

PROPRIETARY



South Texas Project Electric Generating Station 4000 Avenue F – Suite A Bay City, Texas 77414

October 11, 2010
U7-C-STP-NRC-100216
10 CFR 2.390

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville MD 20852-2738

South Texas Project
Units 3 and 4
Docket Nos. 52-012 and 52-013
Response to Requests for Additional Information and Submittal of Revised Technical Report

Reference: Letter, Mark McBurnett to Document Control Desk, "Submittal of Technical Report", U7-C-STP-NRC-100136 dated June 14, 2010 (ML101670139)

Attached are responses to NRC staff questions included in Request for Additional Information (RAI) letter number 360 related to Combined License Application (COLA) Part 2, Tier 2, Section 9.1, "Fuel Storage and Handling." This letter completes the response to RAI letter number 360.

The attachments provide responses to the RAI questions listed below:

09.01.01-6	09.01.01-11
09.01.01-7	09.01.01-12
09.01.01-8	09.01.01-13
09.01.01-9	09.01.01-14
09.01.01-10	09.01.01-15

COLA changes will be incorporated in the next routine revision of the COLA following NRC acceptance of the RAI responses.

STI 32755972

DOA
NRC

Several of the RAI responses related to letter number 360 include proprietary information and required revisions to WCAP-17246, "South Texas Project Units 3 & 4 Fuel Storage Racks Criticality Safety Methodology Report," previously submitted by the referenced letter. Therefore this letter transmits proprietary and non-proprietary versions of the applicable RAI responses and proprietary and non-proprietary versions of the revised WCAP.

Please note that the proprietary information is contained in Attachments 14 through 19 and is considered to be proprietary to Westinghouse Electric Company, LLC. Attachments 12 and 13 provide Westinghouse Authorization Letters CAW-10-2974 and CAW-10-2978, accompanying affidavits, Proprietary Information Notices, and Copyright Notices. Since Attachments 14 through 19 contain information considered proprietary to Westinghouse, they are supported by affidavits signed by Westinghouse, the owner of the information. The affidavits set forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b) (4) of Section 2.390 of the Commission's regulations. Accordingly, it is respectfully requested that the information which is proprietary to Westinghouse be withheld from public disclosure in accordance with 10 CFR 2.390 of the Commission's regulations. Correspondence with respect to the copyright or proprietary aspects of the items listed above or the supporting Westinghouse Affidavit should reference CAW-10-2974 or CAW-10-2978 as appropriate and should be addressed to B. F. Maurer, Manager, ABWR Licensing, Westinghouse Electric Company LLC, P.O. Box 355, Pittsburgh, Pennsylvania 15230-0355.

Attachments 1 through 11 contain the non-proprietary versions of the RAI responses and the WCAP. When separated from the proprietary material in Attachments 14 through 19, this letter is not proprietary.

There are no commitments in this letter.

If you have any questions regarding these responses, please contact me at (361) 972-7136, or Bill Mookhoek at (361) 972-7274.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on 10/11/10



Scott Head
Manager, Regulatory Affairs
South Texas Project Units 3 & 4

jaa

Attachments:

1. RAI 09.01.01-6 Response
2. RAI 09.01.01-7 Response (non-proprietary)
3. RAI 09.01.01-8 Response (non-proprietary)
4. RAI 09.01.01-9 Response (non-proprietary)
5. RAI 09.01.01-10 Response (non-proprietary)
6. RAI 09.01.01-11 Response (non-proprietary)
7. RAI 09.01.01-12 Response
8. RAI 09.01.01-13 Response
9. RAI 09.01.01-14 Response
10. RAI 09.01.01-15 Response
11. WCAP-17246-NP, Revision 1, "South Texas Project Units 3 & 4 Fuel Storage Racks Criticality Safety Methodology Report" (non-proprietary)
12. CAW-10-2978, Affidavit for Withholding Confidential and Proprietary Information from Public Disclosure under 10 CFR 2.390
13. CAW-10-2974, Affidavit for Withholding Confidential and Proprietary Information from Public Disclosure under 10 CFR 2.390
14. WCAP-17246-P, Revision 1, "South Texas Project Units 3 & 4 Fuel Storage Racks Criticality Safety Methodology Report" (proprietary)
15. RAI 09.01.01-7 Response (proprietary)
16. RAI 09.01.01-8 Response (proprietary)
17. RAI 09.01.01-9 Response (proprietary)
18. RAI 09.01.01-10 Response (proprietary)
19. RAI 09.01.01-11 Response (proprietary)

cc: w/o attachment except*
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RAI 09.01.01-6**QUESTION:**

In response to RAI 4173 (09.01.01-3), South Texas Project provided a fuel storage racks criticality safety methodology report (WCAP-17246-P, Rev. 0). In Section 1.2 of this report, it is stated that in the new storage vault the full density water scenario bounds the low density options due to the presence of fixed poison in the storage racks. No calculations or results were presented to justify this statement. Provide justification for this statement.

RESPONSE:

In support of response to RAI 4987 Revision 3 (09.01.01-6 through 09.01.01-15) a revision to the fuel storage racks criticality safety methodology report (WCAP-17246-P, Rev. 1) is provided in Attachment 14 to this letter. In addition, several of these responses reference Topical Report CENPD-390-P-A Revision 00 which was accepted by the USNRC on July 24, 2000 (TAC No. MA5659).

The calculation results from the optimum moderation search for the New Fuel Storage Vault have been added in Section 1.2 of WCAP-17246-P, Rev. 1, to support the statement that the highest reactivity is caused by full density water.

The COLA mark-up originally provided by the response to RAI 09.01.01-3 is revised as follows to reflect the revision:

9.1.7S References

9.1-2 WCAP-17246-P, Revision 1, "South Texas Project Units 3 & 4 Fuel Storage Racks Criticality Safety Methodology Report," Westinghouse Electric Company, LLC.

RAI 09.01.01-7

QUESTION:

In response to RAI 4173 (09.01.01-3), South Texas Project provided a fuel storage racks criticality safety methodology report (WCAP-17246-P, Rev. 0). Section 2.1 discusses the code validation for SCALE 5.1.

What was the calculated uncertainty at a 95%/95% level?

RESPONSE:

The 95/95 confidence level uncertainty and methodology bias determined from the validation analysis is []^{a,c} and []^{a,c}, respectively. This information has been added to Section 2.1 of WCAP-17246-P, Rev. 1, which is being submitted as discussed in the response to RAI 09.01.01-6.

No COLA change is required as a result of this RAI response.

RAI 09.01.01-8

QUESTION:

In response to RAI 4173 (09.01.01-3), South Texas Project provided a fuel storage racks criticality safety methodology report (WCAP-17246-P, Rev. 0). Section 2.2 discusses the code validation for PHOENIX4.

What was the calculated uncertainty at a 95%/95% level?

RESPONSE:

There is no 95/95 calculated code bias and bias uncertainty reported in the PHOENIX4 and POLCA topical report (CENPD-390-P-A). Results from reactivity benchmarks indicate excellent agreement and outcome of the pin power distribution benchmarks using POLCA is sufficient and acceptable for BWR analyses.

Furthermore, PHOENIX4 was used to determine the reactivity behavior of the bundle as a function of burnup, which allows the investigation and determination of the peak reactivity in its lifetime. [

The range of reactivity misprediction in PHOENIX4 is from $\left[\quad \right]^{a,c}$ to $\left[\quad \right]^{a,c} \Delta k_{eff}$. This is significantly less than the 95% confidence interval of $\left[\quad \right]^{a,c} \Delta k_{eff}$ on the KENO validation suite. It is therefore concluded that the PHOENIX4 rack model is validated and can be used for reactivity determinations.

After the rack model is validated, depletion calculations are performed. The bundle depletion is modeled with appropriate in-core conditions and geometry. The depleted compositions are then restarted in the rack model at a range of burnups to establish the reactivity behavior of the bundle in the cold rack conditions as a function of depletion.

The results show that for all cases analyzed the beginning of life (BOL) (i.e., zero burnup) reactivity is the highest. Therefore, no burnup is considered in the criticality safety calculations.

No COLA change is required as a result of this RAI response.

RAI 09.01.01-9**QUESTION:**

In response to RAI 4173 (09.01.01-3), South Texas Project provided a fuel storage racks criticality safety methodology report (WCAP-17246-P, Rev. 0). Within this presented methodology, PHOENIX4 is used for depletion calculations of the fuel. The report references CENPD-390-P-A, Rev. 0 when describing PHOENIX4. The staff reviewed the topical report and its associated SER to assure its applicable use within the framework of the STP spent fuel pool criticality analysis.

The staff notes that within the conclusions of the SER for CENPD-390-P-A, there are four conditions concerning the acceptance of PHOENIX4. Provide discussion that demonstrates that PHOENIX4 as used in the spent fuel pool criticality analysis for the STP fuel designs meets the four conditions.

RESPONSE:

The representative fuel, []^{a,c} and meets the requirement []

[]^{a,c} Therefore, the usage of PHOENIX4 is appropriate for these criticality safety calculations.

No COLA change is required as a result of this RAI response.

RAI 09.01.01-10

QUESTION:

In response to RAI 4173 (09.01.01-3), South Texas Project provided a fuel storage racks criticality safety methodology report (WCAP-17246-P, Rev. 0). Section 2.2 discusses the code validation for PHOENIX4.

Provide additional information that describes which critical experiments and fission rate data was used in the PHOENIX4 validation for the spent fuel pool criticality analysis such that the staff can determine its applicability to the STP ABWR design.

RESPONSE:

As stated in Section 2.2 of WCAP-17246-P, Rev. 0, PHOENIX4 has been evaluated against a set of critical experiments and fission rate data to provide verification and validation of the cross section library. [

[]^{a,c}

[]^{a,c}

No COLA change is required as a result of this RAI response.

RAI 09.01.01-11

QUESTION:

In response to RAI 4173 (09.01.01-3), South Texas Project provided a fuel storage racks criticality safety methodology report (WCAP-17246-P, Rev. 0). Section 2.3 discusses the peak reactivity determination and indicates that PHOENIX4 calculations are adjusted by comparisons with KENO calculation results. It is stated that the "KENO model does not represent the fuel bundle exactly as approximations are made...".

Identify the approximations made and discuss their effect on the calculations.

RESPONSE:

WCAP-17246-P Rev.1 is being submitted as discussed in the response to RAI 09.01.01-6.

As stated in Section 2.3 of WCAP-17246-P, Rev. 0, the KENO model does not represent the fuel bundle exactly as approximations are made^{a,c}. An explanation has been added in Section 2.3 of WCAP-17246-P, Rev. 1, stating why these approximations will not impact the reactivity of the system.

^{a,c}

No COLA change is required as a result of this RAI response.

RAI 09.01.01-12

QUESTION:

Section 2.3 of the STP technical report on spent fuel pool criticality (U7-C-STP-NRC-100136) discusses the peak reactivity determination.

What are the bundle in-core conditions and geometry used for the depletion calculations?

RESPONSE:

A discussion of the geometry was provided in Section 2.3 of WCAP-17246-P, Rev. 0. In-core conditions for the depletion calculations have been added to Section 2.3 in WCAP-17246-P, Rev. 1, which is being submitted as discussed in the response to RAI 09.01.01-6.

No COLA change is required as a result of this RAI response.

RAI 09.01.01-13

QUESTION:

In response to RAI 4173 (09.01.01-3), South Texas Project provided a fuel storage racks criticality safety methodology report (WCAP-17246-P, Rev. 0). Section 3.1 discusses the assumptions used throughout the criticality safety analysis.

- a) What is the representative fuel design used in the analysis?
- b) Were any burnable absorbers analyzed as part of the analysis?
- c) Provide more description of how tolerances were modeled.

RESPONSE:

WCAP-17246-P, Rev. 1 is being submitted as discussed in RAI 09.01.01-6.

Additional information has been added to Section 3.1 of WCAP-17246-P, Rev. 1, addressing (1) the identification of the representative fuel design, (2) the burnable absorbers considered in the analysis, and (3) tolerances utilized in the analysis.

No COLA change is required as a result of this RAI response

RAI 09.01.01-14

QUESTION:

In response to RAI 4173 (09.01.01-3), South Texas Project provided a fuel storage racks criticality safety methodology report (WCAP-17246-P, Rev. 0). Section 3.2 discusses the postulated accident scenarios. It is stated that the seismic analysis bounds any reactivity caused by a reduction in intermodule spacing.

What is the reference for the spent fuel pool seismic criticality analysis?

RESPONSE:

WCAP-17246-P, Rev. 1 is being submitted as discussed in response to RAI 09.01.01-6.

The WCAP states that by modeling the spent fuel pool as infinite in the lateral directions and by not crediting any inter-module spacing, any potential conditions caused by an earthquake are covered / represented. Further, please note that Section 3.2 of WCAP-17246-P, Rev. 0, does not state that "the seismic analysis bounds any reactivity caused by a reduction in intermodule spacing." A spent fuel pool seismic criticality analysis has not been performed.

No COLA change is required as a result of this RAI response.

RAI 09.01.01-15

QUESTION:

The report submitted by STP (U7-C-STP-NRC-100136) in support of its response to RAI-9.1.1-3 provides a high-level overview of a general methodology. This is in conflict with the commitments provided by the applicant in the RAI response (U7-C-STP-NRC-100101) which stated that "a criticality analysis covering both the New Fuel Storage Racks (COL Item 9.1.6.3) and the Spent Fuel Storage Racks (COL Item 9.1.6.3) is being performed based on a baseline rack design using a representative fuel type. A report, WCAP-17246-P... will be provided by June 11, 2010 to support the NRC safety finding."

Please provide the criticality analysis as mentioned in U7-C-STP-NRC-100101. This report should include information supporting the conclusions that the requirements of 10CFR50.68 are met, such that the staff may perform a full review.

RESPONSE:

Appendix A has been added to WCAP-17246-P, Rev. 1. This appendix summarizes the results of the criticality safety analysis to demonstrate compliance with 10CFR50.68.

WCAP-17246-P Rev.1 is being submitted as discussed in the response to RAI 09.01.01-6.

No COLA change is required as a result of this RAI response.