



GULF STATES UTILITIES COMPANY

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U. S. Nuclear Regulatory Commission
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Gentlemen:

River Bend Station - Unit 1
Refer to: Region IV
Docket No. 50-458/90-02

Pursuant to 10CFR2.201, this letter revises Gulf States Utilities Company's (GSU) response dated September 18, 1990 to the Notice of Violation for NRC Inspection Report No. 50-458/90-02. The inspection was conducted by Messrs. Johnson, Singh and Murphy during the period of January 22 - 26, 1990 of activities authorized by NRC Operating License NPF-47 for River Bend Station - Unit 1 (RBS). This second revision to the original response (dated May 7, 1990) provides a current status and justification for allowing the outboard isolation valve 1B21*MOV*01, for the mainsteam drain lines to remain energized during startup operations.

Changes in the text are denoted by change bars in the margin.

Should you have any questions, please contact Mr. David N. Lorring at (504) 381-4157.

Sincerely,

W. H. Odell
Manager-Oversight
River Bend Nuclear Group

[Handwritten initials]
LAE/PDG/DEB/DNL/JHM/TMH/pg

Attachment

cc: U. S. Nuclear Regulatory Commission
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ATTACHMENT

REPLY TO NOTICE OF VIOLATION 50-458/9002-02
(SEVERITY LEVEL III)

REFERENCES

Response to Violation - Letter from J. C. Deddens to U. S. NRC, dated May 7, 1990.

Notice of Violation - Letter from S. J. Collins to J. C. Deddens, dated April 6, 1990.

Enforcement Conference Summary - Letter from S. J. Collins to J. C. Deddens, dated March 26, 1990.

Notice of Enforcement Conference - Dated March 6, 1990.

Inspection Report - Letter from S. J. Collins to J. C. Deddens, dated February 26, 1990.

Licensee Event Report No. 89-036 - Letter from J. E. Booker to NRC, dated November 16, 1989, Rev. 1 dated January 31, 1990.

VIOLATION

Operating License NPF-47, Section C.10., states that GSU shall comply with the requirements of the fire protection program as specified in "Attachment 4."

Attachment 4 to Operating License NPF-47, "Fire Protection Program Requirements," states that GSU shall implement and maintain in effect all provisions of the approved fire protection program as described in the Final Safety Analysis Report for the facility through Amendment 22 and as approved in the SER dated May 1984 and Supplement 3 dated August 1985 subject to Provisions 2 and 3 below (which are not applicable here).

Tables 2 and 5 of GSU design specification 240.201, "Fire Analysis and Evaluation Criteria and Evaluation Method Including Results and Conclusions for 10 CFR 50, Appendix R Fire Hazards Analysis," part of the approved fire protection program described above, list motor-operated valves for which electrical power is assumed to be removed during plant operations.

Contrary to the above, from November 1985 to October 1989, GSU did not implement and maintain in effect all provisions of the approved fire protection program in that when River Bend Station was operating during this period, electrical power had not been removed from 19 motor-operated valves listed in Tables 2 and 5 of design specification 240.201 as having power removed during plant operations.

REASON FOR THE VIOLATION

Of the nineteen valves assumed in the FHA to have electrical power removed, four were listed in the Final Safety Analysis Report (FSAR), Section 9A.2.1.2, as high/low pressure interface valves. These four valves, plus two additional valves associated with steam condensing mode of residual heat removal (RHR), did have power removed during initial startup. Two of these valves, 1E12*MOV009 and 1E12*MOV040, were subsequently re-energized.

VALVE 1E12*MOV009

Valves 1E12*MOV009 and 1E12*MOV008 are the containment isolation valves for the RHR shutdown cooling mode suction line. This is a high/low pressure interface between the recirculation system and the RHR shutdown cooling mode piping. The FSAR required one of the pair to have electrical power removed. Meeting this requirement of the FSAR also met the assumption for power removal in the FHA.

In Supplement 3 to the Safety Evaluation Report for River Bend Station, August 1985, and a GSU letter dated August 6, 1985, a commitment was made to add a keylock switch in the control circuitry of 1E12*MOV008 to "lock out (block) control of the valve (1E12*MOV008) from both the control room and the remote shutdown panel." The switch was to be installed in the motor control center (MCC) located in the auxiliary building and was not to disable the valve position indication in the control room or the remote shutdown panels.

Modification request (MR) 85-0956 was initiated and installed in November 1985 to add the keylock switch to the control circuitry for 1E12*MOV008. Both valves were then energized. During the design for the MR, the engineer perceived concerns with locating the switch in the auxiliary building at the MCC. There were no keylock switches available that could be qualified for the harsh post accident environment in this area. There was also a concern about operator access to the switch during a post accident environment. Due to these concerns, the keylock switch was relocated to the remote shutdown panel in the control building. In this location, the keylock switch provided easy operator access yet still prevented inadvertent opening of 1E12*MOV008 during a transfer of control from the main control room to the remote shutdown panel.

The design in the MR and the 10CFR50.59 safety evaluation failed to recognize the concerns associated with fire exposure and subsequent spurious actuation of both the 1E12*MOV008 and 1E12*MOV009 valves. With the keylock switch located in the remote shutdown panel and the manner in which it was installed in the control circuitry, a single fire in either the remote shutdown panel or the main control room could cause spurious actuation of both valves. With the electrical power restored to both valves after the MR, the assumptions in the FHA were violated.

An inadequate design analysis for MR 85-0956 is considered to be the root cause for violating the assumptions of the FHA as related to 1E12*MOV009. Several factors contributed to the inadequate design analysis. An inadequate depth of investigation as part of the design development failed to reveal the FHA assumptions. A lack of familiarity with the FHA and no formal training in the requirements of the FHA on the part of individual system engineers

contributed to this oversight of the FHA. Coupled with this was a deviation from the modification procedure. The modification procedure required a fire protection checklist to be completed if fire protection issues were affected. The fire protection checklist was not prepared, and no review by the design fire protection engineer was performed. The lack in depth of documentation in the methods and assumptions used in the FHA contributed not only in the initial oversight but also in the delay in discovery of the problem. The lack of maturity in the engineering organization during the transition of responsibility from the architect/engineer to GSU also contributed to the oversight. At the time of installation of the MR, fire protection engineering responsibility was divided among GSU Nuclear Plant Engineering, GSU Technical Staff, the architect/engineer design office, and the architect/engineer Site Engineering Group.

VALVE 1E12*MOVFO40

Valves 1E12*MOVFO40 and 1E12*MOVFO49 are the system interface isolation valves between the RHR system and the radwaste system. This is considered a high/low pressure interface only during the steam condensing mode of RHR. A license condition prohibits use of the steam condensing mode of RHR at River Bend Station. Due to this, Engineering Evaluation and Assistance Request (EEAR) 87E-0216 was initiated in May 1987 to evaluate re-energizing 1E12*MOVFO40 since it is not a high/low pressure interface valve with steam condensing mode of RHR disabled. The EEAR was answered in June 1987 with the required changes to the FSAR and operating procedures to allow energizing the valve. Included in these operational procedure changes is a revision to AOP-0031, "Shutdown from Outside the Main Control Room". This revision required verification that 1E12*MOVFO40 was in the closed position if the 'A' division of RHR was in shutdown cooling prior to transfer of control from the main control room to the remote shutdown room.

Although subsequent reviews for separation showed that this situation was acceptable, the FHA was not revised at the time to delete the assumption of removing power on this valve. It is not clear that the FHA and its assumptions were considered in the evaluation process. The oversight associated with EEAR 87E0216 can be attributed to the same root causes as associated with MR 85-0956.

REMAINING VALVES

The remaining thirteen valves that had not had electrical power removed as assumed in the FHA remained energized due to oversight during the original preparation of operational procedures in 1985. This oversight was most probably caused by a lack of awareness by the developers of the procedures of the FHA and its assumptions. The FSAR listed only those valves that were required to have power removed due to high/low pressure interface considerations. The valves listed in the FSAR were proceduralized to have power removed but those that were only contained in the FHA were overlooked.

Valve 1B21*MOVFO19 is not a high/low pressure interface valve but does represent a potential loss of coolant path. Valve 1B21*MOVFO19 is an isolation valve for the main steam drain lines. A fire in the main control room could cause spurious actuation of this valve and the other valves in series with this valve. This would allow reactor coolant to bypass the main

steam isolation valves directly to the condenser. Coupled with the Appendix R-required assumed loss of offsite power, the condenser could be pressurized causing the rupture of the air relief diaphragms on the low pressure turbine. Although of minor safety significance, this would represent an uncontrolled discharge to the turbine building atmosphere.

CORRECTIVE ACTIONS WHICH HAVE BEEN TAKEN AND THE RESULTS ACHIEVED

The immediate corrective action that was taken in October 1989 upon discovery of the problem was to remove the electrical power from valves 1E12*MOV009 and 1B21*MOV019. Power was removed from these two valves due to inaccessible locations in the drywell and main steam tunnel. A fire watch was initiated for the other valves along their control circuitry until the separation required by 10CFR50, Appendix R could be verified. By November 13, 1989, the review for adequate separation for those valves was completed verifying that the necessary separation did exist. During that time period, the requirement for removal of power from 1E12*MOV009 and 1B21*MOV019 was verified since adequate separation did not exist for these potential loss of coolant paths. Adequate Appendix R separation does not exist in the main control room for either valve and does not exist in the remote shutdown room for 1E12*MOV009. The verification of divisional separation for thirteen of the valves and removal of power for two of the valves, along with the four valves which have had power removed since 1985, put the plant in a condition that was in compliance with the basis of the FHA for these valves. MR 90-0003 was issued on January 25, 1990 to revise the FHA to reflect the current status of the valves in the plant.

As part of the corrective action, Engineering Analysis performed safety assessments of the spurious opening of 1B21*MOV021 and 1E12*MOV009 due to fires in the main control room and the remote shutdown panel. (Note that 1B21*MOV019 was open with the downstream valve 1B21*MOV021 closed. Therefore, the safety assessment for containment bypass via 1B21*MOV019 focused on the probability of spurious actuation of 1B21*MOV021 due to fire, to create an open bypass pathway.) Details of these assessments are provided in the referenced Licensee Event Report.

The probabilistic risk assessment (PRA) for 1B21*MOV021 indicated that the probability for a steam release from the condenser was approximately $1.9 \text{ E-}04$ over the time the valve was energized. The radioactivity releases from this event were determined to remain below 10CFR20 and 10CFR100 limits. Therefore, the safety significance of this event is low.

The PRA for 1E12*MOV009 examined the likelihood of an interfacing system LOCA and estimated the core damage frequency (CDF) for this event as $5.8\text{E-}08$. This is a factor of 100 below the total CDF of $5.0\text{E-}06$ for RBS. Therefore, the safety significance of this event is also low.

Due to the heightened awareness of the FHA and the lack of incorporation of specific requirements associated with the valves, GSU Quality Assurance performed from January 1 - February 7, 1990 a Safety System Functional Inspection (SSFI) of the FHA as related to the energized valves. The SSFI identified several recommendations for operator actions from the FHA that

were not reflected in the plant Prefire Strategies. The SSFI also identified two instances where the necessary electrical jumpers were not available for potential fire-induced repairs required for equipment necessary to achieve cold shutdown.

The affected Prefire Strategies were revised by March 8, 1990, to add the recommendations for operator action from the FHA. The electrical jumpers and work packages for the repairs necessary to equipment for cold shutdown were fabricated and staged by January 16, 1990.

An initial review of the FHA by Design Engineering was completed in January 1990 to verify the consistency of the existing design and operational procedures. This review was done in conjunction with review of the Prefire Strategies to ensure all actions or plant conditions assumed in the FHA were contained in the Prefire Strategies or other plant procedures. No other inconsistencies other than those already detailed were identified.

In addition to the actions taken to correct the specific condition with the valves and FHA, additional programmatic actions have been taken over the last few years. In 1987, responsibility for fire protection engineering was consolidated in Design Engineering. This minimized the potential for errors due to confusion over engineering responsibility. Procedural compliance has improved throughout River Bend. The need for procedural compliance has been emphasized to all managers and supervisors. The Design Engineering supervisors review and evaluate each QA unsatisfactory finding (unsats) and Quality Assurance Finding Report assigned to Design Engineering. The results of those evaluations are discussed in Design Engineering staff meetings to determine if trends in unsats are developing and to correct those trends early. This has resulted in a significant decrease in the number of unsats generated against Design Engineering documents.

The modification procedure has been revised to require increased depth of design bases evaluation and documentation. This will help preclude an oversight of the FHA and its requirements in the future.

CORRECTIVE ACTIONS WHICH WILL BE TAKEN TO AVOID FURTHER VIOLATIONS

Although the corrective actions that have been taken to date bring the plant into a state of full compliance with the operating license, additional corrective actions are necessary to ensure a similar situation does not occur in the future. The corrective actions are separated into three areas: the FHA and associated procedures, modification requests, and training.

As stated above, an initial review of the FHA has been performed. A final review and verification of the FHA will be performed by an independent contractor. In addition, the independent contractor is to provide fully detailed documentation of the design bases and assumptions of the FHA. Additional verification of the consistency between the FHA and plant procedures will be performed by the independent contractor. This will be followed by another SSFI performed by GSU Quality Engineering to evaluate implementation and effectiveness as outlined in the FHA.

To ensure that no additional modification requests with similar oversights exist, a review of MRS engineered from the time GSU assumed control of the

design modification process to January 20, 1987 will be performed. This review will be done to ensure that adequate documentation exists for potential impact on the FHA. After January 20, 1987, the fire protection checklist was required to be completed for all MRS. If the review of MRS engineered prior to that date indicates the problem may extend beyond January 20, 1987, the scope of the review will be increased.

In order to increase the general awareness of the Fire Hazards Analysis and its requirements, a training program on the FHA is to be developed. The training program will be provided to all engineers who perform modification requests and safety evaluations. In addition to the engineers, the members of the Facility Review Committee and appropriate operations personnel will be given training on the FHA. The training for the operations personnel will include the recommended operator actions that are included in the FHA.

In addition to the corrective actions that are being done to prevent a recurrence, an investigation was performed to allow operations to energize 1B21*MOV019 during startup phases of plant, without continuous operator attendance at the valve's MCC. This investigation evaluated the amount of time that would be required to pressurize the condenser and rupture the air relief diaphragms with the reactor at various power levels and pressures. These times were evaluated to determine at what pressure level or power level adequate time is available for ensuring isolation of the main steam drain lines in the event of a main control room fire.

As described in LER 89-036 Revision 2, submitted to the NRC November 28, 1990, the investigation described in the previous paragraph has been completed. Calculation G13.18.2.7*50-0 conservatively demonstrates that the length of time required to pressurize the main condenser to the low pressure turbine relief diaphragm rupture pressure of 5 psig is approximately 25 minutes. This figure is conservative since assumptions utilized in the calculation were conservative, e.g. reactor pressure vessel at 1050 psia, no circulating water available for condenser, no credit taken for heat sink capacity or volume of low pressure turbines, or condensation of steam in drain piping. This will allow operations to leave valve 1B21*MOV019 energized during start-up operations (only) and without continuous operator attendance at the valve's motor control center. To assure the correct status for valve 1B21*MOV019 during start up operations, procedural changes have been made to: 1) reflect that the valve will be energized, and 2) to require the opening of the breakers and the manual closing of the valve within 25 minutes in the event of a control room fire.

Valve 1E12*MOV009 will remain de-energized during normal operation or until reactor pressure is reduced below 135 psig reactor pressure, which is the system pressure for the shutdown cooling piping. Administrative controls have been implemented to allow station personnel (while at the local motor control centers) to open the valve when needed during normal operations. Operations personnel have assured administrative controls reflect correct valve lineups to show valve 1E12*MOV009 as being closed and de-energized during normal operations.

DATE WHEN FULL COMPLIANCE WILL BE ACHIEVED

As of March 8, 1990, with the issuance of the revised Prefire Strategies, River Bend Station was in compliance with the Fire Protection Program as required by its operating license. Further corrective actions will be accomplished per the following schedule:

- The contract has been awarded to NUS Corporation for the FHA review and documentation, the proposed schedule requires the work to be complete by January 15, 1991.
- Review of the MRs will be complete by February 28, 1991.
- The follow-up SSFI to evaluate the implementation and effectiveness of revised procedures regarding the FHA will be performed by July 1991.
- Implementation of the training program will be complete during the second quarter 1991.