

September 20, 2006

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

FROM: Christopher Gratton, Sr. Project Manager */RA/*
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

SUBJECT: JOSEPH M. FARLEY NUCLEAR PLANT, UNITS 1 AND 2, AND
VOGTLE ELECTRIC GENERATING STATION, UNITS 1 AND 2 -
FACSIMILE TRANSMISSION OF DRAFT REQUEST FOR
ADDITIONAL INFORMATION (TAC NOS. MD2794, MD2795, MD2796
AND MD2797)

The Nuclear Regulatory Commission (NRC) staff transmitted the enclosed facsimile containing questions to Mr. Jack Stringfellow of the Southern Nuclear Operating Company, Inc., on September 15, 2006. The questions will support a conference call with the licensee to be held at a future date regarding the licensee's submittal dated August 10, 2006. The licensee requested the approval of a proposed alternative to allow the application of full-structural weld overlay repairs on the pressurizer nozzle welds. This memorandum and the enclosed questions do not convey or represent an NRC staff position regarding the licensee's request.

Docket Nos. 50-348, 50-364, 50-424 and 50-425

Enclosure: Draft Request for Additional Information sent September 15, 2006

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REVISED DRAFT REQUEST FOR ADDITIONAL INFORMATION
PROPOSE ALTERNATIVE FOR APPLICATION OF
FULL STRUCTURAL WELD OVERLAYS ON PRESSURIZER NOZZLES
JOSEPH M. FARLEY NUCLEAR PLANT, UNITS 1 AND 2
VOGTLE ELECTRIC GENERATING PLANT, UNITS 1 AND 2
SOUTHERN NUCLEAR OPERATING COMPANY

By letter dated August 10, 2006, Southern Nuclear Operating Company, Inc (the licensee), requested Nuclear Regulatory Commission (NRC) staff approval of proposed alternative ISI-GEN-ALT-06-03 to allow the application of full-structural weld overlay repairs on the pressurizer nozzle welds at the Joseph M. Farley Nuclear Plant (Farley), Units 1 and 2, and Vogtle Electric Generating Plant (Vogtle), Units 1 and 2. To complete its review, the NRC staff requests the following additional information.

1. Page 1. The NOTE under the Contingency Overlay Repairs heading states that the contingency repair would only be used "If evidence of PWSCC [primary water stress-corrosion cracking] is observed during volumetric or visual examinations of one of the pressurizer dissimilar metal welds..." The visual examination cannot detect a PWSCC flaw that is not connected to the outside surface of the weld. Therefore, the result of a visual examination by itself cannot be used as a criterion in determining whether a repair should be made. There is a total of six dissimilar metal welds and six similar metal welds at each unit as shown on page 2 of the submittal.

(a) Clarify that both visual examination and ultrasonic examination will be performed on all pressurizer nozzle dissimilar metal and similar metal welds at Vogtle Unit 1 and Farley Unit 2 prior to applying contingency overlay repairs. (b) Clarify whether a weld overlay will be applied to a similar metal weld if an ultrasonic examination will not be performed on that similar metal weld. (c) Discuss the criteria for determining a PWSCC indication and provide the indication size (the threshold) that requires a contingency overlay repair. (d) Discuss whether a contingency overlay repair will be performed on a dissimilar metal weld if the indication detected is not caused by PWSCC. (e) If one of the pressurizer dissimilar metal welds in Vogtle Unit 1 or Farley Unit 2 is detected with an indication, clarify whether all the dissimilar metal and similar metal welds in Vogtle Unit 1 and Farley Unit 2 pressurizers will be repaired.

2. Page 1, last two paragraphs. Under the Preemptive Overlays heading, the licensee stated that "A preemptive FSWOL [full structural weld overlay] will be applied to each of the VEGP-2 [Vogtle Unit 2] and FNP-1 [Farley Unit 1] pressurizer DSM [dissimilar metal weld]..." However, under the NOTE for the Preemptive Overlays heading, the licensee stated that "...If Primary Water Stress Corrosion Cracking (PWSCC) is discovered at the VEGP and FNP units prior to applying the preemptive overlay, an FSWOL may be used to perform repairs, as necessary..." The second statement contradicts the first statement by applying conditions to the FSWOL. The second statement implies that the criterion of applying a preemptive overlay is the same as

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the criterion of applying a contingency overlay repair (i.e., an overlay will be applied based on the result of nondestructive examinations).

- (a) Discuss the criteria for the application of FSWOL to the dissimilar metal and similar metal welds under the preemptive overlay strategy.
- (b) Clarify whether the ultrasonic examination and visual examination will be conducted on the dissimilar metal and similar metal welds at Vogtle Unit 2 and Farley Unit 1 prior to applying preemptive overlays.
- (c) Identify the number of welds that will be overlaid under the preemptive overlay strategy.

3. Page 3. In the Applicable Code Requirements section, the licensee stated that examinations of pressurizer dissimilar metal and similar metal welds are performed based on the NRC-approved risk-informed program. Confirm that once the weld overlay is applied to the subject welds, the welds will no longer be part of the risk-information program. The examinations of the overlaid welds will follow the inspection strategy in the proposed alternative.

4. Page 4, first paragraph. The licensee stated that the proposed alternative will be based on the 2001 edition of the American Society of Mechanical Engineers (ASME), *Boiler and Pressure Vessel Code* (Code), Section III and Section XI, with Addenda through 2003. As stated in NRC Regulatory Issue Summary 2004-16, licensees need to request the NRC approval for the use of the later edition or addenda of the ASME Code (i.e., later than the edition of the Code of record).

- (a) Confirm that the proposed Relief Request ISI-GEN-ALT-06-03 also contains a request to use the later edition of the Code.
- (b) Confirm that the 2001 edition with addenda through 2003 of the ASME Code is used for Relief Request ISI-GEN-ALT-06-03, because this is the latest edition of the Code that the NRC has approved in 10 CFR 50.55a.

5. On Page 4:

- (a) To clarify the description in Section 1(a) of the proposed alternative, provide a drawing of a typical nozzle-weld-pipe configuration including the nozzle, dissimilar metal weld, safe end, similar metal weld, pipe, and the overlay. Identify the material of each component. Provide dimensions for relief, safety, spray, and surge nozzles and piping (such as diameters and thickness) in a table. Include the thickness of weld overlays.
- (b) Clarify when the overlay will be applied and will not be applied to the similar metal welds.

6. Page 5: Section 2(a) of the proposed alternative states that for a preemptive overlay, a flaw with a depth of 75 percent and a circumference of 360 degrees will be assumed.

- (a) Confirm that the 75 percent depth flaw is assumed to be located in the original weld and that the flaw originates from the inside surface of the pipe.
- (b) Provide the technical basis of the assumed flaw depth.

7. On Pages 5 and 6:

(a) Discuss whether the thickness of the full structural weld overlay will be the same for a specific nozzle weld between the contingency overlay repair design and preemptive overlay design because the flaw assumed in the original nozzle weld between these two designs is different as shown in Section 2(b) of the alternative. (b) Discuss how the thickness of the weld overlay is derived. Use an example to show how an actual overlay thickness is calculated.

8. Page 6. Section 2(b)8 states that the effects of any changes in applied loads, as a result of weld shrinkage from the entire overlay on other items in the piping system shall be evaluated. The licensee also stated that existing flaws previously accepted by analytical evaluation shall be evaluated in accordance with IWB-3640. Confirm that these evaluation results will be completed and available for staff review prior to plant startup.

9. Page 6, last paragraph. The licensee stated that ultrasonic examination procedures and personnel shall be qualified in accordance with Appendix VIII of the ASME Code, Section XI. On Page 10, first paragraph, the licensee mentioned that the Appendix VIII ultrasonic examinations are implemented through the Performance Demonstration Initiative (PDI) program. In similar relief requests by other licensees, a comparison of the ultrasonic examination qualified by the PDI program to the requirements in Appendix VIII of the Code is included to demonstrate the compliance.

(a) Clarify why the proposed alternative did not present such comparison. (b) Clarify whether the ultrasonic examination will be performed on the maximum extent achievable.

10. Page 7. Section 3(a)2 of the proposed alternative requires that the weld overlay and the adjacent base material for at least one-half inch from each side of the weld shall be examined using the liquid penetrant method. This requirement is not consistent with Section 4.0(b) of Code Case N-638-1, which requires surface and ultrasonic examination of a band on either side of the overlay with an axial length of at least 1.5 times the component thickness or 5 inches whichever is greater. Discuss why the proposed requirement is sufficient to meet Section 4.0(b) of Code Case N-638-1.

11. Page 7. Section 3(a)3.(iii) states that any un-inspectible volume in the weld overlay shall be assumed to contain the largest radial planar flaw that could exist within that volume. The assumed flaw shall meet the standards of Table IWB-3514-2 or the requirements of IWB-3640 by evaluation. Confirm that these evaluation results will be completed and available for staff review prior to plant startup.

12. On Page 7:

(a) The acceptance examination of Section 3(a) is performed 48 hours after the temperature of the weld overlay reaches the ambient temperature. Discuss when the preservice inspection of Section 3(b) is performed in the sequence of the weld overlay installation. (b) Section 3(a) contains no requirements regarding the disposition of an unacceptable indication in the weld overlay during the acceptance examination. However, Section 3(c)6 requires repair/replacement of the weld overlay if an

unacceptable indication is detected in the overlay during inservice inspection. Explain why similar repair/replacement requirements are not discussed in Section 3(a), or clarify the requirements for unacceptable indications in Section 3(a).

13. Page 8. Section 3(c)(3) states that for Class 1, 2, or 3 piping, the acceptance criteria of IWB-3600, IWC-3600, or IWD-3600 shall be met for the weld overlay. However, relief request ISI-GEN-ALT-06-03 is specifically requested for pressurizer piping which is Class 1. Please clarify.

14. On Pages 8 and 9:

(a) Section 3(c)(4) states that the 25 percent of weld overlays in the population will be examined once every ten years. Clarify whether the population of welds to be examined is based on the plant specific number of weld overlays. (b) Justify the adequacy of the proposed successive examinations in Section 3(c)(5), because the proposed successive examinations are not consistent with the requirements of IWB-2420 of the ASME Code, Section XI.

15. Page 9, last paragraph, last sentence. The licensee stated that if a flaw is detected in the upper 25 percent of the original material during the preservice examination, the actual flaw size would be used for the crack growth evaluations. The staff thinks that this flaw size is not a conservative assumption for the crack growth calculations. The current ultrasonic examination is qualified only to detect flaws in the upper 25 percent of the pipe base metal after a weld overlay is applied. Therefore, the condition in the lower 75 percent of the pipe base metal would be unknown. The conservative assumption would be to assume existence of a crack of 75 percent throughwall depth in the lower 75 percent pipe base metal which should be added to the depth of the crack found in the upper 25 percent of the pipe base metal. This worst case crack should be used to calculate crack growth. Discuss why it is acceptable to assume the actual flaw size as you proposed when the ultrasonic examination is only qualified for the upper 25 percent of the pipe metal.

16. (a) Section 2(g) of Appendix 1 to the submittal is different from the corresponding Section (j) in Code Case N-638-1. Section 2(g) of Appendix 1 provides additional requirements for the case when the average lateral expansion value of the heat affected zone of Charpy V-notch specimens is less than the average value for the unaffected base metal. Discuss the technical basis for the requirements in Section 2(g) of Appendix 1. (b) Section 3.0(c) of Appendix 1 states that the heat input of the first three layers shall not exceed 45,000 J/inch under any conditions. Provide the technical basis for this heat input. (c) Section 3.0(c) of Code Case N-638-1 requires that for similar metal welding, the completed weld shall have at least one layer of weld reinforcement deposited. This reinforcement shall be removed by mechanical means, so that the finished surface is flush with the surface surrounding the weld. Discuss whether this requirement should be included in Section 3.0(c) of Appendix 1. (d) Section 3(d) of Appendix 1 states that the interpass temperature limitation of QW-406.3 does not need to be applied. This condition is not in the corresponding Section 3.0(d) of Code Case N-638-1. Discuss why this condition is included in the proposed alternative. (e) Discuss the technical basis for the requirements in Section 3(e) of Appendix 1, which are not shown in Code Case N-638-1. (f) Section 4.0(c) of Code Case N-638-1 requires that areas from which weld-attached thermocouples have been removed be

ground and examined using a surface examination method. Discuss whether this requirement should be included in Appendix 1 to the alternative. (g) In Regulatory Guide 1.147, Revision 14, the staff imposed a condition on Code Case N-638-1 regarding ultrasonic examination and associated acceptance criteria based on NB-5330 of the ASME Code, Section III. Discuss whether this condition will be satisfied. (h) For the case when it is impossible to measure the temperature of the weld overlay during installation, confirm that requirements in Sections 3(e)(2) and 3(e)(3) of Appendix 1 to the proposed alternative will be used in combination to determine the weld overlay temperature.

17. On Page 3: The code of record for both VEGP units and Farley units is the 1989 editions of the ASME Code, Section XI. On page 1, the licensee stated that the second ISI interval for both VEGP units started on May 31, 1997. For Farley Unit 1, the third ISI interval started on December 1, 1997. For Farley Unit 2, the third ISI interval started on July 30, 2001. Based on the aforementioned starting dates of the ISI intervals, clarify why the code of record for these units is not based on the edition or addenda later than 1989 edition of the ASME Code.

18. If the pressurizer surge line in any of the Vogtle or Farley units has been approved for leak-before-break and the weld overlay is applied to the surge line, the licensee needs to confirm that the original leak-before-break analyses are still valid and associated acceptance criteria (e.g., the safety margin on crack size and leak rates as specified in Standard Review Plan 3.6.3) are still acceptable.

19. By letter dated April 28, 2006, Exelon submitted a relief request for the preemptive weld overlays of the pressurizers lines at Byron and Braidwood. By letter dated September 14, 2006, Exelon committed to provided the NRC, within 14 days after the completion of the ultrasonic examination of the weld overlay installations, (1) the examination results of the weld overlays, (2) a discussion of any repairs to the overlay material and/or base metal and the reason for the repair, and (3) commitment to perform the subsequent inservice examination in accordance with Subarticle Q-4300 of Appendix Q to the ASME Code, Section XI. The staff requests that Southern Nuclear submit the same commitments as specified in Exelon's letter dated September 14, 2006, for the contingency and preemptive weld overlay relief requests at Vogtle Units 1 and 2 and Farley Units 1 and 2.

To assure timely processing of your application, the NRC staff requests that you respond to this RAI by October 20, 2006.