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Update...

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Current Projects in Brief:

- Model Building and Benchmarking 8 cycles for Limerick Microburn-B2 Powerplex-III Models
- Software support for fuel accounting and fuel expense forecast
- Independent assessment of proposed new lattice design, including recent industry experience
- Linking Code between MICRO-BURN-B2 and RETRAN- 3D (see article below)

Inside this issue:

CPW for SIMULATE-3

Kevin O'Sullivan

Since 1992, URA has licensed the Core Physics Workstation (CPW) to five Operating Companies as a visual interface to nodal analysis code sets (EPRI codes and the Framatome ANP NEMO code) used for core analysis and fuel management, but the recent installation as an interface to SIMULATE-3 can compete with the Studsvik XIMAGE product. The CPW is written in Visual Basic with an ODBC database connection to Access, SQL, Oracle or Sybase as well as Microsoft Excel and Word. SIMULATE-3 may be resident on a Unix and/or PC platform in a network environment, running either BWR or PWR models or both.

Reactor engineers use the CPW to generate Excel graphics or worksheets of an analysis and send these files to control room operators to support upcoming power maneuvers or to support a restart following reactor trip. The reactor engineers also have an efficient process to prepare input for analyses, examine results, and automate the documentation of output.

Core design engineers use the CPW to shuffle from cycle-to-cycle and to evaluate different fuel management strategies with respect to limits, fuel utilization and fuel economics using the graphical output displays. Personnel training is reduced with a common interface program to PWR and BWR analysis using SIMULATE-3 or another nodal code, (URA anticipating working with utility organizations that use MICROBURN-B2 and ANC).

The core design engineer can quickly evaluate minor adjustments in a loading pattern using a 4-node per assembly Quarter Core Map that is synchronized with a full core map and set of Shuffle windows used to discharge fuel from the core, rearrange the remaining fuel, load fresh fuel, and reinsert prior burned assemblies from the spent fuel pool. Using a right click on the mouse, groups of symmetric assemblies can be rotated 90, 180 or 270 degrees, core locations may be darkened where an assembly has been moved, BPRs and WABAs may be removed from once burned assemblies, and the assembly fuel type can be changed from one cycle to the next. The BWR version is currently Quarter Core, but can be expanded to Full Core. (continued on page 2)

MICROBURN-B2 to RETRAN-3D Linking Code

Donald Hines

URA has developed a linking code to pass data from MICROBURN-B2 to RETRAN-3D for PPL to facilitate both one-dimensional and three-dimensional transient analysis of Susquehanna. The main purpose of this linking code is to transfer the necessary data so that at the onset of a transient, RETRAN-3D is modeling the same core with the same power distribution and feedback characteristics as MICROBURN-B2.

For three-dimensional analysis, the linking code passes core layout and thermal-hydraulic data in the form of the RETRAN-3D's CORETRAN Data Interface (CDI) file while actual cross-sections are provided in RETRAN-3D's binary Tape 68 file. The binary cross-section file is prepared directly from MICROBURN-B2 fuel type library data and represents the state point of interest with all the required perturbation necessary to analyze plant transients.

One-dimensional analysis requires collapse of the core's thermal-hydraulic and cross-section from MICROBURN-B2 data to one channel. While collapsing is rather straight forward, inaccuracy in blended cross-sections can normally result in poor axial power distributions. Our linking code cross-section preparation methodology overcomes this potential shortcoming. For more information on this service, contact ddhines@urac.com.

CPW for SIMULATE-3

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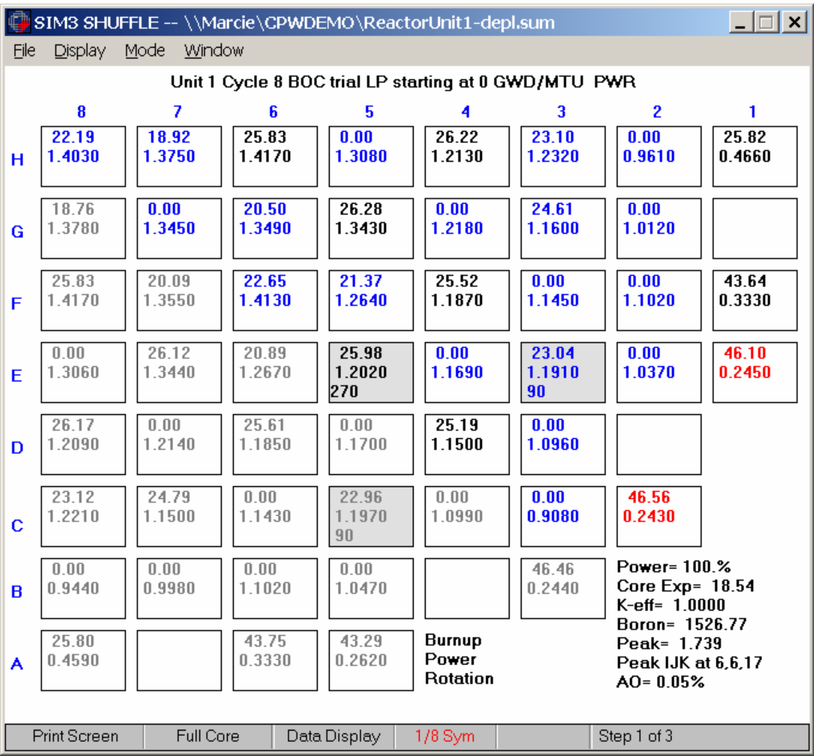
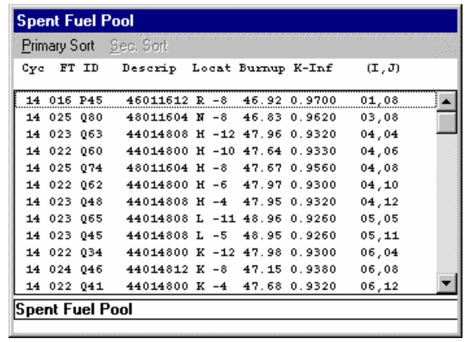
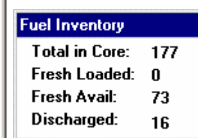
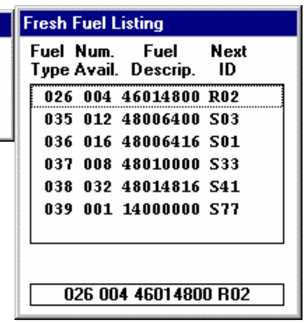
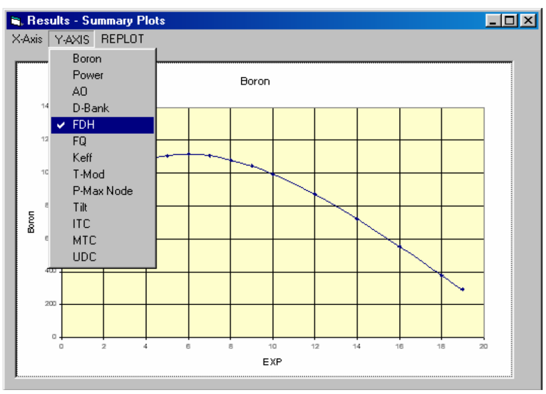




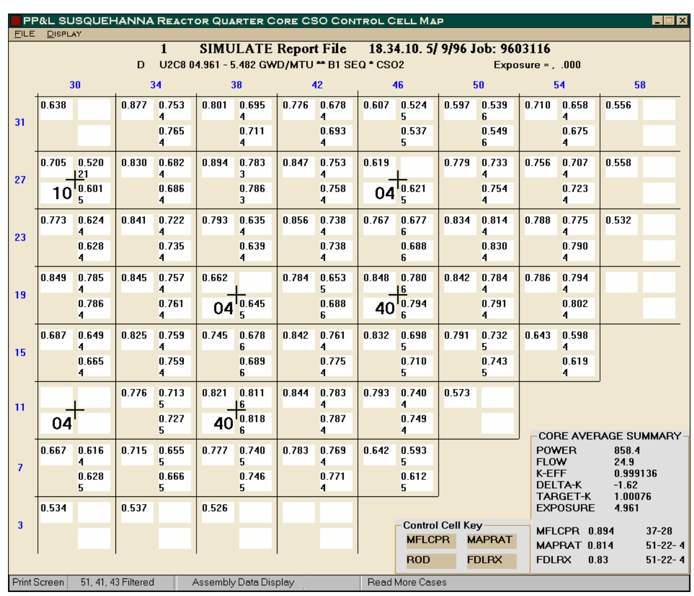




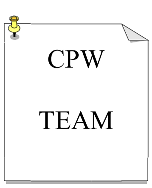


In both PWR and BWR versions, the core design engineer can swap assembly locations in the core or "drag and drop" assemblies and their modeling data from the Spent Fuel Pool or Fresh Fuel locations to the core. A Fuel Inventory summary is displayed to keep a running tabulation of the number of assemblies in each location.

Clicking on the EXCEL command button loads data and graphs into a new or existing worksheet. For more information on this service, contact ko'sullivan@urac.com.



Quarter core BWR display showing control cells with rod position and thermal limits.



Technical Assessments

Rod Grow

URA has a long history of providing utility company fuel organizations independent assessments of their analysis or the analysis performed for them by their fuel supplier. The scope of the technical assessments may range from a specific reload campaign to a broader analysis methodology review. We have the ability and resources for multi-discipline technical assessments pertaining to new fuel designs, new fuel management strategies, or new analysis methodology. Our familiarity with all US fuel vendor reload design and safety evaluation methodologies, plus our hands-on experience with BWR and PWR fuel designs provides a solid foundation for these consulting services.

Technical assessments have been performed in the following areas:

- Reload Design Process
- Analysis of Industry Problems such as AOA, Shutdown Margin and Reactivity Insertion Analysis
- Multi-Cycle Fuel Management Plans
- Vendor Reload Core
- Independent Analysis Methodology

Several Operating Companies have decided over the past two years to reduce their commitment to applying their approved RSE methodology, opting instead to use more resources from the fuel vendor. This current trend has the utility staff focusing on the reload design and the fuel vendor performing the reload safety evaluations. URA's technical assessment process helps assure that the objectives of both are being met with consideration to margins and while maintaining adequate safety of the reload.

For more than 15 years, URA has provided independent technical assessments with the Licensee's QA and/or reload design engineers to raise the bar in this dialogue with the fuel vendor. URA uses either a one person or a two-person team at the vendor site over a 3 to 5 day period.

URA submits a written report to the Licensee that is a technical evaluation and assessment of the critical aspects of the core design and reload safety analysis. This is done during the time the Reload Licensing Report is to be transmitted to the utility, and may cover:

- Vendor Reload Design and Safety Analysis Process
- Methodology (Procedures, Codes and Versions)
- Examination of Design Record Files
- Behavior of Physics Parameters
- Core Performance vs. Expectations
- Cycle specific event analysis versus bounding values
- Current Industry Problem Evaluation
- Risk Assessment

Additional attention is given to the changes and revisions since the previous cycle design process because processes that have changed are more prone to error than those that have not changed.

To facilitate these evaluations URA has signed three-party proprietary agreements with the fuel vendors and utilities.

A utility engineer familiar with plant data and fuel requirements usually accompanies the URA team during an inspection. This person can then verify plant data, contact plant engineers to resolve data questions, and learn the inspection process for future cycles. For more information on this service, contact rlgrow@urac.com.

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Welcome Kurt

In June 2002 URA welcomed the return of Kurt Weidenhammer to the URA staff. Kurt was a URA associate from 1991 to 1997 before joining Northern States Power Company in Minneapolis. Kurt is a 1984 graduate of Rensselaer Polytechnic Institute and brings with him eighteen years of nuclear engineering and project management experience in nuclear fuel management, reactor physics, safety analysis, methods development, and QA records management. This experience has been acquired through employment in all areas of the nuclear power industry supporting both BWR and PWR technologies.

Prior to returning to URA Kurt was the project manager responsible for the reactor physics and safety analysis methods development for the Nuclear Management Company (NMC) which operates the Duane Arnold, Kewaunee, Monticello, Palisades, Prairie Island, and Point Beach nuclear power plants. Kurt was also the project manager for the service agreement between the NMC and Nebraska Public Power District (NPPD) to provide technical services in the areas of reactor physics, safety analysis, methods development, and fuel management in support of Cooper Nuclear Station.

Readers involved in the BWR nuclear analysis industry will know Kurt from his industry involvement in the BWR Owner's Group Reload Analysis and Core Management Committee (RACMC). Kurt was also a Steering Committee representative to the BWR Owner's Group committee to address problematic issues associated with the existing stability detect and suppress methodology. Those who attended the 10th International RETRAN conference will know Kurt from his presentation of his EPRI invited paper "The Importance of Vendor Independent Analysis Methods".

Kurt will be working out of the Midwest office of URA located in downtown Minneapolis. He can be reached at 612.664.0061 or kaweidenhammer@urac.com.