



RADIATION PROTECTION COMPUTER CODE
ANALYSIS AND MAINTENANCE PROGRAM

2022 FALL USERS GROUP MEETING WASHINGTON, DC

UNITED STATES NUCLEAR REGULATORY COMMISSION
(VIRTUAL) OCTOBER 24–27, 2022
(HYBRID) NOVEMBER 1–3, 2022



WELCOME!

Audio

All participants will be muted.

Video

All participants should have video turned off.

Meeting Recording

This meeting (aside from selected small sessions) will be recorded and may be posted on NRC's website or used internally. If you do not wish to have your voice recorded, please do not speak during the meeting. If you do not wish you have your image recorded, please turn off your camera or participate only by phone. If you speak or use a video connection, you are presumed to consent to recording and to the use of your voice or image.

Questions

- Questions will be addressed at the end of the presentations.
- Please use Chat to submit any questions.
- Please type your name, country, the question, and the person the question is directed to in the chat.
- If you have questions after the meeting, please email the questions to RAMP.ADMIN@pnnl.gov.

Electronic Certificates

- Available per request only. Please email RAMP.ADMIN@pnnl.gov.

Technical Issues

- Please email RAMP@nrc.gov.

WELCOME TO THE 2022 FALL RAMP USERS' MEETING



NRC, Director, Office of Nuclear Regulatory Research (RES)

Welcome to the Radiation Protection Computer Code Analysis and Maintenance Program (RAMP) Users' Meeting. We are pleased that you are joining us for this meeting and for collaboration to enhance nuclear and radiation safety. RAMP is one of the important initiatives through which we engage with domestic and international colleagues. The success of our regulatory program is bolstered by strong partnerships such as the RAMP users' group.

In addition to RAMP, the RES plans, recommends, manages, and implements applied research, confirmatory analyses, standards development, and resolution of generic safety issues for nuclear power plants and other facilities.

regulated by the NRC. RES partners with other NRC offices, federal agencies, industry research organizations, international organizations, and universities to achieve our mission. We employ a wide variety of talented and diverse experts in engineering and scientific disciplines, including radiation protection, thermal-hydraulics, severe accident progression, nuclear materials, human factors and human reliability, fire protection, seismology, environmental transport, and probabilistic risk assessment. Our experts provide the technical support, analytical tools, and information necessary to accomplish NRC's nuclear safety and security mission.

Besides RAMP, RES also coordinates domestic and international cooperative nuclear safety research activities, including cooperative code-sharing programs for the following areas:

- thermal hydraulics, called the Code Applications and Maintenance Program (CAMP)
- severe accidents, called the Cooperative Severe Accident Research Program (CSARP).

The NRC is pleased to host this RAMP Users' Meeting and we look forward to collaboration with all attendees. Engaging with our RAMP colleagues is just one of the many ways the NRC works to ensure the safety and security of nuclear materials around the globe. These efforts are critically important as the world becomes more interconnected and interest grows in the use of nuclear technologies. We look forward to your active participation.

Raymond Furstenau

*Director of Nuclear Regulatory Research
U. S. Nuclear Regulatory Commission*

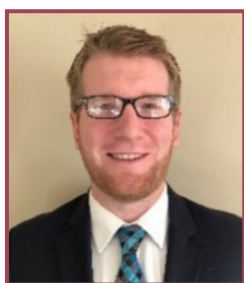
MEET THE NRC RAMP TEAM

NRC RAMP TEAM



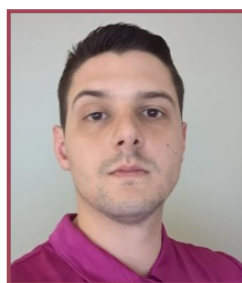
**STEPHANIE
BUSH-GODDARD**

*Senior RAMP
Program Manager*



**EDWARD
HARVEY**

*RAMP Program
Manager*



**RIGEL
FLORA**

*RAMP Program
Team*



**JOHN
TOMON**

Branch Chief

PACIFIC NORTHWEST NATIONAL LABORATORY (PNNL) RAMP TEAM



**CAITLIN
CONDON**

*PNNL RAMP
Program Manager*



**HARISH
GADEY**

*Deputy PNNL RAMP
Program Manager*



**LUBA
HAMILTON**

*PNNL RAMP
Program Coordinator*



**TANYA
KOROTKOV**

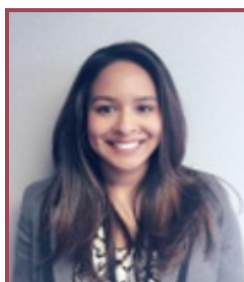
*PNNL RAMP
Program Coordinator*

LEIDOS RAMP TEAM



**DANIEL
POMYKALA**

*Leidos RAMP
Program Manager*



**WENDY
CHINCHILLA**

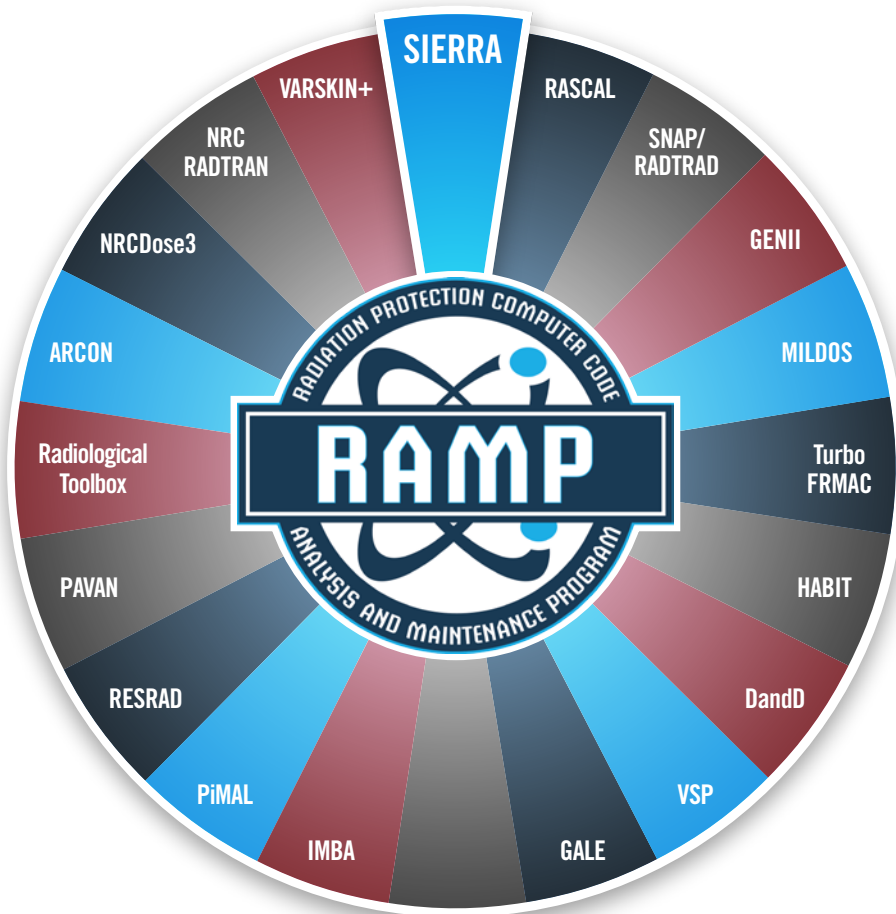
*Leidos RAMP Website
Technical Lead*



**FREDERIC
GOODING**

*Leidos RAMP
Operations Support*

RADIATION PROTECTION COMPUTER CODE ANALYSIS AND MAINTENANCE PROGRAM (RAMP) CODES



DOSE ASSESSMENT CODES IN RAMP

<https://ramp.nrc-gateway.gov/codes>

FALL 2022 RAMP USERS' GROUP MEETING

October 24-27, 2022 (100% virtual)

November 1-3, 2022 (hybrid*)

All times listed are Eastern Daylight Time (EDT)

Monday October 24, 2022	DAY 1–Virtual
8:30–9:30 AM	Welcome U.S. NRC & Opening Remarks Feature Presentation: Federal Emergency Management Agency (FEMA) Emergency Response
9:40 AM–12:00 PM	Emergency Response Symposium
1:00–4:15 PM	Emergency Response Symposium
Tuesday October 25, 2022	DAY 2–Virtual
8:00–8:50 AM	Morning Primer – VARSKIN+
9:00 AM–12:00 PM	IMBA Training
1:30–4:00 PM	PiMAL
Wednesday October 26, 2022	DAY 3–Virtual
8:00–8:50 AM	Morning Primer – EPA Compliance Codes
9:00 AM–12:00 PM	RASCAL Beginner
1:30–4:00 PM	Turbo FRMAC Overview
Thursday October 27, 2022	DAY 4–Virtual
8:00 AM–8:50 AM	Morning Primer – Code Consolidation
9:00 AM–12:00 PM	RASCAL Intermediate
1:30 PM–4:00 PM	RASCAL Advanced/Turbo FRMAC Discussion
Tuesday November 1, 2022	DAY 5–Hybrid*
8:30–8:50 AM	Check In/Meet & Greet for In-Person Attendees
8:50 AM–12:00 PM	SNAP/RADTRAD Beginner
1:30–4:00 PM	SNAP/RADTRAD Beginner
Wednesday November 2, 2022	DAY 6–Hybrid*
9:00 AM–12:00 PM	SNAP/RADTRAD Intermediate
1:30–4:00 PM	SNAP/RADTRAD Intermediate
Thursday November 3, 2022	DAY 7–Hybrid*
9:00 AM–12:00 PM	SNAP/RADTRAD Open Users' Forum

**Hybrid: in-person and virtual*

Full agenda, registration, and additional information will be available on the RAMP website:

ramp.nrc-gateway.gov

DAY 1 - RAMP OPENING SESSION & EMERGENCY RESPONSE SYMPOSIUM

TIME	TOPIC	PRESENTER
RAMP Opening Session		
8:30–8:35 AM	Opening and Housekeeping	Caitlin Condon <i>PNNL RAMP Program Manager</i>
8:35–8:40 AM	Welcome	Ray Furstenau <i>Director, Office of Nuclear Regulatory Research</i>
8:40–8:55 AM	Welcome from the RAMP Team	Edward Harvey <i>NRC RAMP Program Manager</i>
8:55–9:20 AM	Feature Presentation: Federal Emergency Management Agency (FEMA) Emergency Response	Jon Gill <i>Nuclear Incident Response Team and Nuclear Radiological Incident Task Force Program Manager</i>
9:20–9:30 AM	RAMP User Meeting Information & Roll Call	Stephanie Bush-Goddard <i>NRC RAMP Program Manager</i>
9:30–9:45 AM	Break	
Emergency Response Frameworks		
9:45–10:00 AM	How the U.S. NRC Responds to an Emergency Video	Video/Ed Harvey, <i>NRC</i>
10:00–10:20 AM	Northwest Regional Technology Center	Ann Lesperance, <i>PNNL</i>
10:20–10:40 AM	How States Respond to Emergencies	William Irwin, <i>State of Vermont</i>
10:40–11:00 AM	Nuclear Emergency Response – An Overview	John Crapo, <i>REAC/TS ORAU</i>
11:00–11:10 AM	Break	
International Emergency Response Panel		
11:10 AM–11:25 PM	Special Presentation: Ukraine Emergency Response during War Time	Yurii Kyrylenko, <i>Ukraine</i>
11:25 AM–12:00 PM	International Panel with Canada, South Africa, South Korea, Spain, and the US	John Tomon, <i>NRC</i> Edward Harvey, <i>NRC</i>
12:00–1:00 PM	Lunch	
Innovation and New Initiatives in Emergency Response		
1:00-1:20 PM	Preventative Radiological and Nuclear Detection	Melanie Godinez, <i>PNNL</i>
1:20-1:40 PM	DOE NA-83 – Forensics after Nuclear Incidents	Grant Ford, <i>NNSA</i>
1:40-2:30 PM	Machine Learning in Emergency Response	Don Lucas, <i>LLNL</i>
2:30–2:45 PM	Break	
NRC Initiatives		
2:45-3:05 PM	Exacting the Science of Emergency Response	Todd Smith, <i>NRC</i>
3:05-3:25 PM	What is MACCS and the PAR Study	A.J. Nosek, <i>NRC</i>
3:25-3:45 PM	Non-Radiological Health Effects of the Evacuation and Relocation Study	Amy Sharp, <i>NRC</i>
3:45-4:05 PM	Cost Effectiveness Analysis – Masks vs KI	Adam Stricker, <i>NRC</i>
4:05-4:15 PM	Closing Remarks	John Tomon, <i>NRC</i>

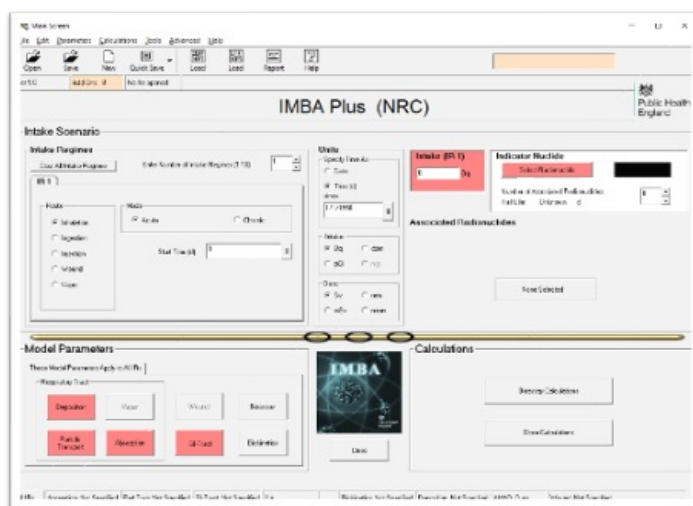
IMBA – DAY 2

INSTRUCTOR:



COLBY MANGINI, PH.D.

Renaissance Code Development, LLC (RCD)



The IMBA code is a suite of software modules for internal dosimetry that implements respiratory tract, GI-tract, tissue dosimetry, biokinetic and bioassay models as recommended by the International Commission on Radiological Protection (ICRP). Originally designed by the UK's Health Security Agency, the IMBA modules can estimate single or multiple intakes of different radionuclides and calculate resulting doses in the body and/or excrement for workers based on ICRP Publication 68 and US 10 CFR 835. IMBA provides a platform for conducting customized dose calculations with different user set parameters. The suite has functionalities to:

- perform simple and more complex dose calculations
- vapor inhalation
- forward bioassay calculations, and
- intake estimation for multiple regimes.

TIME (EDT)	PRESENTATION TOPIC
9:00–9:50 AM	Internal Dose and Dosimetry Models <ul style="list-style-type: none"> • ICRP 66 Human Respiratory Tract Model • ICRP 30 Gastrointestinal Model • Generic Wound Model • Radiation and Tissue Weighting Factors
9:50–10:00 AM	Break
10:00–10:45 AM	Overview of IMBA Base Unit, IMBA Plus, and IMBA Pro <ul style="list-style-type: none"> • Walk Through of IMBA Plus Add-Ons
10:45–10:55 AM	Break
10:55–11:45 AM	In-Depth IMBA Plus Exercises <ul style="list-style-type: none"> • Ingestion of fine dust containing Co-60 (acute intake) • I-125 spill on the skin – inhalation vs injection • I-131 released into lab – inhalation
11:45 AM–12:00 PM	Questions/Discussion

PiMAL – DAY 2

INSTRUCTOR:



**CHARLOTTE
ROSE**

*Renaissance Code
Development,
LLC (RCD)*

PiMAL is a collection of computational human phantoms useable with MCNP® for the assessment of radiation dose to various organs in standard and nonstandard positions through the user inputted articulation of arms and legs. A phantom model, included in the GUI, enables visualization of the arms and legs as they are positioned using slider bars. An MCNP® input file is then generated and the radiation transport simulations using MCNP® are performed through the GUI. Once simulation is complete, the computed organ dose values are extracted from the MCNP® output file, displayed, and exported as an ASCII file.

Training objectives

This training will guide the student through the use of PiMAL from installation to simulation with emphasis on use cases, methods, materials, sources, and tallies. A detailed tutorial on a simple modeling technique will conclude the training session.

TIME (EDT)	PRESENTATION TOPIC
1:30–2:20 PM	<ul style="list-style-type: none">• Introduction to the phantom method/ICRU etc.• What kinds of problems can you solve with PiMAL?<ul style="list-style-type: none">◦ External/internal exposures with various geometries to male or female phantoms◦ Examples of PiMAL problems in literature• Installation and setup of PiMAL
2:20–2:30 PM	Break
2:30–3:20 PM	PiMAL application and input file <ul style="list-style-type: none">• Utility of moving arms/legs• Tabs: sliders, text, simulation, grid view (preferences) and transparencies• Limitations of movement and limitations of simulation in app• Simulation: generate MCNP output• Tallies: what is the default and why.
3:20–3:30 PM	Break
3:30–4:00 PM	PiMAL use <ul style="list-style-type: none">• Checking your source to make sure that it is what you expect• Tallies: what the default types are, why you would change them.• How to edit the input file: adding geometry or materials or tallies• Go through the simple example<ul style="list-style-type: none">◦ Tutorial 7.1 with existing case

RASCAL – DAY 3

INSTRUCTORS:



**JEFF
KOWALCZYK**

*U.S. Nuclear
Regulatory
Commission*



GEORGE ATHEY

Athey Consulting, Inc.

RASCAL Training for Novice Users (October 26)

This RASCAL training course is a hands-on computer class for new RASCAL users. No experience with RASCAL is required, but a general familiarity of radiological assessments will be helpful. Instructors will walk users through a step-by-step example of doing a dose assessment using RASCAL 4.3.4. Discussion topics include:

- RASCAL capabilities and tools
- Site locations
- Source Term models
- Atmospheric models
- Reading results

Users are required to have RASCAL 4.3.4. installed on their computer prior to attending.

RASCAL Training for Intermediate/Advanced Users (October 27)

This RASCAL training course is a hands-on computer class for intermediate and experienced RASCAL users. Experience with RASCAL is required. Instructors will walk users through a series of dose assessments, focusing on comparing models in a real-world scenario. Discussion topics include:

- Building RASCAL runs for real-world scenarios
- Core damage estimation using containment radiation monitors
- Comparing small and large break coolant accidents
- Comparing projection results to field measurements

Users are required to have RASCAL 4.3.4. installed on their computer prior to attending.

TURBO FRMAC – DAY 3

INSTRUCTORS:



LAINY COCHRAN

*Sandia National
Laboratories*

The Turbo FRMAC software performs complex calculations to quickly evaluate radiological hazards during an emergency response by assessing impacts to the public, workers, and the food supply. Turbo FRMAC calculations are based on methods established by the Federal Radiological Monitoring and Assessment Center (FRMAC). These federal interagency consensus methods are specified in the FRMAC Assessment Manual, Volume 1 (July 2020). This presentation provides an overview of Turbo FRMAC's capabilities, an update on new features in the latest release of the software, information on how to request access to the software and web-based training opportunities, and a demonstration problem.



SNAP/RADTRAD - NOVEMBER 1-3, 2022 (HYBRID)

INSTRUCTORS:



LANCE LARSEN

ISL



COLLIN LEAVITT

ISL

November 1-3, 2022: SNAP/RADTRAD Training is being hosted in person at NRC Headquarters in Washington D.C. and hosted remotely on teams for those who would like to participate virtually.

Planned Sessions:

- Purpose/Background
- Installation
- RADTRAD Exercises
- Use of APTPlot
- Origins of Source Terms Used in SNAP/RADTRAD
- Source Terms for Non-LWRs
- RADTRAD Open Discussions

For those joining the in-person training there will also be a tour of the NRCs Incident Response Center and a no-host Happy Hour on Tuesday evening.

SNAP

The Symbolic Nuclear Analysis Package (SNAP) consists of a suite of integrated applications designed to simplify the process of performing engineering analysis. SNAP is built on the Common Application Framework for Engineering Analysis (CAFEAN) which provides a highly flexible framework for creating and editing input for engineering analysis codes as well as extensive functionality for submitting, monitoring, and interacting with the codes. SNAP is developed by Applied Programming Technology (APT), Inc. and is sponsored by the NRC. It provides the RADionuclide, Transport, Removal, and Dose Estimation (RADTRAD) user with a graphical user interface with pre- and post-processor capabilities allowing users to develop RADTRAD input decks. prior to attending.

RADTRAD

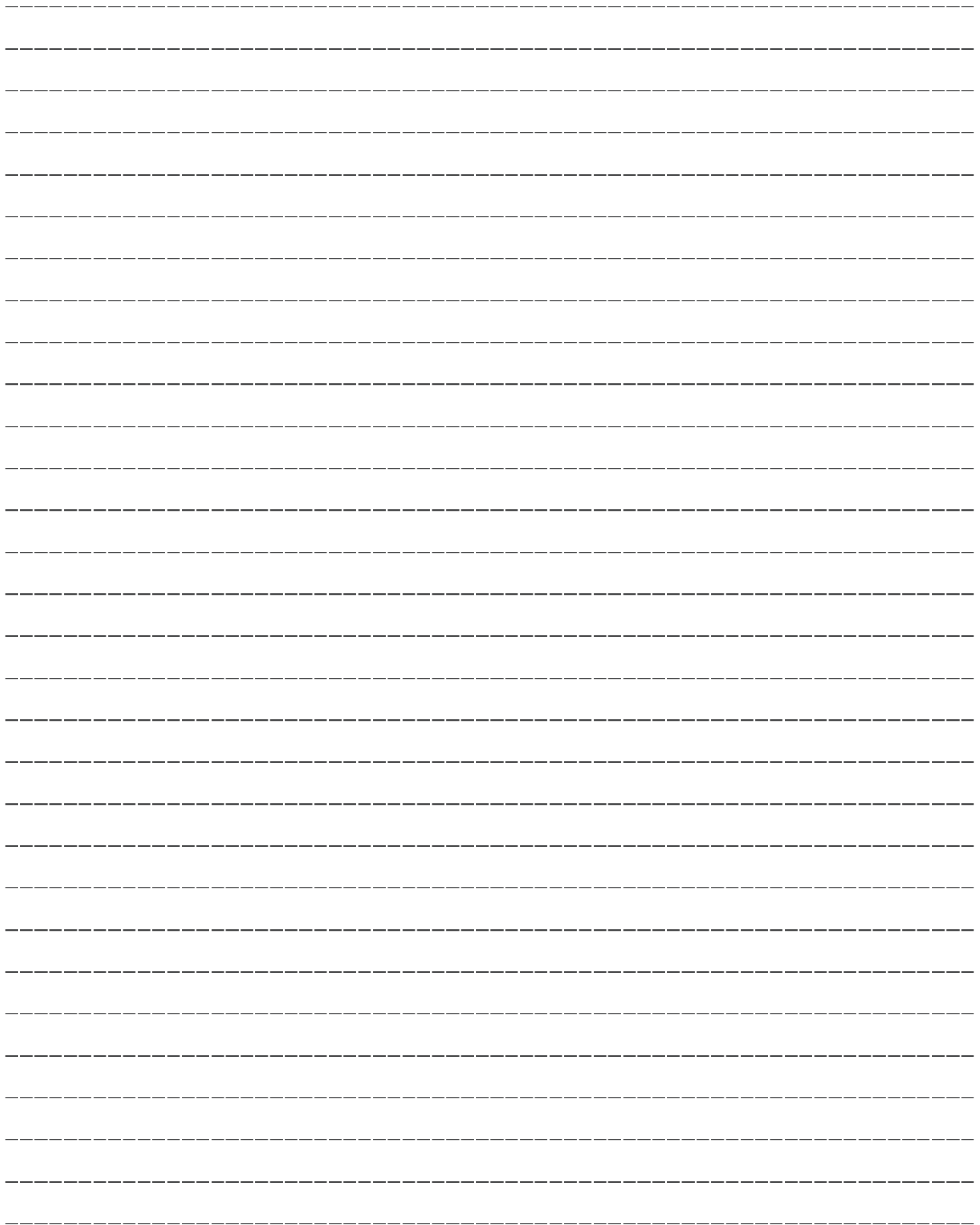
The RADionuclide, Transport, Removal, and Dose Estimation (RADTRAD) code is a licensing analysis code used to show compliance with nuclear plant siting criteria for the site boundary radiation doses at the Exclusion Area Boundary (EAB) and the Low Population Zone (LPZ) and to assess the occupational radiation doses in the control room (CR) and /or Emergency Offsite Facility for various loss-of-coolant accidents (LOCA) and non-LOCA design basis accidents (DBAs). RADTRAD uses a combination of tables and numerical models of source term reduction phenomena to determine the time-dependent dose at the CR, EAB and LPZ for given DBA scenarios.

RADTRAD version 4.5, which was issued in January 2015, is new NRC developed Java version of the RADTRAD code with additional features and options. Some of these include additional features and options include the reactor coolant system (RCS) activity calculator, a larger radionuclide database from ICRP-38 (838 available nuclides), and the ability for the user to model alternative source term (AST) non-LOCA DBAs described in Regulatory Guide 1.183 (RG 1.183).

Tuesday November 1, 2022	DAY 5–Hybrid*
8:30–8:50 AM	Check In/Meet & Greet for In-Person Attendees
8:50 AM–12:00 PM	SNAP/RADTRAD Beginner
1:30–4:00 PM	SNAP/RADTRAD Beginner
Wednesday November 2, 2022	DAY 6–Hybrid*
9:00 AM–12:00 PM	SNAP/RADTRAD Intermediate
1:30–4:00 PM	SNAP/RADTRAD Intermediate
Thursday November 3, 2022	DAY 7–Hybrid*
9:00 AM–12:00 PM	SNAP/RADTRAD Open Users' Forum

**Hybrid: in-person and virtual*

[illegible]



THANK YOU FOR ATTENDING

STAY TUNED FOR THE
2023 Spring International
Users Group Meeting



For additional information

Email:

ramp@nrc.gov

ramp.admin@pnnl.gov

RAMP Website:

ramp.nrc-gateway.gov