

The **R**adiation Protection Computer  
Code **A**nalysis and **M**aintenance  
Program (RAMP)

Stephanie P. Bush-Goddard, Ph.D.  
RAMP, Project Leader  
Office of Nuclear Regulatory Research

---

---

---

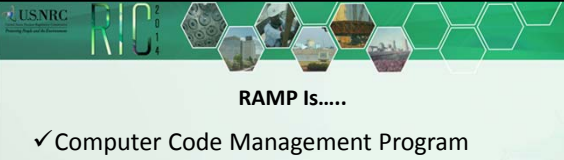
---

---

---

---

---



**RAMP Is....**

- ✓ Computer Code Management Program
  - ✓ Incorporates state of the art models
  - ✓ Moves toward software modernization
  - ✓ Prioritizes technical updates
  - ✓ Implements centralized and consistent management structure
  - ✓ Shares costs

---

---

---

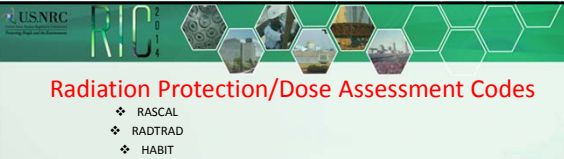
---

---

---

---

---



**Radiation Protection/Dose Assessment Codes**

- ❖ RASCAL
- ❖ RADTRAD
- ❖ HABIT
- ❖ VARSKIN
- ❖ DandD
- ❖ MACCS2
- ❖ GALE
- ❖ Rad Toolbox
- ❖ PIMAL
- ❖ NRC Dose
- ❖ GENII
- ❖ LADTAP
- ❖ GASPAR
- ❖ RADTRAN
- ❖ FramesV2
- ❖ RESRAD

**GOAL: Develop a framework to coordinate and share experiences and resources to raise the quality and efficiency of Radiation Protection/Dose Assessment Codes**

---

---

---

---

---

---

---

---

**RASCAL**  
The Radiological Assessment Systems for Consequence Analysis (RASCAL) computer code evaluates releases from nuclear power plants, spent fuel storage pools and casks, fuel cycle facilities, and radioactive material handling facilities and is designed for use by the NRC in the independent assessment of dose projections during response to radiological emergencies.

**RADTRAD**  
The RADTRAD computer code is used to assess occupational radiation exposures, typically in the control room; to estimate site boundary doses; and to estimate dose attenuation due to modification of a facility or accident sequence.

**HABIT**  
The HABIT computer code is an integrated set of computer programs used 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.

**VARSKIN**  
The VARSKIN computer code uses a library of decay data for a large number of radionuclides, and also a set of built-in source geometries, to calculate the dose to the skin resulting from contamination on the surface of the skin or on protective clothing.

**PIMAL**  
The Phantom with Moving Arms and Legs (PIMAL) humanoid phantom models are considered an efficient and accurate tool for developing exposure models and performing dosimetry calculations for radiation workers and exposed members of the public.

**RAD Toolbox**  
The Radiological Toolbox is an electronic handbook that contains extensive databases related to radiation work. The software does not perform any calculations beyond unit conversions and minor radioactive decay and equilibrium calculations.

---

---

---

---

---

---

---

---

---

---

### Rad Protection Codes: Different Functions

Design Basis Analysis and Probabilistic Risk Assessment	Normal Licensing: Effluents/Decommissioning	Incidence Response
<ul style="list-style-type: none"> <li>• RADTRAD</li> <li>• HABIT</li> <li>• MACCS</li> </ul>	<ul style="list-style-type: none"> <li>• DandD</li> <li>• GENII               <ul style="list-style-type: none"> <li>• LADTAP</li> <li>• GASPAP</li> </ul> </li> <li>• VARSKIN</li> <li>• GALE</li> <li>• PC Dose</li> </ul>	<ul style="list-style-type: none"> <li>• RASCAL</li> </ul>

**Radiological Toolbox**  
**PIMAL Graphical User's Interface**

---

---

---

---

---

---

---

---

---

---

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

---

---

---

---

---

---

---

---

---

---

USNRC **RIC**

## Considerations

- Prioritizing
  - NRC needs vs Agreement States vs Licensee
  - Domestic vs. international needs
  - Codes with different functions
- Sharing cost
  - NRC has previously funded codes distributed through ORNL/RISCC
  - Future updates will be available only to RAMP members
- Managing expectations
  - Funding streams will take time to establish
- We are pooling resources to improve the codes

---

---

---

---

---

---

---

---

---

---

USNRC **RIC**

## Program Elements of RAMP

- RAMP is being patterned after successful programs that have been in place for decades for our T/H and severe accident codes.
- RAMP Members have.....
  - routine meetings to share experiences with codes and help prioritize code improvements and updates
  - the ability to submit in-kind as well as monetary contributions
  - access to a user's forum and periodic training
- International Users
  - Contribution are negotiated individually with each country through international RAMP agreements
- Domestic users
  - Contributions are negotiated with each organization through NDAs and domestic RAMP agreements

---

---

---

---

---

---

---

---

---

---

USNRC **RIC**

## Future Phases of RAMP

### Combine/Collaborate/Share

**Codes for Assessing Radiological Releases**

NRC Codes			Non-NRC Codes		
Incident Response	Effluents Discharge	DEA PEA	Incident Response	Effluents Discharge	DEA PEA
RA SCAL	GEN 2 GEN 3 LICRFS NRCDOSE	HABIT MACCS2 RADTRAD	NOT SPOT (LNU) NRC DOSE MCA & NU (AB) NARC (LNU) RADTRAD (LNU) RELRAD-RCC (NU) SHARC (LNU) NUREG-PREAC (NU) Other Codes SECURITY Codes	AIRED (EPA) CARPS (EPA) MELPS (DOE) MCA & NU (AB) RELRAD (NRC) SYSTEMS (EPA) Other Codes SECURITY Codes	COZYMA (EC) EU (EU-2 (2006)) INES (IAEA) PERCZ (IAEA) RADTRAD (NA)

---

---

---

---

---


---

---

---

---

---



- Phase I – “Ramping Up”
  - Developing Agreements
  - Developing Contractual Obligations
  - Updating current code processes
- Phase II - (1-3 years)
  - Program in place
  - Bring other codes to RAMP
- Phase III – “Ramped” (3-5 years)
  - Combine or coordinate codes for greater efficiencies

---

---

---


---

---

---


---

---



**RAMP CONTACT**

Stephanie Bush-Goddard, Ph. D.  
 United States Nuclear Regulatory Commission  
 Washington D.C.  
 Mailstop C0305  
[Stephanie.Bush-Goddard@nrc.gov](mailto:Stephanie.Bush-Goddard@nrc.gov)  
 or  
[RAMP@nrc.gov](mailto:RAMP@nrc.gov)  
 301-251-7528




---

---

---

---

---

---

---

---