L-PI-04-036
10 CFR 50.55a

MAR 1 9 2004

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

PRAIRIE ISLAND NUCLEAR GENERATING PLANT
DOCKET 50-282
LICENSE NO. DPR-42

REQUEST FOR RELIEF FROM AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) CODE SECTION III HYDROSTATIC TEST FOR THE UNIT 1 REPLACEMENT STEAM GENERATORS

The Nuclear Management Company (NMC) plans to replace the Prairie Island Nuclear Generating Plant (PINGP) Unit 1 steam generators in the Fall of 2004. Due to containment design limitations, each of the replacement steam generators will be installed in two parts with the final girth welds made as part of the installation activities.

The purpose of this letter is to submit a request for relief from ASME Code Section III requirements for a secondary (shell) side overpressure hydrostatic test of the replacement steam generators. NMC has determined that the ASME Section III overpressure hydrostatic test requirements create a hardship or unusual difficulty without a compensating increase in the level of quality or safety. NMC requests relief pursuant to 10 CFR Part 50, Section 50.55a(a)(3)(ii) due to the hardships associated with an overpressure hydrostatic test.

The attachment, "ASME Section III Hydrostatic Test Relief Request, Steam Generator Replacement," provides the basis for this request. The Relief Request addresses issues raised by the NRC in a phone call related to this request for relief on March 1, 2004.

NMC requests review and approval of this Relief Request by August 1, 2004 to support the steam generator replacement activities.

A047

This letter contains no new commitments and no revisions to existing commitments. Please contact Dale Vincent at 651-388-1121 if you have any questions related to this letter.

Richard Graham for

Joseph M. Solymossy
Site Vice-President, Prairie Island Nuclear Generating Plant

cc: Regional Administrator, USNRC, Region III
Project Manager, Prairie Island Nuclear Generating Plant, USNRC, NRR
NRC Resident Inspector – Prairie Island Nuclear Generating Plant
Chief Boiler Inspector, State of Minnesota
P. Fisher, Hartford Insurance

Attachment: ASME Section III Hydrostatic Test Relief Request, Steam Generator Replacement

Nuclear Management Company (NMC)
Prairie Island Nuclear Generating Plant (PINGP) Unit 1

ASME Section III Hydrostatic Test Relief Request
Steam Generator Replacement

Proposed Alternative
In Accordance with 10CFR 50.55a(a)(3)(ii)

--Hardship or Unusual Difficulty without Compensating Increase in Level of Quality or Safety—

ASME CODE COMPONENT AFFECTED	
Code Class:	ASME Section III Class 1
Code Subsection:	NB-6221(c)/ NB-5410
Code Examination Category:	N/A
Code Item No.:	N/A
Parts Examined:	STEAM GENERATOR SECONDARY SIDE (CLASS 1)
Examination Method:	HYDROSTATIC PRESSURE TEST
Examination Frequency:	N/A (CONSTRUCTION CODE HYDROSTATIC PRESSURE TEST)
System:	STEAM GENERATOR
Component Description:	STEAM GENERATOR GIRTH WELD
ISI Summary Number:	N/A
Component ID:	o Framatome ANP Replacement Steam Generators for Prairie Island Unit 1 Serial Numbers: GV/PI291, GV/PI292 o Tubesheet to lower shell girth weld (S/C003) o Tap welds to the tubesheet (S/P006) o Tap welds to the lower shell (S/C007) o Lower shell/intermediate shell weld (S/C004) o Intermediate shell/ conical shell weld (S/C005) o Conical shell/nozzle shell weld (S/C006) o Tap welds to nozzle shell welds (S/P008 and S/P009) o Recirculation nozzle to nozzle shell weld (S/T003) o Feedwater nozzle / nozzle shell weld (S/T001)

Component ID:	o Nozzle shell/upper shell weld (S/C007) o Manway nozzle to upper shell welds ((S/T002) o Tap welds to upper shell welds (S/P010 and S/P011) o Upper shell/elliptical head weld (S/C008) o Tap welds to elliptical head (S/P012) o Hand hole build-up on lower shell ((S/D002) o Hand hole build-up on intermediate shell (S/D003) o Upper lateral support lug weld o Any eventual base metal repairs by welding prior to placing in service.
Description of Relief:	Relief from performance of the Construction Code required hydrostatic test and associated post hydrostatic pressure test nondestructive examinations.

APPLICABLE CODE EDITION AND ADDENDA

1995 Edition with the 1996 Addenda of ASME Section III
1989 Edition of the ASME Section XI

APPLICABLE CODE REQUIREMENT

1989 Edition of ASME Section XI,

IWA-7210 (b) states: "Any items to be used for replacement shall meet the following requirements unless the alternative of (c) below is adopted:

(1) the applicable Construction Code to which the original item was constructed, and
(2) the existing design requirements"

IWA-7510 states: "All procedures for installation of items to be used for replacement shall be in accordance with IWA-4100."

IWA-4700 "Pressure Test" states: "After repairs by welding on the pressure retaining boundary, a system hydrostatic test shall be performed in accordance with IWA-5000."

The Construction Code for the original Steam Generators is the 1965 Edition through the 1966 Summer Addenda of ASME Section III.

N-714.1 states: "Except as otherwise permitted in N-715, completed vessels designed for internal pressure shall be subjected to a hydrostatic test pressure which, at every point in the vessel, is not less than 1.25 times the design pressure to be marked on the vessel multiplied by the lowest ratio (for the materials of which the vessel is constructed) of the stress values, S_m, for the test temperature of the vessel to the stress value, S_m, for the design temperature (see N-422)."

N-715 is the Pneumatic Test used when the vessel cannot be safely filled with water or traces of remaining water cannot be tolerated following the hydrostatic test. N-715.2 states: "The pneumatic test pressure shall be not less than 1.20 nor more than 1.25 times the design pressure to be stamped on the vessel multiplied by ----."

The Construction Code for the Steam Generator replacement is the 1995 Edition with the 1996 Addenda of ASME Section III.

NB-6111 states: "All pressure retaining components, appurtenances, and completed systems shall be pressure tested."

NB-6221 (c) states: "Components shall be hydrostatically tested at not less than 1.25 times their Design Pressure."

NB-5410 states: "After the hydrostatic or pneumatic test of a vessel, all weld joints and heat affected zones of Categories A, B, C, and D, used to join ferritic material and repair welds in ferritic material that exceed in depth either 3/8 in. or 10% of the section thickness, whichever is less, shall be examined when physically accessible by the magnetic particle or liquid penetrant method."

Generic Letter 89-09 states:

> "For replacements of components that were originally constructed to ASME Code Section III, Classes 1, 2, or 3 or other standards within the scope of the current edition of Section XI, Division 1, "Rules for Inservice Inspection of Nuclear Power Plant Components," of the Code, Article IWA-7000 of Section XI specifies the general requirements. Paragraph IWA-7210 provides that replacements ordered as spares shall meet the requirements of the original construction Code used or those of a later Code edition and/or addenda approved in the Codes and Standards Rule 10 CFR 50.55a."

The NRC Position in Generic Letter 89-09 states:

> "In order to use the guidance in this staff position (provided below) for purchasing replacements, a licensee must first establish that an equivalent Section III stamped replacement is not available."
>
> "Licensees that choose to use this staff position need only indicate such replacements in the Final Safety Analysis Report annual update and certify their compliance with the guidance provided herein."

REASON FOR REQUEST

The replacement steam generators for Unit 1 of the PINGP are being fabricated in accordance with the 1995 Edition with the 1996 Addenda of ASME Section III. The upper and lower parts will be welded together during installation due to the limited access into the containment. The assembled steam generator cannot be moved into containment as a complete component. The girth weld will be completed in place along with the attachment welds for the associated piping.

There was more than one hydrostatic pressure test configuration considered for the secondary side of the replacement steam generators:

Option A – Test with Main Steam Line Included

> Perform the replacement steam generator secondary side hydrostatic test in situ using the isolation/boundary valves of the Main Steam, Feedwater/Auxiliary Feedwater, Blowdown and Water Level Systems.

Option B – Test with Hydrostatic Test Cap

> Same as Option A above, but use a hydrostatic cap on the Main Steam nozzle. Subsequent to the hydrostatic test, the hydrostatic cap would be machined from the Main Steam nozzle, the Main Steam line would be replaced, and an ASME Section XI in-service leakage test would be performed on the Main Steam repair welds.

Option C – Hydrostatic Test in Two Steps

> Similar to Option B above, a hydrostatic cap as well as a mechanical plug beneath the Main Steam nozzle flow restrictors are installed while the component is in the site preparation building. The portion between the hydrostatic cap and the mechanical plug would be hydrostatic tested in the site preparation building. The hydrostatic cap would then be removed, the component installed in the system, and the balance of the secondary side hydrostatic test of the steam generator would be performed in situ, similar to Option A above but using the mechanical plugs beneath the Main Steam nozzle flow restrictors as the hydrostatic boundary, i.e perform the hydrostatic test in two parts.

Option D – Separate Test of the Two Parts

> Perform the replacement steam generator secondary side hydrostatic test on the two halves separately prior to installation. Not one, but two hydrostatic tests per steam generator would actually be required. This is because a portion of the secondary side pressure boundary is also part of the lower assembly. The diameter of the girth weld is nominally175 inches. A 175 inch hemispherical

hydrostatic cap would need to be welded to the lower assembly and then the secondary side of the lower assembly could be tested. The hemispherical hydrostatic cap would then need to be welded to the steam dome and the steam dome then tested (as well as welding hydrostatic caps to the Feedwater and Main Steam nozzles).

Option E – Assemble, Perform Hydrostatic Test, Disassemble for Installation

Perform the girth weld between the lower and upper parts of the replacement steam generator and perform the secondary side hydrostatic test in the site preparation building. This option would also require welding hydrostatic caps to the Feedwater and Main Steam nozzles.

This two piece assembly makes conducting the hydrostatic pressure test a hardship for the following reasons:

Option A - Test with Main Steam Line Included

In situ hydrostatic testing requires abnormal valve line-ups in order to properly vent, fill and isolate the replacement steam generator requiring testing. The requirement to perform the hydrostatic test with this line-up may require additional outage time establishing the line-up and restoring the plant to its normal valve line-up.

When the main steam line is included in the pressure boundary, the main steam line must be heated above 100 degrees Fahrenheit. It will be difficult to maintain this temperature because only half of the insulation will be on the replacement steam generator to provide access for inspection as required by ASME Section III.

Relief valves with setpoints lower than the hydrostatic test pressure must be gagged or removed and blind flanged. This process requires the installation and removal of gags or removal and reinstallation of 10 Main Steam Safety Valves and draining of the system. These activities may require additional outage time and the expense of personnel to perform these activities.

There is additional radiation exposure required to perform a hydrostatic pressure test due to the amount of time required to prepare the volume for testing (e.g., installing relief valve gags, performing appropriate valve line-ups, nozzle dam installation and removal, etc.).

NMC estimates that not performing the secondary side hydrostatic test may save approximately 66 hours of outage critical path time which will have a direct impact on planned replacement power purchases.

Option B – Test with Hydrostatic Test Cap

This hydrostatic testing requires abnormal valve line-ups in order to properly vent, fill and isolate the component requiring testing. The requirement to perform the hydrostatic test with this line-up may require additional outage time establishing the line-up and restoring the plant to its normal valve line-up.

There is additional radiation exposure required to perform a hydrostatic pressure test due to the amount of time required to prepare the volume for testing (e.g., performing appropriate valve line-ups, etc.).

NMC estimates that not performing the secondary side hydrostatic test may save approximately 66 hours of outage critical path time which will have a direct impact on planned replacement power purchases.

Additional concerns include Post Weld Heat Treatment (PWHT) required by the use of a hydrostatic cap on the Main Steam nozzle and the replacement of the Main Steam piping. PWHT requires additional time and the expense of personnel applying the PWHT. Replacement of Main Steam piping also involves additional time and expense for personnel performing the work.

Option C – Hydrostatic Test in Two Steps

This hydrostatic testing requires abnormal valve line-ups in order to properly vent, fill and isolate the component requiring testing. The requirement to perform the hydrostatic test with this line-up may require additional outage time establishing the line-up and restoring the plant to its normal valve line-up.

There is additional radiation exposure required to perform a hydrostatic pressure test due to the amount of time required to prepare the volume for testing (e.g., performing appropriate valve line-ups, etc.).

NMC estimates that not performing the secondary side hydrostatic test may save approximately 66 hours of outage critical path time which will have a direct impact on planned replacement power purchases.

Additional concerns include Post Weld Heat Treatment (PWHT) required by the use of a hydrostatic cap on the Main Steam nozzle. PWHT requires additional time and the expense of personnel applying the PWHT prior to the refueling outage.

An additional concern includes potential internal damage caused by the foreign material associated with the installation and removal of the mechanical plugs. There is a risk for damage to the surfaces/configuration of the venturis. Framatome ANP experience has shown that flow stability is very sensitive to the surface finish of the flow venturis. Damage to the steam outlet venturis may result in steam flow instability that could create operational limitations. The lead time for replacement venturis is about one year.

Option D – Separate Test of the Two Parts

The welding of the 175" hemispherical hydrostatic cap would have an impact on the site preparation scheduling. The welding of the 175" hemispherical hydrostatic cap would have a significant impact on the PWHT because this has a cumulative affect on the heat affected zone and this weld would need to be re-performed with an additional PWHT upon joining the two parts together while in containment. Lastly, the girth weld, Feedwater nozzle and Main Steam nozzle would require several weld preparations versus one. Each weld preparation involves additional expense for personnel performing the activity. This option also does not test the final girth weld after installation.

Option E – Assemble, Perform Hydrostatic Test, Disassemble for Installation

The girth assembly welding would have an impact on the site preparation scheduling. As in Option D, the PWHT would be an issue as well as preparing the girth weld and Feedwater/Main Steam nozzle welds multiple times. Also, there is a concern regarding the appearance of misusing ASME Section III rules by assembling as a complete vessel, immediately cutting it in two pieces and then imposing ASME Section XI on the girth weld.

The quality and safety benefits of performing a hydrostatic pressure test are not commensurate with the time and expense hardships and difficulties encountered with any of these options. Industry experience, which is corroborated by PINGP experience, shows that most through wall leakage is detected during system operation as opposed to during elevated pressure tests such as ten-year system hydrostatic tests or Section III hydrostatic tests.

Marginal benefit is gained from the over-pressurization of the vessel when compared to an operational test, especially when one considers that the stress experienced during a hydrostatic test does not include the significant stresses associated with design basis events. "Considering the NDE performed on Code Class 1 and 2 systems, and considering that the hydrostatic pressure tests rarely result in pressure boundary leaks that would not occur during system leakage tests, the NRC staff believes that the increased assurance of the integrity of Class 1 and 2 welds that could be achieved is not commensurate with the burden of performing hydrostatic testing."[1] Elevating pressure 35% (from normal operating pressure to the hydrostatic test pressure) has no meaningful impact.

These arguments are also supported by NRC endorsement of Code Case N-498-4, "Alternative Rules for 10 Year Hydrostatic Pressure Testing for Class 1, 2 and 3 Systems,

[1] Excerpt from Safety Evaluation by the Office of Nuclear Reactor Regulation for Kewaunee's Request for Relief RR-G-4 (TAC NO. MB0307) dated 2/9/2001.

Section XI, Division 1" and Code Case N-416-2 "Alternative Pressure Test Requirement for Welded Repairs, Fabrication Welds for Replacement Parts and Piping Subassemblies, or Installation of Replacement Items by Welding Class 1, 2, and 3, Section XI Division 1". This relief request is a logical extension of those Code Cases. (It is important to note that the NRC acceptance for the Code Cases have a limitation associated with them. "The provisions of IWA-5213, "Test Condition Holding Times," 1989 edition, are to be used.")

In not performing the Construction Code hydrostatic pressure test, the Steam Generators will not be "N" stamped per the requirements of ASME Section III.

PROPOSED ALTERNATIVE AND BASIS FOR USE

Proposed Alternative:

A system inservice pressure test will be performed in accordance with IWA-5223 and IWC-5000.

Basis for Use:

All the requirements of ASME Section III with the exception of the requested relief (hydrostatic test and associated post hydrostatic pressure test nondestructive examinations) and "N" Stamping will be completed including:

> The upper and lower parts have received full radiography of the shell welds and have been NPT stamped. The Girth Weld will receive a full radiograph and will be NPT stamped.

In addition, the preservice examinations required by IWC-2200 will be completed.

The primary side of the replacement steam generators has been hydrostatically pressure tested and found acceptable.

DURATION OF PROPOSED ALTERNATIVE

This is a one time relief request for the Steam Generator Replacement Project for Prairie Island Unit 1.

PRECEDENTS
Although these examples are not ASME Section III relief request precedents, they are provided as similar logic examples where secondary side hydrostatic pressure tests of replacement steam generators were not performed. o D.C. Cook, the secondary hydrostatic test was not required. o Calvert Cliffs, the secondary hydrostatic test was not required. o Kewaunee, the secondary hydrostatic test was not required.
REFERENCES
Code Case N-416-2 Code Case N-498-4 Generic Letter 89-09