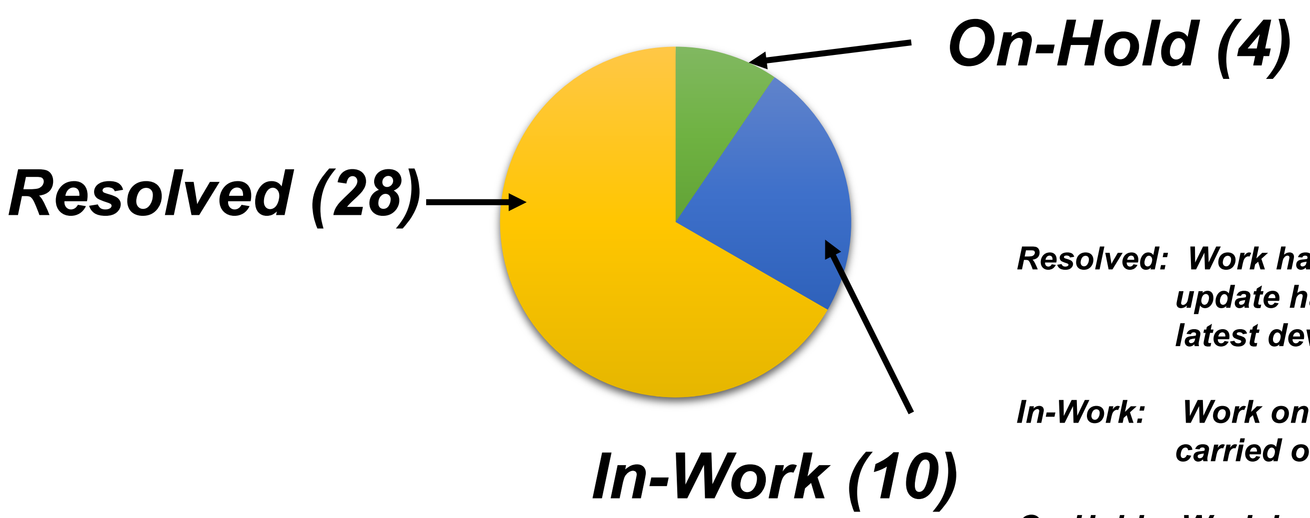
User Problems

2018 RELAP5 International Users Seminar
May 3-4, 2018
Idaho Falls, ID

Idaho National Laboratory

User Problem History

September 2016 – April 2018
42 reported
10 additional older problems were resolved



Resolved: Work has been completed on user problem, update has been submitted, and update is in latest developmental version

In-Work: Work on user problem is currently being carried out

On-Hold: Work has not begun on user problem, or work was began on user problem but work is now stopped on user problem

Selected User Problems

- ***UP# 16027***
- ***UP# 16028***
- ***UP# 17014***
- ***UP# 17026***
- ***UP# 18001***
- ***UP# 18007***

Problem 16027

- The CCFL model does not work correctly when the abrupt area change option is used and the input area at the junction is less than the minimum of the two adjacent volumes. The root cause of the problem is that the superficial velocities used in the CCFL model are calculated based on velfj and velgj. These velocities are correctly based on the input junction area when the smooth area change is used. However, when the abrupt area change model is used, velfj and velgj are based on the minimum of the two adjacent volumes rather than the input junction area. The correct solution is to divide velfj and velgj by the junction throat ratio when the abrupt area change model is used or to provide guidance to the user to alter the input constant C for the flooding equation.
- *Root Cause: Incorrect velocity calculation.*
- *Status: Resolved.* Modified the coding so that the constant C is modified when the abrupt area change model is in use. With this modification the junction velocity is the same for the first two cases of the test problem. The modification to the constant in input is no longer necessary to obtain the correct flow rate.

Problem 16028

- *Symptom:* The CCFL model exhibits a large sensitivity to time step size. The test case is similar to the one submitted for UP 16027, except that the steam flow rate was changed from 0.02 kg/s to 0.03 kg/s. The code's solution to the flooding equation yields no downflow of liquid at 100 s. However, the correct solution is a downflow of about 0.04 kg/s. When the time step is reduced from 0.025 s to 0.01 s, the code gets the correct solution. If the time step is too big, the code appears to predict no downflow, even when the flooding equation allows some downflow.
- *Root Cause: Insufficient error checking.*
- *Status: In-Work.* Modified the code so that the test for whether the ccfl model is on is based on the velocity at the previous time step instead of an intermediate value. With this change the results roughly lie on top of each other with the two different time step sizes. However there is some oscillation in the results which should be smoothed out.

Problem 17014

- *Symptom*: A thermodynamic property failure was reported when using the jetmixer model. In a LOCA event when there is reverse flow through the jetmixer, the code fails as the vapor internal energy in the jetmixer exceeds the steam property table.
- *Root Cause: Incorrect donoring.*
- *Resolution:* Resolved. The original coding always calculated the mass flow rates using the volume fraction and density from the K volume, which is the upstream volume for normal flow in the jet mixer. The revised coding now calculates the mass flow rates using the donored junction properties. The revised coding is more accurate in that it accounts for flow reversals and countercurrent flow. There was also an error in calculating the loss coefficient in the event of flow reversal that was corrected. The problem then was able to run successfully with meaningful results.

Problem 17026

- *Symptom:* The verification input deck multicase.i has a restart input deck, multirest.r.i that fails with a core dump on a case after the first one. This failure has been observed to occur on the second and fourth case depending on which restart record is used for restart.
- *Root Cause: Variable reinitialization.*
- *Status: Resolved.* Found that there were issues in the input deck and that if the decks were changed to write the plot file in mbinary the problems ran to completion. Found that the obserbed differences were due to variable l3g(4) in subroutine rrkin.F not being reset correctly when running a multicase problem. Reset variable l3g(4) at the beginning of the subroutine and all of the cases now run to completion and the results pass verification testing.

Problem 18001

- *Symptom:* Pressurizing an initially helium-filled volume with nitrogen results in a large mass error and reduction in both noncondensable quality and vapor temperature, apparently when the pressure reaches the helium critical pressure.
- *Root Cause: Incorrect logic.*
- *Status: Resolved.* This issue was corrected by modifying two 'if tests' in subroutines ijprop.F and jprop.F. These tests previously checked the volume pressure against the critical pressure, but were modified to test the partial pressure against the critical pressure. This change corrected the observed issues.

Problem 18007

- ***Symptom:*** **The Gnielinski correlation is selected through input (heat transfer package 160), but does not appear to be used if axial conduction is turned on for that structure.**
- ***Root Cause: Variable not set correctly.***
- ***Status: Resolved.*** **Found that variable htopta was not defined correctly for 2D conduction structures. Added the correct setting of this variable to subroutine htrc2.F as is done in other routines. The problem now uses the proper correlation.**

Questions?