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SUBJECT: Application for amend to license NPF-63, modifying TS 3/4.4.5
 "SG," to add alternative to tube plugging, repair of SG tubes
 that have indications of degradation.

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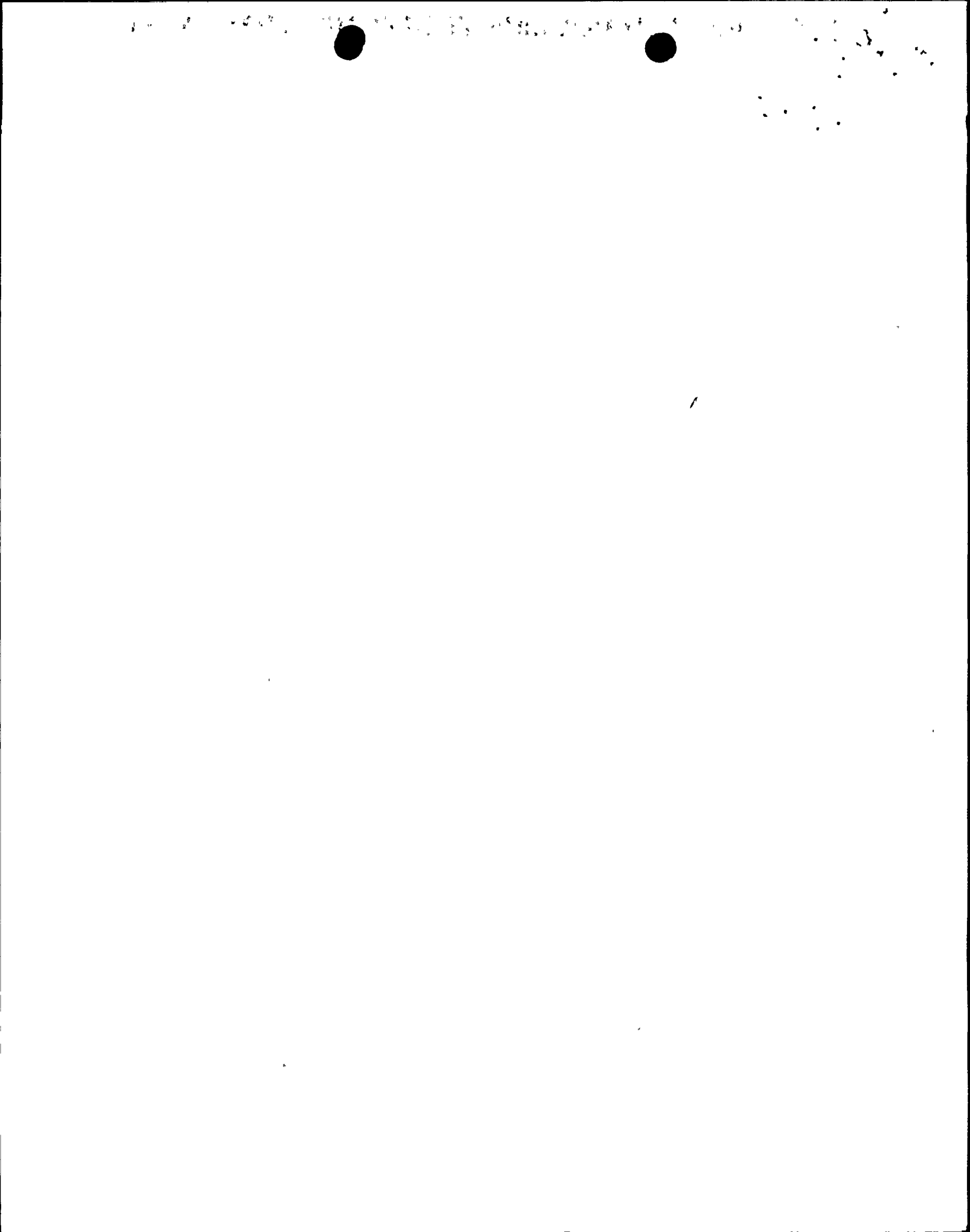
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Carolina Power & Light Company

AUG 20 1993

SERIAL: HNP-93-831
10 CFR 50.90

Letter Number: HO-930138

United States Nuclear Regulatory Commission
ATTENTION: Document Control Desk
Washington, DC 20555

SHEARON HARRIS NUCLEAR POWER PLANT
DOCKET NO. 50-400/LICENSE NO. NPF-63
REQUEST FOR LICENSE AMENDMENT
STEAM GENERATOR TUBE REPAIR

Gentlemen:

In accordance with the Code of Federal Regulations, Title 10, Parts 50.90 and 2.101, Carolina Power & Light Company (CP&L) hereby requests a revision to the Technical Specifications (TS) for the Shearon Harris Nuclear Power Plant (SHNPP). This TS change request would allow, as an alternative to tube plugging pursuant to Technical Specification 3/4.4.5, "Steam Generators", the repair of steam generator tubes that have indications of degradation.

Enclosure 1 provides a detailed description of the proposed changes and the basis for the changes.

Enclosure 2 details, in accordance with 10 CFR 50.91(a), the basis for the Company's determination that the proposed changes do not involve a significant hazards consideration.

Enclosure 3 provides an environmental evaluation which demonstrates that the proposed amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental assessment needs to be prepared in connection with the issuance of the amendment.

Enclosure 4 provides page change instructions for incorporating the proposed revisions.

Enclosure 5 provides the proposed Technical Specification pages.

In accordance with 10 CFR 50.91(b), CP&L is providing the State of North Carolina with a copy of the proposed license amendment.

In order to allow time for orderly incorporation of the change into copies of the Technical Specifications and the revision of necessary procedures for

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implementation in the next refueling outage, CP&L requests that the proposed amendment be approved by February 1, 1994 and allow implementation within 30 days of issuance of the amendment.

Please refer any questions regarding this submittal to Mr. D. C. McCarthy at (919) 362-2100.

Yours very truly,



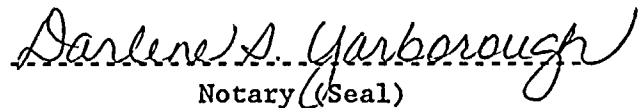
W. R. Robinson

SDC/sdc

Enclosures:

1. Basis for Change Request
2. 10 CFR 50.92 Evaluation
3. Environmental Considerations
4. Page Change Instructions
5. Technical Specification Pages

W. R. Robinson, having been first duly sworn, did depose and say that the information contained herein is true and correct to the best of his information, knowledge and belief; and the sources of his information are officers, employees, contractors, and agents of Carolina Power & Light Company.



Notary (Seal)

My commission expires: 2-5-95

cc: Mr. Dayne H. Brown
Mr. S. D. Ebnetter
Mr. N. B. Le
Mr. J. E. Tedrow





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ENCLOSURE 1

SHEARON HARRIS NUCLEAR POWER PLANT
NRC DOCKET NO. 50-400/LICENSE NO. NPF-63
REQUEST FOR LICENSE AMENDMENT
STEAM GENERATOR TUBE REPAIR

BASIS FOR CHANGE REQUEST

Background

Technical Specification 3.4.5, "Steam Generators", currently requires that all defective tubes be plugged. The purpose of this License Amendment Request is to propose the use of tube sleeves for the repair of defective steam generator (S/G) tubes. sleeving has been demonstrated to be a safe and effective method of repair for degraded steam generator tubes. The use of sleeve repairs will reduce the number of steam generator tubes that must be removed from service by plugging. Tube sleeving is bounded by the current practice of plugging, yet it has substantially less impact on the capacity of the steam generator to transfer heat from the primary to secondary coolant systems.

Proposed Change

This Technical Specification change request would modify Specification 3/4.4.5, "Steam Generators", to add as an alternative to tube plugging, the repair of steam generator tubes that have indications of degradation.

Basis

Technical Specification 3/4.4.5 requires steam generator tubes to be removed from service by plugging both the inlet and exit of the tube when an imperfection in the tube reaches 40% of the nominal tube wall thickness. Installing plugs in a steam generator tube removes the heat transfer surface of the plugged tube from service and reduces the primary coolant flow available for core cooling.

Babcock & Wilcox (B&W) Nuclear Service Company has developed a repair methodology that allows degraded steam generator tubes to be repaired by sleeving and remain in service. B&W documented the repair method in Topical Report BAW-2045PA, Revision 1. The design and installation methodology accounts for tube mechanical and structural aspects, water chemistry, metallurgical aspects, and thermal/hydraulic considerations, as well as allowing for subsequent inspections of the tube and sleeve. The NRC staff has reviewed the report and found that it is suitable for referencing in license applications¹.

¹Sleeves span a defective or degraded region of a steam generator tube. The ends

¹ Letter and Safety Evaluation from Mr. J. E. Richardson (NRC) to Mr. J. H. Taylor (B&W) dated June 18, 1992; Acceptance for Referencing of Topical Report BAW-2045P, Revision 1 "Recirculating Steam Generator Kinetic sleeve qualification for 3/4 inch OD Tubes (TAC No.M83286)"

of the sleeve are expanded and/or kinetically welded to provide acceptable leak resistance and redundant load-carrying capability. A severed tube with a mechanical sleeve installed in it has been shown by tests to have mechanical strength at least as great as that of a new tube. The sleeves are designed to maintain the primary-to-secondary pressure boundary of the steam generator tube under all loads that any steam generator tube may experience due to normal plant conditions and all anticipated transients specified for the steam generator.

The installation of a sleeve enhances the safety of the plant while keeping degraded steam generator tubes in service. Safety is improved because a double barrier is established between the primary and secondary fluids, which reduces the risk of tube rupture. The second barrier, the sleeve, is made of thermally treated Alloy 690, which provides enhanced corrosion resistance compared to the original tubing. In addition, the tube/sleeve freespan joint is stress relieved so that the joint is not susceptible to IGSCC.

Following the guidelines of Regulatory Guide 1.121 for tube degradation limits, a plugging limit has been established at 40% of the original sleeve wall thickness. Eddy current techniques are available to perform necessary sleeve/tube inspections as needed to detect defects and to verify proper installation of the sleeve.

CP&L will demonstrate prior to the implementation of any steam generator tube repair process that no adverse safety concern will be created by the repair as determined by the satisfactory completion of a 10 CFR 50.59 safety evaluation as part of the design control program.

The sleeved tube will not transfer energy as efficiently as an unsleeved tube. Thus, the sleeving will result in a slight reduction in heat transfer in the steam generator and a small increase in the primary side pressure drop through the steam generator due to the smaller tube diameters in the sleeved tubes. The number of steam generator tube sleeves that can be installed in any steam generator is limited by pre-established tube plugging limits which are an integral part of each fuel reload analysis (performed for each refueling). The tube plugging limits ensure that the resulting configuration remains within the envelope of the reload analysis. The B&W Qualification Report shows that one tube plug is equivalent to eighteen tube sleeves with respect to pressure drop and is equivalent to forty-three to sixty-five sleeved tubes based on heat transfer losses. Therefore, these equivalencies will be taken into account when applying the tube plugging limit to the installation of tube sleeves.

The FSAR accident analyses for over cooling events assume that the feedwater flow increases during these events to increase heat removal by the steam generator. Thus, for over cooling events, any reduction in heat transfer due to the installation of sleeves is conservative. For overheating events, the heat transfer area of the steam generator remains constant. The available heat transfer area is defined as the steam generator design heat transfer area minus the tube plugging margin. Therefore, overheating events are bounded by tube plugging margin assumptions. Other events analyzed in the FSAR which do not fall into one of the above categories are not affected at all since the assumptions on steam generator heat removal do not change.

Conclusions

Steam generator sleeving has been shown to be an effective means of repairing degraded steam generator tubes. By sleeving a tube rather than plugging, the tube remains in service and continues to be used to transfer energy from the primary to secondary systems. The sleeved tube performs as well mechanically as an unsleeved tube. Sleeving does not significantly increase the probability or consequences of accidents previously analyzed nor does it create the chance for a new event that is not already bounded by the licensing analysis. The plant safety analysis for tube plugging bounds tube sleeving.

ENCLOSURE 2

SHEARON HARRIS NUCLEAR POWER PLANT
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STEAM GENERATOR TUBE REPAIR

10 CFR 50.92 EVALUATION

The Commission has provided standards in 10 CFR 50.92(c) for determining whether a significant hazards consideration exists. A proposed amendment to an operating license for a facility involves no significant hazards consideration if operation of the facility in accordance with the proposed amendment would not: (1) involve a significant increase in the probability or consequences of an accident previously evaluated, (2) create the possibility of a new or different kind of accident from any accident previously evaluated, or (3) involve a significant reduction in a margin of safety. Carolina Power & Light Company has reviewed this proposed license amendment request and determined that its adoption would not involve a significant hazards determination. The bases for this determination are as follows:

Proposed Change

This Technical Specification change request would modify Specification 3/4.4.5, "Steam Generators", to add as an alternative to tube plugging, the repair of steam generator tubes that have indications of degradation.

Basis

This change does not involve a significant hazards consideration for the following reasons:

1. The proposed amendment does not involve a significant increase in the probability or consequences of an accident previously evaluated.

The Final Safety Analysis Report conservatively evaluated a double-ended rupture of a steam generator tube. A severed tube with a mechanical sleeve installed in it has been shown by tests to have mechanical strength at least as great as that of a new tube. Thus a sleeved tube is no more likely to rupture than any other tube in the steam generator.

Tube sleeves are designed to accommodate all loads that any steam generator tube may experience due to normal plant conditions and all anticipated transients specified for the steam generator.

A sleeved tube is functionally equivalent to an unsleeved tube except for less effective heat transfer due to the air gap and a slight pressure drop due to the primary flow restriction. These differences would be insignificant to the performance of the steam generator in any accident situation.

The sleeves are structurally equivalent to the steam generator tubes.



There is no increase in the possibility for increased fatigue loadings. There is no possibility for the sleeve to become dislodged from its plugging location and enter the RCS flow path. The sleeving process results in the deformation of the sleeve into the steam generator tube in at least one end of the sleeve. This process ensures that the sleeve remains locked in to its mating tube once the kinetic weld has been completed.

The plant safety analysis for tube plugging bounds tube sleeving.

Therefore, there would be no increase in the probability or consequences of an accident previously evaluated.

2. The proposed amendment does not create the possibility of a new or different kind of accident from any accident previously evaluated.

The only equipment affected by sleeving is the steam generator. The most severe malfunction of a steam generator is a tube rupture. The consequences of a ruptured sleeve are no greater than the consequences of a ruptured tube. Sleeving does not increase the probability of a steam generator failure because the sleeved tube has been shown to be mechanically stronger than an unsleeved tube. Thus, a steam generator with sleeved tubes would perform in the same manner as one without sleeved tubes, and there is no risk of a new or different accident.

Therefore, the proposed changes do not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. The proposed amendment does not involve a significant reduction in the margin of safety,

The proposed revision to the Shearon Harris Technical Specifications to permit the installation of tube sleeves does not reduce the margin of safety as presently defined in BASES section 3/4.4.5. The analysis for the proposed tube sleeve design (based on B&W Nuclear Services Company Report BAW-2045PA, Revision-1) demonstrates that the structural integrity of the RCS is maintained. Design of the tube sleeve considers mechanical/structural aspects, water chemistry and metallurgical aspects as well as thermal/hydraulic considerations.

The integrity of steam generator tubes is in fact enhanced by the installation of sleeves due to increased vibration stability margin and the ability to bridge over imperfections and degradations.

- Therefore, the proposed changes do not involve a significant reduction in a margin of safety.

ENCLOSURE 3

SHEARON HARRIS NUCLEAR POWER PLANT
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STEAM GENERATOR TUBE REPAIR

ENVIRONMENTAL CONSIDERATIONS

10 CFR 51.22(c)(9) provides criterion for and identification of licensing and regulatory actions eligible for categorical exclusion from performing an environmental assessment. A proposed amendment to an operating license for a facility requires no environmental assessment if operation of the facility in accordance with the proposed amendment would not: (1) involve a significant hazards consideration; (2) result in a significant change in the types or significant increase in the amounts of any effluents that may be released offsite; (3) result in an increase in individual or cumulative occupational radiation exposure. Carolina Power & Light Company has reviewed this request and determined that the proposed amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment needs to be prepared in connection with the issuance of the amendment. The basis for this determination follows:

Proposed Change

This Technical Specification change request would modify Specification 3/4.4.5, "Steam Generators", to add as an alternative to tube plugging, the repair of steam generator tubes that have indications of degradation.

Basis

The change meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9) for the following reasons:

1. As demonstrated in Enclosure 2, the proposed amendment does not involve a significant hazards consideration.
2. The proposed amendment does not result in a significant change in the types or significant increase in the amounts of any effluents that may be released offsite.

Addition of the sleeving repair technique to Technical Specification 3/4.4.5 and the use of sleeves for repairing degraded steam generator tubes will have no impact on the type or quantities of radioactive materials produced by the facility. As such, the change can not affect the types or amounts of any effluents that may be released offsite.

3. The proposed amendment does not result in an increase in individual or cumulative occupational radiation exposure.

The use of kinetic welding has proved to be extremely reliable and rapid

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to perform, thus keeping personnel exposure low. It is anticipated that occupational exposures associated with tube sleeving will be comparable to that received during tube plugging.

Therefore, the amendment has no affect on either individual or cumulative occupational radiation exposure.

ENCLOSURE 4
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PAGE CHANGE INSTRUCTIONS

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