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

Edwin I. Hatch Nuclear Plant
Response to Request for Additional Information on
Proposed Criteria for ECCS Strainer Design

Gentlemen:

By letters dated August 30 and October 1, 1996, a response to Nuclear Regulatory Commission (NRC) Bulletin 96-03, "Potential Plugging of Emergency Core Cooling Suction Strainers by Debris in Boiling Water Reactors," was provided to the NRC staff. By letter dated March 25, 1997, Southern Nuclear Operating Company (SNC) submitted detailed descriptions of the proposed resolution approach and the design criteria used for sizing the new suction strainers for Plant Hatch Unit 1. SNC requested NRC staff review and approval of the resolution approach and design criteria by May 15, 1997.

By letter dated May 15, 1997, the NRC staff requested additional information concerning debris generation, new strainer configurations, and the licensing basis concerning credit for containment pressure. The enclosure provides the requested response.

Sincerely,

Lewis Sumner

H. L. Sumner, Jr.

JKB/eb

JE73/1

Enclosure: Response to Request for Additional Information on
Proposed Criteria for ECCS Strainer Design

020019 cc: (See next page.)

cc: *Southern Nuclear Operating Company*
Mr. P. H. Wells, Nuclear Plant General Manager
NORMS

U.S. Nuclear Regulatory Commission, Washington, D.C.
Mr. K. Jabbour, Licensing Project Manager - Hatch

U.S. Nuclear Regulatory Commission, Region II
Mr. L. A. Reyes, Regional Administrator
Mr. B. L. Holbrook, Senior Resident Inspector - Hatch

Enclosure

Edwin I. Hatch Nuclear Plant
Response to Request for Additional Information
on Proposed Criteria for ECCS Strainer Design

By letters dated August 30 and October 1, 1997, a response was provided to Nuclear Regulatory Commission (NRC) Bulletin 96-03, "Potential Plugging of Emergency Core Cooling Suction Strainers by Debris in Boiling Water Reactors." By letter dated March 25, 1997, Southern Nuclear Operating Company (SNC) provided a description of the proposed resolution approach and the design criteria used for sizing the new strainers. SNC will use the analytical methodologies developed by the Boiling Water Reactor Owners Group (BWROG) and contained in the Utility Resolution Guidance (URG) document and vendor test data to establish the required strainer size.

By letter dated May 15, 1997, the NRC staff requested additional information concerning the debris loading, new strainer configuration, and licensing basis concerning credit for containment pressure. Each NRC request, along with SNC's response, is presented below:

1. *NRC Question*

Your estimates of debris generated/transported do not include either calcium silicate or urethane. Please provide your justification for not including them.

SNC Response

The bounding estimate of debris generated consists of approximately 580 ft^3 of fiber. This worst-case break for debris generation is located on the reactor recirculation piping at approximately elevation 153 ft 1 in. No calcium silicate is identified within the zone of influence from this worst-case break. Other postulated breaks that include calcium silicate within the zone of influence result in less debris generated; i.e., approximately 40 lb of calcium silicate and approximately 300 ft^3 of fiber. Urethane is not included in the debris loading, since it represents a type of material that is light and will float on the surface of the suppression pool should it be transported. Consistent with the guidance in the BWROG URG document, debris that floats is not considered since it will not collect on the strainer surface.

2. *NRC Question*

Have you conducted evaluations to demonstrate that the head loss is maximized for the selected break? Your March 25, 1997, submittal appears to focus entirely on maximizing the quantity of fibrous insulation.

SNC Response

The head loss is maximized based on the following:

1. The amount of insulation generated was determined non mechanistically. A break location was chosen that produced the most fiber without determining, mechanistically, where the breaks had a higher probability of occurring. In other words, the criteria applicable to High Energy Line Breaks (HELBs) were not used.

2. Conservative values were used for the generation of sludge (675 lbs) and dust, dirt, rust, and paint chips (520 lbs). The 675 lbs of sludge, for example, is consistent with the 150 lbs per year (225 lbs per cycle times 3 cycles) contained in the URG. The 675 lb value exceeds the expected sludge to be generated. A recent measurement of the sludge removed during the recent Unit 2 refueling outage showed approximately 120 lbs of sludge for the cycle.

It should be noted that the sludge quantity listed in SNC's March 25, 1997, letter was revised from 920 lbs to 675 lbs to remove excessive conservatism. The original value of 920 lbs was based upon volumetric measurements. On Unit 2, actual weights taken during the desludging process showed that the volumetric method was excessively conservative.

3. *NRC Question*

Please describe the transportable materials, and discuss how they were incorporated into the head loss estimate?

SNC Response

The 1.0 ft^2 area of transportable foreign materials included in the design criteria represents a plant-specific value that is intended to represent miscellaneous small foreign material that is conservatively assumed to exist in the suppression pool. The 1.0 ft^2 number is based upon an accounting of the foreign material identified in the suppression pool during the last two desludging processes. The materials are intended to represent items having a specific gravity such that the material could be suspended during emergency core cooling system (ECCS) pump operation and migrate to the suction strainer. Example materials include tie wraps, pieces of duct tape, and wood splinters. The materials are incorporated into the head loss estimate by ensuring that a margin of 1.0 ft^2 is incorporated into the strainer design specifically for this item.

4. *NRC Question*

Please discuss whether or not you intend to have a dedicated strainer for each pump such that one residual heat removal strainer and two core spray strainers can handle 100 percent of all debris generated/transported? If not, do you intend to use a common header? Please provide sufficient details of your design.

SNC Response

The new strainer design provides a dedicated strainer for each residual heat removal (RHR) and core spray (CS) pump. The current design uses one single strainer for each CS pump and a pair of strainers for each RHR pump. The strainers will be sized such that the total design debris loading is deposited on to one RHR and two CS strainers, proportional to the pump flow rates. For example, during the 0- to 10-minute post-accident time frame, approximately 47% of the debris loading would be allocated to the RHR penetration and approximately 26.5% would be allocated to each of the two core spray penetrations.

5. *NRC Question*

Using the generic methodology provided in the General Electric report as applied to Hatch, describe the characteristics, including the sizes, of the strainers proposed for use at Hatch. What is the actual size of the strainer used in the GE testing? In particular, please provide details regarding the crevices (troughs), etc.

SNC Response

Determination of the final strainer sizing for Plant Hatch is still in progress; thus, a final size for fabrication has not been established. The final sizing is heavily dependent upon NRC staff approval of the design criteria previously submitted. Based on the design criteria contained in SNC's March 25, 1997 letter, and using a sludge loading of 450 lbs., (which represents a minimum sludge loading for the smallest size strainer to meet the regulatory criteria), one strainer per pump has been shown to be acceptable. The strainer size for each RHR pump is approximately 40 inches in diameter by 49 inches in hydraulic length. The strainer size for each core spray pump is approximately 34 inches in diameter by 35 inches in hydraulic length. Additionally, other factors, such as fabrication issues, will likely influence strainer size. For example, fabricating a single size strainer for the RHR and CS pumps is more cost effective even though the design for the core spray strainers results in a smaller size. In any case, the maximum diameter is limited to approximately 40 in. due to the diameter of the access hatch to the torus and anticipated installation interferences.

The new strainers are the stacked-disk design supplied by General Electric (GE). The strainers utilize disks whose internal radius and thickness vary over the length of the strainer. The variation in these parameters achieves an increased surface area compared to conventional strainers of comparable size.

The actual size of the strainers used in GE's testing is provided below. (Reference GE Licensing Topical Report NEDC-32721P for further details.) The stacked-disk strainer No. 2 described in the URG document and the GE-supplied stacked disk strainer have identical measurements.

Flange size	24 in. nominal
Outer diameter	42 in.
Active strainer length	48 in.

6. *NRC Question*

What is the fraction of the insulation contained below the grating in the "worst-case" break?

SNC Response

None of the insulation in the worst case break is below the lowest grating. As a further explanation, the only piping below the grating is recirculation pump suction and discharge piping. Assuming the recirculation line break is at a level low enough to produce damage below the lowest grating it would delete insulation by the allowed assumptions (zone of influence) on the recirculation injection nozzle piping, some of the main steam piping, and some of the feedwater piping. This break would result in less cubic feet of insulation being generated.

7. *NRC Question*

During a call with the licensee on May 13, 1997, the licensee stated that it will maintain the margin with regards to minimum containment pressure available and low-pressure coolant injection (LPCI) net positive suction head required. This is described in the Hatch Unit 1 Final Safety Analysis Report (FSAR) on page 14.4-15. However, this statement is not consistent to the statements with regard to the use of containment overpressure on page E-2 of the March 25, 1997, submittal. In particular, the staff's licensing safety evaluation and the FSAR for Hatch, Unit 1, indicate that credit was taken for 1 psig of containment overpressure for the LPCI pumps, and that no overpressure was taken for the core spray pumps. Please reconcile the docketed information with the information provided in the phone conference.

SNC Response

On page E-2 of SNC's March 25, 1997, letter, the statements addressing the use of containment overpressure are intended to demonstrate that the licensing basis for Unit 1 does not require full conformance with the requirements of NRC Safety Guide 1. The Hatch the amount of containment pressure available for NPSH considerations. The Hatch Unit 1 FSAR (page 14.4-15) states that a minimum margin between containment pressure and the pressure required for adequate NPSH is approximately 5 psi for the LPCI pumps and over 6 psi for the core spray pumps. The section continues to state that the core spray pumps have adequate NPSH at atmospheric pressure; however, there is a time period when 1 psig (of the 5 psig minimum available) of containment pressure is needed for LPCI to have adequate NPSH. As previously stated, this is the 1 psig discussed in the SER.

In reviewing the applicable licensing basis for Plant Hatch Unit 1, SNC determined that the appropriate method to maintain the licensing basis is relative to preserving the margin between the minimum containment pressure required for adequate NPSH and the calculated containment pressure stated in section 14.4 (page 14.4-15) of the Unit 1 FSAR. The stated margin is approximately 5 psi for the LPCI pumps and over 6 psi for the core spray pumps. Consequently, it is established that the containment backpressure reviewed, and allowed, relied on a minimum margin of approximately 5 psi between the calculated pressure and required pressure. By definition, this method required consideration of all appropriate parameters and their relationship as a function of time. As a result, the margin of safety as defined in the current licensing basis will be maintained.