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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

MAR 0 9 1979

Docket Nos. STN 50-498
and STN 50-499

Mr. E. A. Turner
Vice President
Houston Lighting and Power Company
P. O. Box 1700
Houston, Texas 77001

Dear Mr. Turner:

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE SOUTH TEXAS FINAL SAFETY ANALYSIS REPORT (FSAR)

As a result of our continuing review of the South Texas FSAR, we find that we need additional information to complete our evaluation. The specific information required is in the area of mechanical engineering and is listed in the Enclosure. Please note that Request No. 110.16 in the Enclosure is in lieu of Request No. 110.1 which was previously sent to you.

To maintain our licensing review schedule for the South Texas FSAR, we will need responses to the enclosed request by June 11, 1979. If you cannot meet this date, please inform us within seven days after receipt of this letter of the date you plan to submit your responses so that we may review our schedule for any necessary changes.

Please contact us if you desire any discussion or clarification of the enclosed request.

Sincerely,

Olan D. Parr, Chief
Light Water Reactors Branch No. 3
Division of Project Management

Enclosure:
As Stated

cc w/enclosure:
See next page

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110.20 (3.9.3) (Cont'd)

We request that you provide in the FSAR a specific listing of all combinations of dynami . loads and all components for which combination of dynamic responses by the SRSS method is proposed. The listing should specifically include such loads as CBE inertia loads, OBE anchor point movement loads, SSE loads, SRV loads, turbine stop valve closure loads, and LOCA loads (including annulus pressurization).

110.21 (3.9.3.2)

Para. 3.9.3.2.2 describes four possible operability assurance programs that can be used for active pumps in the BOP scope of supply. For program number 3, which discusses utilizing a qualified prototype pump to qualify a "group of similar pumps", provide more specific information, possibly by means of an example, as to how "similarity" is established between the prototype and those in the "similar group" which are considered qualified by virtue of their similarities to the prototype.

110.22 (3.9.3.3) (5.2.2.5)

Criteria are provided in para. 3.9.3.3 of the FSAR for the design and installation for mounting of pressure relief devices. The information provided discusses compliance with Regulatory 1.67 and Code Case 1569. Also reference is made to ASME Cl. 2 and 3 safety valve installations. Para. 5.2.2.5 of the FSAR references para. 3.9.3.3 as applicable for the design of the "mounting" of ASME Cl. 1 pressure relief devices. The information provided in para. 3.9.3.3 is not applicable for the design of closed discharge pressure relieving systems such as that used for the pressurizer safety and relief valves on the South Texas Units. Both the Regulatory Guide and the Code Case referenced, while providing acceptable criteria for the design of open discharge systems, do not contain criteria for the design of closed discharge systems. Provide a description of the methodology used for the design of ASME Cl. 1, 2, and 3 closed discharge systems, specifically including a description of how valve discharge reaction forces for the pressurizer ASME Cl. 1 safety valves are determined and limited as necessary so as not to exceed the loads used by the NSSS supplier for the design of the safety valve mounting brackets on the pressurizer.

110.23 (3.9.3.4) The information provided in response to Request No. 110.4 is partially adequate. It is indicated that additional information concerning the design of hydraulic snubbers will be provided later. Supplement this additional information with the following, regarding the operability assurance of both hydraulic and mechanical snubbers:

(1) Identify and tabulate all mechanical and hydraulic snubbers installed on safety related systems, including:

(a) System identification and location.

(b) Fabrication and rated load capacity.

(c) Function (Shock or Vibration Arrestor, Dual Purpose).

(2) Describe methods and procedures to be used for verifying operability of those snubbers during start up tests

(3) Provide a summary of the contents of the snubber design specification including a description of the snubber suppliers performance qualification tests and load tests.

(4) Commit to provide documentation for verifying operability and non-interference to normal plant operation if additional snubbers are installed after plant start-up.

(5) Provide a summary of system and component structural analyses showing (a) the structural analytical model and (b) a description of the characterization of snubber mechanical properties used in the structural analysis, including considerations such as, differences in tension and compression spring rates, effect of entrapped air and temperature on fluid properties, and other factors affecting snubber character characteristics.

Also provide a summary of the load conditions and transients analyzed, maximum snubber loads, and corresponding piping or component stresses, and a comparison of computed loads and stresses with rated snubber load and component stress intensity limits.

110.23 (3.9.3.4) (Cont'd) (6) Provide an inservice inspection and testing program and discuss accessibility for maintenance and possible repair and replacement of snubbers.

110.24 (3.9.3.2) The exception taken to position C.2.a.(2) and C.2.a.(4) of Regulatory Guide 1.121 in Section 3.2.1 of the FSAR is unacceptable without further justification. The Regulatory Guide recommendation for a 300 percent margin against burst failure, based on normal operating pressure differential, should be satisfied for all types of defects. This margin of safety may be demonstrated either analytically or experimentally. Test data submitted by Westinghouse for certain types of through wall defects have indicated that additional margin remained in the tube beyond the point where bulging occurs. A lower margin of safety may be applicable to these test data, provided it is shown that the remaining strength beyond bulging to gross rupture provides an equivalent margin of safety as recommended in Regulatory Guide 1.121.

On this basis, provide additional information that substantiates the equivalency of the W 200 percent margin, based on W performed tests, to the 300 percent margin recommended by the Regulatory Guide which is related to a somewhat less conservative definition of tube failure. This equivalency must be justified for all types of tube defects. It is our understanding that the South Texas Project term "margin of safety" is to be considered equivalent to "factor of safety" used in Regulatory Guide 1.121.

110.25 (3.9.3) It is indicated in Section 3.9.3.2 of the FSAR that BOP active valves will be qualified for operability under plant conditions when their safety function is relied upon to effect either a plant shutdown or to mitigate the consequences of an accident. It is further indicated that the qualification may be done on a prototype basis. Verify that seismic loadings are considered where applicable during qualification tests. Also describe in sufficient detail the characteristics you consider in determining that a valve is similar to the tested prototype valve, and therefore can be qualified by analysis only.

Provide a discussion of how you establish the "similarity" of valves to a tested prototype. This discussion should include, but not be limited to, characteristics such as valve type, size, geometry, pressure rating, stress level, manufacturer, actuator type, and actuator load rating.

110.26 (3.9.3) (3.6.2) For ASME Class 1, 2, and 3 components that could be exposed to jet impingement or pipe whip impact loads resulting from postulated pipe breaks in adjacent high energy piping, describe the procedure used to determine the stress levels in the targeted components and all other components in the target system resulting from exposure to such loads in combination with those resulting from other applicable loads. Provide specific assurance that the calculated stress levels are kept below ASME Service Level D limits or, if appicable, more conservative limits for active components or where piping functional capability must be assured.

110.27 (3.9.3) Paragraph II.2.c of Section 3.9.3 of the Standard Review Plan specifies five items that require consideration in the design specification for active pumps and valves. Provide a discussion in the FSAR that describes how these items are included in your design specifications.

110.28 (3.9.6) Per 10 CFR 50.55a(g), we require a submittal of your program for inservice testing of ASME Class 1, 2, and 3 pumps and valves. The staff position is delineated in Section 3.9.6 of the Standard Review Plan. Attachment 110-2 provides a suggested format for this submittal and a discussion of the information we require to justify any relief requests. Provide the required information.

110.29 (3.10) (3.9.2) A review of the design adequacy of your safety-related electrical and mechanical equipment under seismic loadings will be performed by our Seismic Qualification Review Team (SQRT). A site visit at some future date will be necessary to inspect and otherwise evaluate selected equipment after our review of the following requested information. The SQRT effort will be primarily focused on the tests or analyses of equipment qualified per the criteria of IEEE Standard 344-1971 and IEEE Standard 344-1975 Attachment. Attachment 110.3 describes the SQRT and its procedures. Section V.2.A of Attachment 110.3 describes the information which SQRT will require to perform its review. Provide this information.

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ENCLOSURE

REQUEST FOR ADDITIONAL INFORMATION

FOR THE REVIEW OF THE FSAR FOR THE

SOUTH TEXAS PROJECT, UNITS 1 AND 2

110.0 MECHANICAL ENGINEERING

110.6 (3.6.2.1) (RSP)

In Section 3.6.2.1.2 of the FSAR, it is stated that intersections of branch lines with the main piping run need not be considered as terminal ends when so justified in the analysis. It is our position that a branch connection to a main run need not be considered as a terminal end when all of the following conditions are met:

(1) The branch and main runs are of comparable size and f[illegible]ity (i.e., the nominal size of the branch is at least one half of that of the main).

(2) The branch and main runs are modeled as a common piping system during the piping stress analysis.

Expand Section 3.6.2.1.2.1.(1) to correspond with this definition of terminal ends.

110.7 (3.6.2.1)

Provide the criteria for postulating break locations in other than ASME Class 1, 2, and 3 piping and indicate the differences in these criteria from the criteria used for ASME Class 1, 2, and 3 piping.

110.8 (3.6.2.1) (RSP)

It is our position that piping between the containment isolation valves for which no breaks are postulated shall receive a 100 percent volumetric examination of all circumferential, longitudinal and branch to main run welds during each inspection interval (IWA-2400 of the ASME Code). Modify Section 3.6.2.1.3.3.5(d) to provide a commitment to such an augmented inservice inspection program.

110.9 (3.6.2.1)

Provide additional information in Section 3.6.2.1.2 to indicate the criteria used for postulating cracks in moderate energy ASME Class 1 piping.

110.10 (3.6.2.1)

Provide additional information in Section 3.6.2.1.2 to indicate the criteria used for postulating cracks in moderate energy piping not designed to seismic Category I requirements.

110.11 (3.6.2.3)

Provide additional information in Section 3.6.2.3.7.2 regarding the design procedures for the pipe whip restraints. The design strain in the yielding type restraints (Fig. 3.6-11) should not exceed 0.5 of the ultimate uniform strain of the material and the design displacement in crushable honeycomb pads should not experience a deflection in excess of that which is defined by the horizontal portion of its load deflection curve.

110.12 (3.10) (3.9.2) It is not clear from the FSAR how the seismic analyses of seismic Category I electrical and mechanical equipment have taken into consideration all three seismic accelerations (i.e., x, y, and z directions) acting on the equipment.

Regulatory Guide 1.92 provides methods acceptable to the staff for combining the responses to the three spatial components of seismic excitation.

Describe how your analyses have considered the three spatial components of seismic excitation.

110.13 (3.9.1) The loading combinations shown in Table 3.9-2.3 indicates that OBE loads in combination with internal pressure, weight, and sustained loads have been evaluated against the emergency stress limits for non-NSSS ASME Class 2 & 3 components. Regulatory Guide 1.48 recommends that stresses resulting from loads associated with the combination of OBE (50% of SSE) and normal or upset plant condition loads be no higher than permitted by the code upset stress limit. Revise the FSAR to be consistent with the Regulatory Guide recommendation or provide justification for use of the less conservative stress limit.

110.14 (3.9.1) Provide the following information regarding the stress limits to be used for bolting materials:

(1) For ASME Class 1 components, provide stress limits to be used for bolting materials for faulted condition loading. Neither ASME Section III nor Appendix F to ASME Section III contains faulted stress (Level D Service Limit) limits for bolts.

(2) For ASME Class 1, 2, and 3 component supports, provide stress limits for bolting materials for both emergency and faulted condition loading. Neither Section III, Appendix XVII nor Appendix F contain emergency or faulted stress (Level C or D Service limit) limits for component support bolts.

110.15 (3.9.3) As recommended by Regulatory Guide 1.70 Rev. 2 "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants", provide in the FSAR a summary of the results of analysis for ASME Class 1 components systems and supports together with critical locations and applicable allowable stresses and deformations.

110.16 (3.9.3) (3.9.2) In lieu of a response to Request No. 110.1, provide the following information. Previous analyses for other nuclear plants have shown that certain reactor system components and their supports may be subjected to previously underestimated asymmetric loads under the conditions that result from the postulation of ruptures of the reactor coolant piping at various locations. It is therefore necessary to reassess the capability of these reactor system components to assure that the calculated dynamic asymmetric loads resulting from these postulated pipe ruptures will be within the bounds necessary to

110.16 (3.9.3) (3.9.2) (Cont'd)

provide high assurance that the reactor can be brought safely to a cold shutdown condition. The reactor system components that require reassessment include:

(1) Reactor pressure vessel.

(2) Core support and other reactor intern

(3) Control rod drives.

(4) ECCS piping that is attached to the primary coolant piping.

(5) Primary coolant piping.

(6) Reactor vessel, steam generator, pressurizer, and pump supports.

The following information should be included in the FSAR about the effects of postulated asymmetric LOCA loads on the above mentioned reactor system components and the various cavity structures.

(1) Provide arrangement drawings of the reactor vessel support systems in sufficient detail to show the geometry of all principal elements and materials of construction.

(2) If a plant-specific analysis will not be submitted for your plant, provide supporting information to demonstrate that the generic plant analysis under consideration adequately bounds the postulated accidents at your facility. Include a comparison of the geometric, structural, mechanical and thermal-hydraulic smilarities between your facility and the case analyzed. Discuss the effects of any differences.

(3) Consider all postulated breaks in the reactor coolant piping system, including the following locations:

   (a) Reactor vessel hot and cold leg nozzles to piping terminal ends.

   (b) Pump suction and discharge nozzles to piping terminal ends.

   (c) Steam generator inlet and outlet nozzles to piping terminal ends. 1/

1/ Postulated steam line breaks may control the design of certain steam generator supports and therefore must also be considered in support design.

110.16 (3.9.3) (3.9.2) (Cont'd)

Provide an assessment of the effects of asymmetric pressure differentials 2/ on the systems and components listed above in combination with all external loadings, including safe shutdown earthquake loads and other faulted condition loads, for the postulated breaks described above. This assessment may utilize the following mechanistic effects as applicable:

(a) limited displacement break areas

(b) fluid-structure interaction

(c) actual time-dependent forcing function

(d) reactor support stiffness

(e) break opening times.

(4) If the results of the assessment in item (3) above indicates loads leading to inelastic action in these systems or displacement exceeding previous design limits, provide an evaluation of the inelastic behavior (including strain hardening) of the material used in the system design and the effect of the load transmitted to the backup structures to which these systems are attached.

(5) For all analyses performed, include the method of analysis, the structural and hydraulic computer code employed, drawings of the models employed, and comparisons of the calculated to allowable stresses and strains or deflections with a basis for the allowable values.

(6) Demonstrate that active components will perform their safety function when subjected to the combined loads resulting from the loss-of-coolant accident and the safe shutdown earthquake.

2/ Blowdown jet forces at the location of the rupture (reaction forces), transient differential pressures in the annular region between the component and the wall, and transient differential pressures across the core barrel within the reactor vessel.

110.16 (3.9.3) (3.9.2) (Cont'd)

(7) Demonstrate the functional capability of any essential piping when subjected to the combined loads resulting from the loss-of-coolant accident and the safe shutdown earthquake.

110.17 (3.9.2.1)

Supplement the preoperational piping vibration test program with sufficient detail information as delineated in Section 3.9.2 of the Standard Review Plan. In addition to recirculation and RHR suction piping, the following should be included:

(1) All safety-related ASME Class 1, 2, and 3 p ping systems.

(2) Other high energy piping systems inside Seismic Category I structures.

(3) High energy portions of systems whose failure could reduce the functioning of any seismic Category I plant feature to an unacceptable safety level.

(4) Seismic Category I portions of moderate energy piping systems located outside containment.

For steady state, transient, and thermal expansion qualification tests, identify the piping systems which are proposed to be inspected visually and those which would be qualified with the aid of instruments. In addition, provide the vibration monitoring requirements, and describe any instrumentation and measurement techniques used and the associated acceptance criteria.

110.18 (3.9)

For active pumps and valves and for all other components (including piping and vessels) required for safe shutdown of the plant, provide assurance that the design criteria, i.e., stress limit, deformation limit etc., which have been utilized to evaluate the acceptability of each such component under exposure to its worst case postulated loading environment, will provide for sufficient component dimensional stability to assure its system functional capability as has been assumed in the FSAR Ch. 15 analyses. Acceptable criteria for piping are provided in Attachment 110-1.

110.19 (3.9.3)

Provide the following information with regard to buckling loads:

(1) Provide the bases for the allowable buckling loads, including the buckling allowable stress limit, under faulted conditions for all NSSS and BOP ASME Class 1 component supports.

110.19
(3.9.3)
(Cont'd)

Also describe the analytical techniques used in determining both the calculated buckling loads under faulted conditions and the critical buckling loads of the ASME Class 1 and 2 component supports.

(RSP)

(2) In FSAR Section 3.9.1.4.7 you state that for all NSSS Class 1 component supports, loads shall not exceed 0.90 times the critical buckling strength. We require that Class 1 component supports meet the following criteria, which are consistent with Regulatory Guides 1.124 and 1.130, and F-1370 of the ASME Code.

Whenever the design of component supports permits loads in excess of 0.67 times the critical buckling strength, verification of the support fuctional adequacy shall be established by full scale experimental testing (II.1252(b)). The results of such tests shall be submitted for NRC review on an individual case basis. It is our understanding that the design criteria for component supports in Appendix F to ASME Section III is currently being reevaluated by the applicable code committee and that some changes to the existing criteria may be made. As an alternative to full scale testing, we will consider any revised criteria after approval by the ASME for inclusion in Appendix F. State your intent with regard to this position.

(3) Provide the allowable buckling loads under faulted conditions for Class 2 and safety-related Class 3 component supports. Criteria consistent with the staff position for Class 1 supports in item (2) above will be acceptable.

110.20
(3.9.3)

For reactor coolant pressure boundary components and supports, we have accepted the use of the Square Root of Sum of Squares (SRSS) methodology for combining dynamic responses resulting from LOCA and SSE. This acceptance is documented in NUREG-0484, "Methodology for Combining Dynamic Responses." At this time we have not accepted the use of SRSS for combining responses from other combinations of dynamic loads and for other components and supports. Our review of the SRSS methodology is continuing and we are concentrating on the Kennedy-Newmark criteria which are being proposed by the BWR Mark-II Owner's Group and the eventual outcome is expected to establish our position and criteria for general acceptance of response combination using SRSS methods.