RSB R/F: Vogtle
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APR 16 1984

Marc -
Good Question Set -
Very probing questions
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MEMORANDUM FOR: Elinor Adensam, Chief, Licensing Branch #4
Division of Licensing

FROM: Brian W. Sheron, Chief. Reactor Systems Branch
Division of Systems Integration

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION - VOGTLE ELECTRIC GENERATING STATION

Plant Name: Vogtle Electric Generating Station, Units 1 and 2
Docket No.: 50-424/425
Licensing Status: OL
Responsible Branch: Licensing Branch #4
Project Manager: M. Miller
Review Status: Request for Additional Information

Enclosed with this letter is a set of questions concerning the Vogtle plant. These questions are a result of a review of those sections of 6.3 of the FSAR for which Reactor Systems Branch has primary review responsibility. RSB is continuing its review and will submit additional questions as the evaluation proceeds through the other areas for which we are responsible.

Original signed by:
Brian W. Sheron

Brian W. Sheron, Chief
Reactor Systems Branch
Division of Systems Integration

Enclosure: As stated

cc: R. W. Houston
M. Miller

CONTACT: M. Wigdor, x27592

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DATE	04/16/84	04/16/84	04/16/84				

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REQUEST FOR ADDITIONAL INFORMAITON

GEORGIA POWER CORPORATION

VOGTLE ELECTRIC GENERATING PLANT, UNITS 1 AND 2

DOCKET NOS. 424/425

440.49 (6.3) Because of freezing weather conditions, blocking of the vent line on the RWST has occurred on at least one operating plant. Describe the features you have incorporated into the design that preclude this condition from occurring in the Vogtle plant or otherwise discuss how your ECCS performance analysis accounts for the possibility of this condition occurring. (6.3.2.2.9)

440.50 (6.3) Recent plant experience has identified a potential problem regarding the long-term reliability of some pumps used for long-term core cooling following a LOCA. For all pumps that are required to operate to provide long-term core cooling, describe how you established the period of time the pumps must remain operational following a LOCA, and provide justification that the pumps are capable of operating for this required period of time. This justification could be based on previous testing or on previous operational experiences of identical pumps. Differences between expected post-LOCA conditions and the conditions during previous testing or operational experience cited should be justified (e.g., water temperature, debris, water chemistry). (6.3.4)

440.51. (6.3) So that we may evaluate the dependence of the ECCS equipment on the plant auxiliaries, provide, or reference in the FSAR the following:

(1) A list of all of the primary auxiliary systems required to directly support each ECCS component.

(2) A brief description of the support function performed by the primary auxiliary systems. This should include the ECCS components that are supported and the associated trains.

(3) The method of initiating the primary auxiliaries to provide support to the ECCS.

(4) The additional secondary auxiliaries required to directly support the primary auxiliary specified in (1).

(5) A brief description of this supporting function performed by the secondary auxiliary.

(6) The method of initiating this secondary auxiliary.

(7) For those primary and secondary auxiliary systems required to directly support each ECCS component, discuss the classification you assign to the system (i.e., is it a

safety-related system or component and is it designed to safety-related standards?) and your rationale for this assignment.

Also, discuss the potential for damage to ECCS equipment as a result of an auxiliary system transient such as overpressurization or overheating. (6.3.2)

440.52 (6.3) Table 6.3.2-2 lists the capacity of the accumulator relief valves as 1500 SCFM. Verify that this capacity is adequate to relieve all possible RCS backleakage and that it is adequate to prevent accumulator overpressurization during level adjustments, assuming equipment malfunction or operator error while adding water to the accumulators. Show the relief valve fluid flow rate and temperature assumed in this calculation. (6.3.2.2.14)

440.53 (6.3) Westinghouse has indicated a potential problem associated with the volume control tank level instrumentation and level control system. In some designs a potential single failure could cause loss of suction and subsequent damage to all safety injection pumps. Provide a discussion of this potential problem for the Vogtle plant, and what design modifications you have made to your system to prevent this single failure situation.

What is the safety classification of the volume control tank level control system? In the event of a failure of this system, describe the alarms and procedures that direct the operator to assure an adequate water supply is maintained to the charging pump. (6.3.2)

440.54 (6.3) During our reviews of license applications we have identified concerns related to the containment sump design and its effects on long term cooling following a Loss of Coolant Accident (LOCA).

These concerns are related to (1) creation of debris which could potentially block the sump screens and flow passages in the ECCS and the core, (2) inadequate NPSH of the pumps taking suction from the containment sump, (3) air entrainment from streams of water or steam which can cause loss of adequate NPSH, (4) formation of vortices which can cause loss of adequate NPSH, air entrainment and suction of floating debris into the ECCS and (5) inadequate emergency procedures and operator training to enable a correct response to these problems. Preoperational recirculation tests performed by utilities have consistently identified the need for plant modifications.

We require the following actions to provide additional assurance that long term cooling of the reactor core can be achieved and maintained following a postulated LOCA.

1. Establish a procedure to perform an inspection of the containment, and the containment sump area in particular, to identify any materials which have the potential for

becoming debris capable of blocking the containment sump when required for recirculation of coolant water. Typically, these materials consist of: plastic bags, step-off pads, health physics instrumentation, welding equipment, scaffolding, metal chips and screws, portable inspection lights, unsecured wood, construction materials and tools as well as other miscellaneous loose equipment.

This inspection should be performed at the end of each shutdown as soon as practical before containment isolation.

2. Institute an inspection program according to the requirements of Regulatory Guide 1.82, item 14. This item addresses inspection of the containment sump components including screens and intake structures.

3. Discuss possible actions for the operator to take for both a vortex problem (with consequent pump cavitation) and sump blockage due to debris. These should address all likely scenarios and should list all instrumentation available to the operator (and its location) to aid in detecting problems which may arise, indications the operator should look for, and operator actions to mitigate these problems.

4. Pipe breaks, drain flow and channeling of spray flow released below or impinging on the containment water surface in the area of the sump can cause a variety of

problems; for example, air entrainment, cavitation and vortex formation.

Describe any changes you plan to make to reduce vortical flow in the neighborhood of the sump. Ideally, flow should approach uniformly from all directions.

5. Evaluate the extent to which the containment sump(s) in your plant meet the requirements for each of the items previously identified; namely, debris, inadequate NPSH, air entrainment, vortex formation, and operator actions.

   The following additional guidance is provided for performing this evaluation.

   1) Refer to the recommendations in Regulatory Guide 1.82 (Section C) which may be of assistance in performing this evaluation.

   2) Provide a drawing showing the location of the drain sump relative to the containment sumps.

   3) Provide the following information with your evaluation of debris:

(a) Compare the size of opening in the fine screens with the minimum dimensions in the pumps which take suction from the sump, the minimum dimension in any spray nozzles and in the fuel assemblies in the reactor core or any other line in the recirculation flow path whose size is comparable to or smaller than the sump screen mesh size in order to show that no flow blockage will occur at any point past the screen.

(b) Estimate the extent to which debris could block the trash rack or screens (50 percent limit). If a blockage problem is identified, describe the corrective actions you plan to take (replace insulation, enlarge cages, etc.).

(c) For each type of thermal insulation used in the containment, provide the following information:

(i) type of material including composition and density,

(ii) manufacturer and brand name,

(iii) method of attachment,

(iv) location and quantity in containment of each type,

(v) an estimate of the tendency of each type to form particles small enough to pass through the fine screen in the suction lines.

(d) Estimate what the effect of these insulation particles would be on the operability and performance of all pumps used for recirculation cooling. Address effects on pump seals and bearings.

440.55 (6.3) Provide a discussion of procedures and administrative controls for manually resetting SIS following a LOCA. Specifically address the minimum time after actuation that the SI signal can be reset, and procedures to be followed if a reset were to be followed by a loss of offsite power. (6.3.2)

440.56 (6.3) Certain automatic safety injection signals and certain safety system components, such as accumulators, charging pumps and/or SI pumps, are blocked to preclude unwanted actuation of these systems during normal shutdown and startup operations. Describe the alarms available to alert the operator to a failure in the primary to secondary system for which these blocked systems would be required to mitigate the effects of the failure during this phase of operation and the time frame available for the operator to take the necessary actions to mitigate the consequences of such an accident. If applicable, provide or reference sensitivity studies to demonstrate that these cases are bounded by existing analysis. (6.3.2)

440.57 (6.3) Provide a discussion on excessive boron concentration in the reactor vessel and hot leg recirculation flushing related to long term cooling following a LOCA. During the hot leg recirculation, what will be the minimum expected flow rate in the hot leg and what is the required rate to match boil-off? (6.3.5.4)

440.58 (6.3) Discuss the design provisions for prevention of post-LOCA vortex formation in the containment sump. Discuss any anti-vortex criteria which was utilized during the sump design. (6.3.2.2.9)

440.59 (6.3) The staff will require verification that no vortexing tendencies exist in the containment sump during recirculation phase of a LOCA. Discuss the full scale preoperational tests which will show that under prototypical post LOCA conditions, no adverse flow conditions will occur which could degrade ECCS pump performance. In lieu of full scale in-plant tests, a scale model sump test may be acceptable to the staff. If you chose to conduct a scale model test, provide details of the test program. Include information of the model size, scaling principles utilized, comparison of model parameters to expected post LOCA conditions, and a discussion on how all possible flow conditions and screen blockage will be considered in the model tests. Due to scaling problems, the staff will require that model tests show that considerable margin is available in respect to vortexing tendencies. Rotational flow patterns and surface dimples, which might be acceptable in full scale tests, may not be acceptable in a model program. (6.3.2.2.9)

440.60 (6.3) What is the minimum elapsed time following initiation of LOCA before the operator must initiate switchover from injection to recirculation.

What is the minimum time available to the operator to complete the switchover from injection to recirculation following a LOCA considering the most limiting single failure? How much time is required for the automatic switchover actions? Indicate the time required to complete each manual action identified in Table 6.3.2-7 of the FSAR. Also indicate any other duties the operator would be responsible for at this point in the postulated scenario. (6.3.2.2.9.2)

440.61 (6.3) Describe the instrumentation available for monitoring ECCS performance during post-LOCA operation (injection mode and recirculation mode). Include a description of the instrument location, power supply, and ranging as well as environmental qualification and safety characterization. (6.3.5)

440.62 (6.3) Describe the means provided for ECCS pump protection including monitoring of overcurrent, overspeed, overtemperature and high vibration conditions. (6.3.5)

440.63 (6.3) The Standard Review Plan (NUREG-0800) indicates that ECC testing should include delivery of coolant to the vessel during shutdowns for refueling. Provide or reference a discussion of proposed ECC testing during refueling. (6.3.4)

440.64 (6.3) Certain operator actions are required for the various modes of operation of the ECCS to mitigate the consequences of certain events (i.e., steam line break, small LOCA, large LOCA). For each of these modes of operation, list, along with the required operator actions, the alarms/indications available that would lead the operator to take the appropriate actions. Discuss the time interval assumed in the FSAR analyses between the time the operator is alerted to a condition by these alarms/indications and the time that the operator is assumed to perform the action. (6.3.2.8)

What would be the consequences of performing the required manual action in an incorrect order or accidently omitting one of the sequential actions?

440.65 (6.3) A minimum flow bypass is provided on each safety injection (SI) pump discharge to recirculate flow to the refueling water storage tank (RWST) in the event the pumps are started with the normal injection flow paths unavailable. Normal injection paths could be unavailable for the situation of inadvertent actuation of safety injection while the RCS is at normal operating pressure or in the event of a small LOCA during the period when RCS pressure remains above the shutoff head of the pumps.

The minimum flow bypass line for each pump contains a single motor-operated valve. Downstream of these motor-operated valves the minimum flow bypass lines join and are connected to a single line which terminates in the RWST. In this single line is a single motor-operated valve (8813). If valve 8813 should close while SI pumps are running with the normal injection flow paths unavailable, both SI pumps could be damaged as a result.

Demonstrate that no pump damage will occur as a consequence of the closure of this valve or modify the design of the minimum flow bypass lines. Any proposed design must ensure that (1) no single failure can result in the loss of degradation of both SI pumps and (2) no single failure results in not being able to isolate the RWST during the recirculation phase following the postulated LOCA. Please note that if you rely on the operator to observe the failure and take corrective action, you must provide.

1. A description of the alarms and their setpoints that will alert the operator to the failure.

2. The minimum amount of time after receipt of the alarm that the operator has to correct the situation.

3. A description of the corrective actions that would need to be taken.

Note that if the failure occurred during SBLOCA, an acceptable action would not be to stop the HPI pumps, but rather to manually open the valve. In this case we need to know valve accessibility and the amount of time needed to dispatch an operator to the valve and take the necessary corrective action. We will also need justification why pump damage will not occur during this time internal. (6.3.2.2.9.2)

440.66 (6.3) Please describe the function of PSV-8852, a relief valve in the Boron Recirculation System. Compare the pressure at which this valve lifts and the design pressure of the piping up to the isolation valves with the head of the charging pumps. (6.3.2)

440.67 (6.3) Section 6.3.3.1 discusses the failure of a single steam dump. In your design, could a single failure in the steam dump control circuitry cause more than one steam dump to fail open or inadvertently open? (6.3.3.1)

440.68 (5.4.7) Section 5.4.7.2.4 of FSAR states that the RHRS suction side reliefs have a set pressure of 450 psig. It also states that the RHRS is not isolated from the RCS until a pressurizer bubble is formed and prior to increasing RCS pressure to 600 psig and that the isolation valves receive an automatic close signal at 750 psig. Provide an explanation as to how the RHRS can be kept in service above 450 psig.

440.69 (6.3) The FSAR states that there are manual valves "which could through mispositioning, potentially degrade ECCS performance". Please list these valves and describe the effect their mispositioning would have on the ability to cool the core. Describe the administrative controls, surveillance frequencies and position indication used to ensure and verify proper valve position. (6.3.2.2.17)

440.70 (6.3) Section 6.3.2.5 states that the most ECCS components can be tested on line. Which components are not testable on-line and for which power is not locked out? (6.3.2.5)

440.71 (6.3) Please explain what is meant by "alarm for group monitoring of component" as is stated in Table 6.3.2-5. (6.3.2.2)

440.72 (6.3) What precautions will be taken during the recirculation mode to protect both trains of ECCS pumps when a passive failure in a common suction line is considered? An example is a gross failure of a seal for valve HV8804B which is on the suction line to both SI pumps from RHR train B heat exchanger. How much time is available to the operator to isolate the failure and how much time will it take to detect the failure? (6.3.2.2)

440.73 (6.3) Section 6.3.5.1 lists the temperature indication for the ECCS, however the Refueling Water Storage Tank is not included. Please provide a discussion of the temperature indication for the RWST and its associated piping located outside of the auxiliary building or any other indication that would indicate freezing of the water. (6.3.5.1)

440.74 (6.3) Identify any length of ECCS piping which have normally closed valves and do not have pressure relief in the piping section between the valves. (6.3.2.2.14)

440.75 (6.3) How does the water temperature of the refueling water storage tank assumed in your ECCS performance analysis compare with the maximum expected temperature? Do you propose any tech spec limit on the maximum refueling water storage tank temperature? If not, what assurances do you provide that the maximum temperature will not exceed that assumed in your ECCS analysis?

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