L. M. Stinson (Mike)
Vice President

Southern Nuclear
Operating Company, Inc.
40 Inverness Center Parkway
Post Office Box 1295
Birmingham, Alabama 35201

Tel 205.992.5181
Fax 205.992.0341

SOUTHERN COMPANY
Energy to Serve Your World℠

March 25, 2004

Docket No.: 50-364

NL-04-0494

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

Joseph M. Farley Nuclear Plant – Unit 2
Request for Relaxation
of the First Revised NRC Order (EA-03-009) Establishing Interim Inspection
Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors

Ladies and Gentlemen:

In accordance with the requirements of Section IV.F of the February 20, 2004 Commission First Revised Order (EA-03-009) Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors, Southern Nuclear Operating Company (SNC) requests relaxation of an inspection coverage requirement for specific penetration nozzles at Unit 2 of the Farley Nuclear Plant (FNP), as described in the enclosure. This request for relaxation is being transmitted to the Commission for filing pursuant to 10 CFR 50.4.

In a March 23, 2004 phone call, SNC discussed this issue with the NRC staff. Since this call, SNC has completed inspection of the top and bottom reactor pressure vessel (RPV) heads at FNP Unit 2. These inspections included bare metal visual examination of the outer surface of the top and bottom RPV heads and non-destructive examination (NDE) of the penetration nozzles in the top head. Preliminary assessment of the inspection results has disclosed no evidence of head material wastage or of leaking or cracked nozzles. A detailed report of these inspections will be submitted in accordance with the requirements of the Revised Order.

SNC requests approval of the requested relaxation by April 1, 2004 in order to support the planned re-installation of the FNP Unit 2 RPV head.

A101

This letter contains no new NRC commitments. If you have any questions, please advise.

Sincerely,

L. M. Stinson

LMS/DWD/daj

Enclosure: Request for Relaxation of the February 20, 2004 First Revised NRC Order (EA-03-009) Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors

cc: Southern Nuclear Operating Company
Mr. J. B. Beasley, Jr., Executive Vice President
Mr. D. E. Grissette, General Manager – Plant Farley
RTYPE: CFA04.054; LC# 13994

U. S. Nuclear Regulatory Commission
Mr. L. A. Reyes, Regional Administrator (2 copies)
Mr. S. E. Peters, NRR Project Manager – Farley
Mr. C. A. Patterson, Senior Resident Inspector – Farley
Document Control Desk (3 copies)

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
	)	
Southern Nuclear Operating Company	)	Docket No. 50-364
	)	License No. NPF-8
Joseph M. Farley Nuclear Plant, Unit 2	)	EA-03-009
	)	

REQUEST FOR RELAXATION OF THE FEBRUARY 20, 2004 FIRST REVISED NRC ORDER (EA-03-009) ESTABLISHING INTERIM INSPECTION REQUIREMENTS FOR REACTOR PRESSURE VESSEL HEADS AT PRESSURIZED WATER REACTORS
JOSEPH M. FARLEY NUCLEAR PLANT – UNIT 2

On February 20, 2004, the Nuclear Regulatory Commission ("NRC" or "Commission") issued an order in the captioned matter entitled First Revised Order Modifying Licenses ("Revised Order") to Southern Nuclear Operating Company (SNC), in connection with the Joseph M. Farley Nuclear Plant (FNP). The Revised Order superceded the original NRC Order Modifying Licenses (Effective Immediately), dated February 11, 2003 ("Original Order"). The Original Order was issued as a result of the discovery of leaks and nozzle cracking at the Davis-Besse Nuclear Power Station and other pressurized water reactor (PWR) plants, after which the Commission determined that the performance of more effective inspections of the reactor pressure vessel (RPV) heads and associated penetrations are necessary. Section XI of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) , which is incorporated into NRC regulations by 10 CFR 50.55a, "Codes and Standards," currently specifies that inspections of the RPV head need only include a visual examination of the insulated surface or surrounding area for signs of leakage. Based on recent experience, the Commission determined that such inspections are not sufficient to reliably detect circumferential cracking of RPV head nozzles and corrosion of the RPV head. Circumferential cracking of the RPV head nozzles and corrosion of the RPV head pose a safety concern because of the possibility of a nozzle ejection or loss-of-coolant accident if the conditions are not detected and repaired. Therefore, the NRC Original Order established interim requirements in Section IV to ensure that licensees implement and maintain appropriate measures

to inspect and, as necessary, repair RPV heads and associated penetrations. Since issuance of the Original Order, many requests for relaxation have been reviewed and granted by NRC staff. Several common issues emerged from these requests prompting revision of certain inspection aspects of the Original Order. Consequently, the Revised Order includes revisions to Section IV addressing bare metal visual inspections, penetration nozzle inspection coverage, flexibility in combination of non-destructive examination methods, flaw evaluation, and requirements for plants which have replaced their RPV head.

The requirements of Section IV were effective and final 20 days from the date of the Revised Order, absent any request for a hearing or written approval of an extension of time in which to request a hearing. In a letter dated March 10, 2004 answering the Revised Order, SNC made no such request and accordingly, pursuant to 10 CFR 2.202(d), SNC consented to the Revised Order.

Pursuant to Section IV.F of the Revised Order, SNC is required to seek relaxation of any conditions of the Revised Order with respect to any proposed deviations or alternatives to the inspection requirements with which SNC is unable to comply or as to which compliance is unnecessary. A request for relaxation regarding inspection of specific nozzles is required to address the following criteria:

(1) The proposed alternative(s) for inspection of specific nozzles will provide an acceptable level of quality and safety, or

(2) Compliance with the Revised Order for specific nozzles would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Requirement for which Relaxation is Requested:

Section IV.C of the Revised Order in Footnote 2 allows use of a previously accepted inspection plan for the first refueling outage after February 11, 2003. The spring 2004 refueling outage at FNP Unit 2 meets this criterion and SNC's March 10, 2004 letter stated SNC's intention to conduct the FNP Unit 2 RPV inspection in accordance with a previously accepted inspection plan. The features of this plan differing from the Original Order are described in a Safety Evaluation Report (SER) issued by the NRC

on April 25, 2003, which approved certain relaxations of the Original Order for FNP Units 1 and 2. (FNP Unit 1 was inspected in accordance with this SER during spring 2003.)

As required by Footnote 2 in Section IV of the Revised Order, the discrepancies between the inspection plan approved by the April 25, 2003 SER and the requirements of the Revised Order were described in SNC's March 10, 2004 letter. One of those differences involved the extent to which the 4-inch diameter penetration nozzles are accessible for non-destructive examination (NDE) below the J-groove weld. The Original Order required ultrasonic testing (UT) from two (2) inches above the J-groove weld to the bottom of the nozzle. The bottom ends of these nozzles are machined to accommodate an external thread. The shoulder of this machined area (located approximately 1.25 inches above the nozzle bottom) creates a physical limit to NDE accessibility. Based on design dimensions and previous inspection experience, SNC anticipated that NDE coverage to at least 1 inch below the lowest point of the toe of the J-groove weld could be achieved at each nozzle. This expectation was reflected by text in the April 25, 2003 SER to the effect that NDE was to be performed to at least 1 inch below the bottom of the J-groove weld. Physical inspection of the nozzles in FNP Unit 2, however, indicates that for 5 of the 69 nozzles, the distance between the toe of the J-groove weld and the shoulder of the machined area of the nozzle is slightly less than one inch.

Proposed Alternative:

SNC proposes to achieve NDE coverage by means of UT to at least 1 inch below the lowest point of the toe of the J-groove weld in accordance with the April 25, 2003 SER for 64 of the 69 FNP Unit 2 4-inch diameter nozzles, but for the other 5 nozzles (#62, 63, 65, 66 and 69) SNC proposes to achieve UT coverage to as far below the weld as can be achieved (i.e.; to the shoulder of the area machined for threading).

Discussion of Proposed Alternative and Consideration of Criteria:

NDE coverage down to the shoulder of the machined area was achieved for 100% of the 4-inch diameter penetration nozzles during the spring 2004 FNP Unit 2 inspection. However, due to manufacturing variations the distance between the lowest point of the toe of the J-groove weld and the shoulder of the machined area was discovered to be less than 1 inch for five nozzles in the outermost row (#62, 63, 65, 66 and 69). The coverage achieved at each of these nozzles is listed in Table 1.

Table 1 - FNP Unit 2 Spring 2004 RPV Head Inspection
Nozzles With UT Coverage Less Than 1 Inch
Below Lowest Point of Toe of J-Groove Weld (i.e. downhill side)

Nozzle #	Weld Angle	Minimum UT Coverage Achieved Below J-Groove Weld	Hoop Stress at Lowest Point of Coverage[1]
62	42.6°	0.76 inches	5000 psi
63	42.6°	0.92 inches	zero to compressive
65	42.6°	0.92 inches	zero to compressive
66	42.6°	0.96 inches	zero to compressive
69	42.6°	0.76 inches	5000 psi

1. Approximate values taken from Figure 9 hoop stress curves provided in Enclosure 1 of April 11, 2003 SNC letter to NRC

NDE coverage to at least 1 inch below the J-groove weld is unnecessary for the cited nozzles, because UT examination to the lower limit physically achievable provides an acceptable level of quality and safety, as described below.

In a previous response to an NRC question regarding growth of postulated cracks in unexamined portions of the nozzle below the J-groove weld (Question 3 in Enclosure 1 of SNC's letter of April 11, 2003), SNC described flaw evaluations performed using FNP Unit 1 specific penetration nozzle stresses. These stresses and evaluations also apply to FNP Unit 2. A through-wall axial flaw was postulated in the nozzle material growing upwards towards the bottom of the weld. Since the stresses for the unexamined portion of the nozzle below the weld are too low to propagate an axial flaw, the flaw evaluations started at 0.5" below the weld (well within the zone examined by UT for the 5 cited nozzles) and the time to propagate the flaw in the nozzle to the toe of the J-groove weld was determined.

As stated in SNC's April 11, 2003 letter, this assumed through-wall axial flaw would take approximately 5 years of operation to grow from 0.5" below the weld up to the point of contact with the weld, and even longer to grow from the bottom of the weld upwards through the pressure boundary. This 5 year period was a limiting case based on the most highly stressed nozzles. For the postulated crack to propagate up to the weld from the downhill side of a nozzle with a 42.6° weld angle (typical for the 5 nozzles at issue) an even longer period is required; approximately 6.8 operating years per Figure 6-11 of WCAP-15925-P, "Structural Integrity Evaluation of Reactor Vessel Upper Head Penetrations to Support Continued Operation: Farley Units 1 and 2" (Proprietary, transmitted by SNC's April 11, 2003 letter).

The axial crack growth prediction shown in Figure 6-11 of WCAP-15925 can be conservatively applied to possible undetected flaws in the 42.6° penetration nozzles where less than 1 inch UT coverage was achieved below the weld. That is, it can be shown that more than the 6.8 years indicated by Figure 6-11 would be required for an undetected axial through-wall flaw to propagate up to the weld. From Table 1 above, the most limiting inspection coverage is 0.76 inches below the lowest point of the toe of the J-groove weld. Referring to Enclosure 1, Figure 9 of SNC's April 11, 2003 letter, a flaw with the upper crack tip located at the boundary of the examined area (i.e. 0.76 inches below the weld) and the lower crack tip located at the point where the hoop stress becomes compressive will only be about 0.2 inches long. Also from Figure 9, the hoop stress at the upper crack tip will only be about 5000 psi. In contrast, the crack growth curve in WCAP-15925 Figure 6-11 was generated assuming an initial through-wall flaw 0.474 inches long (required to achieve a crack tip stress intensity factor that exceeds 9 MPa$\sqrt{m}$, the threshold assumed for propagation), with the upper crack tip located 0.5 inches below the weld where the hoop stress is about 15,000 psi. Therefore it is clear that Figure 6-11, which assumes a larger crack with higher stress located closer to the weld, conservatively bounds possible undetected flaws in the five nozzles for which UT coverage relaxation is sought.

Since the FNP Unit 2 RPV head is scheduled to be replaced after just one more operating cycle (in fall 2005), the predicted time period for possible undetected flaws to grow up to the weld is far greater

than the remaining planned service life of the RPV head. Accordingly, the proposed alternative will provide an acceptable level of quality and safety.

Mr. L. M. Stinson states he is a Vice President of Southern Nuclear Operating Company, is authorized to execute this oath on behalf of Southern Nuclear Operating Company and to the best of his knowledge and belief, the facts set forth in this letter are true.

Respectfully submitted,

Southern Nuclear Operating Company

L. M. Stinson

Sworn to and subscribed before me this 25th *day of* March, *2004.*

Notary Public

My commission expires: 11/10/06