



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. \_\_\_\_\_ TO FACILITY OPERATING LICENSE NO. NPF-47  
ENERGY OPERATIONS, INC.  
RIVER BEND STATION, UNIT 1  
DOCKET NO. 50-458

1.0 INTRODUCTION

During the River Bend Station (RBS) Engineering and Technical Support Inspection conducted in March and April 1995, it was identified that the steam blowdown load resulting from the Reactor Core Isolation Cooling (RCIC) gland seal failure had not been considered in the original RCIC room heat up analysis performed to comply with the Station Blackout (SBO) rule (10 CFR 50.63). Consequently, the licensee (Entergy Operations, Inc.) re-performed the analysis to evaluate the effect of the failure of the RCIC gland seal on RCIC room temperature during an SBO event. In addition, the licensee revised the classification for valves of no concern for certain containment penetrations. By letter dated October 17, 1995, the licensee provided the summary of the analysis, G13.18.12.4\*26, "RCIC Room Heat Up Analysis," Rev.0 and justifications for revising the classifications of containment isolation valves for certain containment penetrations for the staff to review.

2.0 EVALUATION

2.1 RCIC Room Heat Up Analysis

For the RCIC room heat-up re-analysis, the licensee utilized a general purpose thermal-hydraulics computer program developed for the design, licensing, safety and operating analyses of nuclear power plant containment and for room heat-up calculation. The licensee stated that heat sinks and walls were modeled. In addition, the following conservative assumptions were used in the re-analysis:

- a. The water-tight door between the Residual Heat Removal (RHR) "C" room and the RCIC room is assumed to be air tight.
- b. The steam leakage is 250 lbm/hr (GE design gland seal system steam flow) with a steam condition of 1189 Btu/lbm and starts at the time zero in the SBO event.
- c. An initial temperature of 110°F (based on a 2 year period, 1993-1994, of actual plant data) at relative humidity of 100% is assumed.

- d. The two fire doors (A95/8 and A95/9) at elevation 95'9" are assumed to be open. These doors are fusible and close automatically at 225°F.

The licensee stated that the calculated maximum RCIC room temperature at the time 4 hours in an SBO event is 178°F which is lower than the component environmental qualification temperature of 207°F for RCIC room.

Based on our review, we find the above calculated maximum RCIC room temperature of 178°F meets the intent of the guidance for equipment qualification described in NUMARC 87-00, "Guidelines and Technical Bases for NUMARC Initiatives Addressing Station Blackout at Light Water Reactors." Therefore, we conclude that reasonable assurance of the operability of SBO equipment in the RCIC room under conditions of an SBO event of 4-hour duration has been assessed and found to operable.

## 2.2 Revision of Classifications of Valves of No Concern for RHR Minimum Flow By-pass Line and RCIC Steam Supply Line Containment Penetrations

With respect to containment isolation following an SBO event, five categories of containment isolation valves were established in NUMARC 87-00 as containment isolation valves of no concern. In addition, the licensee (in the original submittals for responses to the SBO Rule) provided justifications for four additional categories of containment isolation valves to be considered as containment isolation valves of no concern.

During the review of the licensee's responses to the SBO Rule, the staff reviewed the RBS containment isolation valves including the licensee's justifications for the four additional categories of containment isolation valves considered as containment isolation valves of no concern. The staff in the Safety Evaluation (dated January 16, 1992) concluded that the containment isolation valve design and operation at the RBS had met the intent of the guidance described in Regulatory Guide (RG) 1.155 and were acceptable.

In the October 17, 1995, submittal, the licensee revised the classifications for the RHR minimum flow by-pass line containment penetration from Category 7 to Category 5. In addition, the licensee replaced the valves 1E51\*MOVFO63 and 1E51\*MOVFO64 (A, B and C) with a downstream DC powered RCIC steam line isolation valve, 1E51\*MOVFO45, to provide containment isolation during an SBO event. The classifications for the RCIC steam line containment penetration was changed from Categories 8 to 6.

These categories are:

- Category 5 - all valves less than 3-inch nominal diameter.
- Category 6 - at least one valve is DC powered.
- Category 7 - at least one valve is normally closed, AC-powered and failing as is.

Category 8 - this valve is normally open, AC-powered, fail as-is, and failure position is acceptable, if not desirable during SBO.

a. Valve 1E12\*MOVFO64 (A, B and C)

Valve 1E12\*MOVFO64 (A, B and C) provides containment isolation for the containment penetration of the RHR minimum flow by-pass following a design-basis accident. However, this valve is normally open and will fail as is on loss of AC power. This is a desirable fail-safe position for RHR pump operation following a design bases accident.

In the event of an SBO, this isolation valve for the containment penetration of RHR minimum flow by-pass would fail in open position. This containment penetration was previously classified as Category 7 and was found acceptable. In the October 17, 1995, submittal, the licensee revised the classification for this penetration from Category 7 to Category 5.

The licensee stated that in the event of an SBO if containment integrity must be established, containment isolation for this penetration is assured for the following reasons:

1. A flow restricting orifice in each mini-flow line is less than 1.6" and thus would limit leakage to that of SBO isolation Category 5 (i.e., under 3").
2. The discharge of the mini-flow line is located below the water level of the suppression pool and thus provided with a water seal.
3. In-line check valve (1E12\*VF046 A, B and C) is downstream of 1E12\*MOVFO64 (A, B and C) and near the penetration and would limit or stop reverse flow from the containment penetration.
4. The mini-flow isolation valve, 1E12\*MOVFO64 (A, B and C) is located near the RHR pump and could be manually closed if required. Manual valve 1E12\*VF018 (A, B and C) located downstream of 1E12\*MOVFO64 (A, B and C) can be closed by a dispatcher operator.

Based on our review and understanding that plant procedures for SBO have provisions to manually close the valves 1E12\*MOVFO64 (A, B and C) and 1E12\*VF018 (A, B and C), we find that the above licensee's justification for the RHR mini-flow containment penetration meet the intent of the guidance described in RG 1.155 for containment isolation during an SBO event. Therefore, we find the licensee's revision of containment isolation classification for the RHR mini-flow containment penetration from Category 7 to Category 5 acceptable.

b. Valve 1E51\*MOVFO45

In a design-basis event, containment isolation valves 1E51\*MOVFO63 and 1E51\*MOVFO64 (A, B and C) provide containment isolation for the RCIC steam supply line containment penetration (1KJB\*Z15). However, these valves are normally open and will fail as is on loss of AC power. This is a desirable fail-safe position for RCIC pump operation. The licensee revised the procedure, AOP-0050, "Station Blackout," to utilize the downstream DC powered RCIC steam line isolation valve, 1E51\*MOVFO45, to provide containment isolation during an SBO event. This RCIC steam supply line containment penetration is changed from Category 8 to Category 6.

Based on our review, we find that the licensee's utilization of the valve, 1E51\*MOVFO45, to provide containment isolation for the RCIC steam supply line containment penetration (1KJB\*Z15) during an SBO event meet the intent of the guidance described in RG 1.155 for containment isolation during an SBO event, and therefore, is acceptable.

3.0 CONCLUSION

Based on our review, we find the licensee's re-analysis of the RCIC room temperature acceptable concluded that reasonable assurance of the operability of SBO equipment in the RCIC room under conditions of an SBO event of 4-hour duration has been assessed and found to be operable. In addition, we find that the licensee's revision of classifications for the containment penetrations of the RHR minimum flow by-pass and the RCIC steam supply does not have any negative impact on the staff's previous conclusions as stated in the Safety Evaluation (dated January 16, 1992) that the containment isolation valve design and operation at the River Bend plant had met the intent of the guidance described in RG 1.155 and were acceptable.

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