RASCAL Change Log: Version v4.3.1

Released Date December 31, 2014

- **Reactor Events (Source Term to Dose Model, STDose):**
  - Updated the LTSBO core release fractions used from the draft 2009 SOARCA results to the final 2012 SOARCA results.
  - Calibrated the BWR Mark I saturated wet well reduction factors for LTSBO to comport with SOARCA releases.
  - Resolved an issue where the BWR wet well reduction factors were incorrect if the pool status changed during the simulation (e.g. going from sub-cooled to saturated). This resulted in too much material being removed by the suppression pool.
  - Revised the containment leak rate "pressure/hole size" model to comport with MELCOR and made corresponding changes to predefined hole sizes in the user interface.
  - Added the late in-vessel component of NUREG-1465 release fractions to the LOCA sourceterm model. This phase was not included in earlier RASCAL versions.
  - Fixed the NUREG-1465 LOCA calculation so that the "core not recovered" and the "vessel melt through" options produce the same results.
  - Resolved an issue in the reactor source term model where holdup reduction factors became undefined after 32 hours of simulation for a BWR release via the wet well. This was causing user interface issues if the activity balance file values became corrupted.
  - Updated the containment radiation monitor source-term model to remove the normalization of monitor readings based on reactor power. Also, improvements were made to the methods used for estimating damage after 24 h from shutdown.
  - Revisions were made to the NPP activity balance file to improve utility. These changes included: showing RCS activity at shutdown, changing the radionuclides tracked, showing the times in hours.

- **Spent Fuel Pool Events (Source Term to Dose Model, STDose):**
  - The "spent fuel pool uncovered" source term input screen was modified to:
    - Allow the user to specify the heat-up duration before the start of the zirconium fire.
    - Resolve a problem with the validation of the batch counts.
    - Implement a limit after reactor shutdown before which fuel damage cannot occur. This is 1 day for BWRs and 3 days for PWRs.
    - Provide a caution statement and suggestion to review the revised help.
  - Resolved an issue with the spent fuel pool inventory when using the full core offload option for "spent fuel uncovered" source term type.
  - Resolved an issue in the STDose spent fuel damaged underwater option where the percentage of fuel rods damaged and the days exposed in reactor user entries were not being used correctly when modeling with default pool inventories.

- **Source-Term Import, Export and Merge Functions:**
  - Resolved an issue where the Merge / Export tool was unable to retrieve the release height from a STDose case run with an imported source term. This resulted in the release height defaulting to 10 m if exporting to CSV format and program termination if exporting to XML format.
  - Added the capability to the STDose source term import function to build in any missing daughters needed for ATD models.
  - Resolved an issue with the STDose source term import function where some radionuclide names were incorrectly being changed to indicate the inclusion of implicit daughters. This was subsequently causing the calculations to fail when an unrecognized radionuclide name was encountered.
  - Resolved an issue where an exported source term CSV file that was filtered by importance did not include the date/time information. This prevented the file from being reimported.
  - Resolved an issue with the Merge/Export tool where the display of the data at 15 min intervals failed when the merged data length exceeded 6.75 days.
  - An issue was resolved where the STDose case summary did not display the import file name when a saved case was reloaded.
  - Revised GUI for ease of use of import, export and merge functions:
    - Radioactivity in Becquerel and Curies; release heights in feet and meters.
    - Flexible formatting allows more direct use of Excel for modifying CSV format.
    - Adds validations to report formatting issues to user, rather than "failure" message.
    - Updated button behavior (disable/enable) to correctly allow appropriate actions in the import/export process steps.
    - Added busy cursor when loading files and progress bar when merging files.
  - Updated the metadata input into the export files.

- **Atmospheric Transport and Dispersion Models:**
  - Resolved an issue with the depletion calculation in the plume mode. The error was causing a small overestimation of dry deposition and a small underestimation of material remaining in the plume.
  - New output files are created by the plume and puff models that describe the plume and puff characteristics as they change in time and distance from the source. This change was made to facilitate code analysis and may be made available to the user in a future version.
  - Resolved an issue where the plume and puff models were not correctly building the list of depositing nuclides when the scenario used an imported source term. This was resulting in a user interface problem when trying to display ground concentrations by nuclide at a specific location.

- **Meteorological Data Handling:**
  - Resolved the issue where precipitation categories were not retained when using data from the internet.
  - Resolved an issue with the meteorological data entry program incorrectly validating wind speeds units of kilometers per hour. The allowed range of values was changed from 0-30 to 0-108 kph.
  - Modified the MetFetch utility to correctly handle a "NIL" in records from some forecast files (usually buoy data).
  - Updated the MetFetch code to display a message if the download process times out or if user does not have the write permissions needed for the data to be saved.

- Added the capability to the Meteorological Data Processor to read stability class information if it is present in a RASCAL-ready import file. The stability is not a normal part of NWS observations or forecasts, but in some cases may be added to the files before being brought into RASCAL.
- Resolved an issue where the user could not edit the meteorology when trying to load a v4.2 case that used actual meteorology.

- **Calculations Results (Source Term to Dose, Field Measurements to Dose):**
  - Resolved an issue where the STDose "detailed results" viewer would fail when the user tried to examine the deposition mix on the ground for a case created using an imported source term.
  - Resolved an issue where STDose would terminate abnormally when the user tried to cancel the export of a dose vs time plot.
  - Resolved an issue where the STDose "detailed results" viewer would terminate abnormally if the user clicked outside the cells of the numeric table dose output but within the frame of the table.
  - The source term plot function was revised to resolve an issue in displaying long duration source terms. The x-axis values (time) were not being handled correctly.
  - Resolved a problem where the I-131 air concentrations in SI units were not displayed correctly in the footprints. The values were correct in the cells but the legend was being interpreted incorrectly.
  - Updated GUI for consistent wording to describe dose calculations.
  - Dose labels now reflect the ICRP dosimetry system in use in RASCAL.
  - Changed "submersion" to "cloudshine."
  - Changed "dose conversion factor" to "dose coefficient."

- **Updates to RASCAL Facility Database and Site Data:**
  - Incorporated the power uprates approved since the release of RASCAL 4.3: Braidwood 1 & 2, Byron 1 & 2, Fermi 2, Monticello, and Peach Bottom 2 & 3.
  - Updated the topography data file, surface roughness data file, and UTM coordinates in the facility database for the three "special" sites: ORNL, INEL, and Hanford.
  - Minor errors were fixed in the climatology data for Point Beach, Laguna Verde, INEL, Paducah, and Hanford.
  - Resolved a problem with the on-site meteorological station definition at Laguna Verde (Mexico) that was preventing entry of actual weather data. Also, added 2 other meteorological stations that can provide observations and be accessed via MetFetch.

- **RASCAL Software Installation:**
  - Resolved a problem where the installation setup program was not creating the \Other folders in the \Site folder tree. This was causing the STDose model to fail if the user attempted to enter actual meteorology for an event location not in the RASCAL database.

- **Other Fixes and Updates:**
  - Modified the STDose "Uranium oxide in a fire" source term screen to increase the allowed material-at-risk (mass). This increases the usefulness of the tool to support some postulated accident scenarios.
  - Resolved an issue with the source-term option "Sources and Material in a Fire" where user-entered radionuclides names were not being correctly validated. This sometimes resulted in failures in the source term module when the nuclide could not be found in the database.

- Resolved an issue where invalid numbers were being written to the importance file. That resulted in read errors in the STDose UI (“not-a-number” code error).
- Resolved an issue with STDose where case files were not saving correctly if the user changed the save method option mid-stream. The file name was being “lost” and to the user it appeared that no file was saved.
- Fixed the STDose calculation timer to work properly when using imported source terms (for code developer use).
- Resolved an issue where the radionuclide names list was not displaying in the Decay Calculator.
- Modified the STDose automatic case naming function to use a 24-hour clock in the time string for a file name.
- An issue was resolved in STDose where the user could not print the full activity balance file.
- Minor changes were made to the decay chains data file to correct problems with the daughter count for 5 nuclides (Tc-93m, Os-182, Po-205, U-230, and Sr-83). This problem could in some cases cause the transport diffusion models to terminate with a “missing daughter nuclide” message.