



UNITED STATES
NUCLEAR REGULATORY COMMISSION
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATING TO CONTAINMENT PURGE SYSTEM

GULF STATES UTILITIES

RIVER BEND STATION

DOCKET NO. 50-458

1.0 INTRODUCTION

The containment purge system for the River Bend Station has two 36-inch diameter containment penetrations (one supply and one exhaust). The licensee originally proposed to use the system to continuously purge the containment atmosphere during normal plant operation and shutdown. As indicated in the River Bend Safety Evaluation Report (NUREG-0989), it is the staff's view that purging should be minimized during reactor operation because the plant is inherently safer with closed purge valves than with open valves which require valve action to provide containment isolation. One of the staff's concerns had been the ability of the large purge valves to close against the LOCA transient thus resulting in a large off-site release. However, the staff also recognized that the BWR Mark III containment is different from PWR and other BWR containments in that a large portion of the reactor support systems are located inside containment. Since this design feature requires greater personnel access to support day-to-day operations (e.g., routine inspection, maintenance, surveillance, etc.), containment must be purged to ensure that exposure of personnel to airborne radioactivity is within the maximum permissible concentration allowed in 10 CFR 20. Therefore, the staff required the licensee to provide a detailed justification for the need to purge and an estimate of the number of hours per year that purging was expected over the life of the plant. Subsequently, the staff outlined a nine-point interim program in NUREG-0989, to be based upon operating experience gained during the first cycle of plant operation, that would assess the need and the line sizes of the purge system. The staff also committed to re-evaluate the use of the purge system based on this data.

By letters dated November 8, 1984 and January 31, 1985, the licensee provided its response and commitment to this nine-point interim program. As indicated in Supplement 2 to NUREG-0989, the staff found the licensee's response and commitments to the nine-point plan acceptable with issues which would be resolved based on operating experience gained during the first cycle of plant operation. Accordingly, the River Bend Station was licensed with technical specifications that restricted the use of the 36-inch purge system to 2000 hours per year during Operation Conditions 1, 2, and 3 for the first cycle of operation with a subsequent reduction to 1000 hours per year thereafter.

Supplement 2 issues include the following:

- (1) The licensee was to implement a data collection program during the first cycle of operation to evaluate the operating experience with the purge system. Based on the evaluation of this data, the licensee was to determine the minimum time needed for purging and the minimum size purge line that could be used to satisfy the purging needs. The intent of this issue was: (a) to satisfy item 1.c of Branch Technical Position (BTP) CSB 6-4, "Containment Purging During Normal Plant Operations," which recommends purge lines of approximately eight inches in diameter, and (b) to re-evaluate the technical specification restrictions described above.
- (2) Item 3 of BTP CSB 6-4 states that use of the purge system should be minimized by providing containment atmosphere cleanup systems within the containment. In its response by letter dated November 8, 1984, the licensee indicated that cleanup of containment atmosphere is accomplished through the use of an external purge filter. As indicated in Supplement 2 to NUREG-0989, the staff found this acceptable until the staff completed its evaluation of the report to be submitted at the end of the first refueling cycle.

2.0 EVALUATION

It has been recognized that the use of the containment purge system during normal plant operation must be a balance between maintaining some degree of operational flexibility along with the need to minimize the potential for release of containment atmosphere following a design basis loss-of-coolant accident. Historically, the staff has accomplished these objectives by establishing guidance (e.g., installing purge system lines of approximately eight inches in diameter, incorporating fast closing isolation valves that isolate upon an accident signal, etc.) to minimize the use of purge systems with large containment penetrations during normal plant operation. However, as indicated in BTP CSB 6-4, limiting purge system lines to eight inches in diameter may be overly conservative for the Mark III containment and that larger lines may be justified.

In its response submitted by letter dated November 8, 1984, the licensee indicated that its position was to use the existing (36-inch lines) system for limited purge and did not propose a minimum line size in accordance with the guidance described in BTP CSB 6-4 to support purging operations. In supporting its position, the licensee performed analyses with conservative input parameters to demonstrate the purge valve operability under the design basis LOCA condition. In addition, mechanical stops were installed on the purge valves to limit valve opening to 65 degrees. The analyses including the methodologies and results were submitted for staff review. Based on its review, the staff concluded (as described in Appendix H to the Supplement 2 to NUREG-0989) that the 36-inch purge valves will be capable of closing against the steam/air flow associated with a design basis accident. Therefore, the staff found the licensee's responses acceptable.

By letter dated October 30, 1987, the licensee submitted their evaluation of the purge system during the first cycle of plant operation. While the cycle lasted from November 1985 to September 1987, most of the statistical information was based on operations between January 1, 1987 to September 14, 1987 when the facility was operating at higher power levels, which is more indicative of normal plant operation.

The licensee presented an extensive tabulation of the number of containment entries broken down by discipline (e.g., maintenance, operations, radiation protection, etc.) for this cycle of operation. The containment entries reflected the licensee's containment access management program that was intended to minimize personnel entry into containment. The containment entries were correlated with purging operations. Correlations were also drawn between purging operations and average reactor coolant system activity levels, average reactor coolant system leakage rates in containment, and average containment airborne activity levels.

During the nearly two years covered by the first cycle of plant operation, the licensee reported that the 36-inch purge system was used for a cumulative period of 724.7 hours during Operating Conditions 1, 2 and 3. This was considerably less than the technical specification limit of 2000 hours per year for the first cycle of operation. However, as discussed by the licensee, this data reflected a period of good fuel integrity and low reactor coolant system leakage inside containment which may not be indicative of future operations. During a particular two month period, when higher leakage rates and airborne activities were being experienced, purging operations were such that they could be extrapolated to a rate of 1500 hours per year. In conclusion, the licensee proposed that the technical specification purge limit of 1000 hours per year during Operation Conditions 1, 2 and 3 remain unchanged. Based on its review, the staff finds the current technical specification limitation in the operation of the River Bend purge system adequate and is in agreement with the licensee that changes are not warranted.

3.0 CONCLUSION

In NUREG-0989 the staff recognized that use and limitations of the purge system for the Mark III containments would need to be based on operating experience. Thus, the staff committed to re-evaluate the value of the purge system based on operating experience submitted by the licensee at the end of the first fuel cycle. While the number of hours of purging was less than the technical specification limit, the staff concurs with the licensee's conclusion that the results may not be representative of future operating cycles.

Despite the above, the staff finds it reasonable to conclude that the licensee's containment access management program has reduced personnel entry into containment. This, in turn, has reduced operation of the purge system which was a staff objective. In addition, the licensee has adequately addressed staff concerns about the 36-inch purge valves failing to close thus resulting in a significant radiological release.

Based on the above discussions, the staff finds the current technical specification limitation on the River Bend purge system adequate and is in agreement with the licensee that changes are not warranted. Therefore, the staff finds the licensee's response to the issues described in Supplement 2 to NUREG-0989 including the use of an external purge filter for containment atmosphere cleanup acceptable. It is the staff's position that the licensee's containment access management program be maintained throughout the plant's life in order to provide continued control of personnel entry into containment so that operation of the purge system will be minimized.

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