

**Request to Withhold from Public Disclosure Under 10 CFR 2.390(a)(4) and (6)**

April 11, 2013

U. S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555-0001

Subject: **Docket Nos. 50-361 and 50-362  
Response to Request for Additional Information Regarding License  
Amendment Request for Permanent Use of AREVA Fuel  
and for Permanent Exemption to Use M5 Cladding  
(TAC Nos. ME6820, ME6821, ME6822, AND ME6823)  
San Onofre Nuclear Generating Station, Units 2 and 3**

Reference: Letter from D. Bauder (SCE) to J. Sebrosky (NRC) dated July 29, 2011;  
Subject: San Onofre Nuclear Generating Station, Units 2 and 3 Proposed  
Permanent Exemption Request and Proposed Change, Number (PCN) 600,  
Amendment Application Numbers 261 and 249, Request for Unrestricted  
Use of AREVA Fuel.

Dear Sir or Madam:

By email dated February 20, 2013, the Nuclear Regulatory Commission issued a Request for Additional Information (RAI) part 3 and an RAI part 4 regarding unrestricted use of AREVA fuel and permanent exemption to use M5 cladding (Reference). The enclosure of this submittal contains the responses to the requests for additional information.

Enclosure 2 of this submittal contains information that is proprietary to SCE or AREVA. SCE requests that this proprietary enclosure be withheld from public disclosure in accordance with 10 CFR 2.390(a)(4). Enclosure 1 provides a notarized affidavit from SCE which sets forth the basis on which the information in Enclosure 2 may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed by paragraph (b)(4) of 10 CFR 2.390. Enclosure 3 provides the non-proprietary version of Enclosure 2.

**Notice: This document is decontrolled when separated from Enclosure 2**

**Request to Withhold from Public Disclosure Under 10 CFR 2.390(a)(4) and (6)**

Document Control Desk

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April 11, 2013

There are no new regulatory commitments contained in this letter. If you have any questions or require additional information, please contact Mark Morgan, Licensing Lead, at (949) 368-6745.

Sincerely,

A handwritten signature in black ink, appearing to read 'Mark Morgan', written in a cursive style.

Enclosures:

1. Notarized Affidavit

Proprietary Enclosures

2. Response to Request for Additional Information (RAI) Part 2 regarding use of unrestricted usage of AREVA fuel and permanent exemption to use M5 cladding

Non-Proprietary Enclosures

3. Response to Request for Additional Information (RAI) Part 2 regarding use of unrestricted usage of AREVA fuel and permanent exemption to use M5 cladding

cc: A. T. Howell III, Regional Administrator, NRC Region IV  
B. Benney, NRC Project Manager, San Onofre Units 2 and 3  
R. Hall, NRC Project Manager, San Onofre Units 2 and 3  
G. G. Warnick, NRC Senior Resident Inspector, San Onofre Units 2 and 3

**Notice: This document is decontrolled when separated from Enclosure 2**

**Request to Withhold from Public Disclosure Under 10 CFR 2.390(a)(4) and (6)**

**ENCLOSURE 1**  
**NOTARIZED AFFIDAVIT**

**Notice: This document is decontrolled when separated from Enclosure 2**



- (b) The information reveals details of Westinghouse's, SCE's, and/or AREVA's research and development plans and programs, or the results of these plans and programs.
  - (c) The information includes test data or analytical techniques concerning a process, methodology, or component, the application of which results in a competitive commercial advantage for Westinghouse, SCE, and/or AREVA.
  - (d) The information reveals certain distinguishing aspects of a process, methodology, or component, the exclusive use of which provides a competitive commercial advantage for Westinghouse, SCE, and/or AREVA on product optimization or marketability.
  - (e) The unauthorized use of the information by one of Westinghouse's, SCE's, and/or AREVA's competitors would permit the offending party to significantly reduce its expenditures, in time or resources, to design, produce, or market a similar product or service.
  - (f) The information contained in the document is vital to a competitive commercial advantage held by Westinghouse, SCE, and/or AREVA, would be helpful to their competitors, and would likely cause substantial harm to the competitive position of Westinghouse, SCE, and AREVA.
6. The information contained in the document is considered proprietary and confidential for the reasons set forth in Paragraph 5. In addition, the information contained in the document is of the type customarily held in confidence by AREVA, Westinghouse, and SCE, and not made available to the public. Based on my experience in the nuclear industry, I am aware that other companies also regard the type of information contained in the document as proprietary and confidential.
7. In accordance with the Westinghouse-AREVA-SCE NDA, the document has been made available to the NRC in confidence, with the request that the information contained in this document be withheld from public disclosure. The

request for withholding the information from public disclosure is made in accordance with 10 CFR 2.390. The information qualifies for withholding from public disclosure under 10 CFR 2.390(a)(4) "Trade secrets and commercial or financial information."

8. In accordance with SCE's policies governing the protection and control of proprietary and confidential information, the information contained in the document has been made available, on a limited basis, to others outside Westinghouse, SCE and AREVA only as required in accordance with the Westinghouse-AREVA-SCE Nondisclosure Agreement.
9. SCE's policies require that proprietary and confidential information be kept in a secured file or area and distributed on a need-to-know basis. The information contained in the document has been kept in accordance with these policies.
10. The foregoing statements are true and correct to the best of my knowledge, information, and belief, and if called as a witness I would competently testify thereto. I declare under penalty of perjury under the laws of the State of California that the above is true and correct.

Executed on March 19, 2013  
Date

  
\_\_\_\_\_  
Vickram Nazareth

State of California

County of San Diego

On March 19, 2013 before me, Barbara G. Bourland, Notary Public  
(here insert name and title of the officer)

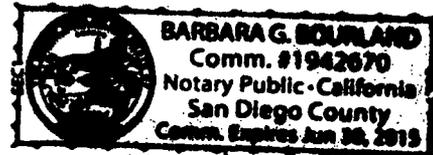
personally appeared Vickram F. Nazareth

who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature Barbara G. Bourland



(Seal)

**OPTIONAL INFORMATION**

Law does not require the information below. This information could be of great value to any person(s) relying on this document and could prevent fraudulent and/or the reattachment of this document to an unauthorized document(s)

**DESCRIPTION OF ATTACHED DOCUMENT**

Title or Type of Document: \_\_\_\_\_

Document Date: \_\_\_\_\_ Number of Pages: \_\_\_\_\_

Signer(s) if Different Than Above: \_\_\_\_\_

Other Information: \_\_\_\_\_

**CAPACITY(IES) CLAIMED BY SIGNER(S)**

Signer's Name(s): \_\_\_\_\_

- Individual
- Corporate Officer

\_\_\_\_\_  
(Title(s))

- Partner
- Attorney-in-Fact
- Trustee
- Guardian/Conservator
- Other: \_\_\_\_\_

**SIGNER IS REPRESENTING:**

Name of Person(s) or Entity(ies): \_\_\_\_\_

**ENCLOSURE 3**

**Response to Request for Additional  
Information (RAI) regarding  
use of unrestricted usage of AREVA fuel  
and permanent exemption to use  
M5 cladding (Non-Proprietary)**

SOUTHERN CALIFORNIA EDISON  
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

SET 3

SOUTHERN CALIFORNIA EDISON  
SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 2 AND 3  
PROPOSED LICENSE AMENDMENT REQUEST  
FOR UNRESTRICTED USE OF AREVA FUEL  
AND FOR PERMANENT EXEMPTION TO USE M5™ CLADDING  
DOCKET NOS. 50-361 AND 50-362  
(TAC NOS. ME6820, ME6821, ME6822, AND ME6823)

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## RAI #1

1. In Section 4.5.1.1 *Analysis of M5 Application*, the licensee states that Reference 8.24 (CEN-372-P-A) which is a CE DNB propagation methodology is applicable to the AREVA fuel with M5 clad. NRC approved the CEN-372-P-A methodology for application to CE fuel for DNB propagation resulting from cladding strain. The licensee is using CE methodology to evaluate AREVA fuel performance without NRC approval and non-conformance with AREVA requirements. The staff notes that the CE methodology should not be used to evaluate AREVA fuel performance without NRC approval. Therefore the licensee should provide a detailed justification for the use of the CE DNB methodology or alternatively provide the analysis using an approved AREVA methodology

## RESPONSE:

The NRC approved SCE reload methodology (SCE-9801-P-A), which is based on Combustion Engineering (CE) non-LOCA methodology, is the currently approved method for Westinghouse manufactured CE fuel used at SONGS. The methodology and the tools to evaluate DNB propagation are well understood and are an integral part of the NRC-approved reload methodology employed by SCE. Sections 1, 2.2, and 2.3 of Enclosure 2 to the LAR address the need for NRC approval in order to allow the use of the NRC approved SCE reload methods for evaluating DNB propagation on AREVA fuel.

The SCE method for demonstrating coolable geometry (i.e., that a coolable geometry is maintained during an event) is to verify that DNB propagation does not occur. The existing strain limit used in the DNB propagation methodology is based upon [[

]] Further details are provided in Section 4.5.1 of Enclosure 2 to the LAR.

## RAI #2

- Licensee has justified the use of CE methodology for evaluating the AREVA M5 clad fuel by quoting a portion of text from Section 4.1 of Reference 8.9 (BAW-10227P-A, Revision 0, February 2000),

*"...for DNB related events there is no consequence of a switch from Zircaloy-4 to M5, other than an improved ability to control the fuel assembly performance ....For those accident evaluations that produce cladding temperature responses that exceed the phase transition range, approximately 700 degree C, a small impact on temperature response is expected and a revised calculation with M5 specific material properties should be performed for batch licensing. The results of those calculations are not expected to differ substantially from Zircaloy-4 based calculations and no limiting criteria are expected to be challenged..... "*

This portion of text states that for those accident evaluations that produce cladding temperature responses that exceed the phase transition range, approximately 700°C (1292°F), a small impact on temperature response is expected and a revised calculation with M5 specific material properties should be performed for batch licensing.

The LAR Reference 8.10 (BAW-10240(P)-A, Revision 0, *Incorporation of M5 Properties in Framatome ANP Approved Methods, May 2004*) Section 3.3 *Non-LOCA Methodology states,*

*Reference 5 defines the approved FRA-ANP Group M SRP Chapter 15 non-LOCA evaluation methodology for PWRs. The FRA-ANP Group M approved statistical setpoint methodology is defined by References 6 and 7.*

*FRA-ANP's implementation of M5 cladding in the non-LOCA methodologies uses the approved evaluation methodologies defined in References 5, 6, and 7, but substitutes the approved M5 specific properties (Reference 1 and 2) for the Zircaloy-4 material properties when M5 clad fuel is analyzed. The implementation thus primarily addresses:*

- 1. The incorporation of the M5 cladding properties (References 1 and 2) into the RODEX2- 2A fuel performance code.*
- 2. The incorporation of M5 cladding properties (References 1 and 2) into the S-RELAP5 thermal-hydraulic system evaluation code and code input.*

*Modification of the approved methodologies beyond the use of M5 specific material properties and models is not necessary.*

References 1, 2, 5, 6, and 7 mentioned in the above text are all AREVA/FANP methodologies for M5 and AREVA fuel. The quoted text indicates that FRA-ANP's (AREVA) implementation of M5 cladding in the non-LOCA methodologies uses the approved methodologies defined in AREVA methodologies, EMF-2310(P)(A), EMF-92-081(P)(A), EMF-1961(P)(A).

Explain why the licensee has deviated from using the AREVA's approved non-LOCA methodology in evaluation of M5 clad fuel.

**RESPONSE:**

AREVA does not have a NRC approved transient analysis methodology for Combustion Engineering (CE) plants with COLSS/CPC monitoring and protection systems.

SCE will continue to use SCE non-LOCA methodology which is based on the CE non-LOCA methodology as approved by the NRC in SCE-9801-P-A. SCE has accumulated a considerable body of experience using the CE non-LOCA methodology resulting in processes and methods that are well understood. The objective of this submittal is to demonstrate that [[

]] This confirms the small impact of exceeding the phase transition temperature, and the adequacy of [[  
]]. The impact of cladding on temperature [[  
]] is discussed in Section 4.5.4.1 of Enclosure 2 to the LAR. Based on the preceding discussion, [[  
]] using the proposed SCE methodology.

**RAI #3**

3. Section 4.0 of Enclosure 2 *CHANGES TO SCE RELOAD ANALYSIS PROCESS AND METHODOLOGY* indicates that,

“The current SCE Core Thermal Hydraulic Analysis scope will be modified to the extent that [[

compliance with Technical Specification limits on DNBR.”

]] for

Section 4.2 (page 24 of 166) indicates that [[

]]

Section 7.2.3 indicates that [[

]] Please give more details (than what are given in the LAR) of this benchmarking process and specify which of the two correlations, CE-1 or BHTP, is used for the benchmarking process.

**RESPONSE:**

The response to RAI # 26 in Set 2 (transmitted on 03/19/13), discusses the CETOP-D/TORC benchmarking process.

The TORC code calculates an assembly-specific DNBR value. The TORC/CETOP-D benchmarking converts the DNBR differences between the TORC code and CETOP-D code into ratios of iterated heat fluxes at reference DNBR values. Note that the process remains unchanged for the inclusion of AREVA fuel and the BHTP CHF correlation. The TORC code accurately calculates DNBR for each fuel type using the appropriate grid loss coefficients and appropriate CHF correlation.

In a mixed-core of WEC and AREVA fuel, the following are the processes for determining the Over Power Penalties (OPP) values for CETOP-D benchmarking:

[[

]]

As noted in the preceding text above and in the response to RAI Set #2 Question 26, the whole premise of CETOP-D benchmarking lies in the fact that the iterated critical heat fluxes are used for comparison. This allows a direct comparison between AREVA and WEC assemblies' performance with regard to DNBR since the heat flux is not a property of the assembly but a property of the core as a whole. The inherent conservatism in the SONGS process is that it penalizes the entire core based on a single assembly at a very specific operating condition which may never be achieved during the cycle operation. In other words, the entire core is reduced to a single most limiting point with respect to DNBR over the entire COLSS/CPC protection range. Both fuel types are analyzed, and the single most limiting point is used to tune CETOP-D to ensure that the COLSS/CPC system (using CETOP) remains conservative to TORC at all times. This process negates the need for a mixed-core penalty.

SOUTHERN CALIFORNIA EDISON  
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

SET 4

SOUTHERN CALIFORNIA EDISON  
SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 2 AND 3  
PROPOSED LICENSE AMENDMENT REQUEST  
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## RAI #1

1. Section 4.2.1 of Enclosure 2 to SONGS PCN 600 describes the impact of the AREVA fuel design on the core thermal-hydraulic MSCU methods. This section concludes that since the engineering and systematic factor uncertainties are less for the AREVA fuel design relative to the existing Westinghouse fuel, then “the MSCU analysis for SONGS which determined the 1.31 design DNBR limit and its associated Probability Distribution Function (pdf) is bounding and conservative for AREVA fuel, for both mixed core and full AREVA core configurations.” Following approved methods, generate a specific design DNBR limit and associated pdf using AREVA fuel specifications and uncertainties for the limiting mixed core and full core configuration. The impact of differences in calculated DNBR limits and associated pdfs on COLSS/CPCS setpoint analyses (e.g., ROPM, EPOL2/4, BERRi) and predicted fuel rod failures should be discussed.

### RESPONSE:

A detailed calculation was performed to show a cycle-specific DNBR limit calculation for a mixed core of AREVA CE-HTP and CE16 fuel. This analysis calculates a cycle-specific DNBR limit of [[     ]] for AREVA CE-HTP fuel and a DNBR limit of [[     ]] for CE16 fuel. The process for mixed core and full core analysis is the same, as the TORC code models each full assembly in Stage 1, and the entire limiting assembly in Stage 2. These cycle-specific DNBR limits show that the existing 1.31 DNBR limit is highly conservative. By leaving the Technical Specification DNBR limit at 1.31, SONGS has significant DNBR margin that is not being utilized.

The plot on the following page shows the calculated Probability Distribution Function (pdf) for the Analysis of Record (AOR – which set the 1.31 DNBR limit) and the demonstration calculation cycle-specific pdf for a mixed core which calculated pdfs for both CE16 and AREVA CE-HTP fuel. This plot shows significant margin available with cycle-specific DNBR limit approach.

This LAR is not requesting a change to the existing DNBR limit (i.e., not taking advantage of this extra DNBR margin). The purpose of this license amendment request is to provide SONGS a viable alternative fuel design to eliminate grid-to-rod fretting fuel failures at SONGS. [[

]]

Since SCE has decided to not change the existing 1.31 DNBR limit, there is no impact on COLSS/CPC setpoint analyses (e.g., ROPM, EPOL2/4, BERR) from the existing methodology.

[[Figure RAI #1-1  
Probability Distribution Functions for AOR, CE-1 and BHTP

]]

## RAI #2

2. Section 4.8.1.2 of Enclosure 2 to SONGS PCN 600 states that the impact of the new AREVA CHF is limited to the TORC code and that the CETOP-D code and on-line algorithms will not be modified.
  - a. Provide tables of  $CETOP-D_{(CE-1)}$  to  $TORC_{(CE-1, BHTP)}$  correction factors as a function of AXP, temperature, pressure and flow for the COLSS narrow range, CPCS wide range, and transient analysis range of operating conditions. Include a discussion of the impact of mixed core and full core configurations on these correction factors. Also, discuss any interpolation or extrapolation of these values within the reload methods.

### RESPONSE:

A detailed calculation was performed to see how the BHTP correlation performed in comparison to CE-1 over the range of operating parameters protected by COLSS/CPC. Plots of the results are provided on the following pages.

These plots show [[

]]

CETOP-D/TORC benchmarking is performed over the full range covered by COLSS/CPC, no interpolation or extrapolation is necessary.

[[Figure RAI #2-1

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[[Figure RAI #2-2

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[[Figure RAI #2-3

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[[Figure RAI #2-4

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[[Figure RAI #2-5

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- b. To demonstrate the conservatism of the proposed approach, perform a sample COLSS/CPCS MSCU evaluation using a modified CETOP-D code with the AREVA BHTP CHF correlation (along with associated DNBR pdfs and CETOP-TORC correction factors). Identify any dependence of the COLSS and CPC DNB POL uncertainty with AXP, temperature, pressure, or flow between the two approaches.

**RESPONSE:**

SCE does not intend to change either CETOP in the COLSS/CPC systems, or CETOP-D to incorporate the AREVA BHTP CHF correlation. CETOP-D is being maintained with the current CE-1 CHF correlation so that it can be the best approximation possible of the CETOP in COLSS/CPC. There are no plans to modify the plant COLSS/CPC systems.

The CE-1 CHF correlation is a legacy correlation, and as such, SCE realizes that any advanced CHF correlation in TORC (e.g. AREVA BHTP or Westinghouse ABB-NV), when compared to CE-1 in CETOP and CETOP-D, will not respond as consistently as TORC using CE-1. Still, using the CE-1 CHF correlation has been shown in the LAR to be [[

]]

The demonstration calculation shows that [[

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Note that SCE is not requesting any change to the DNBR limit by this method. The Technical Specification DNBR limit remains at 1.31 (the value determined for the CE-1 CHF correlation). [[

]] Note that from the same calculation, the calculated cycle-specific DNBR limit for the existing CE16 fuel is [[ ]], compared to the Technical Specification limit of 1.31. This shows the substantial conservatism already built into the SCE methodology.

- c. Describe the calculation of AOPM and ROPM using CETOP-D (CE-1) for AOOs and accidents with respect to a mixed core of Westinghouse and AREVA fuel.

**RESPONSE:**

There is no change in the Setpoints methodology as described in the approved methodology for SONGS (SCE-9801-P-A). All changes required for AREVA fuel are captured in the Fuel Rod Performance and Thermal-Hydraulic analyses changes described in the LAR.