

September 7, 2006

MEMORANDUM TO: Evangelos C. Marinos, Chief  
Plant Licensing Branch II-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

FROM: Siva P. Lingam, Project Manager */RA/*  
Plant Licensing Branch II-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

SUBJECT: SURRY POWER STATION, UNIT NOS. 1 AND 2 - E-MAIL  
TRANSMISSION OF REQUEST FOR ADDITIONAL INFORMATION  
(TAC NOS. MC9724 AND MC9725)

The Nuclear Regulatory Commission (NRC) staff transmitted the enclosed e-mails containing requests for additional information (RAIs) to Virginia Electric and Power Company (licensee) on July 12, 2006 (Enclosures 1 and 2) and July 14, 2006 (Enclosure 3). The RAIs supported conference calls with the licensee on July 19, 2006, regarding their application dated January 31, 2006, and supplemented by letter on June 21, 2006. The July 19th call was held to ensure the scope and breadth of the responses was clear. The licensee submitted the application as part of the resolution to NRC Generic Safety Issue 191.

This memorandum and the enclosed questions do not convey or represent an NRC staff position regarding the licensee's request.

Docket Nos. 50-280 and 50-281

Enclosures: 1. Request for Additional Information sent to Licensee by e-mail on 7/12/2006  
(5 pages)  
2. Request for Additional Information sent to Licensee by e-mail on 7/12/2006  
(3 pages)  
3. Request for Additional Information sent to Licensee by e-mail on 7/14/2006  
(4 pages)

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Plant Licensing Branch II-1  
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SUBJECT: SURRY POWER STATION, UNIT NOS. 1 AND 2 - E-MAIL  
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NRR-106

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NAME	SLingam	MO'Brien	EMarinos
DATE	09/06/06	09/06/06	09/07/06

OFFICIAL RECORD COPY

**From:** Siva Lingam  
**To:** margaret\_bennett@Dom.com  
**Date:** 07/12/2006 7:56:31 AM  
**Subject:** Generic Safety Issue 191 (Surry)

Attached please find a draft copy of RAI for the subject matter. Please pass this to appropriate people. I am in the training class this week fro 8:00 AM to 4:00 PM. If you need to discuss the subject matter, please feel free to call me and I can arrange a conference call with our technical staff.

Siva P. Lingam  
Project Manager (NRR/DORL/LPC)  
Location: O8-D5  
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Telephone: 301-415-1564  
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E-mail address: spl@nrc.gov

**Mail Envelope Properties** (44B4E36F.5DD : 13 : 35786)

**Subject:** Generic Safety Issue 191 (Surry)  
**Creation Date** 07/12/2006 7:56:31 AM  
**From:** Siva Lingam

**Created By:** SPL@nrc.gov

**Recipients**

Dom.com  
margaret\_bennett (margaret\_bennett@Dom.com)

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<b>Files</b>	<b>Size</b>	<b>Date &amp; Time</b>
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**Concealed Subject:** No  
**Security:** Standard

Draft Request for Additional Information  
on Virginia Electric and Power Company's  
Surry Power Station, Units 1 and 2, License Amendment Request  
on Proposed Technical Specification Change and Supporting Safety Analyses Revisions to  
Address Generic Safety Issue 191  
Dated January 31, 2006  
(TAC Nos. MC9724 and MC9725)

1. NRC Office of Nuclear Reactor Regulation's Office Instruction No., LIC-101, "License Amendment Review Procedures," Revision 3, dated February 9, 2004, instructs the staff to include a regulatory evaluation section in the safety evaluation on license amendment requests (LARs) and the industry has agreed to provide this information in LARs. (See the Nuclear Energy Institute issued white paper entitled "Standard Format for Operating License Amendment Requests from Commercial Reactor Licensees," dated August 24, 2001 (Agencywide Documents Access and Management System Accession No.: ML013390222)). The licensee's LAR does not provide an applicable regulatory requirements/criteria section, which is a part of a regulatory evaluation, for the staff's review and consideration. Please provide a regulatory requirements/criteria section for review by the staff.
  
2. Section 3.5, LHSI Pump NPSH Analysis, of the licensee's submittal states the following:

The NPSH required at maximum LHSI pump flow was revised as part of the GSI-191 project. A review of the original pump NPSH required test report. It was discovered that the pump can and entrance losses were accounted for twice, in the NPSH required from the test and in the suction friction loss in previous containment analysis calculations. The current UFSAR value of 15.6 ft at 3305 gpm is conservative when compared to the revised value of 13.82 ft at 3330 gpm, which is consistent with the LHSI pump test.

  - (a) Please explain what you mean by "the pump can."
  - (b) It is not clear to the staff how "the pump can and entrance losses were accounted for twice" during testing. Were these losses included in the measured of NPSH required? Please explain and provide pages of the pump report on correction of the error.
  
3. Generic Letter No. 83-11, "Licensee Qualification for Performing Safety Analyses in Support of Licensing Actions," outlines NRR practice regarding licensee qualification for performing safety analyses in support of licensing actions. In this regard please provide the following information:
  - (a) Confirm that GOTHIC users are qualified to use the code by training, procedures, and guidelines;
  - (b) Confirm that GOTHIC is maintained under a qualified quality assurance program; and

- (c) Confirm that you have a program to review and dispose the GOTHIC error reports which are issued from time to time by Electric Power Research Institute, the developer of GOTHIC.
4. Section 3.1.2, Engineered Safeguards Features, of the licensee's submittal states the following:
- For NPSH analyses, sensitivity studies showed that NPSHa is not sensitive to a reduction in containment height, because the conservative reduction in drop diameter by a factor of 10 makes the spray drops 100% efficient for NPSH analysis. Therefore, the containment height in the NPSH models is input from the containment free volume and the pool surface area.
- As stated in an email from Mr. Paul R. Willoughby of Dominion to Mr. Steven Raul Monarque of NRC, dated June 21, 2006, and subsequently discussed on the same day during a teleconference between the licensee and NRC, the drop diameter is to be reduced by a factor of 2 instead. How does this change affect the above conclusion on the effect of containment height on NPSH analysis?
5. Section 3.1.4, Plant Parameter Design Inputs, of the licensee's submittal states that "The minimum surface area for metal heat sinks in containment was increased conservatively based on a revised inventory that was documented in an internal calculation." Please provide the reference and the old and new minimum surface area for metal heat sinks in containment.
6. Section 3.1.4 of the licensee's submittal states that "Some of the assumed pump flow rates were revised based on hydraulic analyses of RS, SI, SW and CS system performance. The most significant change was an increase in the minimum CS flow rate. The assumed flow rates are listed in Table 3.1-1." However, Table 3.1-1 lists containment spray flow rate as a variable and a footnote to the table states that it varies with containment pressure and refueling water storage tank water level. Please provide the containment spray flow rate used in the analysis.
7. Table 3.1-1 of the licensee's submittal lists the accumulator nitrogen volume as between 369 to 431 ft<sup>3</sup>, which includes uncertainty. What is the value of uncertainty used? Correspondingly, the accumulator water volume used for the calculation as listed in the table does not include uncertainty. What is the uncertainty of water volume and why is it not included?
8. Section 3.2.1, LOCA Mass and Energy Releases, of the licensee's submittal states that "For the pump suction breaks, the SG secondary stored energy at the end of reflood was increased to add conservatism to address a recent Westinghouse error report." Please describe this change.
9. Section 3.2.1 of the licensee's submittal states that "The GOTHIC simplified RCS model ensures that the stored energy in the core, primary metal, and the SG secondary has been released to the containment when the vessel is fully depressurized and the acceptance criteria for containment depressurization and NPSHa are challenged."

Please explain how the RCS model is setup to release the stored energy when the vessel is fully depressurized and the acceptance criteria for containment depressurization and NPSHa are challenged and why this is conservative.

10. Section 3.6 RS Pump NPSH Analysis, of the licensee's submittal states the following:

The ORS pump is more limiting than the IRS pump for three reasons: 1) IRS pump suction friction loss is 5.26 ft smaller (2.14 ft versus 7.4 ft for the ORS pump); 2) the ORS pump has 1.2 ft of extra head because the elevation of the pump impeller relative to the floor is -9.0 ft versus -7.8 ft for the IRS pump; and 3) the ORS pump suction receives 300 gpm of 45 °F RWST water, while the IRS pump gets 300 gpm of recirculation water from the HX discharge (hotter than the RWST).

It is not clear to the staff how the ORS pump is more limiting than the IRS pump because reason 1 supports this argument but reasons 2 and 3 counter it. Please explain.

**From:** Siva Lingam  
**To:** margaret\_bennett@Dom.com  
**Date:** 07/12/2006 3:47:40 PM  
**Subject:** Fwd: Generic Safety Issue 191 (Surry)

Please ignore item # 3 in the RAI since this was addressed in Topical report TOM-NAF-3. We will correct this in our final RAI letter.

Siva P. Lingam  
Project Manager (NRR/DORL/LPC)  
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**CC:** Harry Wagage; Leonard Olshan; Stephen Raul Monarque

**Mail Envelope Properties** (44B551DC.DA2 : 13 : 35786)

**Subject:** Fwd: Generic Safety Issue 191 (Surry)  
**Creation Date** 07/12/2006 3:47:40 PM  
**From:** Siva Lingam  
**Created By:** SPL@nrc.gov

**Recipients**

Dom.com  
margaret\_bennett (margaret\_bennett@Dom.com)

nrc.gov  
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LNO CC (Leonard Olshan)  
SRM2 CC (Stephen Raul Monarque)

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**Return Notification:** None

**Concealed Subject:** No  
**Security:** Standard

To Be Delivered: Immediate  
Status Tracking: Delivered & Opened



**From:** Siva Lingam  
**To:** margaret\_bennett@Dom.com  
**Date:** 07/14/2006 3:13:44 PM  
**Subject:** Fwd: Generic Safety Issue 191 - Additional RAls

SORRY! I forgot to attach the document.

>>> Siva Lingam 7/14/2006 3:11 PM >>>

Attached please find two more draft RAls for the subject matter. Please note that Steve will be back on Monday, and you can contact him (or me) for further assistance.

Siva P. Lingam  
Project Manager (NRR/DORL/LPC)  
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E-mail address: [spl@nrc.gov](mailto:spl@nrc.gov)

**CC:** Harry Wagage; Leonard Olshan; Stephen Raul Monarque

**Mail Envelope Properties** (44B7ECE8.927 : 13 : 35786)

**Subject:** Fwd: Generic Safety Issue 191 - Additional RAIs  
**Creation Date** 07/14/2006 3:13:44 PM  
**From:** Siva Lingam

**Created By:** [SPL@nrc.gov](mailto:SPL@nrc.gov)

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Draft Request for Additional Information **Round 2**  
on Virginia Electric and Power Company's  
Surry Power Station, Units 1 and 2, License Amendment Request  
on Proposed Technical Specification Change and Supporting Safety Analyses Revisions to  
Address Generic Safety Issue 191  
Dated January 31, 2006  
(TAC Nos. MC9724 and MC9725)

1. Section 2.3, Change Containment Air Partial Pressure Operating Limits in TS Figure 3.8-1, of the licensee's submittal states that "The GOTHIC containment analyses for . . . support an increase in the containment air partial pressure upper limit in TS Figure 3.8-1 from 10.3 psia to 11.3 psia." However, the same section also states that "The plant changes no longer support a 'subatmospheric peak pressure' since some GOTHIC cases produce long-term pressures that exceed 0.0 psig. Therefore, it is proposed to change the description from 'subatmospheric peak pressure' to 'LOCA depressurization criteria' to reflect the positive pressure after one hour." This appears to contradict the first statement because GOTHIC analysis does not support a subatmospheric peak pressure. Please explain this apparent discrepancy.

Reference 1 (Reference 24 of the submittal), dated July 31, 2001, states that you had proposed to change the acceptance criteria for design basis LOCA containment integrity analyses from "containment must be depressurized to less than atmospheric within 1 hour" to "containment must be depressurized to 0.5 psig within 1 hour and to subatmospheric pressure within 4 hours" even before performing GOTHIC analyses supporting the present license amendment request. Please explain why the proposed change from 'subatmospheric peak pressure' to 'LOCA depressurization criteria' was not made at that time.

2. The following questions are regarding the proposed changes to Technical Specifications Figure 3.8-1 (a plot of air partial pressure versus service water temperature):
  - 2.1 The current figure has a note "acceptable operation below this line" with an arrow pointing to a line. This apparently indicates that there is no lower bound of pressure. However, the new figure has lower bounds to the pressure and the corresponding note states that "acceptable operation inside the lines." Please explain the need and the significance of a lower bound pressure.
  - 2.2 Please explain or provide a reference on what accident analysis determines each line on the proposed figure.

References

1. Letter from Eugene S. Grecheck (Dominion) to USNRC, "Virginia Electric and Power Company, Surry Power Station Units 1 and 2, Response to Request for Additional Information, Alternate Source Term - Proposed Technical Specification Change," Serial No. 01-037A, July 31, 2001.