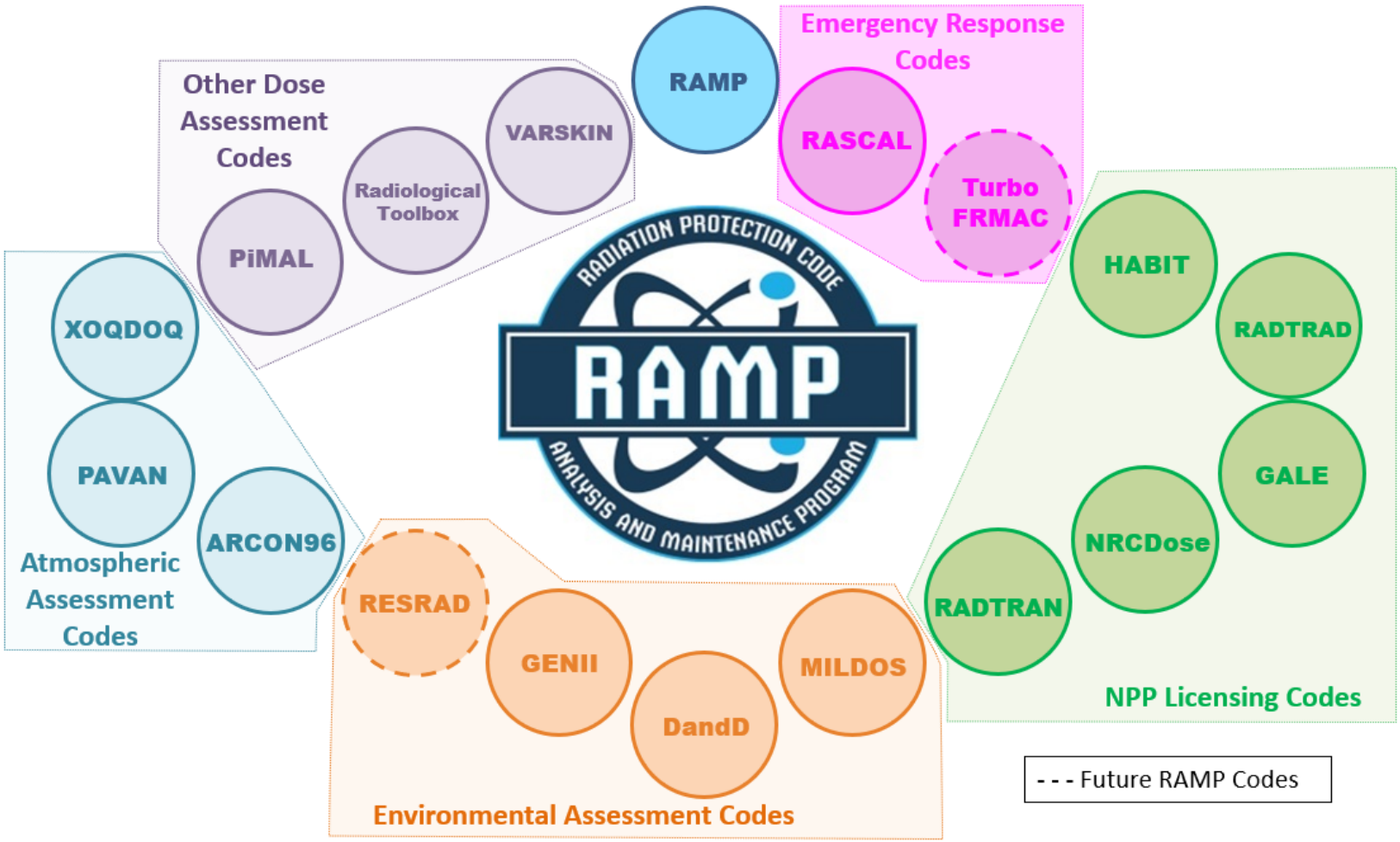
Overview of RAMP Codes & What's New?

Vered Shaffer

United States Nuclear Regulatory Commission

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Dose Assessment Codes in RAMP



RASCAL

Radiological Assessment System for Consequence AnaLysis

- Fast running software used in radiological incidents to assess off-site dose consequences.
- Provides response organizations with pre-release and/or plume phase of radiological release to atmosphere; to help inform or evaluate protective actions.

Instructors:

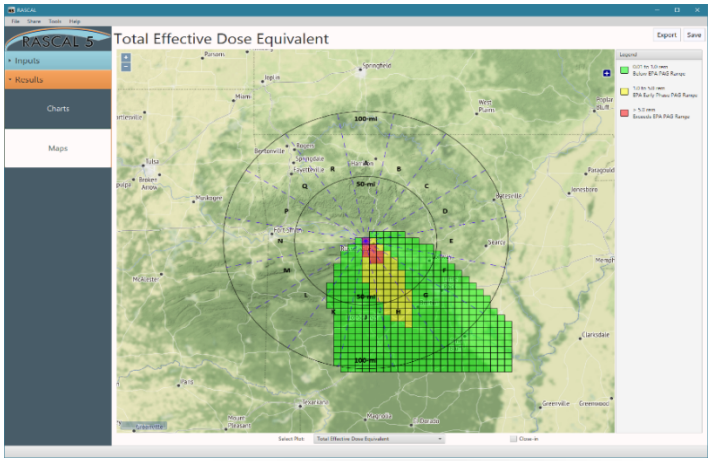
Jeff Kowalczik, CHP

NRC

George Athey

Athey Consulting

- **What's New? RASCAL 5.0: Summer 2020**
  - Integrates MetFetch and surface roughness and topography generating tools into the GUI
  - New charting and mapping features
  - **Demo of 5.0 this week**



VARSKIN

- Calculates occupational dose to the skin over contiguous 10 cm^2 of skin at a tissue depth of 0.007centimeters (7 mg/cm^2)
- Used for confirmatory calculations of licensees' skin dose as required by 10 CFR 20.1201(c).

- **What's New?**
  - Sensitivity Report: RAMP website
  - VARSKIN versions in Spanish and French
  - Availability of Workbooks
  - VARSKIN 7.0: Summer 2020
    - Eye, alpha and neutron dosimetry
    - Updated GUI
    - Real time QA/QC
    - User driven uncertainty analysis

Instructors:

David Hamby, Ph.D.

Renaissance Code Development, LLC (RCD)

Colby Mangini, Ph.D.

Renaissance Code Development, LLC (RCD)

RESRAD

RESidual RADioactive Material

- Family of codes used to analyze human and biota radiation exposures from environmental contamination of residual radioactive materials.
- The codes are used worldwide by regulatory agencies, the risk assessment community, and universities in more than 100 countries.

Instructors:

Charley Yu, Ph.D.

Argonne National Laboratory (ANL)

Emmanuel Gnanapragasam, Ph.D.

Argonne National Laboratory (ANL)

- **What's New?**
  - RESRAD-OFFSITE: Summer 2020
    - Update of source term model and updated surface water model

Officially in RAMP…. ANY MINUTE NOW (waiting on lawyers ☹)

SNAP/RADTRAD

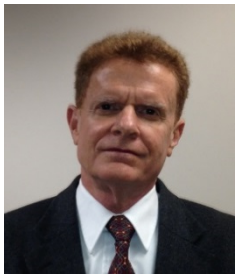
Symbolic Nuclear Analysis Package/RADionuclide Transport, Removal And Dose Estimation

- Purpose: Performs dose calculations for design-basis accidents at the exclusion area boundary, low population zone, and control room
- Use: NRC staff performs licensing confirmatory analyses of the plant's design and the licensee's offsite and control room dose calculations following a design basis accidents.

- **What's New?**
  - Evaluation of non-LWR reactor needs

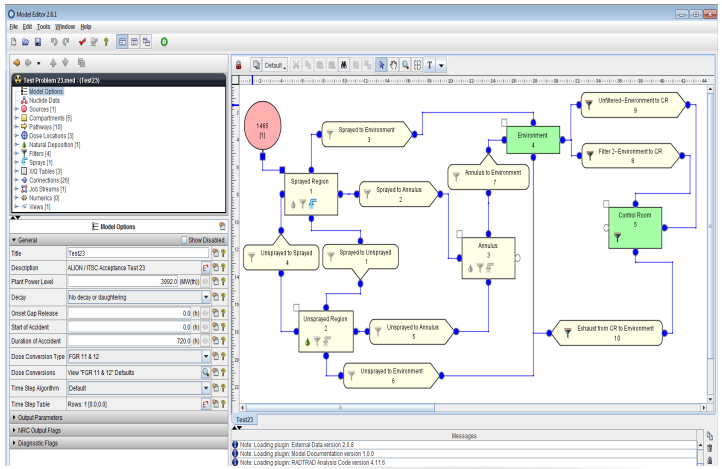
  Upcoming Updates
  - RADTRAD-AC v5.0 – January 2020

Instructor:



William Arcieri

Information Systems Laboratories, Inc. (ISL)



NRCDose

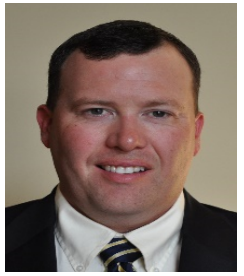
- GUI for the LADTAP II, GASPAR II, and XOQDOQ Fortran codes that implement NRC's current requirements for As Low As Reasonably Achievable for radioactive effluents from NPP.
- **What's New?**
  - NRCDose3 – August 2019
    - Updated Windows GUI
    - Option to select DCFs from ICRP-2 [Default], ICRP-30 or ICRP-72 (six age groups)

  Future Code Work:
  - Publish NUREG – Spring 2020
  - On-line Training Modules
  - **Stand alone XOQDOQ will be sunset from RAMP – December 2019**

Instructors:

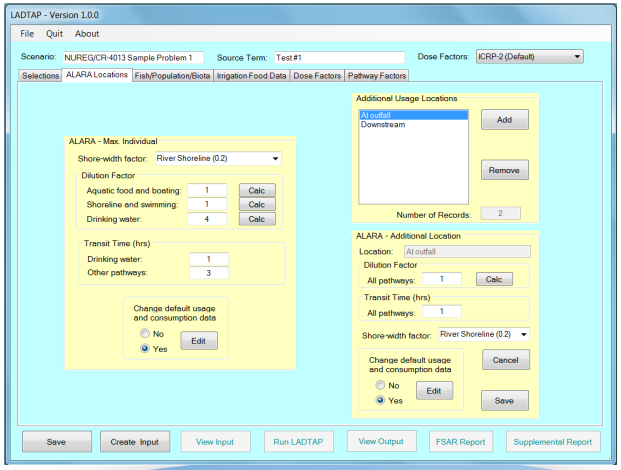
J. Stewart Bland, CHP

Chesapeake Nuclear Services, Inc. (CNS)



Duane DeMore

Chesapeake Nuclear Services, Inc. (CNS)

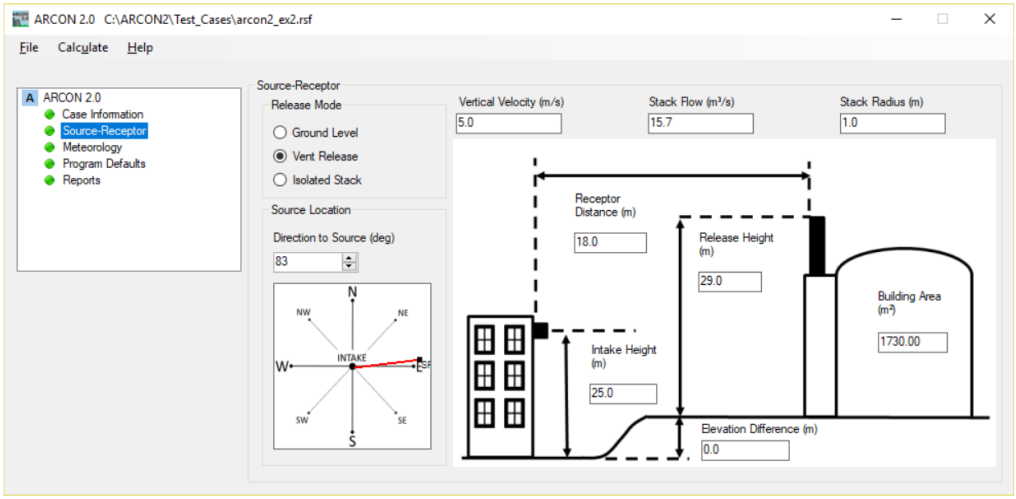


ARCON96

Atmospheric Relative CONcentrations in Building Wakes - **PRIMER**

- Calculates relative concentrations (X/Q) within 100 meters from the initiation of the source, i.e. the stack of the building.
- Use: U.S. NRC, Licensees and DOE to calculate relative concentrations (X/Q) in building wakes and the near field.
- **What's new?**
  - ARCON 2.0 – Spring 2020
  - New 64-bit Windows GUI
  - NUREG/CR-6331 capture updates
  - SQA - Register in DOE Safety SQA - Central Registry

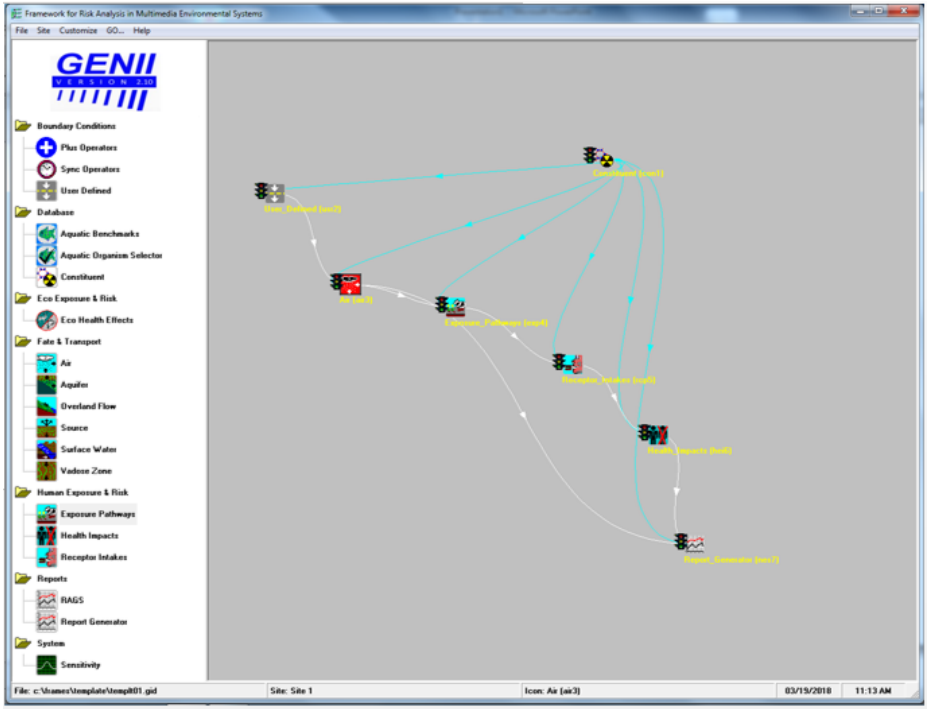
ARCON 2.0



GENII

- A set of programs for estimating radionuclide concentrations in the environment and dose to humans from acute or chronic exposures from radiological releases to the environment or initial contamination conditions.

- **What's new?**
  - Updated Air Module
  - New General Model Option
  - Updated source geometry configuration – irregular shapes
  - **GENII Technical Meeting October 2020**

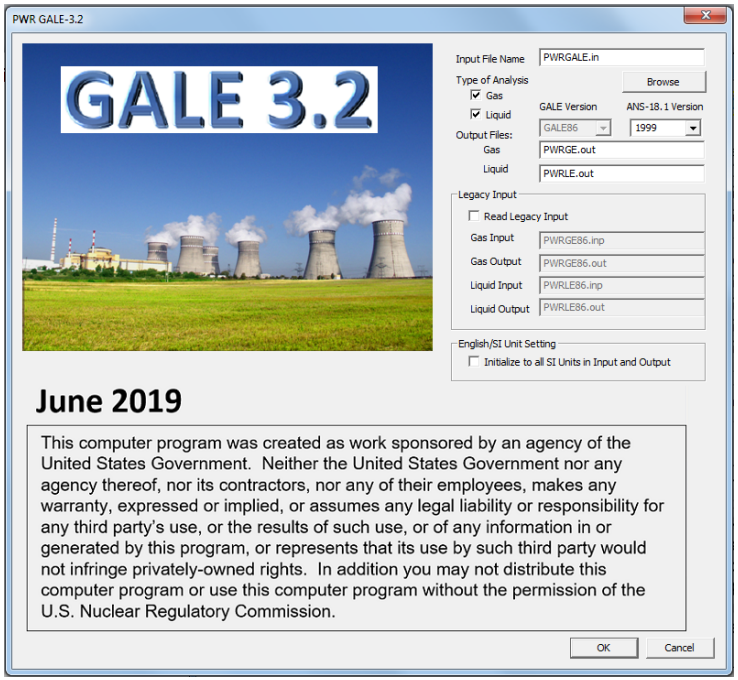


GALE

Gaseous And Liquid Effluent

- Calculates the gaseous and liquid effluents from routine releases (normal source term) from light water reactors. Aids in determination of compliance with the requirements of Appendix I to 10 CFR Part 50.

- **What's New?** GALE v3.2 September 2019
  - •Removed GALE09 Modeling Parameters Option
  - • ANSI/ANS-18.1-1999 Default RCS Source Term
  - •Future Code Work:
    - •Publish NUREGs – Spring 2020
    - •On-line Training Modules

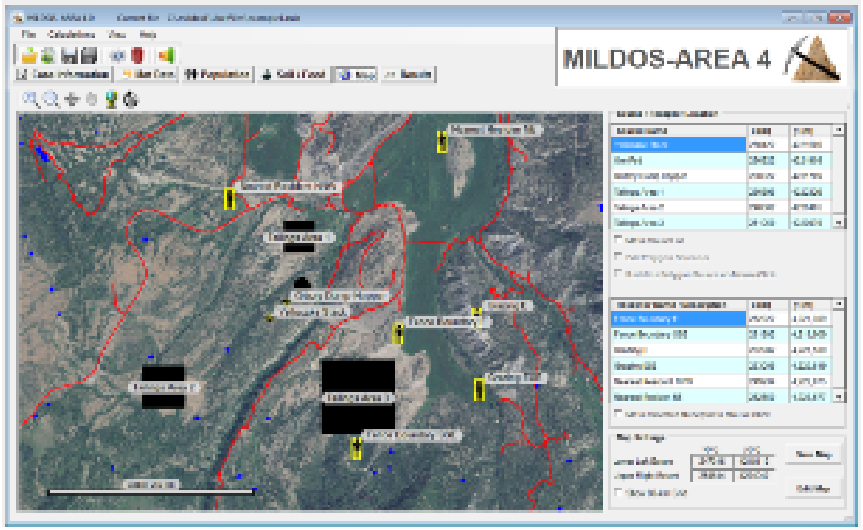


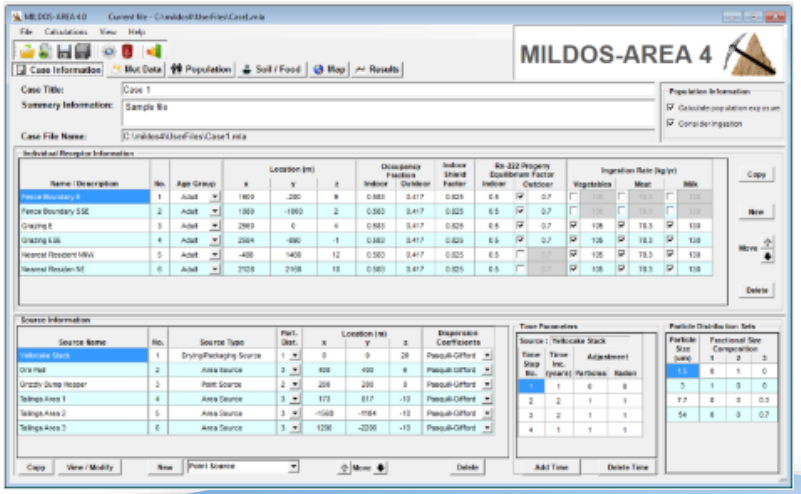
MILDose - Area

- Estimates the radiological impacts from airborne emissions from uranium milling facilities and it provides the capability to consider both conventional uranium ore operations and operations associated with in-situ recovery facilities.
- **What's new?**
  - MILDOS 4.1 – November 2019

    - models revised for well-field vent sources, purge, and ion-exchange sources

    -Shielding/infiltration factor added to user input and calculations for individual receptor inhalation exposure





RADTRAN

RADioactive Material TRANsport - **PRIMER**

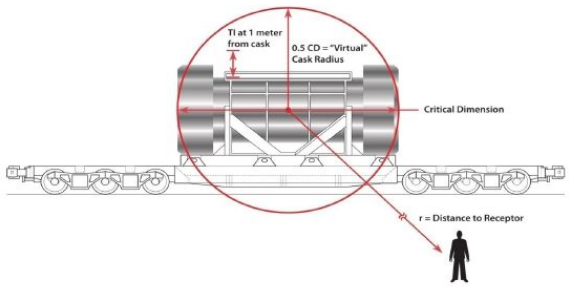
- Environmental impact statement (EIS) for transportation of all types of radioactive material by road, rail, air, and water, 10 CFR Part 51.

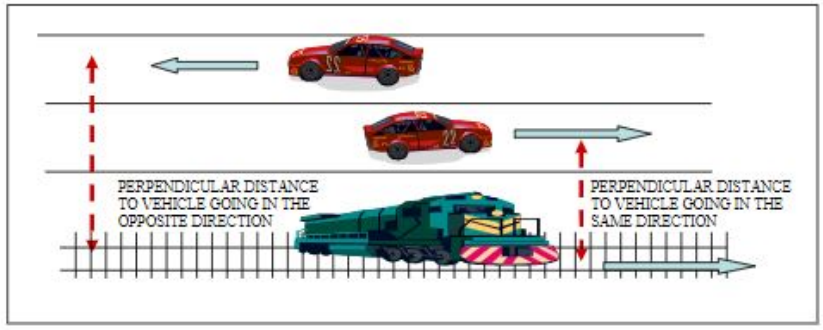
- **What's New?**
  - RADTRAN 6.02.1– April 2019

    - Fortran95 complied version executed in batch mode from a command prompt.

  Future Code Work:

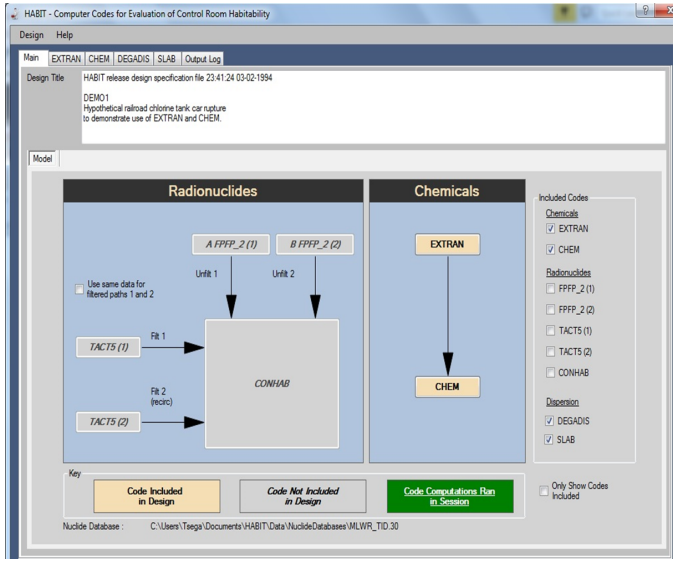
  - NRC is working with a contractor to develop a user-friendly GUI (JAVA)
  - "NRCRADTRAN" will be available through RAMP – Late Fall 2020
  - NRCRADTRAN user guide and documentation

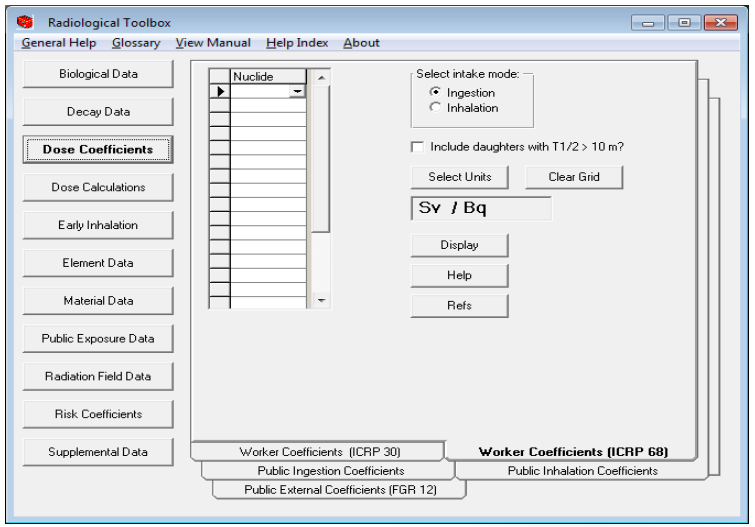




RAMP Codes

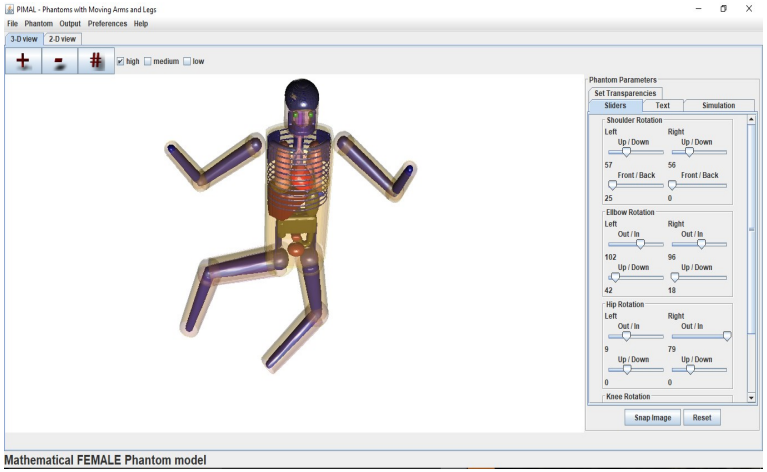
- **HABIT:** Evaluation of Light-Water Reactor (LWR) control room habitability in the event of accidental spills of toxic chemicals. NRC performs independent confirmatory calculations of control room habitability in the event of accidental spills of toxic chemicals. Version 2.2 coming in 2020.
- **Radiological Toolbox:** Electronic handbook containing radiation safety data including control constants and coefficients, as well as models and formulas.

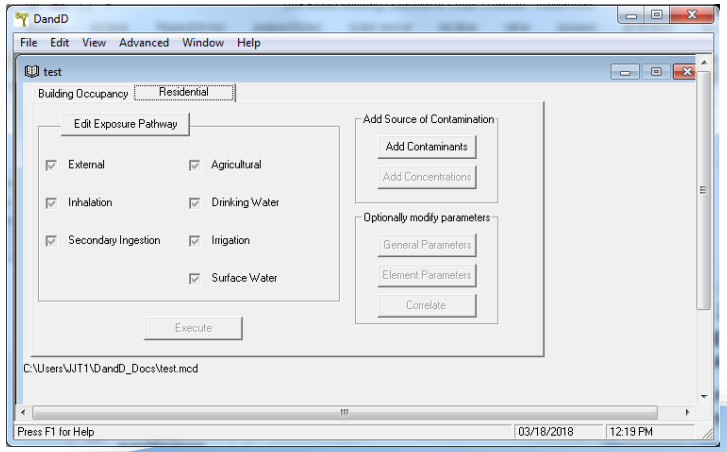




RAMP Codes

- **PAVAN:** Gaussian dispersion model for calculating short-term relative concentrations (χ/Q's) for the mid-field (~10 km)
- **DandD (decontamination and decommissioning)**: compliance with the dose criteria of 10 CFR Part 20, Subpart E. Perform simple estimates of the annual dose from residual radioactivity in soils and on building surfaces.
- **PIMAL:** External and internal dose assessments using realistic phantom postures,. Phantom input file for the Monte Carlo N-Particle (MNCP) radiation transport code





RAMP User Meeting Information and Roll Call

Stephanie Bush-Goddard

United States Nuclear Regulatory Commission

Everything you need is in your Program Booklet

Radiation Protection Computer Code Analysis and Maintenance Program (RAMP)

2019 Fall Users Group Meeting, October 28 - November 01, 2019
United States Nuclear Regulatory Commission
3 White Flint North (3WFN), 11601 Lansdowne Street, North Bethesda, MD 20852
Two White Flint North (2WFN), 11545 Rockville Pike, Rockville, MD 20852
RAMP Website: https://ramp.nrc-gateway.gov/

Monday **October 28, 2019**	8:00 AM – 9:00 AM	Registration and Check-In (3WFN 1C03/1C05)			
	9:00 AM – 12:00 PM	Opening Remarks, Tour of Operation Center (3WFN 1C03/05 & Emergency Response Tour)			
	1:00 PM – 4:30 PM	RASCAL (2WFN PDC 3D04)	VARSKIN Training (3WFN 1C03/05)	RESRAD (2WFN PDC 3D02)	
	6:00 PM – 7:30 PM	RAMP Meeting Social Night (City Perch Kitchen + Bar)			
Tuesday **October 29, 2019**	8:00 AM – 8:45 AM	Morning Primer: ATMO Codes (3WFN 1C03/05)			
	9:00 AM – 12:00 PM 1:00 PM – 5:00 PM	RASCAL (2WFN PDC 3D04)	NRCDose3 (2WFN PDC 3B80)	VARSKIN Technical Meeting (3WFN 1C03/05)	RESRAD (2WFN PDC 3D02)
Wednesday **October 30, 2019**	8:00 AM – 8:45 AM	Morning Primer: RADTRAN (3WFN 1C03/05)			
	9:00 AM – 12:00 PM	RASCAL (2WFN PDC 3D04)	NRCDose3 Code Discussions (2WFN PDC 3B80)	VARSKIN Technical Meeting (3WFN 1C03/05)	RESRAD (2WFN PDC 3D02)
	12:00 PM – 1:00 PM	International Lunch Meeting (3WFN 1C03/05)			
	1:15 PM – 5:00 PM	RAMP Tours at NIH			
Thursday **October 31, 2019**	8:00 AM – 8:30 AM	Registration for the Non-LWR HP Technical Meeting (3WFN 1C03/05)			
	8:30 AM – 12:00 PM 1:00 PM – 5:00 PM	Non-LWR HP Technical Meeting including RADTRAD Code Discussions (3WFN 1C03/05)	Internal Dosimetry IMBA Code (2WFN PDC 3B60)	RASCAL Code Open Discussions (2WFN PDC 3D04)	
Friday **November 01, 2019**	8:00 AM – 8:45 AM	Morning Primer: Open Discussions with Code Developers (3WFN 1C03/05)			
	9:00 AM – 11:00 AM	RADTRAD Code Discussions for Int'l Users (3WFN 1C03/05)	Country2Country Discussions (Room To Be Announced)		
	11:00 AM – 12:00 PM	RAMP Closing Remarks and Ceremony (3WFN 1C03/05)			

2WFN Classes

RASCAL, RESRAD, NRCDOSE, IMBA :

- You must be **escorted** to the classroom in the Professional Development Center
- Please be at the lobby of One White Flint North 10 minutes prior to the start of class in the morning and in the afternoon
- No wifi, but cables to hook to your computer for wifi?

Wednesday:
National Institutes of Health Tour

- Did you sign up and submit DOB?
- Four vans meeting in 3WFN Lobby at 1:15PM

NIH Tour Schedule

1:15 PM	Meet at the 3WFN Lobby
1:45 PM	Arrival at NIH
2:15 PM	Visit Building 21 – Presentation: "A History of Radiation Science at NIH"
2:45 – 3:45 PM	Molecular Imaging Program, NIH Cyclotron, Nuclear Medicine and PET department tours
3:45 – 4:15 PM	Visit 1-2 specifically chosen NIH labs (Hot Cell user groups - based on history/potential for skin contamination)
4:30 – 4:45 PM	Visit the Building 21 Radioactive Waste Facility
4:45 – 5:00 PM	Wrap Up
5:00 PM	Depart from NIH
6:00 PM	Optional dinner out

National Institutes of Health

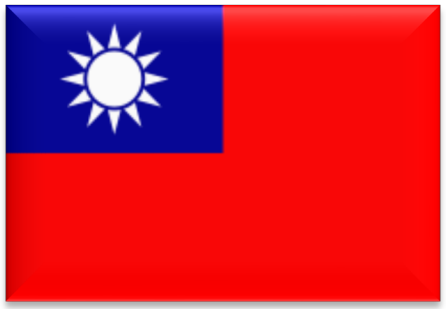
Social Activities

- Monday (today): City Perch Kitchen and Bar 6 – 8 pm

- Wednesday: **No Host** Dinner after NIH Tour

Sign up at Desk

Roll Call



Federal Partners

FEMA

United States Nuclear Regulatory Commission

United States Environmental Protection Agency

NIST
National Institute of Standards and Technology
U.S. Department of Commerce

Department of Justice Federal Bureau of Investigation

NAVSEA
Warfare Centers
Carderock

NIH
National Institutes of Health

Department of Energy United States of America

U.S.ARMY

RAMP

Agreement State Partners

States and Universities

Oregon State University

Carnegie Mellon University

National Labs

RAMP Contractors

RENAISSANCE
CODE DEVELOPMENT

Athey
Consulting

INFORMATION
SYSTEMS
LABORATORIES, INC.
ISL

Private Industry and Consulting Firms

Dominion Energy

Southern Company

TIDEWATER

ENGINEERS / SCIENTISTS / PROGRAM MANAGERS

MJW Corporation

TerraPower

Bostelman Engineering, LLC

Kairos Power

ABS Consulting

NEXTera ENERGY RESOURCES

Wangler Consulting

CardinalHealth

Pittsburg Technical

RAMP

What's Next: Emergency Response Tour

- Did you sign up?
- Group 1 goes first, while Group 2 networks
- Group 2 starts at 11:15 and Group 1 networks

10:20 – 10:30 AM	RAMP User Meeting Information & Roll Call	Stephanie Bush-Goddard, Ph.D. NRC RAMP Program Manager
10:30 – 11:15 AM	Emergency Response Tour Group 1	Jeff Kowalczik, CHP Emergency Response Coordinator
10:30 – 11:15 PM	RAMP Meet & Greet with the Code Developers / Networking (Group 2)	RAMP Group 2
11:15 – 12:00 PM	Emergency Response Tour Group 2	Jeff Kowalczik, CHP Emergency Response Coordinator
11:15 – 12:00 PM	RAMP Meet & Greet with the Code Developers / Networking (Group 1)	RAMP Group 1

Final thoughts!

- **We are glad you are here!**
- **Participate actively**
  - Ask as many questions as you want
- **Share your insights**
  - Share your experience of how you use the code
  - Share your experience of how you want to use the code
  - ..and how you do not know do know how to use the code.
- **Work together to enhance radiation protection and nuclear safety**
- **Build networks**
  - After the meeting, email us, use the forums on the website
- **Strengthen collaboration**
- **Relax and enjoy**

Group 1 please leave. Your time is up!

Questions from Group 2????

Or