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SOUTHERN COMPANY
Energy to Serve Your World℠

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50-364 50-425

NL-03-1958

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

Joseph M. Farley Nuclear Plant and
Vogtle Electric Generating Plant
Response to NRC Bulletin 2003-02
"Leakage From Reactor Pressure Vessel Lower
Head Penetrations and Reactor Coolant Pressure Boundary Integrity"

Ladies and Gentlemen:

Pursuant to the requirements of Nuclear Regulatory Commission (NRC) Bulletin 2003-02, "Leakage From Reactor Pressure Vessel Lower Head Penetrations and Reactor Coolant Pressure Boundary Integrity" issued to the Southern Nuclear Operating Company (SNC) on August 21, 2003, SNC hereby submits Enclosure 1 which constitutes the required 30-day response for Vogtle Electric Generating Plant (VEGP) Unit 1 and the required 90-day response for VEGP Unit 2 and Joseph M. Farley Nuclear Plant (FNP) Units 1 and 2.

Mr. J. T. Gasser 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.

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

Respectfully submitted,

SOUTHERN NUCLEAR OPERATING COMPANY

Jeffrey T. Gasser

Sworn to and subscribed before me this 19th *day of* September, *2003.*

Notary Public

My commission expires: 11/10/06

A109

JTG/DRG/daj

Enclosure: Joseph M. Farley Nuclear Plant and Vogtle Electric Generating Plant Response to NRC Bulletin 2003-02 "Leakage From Reactor Pressure Vessel Lower Head Penetrations and Reactor Coolant Pressure Boundary Integrity"

cc: Southern Nuclear Operating Company
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Mr. W. F. Kitchens, General Manager – Plant Vogtle
Mr. D. E. Grissette, General Manager – Plant Farley
SNC Document Services – RTYPE: CFA04.054; CVC7000; LC# 13844

U. S. Nuclear Regulatory Commission, Washington, D. C.
Mr. F. Rinaldi, NRR Project Manager – Farley
Mr. F. Rinaldi, NRR Project Manager – Vogtle

U. S. Nuclear Regulatory Commission, Region II
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Mr. T. P. Johnson, Senior Resident Inspector – Farley
Mr. J. Zeiler, Senior Resident Inspector – Vogtle

Enclosure 1

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On August 21, 2003, the Nuclear Regulatory Commission (NRC) issued Bulletin 2003-02, "Leakage from Reactor Pressure Vessel Lower Head Penetrations and Reactor Coolant Pressure Boundary Integrity." The NRC requested that specific information be provided within 30 days of the date of the Bulletin for facilities that will enter refueling outages before December 31, 2003. All other responses should be provided within 90 days of the date of this bulletin. Southern Nuclear Operating Company (SNC) hereby responds to the 30-day information request set forth in the Bulletin with respect to Vogtle Electric Generating Plant (VEGP) Unit 1 and the 90 day information request set forth in the bulletin for VEGP Unit 2 and Joseph M. Farley Nuclear Plant (FNP) Units 1 and 2.

NRC Request: *All subject PWR addressees are requested to provide the following information. The responses for facilities that will enter refueling outages before December 31, 2003, should be provided within 30 days of the date of this bulletin. All other responses should be provided within 90 days of the date of this bulletin.*

NRC Request 1(a): *A description of the RPV lower head penetration inspection program that has been implemented at your plant. The description should include when the inspections were performed, the extent of the inspections with respect to the areas and penetrations inspected, inspection methods used, the process used to resolve the source of findings of any boric acid deposits, the quality of the documentation of the inspections (e.g., written report, video record, photographs), and the basis for concluding that your plant satisfies applicable regulatory requirements related to the integrity of the RPV lower head penetrations.*

SNC Response to Request 1(a): As identified in the response to Question 3[1] of the NRC request for additional information on boric acid inspection programs, a VT-2 leak inspection of the RCS pressure boundary is performed at the end of each refueling outage at both FNP and VEGP. The VT-2 inspection is performed after nominal operating pressure and temperature have been achieved per ASME Section XI, Article IWB-5000 requirements. The ASME Section XI inspection includes a thorough visual inspection of the entire RCS (including all Class 1 components and piping) out to the second closed boundary valve. No portions of the RCS are considered inaccessible for the ASME Section XI inspection, however, a VT-2 inspection of the area under the reactor vessel has not consistently been performed during refueling outages prior to the fall of 2002. During the VEGP Unit 2 fall 2002 outage and FNP Unit 1 spring 2003 outage these VT-2 examinations were performed and did not identify any BMI leakage. For future outages the area under the reactor vessel at FNP and VEGP will receive a regularly scheduled VT-2 inspection during the Class 1 System Leakage Test.

In addition, as identified in response to Question 6[1] of the NRC request for additional information on boric acid inspection programs, RCS operational leakage (identified, unidentified, and pressure isolation valve leakage) is monitored in accordance with technical specification requirements at both FNP and VEGP. Whenever a notable increase in unidentified leakage occurs, an investigation is initiated to determine the source of leakage. Steps that are typically taken to locate the source include: 1) Reviewing recent trends of containment activity, moisture, and sump levels, 2) performing a walkdown of accessible areas of containment, 3) performing a review and investigation of potential closed system leakage paths, and 4) sending a robot into the

bioshield area of containment (at VEGP only). The goal is to ensure that unidentified leakage is maintained sufficiently low to permit identification of new leaks at an early stage.

Other measures which have been implemented to assist in the detection of low levels of RCS leakage include the following:

1) The performance of a semiannual sample and analysis of containment atmosphere for iron concentration,
2) periodic checks of the containment atmosphere radiation monitors for filter paper discoloration, and
3) inspection of containment coolers for chemical deposits during each refueling outage. Any such discoloration or chemical deposits (e.g.; boric acid) are required to be analyzed and a plan developed to determine their source.

Once evidence of a possible RCS leak is identified, measures are in place to ensure a report is generated which identifies the location, amount of leakage and/or boric acid residue, apparent source, observable corrosion damage, and apparent impacted components in the leak path. An evaluation is performed to verify the source, verify the extent of existing corrosion damage, assess the potential of further corrosion damage, identify susceptible components in the leak path, and to determine the need for monitoring and corrective actions. As necessary, insulation and/or boron residue is removed to complete the evaluation and assess the material condition of the affected component and any components in the leak path. If RCS pressure boundary leakage is verified as existing, it must be corrected before allowing continued operation.

FNP Visual Examination Results

A visual examination was performed on the outer surface of the RPV bottom head around the 50 – 1.5" OD bottom mounted instrument (BMI) nozzles during the most recent FNP Unit 1 refueling outage (RFO) (spring 2003). No evidence of head material wastage or of leaking or cracked nozzles was found by this examination, but translucent white residue streams were apparent on the bottom head surface near the 0° azimuth.

The white residue streams appeared to have originated from above and run down the RPV to the lowest point, the center of the bottom head. Translucent white residue was also noted on several BMI nozzles. None of this residue exhibited any of the distinctive characteristics of nozzle leakage, and the thinly deposited residue did not prevent verification of the integrity of the penetrations and bottom head surface. No post-inspection cleaning was performed. These inspections met the intent of the MRP recommendations described in letter MRP 2003-017.

A report was submitted by SNC letter NL-03-1387[2] on June 30, 2003 documenting the results of this bare-metal visual inspection.

Enclosure 1

Joseph M. Farley Nuclear Plant and
Vogtle Electric Generating Plant
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VEGP Visual Examination Results

On August 8, 2003, VEGP Unit 2 entered Mode 5 to investigate indications of reactor coolant system (RCS) leakage. During this scheduled outage a general visual inspection of the bare metal of the bottom RPV head was performed. This inspection was not required as part of the scheduled outage, but SNC recognized this outage as providing a window of opportunity to perform an inspection for information only. Insulation panels were removed at 0 and 180 degrees to gain access through the insulation. The BMI penetrations showed no sign of leakage and there were no leakage trails from above. The examination was documented by a written report supplemented by video and photographic images supporting the examination findings. A report was not required to be submitted to the NRC for this examination.

NRC Request 1(b): *A description of the RPV lower head penetration inspection program that will be implemented at your plant during the next and subsequent refueling outages. The description should include the extent of the inspections which will be conducted with respect to the areas and penetrations to be inspected, inspection methods to be used, qualification standards for the inspection methods, the process used to resolve the source of findings of boric acid deposits or corrosion, the inspection documentation to be generated, and the basis for concluding that your plant will satisfy applicable regulatory requirements related to the structural and leakage integrity of the RPV lower head penetrations.*

SNC Response to NRC Request 1(b):

Extent of the inspections: SNC intends to perform Visual examinations of the outer surface of the RPV bottom head during the next RFOs at VEGP Unit 1 (fall 2003), VEGP Unit 2 (spring 2004) and FNP Unit 2 (spring 2004). The intent of these inspections is to include a bare metal visual examination of all the Alloy 600 nozzles penetrating the bottom head of the vessel and a general inspection of the bottom head area for indications of wastage or significant corrosion of the low alloy steel vessel. The entire circumference of the interface of each nozzle with the vessel will be evaluated for the presence of any deposits that might indicate leakage from the annulus between the nozzle and the head. These inspections will be performed as recommended in MRP letter MRP 2003-017 dated June 23, 2003. However, if pre-existing conditions do not provide access and a clean surface for baseline and future examinations of some of the RPV lower head penetrations, necessary steps will be taken to enable the performance of these examinations during subsequent refueling outages.

As stated in paragraph 1(a) of this response, a bare-metal visual inspection of each penetration has been performed at the most recent FNP Unit 1 RFO (spring 2003) which met the intent of the MRP recommendations described in letter MRP 2003-017. The schedule and extent of subsequent inspections of the RPV bottom head will be determined pending results of the visual examinations of the outer surface of the bottom head at the next RFOs at VEGP Unit 1 (fall

2003), VEGP Unit 2 (spring 2004) and FNP Unit 2 (spring 2004); the results of the root cause analysis of the BMI leakage at South Texas Project Unit 1 (STP-1); and future industry experience.

Inspection methods: The examination method for the BMI at VEGP Unit 1 (fall 2003),VEGP Unit 2 (spring 2004) and FNP Unit 2 (spring 2004) will be a direct visual aided by remote devices.

Qualification standards: The visual examination procedures will require resolution of the 0.105 inch lower-case character height of the visual acuity card which was taken from the EPRI Head Penetration report[3] as applicable for the lower head penetrations and has been the standard since the 1992 Edition of ASME for VT-3 examinations.

Process used to resolve the source of findings: The process will include evaluations to determine if the findings of leakage are relevant or non-relevant as an RCS leak as well as the source of the leakage. Examples of relevant leakage are identified in the EPRI report[3] supplemented by the as found pictures of the boric acid accumulation at STP-1 at BMI locations #1 and #46 available on the NRC web site to determine characteristics of relevant indications. Unlike the reactor vessel head upper penetrations, the bottom head location has no mechanical connections or seal welds to provide a potential leak source location during normal plant operation that could result in boron accumulation. Refueling cavity leakage, which occurs only during a refueling outage, occurs at low temperature and results in staining without the "popcorn like" accumulation features of an RCS leak at normal operating temperature. The lower head location of the BMI penetrations is also not likely to be affected by settled debris that could mask a visual examination. Tools to evaluate relevant indications of leakage (boron accumulation) would likely include sample collection for chemical and isotopic analysis.

Examples of non-relevant leakage may include thin films or stains of boron or light surface rust having a characteristic of no discernable thickness with no accumulation around the penetration. Non relevant indications would typically have a trail leading to a source which is removed from the BMI penetration. Each case of leakage will be documented identifying if the finding is relevant or non-relevant to leakage from a BMI nozzle. Thin film boron stains or light rust films are not likely to be chemically or isotopically analyzed due to there being an insufficient accumulation for a sample. However, swipes or some other form of retrieval may be used to gather sufficient accumulations of a sample as techniques become available.

Documentation of the inspections: The examinations will be documented by a report supplemented by video and/or photographic images to support the examination findings of relevant or non-relevant leakage.

Basis for concluding that your plant will satisfy applicable regulatory requirements: The technical basis for concluding that applicable regulatory requirements are met for FNP Units 1 and 2 and VEGP Units 1 and 2 is:

1) SNC satisfies applicable regulatory requirements as described in section 3 "Regulatory Requirements" of MRP-48[4] for FNP Units 1 and 2 and VEGP Units 1 and 2. MRP-48 was written as a response to NRC Bulletin 2001-01 with regard to circumferential cracking of RPV head penetration nozzles, but section 3 is equally applicable to lower RPV head penetration nozzles.

2) The addition of supplemental examinations and measures including those which have been implemented or planned to be implemented in response to this and preceding NRC bulletins.

NRC Request 1(c): *If you are unable to perform a bare-metal visual inspection of each penetration during the next refueling outage because of the inability to perform the necessary planning, engineering, procurement of materials, and implementation, are you planning to perform bare-metal visual inspections during subsequent refueling outages? If so, provide a description of the actions that are planned to enable a bare-metal visual inspection of each penetration during subsequent refueling outages. Also, provide a description of any penetration inspections you plan to perform during the next refueling outage. The description should address the applicable items in paragraph (b).*

SNC Response to NRC Request 1(c): SNC intends to perform a bare-metal visual inspection of each penetration during the next refueling outages at VEGP Unit 1 (fall 2003), VEGP Unit 2 (spring 2004) and FNP Unit 2 (spring 2004). However, as stated in paragraph 1(b) of this response, if pre-existing conditions do not provide access and a clean surface for baseline and future examinations of some of the RPV lower head penetrations, necessary steps will be taken to enable the performance of these examinations during subsequent refueling outages. A bare-metal visual inspection of each penetration has been performed at the most recent FNP Unit 1 RFO (spring 2003) which met the intent of the MRP recommendations described in letter MRP 2003-017.

NRC Request 1(d): *If you do not plan to perform either a bare metal visual inspection or non-visual (e.g.; volumetric or surface) examination of the RPV lower head penetrations at the next or subsequent refueling outages, provide the basis for concluding that the inspections performed will assure applicable regulatory requirements are and will continue to be met.*

SNC Response to NRC Request 1(d): SNC is planning bare metal visual inspections at VEGP Unit 1 (fall 2003), VEGP Unit 2 (spring 2004) and FNP Unit 2 (spring 2004) as described above. As stated in paragraph 1(a), a bare-metal visual inspection of each penetration has been performed at the most recent FNP Unit 1 RFO (spring 2003) which met the intent of the MRP recommendations described in letter MRP 2003-017.

Enclosure 1

Joseph M. Farley Nuclear Plant and
Vogtle Electric Generating Plant
Response to NRC Bulletin 2003-02
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Head Penetrations and Reactor Coolant Pressure Boundary Integrity"

NRC Request 2. Within 60 days of plant restart following the next inspection of the RPV lower head penetrations, the subject PWR addressees should submit to the NRC a summary of the inspections performed, the extent of the inspections, the methods used, a description of the as-found condition of the lower head, any findings of relevant indications of through-wall leakage, and a summary of the disposition of any findings of boric acid deposits and any corrective actions taken as a result of indications found:

SNC Response to NRC Request 2:

SNC will provide inspection summaries in response to this request within 60 days after unit restart following the next inspection at VEGP Unit 1 (fall 2003), VEGP Unit 2 (spring 2004) and FNP Unit 2 (spring 2004). A report was submitted by SNC letter[2] documenting the results of the bare-metal visual inspection of each penetration at the most recent FNP Unit 1 RFO (spring 2003).

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[1] SNC letter NL-03-0088, "SNC, FNP Units 1 and 2, Docket Nos. 50-348 and 50-364, VEGP Units 1 and 2, Docket Nos. 50-424 and 50-425, NRC Bulletin 2002-01, Request for Additional Information Response" J. Barnie Beasley, Jr. to NRC, January 17, 2003.

[2] SNC Letter NL-03-1387, "SNC, FNP Unit 1, Docket No. 50-348, Joseph M. Farley Nuclear Plant – Unit 1 Results of Reactor Pressure Vessel Head Inspections Required by Order EA-03-009" J. Barnie Beasley, Jr. to NRC, June 30, 2003.

[3] "Visual Examination for Leakage of PWR Reactor Head Penetrations" (1006296)

[4] EPRI Document MRP-48, "PWR Materials Reliability Program Response to NRC Bulletin 2001-01 (MRP-48)," EPRI, Palo Alto, CA, August 2001. (1006284)