Outline

- Purposes of code and data testing
- Example of data testing
- Example of code testing
- Example of evaluation testing
Purposes of code and data testing

- Three areas are examined in code and data testing with critical benchmark experiments
  1. Nuclear data testing
  2. Code testing
  3. Evaluation testing – least obvious

- We will look at a brief example of each from work performed recently for the DOE Nuclear Criticality Program (NCSP)
Nuclear data testing

• One of the two obvious purposes: testing the data

• Running a suite of critical experiments with a new data set allows examination of differences caused by new evaluations
  – Experiments do not have to be great benchmarks since the difference is the key result

• Several ENDF/B-VIII beta releases were tested in FY17
  – Andrew Holcomb presented Beta 4 testing at NCSD in Carlsbad and has run all of VALID on the released version as well
  – ENDF/B-VIII data will be available in SCALE 6.3
ENDF/B-VII.1 vs ENDF/B-VIII

Average C/E Difference from Unity

-0.008 to 0.010

HMF, HST, IMF, LCT, LST, MCF, MCT, MST, PMF, PST

6.2.2 v8-252, 6.2.2 ce_v8, 6.2B4 252-group v7.1, 6.2B4 CE v7.1
Code testing

• Careful (critical) examination of results leads to more insights on code performance
  – More than just validation!

• Examining trends in experiment series helps us understand what—if anything—is varying in the experiments that might indicate a bias in the data or bias in the code

• Codes and data are good enough now to allow identification of errors in models
Original results for LCT-010 with ENDF/B-VII.1 library
After the fix!
Last, but not least: evaluation testing

- No evaluation in the ICSBEP Handbook is perfect
  - The code and data testing rely on these evaluations, but some contain errors

- Comparing results from different evaluations can shed light on data problems, code problems, and/or evaluation problems

- Soluble gadolinium is an example of this last one
  - Much discussion about HST-014 through HST-019 is already ongoing in the international data community
  - Most of these thoughts were presented at the June ANS Meeting (Philadelphia)

- In a nutshell: the bias apparent in HST-014 & -016 is probably not real
C/E ratios for HST-014, HST-016, MST-007, HTC Phase 2
Summary

Test code

Test data

Good answers! (If all 3 are right)

Test evaluation
Thank you to the DOE NCSP for funding this work and lots of other work like it!

That’s it – any questions?