

# THE RADIATION PROTECTION CODE ANALYSIS AND MAINTENANCE PROGRAM



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Office of Nuclear Research



## 2015 ISOE International ALARA Symposium

(Occupational Exposure Management at Nuclear Facilities)

Rio de Janeiro, Brasil

# AGENDA

- ✓ What is RAMP?
- ✓ Benefits to Member Countries
- ✓ Countries in RAMP
- ✓ Computer Codes in RAMP
- ✓ Next User Need Meeting and Training



# WHAT IS RAMP?

- ✓ RAMP is a Computer Code Management Program -that will support development and maintenance of radiation/dose assessment codes
  - ✓ Streamline updates
  - ✓ Incorporating the latest accepted state of the art models
  - ✓ Prioritize technical updates
  - ✓ Achieve consistency in documentation
  - ✓ Implement a software QA program
  - ✓ Fiscally responsible by leveraging group dynamics
  - ✓ Implement centralized and consistent management and control structure
  - ✓ Responsive to the RAMP-user needs
  - ✓ Leverage the US NRC expertise in member country activities



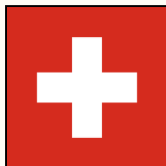
# BENEFITS TO INTERNATIONAL MEMBERS

- Computer Codes will have:
  - Up to date ICRP Reports
  - Country Specific Reactor Types
  - International Units; Sv, Gy
  - Addressing other country specific needs




## RAMP PARTNERS

- Canada
- South Africa
- South Korea
- American Institute of Taiwan
- United Arab Emirates (in discussions)
- Switzerland (in discussions)
- Sweden (in discussions)

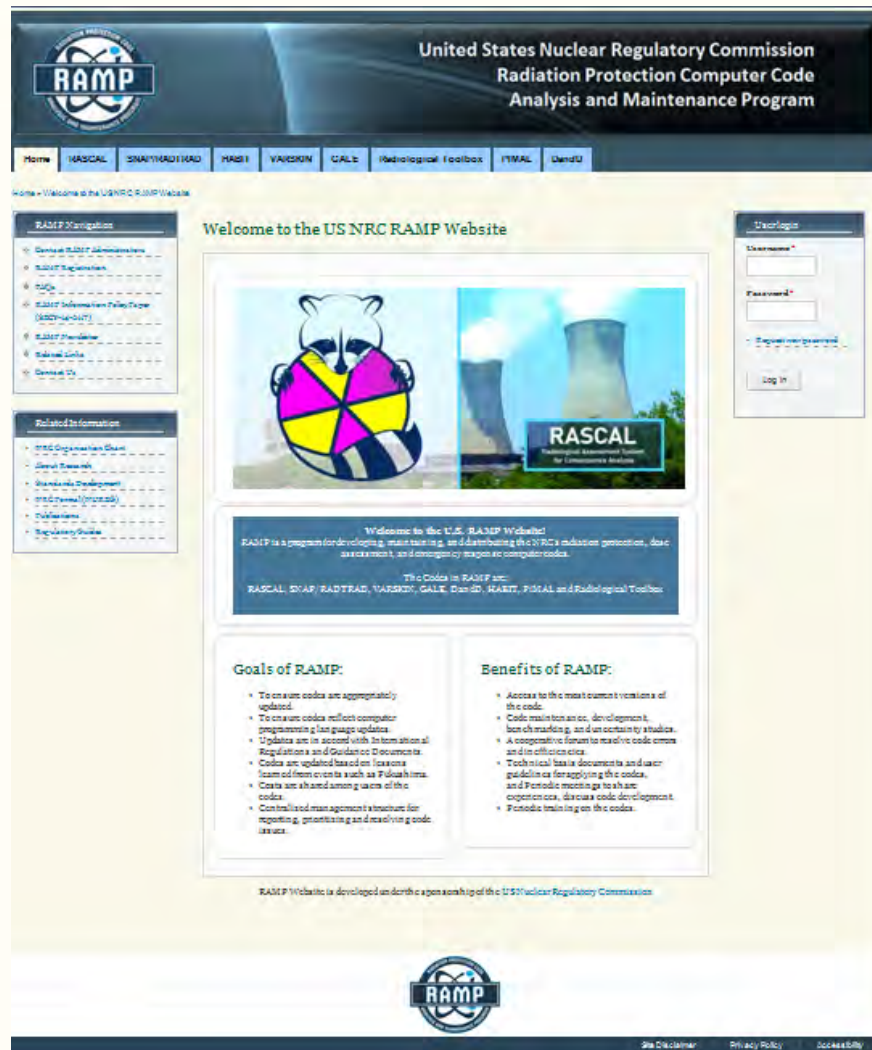


## INCORPORATING NATIONAL AND INTERNATIONAL ORGANIZATIONS

- ✓ Encouraging Organizations to join:
  - ✓ Regulators, licensees, vendor groups, etc
- ✓ Why?
  - ✓ Larger RP community exercises codes more thoroughly
  - ✓ User forums/groups benefit from multiple users
  - ✓ More efficient use of resources (larger resource pool)



U.S. NRC Website Screenshot. The page features a top navigation bar with links to HOME, ABOUT US, REGULATORY, NUCLEAR, RADIOACTIVE WASTE, PUBLIC MEETINGS & INVOLVEMENT, NRC LIBRARY, and ABOUT NRC. A search bar is located in the top right. The main content area includes a 'Facility Locator' section, a 'Spotlight' section with a list of recent events, a 'News & Speeches' section, a 'Public Meetings' section, and a '2015 Fuel Cycle Information Exchange (FCIX)' section. The footer contains a 'POPULAR DOCUMENTS' section and a 'STAY CONNECTED' section with social media links.

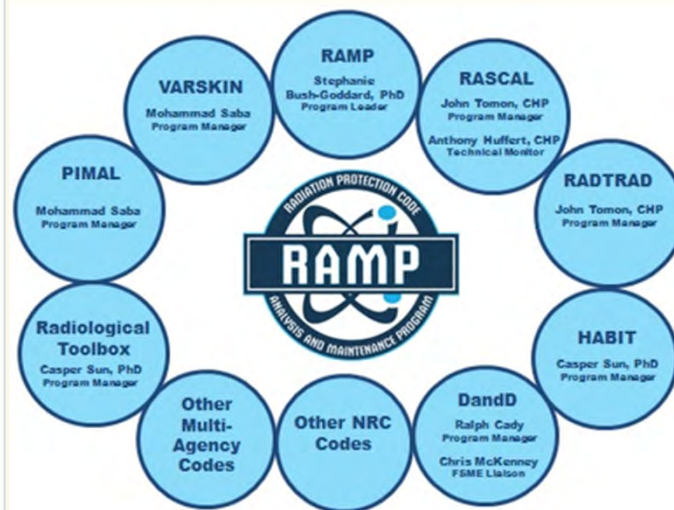


RAMP Website Screenshot. The page features a top navigation bar with links to HOME, RASCAL, SMARTHEAD, RASIT, VARIATION, GALT, Radiological Toolbox, FINAL, and Download. A search bar is located in the top right. The main content area includes a 'Welcome to the US NRC RAMP Website' section, a 'RAMP Navigation' section, a 'Related Information' section, a 'Goals of RAMP' section, and a 'Benefits of RAMP' section. The footer contains a 'RAMP Website is developed under the sponsorship of the U.S. Nuclear Regulatory Commission' and a 'RAMP' logo.

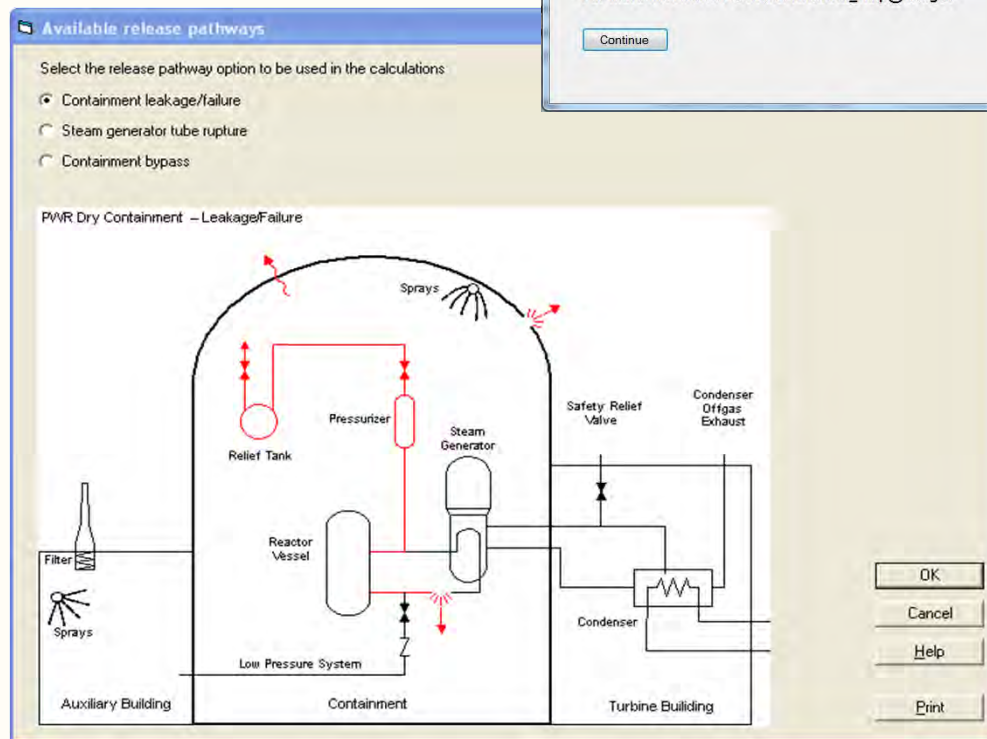
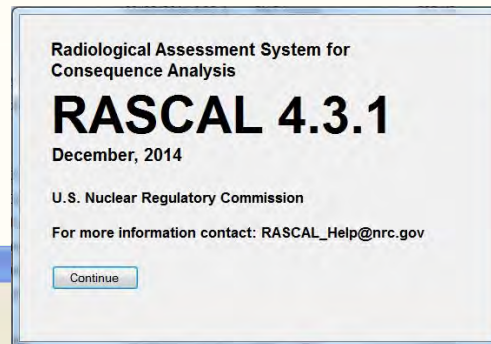
# OBTAINING THE RAMP CODES

## INTERNATIONAL

| Who  | Services   | Cost               | How   |
|--|--|--------------------|---|
| International Nuclear Regulatory Authorities                 | <ul style="list-style-type: none"> <li>All Codes in RAMP</li> <li>All Documentation</li> <li>All User Forums</li> <li>All Email Help Request</li> <li>All Training, when available</li> <li>Voting Member at RAMP User Meetings</li> </ul> <p>These services will be listed in the RAMP International Cooperative Research Agreement</p> | 20,000.00 USD/year | <p><b>Step 1:</b><br/>Email <a href="mailto:Ramp@nrc.gov">Ramp@nrc.gov</a> with the Regulatory International Officer contact information.</p> <p><b>Step 2:</b><br/>RAMPs International Program Team will send you a RAMP Agreement.</p> <p><b>Step 3:</b><br/>Upon US NRC and the Authority signing of the Agreements, access will be given for the services listed.</p>   |
| Non-Regulatory Authority, Companies, Universities, Hospitals | <ul style="list-style-type: none"> <li>All Codes in RAMP</li> <li>All Documentation</li> <li>All User Forums</li> <li>All Email Help Request</li> <li>All Training when available, but with limited seating per organization</li> </ul>  | 20,000.00 USD/year | <p><b>Step 1:</b><br/>Contact RAMP Administrators</p> <p><b>Step 2:</b><br/>Fill out, sign and email this <a href="#">non-disclosure agreement</a> to <a href="mailto:ramp@nrc.gov">ramp@nrc.gov</a> or fax to 301-251-7423.</p> <p><b>Step 3:</b><br/>The RAMP contractor will present an invoice and contract to the entities.</p> <p><b>Step 4:</b><br/>Upon payment, you will be given access, by NRC, for the services listed.</p> |
| All Others   | Contact <a href="mailto:RAMP@nrc.gov">RAMP@nrc.gov</a>   |                    |   |



# CODES IN RAMP - RASCAL

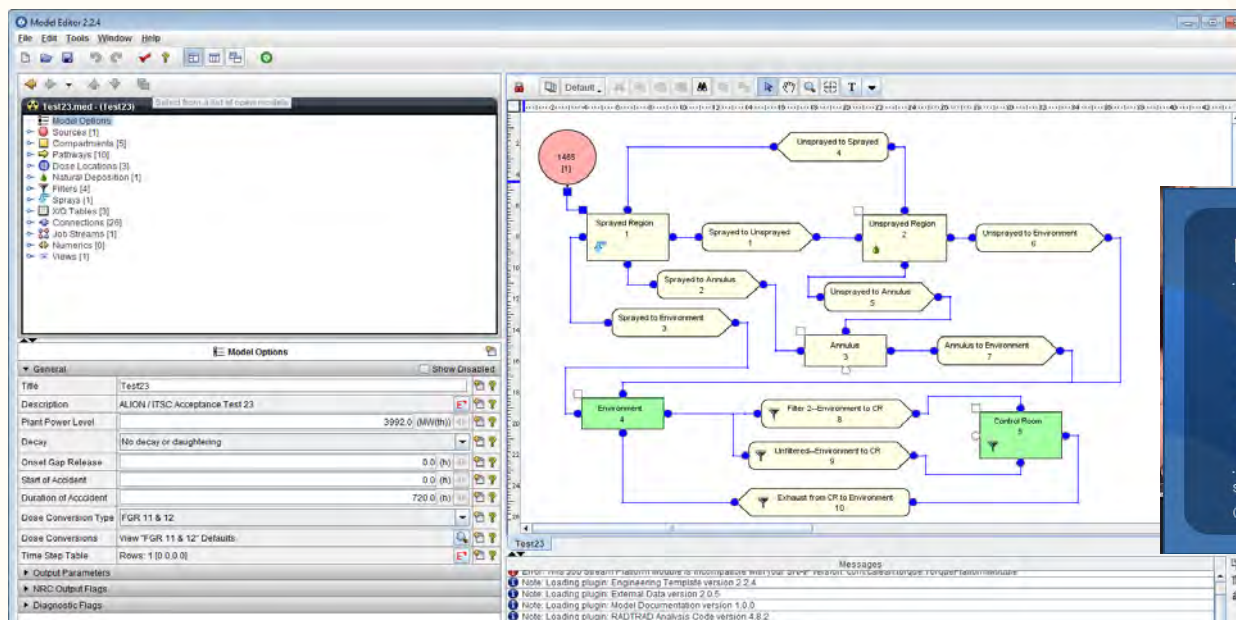


## RASCAL

- Used for making dose projections during radiological emergencies
- premier code used by US NRC's emergency operations center
- Use during the Fukushima Accident
- InterRAS is the International Version of RASCAL

# CODES IN RAMP – RADTRAD/SNAP

**RADTRAD:** RADionuclide Transport Removal And Dose Estimation code. The RADTRAD code uses a combination of tables and numerical models of source term reduction phenomena to determine the time-dependent occupational radiation exposures in the control room and to estimate site boundary doses at the exclusion area boundary (EAB) and low population zone (LPZ) for design basis accidents. Plugin to Symbolic Nuclear Analysis Package (SNAP).



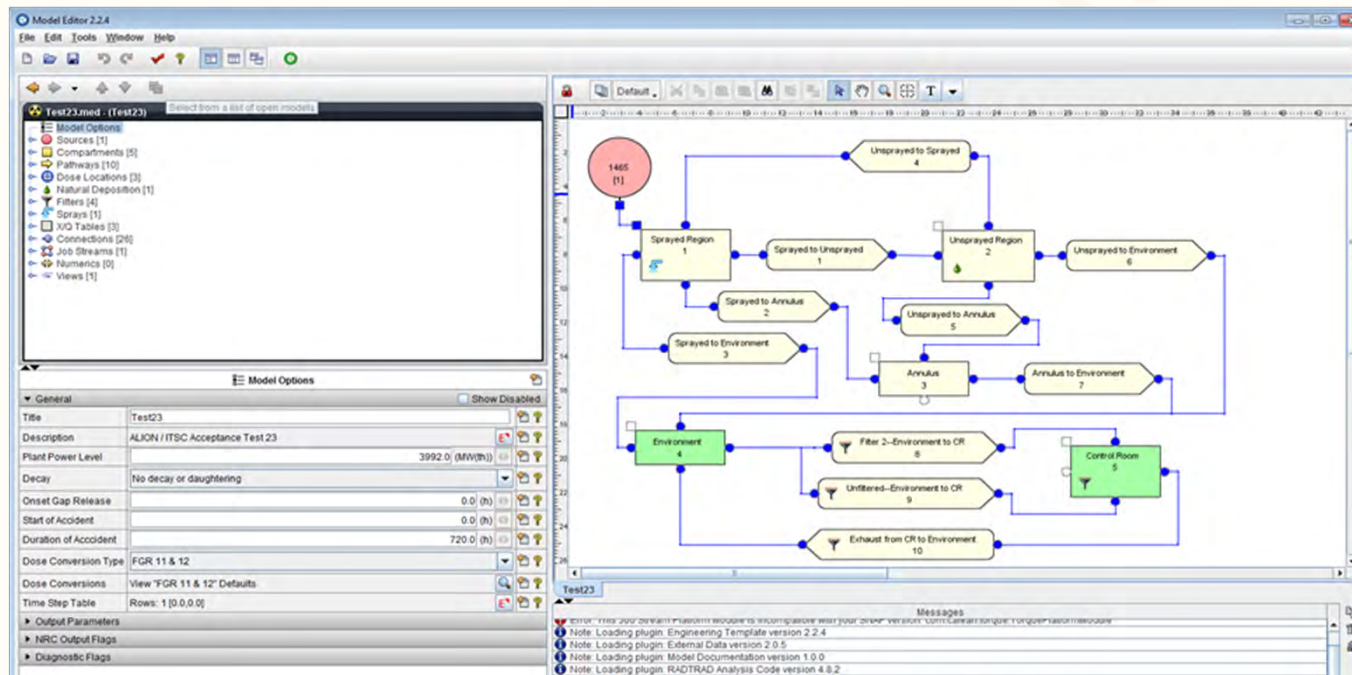
## Model Editor

This code is the result of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees makes any warranty, expressed or implied, or assumes any legal liability or responsibility for any third party's use, or the results of such use, or of any information, product, or process included in or calculated by this code, or represents that the use by such third party would not infringe upon privately-owned rights. In addition, you may not distribute this computer code to anyone or use this computer code without permission from the United States Nuclear Regulatory Commission.

Symbolic Nuclear Analysis Package, Version 2.2.1, October 25, 2012  
(c) 2002-2012 Applied Programming Technology, Inc.

# CORE SOFTWARE SNAP/RADTRAD

- **SNAP** (Symbolic Nuclear Analysis Package): is a graphical user interface which assists users in developing RADTRAD input decks and running the codes. 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.



# CODES IN RAMP - HABIT

**HABIT:** The computer code for evaluating control room HABITability. The HABIT code is an integrated set of computer programs used mainly to estimate chemical exposures that personnel in the control room of a nuclear facility would be exposed to in the event of an accidental release of toxic chemicals.

NUREG/CR-6210  
PNL-10496

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## Computer Codes for Evaluation of Control Room Habitability (HABIT)

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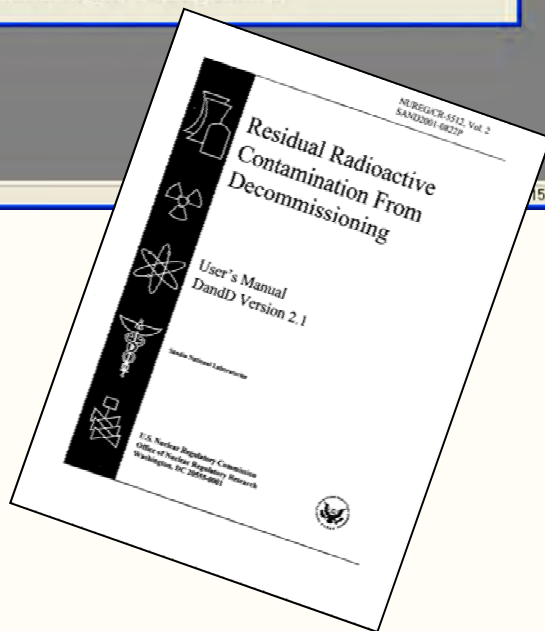
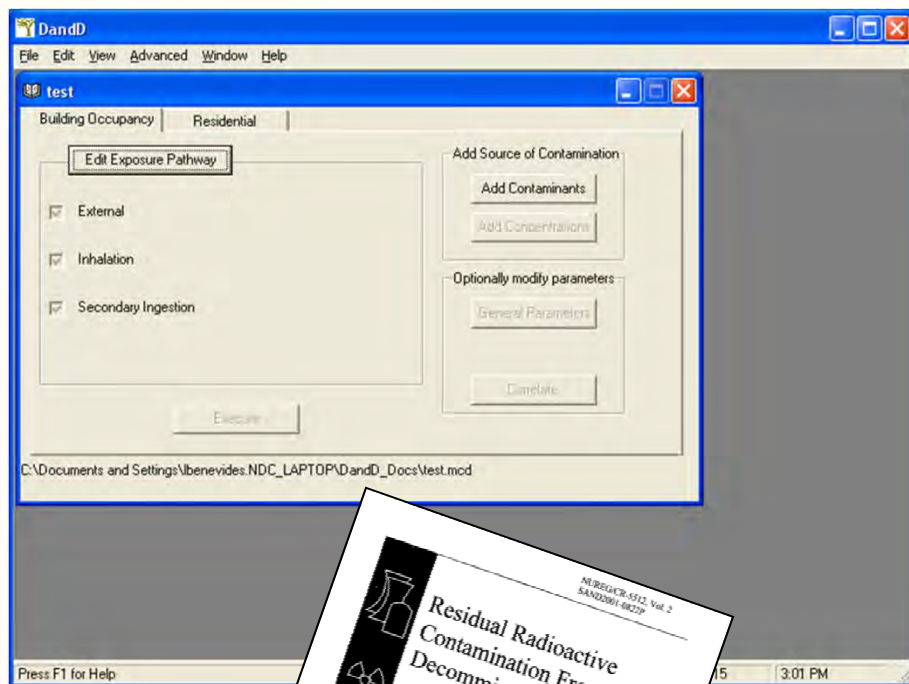
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Prepared by  
S. A. Stage

Pacific Northwest Laboratory  
Operated by  
Battelle Memorial Institute

Prepared for  
U.S. Nuclear Regulatory Commission

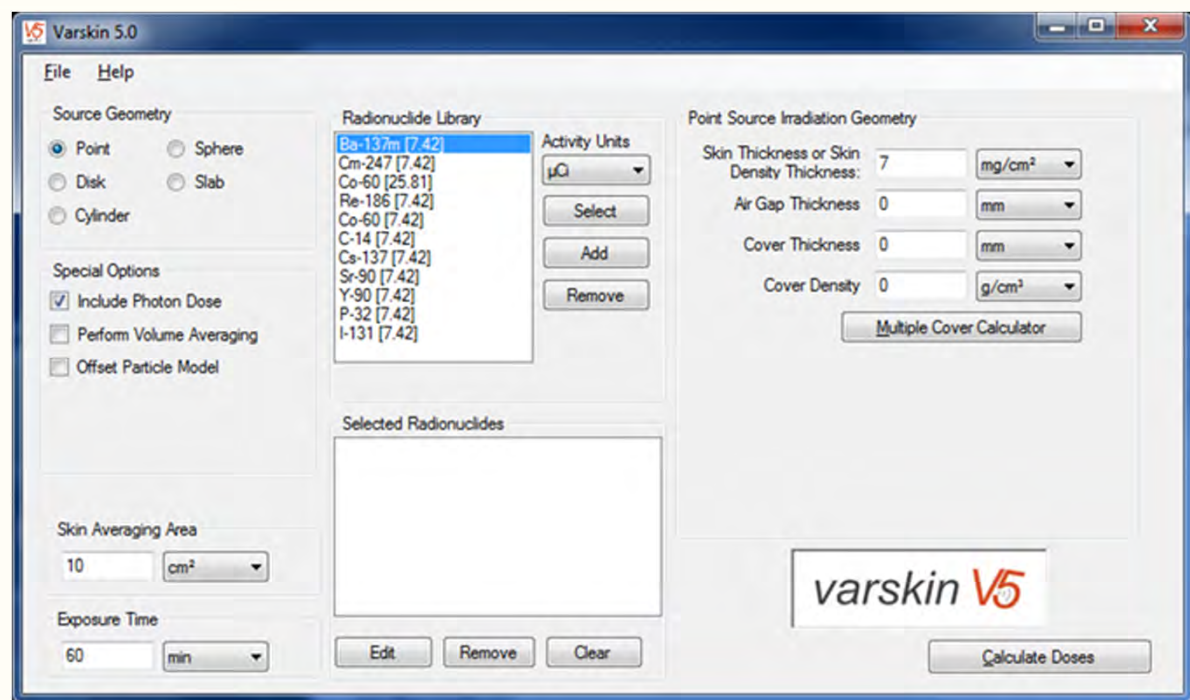
# CODES IN RAMP – D AND D



**DandD:** The Decontamination and Decommissioning (DandD) software package, developed by NRC, assesses compliance with the dose criteria of 10 CFR Part 20, Subpart E. Specifically, DandD embodies NRC's guidance on screening dose assessments to allow licensees to perform simple estimates of the annual dose from residual radioactivity in soils and on building surfaces. For a screening assessment with DandD, NRC has predefined conceptual models for the scenarios along with default parameter distributions (based on NUREG/CR-5512, Volumes 1 and 3). DandD can also be used for site-specific analysis after verification that the site conceptual model is compatible with the conceptual model of the code.

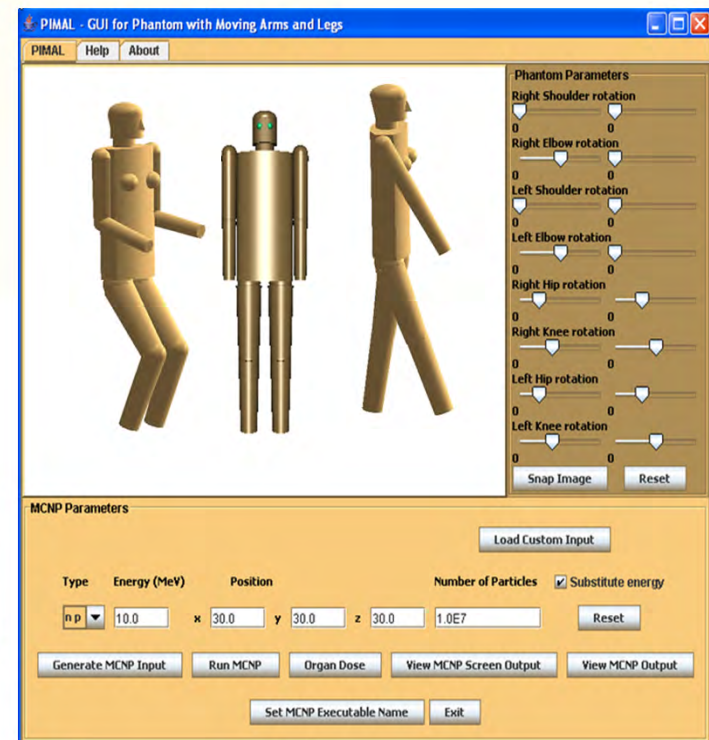
# CODES IN RAMP - VARSKIN

**VARSKIN:** The code is used to perform confirmatory calculations of skin dose (from both beta and gamma sources) estimates at any skin depth or skin volume using different source to target geometries.

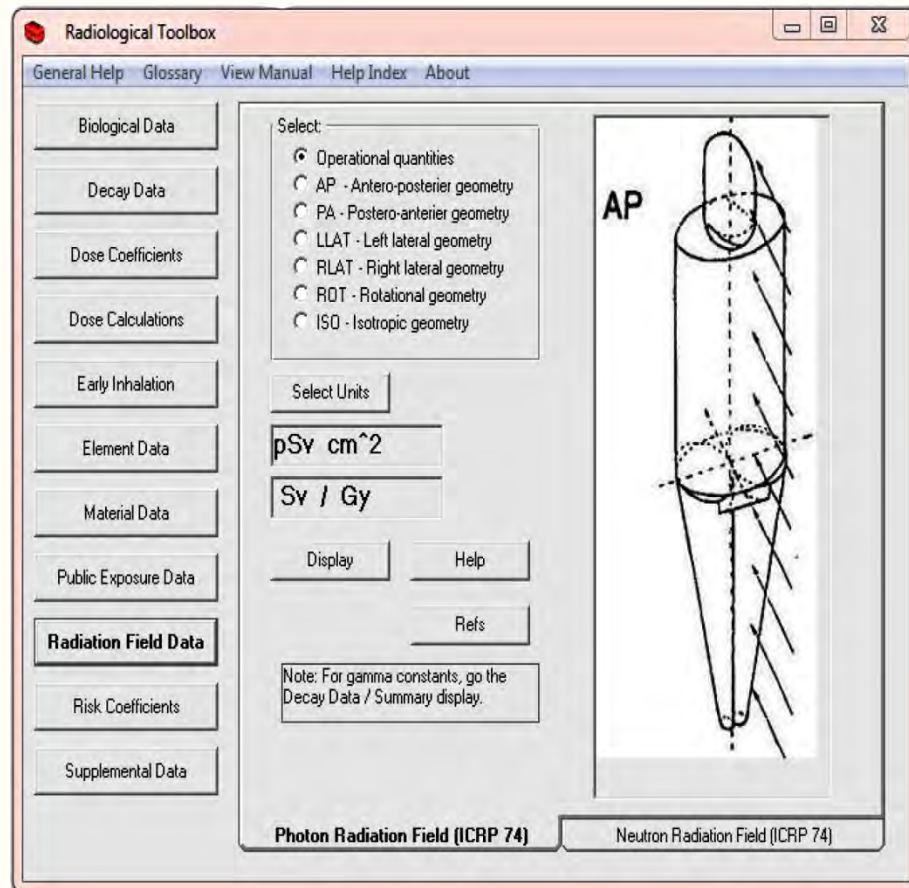


# CODES IN RAMP - PIMAL

**PIMAL:** Phantom with Moving Arms and Legs is a graphical user interface with pre-processor and post-processor capabilities which assists users in developing Monte Carlo computer codes input decks (MCNP, EGS4 (Future), Penelope(Future)) and running the codes. It allows users to easily generate quantitative figures of merit regarding positioning arms and legs in different geometries. PIMAL software is considered an efficient and accurate tool for performing dosimetry calculations for radiation workers and exposed members of the public.



# CODES IN RAMP – RADIOLOGICAL TOOLBOX



**Radiological Toolbox:** The Radiological Toolbox provides ready access to data of interest in radiation protection of workers and members of the public. The data include dose coefficients for intakes of radionuclides, exposure to radionuclides distributed in the environment, and for exposures to photon and neutron radiation fields. Other supportive data include interaction coefficients for alpha, electron, photon and neutron radiations, nuclear decay data, biological and physiological data, and supplemental information on various topics.

# CODES IN RAMP - GALE

- The GALE code estimates the Gaseous And Liquid Effluent from commercial light water nuclear power plants. This Fortran based code can provide estimates for gaseous and liquid effluent from either boiling or pressurized light water reactors for **pre-licensing** reviews. GALE is maintained at the Pacific Northwest National Laboratory under contract for the U.S. NRC Office of Research. The calculations are based on data generated from operating reactors, field tests, laboratory tests, and plant-specific design considerations incorporated to reduce the quantity of radioactive materials that may be released to the environment.



**BWR GALE-2.0**

**GALE 2.0 BETA**

Input File Name:

Type of Analysis:  
☒ Gas  
☒ Liquid

Output Files:  
 Gas:   
 Liquid:

Legacy Input:  
☐ Read Legacy Input  
 Gas Input:   
 Gas Output:   
 Liquid Input:   
 Liquid Output:

**General Reactor Parameters**

Name of Reactor:

Thermal Power Level:  MW(th) ?

Total Steam Flow:  million lb/hr

Mass of Water in Reactor Vessel:  million lb

Cleanup Demineralizer Flow:  million lbs/hr

Condensate demineralizer regeneration time:  days

Copper Tubing for Condenser?:

Fraction of feedwater through condensate demineralizers:  fraction

Detergent Waste Partition Factor:  fraction (0.0 for no laundry)

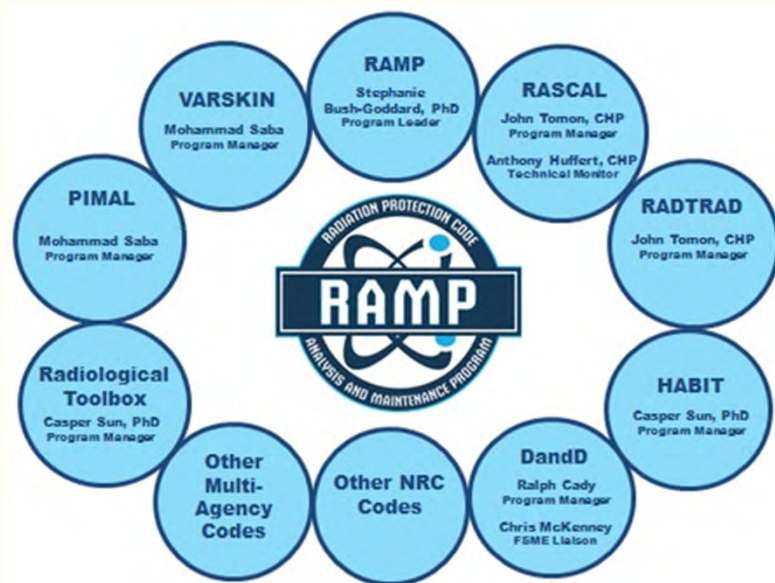
## RAMP USER MEETINGS

- September 2015 – Washington DC
- Spring 2016 – TBD (RAMP Country)
- Fall 2016 – Washington DC
- Spring 2017 – TBD (RAMP Country)
- Fall 2017 – Washington DC

# 1<sup>ST</sup> ANNUAL RAMP USER'S MEETING – WASH D.C.

October 5-9, 2015

United States Nuclear Regulatory Commission Rockville, MD



## Topics to include:

RASCAL  
VARSKIN  
RADTRAD  
D&D  
GALE  
Atmospheric Code  
Discussion  
Advanced Dosimetry  
(PIMAL)

**Registration Opens : May 30, 2015**

**Register at [www.usnrc-ramp.com](http://www.usnrc-ramp.com)**

**Feel free to email [ramp@nrc.gov](mailto:ramp@nrc.gov) for any questions/comments.**

## QUESTIONS?

- United States Nuclear Regulatory Commission



- Washington D.C.
- Mailstop C0305
- [RAMP@nrc.gov](mailto:RAMP@nrc.gov)
- 001-301-251-7528