Northern States Power Company
Prairie Island Nuclear Generating Plant
1717 Wakonade Dr. East
Welch, Minnesota 55089

November 27, 1996

10 CFR Part 50
Section 50.90

U S Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

PRAIRIE ISLAND NUCLEAR GENERATING PLANT
Docket Nos. 50-282 License Nos. DPR-42
50-306 DPR-60

License Amendment Request Dated November 27, 1996
Incorporation of Combustion Engineering Steam Generator Welded Tube Sleeve Topical Report

Attached is a request for a change to the Technical Specifications, Appendix A of the Operating Licenses, for the Prairie Island Nuclear Generating Plant. This request is submitted in accordance with the provisions of 10 CFR Part 50, Section 50.90.

This amendment request proposes a change to Technical Specification (TS) 4.12, "Steam Generator Tube Surveillance " and a change to the Bases to the Technical Specifications section B.4.12, " Steam Generator Tube Surveillance." These changes are proposed to incorporate new steam generator tube sleeve designs and intallation and examination techniques.

Exhibit A contains a description of the proposed changes, the reasons for requesting the changes, the supporting safety evaluation and significant hazards determination. Exhibit B contains current Prairie Island Technical Specification pages marked up to show the proposed changes. Exhibit C contains the revised Technical Specification pages.

We anticipate utilizing the new sleeve designs in the Unit 1 refueling outage scheduled to begin September 25, 1997.

Please contact Jack Leveille (612-388-1121, Ext. 4662) if you have any questions related to this License Amendment Request.

Michael D Wadley

Michael D Wadley
Plant Manager
Prairie Island Nuclear Generating Plant

c: Regional Administrator-III, NRC
NRR Project Manager, NRC
Senior Resident Inspector, NRC
State of Minnesota, Attn: Kris Sanda
J E Silberg

Attachments:

Affidavit -- Northern States Power Company
Exhibit A -- Evaluation of Proposed Changes to the Technical Specifications
Exhibit B -- Proposed Changes Marked Up on Existing Technical Specification Pages
Exhibit C -- Revised Technical Specification Pages
Affidavit -- Combustion Engineering Affidavit Pursuant to 10 CFR 2.790
CE, Inc. -- Repair of Westinghouse Series 44 and 51 Steam Generator Tubes Using Leak Tight Sleeves, FINAL REPORT, CEN-629-P, November 1996 (Proprietary Version)
CE, Inc. -- Repair of Westinghouse Series 44 and 51 Steam Generator Tubes Using Leak Tight Sleeves, FINAL REPORT, CEN-629-P, November 1996 (Non-Proprietary Version) (to Document Control Desk only)

UNITED STATES NUCLEAR REGULATORY COMMISSION

NORTHERN STATES POWER COMPANY

PRAIRIE ISLAND NUCLEAR GENERATING PLANT

DOCKET NO. 50-282
50-306

REQUEST FOR AMENDMENT TO
OPERATING LICENSES DPR-42 & DPR-60

LICENSE AMENDMENT REQUEST DATED November 27, 1996

Northern States Power Company, a Minnesota corporation, requests authorization for changes to Appendix A of the Prairie Island Operating License as shown on the attachments labeled Exhibits A, B, and C. Exhibit A describes the proposed changes, reasons for the changes, safety evaluation and a significant hazards evaluation. Exhibits B and C are copies of the Prairie Island Technical Specifications incorporating the proposed changes.

This letter contains no restricted or other defense information.

NORTHERN STATES POWER COMPANY

By Michael D Wadley

Michael D Wadley
Plant Manager
Prairie Island Nuclear Generating Plant

On this 27 day of NOVEMBER 1996 before me a notary public in and for said County, personally appeared Michael D Wadley, Plant Manager, Prairie Island Nuclear Generating Plant, and being first duly sworn acknowledged that he is authorized to execute this document on behalf of Northern States Power Company, that he knows the contents thereof, and that to the best of his knowledge, information, and belief the statements made in it are true and that it is not interposed for delay.

John N Johnson

JOHN N. JOHNSON
NOTARY PUBLIC - MINNESOTA
My Comm. Expires Jan. 31, 2000

AFFIDAVIT PURSUANT

TO 10 CFR 2.790

I, Ian C. Rickard, depose and say that I am the Director, Operations Licensing, of Combustion Engineering, Inc., duly authorized to make this affidavit, and have reviewed or caused to have reviewed the information which is identified as proprietary and referenced in the paragraph immediately below. I am submitting this affidavit in conjunction with the application of Northern States Power Company and in conformance with the provisions of 10 CFR 2.790 of the Commission's regulations.

The information for which proprietary treatment is sought is contained in the following document:

CEN-629-P, Rev. 01, "Repair of Westinghouse Series 44 and 51 Steam Generator Tubes Using Leak Tight Sleeves," November 1996.

This document has been appropriately designated as proprietary.

I have personal knowledge of the criteria and procedures utilized by Combustion Engineering in designating information as a trade secret, privileged or as confidential commercial or financial information.

Pursuant to the provisions of paragraph (b) (4) of Section 2.790 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure, included in the above referenced document, should be withheld.

1. The information sought to be withheld from public disclosure, is owned and has been held in confidence by Combustion Engineering. It consists of

information concerning the steam generator tube repair process of sleeving, including qualification program results and analyses.

2. The information consists of test data or other similar data concerning a process, method or component, the application of which results in substantial competitive advantage to Combustion Engineering.

3. The information is of a type customarily held in confidence by Combustion Engineering and not customarily disclosed to the public. Combustion Engineering has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and whether to hold certain types of information in confidence. The details of the aforementioned system were provided to the Nuclear Regulatory Commission via letter DP-537 from F. M. Stern to Frank Schroeder dated December 2, 1974. This system was applied in determining that the subject document herein is proprietary.

4. The information is being transmitted to the Commission in confidence under the provisions of 10 CFR 2.790 with the understanding that it is to be received in confidence by the Commission.

5. The information, to the best of my knowledge and belief, is not available in public sources, and any disclosure to third parties has been made pursuant to regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence.

6. Public disclosure of the information is likely to cause substantial harm to the competitive position of Combustion Engineering because:

    a. A similar product is manufactured and sold by major pressurized water reactor competitors of Combustion Engineering.

    b. Development of this information by Combustion Engineering required millions of dollars and thousands of manhours of

effort. A competitor would have to undergo similar expense in generating equivalent information.

c. In order to acquire such information, a competitor would also require considerable time and inconvenience to develop an understanding of welded steam generator tube sleeve installation problems and evaluate specific examples based on test or pulled steam generator tube data and develop and qualify a steam generator tube sleeving program.

d. The information consists of a description of the steam generator tube repair process of sleeving, including qualification program results and analyses, the application of which provides a competitive economic advantage. The availability of such information to competitors would enable them to modify their product to better compete with Combustion Engineering, take marketing or other actions to improve their product's position or impair the position of Combustion Engineering's product, and avoid developing similar data and analyses in support of their processes, methods or apparatus.

e. In pricing Combustion Engineering's products and services, significant research, development, engineering, analytical, manufacturing, licensing, quality assurance and other costs and expenses must be included. The ability of Combustion Engineering's competitors to utilize such information without similar expenditure of resources may enable them to sell at prices reflecting significantly lower costs.

f. Use of the information by competitors in the international marketplace would increase their ability to market nuclear steam supply systems by reducing the costs associated with

their technology development. In addition, disclosure would have an adverse economic impact on Combustion Engineering's potential for obtaining or maintaining foreign licensees.

Further the deponent sayeth not.

Ian C. Rickard
Director, Operations Licensing

Sworn to before me
this 19th day of November, 1996

Laurie J. White
Notary Public
My commission expires: 8/31/99

Exhibit A

Prairie Island Nuclear Generating Plant
License Amendment Request November 27, 1996

Evaluation of Proposed Changes to the Technical Specifications Appendix A of Operating License DPR-42 and DPR-60

Pursuant to 10 CFR Part 50, Sections 50.59 and 50.90, the holders of Operating Licenses DPR-42 and DPR-60 hereby propose the following changes to Appendix A, Technical Specifications:

Introduction

This amendment request proposes a change to Technical Specification (TS) 4.12, "Steam Generator Tube Surveillance", to incorporate new sleeve designs and installation and examination techniques. These new sleeve designs were developed by ABB Combustion Engineering.

The current Prairie Island Technical Specifications (TS), allow steam generator tubes with eddy current indications requiring repair to be sleeved. Tube sleeving is permitted only in areas where the sleeve spans the tubesheet area and whose lower joint is at the primary fluid tubesheet face. In the basis to TS 4.12, three sleeve designs found acceptable by the NRC staff for Prairie Island are listed. The purpose of this license amendment is to obtain approval for repair of steam generator tubes using the Combustion Engineering support plate type sleeves and curved tubesheet sleeves and to fulfill two commitments made to the NRC:

1. NSP Steam Generator Inspection Report Letter dated February 28, 1996: *During the next Unit 1 operating cycle, we will pursue formal qualification of eddy current examination for this application.*
2. NSP January 1996 Steam Generator Sleeving Issues Ninety Day Response Letter dated June 27, 1996: *We will submit, by December 1, 1996, the new Combustion Engineering Sleeve Licensing Topical Report, which will include a variety of sleeve designs and the latest sleeve examination requirements, prior to the next installation of CE sleeves at Prairie Island for approval as a License Amendment.*

The Combustion Engineering TIG welded sleeves can be used to repair degraded SG tubing at tube support plate intersections or free span locations, within and above the tubesheet region, or a combination of both within the same tube. Combustion Engineering TIG welded sleeving has been determined to be an effective repair method and has successfully been licensed at plants with both 3/4" and 7/8" tubing and in both Westinghouse and Combustion Engineering plants.

The steam generators at Prairie Island are Westinghouse Model 51 steam generators with 7/8 inch low temperature mill-annealed Alloy 600 tubing and a partial depth hard roll expansion tubesheet region. The sleeving material is thermally treated Alloy 690 tubing. This material has been used for sleeving by Combustion Engineering at Prairie Island since 1987.

Three types of sleeves are proposed for use at Prairie Island. These three types are the tubesheet sleeve welded at the top and bottom, the tubesheet sleeve welded at the top

and hard rolled at the bottom, and the tube support plate/free span sleeve welded near each end of the sleeve. In addition, a variation on the tubesheet sleeves involves the use of a pre-curved sleeve to install a tubesheet sleeve at the periphery of the tube bundle. The curved sleeve is inserted with tooling which straightens the sleeve during insertion into the tube. The curved sleeve allows tubesheet sleeve installation in the outer periphery of the region where access is limited due to interference of the sleeve and installation equipment with the channel head bowl. The sleeve welds are autogenous welds between the sleeve and parent tube. Sleeve welds are located in the free span of tubing above the tubesheet or outside of the tube support plates or at the lower end of the tube. The welds provide structural integrity and are leak tight. For the tubesheet sleeve with a lower rolled joint, the sleeve is rolled into the tubesheet to provide a leak tight structural joint. A complete description of the sleeve designs and qualification testing is provided in Combustion Engineering Report CEN-629-P, Revision 01, "Repair of Westinghouse Series 44 and 51 Steam Generator Tubes Using Leak Tight Sleeves", November 1996. A description of the eddy current qualification testing for inspection of the sleeve welds is provided in Combustion Engineering Report Number 96-OSW-003-P Rev. 00, "EPRI Steam Generator Examination Guidelines Appendix H Qualification for Eddy Current Plus-Point Probe Examination of ABB CE Welded Sleeves." The Appendix H Qualification Report was previously submitted to the NRC by Commonwealth Edison (Zion Nuclear Plant) September 3, 1996.

Inservice inspection of Combustion Engineering welded tubesheet sleeves has been evaluated using improved technologies. Qualification of the sleeve eddy current inspection process is provided in Combustion Engineering Report Number 96-OSW-003-P Rev. 00, "EPRI Steam Generator Examination Guidelines Appendix H Qualification for Eddy Current Plus-Point Probe Examination of ABB CE Welded Sleeves". This report documents the qualification of the +Point™ probe for eddy current examination of the ABB CE welded sleeve. Reliable detection of blow holes, weld inclusions, sleeve outside diameter suckback, and EDM notches simulating stress corrosion cracking conditions has been demonstrated. Accurately locating an indication relative to the weld centerline has also been verified.

Proposed Changes

Technical Specification 4.12, "Steam Generator Tube Surveillance", describes the inservice inspection program used to demonstrate steam generator operability. In order to utilize the variety of sleeves proposed, several items in Technical Specification 4.12 must be revised. A brief description of the proposed revisions is provided below. The specific wording changes to the Technical Specifications are shown in Exhibits B and C.

1. Proposed Changes to Technical Specification 4.12.D.1.(f)

   The plugging limit for the Combustion Engineering sleeves is added. "The repair limit for the pressure boundary region of any sleeve is 40% of the nominal sleeve wall thickness."

2. Proposed Changes to Technical Specification 4.12.D.1.(i)

   The definition of sleeving is changed to include tube support plate/free span sleeves. "Sleeving is the repair of degraded tube regions using a new Alloy 690 tubing sleeve inserted inside the parent tube and sealed at each end by welding or by replacing the lower weld in a full depth tubesheet sleeve with a hard rolled joint. The new sleeve becomes the pressure boundary spanning the original degraded tube region."

The Bases for Specification 4.12 are revised to incorporate a reference to the new topical report. The changes to the bases are shown in Exhibit B.

Justification

The current Prairie Island Technical Specification 4.12.D.1.(i) allows only the use of tubesheet sleeves since "tube sleeving is permitted only in areas where the sleeve spans the tubesheet area and whose lower joint is at the primary fluid tubesheet face". The proposed Technical Specification change is requested to provide Prairie Island with additional sleeving alternatives in locations other than the tubesheet region, such as at a tube support plate, and to allow the lower joint to be a hard roll joint just above the primary fluid tubesheet face in the region of the original hard roll expansion. In addition, this Technical Specification change meets the NSP commitment made by letter dated June 27, 1996 to "submit , by December 1, 1996, the new Combustion Engineering Sleeve Licensing Topical Report, which will include a variety of sleeve designs and the latest sleeve examination requirements, prior to the next installation of CE sleeves at Prairie Island for approval as a License Amendment". Formal qualification using EPRI Appendix H requirements of the eddy current examination of the weld zone, including location of weld zone indications, as committed to in the NSP Steam Generator Inspection Report letter dated February 28, 1996 is provided in Combustion Engineering Report Number 96-OSW-003-P.

The basis for steam generator tube surveillance and plugging/repair is to ensure that the structural integrity of the tubes is maintained. Sleeving technology was developed to span degraded regions of tubing with new tubing material such that the integrity of the original tubing is maintained. Removal of a tube from service by plugging results in a reduction of reactor coolant system flow. Use of sleeves allows repair of tubes where degradation is located such that other alternate repair criteria are not applicable. Repair of the tube by sleeving maintains the heat transfer area and results in a very small reactor coolant flow reduction. This minimizes the loss of margin in the reactor coolant flow through the steam generator in the loss-of-coolant accident (LOCA) analysis. Therefore, installation of sleeves in lieu of plugging assists in assuring that

minimum reactor coolant flow rates are maintained in excess of that required for operation at full power.

Safety Evaluation

Introduction

The amendment has been proposed to address tube degradation which requires plugging and which can occur in tubes within the tubesheet region, above the top of the tubesheet, at tube support plates, or in straight leg free span regions accessible to the sleeve installation equipment. Sleeves can be used to span the degraded region in order to maintain structural and leakage integrity of the steam generator tube during normal operating and postulated accident conditions. Currently, the Combustion Engineering welded tubesheet sleeve is authorized for use at Prairie Island. Modifications to the sleeve installation processes, new sleeve design options, and improvements in the preservice and inservice examination processes warrant review by the NRC at this time.

The proposed amendment will modify Technical Specification 4.12, Steam Generator Tube Surveillance, and the associated bases to permit the installation of the Combustion Engineering leak tight sleeves using improved processes and examinations. A description of the sleeve designs and installation requirements is provided in Combustion Engineering Report CEN-629-P, Revision 01, "Repair of Westinghouse Series 44 and 51 Steam Generator Tubes Using Leak Tight Sleeves", November 1996.

Evaluation

This safety evaluation provides summaries of discussions on Sleeve Design, Installation Process, Installation Examination, Inservice Examination, Corrosion Testing, Mechanical Testing, Structural Analysis, and Leakage Assessment.

Sleeve Design

Three types of sleeves are available for installation - two types of tubesheet region sleeves and one type of tube support sleeve. The first two types of sleeves are Full Depth Tubesheet (FDTS) Sleeves which span the tubesheet region. Both types of FDTS sleeves have an upper welded joint located above the tubesheet. The first type has a lower joint formed by welding the lower end of the sleeve to the lower end of the parent tube. The second type of tubesheet sleeve has a lower joint formed by hard rolling the sleeve into the parent tube in the region of the original hard roll. Either type of FDTS sleeve can also be installed beginning as a curved sleeve to facilitate installation in the outer periphery of the tubesheet.

The third type of sleeve is the Tube Support sleeve which can span a tube support plate or be installed in a free span section of tubing. The Tube Support sleeve uses a welded joint for both the upper and lower joint.

An optional post weld heat treatment process is available for the welded joints above the tubesheet to reduce the level of residual stress in the weld and in the Alloy 600 parent tubing at the welded joint region. At this time Prairie Island plans to utilize the post weld heat treatment process to ensure long life of the sleeve welded joint region. However, Prairie Island operates at a relatively low hot leg temperature of 590 degrees Fahrenheit and will evaluate the use of post weld heat treatment each outage that sleeves are installed. Experience with the original sleeves installed without post weld heat treatment has been satisfactory.

Installation Process

The basic installation process for each type of sleeve involves cleaning of the inside diameter of the tube in the joint region, installation of the sleeve, hydraulic expansion of the sleeve in the weld joint region to provide sleeve to parent tube contact, welding of the joint, ultrasonic exarnination of the weld, optional visual examination of the weld, optional post weld heat treatment of the weld, completion of the lower joint (welded or rolled), and eddy current examination of the sleeve.

Installation Examination

During the installation process, a combination of visual examination (VT), ultrasonic testing (UT), and eddy current testing (ET) are used at different stages of the installation process to assure an acceptable installation. These inspection techniques and equipment use state-of-the-art practices and may change as new technology becomes available.

The first inspection is an optional (depending on installation experience) visual examination of the inside diameter of the tubing after tube brushing has been completed. This examination confirms the adequacy of the brushing step in order to prevent weld failures due to oxide inclusions. If adequate cleanliness is not confirmed, the tube brushing is repeated until acceptable cleanliness is observed. Currently, the extent of this inspection program is 100% of the tubes to be sleeved. Relaxation of this requirement depends on demonstrating a high degree of cleanliness acceptance in the field. After the sleeve weld is made, the weld is inspected with UT to confirm a leak tight bond has been achieved by the welding process. Upon completion of the sleeve installation processes, an ET examination is done, currently using the +Point™ coil, of the entire length of the pressure boundary, including the parent tube in the pressure boundary behind the sleeve. Acceptance criteria for the ET examination are discussed in the "Inservice Examination" section. An optional VT examination of the upper sleeve

weld is available to help resolve uncertainties in surface conditions detected by either the UT or ET inspections. Currently, the extent of the VT examination of the free span sleeve welds is 100% of the new sleeves installed at Prairie Island. Relaxation of this requirement depends on demonstrating a high degree of acceptable welds in the future. VT examination is required for the lower edge weld.

Inservice Examination

Inservice examination is to be conducted using ET techniques qualified in accordance with the EPRI PWR Steam Generator Examination Guidelines. The +Point coil, or equivalent probe, will be used to examine the sleeve full length. Inspection scope will be in accordance with the EPRI PWR Steam Generator Examination Guidelines. A 20% sample of all installed sleeves in each steam generator will be inspected each refueling outage. One pluggable indication will result in expansion to 100% of the installed sleeves in that steam generator. Acceptance criteria will be based on qualified sizing techniques where available and on the logic presented in Section 5 of CEN-620-P. ET indications in the weld zone are separated into the two categories of surface and subsurface. Surface indications can be caused by weld sag or local irregularities in the weld surface. Additional VT reviews are used to evaluate surface related indications prior to acceptance. If no surface condition is observed, then the ET signal is considered as a subsurface weld zone indication. Subsurface weld zone indications are acceptable for service if located outside the pressure boundary region. portion of the weld.

Corrosion Testing

Combustion Engineering sleeves are fabricated from Alloy 690 which is procured to ASME Boiler and Pressure Vessel Code Case N-20 and ASME Specification SB-163. In addition, a thermal treatment process is applied to impart greater corrosion resistance and lower the residual stress level in the sleeve. The primary selection criterion for Alloy 690 as the sleeve material is its high corrosion resistance to pure water cracking in primary water and caustic stress corrosion cracking in normal and faulted secondary water PWR environments.

CE conducted tests to evaluate the corrosion resistance of the welded sleeve joint. Of particular interest is the effect of the mechanical expansion and weld residual stresses and the condition of the weld and weld heat affected zone. Tests conducted demonstrate that the welded sleeve-tube joint performs well in corrosion tests designed to simulate typical fault and normal conditions on an accelerated basis. General corrosion under anticipated service conditions is expected only for the steam generator tube and not for the sleeve or weld metal. None of the sleeves installed at Prairie Island have exhibited any indication of corrosion to date using state of the art eddy current examination equipment for sleeves installed in 1987 and actual pulled tube

examination for sleeves installed in 1992 and 1994. No degradation was found in the parent tube in the vicinity of the weld joint.

The straightening process used for the curved sleeves does not affect the corrosion performance of the sleeve. The sleeve is thermally treated after the sleeve is precurved. The ends of the sleeve remain straight through the forming process to eliminate effects from the curving operation on the final joint configuration. Residual stresses in the sleeve after straightening are approximately 20 ksi.

Mechanical Testing

Mechanical tests were performed using allowable ASME code stresses on sleeve assemblies to determine axial load, collapse, burst and thermal cycling capability. The load capability of the upper and lower sleeve joints is sufficient to withstand thermally induced stresses in the weld resulting from the temperature differential between the sleeve and the tube and pressure induced stresses resulting from normal operating and postulated accident conditions. The burst and collapse pressures of the sleeve provide a large safety factor over limiting pressure differentials. Mechanical testing revealed that the installed sleeve will withstand the cyclical loading resulting from power changes in the plant and plant transients. Load cycling testing was performed on the lower hard joint for a 3/4" tube sleeving program and recently for the 7/8" sleeve. Hydrostatic and helium leak testing confirmed joint effectiveness. All rolled joints were leak tight.

Structural Analysis

The Combustion Engineering welded and welded-hard rolled sleeves were designed to conform to the stress limits and margins of safety of the ASME Boiler and Pressure Vessel Code. The methodology used is in accordance with the Section III of the 1989 Edition of the ASME Boiler and Pressure Vessel Code. Safety factors of 3 for normal operating conditions and 1.5 for accident conditions were applied. In performing the analytical evaluation on the sleeves, the operating and design conditions for all of the Westinghouse operating plants with 7/8 inch Inconel tubes were considered. Stress evaluations were done for the above the tubesheet sleeve weld (which is also the weld for the tube support sleeve) at the nominal weld height and at the minimum weld height and for the lower sleeve weld. Stress intensity values are less than the ASME Code allowable values and fatigue usage factors are less than 1. Evaluations of the tube support plate sleeve upper and lower welds show that the stresses and loads calculated for the FDTS upper weld are bounding. Details of this analysis are in CEN-629-P.

Using guidance in draft Regulatory Guide 1.121, "Bases for Plugging Degraded PWR Steam Generator Tubes" and the ASME Code, the % allowable degradation for Prairie Island is 52% sleeve wall thickness. Making allowances for NDE uncertainty and

degradation growth, a plugging criteria of 40% through wall degradation is proposed for degradation which can be appropriately sized. Other types of degradation, such as stress corrosion cracking, located in the pressure boundary would be plugged on detection.

Leakage Assessment

The Combustion Engineering welded sleeve joint is inherently a leak tight joint. Ultrasonic examination of the weld is used to confirm no leakage paths. Load cycle testing was performed on the rolled joint test assemblies for both the 3/4 inch and 7/8 inch tube sleeving programs. Hydrostatic and helium leak testing was conducted to confirm joint effectiveness. All rolled joints were leak tight. Experience with the similar Combustion Engineering mechanical plug rolled joint at Prairie Island has been excellent.

Sleeving of Previously Plugged or Repaired Indications

The sleeve installation requirements described are applicable also to tubes which have been previously plugged or repaired by additional roll expansion. The same requirements for integrity of the tubing in the region outside of the sleeve pressure boundary must be met as for leaving a normal tube in service. An eddy current inspection must be completed of the entire tubing length prior to restoring the tube to service by sleeving. The tubing must be free of degradation in the area of the hydraulic expansion for the welded joint, in the area of the hard roll for the rolled joint, and from the tube end to above the seal weld for the edge weld joint. Also, there should be no degradation exceeding the repair limits in the remainder of the tubing outside the sleeve pressure boundary.

Conclusions

In conclusion, Northern States Power believes there is reasonable assurance that the health and safety of the public will not be adversely affected by the proposed Technical Specification changes.

Determination of Significant Hazards Considerations

The proposed changes to the Operating License have been evaluated to determine whether they constitute a significant hazards consideration as required by 10 CFR Part 50, Section 50.91 using the standards provided in Section 50.92. This analysis is provided below:

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

   The supporting technical evaluation and safety evaluation for the Combustion Engineering leak tight sleeves demonstrate that the sleeve configuration will provide steam generator tube structural and leakage integrity under normal operating and accident conditions. The sleeve configurations have been designed and analyzed in accordance with the requirements of the ASME Code. Mechanical testing has shown that the sleeve and sleeve joints provide margin above acceptance limits. Ultrasonic examination is used to verify the leak tightness of the above the tubesheet sleeve welds. Testing has demonstrated the leak tightness of the hard roll joint as well as the structural integrity of the hard roll joint. Tube rupture can not occur at the hard roll joint due to the reinforcing effect of the tubesheet. Tests have demonstrated that tube collapse will not occur due to postulated LOCA loadings.

   The existing Technical Specification leakage rate requirements and accident analysis assumptions remain unchanged in the event that significant leakage did occur from the sleeve joints or that a sleeve assembly ruptured. Any leakage through the sleeve assembly is fully bounded by the existing steam generator tube rupture analysis included in the Prairie Island Plant USAR. The proposed sleeving repair does not adversely impact any other previously evaluated design basis accident.

   The sleeve minimum acceptable wall thickness used for developing the depth based plugging limit for the sleeve is determined using the guidance of draft Regulatory Guide 1.121 and the pressure stress equation of Section III of the ASME Code. Evaluation of the minimum acceptable wall thickness for normal, upset, and postulated accident condition loading per the ASME Code finds that the limiting condition is established from normal operating conditions which then bounds the upset and accident condition values. Allowance for non-destructive examination and growth of existing sleeve wall degradation must be made when determining the sleeve plugging limit. The proposed plugging limit is 40% through wall degradation. The sleeve assembly will be examined by state of the art non-destructive examination techniques on a periodic basis to provide early indication of sleeve degradation. The corrosion resistance of the Alloy 690 sleeve has been verified by field experience at Prairie Island. The oldest Alloy 690 sleeves were installed in May 1987. No indication of corrosion of the sleeve or the parent tube in the weld joint has been identified by state-of-the-art eddy current examination. These oldest sleeve welds did not receive post weld heat treatment. In addition, 5 sleeves were removed for destructive examination in February, 1996. No corrosion was found in any of these sleeves including those dating from October

1992. The pulled sleeves had received post weld heat treatment. Post weld heat treatment can be optionally applied to the free span sleeve weld joints to reduce the susceptibility of the weld joint and parent tube to stress corrosion cracking. Since the sleeve design meets the requirements of the ASME code and mechanical tests have demonstrated margins above acceptance criteria, the installation of the Combustion Engineering leak tight sleeves will not increase the probability or consequences of an accident previously evaluated.

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

Installation of sleeves does not introduce any significant changes to the plant design basis. The use of a sleeve to span a degraded region of steam generator tubing restores the structural and leakage integrity of the tubing to meet the original design bases. Stress and fatigue analysis of the sleeve assembly shows that the requirements of the ASME Code are met. Mechanical testing has demonstrated that margin exists above the design criteria. Any hypothetical accident as a result of any degradation in the sleeved tube would be bounded by the existing tube rupture accident analysis.

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

The use of the sleeves to repair degraded steam generator tubing has been demonstrated to maintain the integrity of the tube bundle commensurate with the requirements of the ASME Code and draft Regulatory Guide 1.121 and to maintain the primary to secondary pressure boundary under normal and postulated accident conditions. The safety factors used in the verification of the strength of the sleeve assembly are consistent with the safety factors in the ASME Boiler and Pressure Vessel Code used in steam generator design. The operational and faulted condition stresses and cumulative fatigue usage are bounded by the ASME Code requirements. The sleeve assembly has been verified by testing to prevent both tube pullout and significant leakage during normal and postulated accident conditions. A test program was conducted to ensure the rolled joint design for the lower joint in the tubesheet sleeve was leak tight and capable of withstanding the designs loads. The primary coolant pressure boundary of the sleeve assembly will be periodically inspected by non-destructive examination to identify sleeve degradation due to operation. Installation of sleeves will decrease the number of tubes which must be taken out of service. There is a small amount of primary coolant flow reduction due to sleeves for which an equivalent plugging sleeve to plug ratio is assigned and is used to assess the final equivalent plugging percentage used as an input to other safety analyses. Because the sleeve maintains the design basis requirements for the steam generator tubing, it is

concluded that the proposed change does not result in a significant reduction in margin with respect to plant safety as defined in the USAR or the Technical Specification Bases.

Based on the evaluation described above, and pursuant to 10 CFR Part 50, Section 50.91, Northern States Power Company has determined that operation of the Prairie Island Nuclear Generating Plant in accordance with the proposed license amendment request does not involve any significant hazards considerations as defined by NRC regulations in 10 CFR Part 50, Section 50.92.

Environmental Assessment

Northern States Power has evaluated the proposed changes and determined that:

1. The changes do not involve a significant hazards consideration,

2. The changes do not involve a significant change in the types or significant increase in the amounts of any effluents that may be released offsite, or

3. The changes do not involve a significant increase in individual or cumulative occupational radiation exposure.

Therefore, the proposed Technical Specification changes would not result in a significant radiological environmental impact.