User-Reported Problems
September 14– August 2015

Resolved User-Reported Problems

- **(13087, 07/13)**
  - DESCRIPTION: An external user reported that the Osmachkin CHF correlation was not documented in the RELAP5 manuals. This needs to be added.
  - STATUS: RESOLVED (NAA) The Osmachkin CHF correlation is now documented in the manuals.

- **(14008, 3/14)**
  - DESCRIPTION: Portions of Card 1 options 9 and 45 are not accessed by the code because of an "#ifdef card1". Card 1 option 78 is completely unavailable due to the same ifdef. The manual indicates that these options are available for use, but option 78 is not available at all.
  - STATUS: RESOLVED (NAA) Card 1 Option 78 is now available for use, the ifdef was removed.

- **(14017, 5/14)**
  - DESCRIPTION: Changes were tested on Windows by running the installation set with executables that were created with the 'before' and 'after' coding. There were a number of unexpected differences on problems that should not have had any differences based on the coding changes. This issue is observed just by running from different working directories. This problem could be due to running with multiple cores on Windows, uninitialized variables, or problems with allocation and deallocation. The Windows results are inconsistent as a result.
  - STATUS: RESOLVED (JHF) This problem was solved by changing the Floating Point Model that is used. Fast is the default, which on Windows apparently doesn't guarantee the required level of consistency that RELAP5 needs. The flag was changed to /fp:source (which is the same as precise). This is the flag that is used on the Linux side. It fixed the issue and it creates more consistency with the Linux version of the code.

- **(14029, 8/14)**
  - DESCRIPTION: CHF is not being suppressed when the stdy-st option is selected on the 100 card and the steady-state initialization flag (Word 4 on the 1CCCG000 card) is set to 1.0. If the input file is changed so that the initialization flag is set to 0.0 (the code uses the input initial temperatures at the start of the calculation), the code works correctly. That is, CHF is suppressed and the heat structure surface does not enter film or transition boiling.
  - STATUS: RESOLVED (NAA) This issue was corrected and the coding was simplified. The problem was determined to be due to the calling of

subroutine htrc1.F in I-level. Variable iroute was found to not be correct in I-level because it hadn't been set yet. This was resolved by using a local variable iroutx which was set to the value that iroute is set to for the transient.

- **(14031, 9/14)**
  - DESCRIPTION: The user has a fairly large problem that PYGI isn't producing a new input deck from. It creates a deck that is exactly like the original deck with a large number of pygi messages about missing data. To take a look at this and determine if it is a pygi issue or a deck issue.
  - STATUS: RESOLVED (JHF) Looked at the input/output decks that the user shared. It looks like the main issue is that the 1200 and 1300 series cards for the PIPE component are not being treated correctly. To confirm the correct way to treat these cards.
    Found an issue with a variable called ‘pvtmax’ which was set to be 20 and had logic to double when the number of volumes exceeded it. The logic was flawed, so the max was set to 100. Found another issue with a test on line length of .lt. 80 - when it can be equal to 80.
    Still have problems with the multiple junctions, it is a known issue and not to address at this time. The updates appear to be working now and have sent the user and Nolan an updated executable and sent Nolan the updated files.

- **(14033, 9/14)**
  - DESCRIPTION: An error was discovered in the P-T interpolation for the transport properties of h2o. Specifically, the interpolation for viscosity and thermal conductivity is wrong for both liquid and vapor phases. The erroneous interpolation affects only the transport properties returned by the sth2x3 interpolator; the error does not affect the transport properties returned by the viscos and thcond subroutines. The error will affect only calculations that use Option 46, which uses the transport properties from the tpf files, in the evaluation of transport properties at film temperatures. Therefore, the impact of the error should be small.
    The error was traced to the pressure interpolation for the transport properties. If the input pressure and temperature correspond to a single-phase grid point in the tpfh2o file, the interpolator returns the transport property for the adjacent pressure rather than the input pressure. For example, at a pressure and temperature of 9.61837 MPa and 565.36 K, the interpolator returns a viscosity of 9.29329E-5 Pa-s, which corresponds to the value contained in the tpfh2o file at the adjacent point of 10.1184E6 MPa and 565.36 K. Inspection of the coding for the transport properties indicates that it is inconsistent with the coding for other properties, such as the specific internal energy. Changing the interpolation to make it consistent with the other coding corrects the error and allows the interpolator to return the correct value of 9.28071E-5 Pa-s, which is the value contained in the tpfh2o file for the input values.

- STATUS: RESOLVED (CBD) Updates were submitted by Cliff and they were merged into a preliminary version.

- **(14037, 11/14)**
  - DESCRIPTION: The following cards are being used to add all of the volume and junction variables to the plot file:
    20800311 allvols -1
    20800312 alljuns -1
    The viscosity variables were not available in the plot file.
    The deck used to identify the errors has a large number of volumes, which may have contributed to the problem.
  - STATUS: RESOLVED (NAA) The viscosity variables were available in the plot file. They were also expected to print in the output file, but did not. The coding was not designed to include the additional variables in the output file when using the allvols and alljuns. This only adds the additional variables to the plot file. The issue is resolved.

- **(15001, 1/15)**
  - DESCRIPTION: PYGI issues with multiple junction components. It seems that, for some reason, it is not possible to read from the rstplt file, so the mltpljun are initialized with velocity 0.0, which is a correct syntax but it's not the correct value.
  - STATUS: RESOLVED (JHF) The multiple junctions that were defined in the input deck were using the + for line continuation. Once those were replaced with incremental cards, it is working fine now. Sent off the corrections to the user to use.

- **(15002, 1/15)**
  - DESCRIPTION: The pitch problem was reported to have failed on backup of an intermediate step. The issue was not observed previously because the problem self-corrects and the verification file is only different for a few intermediate steps.
  - STATUS: RESOLVED (NAA) Variable athrot for inertial valves needed to be backed up. This variable is now backed up and the problem now runs without any back up issues.

- **(15003, 1/15)**
  - DESCRIPTION: An issue with the level model with multiple cross-flow junctions was found when investigating a separate issue. The error occurs on the Windows platform because an array index is out of bounds. The problem is the horizontal multiple junctions are not being ignored when attached to two volumes with the level model turned on. The junction indices are out of bounds for the level model stack.
  - STATUS: RESOLVED (NAA, JHF) An erroneous cycle statement was added to the code which prevented a do loop index from being incremented correctly. The cycle statement was replaced with a go to

statement and the problem now runs correctly.

- **(15005, 2/15)**
  - DESCRIPTION: It was reported that with the latest version of the code some of the DA problems that restart failed. The issue was tracked to a table that was deleted on restart. When the table is not deleted the problem runs. The table delete functionality is not working.
  - STATUS: RESOLVED (NAA) An additional failure was found when a material table was deleted on restart. A test problem was generated to test the delete functionality. This problem was added to the test set to test the delete functionality more frequently. The general table and material data can now be deleted on restart and this problem is now resolved.

- **(15006, 2/15)**
  - DESCRIPTION: Installation problem k3200nk.i fails.
  - STATUS: RESOLVED (JHF) Found that a status variable was not correctly initialized. The initialization was corrected and the problem now runs.

- **(15009, 2/15)**
  - DESCRIPTION: In running a series of calculations, the code hangs up in input processing on a restart. A steady state calculation is run, then a transient is run from the steady state. A second restart is then attempted, in which several components are renodalized. This second restart hangs up. The problem was encountered on 4.1.3, but also occurs in 4.3.1. Input files have been provided to Nolan Anderson.
  - STATUS: RESOLVED (NAA) Further testing has shown that the problem is in the deletion of a heat structure (only one is being deleted). If this structure is renodalized instead, the problem runs. Found that the error was caused by an issue in subroutine rradht.F. The number of heat structures changed on restart but the radiation enclosure model was counting the number of heat structures incorrectly. Modified the coding so that the value would be calculated correctly, and now the problem runs successfully.

- **(15010, 2/15)**
  - DESCRIPTION: A TREAT point kinetics problem failed in input processing on the second of multiple cases. The error message indicated that the number of radiation enclosure sets did not match the number of sets input. Two sets were input in the original case, but the code said that eight sets were input. No changes were made to the radiation model in the second case.
  - STATUS: RESOLVED (NAA) Found that variable 'l3a' in subroutine rradht.F was not reset for multiple case decks. Reset the variable to the initial values, and now the multiple case deck runs successfully.

- **(15011, 3/15)**
  - DESCRIPTION: Various Windows installation issues. This error is corrected for V4.3.x.
  - STATUS: RESOLVED (NAA) When using int32 pminvd.F fails to compile. A mixture of brackets and parenthesis in array index usage are the cause.
    In file pltwrt.F when not using vargrav #ifdef are needed to protect the use msimod, only: m_rring statement that is only needed when vargrav is in use.
    In stratv.F when the card1 options were made permanent, aintf and hifilm were found to not be specifically declared. These were added to the variable declarations.
    An error with #ifndef athena in chfcal.F. The problem is Card 502 W3 has an option of 115 which is a swirl tube. This was implemented specifically for Athena. However, when Athena is turned off and option 115 is used, the transient fails because the temperature is too high for the thermal conductivity table.
    The decision was made to change the input so that with Athena removed using 115 will fail due to input error. The manuals should be updated to reflect the fact that the values 115, 160, 161, 162, 163, 164, and 165 are not available when Athena has been removed.
    Additionally, the code now fails if the first word on the 800 card is a 3. This is reflected in the manual as the ITER option only.

- **(15013, 3/15)**
  - DESCRIPTION: Gap conductance model output incorrect in input processing. If British units are selected for the code output, the rod internal pressure displayed in input processing for the gap conductance model is in Pa instead of lbf/in2, and the units are truncated. If SI units are selected for the output, the values and units for the pressure are correct.
  - STATUS: RESOLVED (PDB) The logic in subroutine ht1inp was changed to make the code work as intended. A format statement was also changed to not cut off the British pressure units.

- **(15014, 4/15)**
  - DESCRIPTION: The code currently allows only one conductance to be entered for a conduction enclosure. The user must select some expected average temperature to use. Design basis transients in the gas reactors, where the response is driven by conduction and radiation, have very large changes in structure temperatures. Allowing the conductance to change during the transient would more accurately model the response of these reactors.
  - STATUS: RESOLVED (NAA) The ability to specify a temperature dependent conductance table was added. The manuals were also updated to indicate how this capability can be accessed and used.

- **(15015, 4/15)**
  - DESCRIPTION: Rebrand the PVMEXEC to be R5EXEC. Modify the manuals to reflect this change and update/review/correct any issues with the manuals.
  - STATUS: RESOLVED (JHF) The manuals have been updated, reviewed, and submitted to STIMS for external release.

- **(15016, 4/15)**
  - DESCRIPTION: Modify the directories and scripts that run PVMEXEC to have a name of R5EXEC. To sync up with the modified manuals.
  - STATUS: RESOLVED (JHF) The PVMEXEC code has been modified to rebrand the executable as r5exec.

- **(15017, 4/15)**
  - DESCRIPTION: Some format statements for the printed output file need to be cleaned up. Some cladding deformation information was not being printed to the major edits.
  - STATUS: RESOLVED (PDB, NAA) Changed offending format statements in subroutine majout to make output file more readable. An "exit" statement was changed to a "cycle" statement to allow the cladding deformation information to be printed in the major edits.

- **(15018, 4/15)**
  - DESCRIPTION: The code currently uses the boundary volume length as the structure length whenever axial conduction (including reflood) is specified. For problems in which it is more appropriate or more convenient to have multiple axial structures connected to the same control volume, the reflood model (or axial conduction) is adversely affected. The capability to specify the length of the heat structures through input is desired.
    This could be accomplished by adding a structure length after the surface area factor on the 500/600 series cards. Analogous to the 800/900 series cards, the 500 and 600 cards could be used to flag which option is being used on the subsequent cards, with the default being the current input format.
  - STATUS: RESOLVED (NAA) This capability was added by using the newly added 1CCCG500 & 1CCCG600 Cards. These cards allow the user to use the 7 word format for the 1CCCG501-599 and 1CCCG601-699 cards, where the heat structure length can be specified with Word 6.

- **(15019, 4/15)**
  - DESCRIPTION: The gap conductance and fuel rod deformation models are being used in a commercial plant large break LOCA calculation. When cladding rupture occurs in a channel with a single heat structure, the area reduction is much larger than that described in the code manual, resulting in a thermodynamic property failure caused a very large pressure increase

in one time step. The flow area reduction also appears to be inconsistent with the model description for flow channels with more than one heat structure. The problem has been reproduced in a simple stand-alone model.
    - STATUS: RESOLVED (NAA) Found issues with the model that did not match what was described in the manuals. These issues were corrected, and the area changes come out as expected now. This problem is resolved.

- **(15020, 4/15)**
    - DESCRIPTION: The h2on generating program has a problem for a narrow range of conditions at high pressure and low temperature. For example, in the stgh2on2.pr file, at a pressure of 20.0 MPa, the reported kappa is negative for temperatures between 297.15 and 351.73 K. The negative value of kappa causes the code to fail in a calculation of the sound speed when the code tries to take the sqrt of a negative number. A closer examination of the results at 20 MPa indicates that the density is off by 20% from what the NBS tables give and the first temperature is about 24 K higher than the first temperatures at 19.0 MPa and 21.0 MPa. Kappa is also negative at 640.778 K at 20.0 MPa and for a range of temperatures at 21.7808 MPa. The results at 19 MPa look good. The generating program will have to be investigated to determine the root cause of this problem. We may also need to search the entire table to determine if there are any other negative kappas.
    - STATUS: RESOLVED (JHF) The h2on fluid property tables were incorrect in the meta-stable regions. This was an attempt to fix the error in the generator in order to generate fluid property tables with the correct values in subcooled liquid at high pressure regions. The attempt only succeeded in getting the generator to compile and create the tables on an updated platform with 64 bit precision. It was decided that the areas where the fluid table has errors should be manually interpolated and the a_tpf files corrected. This interpolation was done using the correcttablevalues.xlsx spreadsheet which is now included with the h2on generator and a README file explaining the process.

- **(15022, 5/15)**
    - DESCRIPTION: Corrections to the RGUI configuration guide with respect to PYGI.
    - STATUS: RESOLVED (JHF) Responded to questions and updated the RGUI configuration guide with corrections.

- **(15024, 6/15)**
    - DESCRIPTION: The RELAP5-3D capability to have multiple decks in the same input file (Multi-deck) capability is not currently working when the single decks try to write/read restart file (same one). Actually the problem is happening at the initialization of the 3rd deck (the first 2 work fine). It looks like the problem is related to the Kinetic Block of the restart

file.
    - STATUS: RESOLVED (GAM) It was recommended to solve this issue by writing only one dump at each advancement, this approach was taken and implemented by saving the number of records read in variable SVNREAD, and repositioning the restart file to the beginning record of the advancement, rather than the end of it. This causes the initial restart dump of the current run to overwrite the dump of the previous run. In the process of solving this problem, the section of coding was updated to FORTRAN 95 level, comments were corrected and more were added, internal subroutines were extracted to clarify the logic flow, and the dictionary of section variables was improved. This was tested with the Normal and Verification test cases and no differences were found. This was also tested with a new Edward's Pipe multi-deck input file that does 3 successive restarts. It worked as well.

- **(15025, 6/15)**
    - DESCRIPTION: The use of multi-deck input to start a problem, run it to a steady-state, and restart it in a single input file is needed to guarantee that the code runs the entire problem on the same thread of a cluster computer. This is used for parameter studies with RAVEN. However, the code fails to properly read the plot file during input processing of the restart.
    - STATUS: RESOLVED (GAM) The code fails during the restart read of the second dump at the same advancement in a kinetics subroutine for the particular test case. When run with a multi-deck Edward's pipe with two restarts, the code failed reading IHTMOD variables. This problem was resolved similarly to UP#15024.

- **(15026, 6/15)**
    - DESCRIPTION: A user group studied many legacy versions of RELAP5 going back to MOD 3.2 and found that four different strip file formats have been employed while the plot file format has remained the same. The user requests that the strip file be made to conform to the plot file.
    - STATUS: RESOLVED (GAM) This is fixed by creating new subroutine psWriteMB that has a select case statement containing each type of machine dependent write: title, plotinf, plotalf, plotnum, and plotrec. All writes to the plot and strip files are done through this unifying subroutine to unit psunit which is a call argument that may be plotfl or stripf. The subroutine tests that the writes conform to the format of the target file before writing.
      Script runn is modified to test this feature by copying edMmbin.st to stripmbstr.plt then running new strip test stripmbstr.i. Stripping a MBINARY strip file demonstrates that the plot and strip file have the same format. The resulting strip file is in ASCII for visual verification. Both plotmod and stripplot have been cleaned up: Outdated comments have been corrected, dead and commented out coding and variable have been eliminated, some new variables are added, more error checking is

performed, the internal subroutines are now in a standardized form. Implicit none is added wherever there are declarations, and calls to subroutines of module allomod provide most allocation.
An error in allomod in allo_real4b1d where the input value argument, val, did not match the array type was found and fixed.

Highest Priority User-Reported Problems Being Worked as Time Permits

- **(13009, 02/13)**
  - DESCRIPTION: On a restart when "allvols-1" is requested, the actual problem answers change and they change after a single timestep.

- **(13018, 03/13)**
  - DESCRIPTION: The level.i file tests the level stack connection rules contained in Volume 1 of the code manual. The problem contains two parallel pipes, each of which uses the mixture level tracking model. A junction is used to connect the two parallel pipes. The problem simulates 36 cases that test each possible combination of from/to face connections. The number of level stacks calculated by the code disagrees with the connection rules contained in the manual for 10 of the 36 cases. The code logic should be modified to be consistent with the code manual or the manual should be corrected to accurately describe the actual connection rules. Related user problems are UP 08017, 08042, 10014, 12001, and 12008.
  - STATUS: IN-WORK (NAA) Found that the coding and the manuals do not agree, working on modifications to the coding.

- **(13021, 04/13)**
  - DESCRIPTION: A user reported that the vapor temperature in a problem running R-134a increased significantly in 2-phase flow. The cause is unknown, but is speculated to be due to the interpolators, or the fluid itself.
  - STATUS: IN-WORK (NAA) Checked the interpolators and tried a similar problem with water, and saw the same issues. It is believed that the problem is with the condensation heat transfer.

- **(13088, 08/13)**
  - DESCRIPTION: A simulation of the LOFT L3-1 experiment showed that the break flow rate increased significantly after the accumulator emptied and noncondensable nitrogen reached the break. The experiment did not show a corresponding increase in the break flow rate. The problem was traced to updates that were implemented in 2009 to make consistent calculations of volume and junction sound speed in the presence of noncondensables. The problem disappeared when Card 1 Option 3 was turned on, which caused the code logic to return to that used prior to 2009.

A simple three-volume test case, which demonstrates the effect of Card 1 Option 3 on the break flow, has been stored on the cluster at /projects/r5dev/cbd/errors/noncon/break.i.

- **(13090, 08/13)**
  - DESCRIPTION: Case 5 of 9 cases of the ans.i problem causes code failure when restarted with input deck ans.r.i which restarts all 9 cases on RELAP5-3D/Version (original coding and with updates). The code was built on the SUN Java Station using intel Fortran 11.1.
    This restart deck ran all 9 cases to completion in version 4.1.2t + updates on the same computer but with compiler level 10.1.

- **(13094, 08/13)**
  - DESCRIPTION: Activating reflood calculation in certain cases may result in the violation of mass conservation. We still could not work it out.
    The user provided a graph of the mass error issue, but no input deck.
    The level and type of compiler and operating system are not reported.

- **(13095, 08/13)**
  - DESCRIPTION: A collection of varying volume problems fail in different ways. These problems all have a volume that is expanded then compressed to the starting volume. This problem occurs in an older version of RELAP5-3D.

- **(13096, 08/13)**
  - DESCRIPTION: Non-realistic results are seen in a model for a long segment of pipe (it takes a while to run it). As can be seen in an attached PDF, the force calculated between junction 42 and junction 61 in pipe 43 appears to be erratic starting from 18 sec to 35 sec. This is most likely due to a rapid cyclical switching in flow regimes in pipe 43, and it is reduced with an increase in L/D ratio.

- **(13098, 09/13)**
  - DESCRIPTION: A user requests information on speedup and testing of RELAP5-3D version 4.0.3 in parallel with OpenMP. Do you have results of OpenMP for LINUX. Do be specific, say, we have LINUX machine with 64 cpus, and I am running RELAP5 with and without OpenMP, what would be run time difference? I am thinking to use Intel Xeon Phi Coprocessor, which is running under LINUX.

- **(13099, 09/13)**
  - DESCRIPTION: Two issues were encountered, using input deck mixbub.i, both with the mixture level tracking model turned on. Using the semi-implicit method, a void fraction inversion occurs after oscillations in the flow regime between slug and annular flow. The bottom volume in the level stack nearly empties, while there is significant liquid in the volume

above (and the volume below if the level tracking model does not include the entire pipe). Using the nearly-implicit model, a large mass error occurs after liquid starts to flow out of the pipe; this behavior was seen in earlier versions of the code as well (at least back to 2.4.2). If the mixture level tracking model is turned off, the void profile is reasonable, and there is no large mass error in the nearly-implicit calculation; the semi and nearly calculations are only slightly different.

- **(13101, 10/13)**
  - DESCRIPTION: The problem occurs for a case with heat transfer from saturated air to a cold surface. Condensation occurs which causes a small amount of liquid to appear. The heat transfer coefficient goes to zero whenever liquid is present in the volume, which seems unreasonable.

- **(14013, 4/14)**
  - DESCRIPTION: A steady state calculation fails after some time with a "Thermodynamic property error with minimum time step, transient being terminated" message, but the location of the failure in the model is not identified.

- **(14014, 4/14)**
  - DESCRIPTION: In running 2 input decks, the only difference is – in one of them the level tracking option is used. There are 2 valves: 633 for SG draining and 139 is for very small venting, the rest of boundaries are not used.
    The first deck is running OK (although heavy numerical instabilities are there, but it is OK from practical perspective).
    In running the second deck (with level tracking), after the separator is empty the temperature in the steam generator head (volume 690-02) becomes erratic; the code should abort because of out of thermodynamic range.

- **(14024, 7/14)**
  - DESCRIPTION: A user is having trouble with RGUI when changing the input parameter locations.
    This might be a function of not clicking out of the field after changing it, or of clicking in the command line area. Or there could be a quirky bug. Turns out that the issue was a missing fluids directory. He added the fluids directory and files and it started working again.
    He is still seeing some troublesome behaviors. Depending on how many times you may have executed an input file, or if you did or did not save or load the option file, sometimes the output file has a ".o" file extension and other times it has a ".p" extension. The .p seems to be created the first time around and then it automatically changes it to .o.
    Sometimes you need to click the Run button twice before you get output files. Yep, I just verified it again. After deleting the contents of the

command: text box, nothing happens when the Run button is clicked. The 2nd click (with the text box now populated), generates files.
In addition, the auto-fill functionality that fills the output files to have the root same name as the input file, it is confused when the user changes one of the directories - it changes the name to input blah blah. So this needs investigated as well.

- **(14026, 8/14)**
    - DESCRIPTION: An existing paragraph was confusing: The wall drag model in subroutine FWDRAG makes a series of loops over all volume cells. The first series of loops calculates the single-phase friction factors for wet wall and/or dry wall cases and interpolates if both cases are present. The second series of loops tests to see if the fluid is two-phase and, if so, calculates the H.T.F.S two-phase multiplier and, for either single- or two-phase, makes a final calculation of the FWALF and FWALG terms. In subroutine VEXPLT, the FWALG and FWALF terms are combined with other terms to form FRICGJ and FRICFJ, as shown previously. The and terms in Equations (6.2-2) and (6.2-3) are equal to the FRICGJ and FRICFJ terms.

- **(14027, 8/14)**
    - DESCRIPTION: To reduce the number of issues the code has with uninitialized variables, the data in the derived type arrays in various modules will be examined and zeroed out at the time of allocation and any pointers created will be immediately nullified. This will be an ongoing task.
    - STATUS: IN-WORK (GLM) Various modules and subroutines had their data initialized and nullified.

- **(14030, 8/14)**
    - DESCRIPTION: A University of Wisconsin user has reported that they believe the RELAP5-3D condensation model in the presence of noncondensable gases is incorrect. An attached file describes the problem.
    - STATUS: IN-WORK (NAA) Looked at the paper written about the error and the coding. Looking for potential ways to test the issue.

- **(14032, 9/14)**
    - DESCRIPTION: RGUI - Input File text replaces names of files in parameters table. The main issue is that sometimes when I click run with all of the information entered then it will auto fill the output, restart, and plot files with the name "Input File". I think this might happen when I have the filenames entered and then change the path the three files will change to input file until I reenter the .i filename.

- **(14034, 9/14)**

- DESCRIPTION: Print button for RGUI doesn't print all of the session window content. When the print button is pushed the content in the window gets truncated. In printing to both a network printer and to an Adobe PDF printer the first line of what was in the session window is truncated. Regardless of the session window size, it is still cut off.

- **(14035, 11/14)**
  - DESCRIPTION: When comparing verification files during case 4 of Verification Test BORONM, which uses PGMRES as the linear equation solver (card 1 option 34), there are differences in the last bit of the right hand side. A little investigation shows a difference occurs on the first time step of a restart or backup. This results in persistent differences for a restart in SOLth, the L1-Norm of the solution vector for restart that is still only one bit at the end. For the backup on the final step, the variables Uf, Vf, Vg, and Boron differ in the final bit while Error differs for many. This problem occurs in all preliminary version of 4.3.1 to date.

- **(14036, 11/14)**
  - DESCRIPTION: Differences in reduction counts occur in a few Verification Test cases when backup testing is performed. Most of the counts differ by 1 or 2. Since these are output-only variables and not primaries, and since the calculations are exactly the same, the issue has lower priority. The following problems have reduction count differences: crit, eccmix, edhtrkm, eflag, httest, iter1, jetjun, l31acc, pvmcs, reflecht, typ12002, and typ_kindt.

- **(14038, 12/14)**
  - DESCRIPTION: A diffusion model was added to the code but it is not available because it uses some scdap variables. The diffusion model needs to be modified so that it is independent of scdap and can be run with the default version of RELAP5.
  - STATUS: IN-WORK (NAA) The diffusion model was made available by adding a relap module to store the diffusion model specific variables. This module was named diffmod.F. The diffusion model is available post version 4.3.1 with the 117 card. The theory and input manuals need to be modified to document this model. The input manual was modified to address the 117 card. The theory manual still needs to be modified.

- **(15004, 2/15)**
  - DESCRIPTION: Pygi issue, bad value on pipe CCC1200 - 1299 cards W(5). The option used is t = 6. According to the input manual, when the noncondensable quality is 1.0, the vapor/gas void fraction should also be 1.0, which is not the case in a volume. In general, those two quantities must be thermodynamically consistent, which was not observed here.

- **(15007, 2/15)**

- DESCRIPTION: The code will generate an input error for fluid h2on if t =8, P = 1.0E6, Tf = 300 K, Tg = 450.0 K, alpha = 1.0, and Xnc = 0.95. The problem will execute if the fluid is changed to h2o.
  This problem may be related to UP 11012 and UP 14028.
  While reviewing UP 11012, it was noticed that the triple point pressure in the ascii file a_tpfh2on differed from that in a_tpfh2on2. The triple point pressure (the second real word in the ascii file) should be 611.73167…, not 611.73200…, in a_tpfh2on.

- **(15008, 2/15)**
  - DESCRIPTION: A Western Services client is using 3D objects, and got a problem in input deck processing. Upon further review it was discovered that the user of the Western Services r3d421-rt coding reported that the 3D offtake did not connect properly.

- **(15012, 3/15)**
  - DESCRIPTION: The snapsock.c file on the Windows platform does not link with the RELAP project on the Windows side. This prevents the use of interactive snap on Windows. It has been sent to Ken Jones for further investigation.

- **(15021, 5/15)**
  - DESCRIPTION: The numerical derivatives of the specific enthalpy of h2on vapor with respect to pressure do not agree with the analytical derivatives, particularly at grid points. Calculations with polate showed the numerical derivative at a pressure of 1.0E6 and a quality of zero was approximately 1.1 J/kg-Pa, whereas the analytical derivative was about 0.0311. The specific internal energy of the vapor returned by the interpolator agreed exactly with the tpfh2on file, but the specific volume differed in the fifth significant digit, which was unexpected at a grid point.
    The numerical and analytical derivatives for h2on liquid and for both phases of h2o agreed much better. It is possible, but unlikely, that the problem is in polate. It is much more likely that the problem is in getstate2. A similar problem would be expected in getstate1.
  - STATUS: IN-WORK (NAA) Found that when entering pressure and quality conditions for h2on the interpolators use table 4 instead of table 3 to obtain property values. By using table 4, there is a difference between the property values for saturation properties. It seems that the interpolation should all be done with table 3 for the saturation properties.

- **(15023, 6/15)**
  - DESCRIPTION: h2on saturation properties are bad for points located within the pressure range 21.583E6 to 21.7808E6 Pa. This causes the code to either fail on input processing or to fail during execution with a negative csubg value. The problem may be that the spinodal lines at

21.7808E6 Pa are not well characterized. There is no valid meta-stable liquid or vapor point at this pressure.

- **(15027, 7/15)**
  - DESCRIPTION: A Seabrook model gives different answers at steady state when two decoupled heat structures (geometries 8502 and 8503) are added to the model. Specifically, the number of time steps and mass errors differs at the end of the run. No differences were expected since decoupled heat structures should not affect the hydraulics. The decoupled heat structures use the cladding deformation model and this is likely the cause of the problem. The cladding deformation model affects the flow area in the volume and hence the hydraulics. For a decoupled heat structure, the cladding deformation should be calculated, but the deformation should not result in a change in the volume flow area.
  - STATUS: IN-WORK (NAA) Began looking at the coding to determine what is causing the difference in results.

- **(15028, 7/15)**
  - DESCRIPTION: The Chen boiling correlation is inappropriately coded with a lower velocity boundary that prevents the intended pool boiling heat transfer coefficients from being used in NRELAP. When liquid velocities decrease below 0.06 m/s, the Chen calculated HTC should approach the solution to the Forster and Zuber pool boiling correlation. However, when liquid velocities decrease below 0.06 m/s, the Chen calculated HTC reflects the solution at 0.06 m/s. During pool boiling conditions, this is causing the heat transfer coefficient to be significantly underpredicted. Depending on the excess wall temperature, the HTC on the outside of the DHRS heat exchangers can be as low as 20% of the expected value.
  - STATUS: IN-WORK (DB) The coding for this transition from Chen to Forster-Zuber is being developed.

- **(15029, 7/15)**
  - DESCRIPTION: The nucleate boiling term, hmic, of the Chen boiling correlation is incorrectly coded in prednb.F by using fluid properties of the bulk fluid. The nucleate boiling term of Chen comes directly from Forster and Zuber's pool boiling correlation, who state that "Liquid properties were evaluated at superheat temperatures; those of the vapor were taken at saturation temperature." In the same paper by Forster and Zuber, a sample calculation is performed for a subcooled liquid, which is preceded with the following statement, "If the properties of the liquid at the superheat temperature and those of the vapor at the saturation temperature are evaluated..." The results of this calculation can only be replicated by using fluid properties at the conditions they suggest. Using fluid properties at the conditions specified by Forster and Zuber are consistent with the boiling phenomena. Incopera states that "for nucleate boiling, the influence of

subcooling is considered to be negligible..." This supports the idea that the use of bulk fluid properties in a subcooled liquid is not appropriate. Likewise, a similar qualitative statement is made by Forster and Zuber, "It is generally agreed that the high heat transfer rates encountered with nucleate boiling are not a consequence of the latent heat transport but are due to the turbulence in the superheated liquid boundary created by bubble dynamics."
By using bulk fluid conditions in the calculation of hmic, the error grows as both the subcooling and wall excess temperature increase.
The impact of this error can be significant, particularly when applied to a stagnant, subcooled fluid volume such as the cooling pool. The low velocity in the cooling pool means that the nucleate boiling term of Chen dominates, while the subcooled temperature of the pool causes significant error in the calculation." HT options that use the Chen boiling correlation

  - STATUS: IN-WORK (DB) The coding for using the saturated liquid properties evaluated at the wall temperature and saturated vapor properties evaluated at the bulk pressure is being developed.

- **(15030, 7/15)**
  - DESCRIPTION: The 2006 Groeneveld CHF model is available as a Card 1 Option. Typically Card 1 options are not fully documented. It is expected that the CHF model will become a more permanent option in the code. This CHF model will need be documented in the theory manual.

- **(15031, 7/15)**
  - DESCRIPTION: There is no documentation indicating that geometry correlation 134 performs any calculation for mode =2. However, there is a section of coding in subroutine dittus.F that does calculate a modified heat transfer coefficient. This section of coding needs to be either documented or removed if its basis cannot be justified.