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February 9, 2012 BW-JAH-2012-279

U.S. Nuclear Regulatory Commission
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Washington, DC 20555-0001

Babcock & Wilcox Nuclear Energy, Inc.
Docket Number-PROJ0776
Project Number-776

Subject: Voluntary Response to NRC Regulatory Issue Summary (RIS) 2011-02, Revision 1, "Licensing Submittal Information and Design Development Activities for Small Modular Reactor Designs," dated December 27, 2011

Attached please find the Babcock & Wilcox Nuclear Energy, Inc. (B&W NE) response to the subject RIS. This response to RIS 2011-02, Revision 1, updates information previously provided to the NRC in our letter BW-JAH-2011-245 dated March 25, 2011.

B&W NE continues to advance the B&W mPower™ Reactor design with Bechtel Power Corporation's support under the Generation mPower LLC. Based on our current project schedule, a Design Certification Application (DCA) for the B&W mPower Reactor design is planned for submittal in the fourth quarter of calendar year (CY) 2013.

The Generation mPower LLC is continuing to support the Tennessee Valley Authority's (TVA's) plans to submit a Construction Permit Application (CPA) for mPower Reactor modules at the Clinch River site in Roane County, Tennessee. Further information regarding this project will be provided in TVA's response to the subject RIS.

Questions concerning this submittal may be directed to Jeff Halfinger at 434-316-7507 (email: jahalfinger@babcock.com) or Peter Hastings at 704-625-4978 (email: pshastings@generationmpower.com).

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VP, Technology Development
B&W NE

JAH/jlr

D104
NRO

Attachments:
1: B&W NE Response to NRC RIS 2011-02, Revision 1
2: List of Planned Technical and Topical Report Submittals

cc: w/Attachments
Joelle L. Starefos, NRC, TWFN 9-F-27
Joseph F. Williams, NRC, TWFN 6-E-4
Stewart L. Magruder, Jr., NRC, TWFN 9-F-27

Attachment 1

B&W NE RESPONSE TO NRC RIS 2011-02 Revision 1

Design and Licensing Submittal Information

- **When (month and year) are applications planned for design-related applications and what NRC action will be requested (i.e., DC, DA, ML, or COL that does not reference a DC or DA)?**

  B&W NE intends to submit a Design Certification Application (DCA) for the mPower™ Reactor design to the NRC in the fourth quarter of calendar year (CY) 2013.

- **Will the applicants be organized into DCWGs? If known, what is the membership of the DCWG and which party is the primary point-of-contact designated for each DCWG? Have protocols been developed to provide coordinated responses for RAIs with generic applicability to a design center?**

  A formal Design Centered Working Group (DCWG) has not yet been established. However, TVA's Construction Permit Application (CPA) is expected to be the lead site-specific license application for the standard Generation mPower design. TVA and Generation mPower are working closely together to integrate the CPA, DCA and Operating License Application (OLA) activities. Protocols are being developed to ensure that coordinated responses will be provided for RAIs with generic applicability to the design center in the future and to maintain configuration management among the applications. Both TVA and Generation mPower believe that this approach is consistent with the intent of the DCWG process, with TVA being the lead applicant. As additional customers are identified, a DCWG will be established.

  In addition, a number of electric utility companies have expressed interest in the mPower Reactor design and the design certification process. They have been continuing to participate with B&W NE and Generation mPower in the review of design development activities via an Industry Advisory Council. Also, certain utilities, including TVA, First Energy Corporation, and 12 regional generation and transmission companies, represented by the Oglethorpe Power Corporation, have formed a consortium with B&W NE to support the design certification effort. Within the framework of both the Consortium and the Industry Advisory Council, we have formed several working groups to provide a mechanism to solicit and incorporate the "end user's perspective" during the design phase of the mPower Reactor development program. We anticipate that members of the above groups and other utilities will evolve into an mPower Reactor DCWG at some point in the future.

- **Which applicant that references the design will be designated as the reference COL applicant or, alternatively, how will various applications (e.g., CP, DC, COL) be coordinated to achieve the desired design-centered licensing review approach?**

  TVA has communicated to the NRC that it plans, as the lead site-specific applicant for the mPower Reactor design, to submit a CPA for mPower modules to be built at the Clinch River site in Roane County, Tennessee. Furthermore, as emphasized during the recent Regulatory Framework Document meetings with the NRC staff, TVA is committed to standardization and expects that a future Operating Licensing stage Final Safety Analysis Report could serve as a template for a reference mPower COL applicant in the future. B&W NE also shares that commitment to standardization for future applications referencing the mPower design under 10 CFR Part 52.

- **When (month and year) will CP, COL, or ESP applications be submitted for review? In addition, what are the design, site location, and number of units at each site.**

  As indicated in previous correspondence with the NRC, TVA has shared information on its plans to submit a CPA to the NRC. TVA will separately update that information in its response to this RIS.

- **Are vendors or consultants assisting in the preparation of the application(s)? If so, please describe roles and responsibilities for the design and licensing activities.**

  The following companies are supporting the design and licensing activities associated with the mPower Reactor Design:

  Bechtel Power Corporation - Balance of Plant Design in accordance with the Generation mPower LLC alliance. (Note that Bechtel is also supporting the TVA CPA effort.);

  Northrop Grumman - Instrumentation & Control design integration, software quality assurance;

  Stern Laboratories, Inc - Critical Heat Flux Testing;

  Maracor Software & Engineering Inc. - Probabilistic Risk Assessment Activities.

Design, Testing, and Application Preparation

- **What is the current status of the development of the plant design (i.e., conceptual, preliminary, or finalizing)? Has the applicant established a schedule for completing the design? If so, please describe the schedule.**

  The conceptual design for the B&W mPower design is complete. Preliminary design development is continuing in parallel with development of the DCA and appropriate design information will be developed to support both the DCA and the TVA CPA for the Clinch River site. The schedule for completing the design has been incorporated in the project master schedule and reflects the submittal of the DCA in the fourth quarter of calendar year (CY) 2013 as noted above.

- **What is the applicant's current status (i.e., planning, in progress, or complete) for the qualification of fuel and other major systems and components? Has the applicant established a schedule for completing the qualification testing? If so, please describe the schedule.**

  The following are the planned testing programs to support the DCA:

  Control Rod Drive Mechanism Testing;
  Critical Heat Flux Correlation Testing;
  Fuel Mechanical Design Separate Effects Testing;
  Integrated CRDM/Fuel Testing;
  Scaled Integrated Systems Testing;
  Reactor Coolant Pump Testing;
  Emergency Condenser Testing.

  Some of these test programs began last year and have been described in earlier B&W NE technical and topical report submittals to the NRC. In addition, planned testing programs have been discussed in detail in several meetings with NRC staff. Additional qualification test program information and schedule updates will be shared with NRC staff in future meetings and in subsequent communications.

- **What is the applicant's status (i.e., planning, in progress, or complete) in developing computer codes and models to perform design and licensing analyses? Has the applicant defined principal design criteria, licensing-basis events, and other fundamental design/licensing relationships? Has the applicant established a schedule for completing the design and licensing analyses? If so, please describe the schedule.**

  B&W NE plans to utilize computer codes such as CASMO/Simulate and FRAPCON for the reactor and fuel analyses. In addition, industry standard computer codes such as GOTHIC and RELAP will be used, as appropriate. Principal design criteria, licensing basis events, and (as appropriate) other fundamental design/licensing relationships are being identified during the ongoing design work and preparation of the DCA. Additional details regarding our planned safety analysis were included in our technical report submittal dated November, 2011, entitled, "Safety Analysis Evaluation Methodology

Requirements for the B&W mPower™ Reactor". The schedule for completing the design and licensing analyses has been incorporated in the project master schedule.

- **What is the applicant's status in designing, constructing, and using thermal-fluidic testing facilities and in using such tests to validate computer models? Has the applicant established a schedule for the construction of testing facilities? If so, please describe the schedule. Has the applicant established a schedule for completing the thermal-fluidic testing? If so, please describe the schedule.**

  An integrated systems test facility has been constructed near Lynchburg, VA, and an existing vendor testing facility at Stern Laboratories, Inc., located in Ontario, Canada, is being utilized for critical heat flux (CHF) testing. The CHF testing began in 2011 and integrated systems testing is beginning this year. The planned integrated systems testing will be used (as needed) to validate the results of certain computer models for the B&W mPower Reactor.

- **What is the applicant's status in defining system and component suppliers (including fuel), manufacturing processes, and other major factors that could influence design decisions? Has the applicant established a schedule for identifying suppliers and key contractors? If so, please describe the schedule.**

  Major primary system components (e.g., integral reactor vessel, steam generator, reactor internals including control rods and drives) will be provided from within the B&W family of companies. It is expected that the reactor coolant pumps, the turbine-generator, and an integrated instrumentation and control (I&C) system will be supplied by external entities. Additional information about suppliers and contractors will be provided in the future.

- **What is the applicant's status in the development and implementation of a quality assurance program?**

  The B&W NE Quality Assurance Program Topical Report (08-00000320-000-A, Rev. 2, "Quality Assurance Program for the Design Certification of the B&W mPower Reactor") dated January 31, 2011 has been approved by the NRC and is being implemented.

- **What is the applicant's status in the development of probabilistic risk assessment models needed to support applications (e.g., needed for Chapter 19 of safety analysis reports or needed to support risk-informed licensing approaches)? What are the applicants' plans for using the PRA models in the development of the design? At what level will the PRA be prepared and when will it be submitted in the application process?**

  B&W NE is preparing both a Level 1 and Level 2 PRA for the mPower Reactor design and is expected to be available to the NRC staff at time of DCA submittal. B&W NE intends to inform the design by using the PRA to identify and subsequently minimize defense in depth vulnerability. The PRA is also being used to identify any significant contributors to risk in the mPower Reactor design and institute design changes to minimize or eliminate that contribution.

- **What is the applicant's status in the development, construction, and use of a control room simulator?**

  B&W NE plans to design and construct a training simulator for the mPower Reactor. The simulator development strategy and integration into the HFE design process will be provided at a later date.

- **What are the applicant's current staffing levels (e.g., full-time equivalent staff) for the design and testing of the reactor design? Does the applicant have plans to increase staffing? If so, please describe future staffing plans.**

  Currently the total staffing level for B&W NE and Bechtel is approximately 280 full time equivalents (FTEs) with a planned increase of about 70 FTEs during this calendar year.

- **What are the applicant's plans on the submittal of white papers or technical/topical reports related to the features of their design or the resolution of policy or technical issues? Has the applicant established a schedule for submitting such reports? If so, please describe the schedule.**

  Please refer to Attachment 2.

- **Will ESP applicants seek approval of either "proposed major features of the emergency plans" in accordance with 10 CFR 52.17(b)(2)(i) or "proposed complete and integrated emergency plans" in accordance with 10 CFR 52.17(b)(2)(ii)?**

  To date, no prospective applicant has indicated a plan to submit an ESP.

- **Describe the possible interest in the use of the provisions of Subpart F, "Manufacturing Licenses," of 10 CFR Part 52 instead of, or in combination with, other licensing approaches (e.g. DC or DA).**

  B&W NE does not plan to pursue a manufacturing license for the mPower Reactor at this time.

- **Describe the desired scope of a possible ML and what design or licensing process would address the remainder of the proposed nuclear power plant. For example, would the ML address an essentially complete plant or would it be limited to the primary coolant system that basically comprises the integral reactor vessel and internals.**

  As noted above, B&W NE does not plan to pursue a manufacturing license for the mPower Reactor at this time.

- **Describe the expected combination of manufacturing, fabrication, and site construction that results in a completed operational nuclear power plant. For example, what systems, structures, and components are being fabricated and delivered? Which of these are being assembled on site? Which of these are being constructed on site?**

  Details on the information related to this question will be provided at a later date.

Attachment 2

PLANNED PRE-APPLICATION TECHNICAL/TOPICAL REPORT SUBMITTALS TO THE NRC
As of February, 2012

TOPIC	Planned SUBMITTAL DATE	CATEGORY
B&W mPower Software Development Program Summary Report	First Quarter 2012	Technical
Operating Experience Review Plan	Second Quarter 2012	Technical
Function Allocation and Requirements Analysis Methodology	Second Quarter 2012	Technical
HFE Program Management Plan Phase 1	Second Quarter 2012	Technical
Source Term and Dose Calculations	Second Quarter 2012	Technical
GSI-191 Discussion Paper	Second Quarter 2012	White Paper
Core Nuclear Design Supplement	Second Quarter 2012	Topical
Control Rod Drive Mechanism Design and Development (Rev 1)	Second Quarter 2012	Technical
Probabilistic Risk Analysis and Human Reliability Analysis Methodology	Third Quarter 2012	Topical
HFE Integration of HRA Report	Third Quarter 2012	Technical
Task Analysis and Design Assessment	Third Quarter 2012	Technical
Human Factor Engineering Verification and Validation Plan	Third Quarter 2012	Technical
DAC Plan for mPower DCA	Third Quarter 2012	White Paper
mPower Reactor Design Overview Report (Rev. 1)	Third Quarter 2012	Technical
IST Report (Initial Testing Results) – Rev. 2	Fourth Quarter 2012	Technical
Plan for Administrative Exemptions from Regulations for mPower Reactor DCA	Fourth Quarter 2012	White Paper
ECCS Design	Fourth Quarter 2012	Technical
Physical Security Design	First Quarter 2013	Technical
ASME Code Applicability to mPower Design	First Quarter 2013	Technical
Core Thermal-Hydraulic Analysis Methodology (VIPRE)	First Quarter 2013	Topical
Human System Interface Design Program	First Quarter 2013	Technical
Procedure Development Guidelines	Second Quarter 2013	Technical

TOPIC	Planned SUBMITTAL DATE	CATEGORY
Training Program Development Guidelines	Second Quarter 2013	Technical
LOCA Accident Analysis Methodology	Second Quarter 2013	Topical
Core Operating Limits Methodology	Second Quarter 2013	Topical
Pressure-Temperature Limits Methodology	Second Quarter 2013	Topical
FOAK Testing Proposals for mPower Reactor	Second Quarter 2013	Technical
HFE Design Implementation Program Plan	Third Quarter 2013	Technical
Operations Staffing for mPower Design	Third Quarter 2013	White Paper
Containment Accident Analysis Methodology	Third Quarter 2013	Technical
HFE Lifecycle Management Program Plan	Third Quarter 2013	Technical
Digital I&C Platform	Third Quarter 2013	Technical
I&C System Defense-in-Depth and Diversity	Third Quarter 2013	Topical
Fuel Performance Analytical Methodology	Third Quarter 2013	Topical
Non-LOCA Accident Analysis Methodology	Third Quarter 2013	Topical
Fuel Assembly Mechanical Design Criteria	Third Quarter 2013	Topical
Critical Heat Flux Test and Correlation (Results)	Third Quarter 2013	Topical
Cyber Security Program	Fourth Quarter 2013	Technical
I&C Software Quality Assurance and Program Plan (Digital Safety Systems)	Fourth Quarter 2013	Topical
Emergency Condenser Test Plan Report	Fourth Quarter 2013	Topical
Integrated Systems Test (Results)	First Quarter 2014	Topical
Emergency Condenser Test Report	Fourth Quarter 2014	Technical