Entergy

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Pete Dietrich
Site Vice President

JAFP-09-0087
July 31, 2009

United States Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

SUBJECT: Application for Amendment to Modify the Technical Specifications Requirements for Testing of Safety/Relief Valves
James A. FitzPatrick Nuclear Power Plant
Docket No. 50-333
License No. DPR-59

Dear Sir or Madam:

Pursuant to 10 CFR 50.90, Entergy Nuclear Operations, Inc. (Entergy) hereby requests an amendment to the Technical Specifications (TS) for the James A. FitzPatrick Nuclear Power Plant (JAF).

This license amendment submittal requests modifying the TS requirements for testing of the Safety/Relief Valves (SRVs) by replacing the current requirement to manually actuate each SRV during plant startup with a series of overlapping tests that demonstrate the required functions of successive valve stages.

Attachment 1 provides the Application for Amendment to Modify the Technical Specifications Requirements On Testing of Safety/Relief Valves.
Attachment 2 provides the proposed TS changes as marked up pages.
Attachment 3 provides the proposed TS changes in final typed format with change bars.
Attachment 4 provides the proposed TS Bases changes as marked up pages.
Attachment 5 provides a copy of JAF 4th IST Interval Relief Request VRR-06 (Info Only).

The TS Bases changes are provided for NRC information only. The final TS Bases pages will be submitted with a future update in accordance with TS 5.5.11, "Technical Specifications (TS) Bases Control Program."

Entergy requests NRC approval of the proposed TS amendment by July 31, 2010, with the amendment being implemented within 60 days from approval.

In accordance with 10 CFR 50.91, a copy of this application, with the associated attachments, is being provided to the designated New York State official.

There are no new commitments made in this letter.

A047
NRR

Questions concerning this report may be addressed to Mr. Joseph Pechacek, Licensing Manager, at (315) 349-6766.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on the 31st day of July 2009.

Sincerely,

Pete Dietrich
Site Vice President

PD/JP/ed

Attachments:
1. Application for Amendment to Modify the Technical Specifications Requirements for Testing of Safety/Relief Valves
2. Proposed TS changes, on current marked up pages
3. Proposed TS changes, on typed final format pages
4. Proposed TS Bases change, as marked up pages (Info Only)
5. Proposed James A. FitzPatrick Fourth IST Interval Relief Request VRR-06 (Info Only)

cc: next page

cc:

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JAFP-09-0087

Attachment 1

Application for Amendment to Modify the Technical Specifications Requirements for Testing of Safety/Relief Valves

1.0 DESCRIPTION

The proposed amendment would modify the Technical Specifications (TS) requirements for testing of the Safety/Relief Valves (SRVs) by replacing the current requirement to manually actuate each SRV during plant startup with a series of overlapping tests that demonstrate the required functions of successive valve stages. Elimination of the manual actuation requirement is desirable to decrease the potential for SRV leakage and spurious SRV openings.

2.0 PROPOSED CHANGES

Current TS Surveillance Requirement (TSSR) 3.4.3.2 states, "Verify each required SRV opens when manually actuated." TSSR 3.5.1.13 likewise states, "Verify each required ADS valve opens when manually actuated." The proposed amendment would change both TSSRs to verify each required valve "is capable of being opened." The current Frequency for both TSSRs is "24 months on a STAGGERED TEST BASIS for each valve solenoid"; this would be changed to state, "In accordance with the Inservice Testing Program."

Both TSSRs are modified by a NOTE that states, "Not required to be performed until 12 hours after reactor steam pressure and flow are adequate to perform the test." This allowance would no longer be needed, and thus, would be deleted.

TS Bases associated with these Surveillance Requirements will be revised to describe the new testing method as discussed below. Revised Bases pages are attached for information, but do not require NRC approval.

3.0 BACKGROUND

SRVs installed at FitzPatrick are Target Rock model 7567F two-stage safety/relief valves. Eleven SRVs are installed on the main steam lines between the reactor vessel and the inboard main steam isolation valves. Each SRV discharges via a separate tailpipe to a point below the water level in the suppression pool. SRVs open:

- In the safety mode on high reactor pressure, to provide primary overpressure protection to the reactor coolant pressure boundary.
- In the relief mode when actuated by the SRV Electric Lift logic on high reactor pressure, as a backup to the safety mode actuation.
- In the relief mode when manually actuated by individual control switches in the Control Room, or by individual control switches in the Remote Shutdown system.
- For seven of the eleven SRVs, in the relief mode when actuated by the Automatic Depressurization System (ADS) logic of the Emergency Core Cooling Systems (ECCS). The ADS function is to rapidly reduce reactor pressure to within the capacity of low pressure ECCS pumps in the event of a small or intermediate break Loss of Coolant Accident with the High Pressure Coolant Injection System (HPCI) unable to maintain level due to equipment failure or break size.

Experience in the industry and at FitzPatrick has shown that manual actuation of SRVs during plant operation leads to valve seat leakage. In particular, manual actuation testing has been the principle cause of main stage seat leakage at FitzPatrick. SRV leakage is routed to the suppression pool; the increased heat and fluid additions to the suppression pool require more frequent suppression pool cooling and pump-down operations. Main stage seat leakage also tends to mask the indications of pilot stage seat leakage; pilot stage leakage can cause maloperation of the SRV, including spurious actuation and/or failure to reclose after actuation. Excessive leakage of either stage requires plant shutdown to replace the leaking SRV.

The Boiling Water Reactor Owners' Group (BWROG) Evaluation of NUREG-0737, "Clarification of TMI Action Plan Requirements," Item II.K.3.16, "Reduction of Challenges and Failures of Relief Valves," recommends that the number of SRV openings be reduced as much as possible and that unnecessary challenges should be avoided. NUREG-1482, "Guidelines for Inservice Testing at Nuclear Power Plants," NUREG-0123, "Standard Technical Specifications for General Electric Boiling Water Reactors," and NUREG-0626, "Generic Evaluation of Feedwater Transients and Small Break Loss-of-Coolant Accidents in GE-Designed Operating Plants and Near-Term Operating License Applications" also recommend reducing the number of challenges to the SRVs.

4.0 TECHNICAL ANALYSIS

The manual actuation test currently prescribed in TSSRs 3.4.3.2 and 3.5.1.13 provides demonstration of the mechanical operation of the SRVs, and overlaps with other testing to demonstrate that the functions of the SRVs can be performed. The manual actuation test is performed once per operating cycle (two years), on a staggered test basis for the two SRV solenoids, so that each solenoid valve is tested every two cycles (four years).

The proposed testing uses a series of overlapping tests to demonstrate these functions. Specifically:

- The simulated automatic actuation test specified in TSSR 3.5.1.11, and additional surveillances associated with LCOs 3.3.5.1 and 3.3.3.2 and TRM 3.3.I, demonstrate the ability of various logics and controls to actuate the SRVs up to the point of energizing the solenoids. These tests are performed once per operating cycle (two years).
- A solenoid valve functional test will be performed in situ for each SRV solenoid valve once per operating cycle. This test demonstrates that when the solenoid is energized, it applies pneumatic pressure to the SRV actuator.
- An SRV actuator functional test will be performed at an offsite test facility as part of certification testing for each SRV pilot. Certification test intervals are determined in accordance with the Inservice Testing Program, which limits the maximum interval of service to six years under conditions described in Code Case OMN-17; typically, two-stage pilots are in service for a maximum of one operating cycle (two years). The actuator test demonstrates that the actuator moves the pilot stem when pneumatic pressure is applied.
- Setpoint testing is performed at the offsite test facility as part of certification testing for each SRV pilot, at intervals determined in accordance with the Inservice Testing Program. This test is the existing test required by

TSSR 3.4.3.1. In addition to demonstrating that the SRV pilot stage will actuate on high steam pressure in the safety mode, this test overlaps with the actuator functional test to demonstrate that the pilot stage will actuate in the relief mode.

- Main stage certification testing will be performed at the offsite test facility at intervals determined in accordance with the Inservice Testing Program, at least every six years per OMN-17. Main stage certification testing demonstrates that the main stage will open and port steam when actuated by the installed pilot stage.

TSSR 3.0.1 Bases states in part, "Surveillances may be performed by means of any series of sequential, overlapping, or total steps provided the entire Surveillance is performed within the specified frequency." Whereas the above steps demonstrate the required safety functions, and whereas the testing frequency is once per operating cycle unless a longer frequency is specified by the Inservice Testing Program, the proposed testing satisfies this Bases statement.

In addition to the mechanical functional testing, the current manual actuation test demonstrates full steam flow capability of the SRV main stage and associated piping. Following the initial demonstration during plant startup testing, limitations on steam flow would arise only through assembly errors or the introduction of foreign material into the piping system. Specific SRV maintenance procedures and plant Foreign Material Exclusion procedures and practices are sufficient to ensure full steam flow capability without periodic actuation testing. FitzPatrick has had no instance of test failure due to inadequate steam flow.

Failures of the manual actuation test have been uncommon. In April 2002, Hatch Unit 1 experienced an SRV failure to fully open and failure to reclose due to deterioration of the main stage piston-to-stem joint (Information Notice 03-001 and General Electric Service Information Letter 646). The deterioration involved a loss of joint preload followed by vibration induced wear that created a groove in the piston guide in which the piston hung up. This wear had occurred over a period of several cycles. FitzPatrick maintenance practice is to disassemble, refurbish, and retest each main stage following any removal from service; this practice would detect time-based degradation such as that involved in the Hatch event prior to main stage failure. Use of Code Case OMN-17 would require that each SRV be disassembled and refurbished every six years.

As discussed in the attached Relief Request, ASME OM Code requirements for testing of main steam pressure relief valves are satisfied by the above testing. The requirement of Section I-3410(d) for manual actuation testing following reinstallation is to be exempted, and relief has been requested from that requirement based on the overlapping tests described above and the maintenance controls involved in reinstallation. The Relief Request provides additional discussion of Code Case OMN-17.

5.0 REGULATORY SAFETY ANALYSIS

5.1 No Significant Hazards Consideration

1. **Will operation of the facility in accordance with this proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?**

Response: No.

The proposed change modifies the method of demonstrating the operability of the Safety/Relief Valves (SRVs) in both the safety and relief modes of operation. The SRVs are required to function in the safety mode to prevent overpressurization of the reactor vessel and reactor coolant system pressure boundary during various analyzed transients, including Main Steam Isolation Valve closure. SRVs associated with the Automatic Depressurization System are also required to function in the relief mode to reduce reactor pressure to permit injection by low pressure Emergency Core Cooling System (ECCS) pumps during certain reactor coolant pipe break accidents. The current testing method demonstrates the operability of the SRVs in both modes through manual actuation of the SRVs. The proposed new testing method demonstrates operability using a series of overlapping tests that show proper functioning of the SRV stages and supporting control components. This proposed testing method results in acceptable demonstration of the SRV functions in both the safety and relief modes, and therefore provides assurance that the probability of SRV failure will not increase. None of the accident safety analyses is affected by the requested Technical Specifications (TS) changes. Therefore, the consequences of accidents mitigated by the SRVs will not increase.

Certain SRV malfunctions are included in the FSAR safety analyses. Specifically, the plant safety analyses include the inadvertent opening of an SRV and a stuck open SRV. By not actuating the SRVs during plant operation for testing and by reducing the incidence of pilot stage leakage of the SRVs, the proposed testing method will reduce the probability of these events.

Based on these considerations, the proposed test method does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. **Will operation of the facility in accordance with this proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?**

Response: No.

The proposed change modifies the method of testing of the SRVs, but does not alter the functions or functional capabilities of the SRVs. Testing under the proposed method is performed in offsite test facilities or in the plant during outage periods when the SRV functions are not required. Existing analyses address events involving an SRV inadvertently opening or failing to reclose. Analyses also address the likelihood and consequences of failure of one or more SRVs to open. The proposed change does not introduce any new failure mode, and therefore, does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. **Will operation of the facility in accordance with this proposed change involve a significant reduction in a margin of safety?**

Response: No.

Overpressure protection of the reactor coolant pressure boundary is based on the Safety/Relief Valves (SRVs) setpoint and total relief capacity. Setpoint is verified at an offsite testing facility; this requirement is not altered by the proposed change. Relief capacity of each SRV is determined by valve geometry, which is also not altered by the test methods. The margin of safety in the Loss of Coolant Accident analysis due to functioning of the Automatic Depressurization System is also based on total relief capacity of the associated SRVs. The proposed change in surveillance test methods demonstrates the operability of the SRVs, but does not alter the critical parameters that affect the margin of safety in analyses involving the SRV functions. Therefore, the proposed change does not involve a significant reduction in any margin of safety.

5.2 Applicable Regulatory Requirements / Criteria

10 CFR 50.36 requires in part that the operating license of a nuclear production facility include technical specifications. Paragraph (c)(2)(ii) of that part requires that a limiting condition for operation (LCO) of a nuclear reactor must be established for each item meeting one or more of four criteria. The SRV functions identified in LCOs 3.4.3 and 3.5.1 both meet Criterion 3, "A structure, system, or component that is part of the primary success path and which functions or actuates to mitigate a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier." Paragraph (c)(3) further requires the establishment of surveillance requirements, "relating to test, calibration, or inspection to assure...that the limiting conditions for operation will be met." As discussed above, the proposed changes in the surveillance requirements for the SRVs are sufficient to demonstrate the safety and relief modes operation of the SRVs, and therefore, are sufficient to ensure that the limiting conditions for operation are met.

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner; (2) such activities will be conducted in compliance with the Commission's regulations; and (3) the approval of the proposed change will not be inimical to the common defense and security or to the health and safety of the public.

6.0 ENVIRONMENTAL ASSESSMENT

A review has determined that the proposed changes would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed changes do not involve: (i) a significant hazards consideration; (ii) a significant change in the types or significant increase in the amounts of any effluents that may be released offsite; or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed changes meet the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed changes.

7.0 PRECEDENT

NUREG-1482 Paragraph 4.3.2.1 states, "In recent years, the NRC staff has received numerous requests for relief and/or TS changes related to the stroke testing requirements for BWR dual-function main steam safety/relief valves (SRVs). Both Appendix I to the ASME OM Code and the plant-specific TS require stroke testing of SRVs after they are reinstalled following maintenance activities. Several licensees have determined that in situ testing of the SRVs can contribute to undesirable seat leakage of the valves during subsequent plant operation and have received approval to perform testing at a laboratory facility coupled with in situ tests and other verifications of actuation systems as an alternative to the testing required by the ASME OM Code and TS."

The NRC has approved similar testing methods for Hatch, Hope Creek, and Limerick (prior to Limerick's conversion to three-stage SRVs).

Similar testing has also been approved for Dresden, Quad Cities, and Peach Bottom, which use three-stage Target Rock SRVs rather than two-stage SRVs. Testing approved for these plants included an in situ actuator test without steam (dry lift test). The dry lift test is not suitable for two-stage SRVs because it has a high probability of causing unseating or leakage of the pilot stage, which can lead to spurious actuation or failure to reclose of the SRV.

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Attachment 2

Proposed Technical Specification Changes (Marked up)

Pages

3.4.3-2
3.5.1-7

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.4.3.1	Verify the safety function lift setpoint of the required S/RVs is 1145 ± 34.3 psig. Following testing, lift settings shall be within ± 1%.	In accordance with the Inservice Testing Program
SR 3.4.3.2	~~NOTE~~ ~~Not required to be performed until 12 hours after reactor steam pressure and flow are adequate to perform the test.~~ Verify each required S/RV ~~opens when manually actuated~~ is capable of being opened.	~~24 months on a STAGGERED TEST BASIS for each valve solenoid~~ In accordance with the Inservice Testing Program.

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.5.1.13	~~NOTE~~ ~~Not required to be performed until 12 hours after reactor steam pressure and flow are adequate to perform the test.~~ Verify each required ADS valve ~~opens when manually actuated~~ is capable of being opened.	~~24 months on a STAGGERED TEST BASIS for each valve solenoid~~ In accordance with the Inservice Testing Program

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Attachment 3

Proposed Technical Specification Changes
(Final Typed)

Pages

3.4.3-2
3.5.1-7

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.3.1	Verify the safety function lift setpoint of the required S/RVs is 1145 ± 34.3 psig. Following testing, lift settings shall be within ± 1%.	In accordance with the Inservice Testing Program
SR 3.4.3.2	Verify each required S/RV is capable of being opened.	In accordance with the Inservice Testing Program.

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.5.1.13	Verify each required ADS valve is capable of being opened.	In accordance with the Inservice Testing Program

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Attachment 4

Proposed Technical Specification Bases Changes (Marked up)
(Information Only)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.4.3.2

Actuation of each required S/RV is performed to verify that mechanically the valve is functioning properly. For the two-stage S/RV, this requires that the pilot stage be tested to show that it actuates when required and opens the associated main stage. Likewise, the main stage must be tested to show that it opens and passes steam when the associated pilot stage actuates. The two stages are bench tested, together or separately, as part of the certification process, at intervals determined in accordance with the Inservice Testing Program. Maintenance procedures ensure that the S/RV stages are correctly installed in the plant, and that the S/RV and associated piping remain clear of foreign material that might obstruct valve operation or full steam flow. This approach provides adequate assurance that the required S/RVs will operate as required, while minimizing the challenges to the S/RVs and the likelihood of leakage or spurious operation.

For the purpose of this test, pilot actuation in the safety mode or relief mode is acceptable to satisfy the test requirements. Testing of the related solenoid valves is not required because they do not affect the safety mode operation of the S/RV. However, the solenoid valves are also tested in the IST program to support relief mode operation of the S/RVs for other functions.~~A manual actuation of each required S/RV is performed while bypassing main steam flow to the condenser and observing ≥ 10% closure of the turbine bypass valves to verify that, mechanically, the valve is functioning properly and no blockage exists in the valve discharge line. This can also be demonstrated by the response of the turbine control valves, by a change in the measured steam flow, or by any other method suitable to verify steam flow. Adequate reactor steam dome pressure must be available to perform this test to avoid damaging the valve. Also, adequate steam flow must be passing through the main turbine or turbine bypass valves to continue to control reactor pressure when the S/RVs divert steam flow upon opening. Sufficient time is therefore allowed after the required pressure and flow are achieved to perform this test. Adequate pressure at which this test is to be performed is 970 psig (the pressure consistent with vendor recommendations). Adequate steam flow is represented by two or more turbine bypass valves open, or total steam flow ≥ 10^6 lb/hr. These conditions will require the plant to be in MODE 1, which has been shown to be an acceptable condition to perform this test. This test causes a small neutron flux transient which may cause a scram~~

~~in MODE 2 while operating close to the Average Power Range Monitors Neutron Flux – High (Startup) Allowable Value. Plant startup is allowed prior to performing this test because valve OPERABILITY and the setpoints for overpressure protection are verified, per ASME Code requirements, prior to valve installation. Therefore, this SR is modified by a Note that states the Surveillance is not required to be performed until 12 hours after reactor steam pressure and flow are adequate to perform the test. The 12 hours allowed for manual actuation after the required steam pressure and flow are reached is sufficient to achieve stable conditions for testing and provides a reasonable time to complete the SR. If a valve fails to actuate due only to the failure of the solenoid but is capable of opening on overpressure, the safety function of the S/RV is considered OPERABLE.~~

~~The 24 month on a STAGGERED TEST BASIS Frequency ensures that each solenoid for each S/RV is alternately tested. The 24 month Frequency was developed based on the S/RV tests required by the ASME Boiler and Pressure Vessel Code, Section XI (Ref. 7). Operating experience has shown that these components usually pass the Surveillance when performed at the 24 month Frequency. Therefore, the Frequency is acceptable from a reliability standpoint.~~

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.5.1.12 (continued)

The Frequency of 24 months is acceptable, given plant conditions required to perform the test and the other requirements existing to ensure adequate LPCI inverter performance during the 24 month interval. In addition, the Frequency is intended to be consistent with expected fuel cycle lengths.

SR 3.5.1.13

Actuation of each required ADS valve is performed to verify that mechanically the valve is functioning properly. For the two-stage S/RV, tests are required to demonstrate:

- That each ADS S/RV solenoid valve ports pneumatic pressure to the associated S/RV actuator when energized;
- That each ADS S/RV pilot stage actuates to open the associated main stage when the pneumatic actuator is pressurized; and
- That each ADS S/RV main stage opens and passes steam when the associated pilot stage actuates.

The solenoid valves are functionally tested once per cycle as part of the Inservice Testing Program. The pilot and main stages are bench tested, together or separately, as part of the certification process, at intervals determined in accordance with the Inservice Testing Program. Maintenance procedures ensure that the S/RV stages are correctly installed in the plant, and that the S/RV and associated piping remain clear of foreign material that might obstruct valve operation or full steam flow. This approach provides adequate assurance that the required ADS valves will operate when actuated, while minimizing the challenges to the valves and the likelihood of leakage or spurious operation. SR 3.5.1.11 and the LOGIC SYSTEM FUNCTIONAL TEST performed in LCO 3.3.5.1 overlap this Surveillance to provide complete testing of the assumed safety function.

~~A manual actuation of each required ADS valve is performed while bypassing main steam flow to the condenser and observing ≥ 10% closure of the turbine bypass valves to verify that the valve and solenoid are functioning properly and that no blockage exists in the S/RV discharge lines. This can also be demonstrated by the response of the turbine control~~

~~or bypass valve or by a change in the measured flow or by any other method suitable to verify steam flow. Adequate reactor steam dome pressure must be available to perform this test to avoid damaging the valve. Also, adequate steam flow must be passing through the main turbine or turbine bypass valves to continue to control reactor pressure when the ADS valves divert steam flow upon opening. Sufficient time is therefore allowed after the required pressure and flow are achieved to perform this SR. Adequate pressure at which this SR is to be performed is ≥ 970 psig (the pressure consistent with vendor recommendations). Adequate steam flow is represented by at least two or more turbine bypass valves open or total steam flow ≥ 10^6 lb/hr. These conditions will require the plant to be in MODE 1, which has been shown to be an acceptable condition to perform this test. This test causes a small neutron flux transient which may cause a scram in MODE 2 while operating close to the Average Power Range Monitors Neutron Flux — High (Startup) Allowable Value. Reactor startup is allowed prior to performing this SR because valve OPERABILITY and the setpoints for overpressure protection are verified, per ASME requirements, prior to valve installation. Therefore, this SR is modified by a Note that states the Surveillance is not required to be performed until 12 hours after reactor steam pressure and flow are adequate to perform the test. The 12 hours allowed for manual actuation after the required pressure and flow are reached is sufficient to achieve stable conditions and provides adequate time to complete the Surveillance. SR 3.5.1.11 and the LOGIC SYSTEM FUNCTIONAL TEST performed in LCO 3.3.5.1 overlap this Surveillance to provide complete testing of the assumed safety function.~~

(continued)

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Attachment 5

James A. FitzPatrick Nuclear Power Plant
Fourth Inservice Test Interval Relief Request VRR-06
(Information Only)

JAMES A. FITZPATRICK NUCLEAR POWER PLANT

10 CFR 50.55a Request VRR-06

Proposed Alternative in Accordance with 10 CFR 50.55a(a)(3)(ii), on the basis that compliance with OM Code testing requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

System:

NUCLEAR BOILER AUTOMATIC DEPRESSURIZATION SYSTEM

ASME Code Components Affected:

02RV-71A, B, C, D, E, F, G, H, J, K, L

Component /System Function:

Eleven Safety/Relief Valves (SRVs) are installed on the main steam lines between the reactor vessel and the inboard main steam isolation valves. Each SRV discharges via a separate tailpipe to a point below the water level in the suppression pool. SRVs open:

- In the safety mode on high reactor pressure, to provide primary overpressure protection to the reactor coolant pressure boundary.
- In the relief mode when actuated by the SRV Electric Lift logic on high reactor pressure, as a backup to the safety mode actuation.
- In the relief mode when manually actuated by individual control switches in the Control Room, or by individual control switches in the Remote Shutdown system.
- For seven of the eleven SRVs, in the relief mode when actuated by the Automatic Depressurization System (ADS) logic of the Emergency Core Cooling Systems (ECCS). The ADS function is to rapidly reduce reactor pressure to within the capacity of low pressure ECCS pumps in the event of a small or intermediate break Loss of Coolant Accident with the High Pressure Coolant Injection System (HPCI) unable to maintain level due to equipment failure or break size.

Applicable Code Edition and Addenda:

ASME OM CODE 2001 Edition to 2003 Addenda

Applicable Code Requirements:

Appendix I, paragraph I-1320(a), "Test Frequencies, Class 1 Pressure Relief Valves" requires that Class 1 pressure relief valves shall be tested at least once every 5 years, starting with initial electric power generation. No maximum limit is specified for the number of valves to be tested within each interval; however, a minimum of 20% of the valves from each valve group shall be tested within any 24-month interval. This 20% shall consist of valves that have not been tested during the current 5-year interval, if they exist. The test interval for any individual valve shall not exceed 5 years.

Appendix I, paragraph I-3410(d) of the OM Code requires that valves that have been maintained or refurbished in place, removed for maintenance and testing, or both, and reinstalled shall be remotely actuated at reduced or normal system pressure to verify open and close capability of the valve before resumption of electric power generation.

Reason For Request:

This 4th Interval request for relief is based on Appendix I of the ASME OM Code-2001 Edition to 2003 Addenda. Exercising of the SRV after reinstallation can only be performed during reactor startup when there is sufficient steam pressure to actuate the main disk. Past history indicates that the main disks may not re-seat properly after being exercised during reactor startup resulting in steam leakage into the suppression pool. This leakage results in a decrease in plant performance and the potential for increased suppression pool temperatures which could force a plant shutdown to repair a leaking SRV. Past operating history indicates that the exercising performed during reactor startup is of no significant benefit in ensuring the proper operation of the individual SRV subassemblies.

This relief request also proposes to implement Code Case OMN-17 "Alternate Rules for Testing ASME Class 1 Pressure Relief/Safety Valves." OMN-17 states in Section (a) that safety valves shall be tested at least once every 72 months (6 years) with a minimum of 20% of the SRV group being tested within any 24-month interval. This 20% shall consist of valves that have not been tested during the current 72-month interval, if they exist. The test interval for any individual valve that is in service shall not exceed 72 months except that a 6-month grace period is allowed to coincide with refueling outages to accommodate extended shutdown periods.

System Description:

The SRVs are Target Rock Two-Stage, Model 7567F design. The SRVs are dual-function valves capable of being independently opened in either the safety or relief mode of operation. A total of 11 SRVs are installed at the James A. FitzPatrick Nuclear Power Plant (JAF). In the safety mode (or spring mode of operation) the spring loaded pilot valve opens when steam pressure at the valve inlet overcomes the spring force holding the pilot valve closed. Opening the pilot valve allows a pressure differential to develop across the main valve piston and opens the main valve. Each of the 11 SRVs can be opened manually in the relief mode from the control room by its associated two position switch. If one of these switches is placed in the open position the logic output will energize the associated SRV solenoid control valve directing the pneumatic supply to open the valve. Seven of these SRVs solenoid control valves can also be energized by the relay logic associated with the automatic depressurization system (ADS). In addition each SRV can be manually operated from another control switch located at the ADS auxiliary panel located outside the control room.

Current Testing at JAF:

Testing of JAF SRVs is performed to satisfy Technical Specifications Surveillance Requirements (TSSRs) and the ASME OM Code-2001, "Code for Operation and Maintenance of Nuclear Power Plants with addenda." Certain tests are performed with the SRVs installed (in situ), while others are performed as "bench tests" after the valve is removed and transported to a maintenance and testing facility. Current requirements are as follows:

Current Testing at JAF (continued):

1. TS B 3.4.3-2 the safety function of the SRVs are required to be operable to satisfy the assumptions of the safety analysis. The requirements of this LCO are applicable only to the capability of the SRVs to mechanically open to relieve excess pressure when the lift setpoint is exceeded (Safety Function). This test is performed during the bench test at the vendor's facility.

2. TSSRs 3.4.3.2 and 3.5.1.13 verify each SRV opens when manually actuated.

3. Remote manual actuation is also required by ASME OM Code, Appendix I, paragraph I-3410(d), to verify open and close capability of the valve before resumption of electric power generation. This applies to valves that have been either maintained or refurbished in place, or removed for maintenance and testing and reinstalled.

Current Testing at Outside Facilities:

During each refueling outage, the11 SRV pilot assemblies and at least one main stage are removed and shipped to an offsite vendor for "as-found" testing, which includes visual inspection, leakage testing, and as-found set pressure testing. The tests are performed on a valve prior to maintenance on the valve. The pre-test leakage is measured at 1050 psig meeting the requirements of ASME OM Code-2001, I-3310 (a), (b), and (c). Following the "as-found" testing, the SRVs are given a dimensional inspection followed by refurbishment, if required. This work is performed by the valve supplier. Post maintenance testing includes initial valve leakage testing, safety mode valve actuation to satisfy requirements for set pressure, reseat pressure, main disc stroke time, and final leakage testing. Final seat leakage tests are performed at approximately 1070 psig. Upon successful test completion, each valve receives written certification from the vendor and is returned to JAF for reinstallation. To receive certification, the valve must have zero seat leakage and meet the acceptance criteria of +/- 1% for set pressure. These tests meet the requirements of ASME OM Code-2001, I-3310 and Technical Specifications SR 3.4.3.1.

General Change Justification:

Leaking SRVs create operational problems associated with the suppression pool. SRV leakage increases both pool temperature and level, requiring more frequent use of the suppression pool cooling mode of the Residual Heat Removal (RHR) system.

As described previously, each SRV pilot assembly and at least one main stage removed during the refuel outage is tested at an offsite facility. The as found testing is performed within 12 months of removal, meeting the OM code requirements. The valves are refurbished the following year just prior to the refuel outage as necessary to meet the acceptance criteria of zero leakage, and are certified in writing as being leak free. The valves are then reinstalled in the plant and proper pilot operation is confirmed through leak rate testing of the pilot air operators and associated accumulator piping followed by manual lift at reactor power.

General Change Justification (continued):

Several aspects of SRV design and operation can contribute to valve leakage. As mentioned earlier, these include test pressure, pilot valve disc and rod configuration, and system and valve cleanliness. Actuation of the SRVs after laboratory testing by any means allows these contributors to impact the ability of the valve to re-close completely. JAF has made significant efforts to minimize the effects of these contributors.

JAF currently uses ASME OM Code 2001 section I-1320 "Test Frequencies, Class I Pressure Relief Valves." This establishes the five year frequency for SRV testing. JAF proposes to use Code Case OMN-17 "Alternate Rules for Testing ASME Class 1 Pressure Relief/Safety Valves." This Code Case changes the frequency to six years to coincide with the 24-month refueling cycle at JAF.

Additionally, reducing challenges to the SRVs is a recommendation of NUREG-0737; "TMI Action Plan Requirements" item II.K.3.(16). This recommendation is based on a stuck open SRV being a possible cause of a Loss of Coolant Accident (LOCA). This relief request is consistent with that NRC recommendation.

Proposed Alternative In Accordance With 10 CFR 50.55a(a)(3)(ii):

As an alternate to the testing required by ASME OM Code-2001, Appendix I, paragraph I-3410(d), JAF proposes to actuate the SRVs in the relief mode at the test facility (i.e., Wyle Laboratory). A test solenoid valve will be energized, the actuator will stroke, and the pilot rod lift will be verified. This test will verify that, given a signal to energize the solenoid, the pilot disc rod will lift. The pilot function will be recorded in the test documentation package for future reference, as needed. Alternate testing is justified since the remaining segments of the SRV relief mode of operation are proven by other tests. The ability of the pilot disc to open is shown in the safety mode actuation bench test. The integrity of the pneumatic and solenoid system for the SRVs is verified by performance of post maintenance leak rate testing, continuity testing, and a functional test of the solenoids while detached from the SRV. The joint between the pilot and solenoid / manifold assembly are visually inspected under the maintenance procedure with a second verification to ensure that the "O" ring is in place during reassembly. Automatic valve actuation is proven operable by logic system functional tests which include verification that the solenoid is energized by the automatic signal. The actuator to main body joint is inspected during ISI VT-2 exam performed prior to startup. The above proposed surveillance and testing of the SRVs and associated components provides reasonable assurance of adequate valve operation and readiness.

JAF proposes to implement Code Case OMN-17 that requires in section (a) 72-month test interval for Class 1 pressure relief valves with a minimum of 20% of the SRV group being tested within any 24-month interval. This 20% shall consist of valves that have not been tested during the current 72-month interval, if they exist. The test interval for any individual valve that is in service shall not exceed 72 months except that a six month grace period is allowed to coincide with refueling outages to accommodate extended shutdown periods.

Proposed Alternative In Accordance With 10 CFR 50.55a(a)(3)(ii) (continued:

ASME Code Case OMN-17 section (d) "maintenance", requires the owner to disassemble and inspect each valve after as found set pressure testing to verify that parts are free of defects resulting from time related degradation or service induced wear. Section (e) requires that each valve shall have been disassembled and inspected in accordance with section (d) prior to the start of the 72-month (6 year) test interval.

Each refueling outage, 100% of the pilot assemblies and approximately one third of the main disc assemblies (4, 4, and 3 main assemblies over a three cycle period) will be sent to an offsite vendor and tested with steam pressure. As a result, even though actual valve movement is not performed after the SRV is re-installed in the plant, all pilot assemblies are tested with steam pressure once per cycle and all the main discs are tested with steam pressure at least once every three cycles. This proposed testing meets the testing requirements of Code Case OMN-17. On the basis that compliance with ASME OM Code 2001 Edition 2003 Addenda testing requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety, this proposed alternative should be granted pursuant to 10 CFR 50.55a(a)(3)(ii).

Duration:

The proposed alternative identified in this 10 CFR 50.55a Request shall be utilized during the Fourth Ten year IST Interval that began on October 1, 2007.

Precedents:

NUREG-1482 Paragraph 4.3.2.1 states, "In recent years, the NRC staff has received numerous requests for relief and/or TS changes related to the stroke testing requirements for BWR dual-function main steam SRVs. Both Appendix I to the ASME OM Code and the plant-specific TS require stroke testing of SRVs after they are reinstalled following maintenance activities. Several licensees have determined that in situ testing of the SRVs can contribute to undesirable seat leakage of the valves during subsequent plant operation and have received approval to perform testing at a laboratory facility coupled with in situ tests and other verifications of actuation systems as an alternative to the testing required by the ASME OM Code and TS."

The NRC has approved similar testing methods at Nine Mile Point Station: reference MSS-VR-01 (Unit 2).

Similar testing has also been approved for Dresden, Quad Cities, and Peach Bottom, which use three-stage Target Rock SRVs rather than two-stage SRVs. Testing approved for these plants included an in situ actuator test without steam (dry lift test). The dry lift test is not suitable for two-stage SRVs because it has a high probability of causing unseating or leakage of the pilot stage, which can lead to spurious actuation or failure to reclose of the SRV.

References:

1. ASME OM Code, 2001 Edition through 2003 Addenda
2. Code Case OMN-17, "Alternative Rules for Testing ASME Class 1 Pressure Relief / Safety Valves
3. NUREG-1482, "Guidelines for Inservice Testing at Nuclear power Plants", April 1995