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SUBJECT: Forwards application for Amend 90 to License NPF-22,revising Tech Spec 3.6.3 re primary containment isolation valves.

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OCT 30 1990

Director of Nuclear Reactor Regulation
Attention: Dr. W.R. Butler, Project Director
Project Directorate I-2
Division of Reactor Projects
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

**SUSQUEHANNA STEAM ELECTRIC STATION**
**EMERGENCY CHANGE REQUEST - PROPOSED**
**AMENDMENT NO. 90 TO LICENSE NO. NPF-22**
**PLA-3467 FILES A17-2, R41-2** Docket No. 50-388

Dear Dr. Butler:

The purpose of this letter is to request an emergency change to Technical Specification 3.6.3 (Primary Containment Isolation Valves), Action "a" for the RWCU HV-244F001 valve in Table 3.6.3-1. Susquehanna Unit 2 entered this action at approximately 1800 hours on October 23, 1990 after discussions with NRC Region I staff. A verbal waiver of compliance was received on October 23, 1990, followed by a written waiver on October 24, 1990 which allowed relief from Action "a" of Technical Specification until October 30, 1990 in order to prepare a one-time emergency change to the Technical Specifications.

**BACKGROUND**

It has been discovered that the "closing" torque switch on the Unit 2 RWCU HV-244F001 Inboard Containment Isolation Valve was incorrectly set to 1 1/2 instead of the required setting of 1 3/4. The setting of 1 3/4 is required to fully close the valve under the maximum delta P that the valve would experience (1000 psid). The current torque switch setting would allow the valve to fully close against 890 psid.

The torque and limit switch logic is such that the torque switch setting does not trip the motor until the limit switch is tripped. The limit switch is set to trip when the valve is 97% closed. Once the limit switch has tripped, the motor is then controlled by the



A001
1/1

torque switch. With a torque switch setting of 1 1/2, the motor would be tripped immediately following the limit switch reaching 97% closed for all cases where the valve would be experiencing a delta P greater than 890 psid.

As a result of discussions with NRC Region I staff, it was determined that the valve was inoperable and that a temporary waiver of compliance and an emergency change to the Technical Specifications were needed. The temporary waiver of compliance from Action "a" of Technical Specification Section 3.6.3 was received on October 24, 1990. This letter is the request for the emergency change to the Technical Specifications.

DESCRIPTION ON CHANGES

As shown on the attached mark-up, a footnote has been added to Technical Specification Table 3.6.3-1, "Primary Containment Isolation Valves" for the RWCU HV-244F001 valve. This footnote would allow the RWCU HV-244F001 valve to remain operable with its minimum torque switch setting until there is an outage of sufficient duration to revise the setting.

SAFETY ANALYSIS

The RWCU HV-244F001 valve, in conjunction with the RWCU HV-244F004 valve, performs two safety functions for the RWCU suction line:

1. Primary containment isolation, and
2. Reactor vessel isolation.

The primary containment isolation function is provided to isolate the RWCU suction line post accident, thereby limiting the release of radioactive material from primary containment. The current torque switch setting impacts the F001 valve's capability to close at differential pressures greater than 890 psid; therefore, the valve will fully close against design basis LOCA differential pressures, which are significantly less. The only design basis accident or operating scenario that we have determined to be able to create the high differential pressure conditions of concern is a break in the RWCU suction line outboard of the RWCU F001 valve (outside of containment). Therefore, for all accidents where primary containment isolation is required, the valve will perform its intended safety function.

The reactor vessel isolation function is provided to isolate the RWCU suction line in order to limit the release of reactor coolant outside of primary containment. The impact of such a release is in two areas:

1. Environmental effects on equipment required for safe shutdown, and
2. Offsite dose.

The 6" DBC-201 RWCU suction line penetrates the primary containment in the RWCU Penetration Room on Floor Elevation 749' and Area 32 of the Unit 2 Reactor Building. From this room, it proceeds to the RWCU pump rooms and heat exchanger rooms. The failure of the RWCU suction line is assumed to be a double-ended guillotine break within the RWCU Penetration Room since this results in a more severe environment than a break in the other rooms. This room has direct access to the Reactor Building vent via blowout panels which are designed to relieve pressure at 0.5 psig. For this break scenario, both the RWCU F001 and F004 valves receive signals to close from the RWCU leak detection system and the F004 valve is assumed to fail (single failure). As previously described, the RWCU F001 valve would then close approximately 97% with the present torque switch setting. This results in a release of reactor coolant outside of primary containment. The consequences of this event must be addressed with respect to environmental effects on equipment required for safe shutdown and offsite dose.

- <u>Environmental Effects/Safe Shutdown Impacts</u>

A break in the RWCU suction line has been previously evaluated in the FSAR. FSAR Section 3.6A assesses the environmental impact of the break on safety related equipment and the ability to safely shutdown the unit. As noted in the FSAR, duration of the break blowdown was not a factor in the analysis since adequate vent area is provided, and any pressure peak resulting from a break occurs quickly and then declines to a lower steady-state value.

For the RWCU Penetration Room, the peak pressure as calculated to be 2.14 psig (the current FSAR entry of 1.14 psig is incorrect), and the peak temperature was 215.6 degrees F. At the calculated pressure, the blowout panels would relieve the pressure in the RWCU Penetration Room via the Reactor Building vent. The Penetration Room also contains an HVAC backdraft isolation damper. This damper would be expected to isolate. However, if the damper did not isolate, the resultant steam would be diluted by the normal Reactor Building HVAC and would not pose an environmental threat to equipment required for safe shutdown of the unit. No equipment required for safe shutdown is directly affected by the break environment.

In addition to the above effects, the effect of flooding was evaluated. There is no equipment required for safe shutdown in the RWCU Penetration Room or surrounding rooms which would be affected by flooding due to this postulated break. It is expected that operator actions will terminate the event prior to any possible adverse consequences due to flooding.

The FSAR analysis, and as supplemented by the above analysis, concluded that the plant can be safely shutdown using equipment not affected by the analyzed RWCU suction high energy line break. For the assumed break scenario with the F001 valve 97% closed and the F004 valve failed open, the environmental impact of the plant is no greater than already evaluated. Therefore, based on this assessment, the current condition of the RWCU F001 valve will not impact the safe shutdown of Susquehanna SES Unit 2 in the event of a RWCU suction line break outside containment.

- Offsite Dose Impact

PP&L has performed an assessment of the offsite dose based on a double-ended guillotine break of the RWCU suction line, 97% closure of the RWCU F001 valve, and failure of the RWCU F004 valve. No credit was assumed for the Reactor Building; all dose was applied to the offsite boundary.

Based on the conservative FSAR Section 3.6A analysis mentioned previously, an initial mass flow rate of 1,320 lbm/sec was assumed. The method of evaluation was to compare this event to the Susquehanna design basis dose analysis, which is the main steam line break outside containment (reference FSAR Section 15.6.4). That analysis assumes that 81,200 lbm is the total integrated mass exiting the break at primary coolant activity concentration. It was then calculated how long the RWCU F001 valve could remain in the "not fully closed" position without exceeding the same amount of mass of reactor coolant. Using more realistic assumptions (i.e., taking credit for decreased flowrate as the RWCU F001 valve closes and a Technical Specification isolation time for valve closure) the RWCU F001 valve must be isolated in 19 minutes following event initiation to be bounded by the design basis dose analysis, which results in a fraction of 10CFR100 dose limits.

The RWCU leak detection system would alert the operators within minutes of a complete break of the RWCU line. There is more than enough time to reduce reactor pressure (via the safety relief valves) to below 890 psig such that the RWCU F001 valve would be able to be fully closed and not exceed the design basis dose analysis results. This would be handled in accordance with existing emergency operating procedures, which are being modified to allow for manual closure of the valve (see discussion of Compensatory Actions below).

Based on the above, in the unlikely event of a RWCU line break concurrent with failure of the RWCU F004 valve and the closure capability of the F001 valve limited to 97%, the dose consequences are within those established by the design basis main steam line break analysis. The design basis analysis is a small fraction of the 10CFR100 limits.

- Probability Of An Unisolatable RWCU Line Break

As previously discussed, the only time the F001 valve will fail to completely isolate is when a delta P greater than 890 psid exists across it. This situation is indicative of a RWCU line break. If the F001 or the F004 valve closes, then the break is isolated and no hazard exists to the general public.

The case of concern involves a RWCU break outside the containment with a failure of the F001 and F004 valves to isolate. This can occur in two ways. First, the line break could cause the F004 valve to also fail. Second, the pipe could break and the F004 valve could fail independently of the pipe break. Each is considered below.

There are three ways of having a RWCU line break coincident with a failure of the F004 valve: the valve could rupture, the weld connecting the valve to the containment penetration could fail, or the pipe section contiguous with the valve could fail in a manner which would also fail the valve. Failure frequencies for each of these cases are available in the Reactor Safety Study, WASH-1400, and they are listed below.

| | |
|---|---|
| Valve Rupture | $1.0 \times 10^{-8}$/hr |
| Weld Failure | $3.0 \times 10^{-9}$/hr |
| Pipe Section Rupture | $1.0 \times 10^{-10}$/hr |
| TOTAL | $1.3 \times 10^{-8}$/hr |

There are about 3300 hours until the next scheduled Unit 2 refueling and inspection outage. Thus, the chance of a coincident RWCU pipe and F004 valve failure between now and the start of that outage becomes $1.3 \times 10^{-8}$/hr x 3300 hr = $4.3 \times 10^{-5}$.

If the pipe failure occurs downstream of the F004 valve, then it must fail randomly to cause the RWCU line break to be unisolated. There are 33 pipe sections and 34 welds in the RWCU Penetration Room between the F004 valve and the penetration to the RWCU pump

rooms. The chance of an unisolated RWCU line break in the Penetration Room becomes the product of the line break and the valve failure. This becomes:

| | | | |
|---|---|---|---|
| Weld Failure | 34 welds x $3.0 \times 10^{-9} \frac{\text{weld}}{\text{hr}}$ | = | $1.0 \times 10^{-7}$/hr |
| Pipe Rupture | 33 sections x $1 \times 10^{-10}$/hr | = | $3.3 \times 10^{-9}$/hr |
| | | TOTAL = | $1.1 \times 10^{-7}$/hr |

The random failure of the F004 valve is assessed at $5.6 \times 10^{-3}$/demand (NUREG/CR-1363). Therefore, the chance of a pipe break and a random failure of the F004 valve causing an unisolatable RWCU line break becomes:

$$(1.1 \times 10^{-7}/\text{hr} \times 3300 \text{ hr}) \quad 5.6 \times 10^{-3}/\text{demand} = 2.0 \times 10^{-6}$$

The total chance from both failure mechanisms becomes:

$$4.3 \times 10^{-5} + 2.0 \times 10^{-6} = 4.5 \times 10^{-5}$$

This is an order of magnitude less than a large LOCA ($3 \times 10^{-4}$).

It should also be noted that in May 1988, the RWCU F004 (outboard isolation valve) was replaced. Following the replacement, the RWCU line was hydrotested at a pressure of 1.25 times design. We are confident of the integrity of the RWCU piping.

Based on the above, a RWCU pipe break and a coincident failure of the RWCU F004 valve is considered an unlikely event.

COMPENSATORY ACTIONS

This section has been prepared to address the compensatory measures we considered in preparing this emergency change request. The actions considered were either for additional surveillance requirements or for alternative methods of closing the RWCU F001 valve. The following is a summary and disposition of each item.

**A. Additional Surveillance**

1. Walkdowns of the RWCU Piping

   The purpose of this surveillance would be to supplement our leak detection capability so that the operator would be provided extra time to respond to a precursor to an

actual line break. The intent would be to provide isolation prior to a large break occurring, since the F001 valve can automatically fully close against a low delta P event.

The RWCU piping is in high radiation areas, therefore the additional exposure does not justify the benefit gained from the walkdown.

2. Operability Testing of the F004 Valve on a More Frequent Basis

The additional testing of the F004 valve (the outboard isolation valve on the RWCU piping in question), would be designed to assure the isolation function of the penetration, assuming the F004 valve does not fail in the event. There are two concerns that have to be weighed against this potential enhancement.

- Increased cycling of the valve may actually degrade its leak tightness.

- Each time this valve is cycled shut, RWCU becomes unavailable. Depending on the chosen frequency for testing, this could be unacceptable since RWCU availability is important to plant operation.

Upon consideration of the above, we have decided not to perform additional cycling of the F004 valve.

B. **Alternative to Ensure Valve Closure**

1. Bypass of the Torque Switch to Close the Valve with Full Motor Torque

This alternative would require a temporary modification to the electrical circuit to bypass the torque switch in the closing circuit of the valve. Full motor torque would be placed on the valve to close it until the motor operator failed. Since valve integrity at full motor torque can not be guaranteed, therefore the torque switch will not be bypassed.

2. Temporary Change to the Valve Logic to Allow for Manually Closing the Valve

Currently, if the event of concern occurred, the RWCU F001 valve could not be closed (remote-manually) until the delta P was reduced below 890 psid and containment isolation signals were bypassed. To enhance this evolution, the affected emergency operating procedure

will be revised to allow bypassing of the isolation signals. Also, a temporary modification will be performed to allow the valve to be slightly opened rather than fully opened (to reset the torque switch) prior to closure. These changes will be in place by on October 30, 1990.

C. Other

1. The operators' awareness of the degraded condition of the RWCU F001 valve will be enhanced through additional training.

2. The emergency operating procedures and the alarm response procedures were reviewed and found to provide adequate direction to mitigate the consequences of this event. A minor revision will be instituted to the alarm response procedure to provide additional assurance that the operator is aware of the current condition of the RWCU F001 valve.

NO SIGNIFICANT HAZARDS CONSIDERATIONS

The proposed change does not:

I. Involve a significant increase in the probability or consequences of an accident previously evaluated.

As delineated above, the only event of concern given the current condition of the F001 valve is a RWCU line break outside containment. The probability analysis indicates that this is an unlikely event over the slightly more than four months that the proposed change could be in effect. The radiological consequences were conservatively determined to be the same as the bounding FSAR analysis of a Main Steamline break outside containment, but the increase is insignificant given the implicit error in such calculations and since both numbers are such a small fraction of 10CFR100 limits.

II. Create the possibility of a new or different kind of accident from any accident previously evaluated.

No hardware or procedural changes are proposed that would create a new event requiring evaluation.

III. Involve a significant reduction in a margin of safety.

As delineated above, the event of concern has been shown to be unlikely, and its consequences, both in terms of affect on safety-related equipment and radiologically, have been shown to be acceptable from a regulatory standpoint. Therefore, the margin of safety is not significantly reduced due to operation with the improper torque switch setting until the Unit 2 Fourth Refueling and Inspection Outage.

BASIS FOR EMERGENCY REQUEST

10CFR50.91 provides guidance on what information the NRC requires in support of an application for an emergency change.

First, it requires the applicant to justify that an emergency exists, i.e. "... failure to act in a timely way would result in derating or shutdown of a nuclear power plant ...". Unit 2 is currently operating at full power. Since the affected valve is inside containment, the torque switch cannot be reset without a unit shutdown and a containment entry. Isolation of the affected RWCU penetration as required by Technical Specification 3.6.3 Action "a" would result in a unit shutdown due to exceeding Chemistry limits on reactor water conductivity (reference Technical Specification 3.4.4) in approximately 72 hours.

Secondly, 10CFR50.91 requires the licensee to "... explain why this emergency situation occurred and why it could not avoid this situation ...". The improper setting was discovered during a records search pursuant to a request from the BWR Owners' Group. After some evaluation, discussion and clarification of guidance, the valve was declared inoperable and a temporary waiver of compliance was applied for. Application in advance of this situation was impossible since the problem was discovered during full power operation. Based on the time necessary to evaluate the problem and to prepare and review this proposal internally, we believe that this application has been submitted in a timely fashion.

IMPLEMENTATION

PP&L requests that your approval be provided on October 30, 1990, prior to the expiration of the Temporary Waiver of Compliance.

Any questions on this submittal should be directed to Mr. J.M. Kenny at (215) 770-7904.

Very truly yours,

H. W. Keiser

cc: NRC Document Control Desk (original, with Attachment)
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