U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
Division of Quality Assurance, Safeguards, and Inspection Programs
Quality Assurance Branch

Report No.: 50-458/84-18 Supplement 1

Docket No.: 50-458

Licensee: Gulf States Utilities Company
P. O. Box 2951
Beaumont, Texas

Facility Name: River Bend Station

Inspection At: Stone & Webster Engineering Corporation, Cherry Hill Operations Center, Cherry Hill, New Jersey

Inspection Conducted: November 19-21, 1984

Inspection Team Members:

Team Leader	R. E. Architzel, Team Leader, IE
Mechanical Systems	G. Overbeck, Consultant, Westec
Mechanical Components	W. Anderson, Senior Mechanical Engineer, IE
Civil and Structural	R. E. Lipinski, Structural Engineer, NRR
Instrumentation and Controls	L. Stanley, Consultant, Zytor, Inc.
Others	J. L. Milhoan, Section Chief, IE* E. V. Imbro, IDVP Program Manager, IE*

*Part Time

Ralph E. Architzel
Team Leader

1/23/85
Date

Approved By:

James L. Milhoan
Section Chief,
Quality Assurance Branch

1/23/85
Date

1 Background and Persons Contacted

The NRC conducted an Integrated Design Inspection of the River Bend Nuclear Power Plant during April-June 1984. The inspection report was issued on August 29, 1984. The applicant responded to this report in a letter dated October 26, 1984. The NRC reviewed and evaluated the response in conjunction with the reinspection conducted November 19-21, 1984. The purpose of this reinspection was to assess the adequacy and status of actions regarding the Integrated Design Inspection Report.

This report documents the results of the reinspection pertinent to the River Bend Integrated Design Inspection. Licensee action on inspection findings is tabulated by discipline in sections 2 through 6. The following technical and supervisory personnel were contacted.

Name	Title	Organization
L. England	Licensing Supervisor	Gulf States Utilities*
W. Kennedy	Senior Vice President - Manager CHOC	Stone & Webster*
W. Drotleff	Assistant Manager - CHOC	Stone & Webster*
F. Canuso	Project Engineering Assurance Engineer	Stone & Webster*
N. Motiwala	Lead Engineer Mechanics Engineer	Stone & Webster*
R. McMorland	Lead Power Engineer	Stone & Webster*
A. Chan	Manager EMD	Stone & Webster
T. Y. Chang	EMD	Stone & Webster
Y. Wu	Principal Pipe Stress Engineer EMD	Stone & Webster
P. Guha	Lead Controls Engineer	Stone & Webster*
R. McMorland	Lead Power Engineer	Stone & Webster
K. Floyd	Power Principal Engr.	Stone & Webster
J. Gelston	Elec. Principal Engr.	Stone & Webster*
D. Van de Putte	Licensing	Stone & Webster
E. Pierpont	Instr. Principal Engr.	Stone & Webster
W. Liverant	Elec. Principal Engr.	Stone & Webster
B. Gupta	Controls Engineer	Stone & Webster
G. Dotty	Controls Princ. Engr.	Stone & Webster
J. Blyth	Wiring Group Leader	Stone & Webster
A. Cross	Wiring Princ. Engr.	Stone & Webster
A. Giancatarino	EQ Principal Engineer	Stone & Webster
K. Jadeja	Lead Structural Engineer	Stone & Webster*
J. Bisti	Project Engineer - River Bend	Stone & Webster*
R. Berry	Assistant Project Engineer	Stone & Webster*
C. Fonseca	Assistant Manager EMD	Stone & Webster*
W. Chamberlain	Assistant Engineering Manager	Stone & Webster*
T. Szabo	Lead NTD Engineer	Stone & Webster*
L. Dietrich	Lead Licensing Engineer	Stone & Webster*
R. Avrich	Project QA Engineer	Stone & Webster*
M. Gilman	QA Dept. Section Manager	Stone & Webster*
D. Malone	Supervisor, Engineering Assurance	Stone & Webster*
J. Lord	Manager - Engineering Assurance	Stone & Webster*

*Attended exit meeting on November 21, 1984.

2. Mechanical Systems

(Open) Deficiency D2.3-1, Residual Heat Removal Pump Runout Calculation. Gulf States Utilities's response to this deficiency recognizes the basis for the concern and indicates that corrective action will be undertaken. The team reviewed the current status of that activity.

Pump calculations for the high pressure core spray, low pressure core spray, and fuel pool cooling pumps had not been reviewed to ensure that similar problems do not exist in other safety related pump calculations. This review was scheduled to be completed by December 15, 1984. The low pressure coolant injection pump calculation has been revised to reflect the most conservative data and to include a system resistance curve. The results indicate runout flows in loops A, B and C of 6100 gpm, 6000 gpm, and 6080 gpm respectively. Stone & Webster requested that General Electric confirm that the 6100 gpm flow identified above is less than the runout flow allowed for the low pressure coolant injection pumps or to identify the runout flow which is not to be exceeded. General Electric has responded by indicating that the 6060 gpm runout flow (per the requirements of Mode A-2 on the Process Diagram 762E425AA) is required. Since the calculated runout flow exceeds the value permitted by design, Gulf States Utilities will perform a runout test to establish the actual runout condition and will transmit the results to General Electric for acceptance.

Based upon the foregoing this deficiency remains open pending demonstration that the actual runout condition is acceptable and completion of reviews of the other safety related pump calculations.

(Open) Deficiency D2.3-2, Failure To Prepare A Calculation That Meets the Stated Objective. Gulf States Utilities has indicated that Calculation No. PN-283 has been cancelled and that a new calculation will be performed to address the concerns of the deficiency. The team reviewed the current status of that activity.

The calculation is scheduled for completion by December 15, 1984. For the Emergency Core Cooling System cubicles Gulf States Utilities has committed to evaluate the post-accident scenario where a leak may be masked by successful operation of the non-safety related sump pumps when offsite power is available. Consideration of this post-accident scenario coupled with revision of the calculation will resolve the team's concern with respect to the Emergency Core Cooling System cubicles. For the crescent area an Engineering and Design Change Request (E&DCR) has been approved to add a provision for pump back of suppression pool water inventory lost as a result of a post-LOCA passive failure. The E&DCR adds piping, valves and 1E motors to provide a safety related path back to the suppression pool. In addition, safety related level instrumentation has been added to the crescent area sumps. Design analysis to confirm that the pump back is sufficient to prevent flooding of safety related equipment has not been completed. To permit resolution the design analysis of the leakage into the crescent area should be completed and include an evaluation as to what the operator's action will be to detect the location of the leak and to isolate it if the leakage exceeds the capacity of the new pump back system.

Based upon the foregoing this deficiency remains open pending completion of design analyses for the Emergency Core Cooling System cubicles and crescent area.

(Open) Deficiency D2.3-3, Failure to Consider Passive Piping Failures in Emergency Core Cooling System Suction Lines Post-LOCA. Gulf States Utilities has committed to revise Project Procedure PMM-163 to specifically require evaluation of pipe cracks under post-LOCA conditions. The team reviewed the current status of this activity.

Project Procedure PMM-163 has been revised to state that passive failure occurring 24 hours following a LOCA will be evaluated. However, the evaluation method and procedure is to be addressed in a later revision to this Project Management Memorandum.

Based upon the foregoing this deficiency remains open pending Gulf States Utilities's description of the evaluation method and procedure to be followed.

(Closed) Deficiency D2.3-4, Lack of Documented Basis for Sizing Safety Class 2 Equipment. Gulf States Utilities committed to revise Calculation No. PN-048 to incorporate the basis for selecting 50 gpm as the fill pump design flow. The team reviewed the current status of this activity.

Calculation PN-048 has been revised to clearly identify the makeup capacity of the Emergency Core Cooling System fill systems after consideration of boundary valve leakage and recirculation flow for pump cooling. The engineering judgment used to conclude that the excess capacity is sufficient to fulfill the system's functional requirements has been documented within the calculation.

(Closed) Deficiency D2.3-5, Insufficient Low Pressure Core Spray Fill Pump TDH. Gulf States Utilities committed to revising calculation No. PN-048 based upon the latest available information, and the suitability of the existing subsystem fill pumps will be reverified based upon the results of this revision. The system design is concerned with leakage makeup flowrate at a pressure capable of reaching the highest point in the discharge portion of the system. The team reviewed the current status of that activity.

Calculation PN-048 has been revised to correct the total dynamic head (TDH) calculation for the low pressure cooling system fill pump. In addition the revised calculation used the vendor pump head curve. The calculation also corrected similar deficient items with respect to the other Emergency Core Cooling System fill pumps.

(Open) Deficiency D2.3-6, Preoperational Tests for Confirming Compliance with System Design Bases. An error was made in the preparation of the Residual Heat Removal preoperational test procedure concerning the verification of maximum flow rate of the Residual Heat Removal pumps in the low pressure coolant injection mode. The test procedure was developed to size a non-existent flow orifice. Deficiency D2.3-1 raised the concern that the flow orifice may be needed. Resolution of D2.3-1 will resolve the team's concern with respect to the flow orifices. However, another concern was not sufficiently addressed in Gulf States Utilities's response to this deficiency. The team expressed

the concern that the Gulf States Utilities staff did not develop the low pressure coolant injection portion of the preoperational tests in conjunction with the Stone & Webster design documents and the actual installed system. In response to this concern Gulf States Utilities has indicated that the error is an isolated incident and is not indicative of a program problem. Gulf States Utilities has also committed to sending a memorandum to all startup engineers to reiterate the need to cross-check General Electric documents against the Stone & Webster design documents. Although this action is desirable, it is not sufficient to resolve the team's concerns. To resolve this concern and to close this deficiency, Gulf States Utilities should describe how it arrived at its conclusion that the error was an isolated incident.

Based upon the foregoing this deficiency remains open pending additional information from Gulf States Utilities.

(Open) Deficiency D2.3-7, Preoperational Test to Verify Low Pressure Coolant Injection NPSHa. This deficiency is concerned with verifying that, for Low Pressure Coolant Injection mode of operation, the Residual Heat Removal pumps have sufficient Net Positive Suction Head available (NPSHa). The deficiency addressed two concerns. The first is the correction of the measured NPSHa for the existing barometric pressure at the time of the test. The second is the correction of the measured NPSHa to a specific reference location.

For the first item Gulf States Utilities has committed to revise the low pressure core spray and high pressure core spray test procedures to account for the actual barometric pressure at the time of the test. For the second item Gulf States Utilities has indicated that no action will be taken to reference the NPSH to the pump suction nozzle. In making this statement Gulf States Utilities stated that to do so is contrary to General Electric Test Specification No. 27A5296AG. Gulf States Utilities indicated that this document requires the NPSHa be greater than 5 feet at a reference location 2 feet above the pump mounting flange. Gulf States Utilities further indicates that correcting to the pump suction nozzle would be of no added benefit. There appears to be a disagreement between the General Electric Test Specification and a General Electric process diagram. The latter design document requires that NPSHa be greater than 5 feet at a reference location of 2 feet above the mounting flange assuming saturated conditions of 212 degrees F. The General Electric process diagram also requires a correction be made for the elevation difference between the pump suction centerline and reference location. The acceptance criterion for an acceptable design is a NPSHa greater than Net Positive Suction Head required (NPSHr). Pump performance curves normally show NPSHr referenced to pump suction centerline and if this is the case with the Residual Heat Removal pumps the preoperational test results must be corrected to pump suction centerline. The purpose for saturation conditions at 212 degrees F is to have surface pressure equal vapor pressure. The variance requested by S&W (temperature of 210 degrees F) indicates a need to have surface pressure greater than the vapor pressure in order to meet the stated NPSHa requirement. The 2 degree F requested amounts to an additional 1.25 feet of NPSHa.

Based upon the foregoing this deficiency remains open pending clarification of which General Electric document correctly represents the required condition to be measured and determination that the test procedure accurately reflects that requirement.

(Closed) Deficiency D2.5-6, Design Control of Input to High Energy Line Break Evaluations. In response to this deficiency S&W has revised the procedure to include checking of the High Energy Line Break (HELB) evaluations and guidance for the HELB coordinator and system engineers for the review of unacceptable targets. The team reviewed how the High Energy Line Break evaluations were being controlled and concluded that sufficient control and checking had been incorporated such that the High Energy Line Break evaluations will be a documented design analysis in accordance with Gulf States Utilities's commitments.

(Open) Deficiency D2.7-1, Interim Problem Report. This deficiency involved failure to provide a timely review of NRC IE Information Notice 83-26. In response Gulf States Utilities states that the Interim Problem Report (IPR) was inadvertently routed to the wrong lead engineer. Gulf States Utilities further indicated that this was an isolated case and that no additional corrective action is needed relative to the IPR distribution system. With respect to the adequacy of evaluations performed in response to NRC IE Information Notice 83-26, Gulf States Utilities took exception and indicated that their actions taken to arrive at a response were adequate. However, it is not clear that the information provided demonstrates that the Velan valves will operate successfully for expected Safety Relief Valve operation including cases involving either leaking or stuck open safety relief valves. Gulf States Utilities has committed to subject the Velan vacuum breakers to inservice inspection requirements of ASME XI. Testing and inspection of these valves is considered appropriate; however, the specific inservice inspection requirements are not identified.

Based upon the foregoing this deficiency remains open pending identification of the inservice inspection that will be performed on these valves.

3. Mechanical Components

(Open) Deficiency D3.3-1, Control of Ball Joint Rotation. This deficiency documented a lack of design control of the predicted rotation of ball joints relative to physical limits on such rotation.

Ball joints have a limit of 7.5° arc amplitude of bending rotation. The piping specification provided that 2.5° arc could be used as an alignment tolerance during installation. The input to the stress analysis group from the power group did not require evaluation of the rotation in the ball joint relative to any limit. During the reinspection, the team reviewed the Power Input Control Listing (PICL) for this system, AP-2 Rev. 0, which now specifies that an evaluation be made of the ball joint rotation and that the limit on the movement is 5° arc after consideration of the field tolerance. Also, during the reinspection, it was determined that the inspection program at the site still did not provide for inspecting the installed ball joints for satisfaction of the align-

ment tolerance. This problem was initially identified during the Integrated Design Inspection and all installed ball joints were installed subsequent to the IDI. E&DCR P-13,050 was issued November 20, 1984 for Specification 228.160 to include this tolerance in the inspection requirements. Also, Change C to Quality Assurance Inspection Plan No. R 1228312F0507 Rev. C was issued in the field to include this inspection requirement.

Action is complete on the specifics of this item. Based on the need for a revised response describing the cause, extent, action on this item and action to prevent recurrence of the field inspection omission, this item remains open.

(Closed) Deficiency D3.3-2, Flow Meter Weight. This deficiency documented a deviation from S&W procedures. The assumed weight of the flow meter 1E12*FE was not listed as requiring verification in pipe stress calculation AX-71-AE-Z.

During the reinspection, revised calculation pages were reviewed which show the proper weight of this item.

(Closed) Deficiency D3.3-3, Safety Relief Valve Nozzle Loads. This deficiency documented the lack of consideration and response to a design interface item. The analyst and the reviewer of pipe stress calculation No. 12210-AX-2E-1 overlooked interoffice correspondence which referenced safety valve nozzle load limits provided by General Electric. These loads were not evaluated. Calculated loads exceeded the limits provided. During the reinspection, the team reviewed PICL-AP-2 Rev. 0 which now lists the valves as an interface and references the General Electric interface drawings with the nozzle loading limits. The previously calculated loadings have been communicated to General Electric and were found by General Electric to be acceptable.

(Closed) Deficiency D3.3-4, Transmittal of Valve Acceleration Data. This deficiency documented an isolated error in data transmittal. Data on calculated accelerations of two different valves were transposed in transmittal to the valve qualification group. IOC DEM-P-3595 was issued to correct the transmittal.

(Closed) Deficiency D3.4-1, Valve Modeling. This deficiency documented a lack of compliance with Stone & Webster procedures. In pipe stress calculation No. 12210-AC-2E-1 for main steam line C, six safety relief valves and two isolation valves were each modeled with one eccentric lumped mass. This was a violation of a Stone & Webster procedure requiring modeling using two masses with a flexible yoke.

During the reinspection the team examined a new analytical model used in reanalysis of the line. This model uses two connected masses for each of the valves.

(Closed) Deficiency D3.4-2, Ball Joint Modeling. This deficiency documented lack of compliance with S&W procedures and technical inadequacies in modeling for analysis.

During this reinspection and a visit by one team member in August 1984, the team reviewed the supplemental calculations using revised models which properly model the ball joints. Additional calculations will use these models for the as-built

verification program. The analysis performed was of the highest quality in several respects and contributes to overall understanding of this problem area.

(Closed) Deficiency D3.4-3, Dimensional Discrepancy. This deficiency documented a dimensional discrepancy in the elevation of a pipe support common to two separate stress packages. For the stress package in which the support elevation is incorrectly specified, Stone & Webster will use the actual as-built elevation of the support in the final reconciliation of the stress package, as part of the as-built verification process. The as-built drawings and a revised isometric drawing for the stress analysis now show the proper support elevation.

(Open) Deficiency D3.4-4, Pipe Support Stiffness. A discrepancy between as-built and calculated support stiffness was identified in that stiffness of pipe supports was calculated without consideration of added flexibility of supplementary steel.

During the reinspection it was agreed that a sample of supports for snubbers would be evaluated for the overall support stiffness when the flexibility of supplementary and building support steel is considered. The licensee stated that the results for this sample will be included in a supplemental response. This item remains open pending review of those results.

(Closed) Deficiency D3.4-6, Added Mass for Trapeze Hangers (BOP). This deficiency concerned the failure of Stone & Webster pipe support engineers to add mass for three trapeze hangers contained in a pipe stress package in accordance with a procedure. Stone & Webster reanalyzed the stress package in accordance with the procedure. Stone & Webster will evaluate additional stress packages as part of the as-built verification program. During the reinspection the results of a reanalysis were reviewed which included the mass of the trapeze hanger in the analytic model. The results showed a relatively minor reduction in natural frequency of about 4%.

(Closed) Deficiency D3.4-7, Pipe Functionality Criteria. This item concerned a failure to flag functional capability requirements as an open item in several stress packages prior to the cut off date of February 17, 1984. The licensee response stated that a decision was made to defer systematic evaluation of functionality criteria. An April 13, 1984 memorandum outlined a plan to address functionality criteria prior to or during final verification. Since the licensee indicates that functional capability is being evaluated in accordance with the FSAR commitment, this deficiency is closed.

(Closed) Deficiency D3.4-8, Time Limits on Drawing Revisions. This deficiency concerned the failure to revise drawings in accordance with time limits stipulated in a procedure. The licensee noted that no deficiencies in incorporating drawing revisions presently exist, and that the requirements for incorporation of revisions into piping drawings have been modified to reflect overall project conditions more realistically. S&W procedures have been revised to explicitly provide that the project engineer may waive the time limit requirement.

(Closed) Deficiency D3.4-9, Interoffice Correspondence Control. This item concerned a failure to control interoffice correspondence containing substantive technical information in accordance with the prescribed procedure. The team cited four specific examples. The licensee stated that the primary intent of the procedure "is to provide a method for ensuring later retrievability for those memorandums which must be directly referenced in a SWEC-issued document...". Stone & Webster procedures have been clarified as to that intent.

(Closed) Deficiency D3.5-1, Incomplete Pipe Support Location Plan. This item concerned the omission of a key plan dimension on a pipe support drawing. A construction revision notice has been issued to add the missing dimension to the referenced drawing.

(Closed) Deficiency D3.5-2, Small Bore Seismic Piping Maximum Support Spans. This deficiency concerned a span length on a small bore piping drawing which exceeded the maximum allowable span length tabulated in the FSAR. Calculations have been performed justifying the referenced span length and the FSAR is to be amended.

(Closed) Deficiency D3.5-3, Dynamic Coupling. This item concerned an FSAR commitment which details relative frequency and mass criteria to be used to evaluate the potential for dynamic coupling between seismic category I equipment and supporting structure. During the reinspection the team reviewed the results of the reanalysis of the specific heat exchanger and the results of analysis of other equipment mounted on structural steel supports and found the results acceptable.

(Closed) Deficiency D3.6-1, Applicable ASME Code Edition for Valves. This deficiency documented an isolated discrepancy in a valve specification. The applicable edition of the code was specified differently in two places in the valve specification. This has been corrected.

(Open) Deficiency D3.6-2, Ball Joint Qualification. This deficiency documented two concerns in the qualification of the ball joints for the SRV discharge lines; (a) no test was required to assure the value of the breakaway torque in service, and (b) inadequacies in the documentation of the Stone & Webster review of the vendors reports on qualification. Stone & Webster committed to rereview the vendor reports to document the justification for accepting the reports. Changes are to be made to the specification as necessary. Stone & Webster also proposed to evaluate three alternatives for establishing a value for the breakaway moment. A supplemental response will be provided later. This item remains open pending NRC review of the supplemental response.

(Closed) Unresolved Item U3.4-1, Added Mass of Trapeze Hangers (NSSS). This unresolved item documented a concern similar to that of Deficiency D3.4-6 in that the suspended mass of a trapeze support was not included in the pipe stress analysis. The justification provided in the response is acceptable and supported by the review of results in resolving Deficiency D3.4-6.

4. Civil/Structural

(Closed) Deficiency D4.3-1, Calculation of Lumped Masses. The inspector confirmed that the calculations have been revised (Calculation Set 201.130-085, pp. A1 through A190, Rev. 1, dated 9/25/84) and that the computer program "MASS" has been added to the calculation set.

(Closed) Deficiency D4.3-2, Concrete Strength of Drywell. The effects of strength of concrete on stiffness properties were discussed. In view of change of concrete strength due to aging, the stiffness properties are calculated on the basis of the nominal compressive strength. Consequently, a certain amount of inaccuracy is inherent in the calculations regardless of the strength of concrete used. Additionally, the stiffness is not sensitive to the strength of the concrete. The team confirmed that Stone & Webster documented its decision not to revise the stiffness properties (Calculation 201.130.124 p. 15, Rev. 1, dated 10/29/84).

(Open) Deficiency D4.3-3, Effect of Torsion/Rocking on Amplified Response Spectra (ARS). To assess the extent of conservatism in the present RBS design ARS's, a study (Preliminary Soil-Structure Interaction Study, RBS 12210-201.130-164, Rev. 0, dated 3/26/84) was performed on the Standby Diesel Generator Building to account for one of the areas of conservatism in the present analysis, radiation damping in soil. Frequency-dependent impedance functions were generated by Stone & Webster for the layered soil as elastic half space. These impedance functions were then included in a frequency-domain time-history analysis of the soil-structures system to generate ARS's at various floors, represented as lumped masses in the structural model. The artificial time-history based on R.G. 1.60 was used as the input ground motion for the time-history analysis.

Comparison of the ARS's generated in the study with the present RBS design ARS shows that the present design ARS's are higher by a factor of 3 or more. This confirms that the ARS's generated at the center-of-mass of each floor are very conservative for River Bend and that it is not necessary to account for secondary effects due to the variation in locations of equipment on a floor.

The team concluded that, although Stone & Webster conclusions appear to be valid, the two methods of analysis should be studied in a more detailed manner so that the basis for comparison could be evaluated. This item remains open for further review by the NRC.

(Closed) Deficiency D4.3-4, Vertical Frequencies of Floor Systems. To show that the floors in Category I Buildings for River Bend Station respond in the rigid range of ARS (greater than 10Hz) for seismic events, control and auxiliary building floors were reviewed (Reference 1). The rigid range of ARS curves is in the area of the curve where the response is flat. Areas of floors which were least rigid were selected for study to maximize the effect of floor flexibility, if any, under a seismic event.

Stone & Webster provided sample vertical amplified response spectra for the two structures which show that the acceleration is uniform for frequencies higher than 10Hz. The analysis was performed by Stone & Webster by two methods. In the first method, frequencies of structural components such as slabs, beams, and girders were computed individually using Reference 2. In the second method (for the control building only), all of these structural components were also analyzed as an integral system and eigenvalues were determined using the computer program "STRUDL". The floor frequencies obtained above were then modified using Reference 2 to consider the effects of equipment (unit coolers for auxiliary building and chiller for control building). Floor frequencies in all cases were found to be greater than 10Hz and are in the rigid range of the ARS's for the control and auxiliary buildings. The team concluded that Stone & Webster demonstrated that the structures at the RBS are sufficiently rigid to warrant the assumption that flexibility of floors can be neglected.

(Closed) Deficiency D4.4-1, Discrepancy Between Calculations and Structural Criteria. Stone & Webster stated that, although there was a discrepancy between the calculations, design criteria and the drawings, the drywell concrete calculations were based on a lower concrete strength and were therefore conservative. The team agrees there is no impact on design. The corrective action to modify the drawings and design criteria appears adequate.

(Closed) Deficiency D4.4-2, Identification of Reviewed Pages. The team confirmed that:

(1) For Calculation No. 201.120-048, the missing reviews have been identified by means of Rev. 1, dated 10/17/84.

(2) For Calculation Set #201.120-070, the seven pages which were not individually signed off have been revised. The revision (Rev. 1, dated 10/12/84) identifies the reviewers on the title sheet.

(3) For Calculation Set #201.120-068 the checkers are identified on the title sheet or on individual pages.

(Closed) Deficiency D4.4-3, Mistaken Cross-Reference in Drawings. During this reinspection the note cross-referencing the information from drawings RC19A to drawing RC59 was deleted (Rev. A dated 11/20/84).

(Closed) Deficiency D4.4-4, Incorrect Capacity Factor. The team reviewed the calculation set No. 201/120-068 and confirmed that the capacity factor has been corrected.

References: (1) "Frequency Calculations for Structural Floor System", 12210-MC20.1, Rev.), dated 9/13/84.

(2) Introduction to Structural Dynamics, John M. Biggs, McGraw Hill Book Co., 1964.

(Closed) Deficiency D4.4-5, Mistakes in Review of Weir Wall Calculations. The team confirmed that Rev. 1, dated 10/17/84, Calculation Set #201.120-048, Weir Wall Design, corrected the subject mistakes.

(Closed) Deficiency D4.6-1, Inadequate Anchorage of Radial Shear Reinforcing. The team reviewed the Calculation Set #120-067 Analysis and Design of Shield Building, Supplementary Calculations, Rev. 1, dated 5/29/84, which indicate that shear reinforcing is not required for the shield building. The team has no further questions on this item.

(Closed) Deficiency D4.6-2, Calculation Procedures. Stone & Webster demonstrated that an attachment was added to the original calculation (Attachment XVI, Rev. 1, dated 5/29/84) by which the missing reviewers have been identified. Each of the reviewers signed an appropriate form acknowledging review of specific pages of the subject calculation. This attachment is a permanent part of the calculation #201.120-067.

Additionally an instruction has been issued (dated 10/29/84) to the staff of the structural group requiring compliance with STP 11.5 and EAP5.3 to prevent recurrence of the situations described in the deficiency. The instruction states that all calculation title pages must have dated signatures of the preparers, reviewer and independent reviewers.

(Closed) Deficiency D4.7-1, Inadequate Anchorage of Vertical Reinforcing Bars into Mat. Stone & Webster originated a program to demonstrate that the embedment of dowels into the reactor building mat is adequate. Elevations of the top of concrete were mapped and the lowest point was selected as indicative of the minimum available embedment. Based on this available embedment of dowels, the strength of concrete necessary to develop the dowels was calculated as 5000 psi.

The team reviewed the test data which indicated that the minimum compressive strength in the areas of concern is 5,000 psi, thus validating the calculations (calculation Set #201.120-096 Rev. 1, dated 11/19/84, Attachment C). The calculations demonstrated that the dowels are properly embedded.

(Closed) Deficiency D4.11-1, Pump Shaft Casing Moment. The team confirmed that the calculations have been prepared to include shear forces due to the pump shaft in the analysis of the auxiliary building foundation mat. (Calculation Set #C66.201 Rev. 3, dated 9/13/84). Addition of the shear forces due to pump shaft casing moments did not affect design of the mat.

(Closed) Deficiency D4.11-2, Mat Shear Design. The team reviewed the calculations for checking shear in the mat, and found them acceptable in accordance with Section 11.10.1(a) of the ACI Code. This section requires that shear be checked at a distance "d" from the face of the support as a "beam shear" and the allowable shear calculated as $2(fc')^{.5}$. Calculation C66-201, Rev. 2, dated 9/13/84 replaced the orignial Rev. 2, dated 4/16/82.

(Closed) Deficiency D4.12-1, Lack of Calculations for Nelson Studs. The team reviewed Calculation #C32.400 Rev. 0, dated 10/1/84 which demonstrated that the beams did not require Nelson studs. The team has no further questions on this item.

(Closed) Deficiency D4.12-2, Qualitative Elimination of Load Combination. During the reinspection, Stone & Webster stated that, after the load combination

equations are compared qualitatively, a numerical assessment is made to identify the equation which will produce the highest stresses for a given design condition. This comparison takes into consideration the load capacity factors as well as the relative contribution of various loadings such as dead loads, earthquake, SRV, etc. As a result of such a comparison, the equation enveloping all other equations is determined and the design is performed for this load combination. The team considers this procedure adequate.

(Closed) Deficiency D4.12-3, Lack of Calculations for Support Angles and Shear in the Concrete Slab. During the follow-up inspection, Stone & Webster stated that all calculations and drawings have been reviewed to assure that the angles are not needed because of stress requirements. Calculation C32.200 p.C32.320.1, Rev. 0, dated 7/12/84 was prepared to demonstrate that concrete alone can support the loads.

(Closed) Deficiency D4.15-1, Checking Procedure Violations, Cable Tray Supports. Stone & Webster demonstrated that the alternate calculation No. ES 400, Reactor Building Cable Tray Supports Attached to Steel Containment, Rev. 0, dated 10/19/83 has been checked as required by Stone & Webster Structural Technical Procedure 11.5 and the original calculation has been voided by Rev. 1, dated 11/20/84. The team considers this action acceptable.

(Closed) Deficiency D4.16-1, Unverified Program PIPERUP. Stone & Webster demonstrated that Section 5 of Appendix C of Design Analysis Outline SA-932-DAO has been deleted by Rev. 4, dated 5/10/84. Accordingly, the PIPERUP program has been eliminated as an analytical tool.

(Closed) Deficiency D4.16-2, Document Control of Reactor Controls Inc. Reactor Controls Inc. (RCI) agreed to place all task files, including computer runs, in Document Control. An additional copy of all task files and computer runs will be placed in a remote warehouse to provide dual storage and protection of records. The original task files and computer runs will be maintained as working documents and controlled by the RCI Analysis Project Engineer or Senior Engineer at each project area by means of a formal signout system. Every 6 months or at the completion of a project, whichever comes first, any task files and computer runs which have been revised will be copied and placed in Document Control and the remote warehouse. The obsolete task files and computer runs will be stamped obsolete and retained or destroyed. Copies may be hard copy, microfiche, or equivalent. The team considers this action acceptable.

(Closed) Deficiency D4.16-3, Inconsistency Between Mathematical Model and Criteria. RCI examined other lines to determine if an overstressed condition resulted from this deficiency. After it was determined that an overstressed condition did not occur, the dimension in Task SA-4835 was corrected and, for traceability purposes, a statement to this effect was placed in all outside drywell insert line task file folders.

(Open) Unresolved Item U4.16-1, Decoupling of Control Rod Drive Piping and Support. The team reviewed the response to this unresolved item and determined the need for the following additional confirmatory information to ensure the adequacy of the analysis of the piping supports:

(1) Detailed description of the method of analysis

(2) Ratio of the mass of piping to the mass of supports

(3) Comparison of the results of the original analysis (without inclusion of the pipe mass) to those which were obtained with the pipe mass included.

5. Electrical Power

(Closed) Deficiency D5.4-1, Inadequate Cable Sizing Calculation Assumptions. The team reviewed a Stone and Webster E-137 cable sizing calculation which referenced both a cable sizing procedure (ETG-IV-4-1) and an equipment protection procedure (EDVM-CHOC-83-18-1). The calculation correctly used the cable sizing procedure to size electric cables, taking into consideration a maximum current value of 55% of locked rotor amperes rather than a maximum current value of 125 to 140% of full load amperes as specified in the latter procedure. In revision 3 of this calculation, a new section was added to clarify the applicability of these two procedures.

(Closed) Deficiency D5.5-1, Cable Installation Routing Error Relative to Pull Ticket. The team had identified that routing of the 1RHSBBK017 power cable did not conform with the cable pull ticket. Subsequently, a series of corrective actions has been taken by Stone and Webster:

(1) Field Quality Control issued Unsatisfactory Inspection Report Number 4000837 on May 16, 1984.

(2) Additional slack has been obtained for this cable so that it could be relocated in the designated cable tray in conformance with the pull ticket.

(3) A separate memorandum regarding the use of Rework Control Forms was circulated to those groups involved with cable routing at the site.

(Open) Unresolved Item U5.5-1, As-Built Conduit Installation Drawings. In lieu of as-built conduit installation drawings, Stone and Webster uses diagrammatic conduit run drawings to provide area-by-area guidance for Site Construction Engineering. This group determines the actual conduit installation location and routing. Since Stone and Webster design drawings do not reflect as-built conduit installation details, the adequacy of fire protection, missile hazard, and similar analyses is dependent upon the accuracy and completeness of plant walk-down activities.

The team believes that added emphasis is needed to assure that the conduit installation is thoroughly considered during these plant walk-downs. The team noted that consideration of conduit location was explicitly stated in the High Energy Line Break Analysis procedure (PMM-152 revision 3 dated 1/4/84), but was not explicitly stated in the Fire Protection or Physical Separation procedures.

Hence, this item remains open pending submittal of a description of the proposed walk-down procedures that addresses the methods to be used for consideration of conduit installation and location.

(Open) Unresolved Item U5.12-1, Standby Diesel Generator Lube Oil Pump Motor Qualification. Ease in starting a main diesel generator is enhanced by the "keepwarm" lube oil circulating pump located off the diesel generator skid. Alarm monitoring, using non-safety-related instrumentation, is provided for this circulating oil loop. The diesel generator manufacturer stated that the "keepwarm" pump is not critical or mandatory for reliable starting and operation of the diesel generator. The team was not provided with the technical basis for this statement.

Several possible options to resolve this concern were discussed among Gulf States Utilities, Stone & Webster, and the team during the reinspection:

(1) upgrade the temperature and/or flow monitoring instruments in the lube oil loop from QA Category II to QA Category I (i.e. Class 1E) to provide a more reliable monitor of lube oil loop failure;

(2) provide administrative controls to monitor the performance of the "keepwarm" pump on a shift basis to provide a more timely indication of lube oil loop failure, or

(3) obtain additional information from the diesel generator qualification test program to confirm the manufacturer's statement that the "keepwarm" pump is not mandatory.

Resolution was not reached for this topic during the reinspection. This item remains open pending further NRC review.

(Closed) Deficiency D5.3-1, Unqualified Limitorque MOV Space Heaters. Limitorque motor operated valve space heaters were not qualified as Class 1E devices since the manufacturer recommends their operation only during prolonged equipment storage. In October 1984, Gulf States Utilities provided oral authorization to Stone & Webster to initiate a program to disconnect the space heater circuit cable for each affected motor operated valve at the Class 1E power supply panelboards. The team determined that implementation of this design change is at a very early stage, and is being scheduled to coordinate with system turnover activities.

(Closed) Deficiency D5.8-2, Analog Wiring Diagram Error for QA Category I Legend. The team re-examined Analog Wiring Diagram 1-1.67, and noted that the QA Category I legend had been added to the drawing by revision 7 on May 4, 1984.

(Closed) Deficiency D5.8-3, Field Deviation Disposition Request Errors. A May 24, 1984 revision to the Field Deviation Disposition Request corrected each of the errors that had been noted by the team.

(Closed) Deficiency D5.10-1, Documents Inconsistent for Leak Detection Instrument Classification. The team identified that the E31*N092 leak detection system instrument was inconsistently classified on various General Electric and Stone & Webster design documents. During the reinspection, the team determined that General Electric Device List DL828E535AA sheet 9 had not been revised. Subsequently, Stone & Webster indicated by telephone that a General Electric Engineering Change Notice numbered NJ60784 had been issued on November 26, 1984 to revise this document by changing the instrument classification from "AI" to "PI." The various documents are now consistent.

(Closed) Deficiency D5.10-3, Instrument Rack Terminal Block Qualification. During review of this concern, Stone and Webster identified eleven local instrument racks that use unqualified CR151B terminal blocks in harsh environment areas. Rather than qualify the terminal blocks, Stone & Webster issued E&DCR number C68095 on August 8, 1984 to eliminate all cable connections at these terminal blocks by substitution with qualified cable splices. At the same time, General Electric Field Deviation Disposition Request LD1-1889 was issued to implement this Stone and Webster design change.

6. Instrumentation and Control

(Open) Deficiency D6.4-1, Standby Service Water System Manual Valves for High Pressure Core Spray Diesel Generator Cooling. The team was concerned with the potential for closure of four manual valves in the HPCS diesel generator jacket cooler loop, the absence of an HPCS system level bypass indication in the event of closure of these valves, and the interdependency of the division 3 HPCS on divisions 1 and 2 cooling loop equipment.

During the reinspection, the team was informed that two design changes are under development that would resolve these concerns. One design change would convert the Standby Service Water System pump 1SWP*P2C from being a division 1 manually initiated pump to being a division 3 automatically initiated pump. The other design change would provide an HPCS system level bypass indication whenever both outlet valves 1SWP*MOV506A and B are not fully open or when inlet valve 1SWP*MOV77A is not fully open or when pump 1SWP*P2C is inoperative. The three concerns identified by the team would be resolved by implementation of these two design changes.

At this time, engineering documentation for these changes has not been prepared; therefore, this item remains open pending submittal of a revised response that includes a commitment to make these two design changes.

(Closed) Deficiency D6.5-2, Standby Diesel Generator Initiation on LOCA Signal. Stone & Webster modified the design drawings on May 4, 1984 to place the Loss of Coolant Accident signal contact multiplication relays on an uninterruptible AC power source for each division. This design change resolves this deficiency.

(Open) Unresolved Item U6.7-1, Periodic Test of the Standby Service Water System. Stone & Webster confirmed that the periodic test provisions of the Standby Service Water System conform with the system level test objective in Regulatory Guide 1.22. With the exception of 8 valves, the remaining portions of the Standby Service Water System can be tested as an integrated system during normal plant operation.

River Bend Technical Specifications state that this system level test is to be performed at 1[illegible] month intervals. This item remains open pending further NRC review of the system level test frequency to determine if it meets the objectives stated in Regulatory Guide 1.22.

(Open) Deficiency D6.9-1, Balance of Plant Accident Monitoring Variables.

With exception of one item, FSAR Table 7.5-2 not including battery current indication, the licensee did not agree that deficiencies exist. This item remains open pending further NRC review of the licensee's response.

(Open) Deficiency D6.6-1, Instrument Setpoint Documentation Inconsistencies. Instrument setpoint value inconsistencies had been identified by the team among Stone & Webster instrument data sheets, loop diagrams, logic diagrams, and setpoint calculations. A formal memorandum on this topic was distributed by Stone & Webster on November 1, 1984 restating that setpoint calculations are the only official source document for setpoint values and that a precautionary note would be added to the affected Stone & Webster design documents as these individual drawings were changed. Several revised drawings containing this note were reviewed, and the Stone & Webster memorandum provides an acceptable solution for this concern. Since this recently enacted method was not reflected in the Gulf States Utilities response, this item remains open pending submittal of a revised response.

(Closed) Deficiency D6.11-1, EQ Analysis Error in Normal Environment Enveloping. In the process of enveloping worst-case environmental conditions imposed on equipment in harsh environmental zones, Stone & Webster had used incorrect values for the normal environmental condition for eight safety-related pressure transmitters in the Standby Service Water and Component Cooling Water Systems. Values of 70 degrees F and 50% relative humidity were used in one analysis instead of worst-case values of 106 degrees F and 90% relative humidity. On June 15, 1984, Stone & Webster issued E&DCR number P40706 to require the use of 122 degrees F and 100% relative humidity values for environmental qualification of these transmitters. These latter values envelope the predicted environment conditions.

(Closed) Deficiency D6.6-3, Instrument Procurement Specification Inconsistency. A minor documentation inconsistency in the maximum range and alarm setpoint for resistance temperature detector 1HVY*RTD24A and B had been noted by the team. The procurement specification listed a maximum temperature of 109 degrees F whereas the corresponding loop and logic diagrams listed an alarm setpoint of 115 degrees F. Subsequently, Stone & Webster prepared the setpoint calculation for these instruments which established 118 degrees F as the maximum alarm setpoint value. The team noted that the procurement specification had been revised to reflect this value.

(Closed) Deficiency D6.13-1, Instrument Change Revision Notice Calculation Reference. An incorrect seismic calculation reference had been noted by the team in Stone & Webster ICRN 316-GE-01 as part of a justification analysis for relocation of several residual heat removal system instruments. The team reviewed a subsequent revision of this ICRN, and confirmed that the correct reference was listed.

7. Exit Interview

A management meeting was held at the conclusion of the inspection on November 21, 1984 to discuss inspection scope and findings as detailed in this report (see Section 1 for Attendees). No written information was provided to the licensee at any time during the inspection.