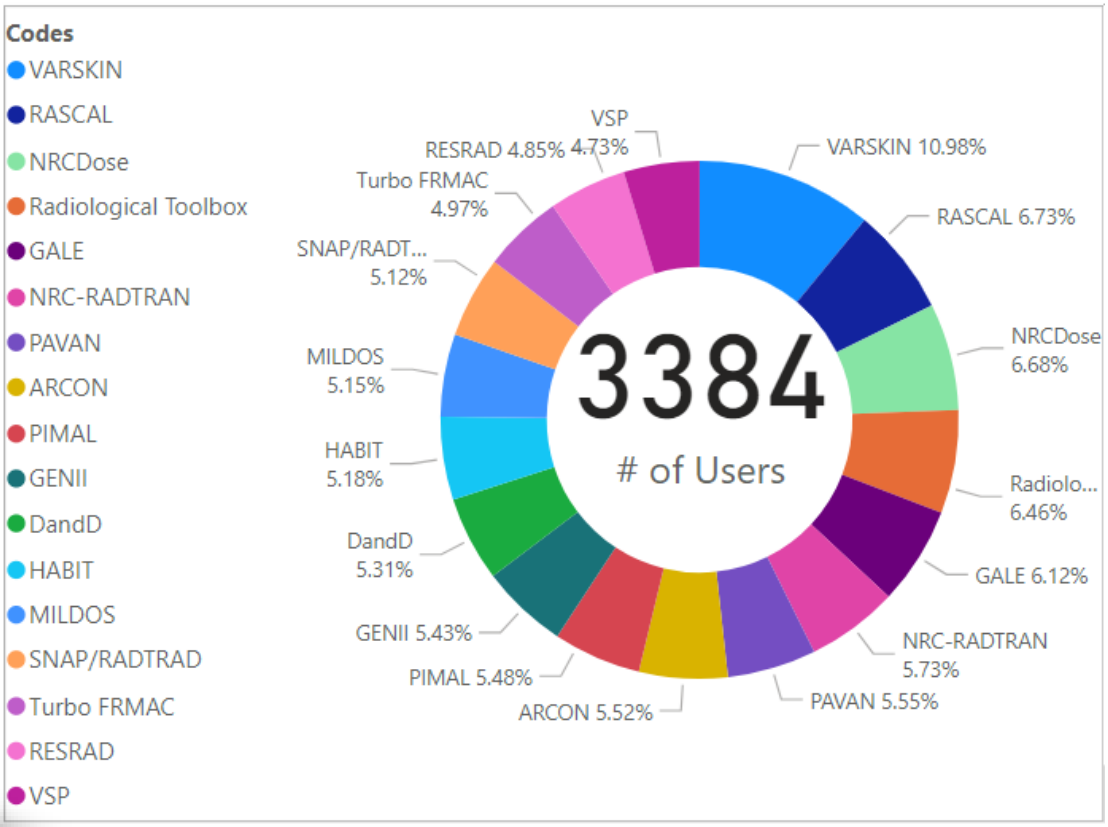
RAMP Users Around the World

RAMP By The Numbers

RAMP Newsletter – Fall 2024

Of the 3384 RAMP users, most users are government affiliated, followed by industry professionals, and academic institutions. VARSKIN+ is the most popular free code, while the most popular premium code is RASCAL.





Spring 2025 User Group Meeting

The RAMP Team is working on the next International RAMP User Group Meeting (Spring 2025), which will be hosted by our international RAMP Agreement member, Canada!

We'd love to hear from you!

The RAMP Team welcomes your thoughts and feedback on any code features and enhancements for the RAMP codes and the RAMP website. Please send your feedback to **RAMP@nrc.gov**.

2024 User Group Meeting

RAMP Newsletter – Fall 2024

DAY 1 | Monday, October 21, 2024 (All times are in ET)			
8:00 AM – 8:30 AM	Registration		
8:30 AM – 11:30 AM	Symposium: Radiation Consequence Codes Used in a Regulatory Framework (hybrid)		
11:30 AM – 12:00 PM	Incident Response Tour (optional, in-person)		
12:00 PM – 1:00 PM	Lunch (on your own)		
1:00 PM – 5:00 PM	RASCAL Beginner (in-person)	*Clean Air Act* Assessment Package – 1988 Overview (hybrid)	
5:00 PM – 7:00 PM	Social Hour (in-person)		
DAY 2 | Tuesday, October 22, 2024			
8:00 AM – 9:00 AM	Primer: SIERRA Overview (hybrid)		
9:00 AM – 11:30 AM	Symposium: Codes Used in the Regulatory Framework (hybrid)		
11:30 AM – 12:00 PM	Incident Response Tour (optional, in-person)		
12:00 PM – 1:00 PM	Lunch (on your own)		
1:00 PM – 5:00 PM	MACCS Workshop I (in-person)	RASCAL Intermediate/Advanced (in-person)	SIERRA ATD (hybrid)
DAY 3 | Wednesday, October 23, 2024			
8:00 AM – 9:00 AM	Primer: Overview of MELCOR Advanced Reactor Source Terms (hybrid)		
9:00 AM – 12:00 PM	MACCS: Presentations (hybrid)	NRCDose Overview (hybrid)	
12:00 PM – 1:00 PM	Lunch (on your own) and International Luncheon (in-person)		
1:00 PM – 5:00 PM	Tour of a DC Area Facility (optional, in-person)		
6:00 PM – 8:00 PM	No Host Dinner (in-person)		
DAY 4 | Thursday, October 24, 2024			
8:00 AM – 9:00 AM	Primer: User Choice (Options: Artificial Intelligence at NRC; Navigating Space Nuclear Safety; Health Risk Communication; NRC Licensing Modernization Project)		
9:00 AM – 12:00 PM	MACCS Workshop II (in-person)	Dosimetry Symposium (VARSKIN, IMBA, PiMAL) (hybrid)	RADTRAN (hybrid)
12:00 PM – 1:00 PM	Lunch (on your own)		
1:00 PM – 4:30 PM	MACCS Workshop III (in-person)	Dosimetry Symposium (VARSKIN, IMBA, PiMAL) (hybrid)	RAMP Code Discussion (in-person)
4:30 PM – 5:00 PM	Closing Ceremony		
DAY 5 | Friday, October 25, 2024 (Optional Day Based on RAMP and MACCS Users' Needs)			
9:00 AM – 11:00 AM	RAMP and MACCS User Admin Meetings (optional) • Optional Code Discussions • Optional RAMP Country to Country Meetings • Optional MACCS Meetings		