Southern Nuclear
Operating Company, Inc.
Post Office Box 1295
Birmingham, Alabama 35201-1295

Tel 205.992.5000

SOUTHERN COMPANY
Energy to Serve Your World℠

June 21, 2007

Docket No.: 50-425 NL-07-1260

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

Vogtle Electric Generating Plant - Unit 2
Results of Reactor Pressure Vessel Head Inspections
Required by First Revised Order EA-03-009

Ladies and Gentlemen:

On February 20, 2004, the NRC issued the First Revised NRC Order EA-03-009 (Order) to establish interim inspection requirements for reactor pressure vessel (RPV) heads at pressurized water reactors. On March 8, 2004, Southern Nuclear Operating Company (SNC) submitted an answer to the Order which included a request for relaxation of the Order pursuant to the provisions of paragraph IV.F. The relaxation request was in regard to inspections performed under paragraph IV.C.(5)(a) of the Order. The relaxation request was supplemented by SNC letter dated July 1, 2005 and was granted by NRC letter dated September 13, 2005 (TAC Nos. MC7019 and MC7020). In addition, by SNC letter dated May 18, 2006, and supplemented by SNC letter dated June 2, 2006, SNC requested a relaxation of the Order pursuant to the provisions of paragraph IV.F in regard to inspections performed under paragraph IV.C.(5)(b) of the Order. This relaxation request was granted by NRC letter dated August 30, 2006 (TAC Nos. MD1805 and MD1806).

As reported by SNC's June 28, 2004 letter, SNC completed a bare metal visual (BMV) examination of >99% of the RPV top head surface including 360° around each RPV head penetration nozzle during the spring 2004 refueling outage (2R10) at Vogtle Electric Generating Plant Unit 2 (VEGP-2). This examination satisfied the portion of paragraph IV.C.(3) of the Order which specified an inspection meeting the requirements of paragraph IV.C.(5)(a), consistent with the relaxation granted by the NRC (TAC Nos. MC7019 and MC7020).

During the recent spring refueling outage at VEGP-2, SNC completed inspections as required to be performed under paragraph IV.C.(5)(b) of the Order, consistent with the relaxation granted by the NRC (TAC Nos. MD1805 and MD1806). SNC hereby reports the results of those inspections as required by paragraph IV.E of the Order. In addition, this letter reports the results of a visual inspection performed under paragraph IV.D of the Order.

Examinations Required by the First Revised NRC Order EA-03-009, Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors:

As required by paragraph IV.A of the Order, SNC calculated the Effective Degradation Year (EDY) value at the end of the last operating cycle (2R12) for VEGP-2. The EDY value is 3.06 years which places VEGP-2 into the Low (EDY <8) category for susceptibility to primary water stress corrosion cracking (PWSCC) established by Paragraph IV.B. The susceptibility category determines the required examinations and timing of those examinations. An examination was completed during 2R12, satisfying the portion of paragraph IV.C.(3) of the Order which specified an inspection meeting the requirements of paragraph IV.C.(5)(b) consistent with the relaxation request granted by the NRC (TAC Nos. MD1805 and MD1806). Full inspection coverage is not achievable at VEGP for all RPV head nozzles, because of nozzle end geometry. Specifically, the bottom end of these nozzles are externally threaded or internally tapered, or both. The relaxation request granted by the NRC consisted of volumetric examination of each nozzle from 2 inches above the J-groove weld down to the maximum extent possible, with a minimum required inspection distance below the J-groove weld to exceed the 6 effective full power years (EFPY) crack growth evaluation limit. The inspection requirement of paragraph IV.D was also performed on the RPV top head during 2R12.

<u>Paragraph IV.C.(5)(b) Inspection Results:</u>

The examination scope satisfying the portion of paragraph IV.C.(3) of the Order, which specified an inspection meeting the requirements of paragraph IV.C.(5)(b)(i) for VEGP-2, included ultrasonic, eddy current, and leakage assessment of the 78 CRDM penetration nozzles. The scope also included a manual eddy current examination of the RPV head vent line penetration.

Of the 78 CRDM penetration nozzles inspected, none showed detectable degradation. There were no indications of leak paths identified in the shrink fit areas. All penetrations were inspected from 2 inches above the highest point of the root of the J-groove weld (on a horizontal plane perpendicular to the nozzle axis), and 77 penetrations were inspected 1 inch or greater below the toe of the J-groove weld. Penetration number 77 had data collected from less than 1 inch below the lowest point at the toe of the J-groove weld, but in all cases coverage was achieved in accordance with the relaxed scope requirement. There was one surface geometry indication identified during the eddy current reactor vessel head vent line penetration examination.

Thermal Sleeve Examinations:

Thermal sleeves were examined for wear and measurements taken at locations where wear was found. Wear of varying magnitudes was found, with more significant wear at nine locations and minimal wear at 23 locations. The wear areas extend, at most, 360-degrees around the thermal sleeves, but at many locations only partially around the thermal sleeve tube. Wear has been found only at penetrations located toward the periphery of the reactor head.

The wear is attributed to the thermal sleeve contacting the inside diameter of the CRDM head adapter tube due to a flow-induced whirling motion of the thermal sleeve. The sleeve-to-adapter contact resulted in wear of material on the outside diameter of the sleeve. The most extensive wear (at 4 unrodded locations, penetrations 62, 63, 64, and 65) thinned the sleeve wall to less than a minimum acceptable thickness when very conservative assumptions were made as to the wear rate for the next cycle of operation, e.g. all wear occurred in the last cycle. Based on the amount of wear found and the probability that the wear will continue, the lower 40 inches of the thermal sleeves (to bottom of funnel) at the 4 unrodded penetration locations have been removed.

An analysis CN-RIDA-07-40, "Thermal Sleeve Wear Criteria Analysis, March 30, 2007," has been performed to determine a minimum wall thickness criterion that would allow continued operation with the thermal sleeves that have exhibited wear. The analysis examined wear, fatigue, and stress intensity for two groups of the highest wearing rodded penetrations. The analysis established a minimum wall thickness and maximum predicted wear depth for the next cycle. Based on eddy-current wear depth measurements and video scans, it was determined that the minimum wall thickness and maximum wear depth limits will not be exceeded for an additional cycle. Prior to the start of the next operating cycle, this condition will be re-evaluated.

Paragraph IV.D Inspection Results:

Visual inspections were performed to identify potential boric acid leaks from pressure-retaining components above the RPV head as required by paragraph IV.D of the Order. No new boric acid residue or evidence attributed to active leakage was found.

The examinations performed were documented by a written report.

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

Sincerely,

B. J. George
Manager, Nuclear Licensing

BJG/DRG/daj

cc: Southern Nuclear Operating Company
Mr. J. T. Gasser, Executive Vice President
Mr. T. E. Tynan, Vice President – Vogtle
Mr. D. H. Jones, Vice President – Engineering
RType: CVC7000

U. S. Nuclear Regulatory Commission
Dr. W. D. Travers, Regional Administrator
Mr. B. K. Singal, NRR Project Manager – Vogtle
Mr. G. J. McCoy, Senior Resident Inspector – Vogtle