June 29, 2005

MEMORANDUM TO: James Lyons, Director
Division of Systems Safety and Analysis

THRU: John N. Hannon, Chief
Plant Systems Branch
Division of Systems Safety and Analysis

THRU: David L. Solorio, Chief
Balance of Plant and Containment Systems Section
Plant Systems Branch
Division of Systems Safety and Analysis

FROM: Ralph Architzel, Senior Reactor Systems Engineer ***/RA JLehning for/***
Balance of Plant and Containment Systems Section
Plant Systems Branch
Division of Systems Safety and Analysis

SUBJECT: REPORT ON RESULTS OF STAFF PILOT PLANT AUDIT– CRYSTAL RIVER ANALYSES REQUIRED FOR THE RESPONSE TO GENERIC LETTER 2004-02 AND GSI-191 RESOLUTION

Generic Letter (GL) 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors," requested that all PWR licensees (1) evaluate the adequacy of the emergency sump recirculation function with respect to potentially adverse effects associated with post-accident debris, and (2) implement any plant modifications the evaluation determined to be necessary. To provide assurance that licensees' sump performance evaluations and any subsequent modifications are performed with adequate quality, in addition to reviewing licensees' generic letter responses, the staff plans to perform sample audits.

Crystal River, Unit 3 (CR3), conducted an evaluation of recirculation sump performance ahead of the schedule requested by GL 2004-02 and volunteered to be a pilot plant for an NRC staff audit. The staff has completed an audit of the CR3 evaluation. The report containing the audit's results is attached to this memorandum. In addition to providing the CR3 licensee feedback on its sump performance evaluation, another primary purpose of the staff's audit report is to serve as a vehicle to inform and potentially improve other licensees' September 1, 2005, responses to GL 2004-02.

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The staff's audit report summarizes the plant modifications planned by the licensee to improve recirculation sump performance, which include:

- Increasing the strainer area from 86 ft^2 to approximately 1140 ft^2
- Reducing strainer opening size from ¼" x ¼" square mesh to 1/8" diameter holes
- Optimizing flow to the sump with a flow distributor, debris interceptor, improved scupper screens, and curbs for the purpose of inducing sedimentation and entrapment of debris
- Installing strainer differential pressure instrumentation to monitor and react to debris accumulation prior to signs of pump performance degradation
- Expanding the trash rack area from 55 ft^2 of horizontal surface to 100 ft^2 of horizontal plus 25 ft^2 of vertical surface to minimize the potential to completely block flow to the strainer
- Installing a trash rack over the fuel transfer canal drain to minimize the potential for holdup of reactor building spray inventory within the refueling canal
- Installing bellmouth flanges to minimize the entrance losses for the flow entering the decay heat suction nozzles in the sump

The staff's audit report provides detailed feedback to the licensee in each section of the licensee's sump performance evaluation (e.g., debris generation, debris transport, head loss), identifying areas that were adequately addressed as well as areas where further analysis or justification may be warranted. The audit report includes a review of the design of the licensee's planned sump modification, and also reviews the licensee's evaluation of upstream and downstream blockage and the other post-accident debris effects identified in GL 2004-02. The audit report concludes by rating each section of the licensee's sump performance evaluation into one of three categories: (1) robust, (2) partially complete with an approach that seems reasonable, and (3) limited information.

Attachment: Pilot Plant Audit Report– Crystal River Analyses Required for the Response to Generic Letter 2004-02 and GSI-191 Resolution

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