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SUBJECT: Requests approval of addl deferral of requirements of Section 4.3 of NUREG-0619.

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SUSQUEHANNA STEAM ELECTRIC STATION
SECOND 10-YEAR INSERVICE INSPECTION INTERVAL PROGRAM REQUEST FOR RELIEF FROM NUREG-0619, BWR FW NOZZLE AND CRD RETURN LINE NOZZLE CRACKING
PLA-4867 **FILE R41-2**

Docket Nos. 50-387 and 50-388

PP&L, Inc. requests approval of additional deferral of the requirements of Section 4.3 of NUREG-0619. In accordance with Section 4.3 of NUREG-0619, for the feedwater nozzle thermal sleeve configuration, a liquid penetrant examination of the nozzle bore and inner radius areas is required every nine refueling cycles (or 135 startup/shutdown cycles). Permission to defer the liquid penetrant examinations for an operating cycle was granted for the Susquehanna SES Units 1 and 2 on June 6, 1996. We request that the deferral of these examinations be extended for another operating cycle.

The hardships associated with performance of these examinations are a major concern to the industry, as well as PP&L. Experience gained with the prescribed fixes for feedwater nozzle cracking and advancements in ultrasonic inspection technology render the required liquid penetrant inspections unnecessary to ensure adequate plant safety margins. Moreover, the associated hardships [personnel dose, vessel drain down, extended plant downtime, potential RPV component damage, etc.] far outweigh the added assurance of safety provided by the liquid penetrant examinations.

REQUIREMENTS FOR WHICH DEFERRAL IS REQUESTED

The Susquehanna SES Units 1 and 2 feedwater nozzles are not clad and incorporate the triple sleeve, double piston ring thermal sleeve design. The augmented inservice inspection requirements for Susquehanna SES Units 1 and 2 feedwater nozzles, based on Section 4.3 of NUREG-0619 and the Susquehanna Units 1 and 2 specific nozzle/thermal sleeve configuration, are as illustrated below:

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Parts Examined	Type of Examination	Extent of Examination	Frequency
Nozzle Safe End	Ultrasonic (UT)	100% of the nozzle safe ends	every two (2) refueling cycles
Nozzle Bore	Ultrasonic (UT) AND Penetrant (PT)	100% of the nozzle bores 100% of the nozzle bores (one sparger removed)	every two (2) refueling cycles every nine (9) refueling cycles or 135 startup/shutdown cycles
Nozzle Inner Radius	Ultrasonic (UT) AND Penetrant (PT)	100% of the nozzle inner radii 100% of the nozzle inner radii (one sparger removed)	every two (2) refueling cycles every nine (9) refueling cycles or 135 startup/shutdown cycles
Sparger	Visual (VT-3)	100% of the spargers	every four (4) refueling cycles

Deferral for one operating cycle is requested from the requirements to perform penetrant testing (PT) of the feedwater nozzle bore/inner radius every 9th refueling cycle or every 135 startup/shutdown cycles.

BASIS FOR DEFERRAL

Background

NUREG-0619 was issued in 1980 to address the problem of feedwater nozzle fatigue cracking experienced by many boiling water reactor plants at that time. The NUREG discussed the cracking mechanism, prescribed fixes and plant system/operational modification recommendations, and established inspection requirements intended to ensure the continued, long term efficacy of the installed fixes. Due to uncertainties associated with the analysis performed and the limited capabilities demonstrated by the available ultrasonic examination systems in this application, the NUREG-required examinations included a combination of nondestructive examination methods to supplement the routine ultrasonic examination of the nozzle areas of concern. Susquehanna SES Units 1 and 2 were constructed at the time of the issuance of NUREG-0619; augmented inservice inspections of the Susquehanna SES Units 1 and 2 feedwater nozzles in accordance with NUREG-0619 commenced during preservice inspection of both units, and have continued to date (except for the deferral of the penetrant testing on the feedwater nozzles during the last refueling outage).

Experience with the prescribed hardware and plant operational fixes has been favorable in mitigating the initiation and propagation of feedwater nozzle cracking. In addition, significant advances in the area of ultrasonic examination technology have provided automated ultrasonic examination systems capable of reliably detecting and sizing fatigue flaws in feedwater nozzle areas of concern.

Basis For Deferral of Penetrant Testing

Periodic penetrant testing of the feedwater nozzle bore and inner radius was prescribed in NUREG-0619 to account for the lack of confidence in the then "state of the art" ultrasonic examination techniques for detecting fatigue cracking in nozzle configurations. Penetrant testing also served to ensure early detection of any new cracking, thereby limiting crack growth and maintaining adequate structural margins to ensure reactor pressure vessel integrity. However, performance of penetrant testing of the feedwater nozzle bore/inner radius poses extreme hardship in terms of personnel exposure and extended plant down time since vessel drain down and sparger removal must be accomplished to facilitate penetrant examinations. In addition, feedwater sparger removal, due to the inherent tight interference fit of the thermal sleeve, may result in damage to the thermal sleeve and/or adjacent vessel components during removal, necessitating costly repairs and extended outage time. With the advent of advanced ultrasonic examination systems capable of detection and sizing of fatigue flaws, performance of penetrant testing is no longer necessary. Continued assurance of feedwater nozzle structural integrity may be effectively assessed solely through ultrasonic inspections; performance of NUREG-required penetrant testing poses undue hardship with little compensating increase in plant safety.

Deferral of the performance of routine penetrant examination of the feedwater nozzle bore/inner radius specified in NUREG-0619 is justified for the following reasons:

Susquehanna SES Units 1 and 2 feedwater nozzles are not clad and incorporate the triple sleeve, double piston ring thermal sleeve design. This design, over the years, has been proven effective in mitigation of feedwater nozzle fatigue crack initiation/propagation

Susquehanna SES Units 1 and 2 inspection history has provided no indication of cracking to date.

Ultrasonic inspection is now a reliable alternate to penetrant testing in assessing feedwater nozzle structural integrity. During this refueling outage the feed water nozzles will be ultrasonically inspected using the GERIS 2000 UT system (GE Reactor Inspection System 2000) with specialized techniques designed specifically for ultrasonic examinations of feedwater nozzles. General Electric report GE-NE-C3100016-01, "GERIS 2000 Ultrasonic Inspection of Feedwater Nozzles", by S. C. Mortenson dated August 23, 1994, describes the GERIS 2000 System's qualified capabilities in detection and sizing.

PP&L is participating in the BWROG's generic relief request on inspections of the feedwater nozzles.

Since the Unit 1 liquid penetrant examinations are required next outage (scheduled to begin April 14, 1998), we request that the deferral be approved by April 14, 1998.

If you have any questions, please contact Mr. C. T. Coddington at (717) 542-3294.

Sincerely,

R. G. Byram

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Mr. K. Jenison, NRC Sr. Resident Inspector
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