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Our ref: LTR-NRC-03-55

Attn: J. S. Wermiel, Chief
Reactor Systems Branch
Division of Systems Safety and Analysis

September 9, 2003

References: 1. Fax dated June 31, 2003 from Mr. B. Benney (NRC) to Mr. R. Sisk (Westinghouse); subject – "PARAGON formal RAI's, TAC #MB8040, WCAP-16045"
2. WCAP-16045-P, "Qualification of the Two-Dimensional Transport Code PARAGON" (Proprietary)

Subject: Response to Request for Additional Information Regarding WCAP-16045-P "Qualification of the Two-Dimensional Transport Code PARAGON" (Proprietary)

Dear Mr. Wermiel:

Enclosed are copies of Westinghouse Electric Company LLC (Westinghouse) responses to the Nuclear Regulatory Commission (NRC) Request for Additional Information (RAI), Reference 1, regarding WCAP-16045-P "Qualification of the Two-Dimensional Transport Code PARAGON," Reference 2. This information is being submitted by Westinghouse Electric Company LLC to obtain Nuclear Regulatory Commission (NRC) generic approval of PARAGON, a new Westinghouse neutron transport code. Generic NRC approval is also requested for the use of PARAGON with Westinghouse's nuclear design code system or as a stand-alone code.

Also enclosed are:

1. One (1) copy of the Application for Withholding, AW-03-1700 with Proprietary Information Notice and Copyright Notice.
2. One (1) copy of Affidavit AW-03-1700.

This submittal contains proprietary information of Westinghouse Electric Company LLC. In conformance with the requirements of 10 CFR Section 2.790, as amended, of the Commission's regulations, we are enclosing with this submittal an Application for Withholding from Public Disclosure and an affidavit. The affidavit sets forth the basis on which the information identified as proprietary may be withheld from public disclosure by the Commission.

This material is for your internal use only and may be used solely for the purpose for which it is submitted. It should not be otherwise used, disclosed, duplicated, or disseminated, in whole or in part, to any other person or organization outside the Office of Nuclear Reactor Regulation without the expressed prior written approval of Westinghouse.

Correspondence with respect to this affidavit or Application for Withholding should reference AW-03-1700 and should be addressed to H. A. Sepp, Manager of Regulatory Compliance and Plant Licensing, Westinghouse Electric Company, P. O. Box 355, Pittsburgh, Pennsylvania 15230-0355.

Very truly yours,

Brad F. Maurer, Acting Manager
Regulatory Compliance and Plant Licensing

Enclosures

cc: F. Akstulewicz/NRR
B. Benney/NRR
U. Shoop/NRR
S. L. Wu/NRR
D. Holland/NRR
E. Peyton/NRR

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September 9, 2003

APPLICATION FOR WITHHOLDING PROPRIETARY
INFORMATION FROM PUBLIC DISCLOSURE

Subject: Response to Request for Additional Information Regarding WCAP-16045-P, "Qualification of the Two-Dimensional Transport Code PARAGON" (Proprietary)

Reference: Letter from B. F. Maurer to J. S. Wermiel, LTR-NRC-03-55, dated September 9, 2003

The Application for Withholding is submitted by Westinghouse Electric Company LLC (Westinghouse), pursuant to the provisions of Paragraph (b)(1) of Section 2.790 of the Commission's regulations. It contains commercial strategic information proprietary to Westinghouse and customarily held in confidence.

The proprietary material for which withholding is being requested is identified in the proprietary version of the enclosure to the referenced letter. In conformance with 10 CFR Section 2.790, Affidavit AW-03-1700 accompanies this Application for Withholding, setting forth the basis on which the identified proprietary information may be withheld from public disclosure.

Accordingly, it is respectfully requested that the subject information which is proprietary to Westinghouse be withheld from public disclosure in accordance with 10 CFR Section 2.790 of the Commission's regulations.

Correspondence with respect to this Application for Withholding or the accompanying affidavit should reference AW-03-1700 and should be addressed to H. A. Sepp, Manager of Regulatory Compliance and Plant Licensing, Westinghouse Electric Company, P. O. Box 355, Pittsburgh, Pennsylvania 15230-0355.

Very truly yours,

Brad F. Maurer, Acting Manager
Regulatory Compliance and Plant Licensing

Enclosures

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

ss

COUNTY OF ALLEGHENY:

Before me, the undersigned authority, personally appeared James W. Winters, who, being by me duly sworn according to law, deposes and says that he is authorized to execute this Affidavit on behalf of Westinghouse Electric Company LLC ("Westinghouse"), and that the averments of fact set forth in this Affidavit are true and correct to the best of his knowledge, information, and belief:

James W. Winters, Manager
Project Engineering and Integration

Sworn to and subscribed
before me this 9th day
of September, 2003

Sharon L. Fiori
Notary Public

SHARON L. FIORI
COMMONWEALTH OF PENNSYLVANIA
NOTARY PUBLIC

Notarial Seal
Sharon L. Fiori, Notary Public
Monroeville Boro, Allegheny County
My Commission Expires January 29, 2007
Member, Pennsylvania Association Of Notaries

(1) I am Manager, Project Engineering and Integration, in Nuclear Plant Programs, Westinghouse Electric Company LLC ("Westinghouse"), and as such, I have been specifically delegated the function of reviewing the proprietary information sought to be withheld from public disclosure in connection with nuclear power plant licensing and rule making proceedings, and am authorized to apply for its withholding on behalf of the Westinghouse Electric Company LLC.

(2) I am making this Affidavit in conformance with the provisions of 10 CFR Section 2.790 of the Commission's regulations and in conjunction with the Westinghouse application for withholding accompanying this Affidavit.

(3) I have personal knowledge of the criteria and procedures utilized by the Westinghouse Electric Company LLC in designating information as a trade secret, privileged or as confidential commercial or financial information.

(4) Pursuant to the provisions of paragraph (b)(4) of Section 2.790 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld.

(i) The information sought to be withheld from public disclosure is owned and has been held in confidence by Westinghouse.

(ii) The information is of a type customarily held in confidence by Westinghouse and not customarily disclosed to the public. Westinghouse has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and whether to hold certain types of information in confidence. The application of that system and the substance of that system constitutes Westinghouse policy and provides the rational basis required.

Under that system, information is held in confidence if it falls in one or more of several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:

(a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of

Westinghouse's competitors without license from Westinghouse constitutes a competitive economic advantage over other companies.

(b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage, e.g., by optimization or improved marketability.

(c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.

(d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of Westinghouse, its customers or suppliers.

(e) It reveals aspects of past, present, or future Westinghouse or customer funded development plans and programs of potential commercial value to Westinghouse.

(f) It contains patentable ideas, for which patent protection may be desirable.

There are sound policy reasons behind the Westinghouse system which include the following:

(a) The use of such information by Westinghouse gives Westinghouse a competitive advantage over its competitors. It is, therefore, withheld from disclosure to protect the Westinghouse competitive position.

(b) It is information that is marketable in many ways. The extent to which such information is available to competitors diminishes the Westinghouse ability to sell products and services involving the use of the information.

(c) Use by our competitor would put Westinghouse at a competitive disadvantage by reducing his expenditure of resources at our expense.

(d) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components of proprietary information, any one component may be the key to the entire puzzle, thereby depriving Westinghouse of a competitive advantage.

(e) Unrestricted disclosure would jeopardize the position of prominence of Westinghouse in the world market, and thereby give a market advantage to the competition of those countries.

(f) The Westinghouse capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.

(iii) The information is being transmitted to the Commission in confidence and, under the provisions of 10 CFR Section 2.790, it is to be received in confidence by the Commission.

(iv) The information sought to be protected is not available in public sources or available information has not been previously employed in the same original manner or method to the best of our knowledge and belief.

(v) The proprietary information sought to be withheld in this submittal is that which is appropriately marked as "Responses to PARAGON RAIs," being transmitted by Westinghouse Electric Company letter (LTR-NRC-03-55) and Application for Withholding Proprietary Information from Public Disclosure, to the Document Control Desk, Attention Mr. J. S. Wermiel. The proprietary information as submitted by Westinghouse is that associated with Westinghouse's request for NRC approval of PARAGON.

This information is part of that which will enable Westinghouse to:

(a) Obtain NRC approval of the Two-Dimensional Transport Code PARAGON.

(b) Promote convergence between Westinghouse organizations.

(c) Assist our customer in obtaining enhanced nuclear design input data for fuel reload analysis.

Further this information has substantial commercial value as follows:

(a) Westinghouse plans to sell the use of this information to its customers for purposes of developing nuclear design input data into the Westinghouse nuclear design code system or as a stand-along code.

(b) Westinghouse can sell support for PARAGON.

(c) The information requested to be withheld reveals the distinguishing aspects of a design developed by Westinghouse.

Public disclosure of this proprietary information is likely to cause substantial harm to the competitive position of Westinghouse because it would enhance the ability of competitors to provide similar manufacturing processes and licensing defense services for commercial power reactors without commensurate expenses. Also, public disclosure of the information would enable others to use the information to meet NRC requirements for licensing documentation without purchasing the right to use the information.

The development of the technology described in part by the information is the result of applying the results of many years of experience in an intensive Westinghouse effort and the expenditure of a considerable sum of money.

In order for competitors of Westinghouse to duplicate this information, similar technical programs would have to be performed and a significant manpower effort, having the requisite talent and experience, would have to be expended.

Further the deponent sayeth not.

PROPRIETARY INFORMATION NOTICE

Transmitted herewith are proprietary and/or non-proprietary versions of documents furnished to the NRC in connection with requests for generic and/or plant-specific review and approval.

In order to conform to the requirements of 10 CFR 2.790 of the Commission's regulations concerning the protection of proprietary information so submitted to the NRC, the information which is proprietary in the proprietary versions is contained within brackets, and where the proprietary information has been deleted in the non-proprietary versions, only the brackets remain (the information that was contained within the brackets in the proprietary versions having been deleted). The justification for claiming the information so designated as proprietary is indicated in both versions by means of lower case letters (a) through (f) located as a superscript immediately following the brackets enclosing each item of information being identified as proprietary or in the margin opposite such information. These lower case letters refer to the types of information Westinghouse customarily holds in confidence identified in Sections (4)(ii)(a) through (4)(ii)(f) of the affidavit accompanying this transmittal pursuant to 10 CFR 2.790(b)(1).

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Responses to PARAGON RAIs

1) **On page 2-1, Sec. 2.3.1, 1st. paragraph, the 1st. sentence states that PARAGON can be "generalized" to handle multi-regions in cells..,,,..... Please provide clarification of what is meant by "generalized".**

   Response: PHOENIX-P uses the Dancoff method described in Reference 2-4 in the topical report for the resonance self-shielding calculation. PHOENIX-P assumes that only one single ring is used to model the fuel region of the pin. In PARAGON, the Dancoff method has been extended (generalized) to handle multi-regions (multi-rings) in the fuel, which is necessary to compute the radial power distribution within the pellet. The following reference (attached) provides more details on the method:

   H. Matsumoto, et al.," Verification of PARAGON for LWR Applications" ,Proc. Int. Conf. On The New Frontiers of Nuclear Technology: Reactor Physics, Safety and High Performance Computing, PHYSOR2002, 14A-01, Seoul, Korea, 2002

   PARAGON can also deplete the pellet in multi-regions. Fission product and actinide concentrations are tracked for each region in the pellet.

2) **On page 2-5, Sec. 2.3.4, last paragraph, the 1st sentence states that the user has the option to hold any region depletable or non-depletable. What is the basis for the decision?**

   Response: The PHOENIX-P lattice code did not give the user the flexibility to control which regions were depletable. Instead, for a given cell type, the depletable region was defaulted. When setting up models, the user had to define the geometry of his model so that the regions which were to be depleted corresponded to these default regions. PARAGON allows the user to specify any region as depletable or non-depletable. This provides more flexibility for modeling and editing. The basis for this decision is the complexity of the geometry and the type of information desired.

   This option is also convenient in other ways. For example, cross section generation methodologies often require a control rod or neutron detector be present in assembly calculations but that the control rod and/or neutron detector not be depleted with the assembly. This situation is easily modeled in PARAGON.

3) **On page 2-5, Sec. 2.4.1, 11. paragraph, the 2nd sentence states that the user has the option to provide temperature tables. What assurance can be provided to the staff that the appropriate table is utilized at the appropriate time?**

   Response: In standard use, the temperature data will be internally calculated by PARAGON in the same manner as is currently done in PHOENIX-P. This was the procedure used for all plant calculations shown in the topical report. It is intended that no temperature tables be directly input by the user for design or safety calculations.

The option to input temperature tables is maintained only for methods development purposes. If in some currently unforeseen situation, a specific temperature table was required to be input for a particular design calculation, that would be an extraordinary situation and would be easily recognized by the verifier as such, and would require the temperature table input to be verified in the same manner as the rest of the code input.

4) **On page 2-5, Sec. 2.4.3, 1St. paragraph, the 2nd sentence states that the user has to provide a code with the coefficients and polynomial. What assurance can be provided to the staff that the appropriate coefficients and polynomials are used at the appropriate time?**

   Response: In standard use, i.e., for design and safety calculations, this expansion data is defaulted and will not be input by the user. All the plant calculations performed in the topical report used the default expansion data.

5) **On page 3-1 and 3-2, reference is made to the Strawbridge-Barry and KRITZ high temperature critical experiments. Please provide additional as to why these experiments are still relevant since they are do not include the high enrichment and temperatures used in LWR today.**

   Response: Strawbridge-Barry critical experiments cover a wide range of parameters of interest in light water reactor (LWR) designs such as moderator to fuel volume ratio, fuel enrichment, and soluble boron concentration. These are clean critical experiments which are used throughout the industry for the qualification of the basic methodology and the associated cross-sections library.

   The KRITZ high temperature critical experiments were included to validate the predictions at higher than room temperatures. There are very few critical experiments available at these conditions.

   Numerical benchmarking with comparisons to Monte Carlo and PHOENIX-P results was used to qualify PARAGON at higher enrichments (up to 5 w/o). In addition, the plant cycles used for the qualification included fuel up to 4.95 enrichment as shown in Table 4.1 of the topical report. These plant cycles included some of the highest temperature PWR plants currently operating.

6) **On page 3-3, Section 3.2, reference is made to U02 and MOX in the Monte Carlo Assembly bench-marking. In the 2nd Paragraph it is pointed out that the largest difference is due to the MOX assembly (276 pcm). Please provide additional justification for this discrepancy.**

Response: Benchmarking of the MOX assemblies did show relatively higher discrepancy vis a vis Monte Carlo results. However, the observed deviations are deemed to be acceptable from a practical standpoint as has been shown in the qualification of the mixed oxide core shown in chapter 4.0 of the topical report.

7) **On page 3-5, Table 3-1, Please provide the expression for the mean in the second column of this table.**

Response: In Table 3-1, the mean is the arithmetic average of the predicted eigenvalues contained in a particular set. This is defined as :

$$\text{Mean} = \Sigma\ \text{keffective}_i\ /\ (\text{Number of data points})$$

The summation in the numerator is over the number of data points.

8) **On page 4-2, Section 4.2, makes reference to start-up tests. Where there any mixed cores start-up tests modeled?**

Response: Cycles 24, 25 and 26 of Plant E (specifications in Table 4.1) had both uranium and MOX fuel. Cycle 25 had MOX fuel fed in previous cycles while Cycles 24 and 26 had a mix feed of both uranium and MOX assemblies. The startup test results for cycles 25 and 26 are provided in Tables 4-2 and 4-3. The rodworth measurement results for cycle 24 are provided in Table 4-8.

9) **On page 4-3, Section 4.3, makes reference to the availability of B10 isotopic concentration But, no reason was given as to why this information was no available. Please provide this information.**

Response: B^{10} isotopic information was not available to Westinghouse for all the plants modeled in Chapter 4. The availability of this data varies from plant to plant and even from cycle to cycle for the same plant. There are currently no standard requirements in the industry for collecting this data. Rather than mix data with B^{10} depletion with that without B^{10} depletion, Westinghouse decided not to use B^{10} depletion for any of the plants. An example of the effect of B^{10} depletion is given by Figure 4-23. B^{10} depletion does not have a significant effect on EOC boron and therefore on the prediction of cycle length. The use of B^{10} depletion data would not alter the conclusion that cycle depletion is well modeled by ANC using PARAGON nuclear data.

10) **Pages 4-3 and 4-4, Section 4,3, the 2nd and last paragraph, make reference to figures 4-10 and 4-20, predicting the boron concentration in the core. In Figure 4-10, both PARAGON and PHOENIX over-predict the concentration, while in Figure 4-20, both codes under-predict the concentration. Please explain the**

effect of these predictions with respect to be conservative or non-conservative in their predictions.

Response: All the depletion calculations in Figures 4-1 through 4-23 are calculated at best estimate conditions. They are not intended to be conservative or non-conservative but are a reflection of the reactivity predictions of the Westinghouse codes with the best information available on plant conditions. If these calculations were performed during plant operation, the criteria which would be used to determine the acceptability of the measured to predicted differences would be the review criteria on reactivity in the Technical Specifications (usually 50 ppm or 500 pcm) and the acceptance criteria (1000 pcm).

11) On pages 4-4, Section 4.4, the 2nd. make reference to flux maps being folded into the right bottom core quadrant.

a) Please provide further clarification as to why this was carried out.

Response: Folding measured flux maps removes the effects of statistical variations from nominal values in fuel manufacture and operational parameters. Folding the core makes the actual core as consistent as possible to the core model. Comparison to the folded core thus gives the best estimate of the accuracy of PARAGON/ANC core model.

b) Also, it is stated in the same paragraph that flux maps were taken up to 20 GWD. Please provide technical justification as to why radial power comparisons were not made at higher burn-ups??

Response: The flux maps that were shown in the topical were primarily the result of the plant selection for the qualification. As seen in Table 4-1, a wide variety of plants were used for the qualification. These plants were chosen primarily to include most features present in current plant designs. Availability of the reliable plant measured data was another criteria for plant selection. For each of the plants included, available maps were chosen at cycle burnups close to beginning of cycle (BOC), middle of cycle (MOC), and end of cycle (EOC) conditions. There were four cycles included in the qualification with EOC burnup in the range from 19700 to 20800 MWD/MTU with assembly burnups exceeding 53,000 MWD/MTU. These represent long cycles of operation. Westinghouse believes that the EOC flux maps shown in the PARAGON topical demonstrate typical EOC performance.

12) On pages 4-4, Section 4.5, the subject of uncertainties is raised in the 1st paragraph. What uncertainties are being referred to and how are they determined??

Response: The uncertainties referred to are those used for with the current PHOENIX-P/ANC code system. Any uncertainty qualified for PHOENIX-P/ANC is applicable to PARAGON/ANC. An example of these uncertainties would be those currently used in reload analyses for Westinghouse type plants performed in accordance with the methodology presented in WCAP-9272-P-A.

13) On pages 4-5, Section 4.5, two of the tables listed on this page make reference to plant E regarding axial power profile and stuck rod analysis for MOX. Please explain?

Response: One of the plants used for qualifying PARAGON had mixed oxide (MOX) fuel (plant E). Core figures comparing radial average assembly powers and burnups for Plant E Cycle 25 were presented in Figures 4-70, 4-71, and 4-72. The axial maps presented in the topical report were selected to show representative performance. There was no specific reason that the MOX core was not included. Axial power shape comparisons between PARAGON/ANC and PHOENIX-P/ANC core models for plant E are shown in Figures 1-6 attached to this response. These axial power comparisons include BOC, MOC, and EOC for both cycles 25 and 26 of plant E. These axial power shape comparisons show excellent agreement in axial power shape between the PARAGON and PHOENIX-P based models.

The topical report provided stuck rod worth comparisons for four plants in Table 4-13. The same comparison is provided for the MOX plant, plant E, in Table 1 attached to these responses. Comparison of the stuck rod worth difference between the PARAGON and PHOENIX-P models shows a small difference (i.e. 19 pcm). However, this difference is larger than those results for the other four cores shown in Table 4-13 of the topical. The difference in the MOX core results can be attributed to an improved treatment for Pu^{240} self-shielding in PARAGON. PARAGON employs space dependent temperature and composition-based shielding factors compared to one single value in PHOENIX-P.

The stuck rod peaking factor differences (Fq, FdH, and Fz) between the PARAGON and PHOENIX-P models for plant E are very small and actually considerably smaller than those seen for the uranium models in Table 4-13 of the topical report.

To complete the rodded comparisons for the MOX plant, Table 2 shows dropped rod comparisons for plant E for the PARAGON/ANC and PHOENIX-P/ANC models. This table presents the same data for plant E as was provided in Table 4-14 for four all uranium cores. Table 2 shows very good agreement between the PARAGON and PHOENIX-P based models both for dropped rod worth and for peaking factors.

14) On pages 4-18, Table 4-15, please explain the difference between the BOC HFP and the BOC HZP values for both the ejected rod and the peaking factors. Also, were similar calculations performed for the MOX core? If so, please provide that information.

Response: Both HFP and HZP calculations are done in a similar way. Both cases start from a case with rods at their rod insertion limits (RILs) corresponding to the core power level. In both cases, a single control rod is fully withdrawn from the core with no change in feedback (i.e. both moderator and fuel temperature feedbacks are kept at their values at the start of the calculation). The control rod which causes the highest reactivity insertion and worst peaking factor is reported. The key difference between HFP and HZP calculations is in the control rod configuration at the start of the calculation. For HZP, the lead bank is full in and the next two banks are partially inserted. For HFP, the lead bank is inserted to its full power RIL condition which is about 25% of full insertion. This difference in rod insertion is the largest contributor to the large difference in the rod ejection results between HFP and HZP. The ejected rod starts from deeper insertion and therefore results in a larger worth for the HZP case. The greater numbers of rods inserted and the deep insertion at HZP also results in a worse peaking factor.

Rod ejection results for the MOX core (plant E, cycle 26) are shown in Table 3 attached to these responses. These results are comparable to the results shown in Table 4-15 for the all uranium cores and show that PARAGON and PHOENIX-P based models give essentially the same results for the rod ejection calculation at all conditions for both uranium and MOX cores.

15) On pages 4-19, Table 4-16, why were the calculation performed at 300 ppm rather than at zero ppm?

Response: To comply with technical specifications, some PWR cores are still required to make a moderator temperature coefficient measurement at a cycle lifetime when HFP critical boron is near 300 ppm. The plants compare their results to calculations performed at the same conditions. This is the type of calculation that is shown in Table 4-16.

16) On pages 4-20 through 4-42, plots are provided showing boron concentration -vs-burnup. Some plots indicate under predictions by the codes, and some plots indicate over predictions by the codes. Please explain these predictions and state which of these predictions are conservative and are non-conservative.

Response: Please see the response to question 10.

17) In the same plots stated in question 16, some of the plots demonstrate spurious peaks, especially figure 4-7 and 4-12. Please explain.

Response: Where available, the raw boron follow data was used directly for the cycle depletion figures. This data includes part-power operation. Core reactivity is higher at part power requiring higher critical boron concentrations. The measured data shown in both plots in question were measured data which included part power operational data. On both these plots, many of the "spurious" points occur together at the same burnups indicating a startup situation with the boron values decreasing as the plant increases power.

18) Please explain why there is no assembly average power distribution for plant E, the MOX core? Nor are there any core average axial power distributions for comparisons between PARAGON and PHOENIX?

Response: Incore maps for Plant E for cycles 25 and 26 are not easily obtained by Westinghouse since Westinghouse no longer supplies fuel to plant E. However, Westinghouse does have access to some maps from cycle 24 which also is a mixed core of MOX and uranium oxide fuel. A middle of cycle at-power map comparing the measured to PARAGON-predicted average powers for Plant E, cycle 24 is shown in Figure 7. The measured and predicted values for the MOX fuel are shown in bold italics in this figure. This map shows very good power predictions for both MOX and UO_2 fuel.

The core average axial power comparisons between PARAGON and PHOENIX-P based models for plant E, cycles 25 and 26 are presented in Figures 1-6 attached to these responses.

Table 1
ARI-WSR Control Rod Worth Comparison

a,b,c

Table 2
Dropped Rod Comparison

a,b,c

Table 3
Rod Ejection Comparison

a,b,c

Figure 1
Core Average Axial Power Distribution (PARAGON versus PHOENIX-P)
Plant E Cycle 25, BOC

a,b,c

Figure 2
Core Average Axial Power Distribution (PARAGON versus PHOENIX-P)
Plant E Cycle 25, MOC

a,b,c

Figure 3
Core Average Axial Power Distribution (PARAGON versus PHOENIX-P)
Plant E Cycle 25, EOC

[ ] a,b,c

Figure 4
Core Average Axial Power Distribution (PARAGON versus PHOENIX-P)
Plant E Cycle 26, BOC

a,b,c

Figure 5
Core Average Axial Power Distribution (PARAGON versus PHOENIX-P)
Plant E Cycle 26, MOC

a,b,c

Figure 6
Core Average Axial Power Distribution (PARAGON versus PHOENIX-P)
Plant E Cycle 26, EOC

a,b,c

Figure 7
Average Assembly Power Distribution: Plant E, Cycle 24, 5584 MWD/MTU

a,b,c