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Subject: River Bend Station - Unit 1
Docket No. 50-458
License No. NPF-47
Valve Relief Requests, VRR-71 and VRR-72
File Nos.: G9.5, 224.600

RBF1-94-0053
RBG-41045

Gentlemen:

In accordance with 10CFR50.55a, Entergy Operations, Inc., (EOI) hereby submits Valve Relief Request VRR-71 and VRR-72 (Attachments 1 and 3, respectively) for River Bend Station (RBS). VRR-71 requests relief from defining and verifying maximum accident condition flow for air supply check valves as required by IWV-3500, "Inservice Tests, Category C Valves," with guidance from NRC Generic Letter 89-04, "Guidance on Developing Acceptable Inservice Testing Programs." VRR-72 requests relief from stroke time testing of the main steam safety relief valves (SRVs) as required by IWV-3400, "Inservice Test, Category A and B Valves."

As stated in the recent cover letter accompanying IRR-02 (RBG-40771, dated August 1, 1994), the RBS Inservice Testing (IST) program is undergoing a systematic review in accordance with the long term performance improvement plan (LTPIP), submitted to the NRC on March 28, 1994, (RBG-40428). This program includes, in part, an IST Improvement Plan to upgrade the technical adequacy and functionality of the IST program. During this review it was discovered that the flow through check valves in air supply systems was not measured to verify full flow to the open position as stated in Generic Letter 89-04. Also, the SRVs are ASME Category B active valves and as such are required to be stroke timed.

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VRR-71

ASME Section XI Subsection IWV-3500, "Inservice Tests, Category C Valves," paragraph IWV-3522, "Exercising Procedure," states, in part, that for other types of check valves it shall be shown that disk movement is sufficient to permit flow adequate for the function of the valve. The functional test of the associated component currently performed shows that the disk movement is sufficient to permit adequate flow for the open function of check valves in air and/or gas systems.

Defining and verifying the maximum accident flow through the check valve would not provide additional assurance of the associated component's operability. RBS proposes, as an alternative, functionally testing all safety-related check valves in the following air systems during their associated component and/or system test:

Service Air
Instrument Air
Main Steam
Penetration Valve Leakage Control
Diesel Starting Air
Containment Atmosphere
Leakage Monitoring
Standby Service Water

Forward flow testing of these valves would be verified during these tests. This proposed alternative would provide an acceptable level of quality and safety.

An engineering evaluation (Attachment 2) determined that functionally testing safety-related check valves in the air and/or gas system during their associated component and/or system test provides reasonable assurance of operational readiness and verifies that these valves stroke to the position required to fulfill their open safety function.

VRR-72

ASME Section XI, Subsection IWV-3400, "Inservice Test, Category A and B Valves," paragraph IWV-3411, "Test Frequency," states that category A and B valves shall be exercised at least once every 3 months, except as provided by IWV-3412(a), IWV-3415, and IWV-3416. Paragraph IWV-3413 (b), "Power Operated Valves," states that the stroke time of all power operated valves shall be measured.

Stroke time testing of the SRVs at RBS is impractical since acceptable stroke times approach milliseconds. Instead, each valve will be exercised at least once per 18 months: a) by bench testing, or b) by stroking if the reactor vessel is at a pressure which supports the stroking of the SRVs. When stroking the SRV with the reactor vessel at pressure, steam flow measurements, reactor vessel pressure drop, or acoustic monitoring of the SRV tailpipe would be used to demonstrate that the valve opens.

An engineering evaluation (Attachment 4) of this condition determined that although a stuck open SRV is within the USAR accident analysis, the potential consequences of this event are undesirable, i.e., plant shutdown must be initiated if the valve cannot be closed. The proposed alternative would provide an acceptable level of quality and safety. The safety function of the SRVs is to maintain adequate margin below the peak ASME code allowable pressure in the nuclear system. Granting this relief from the ASME testing requirements will not decrease the valves' capability of fulfilling their safety function.

Your cooperation regarding EOI's request is greatly appreciated. If you have further questions regarding this request, or require additional information, please contact me or my staff.

Very truly yours,

James J. Fisicaro

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attachments

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Attachment 1

VALVE RELIEF REQUEST NO. 71

COMPONENT:	FUNCTION	CLASS	CATEGORY
Air Supply Check Valves in the following systems: Service Air Instrument Air Main Steam Penetration Valve Leakage Control Diesel Starting Air Containment Atmosphere Leakage Monitoring Standby Service Water	Open to allow air flow.	1, 2, or 3	C

TEST REQUIREMENT: IWV-3500 requires a quarterly full-stroke exercise. Position 1 of Generic Letter 89-04 defines full-stroke as the valve's ability to pass maximum accident condition flow.

BASIS FOR RELIEF: Relief is requested from defining and verifying maximum accident condition flow for all air supply check valves.

Defining and verifying full flow through check valves in air systems is typically impractical.

These valves do not have an external/remote means to verify valve position.

Air supply check valves installed in systems are to regulate pressure not flow. These valves will only open when a differential pressure exists across the valve, in which case the valve is only required to open enough to re-establish the pressure. The valves are functionally tested during their associated component and/or system tests. IWV-3522 states, in part, for other types of check

valves, it shall be shown that disk movement is sufficient to permit flow adequate for the function of the valve. The functional test of the associated component shows that the disk movement is sufficient to permit adequate flow for the function of check valves in air and/or gas systems. Defining and verifying maximum accident flow through the check valve would not provide additional assurance of the associated components operability.

ALTERNATE TESTING: All safety related air supply check valves will be functionally tested during their associated component and/or systems test. Forward flow testing of these valves will be verified during these tests.

Attachment 2

VRR-71 ENGINEERING EVALUATION

Background

The ASME Boiler and Pressure Vessel Code requires check valves that are normally closed and whose safety function is to open on reversal of pressure differential to be exercised open by proving that the disk moves promptly away from the seat when the closing pressure differential is removed and flow through the valve is initiated.

NRC Generic Letter (GL) 89-04, "Guidance on Developing Acceptable Inservice Testing Programs," requires that a check valve's full-stroke exercise to the open position be verified by passing the maximum required accident condition flow through the check valve. GL 89-04 defines "maximum required accident condition flow" as at least the largest flow rate for which credit is taken for this component in a safety analysis in any flow condition.

ASME OM Code, Part 10, 1988 Edition, and ASME OM Code, 1990 Edition, Subsection ISTC, require check valves to be exercised in a manner which verifies the obturator travels to the full open or partially open position required to fulfill its function. The Code further requires that the necessary valve obturator movement be demonstrated by exercising the valve and observing that the obturator opens to the position required to fulfill its function.

The design function of air supply check valves installed in systems is to regulate pressure, not flow. These valves will only open when a pressure differential exists across the valve, in which case the valve is only required to open enough to re-establish the pressure. These check valves have no external/remote means to verify obturator position.

Alternate Testing

Relief is requested from the IWV-3500 requirement to full-stroke exercise to the open position and the GL 89-04 Position 1 requirement to define and measure maximum accident condition flow through these air supply check valves.

Defining and verifying full flow through small air supply check valves is typically impractical. Also, there is no external/remote means to verify obturator position for these check valves.

As an alternative to the required testing, all safety-related air supply check valves in the following systems will be functionally tested during their associated component and/or system test.

- Service Air
- Instrument Air
- Main Steam
- Penetration Valve Leakage Control
- Diesel Starting Air
- Containment Atmosphere
- Leakage Monitoring
- Standby Service Water

Safety Evaluation

Since the design function of air supply check valves installed in systems is to regulate pressure and not flow, these check valves will only open when there is a differential pressure across the valve. At that time the check valve will open enough and remain open as long as is necessary to re-establish the pressure.

These check valves do not have a defined flow rate for which credit is taken in any safety analysis.

Conclusion

In summary, functionally testing all safety-related air supply check valves during their associated component and/or system test provides reasonable assurance of operational readiness and verifies that these valves stroke to the position required to fulfill their safety function. Based on the above evaluation, EOI concludes that the subject relief does not constitute a reduction in the overall protection of the public health and safety.

Attachment 3

VALVE RELIEF REQUEST NO. 72

COMPONENT:	FUNCTION	CLASS	CATEGORY
1B21*RVF041A, B, C, D, E, F, and G 1B21*RVF047A, B, C, D, E, AND F 1B21*RVF051B, C, D, and G	1) Provide automatic depressurization of the reactor coolant pressure boundary for small breaks in the nuclear system occurring with a failure to maintain reactor water level. 2) Prevent overpressurization of the nuclear system that could lead to the failure of the reactor coolant pressure boundary. 3) Act as a primary system relief valve which can be manually actuated from the Control Room.	1	B

TEST REQUIREMENT: IWV-3400 requires full-stroke exercise and IWV-3413, "Power Operated Valves" (a), requires the limiting value of full-stroke time of each power operated valve to be measured quarterly.

BASIS FOR RELIEF: Opening a safety/relief valve (SRV) during normal operation would place the plant in a "mini-LOCA" condition if the SRV(s) were to fail in the open position. The amount of steam injected into the suppression pool could cause a rise in suppression pool temperature beyond the technical specification operating limits.

It is impractical to measure stroke times for the SRVs, since the stroke times are on the order of 100 milliseconds (ms). Steam flow measurements and/or acoustic monitoring of the SRV tailpipe will verify that the SRVs have performed their function in less than or equal to 5 seconds. Time "zero" for this stroke time measurement corresponds to the instant the SRV hand switch is placed in the "open" position.

ALTERNATE TESTING: Each valve will be exercised at least once per 18 months: a) by bench testing, or b) by stroking if the reactor vessel is at a

pressure which supports the stroking of the SRVs. A change in SRV position can be directly associated with a certain steam flow rate, a certain reactor vessel pressure drop, or detected by the SRV tailpipe acoustic monitor.

No stroke time measurements will be performed. SRV tailpipe steam flow, reactor vessel pressure drop, or indication on the SRV tailpipe acoustic monitor when the SRV switch is activated will be adequate to demonstrate valve operability.

Attachment 4

VRR-72 ENGINEERING EVALUATION

Background

The ASME Boiler and Pressure Vessel Code requires that each vessel designed to meet Section III be protected from overpressure under upset conditions. The code allows a peak allowable pressure of 110 percent of vessel design pressure under upset conditions. The code specifications for safety valves require that: 1) the lowest safety valve be set at or below vessel design pressure, and 2) the highest safety valve be set so that total accumulated pressure does not exceed 110 percent of the design pressure for upset conditions.

Sixteen safety/relief valves (SRVs) protect against overpressure of the nuclear system. These valves are located on the main steam lines between the reactor vessel and the first isolation valve within the drywell. Each valve has its own separate discharge line which discharges into the suppression pool. The SRVs are balanced type, spring-loaded safety valves provided with an auxiliary power actuated device which allows opening of the valve even when pressure is less than the safety-set pressure of the valve.

The valves open by either of two modes of operation:

1. The safety (pressure) mode of operation is initiated when the direct and increasing static inlet steam pressure overcomes the restraining spring and frictional forces acting against the inlet steam pressure. The disc moves in the opening direction at a faster rate than corresponding disc movements at higher or lower inlet steam pressures. The pressure at which this action is initiated is termed the "popping" pressure and corresponds to the "set pressure" value stamped on the nameplate of the SRV.

2. The relief (power) mode of operation is initiated when an electrical signal is received at any one of the solenoid valves located on the pneumatic actuator assembly. The solenoid valve(s) opens allowing pressurized air to enter into the lower side of the pneumatic cylinder's piston, pushing the piston and rod upwards. This action pulls the lifting nut upward via the lever arm mechanism and thereby opens the valve to allow inlet steam to discharge through the SRV even if the inlet pressure is equal to zero. The pneumatic operator is arranged so that if it malfunctions, it does not prevent the valve disk from lifting if steam inlet pressure reaches the spring lift set pressure.

The SRVs are operated in a relief mode at set points lower than those specified for the safety mode. This ensures sufficient margin between anticipated relief mode closing pressures and valve spring forces for proper seating of the valves.

Alternate Testing

Relief is requested from the IWV-3400 requirement to full stroke exercise theses valves and the IWV- 3413 requirement to measure quarterly the limiting value of full-stroke time of these valves. Instead, each valve will be exercised at least once per 18 months: a) by bench testing, or b) by stroking if the reactor vessel is at a pressure which supports the stroking of the SRVs. When stroking the SRV with the reactor vessel at pressure, steam flow measurements, reactor vessel pressure drop, or acoustic monitoring of the SRV tailpipe would be used to demonstrate valve operability. This proposed alternative would provide an acceptable level of quality and safety.

Several methods are provided for reliable position indication of the main steam SRVs.

1. SRV Discharge Pipe Temperature - One thermocouple is provided on each SRV discharge pipe. A high temperature reading is caused by steam flow in the pipe, and is indicative of the opening of an SRV. The thermocouple outputs are recorded in the main control room. The recorder and thermocouples are powered from a nonessential bus.

2. Acoustic Monitoring of SRV Discharge Pipe - Positive indication of SRV position is provided by acoustic sensors strapped to each SRV discharge pipe. This accelerometer-type sensor detects vibration generated by flow through an open SRV. By using the relationship between valve flow rate and the corresponding vibration level produced by the flow, the valve status is assessed. The acoustic signals are conditioned and preamplified before being fed to the acoustic monitoring panel in the control building. This panel provides individual contact outputs for main control room indicating lights for SRV Open indication, and a common output relay for annunciation in the main control room, when any one of the 16 SRVs is not fully closed. Additional features of the acoustic monitoring system are: a) the system is seismically and environmentally qualified in accordance with IEEE 344-1975 and IEEE 323-1974, respectively, b) the monitoring system and associated main control room indicating lights are powered from a Class 1E power supply, and c) the system has provisions for periodic testing while in operation.

3. Drop in Reactor Pressure - The opening of an SRV allows steam to be discharged into the suppression pool. The sudden increase in the rate of steam flow leaving the reactor vessel causes a mild depressurization transient. This drop in reactor pressure may be used as an indicator that the SRV being tested has opened.

The SRV acoustic monitoring system provides a highly reliable indication of SRV position, while the SRV discharge pipe temperature recorder provides confirmation. Several systems can be used by the operator in conjunction with the SRV pilot-actuation indicating lights (which show that SRV actuation signal is present) to assess proper SRV operation.

SRV control circuitry is tested per VRR-22 which requires that exercise testing of the valves be performed following every refueling outage.

Safety Evaluation

The SRVs provide three main protection functions:

1. Overpressure relief operation - The valves open automatically to limit a pressure rise.

2. Overpressure safety operation - The valves function as safety valves and open (self-actuated operation if not already automatically opened for relief operation) to prevent nuclear system overpressurization.

3. Depressurization operation - SRVs associated with the automatic depressurization system (ADS) open automatically as part of the emergency core cooling system (ECCS) for events involving small breaks in the nuclear system process barrier. There are seven ADS valves.

The safety function of the SRV is a backup to the relief function described previously. The spring-loaded valves are designed and constructed in accordance with ASME Section III, Subarticle NB-7640, as safety valves with auxiliary actuating devices. For overpressure relief valve operation (power mode), each valve is provided with a pressure-sensing device which operates at predetermined set points (Reference RBS USAR Table 5.2-2). When the set pressure is reached, it operates a solenoid air valve which in turn actuates the pneumatic piston/cylinder and linkage assembly to open the valve. The SRVs can be operated in the power mode by remote-manual controls from the main control room.

Under the General Requirements for Protection Against Overpressure as given in Section III of the ASME Boiler and Pressure Vessel Code, credit can be allowed for a scram from the reactor protection system. In addition, credit is taken for the protective circuits which are indirectly derived when determining the required SRV capacity. The backup reactor high neutron flux scram is conservatively applied as a design basis in determining the required capacity of the pressure relieving dual purpose SRVs. Application of the direct position

scrams in the design basis could be used since they qualify as acceptable pressure protection devices when determining the required SRV capacity of nuclear vessels under the provisions of the ASME code.

As discussed in RBS USAR Section 15.1.4, "Inadvertent Safety/Relief Valve Opening," the postulated cause of an inadvertent SRV opening is attributed to malfunction of the valve or an operator-initiated opening. Opening and closing circuitry at the individual valve level (as opposed to groups of valves) is subject to a single failure. The plant operator must reclose the valve as soon as possible and check that reactor and turbine generator output return to normal. If the valve cannot be closed, plant shutdown must be initiated.

Conclusion

In summary, stroke time testing of the SRVs increases the potential of an SRV becoming stuck open. Although a stuck open SRV is within the USAR accident analysis, the potential consequences of this event, i.e., plant shut down, make stroke time testing of the SRVs undesirable. It is also impractical to measure stroke times for the SRVs since acceptable stroke times approach milliseconds. Instead, each valve will be exercised at least once per 18 months: a) by bench testing, or b) by stroking if the reactor vessel is at a pressure which supports the stroking of the SRVs. When stroking the SRV with the reactor vessel at pressure, steam flow measurements, reactor vessel pressure drop, or acoustic monitoring of the SRV tailpipe would be used to demonstrate valve operability. This proposed alternative would provide an acceptable level of quality and safety. Granting this relief from the ASME testing requirements will not decrease the valves' capability of maintaining adequate margin below the peak ASME code allowable pressure in the nuclear system.