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

RIC 2014
Radiation Protection Computer Codes
and Regulations Session (TH34)

Radiological Assessment System for Consequence Analysis (RASCAL) Update: v4.3

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Office of Nuclear Regulatory Research
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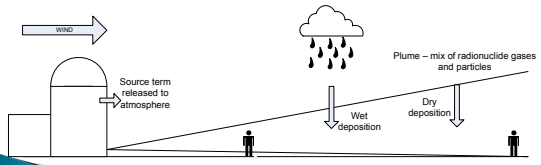
What is RASCAL?

- Computer code used in the NRC Operations Center for independent dose projections for 25+ years
  - State and local authorities and NRC-licensees
- Calculates a radiological source term, transports and deposits it, and then produces dose projections



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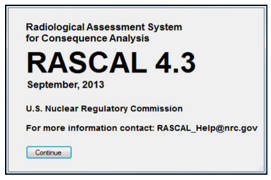
New Features

- Extended calculation times and distance
- Multi-unit assessments
- Additional reactor source term option
- Automated meteorology data retrieval
- Child thyroid dose calculation
- Improved containment hole leakage model
- Custom inventories for reactor cores
- Improved spent fuel pool inventory characterization
- Additional file export format



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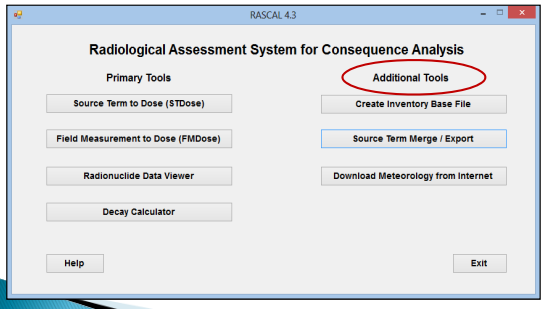
Main Menu: Additional Tools



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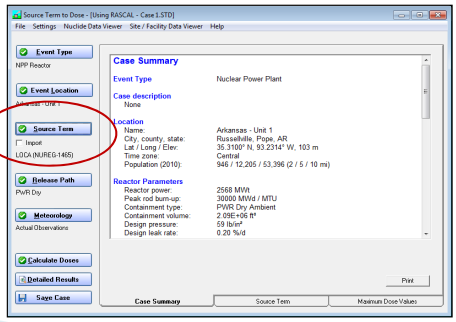
Similar Input Screens

New source term import option



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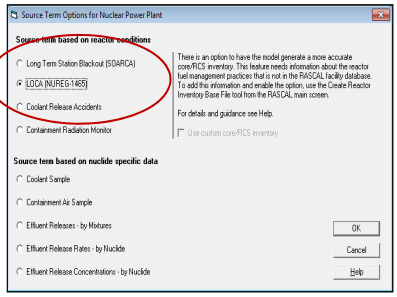
Example: Two-Unit Scenario

Unit 1: LOCA (NUREG-1465)

Unit 2: Long-Term Station Blackout (SOARCA)



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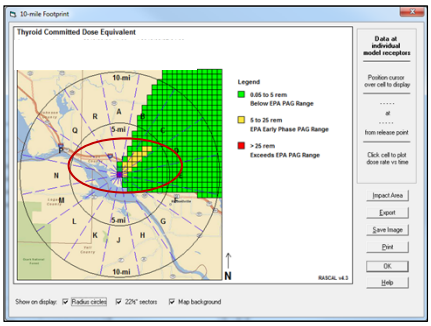
Unit 1: Hypothetical LOCA Results

USEPA Protective Action Guide for thyroid dose exceeded * (yellow area)

* hypothetical accident scenario, radionuclide release, and dose projection



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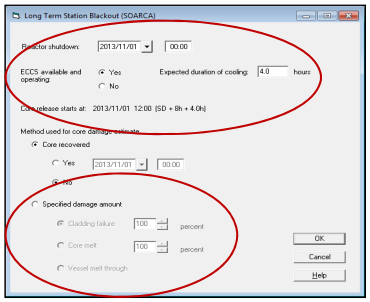
Unit 2: Long Term Station Blackout (LTSBO) Example

Variable times for core cooling to delay onset of core damage

Note: LOCA and LTSBO source terms can specify core damage amount now



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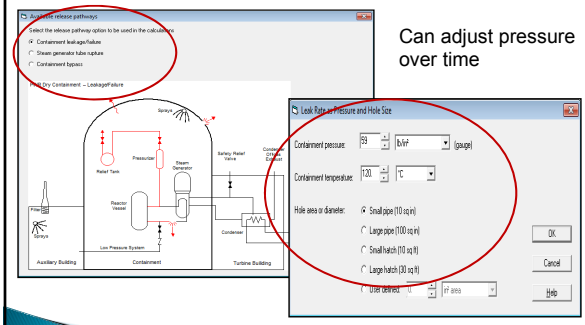
Containment Hole Size

Can adjust pressure over time



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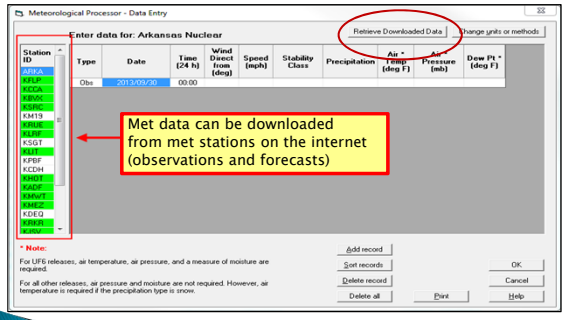
Automated Meteorology



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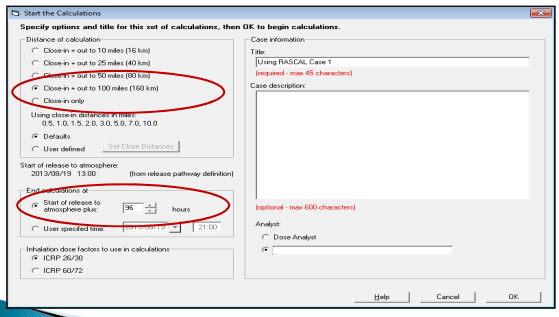
Expanded Distance and Duration



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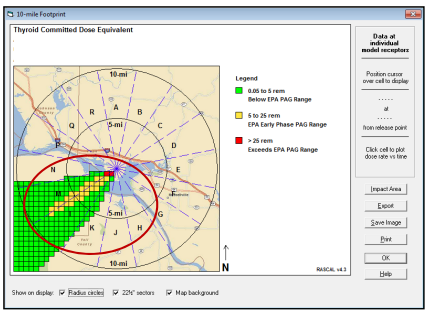
Unit 2: Hypothetical LTSBO Results

USEPA Protective Action Guide for thyroid dose exceeded *
(yellow area)

* hypothetical accident scenario, radionuclide release, and dose projection



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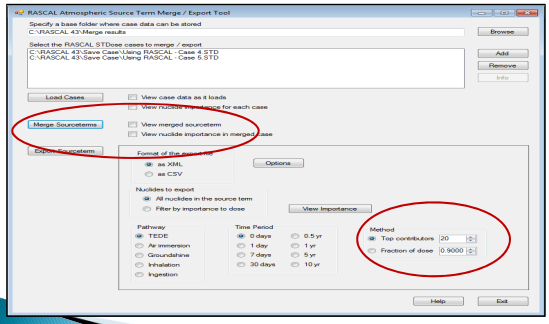
Merging Source Terms



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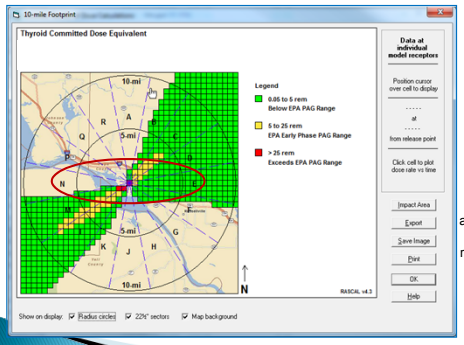
Merged Impact Map *



* hypothetical accident scenario, radionuclide release, and dose projection

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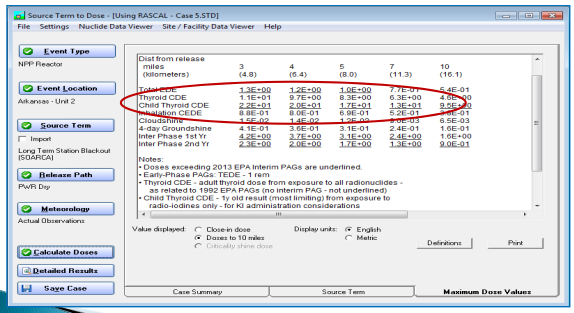
Child Thyroid Dose Example



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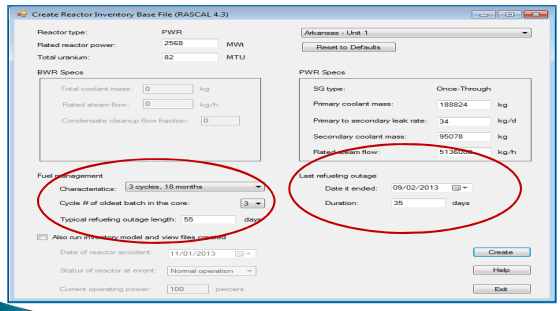
Reactor Inventory Base File



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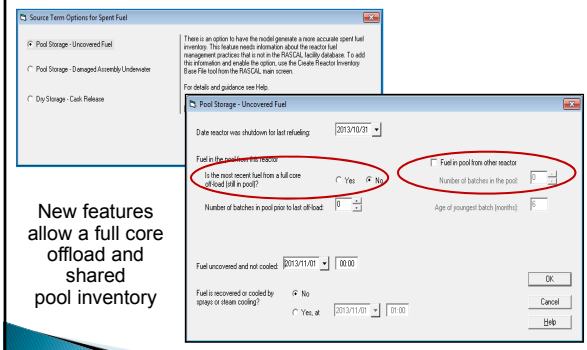
Spent Fuel Pool Source Terms



New features allow a full core offload and shared pool inventory

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Current Benchmarking Activities

Electric Power Research Institute study of domestic emergency response codes

- Fukushima data used for comparisons

Nuclear Energy Agency / Organisation for Economic Cooperation and Development study of “fast running” international emergency response codes

- Identify knowledge gaps
- Propose improvements to modeling capabilities

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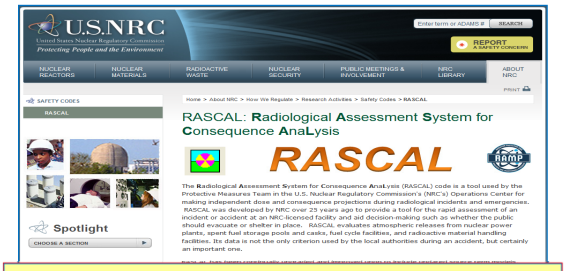
Questions?



http://www.nrc.gov/about-nrc/regulatory/research/safetycodes/rascal.html

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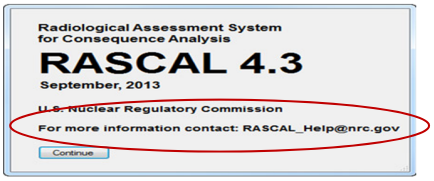
Questions?



How to Obtain the Computer Code and Documentation

The RASCAL 4.3 computer code is available, for ***free***, from the Radiation Safety Information Computational Center (RSICC) [illegible].

The ***draft*** documentation for RASCAL 4.3 can be obtained from the links below:

- ***Draft*** RASCAL 4.3 Workbook
- ***Draft*** RASCAL 4.3 Technical Supplement
- ***Draft*** RASCAL 4.3 User Guide

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