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SUBJECT: Requests approval of Relief Request RRPT-8 to ISI Pressure Test Program for plant.

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SUSQUEHANNA STEAM ELECTRIC STATION
REQUEST FOR APPROVAL OF RELIEF REQUEST
NO. RRPT-8 FOR THE ISI PRESSURE TEST
PROGRAM FOR UNITS 1 AND 2
PLA-4557 **FILE R41-2**

Docket Nos. 50-387
and 50-388

Pennsylvania Power & Light Company requests the approval of Relief Request No. RRPT-8 to the ISI Pressure Test Program for Susquehanna Units 1 and 2. Relief Request No. RRPT-8 requests relief for ASME Section XI Class 1 reactor recirculation pump case-to-cover bolted connections with leakage identified during pressure testing from:

The 1989 Edition of ASME Code Section XI paragraph IWA-5250(a)(2), stating:

"The source of leakages detected during the conduct of a system pressure test shall be located and evaluated by the Owner for corrective measures as follows: ... 'If leakage occurs at a bolted connection, the bolting shall be removed, VT-3 visually examined for corrosion, and evaluated in accordance with IWA-3100.'"

In lieu of this requirement, Pennsylvania Power & Light Company proposes to do the following alternate provisions:

If leakage occurs at a reactor recirculation pump case-to-cover bolted connection, the source of such leakage detected during the conduct of a system pressure test shall be evaluated by PP&L for corrective measures, as follows:

The source of such leakage detected during a system pressure test shall be evaluated to determine bolting corrosion and potential failure. This evaluation shall consider, as a minimum:

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1) location and history of the leakage
2) fastener materials
3) evidence of corrosion with the connection assembled
4) corrosiveness of the process fluid
5) other components in the vicinity that may become degraded due to the leakage

If the evaluation indicates the need for further analysis, then all of the studs shall be volumetrically examined, and evaluated in accordance with IWB-3515. This examination may be deferred until the next outage of sufficient duration if the evaluation supports continued service.

If the evaluation determines that the leaking condition has not degraded the fasteners, then no further action is required. Should significant leakage from this bolted connection persist, it would be detected by the leakage collection system (drywell sump) serving this equipment, be investigated, and be corrected, in accordance with plant Technical Specification 3.4.3.2.

This relief is justified based upon the following:

- In both Susquehanna units, all reactor recirculation pump case-to-cover studs have been volumetrically examined by ultrasonic examination once during the first 10-year Inspection Interval. No unacceptable indications were found by this examination. The past examination results confirm the soundness of these studs at present; and the periodic repetition will confirm their continued soundness in the future.

- BWR industry experience shows no evidence of service-related corrosion damage for the recirculation pump case-to-cover studs. Because the BWR pump environment contains only condensate-quality water with no boron, there is an absence of any chemical agents that can aggressively corrode these studs.

- The geometry of this particular bolted connection mitigates the potential for corrosion due to leakage.

- The complete disassembly of this connection, which is in a High Radiation area, including its insulation and its gasket, would result in significant personnel radiation exposure, in contradiction of the ALARA principle.

- Susquehanna SES experience and the pump manufacturer both suggest that any seepage past the gasket of this connection will disappear or greatly diminish at rated temperature and pressure conditions, as the pump case and cover reach thermal equilibrium with each other.

- The thermal insulation covering the reactor recirculation pump makes it impractical to determine the precise location of any seepage from this connection. It is unwise to have insulation removed from the recirculation pump case cover area because that could introduce unusual temperature distribution patterns. This could have possible adverse effects on dimensional clearances of rotating components of the pump and on achievement of thermal equilibrium between the pump case and cover, and create or exacerbate leakage past the gasket.

- The reactor recirculation pump case and cover are designed to support removal of studs from the pump case only after removal of the cover (and of the motor above it). Lack of exposure of the full length of each stud when the cover is in place impedes the stud removal operation and precludes removal of any stud that galls.

- The stainless steel material of the pump case is vulnerable to galling during stud removal. If galling occurs, the old stud must be drilled and machined to extract it. A repair of the threaded hole in the pump case, prior to installation of a new stud, would also be necessary.

Pennsylvania Power and Light Company requests that this relief be approved by March 12, 1997, so that the relief can be used during the Unit 2 Eighth Refueling Outage.

If you have any questions, please call, Mr. C. T. Coddington at (610) 774-7531.

Very truly yours,

R. G. Byram

Attachment

copy: NRC Region I
Mr. K. Jenison, NRC Sr. Resident Inspector
Mr. C. Poslusny, NRC Sr. Project Manager

RELIEF REQUEST RRPT-8

I. RELIEF REQUEST APPLICABILITY

A.	Units:	1 and 2
B.	Code Examination Category:	N/A
C.	Code Item Number:	N/A
D.	Code Reference:	ASME Section XI (1989 Edition), Paragraph IWA-5250(a)(2), Corrective Measures

II. IDENTIFICATION OF COMPONENTS

ASME Section XI Class 1 reactor recirculation pump case-to-cover bolted connections with leakage identified during pressure testing. This bolting is as specified in Table IWB-2500-1, Examination Category B-G-1, Item Number B6.180.

III. CODE REQUIREMENTS FROM WHICH RELIEF IS REQUESTED

The 1989 Edition of ASME Code Section XI paragraph IWA-5250(a)(2), stating:

> "The source of leakages detected during the conduct of a system pressure test shall be located and evaluated by the Owner for corrective measures as follows: ... 'If leakage occurs at a bolted connection, the bolting shall be removed, VT-3 visually examined for corrosion, and evaluated in accordance with IWA-3100.'"

IV. BASIS FOR RELIEF

The requirements described above create a hardship for this plant, potentially compromise radiation safety, and are less effective than the alternative actions, which Susquehanna proposes.

The bolting at the reactor recirculation pump case-to-cover bolted connection, being Code Examination Category B-G-1, Item Number B6.180, is required by Table IWB-2500-1 to receive a volumetric examination, to the Acceptance Standard of paragraph IWB-3515, once each 10-year Inspection Interval. In both Susquehanna units, all reactor recirculation pump case-to-cover studs have been volumetrically examined by ultrasonic examination once during the first 10-year Inspection Interval. No unacceptable indications were found by this examination. The past examination results confirm the soundness of these studs at present; and the periodic repetition will confirm their continued soundness in the future.

BWR industry experience shows no evidence of service-related corrosion damage for the recirculation pump case-to-cover studs. Because the BWR pump environment contains only condensate-quality water with no boron, there is an absence of any chemical agents that can aggressively corrode these studs. Throughout the industry, there have been no reports of any deterioration of BWR recirculation pump case-to-cover connection studs, despite several plants having disassembled these bolted connections in the past to reduce observed leakage.

The geometry of this particular bolted connection mitigates the potential for corrosion due to leakage. The sealing area, which includes a flexitallic gasket, is inside the stud circle. The cover is of complex shape, having a smaller diameter (within the stud circle) on the bottom, next to the pump; and a larger diameter (enclosing the stud circle) above. The small diameter of the lower part of the cover, inside the stud circle, permits direct visual inspection of about 3 inches of the lower portion of the shank of each stud, after the thermal insulation is removed. This includes the location where the stud enters the threads of the pump case. This configuration elevates the nut well above the area where any water from leakage could impinge on the nut. An annular space between the pump case and the overhang of the cover permits direct visual examination of the lower shank and portions of the threads of each stud.

The flexitallic-type gasket of this particular bolted connection tends to seal poorly if recrushed following relaxation during any gross disturbance to the pattern of bolt tension.

The ASME Code requirement cited above creates a hardship for this plant and potentially compromises radiation safety. Removal of insulation and all bolting from this bolted connection is not required to assure absence of significant corrosion and other forms of deterioration. Further, removal of this bolting is not advisable. This connection would require the installation of a new gasket of special materials and be more difficult to seal after disassembly. The complete disassembly of this connection, which is in a High Radiation area, including its insulation and its gasket, would result in significant personnel radiation exposure, in contradiction of the ALARA principle. The ASME has recognized the potential for such conditions and has subsequently modified this requirement to allow the removal and evaluation of one bolt closest to the leak in a bolted connection reported as leaking.

Although ASME Code editions subsequent to 1989 have improved the approach to corrective action for leakage at bolted connections, the improvement does not well address the situation of the reactor recirculation pump case-to-cover bolted connection. In the 1990 Addenda and later editions of ASME Code Section XI, paragraph IWA-5250(a)(2) has been enhanced to state, "If leakage occurs at a bolted connection, one of the bolts shall be removed, VT-3 examined, and evaluated in accordance with IWA-3100. The bolt selected shall be the one closest to the source of leakage. When the removed bolt has evidence of degradation, all remaining bolting in the connection shall be removed, VT-3 examined, and

evaluated in accordance with IWA-3100." This approach is not appropriate for the reactor recirculation pump case-to-cover bolted connection for the following reasons:

1) Susquehanna experience and the pump manufacturer both suggest that any seepage past the gasket of this connection will disappear or greatly diminish at rated temperature and pressure conditions, as the pump case and cover reach thermal equilibrium with each other.

2) The thermal insulation covering the reactor recirculation pump makes it impractical to determine the precise location of any seepage from this connection. Leakage of interest might occur only at ASME Class 1 System Leakage Test pressure. While at test pressure and increasing coolant temperature, it is unwise to have insulation removed from the recirculation pump case cover area because that could introduce unusual temperature distribution patterns. This could have possible adverse effects on dimensional clearances of rotating components of the pump and on achievement of thermal equilibrium between the pump case and cover, and create or exacerbate leakage past the gasket.

3) The reactor recirculation pump case and cover are designed to support removal of studs from the pump case only after removal of the cover (and of the motor above it). Lack of exposure of the full length of each stud when the cover is in place impedes the stud removal operation and precludes removal of any stud that galls.

4) The stainless steel material of the pump case is vulnerable to galling during stud removal. If galling occurs, the old stud must be drilled and machined to extract it. A repair of the threaded hole in the pump case, prior to installation of a new stud, would also be necessary.

Thus, removal of any stud for visual examination would result in the hardship of drastic increase in work scope and personnel radiation exposure without any compensating increase in safety.

V. ALTERNATE PROVISIONS

If leakage occurs at a reactor recirculation pump case-to-cover bolted connection, the source of such leakage detected during the conduct of a system pressure test shall be evaluated by PP&L for corrective measures, as follows:

> The source of such leakage detected during a system pressure test shall be evaluated to determine bolting corrosion and potential failure. This evaluation shall consider, as a minimum:

1) location and history of the leakage
2) fastener materials
3) evidence of corrosion with the connection assembled
4) corrosiveness of the process fluid
5) other components in the vicinity that may become degraded due to the leakage

If the evaluation indicates the need for further analysis, then all of the studs shall be volumetrically examined, and evaluated in accordance with IWB-3515. This examination may be deferred until the next outage of sufficient duration if the evaluation supports continued service.

If the evaluation determines that the leaking condition has not degraded the fasteners, then no further action is required. Should significant leakage from this bolted connection persist, it would be detected by the leakage collection system (drywell sump) serving this equipment, be investigated, and be corrected, in accordance with plant Technical Specification 3.4.3.2.