NMC
Committed to Nuclear Excellence

Kewaunee Nuclear Power Plant
N490, State Highway 42
Kewaunee, WI 54216-9511
920-388-2560

Operated by
Nuclear Management Company, LLC

February 5, 2001

10 CFR 50.90

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Ladies/Gentlemen:

Docket 50-305
Operating License DPR-43
Kewaunee Nuclear Power Plant
Proposed Amendment 173 to Kewaunee Nuclear Power Plant Technical Specifications

Reference: 1) NEI 97-06, "Steam Generator Program Guidelines," Revision 1, January 8, 2001, by Nuclear Energy Institute

Nuclear Management Company, LLC, (NMC) proposes to amend Kewaunee Nuclear Power Plant (KNPP) Facility Operating License DRP-43 by incorporating the attached changes into Technical Specification (TS) 3.1.d.2 for primary to secondary leakage of reactor coolant.

NMC intends to replace existing KNPP Westinghouse Model 51 original steam generators (OSG) with Westinghouse Model 54F replacement steam generators (RSG) in the fall of 2001, and is amending TS 3.1.d.2 as part of that replacement. The proposed change to TS 3.1.d.2 reduces maximum allowable leakage of primary system reactor coolant to the secondary system and removes reference to voltage based repair criteria. Maximum allowable leakage for non-repaired steam generators is reduced from 500 gallons per day (gpd) through any one steam generator to 150 gpd through any one steam generator. This conforms to NEI 97-06, "Steam Generator Program Guidelines," (Reference 1) established for the industry by Nuclear Energy Institute (NEI) and is a conservative change. Currently licensed voltage-based alternate repair criteria are not applicable to the RSG design and this request removes their reference from TS 3.1.d.2 and its basis.

In accordance with 10 CFR 50.90, this letter requests Nuclear Regulatory Commission (NRC) approval to remove the 500 gpd limit for Leakage of Reactor Coolant from KNPP TS 3.1.d.2 and leave its 150 gpd limit in place without reference to voltage-based repair criteria. NMC asks that the NRC approve this TS change by September 3, 2001, for implementation prior to restarting after steam generator replacement.

Nothing in this letter should be construed to constitute a commitment or redefine a margin to safety unless specifically so stated in separate correspondence or in safety analyses of record.

In accordance with 10 CFR 50.30(b), a signed and notarized affidavit is included herewith. Additionally, NMC has transmitted a copy of this license amendment request to the State of Wisconsin as required by 10 CFR 50.91(b)(1).

If there are questions regarding this amendment, please contact either Mr. Thomas J. Webb at (920) 388-8537 or me at (920) 755-7627.

Sincerely,

Mark E. Reddemann
Site Vice President
Nuclear Management Company, LLC

MTVN

Attachments:
1. Description of Change, Safety Evaluation, Significant Hazards Determination, and Statement of Environmental Considerations
2. Strike-Out Pages for Technical Specification 3.1.d.2 and Basis
3. Revised Pages for Technical Specification 3.1.d.2 and Basis

cc - US NRC Region III
US NRC Senior Resident Inspector
Electric Division, PSCW

Subscribed and Sworn to
Before Me This 5th Day
of February 2001

Jeanne M. Ferris
Notary Public, State of Wisconsin

My Commission Expires:
June 8, 2003

ATTACHMENT 1

Letter from M. E. Reddemann (NMC)

To

Document Control Desk (NRC)

Dated

February 5, 2001

Proposed Amendment 173

Description of Proposed Changes

Safety Evaluation

Significant Hazards Determination

Environmental Consideration

Introduction

Nuclear Management Company, LLC (NMC) intends to replace Kewaunee Nuclear Power Plant's (KNPP) Westinghouse Model 51 original steam generators (OSG) with Westinghouse Model 54F replacement steam generators (RSG) commencing in the fall of 2001.

As a part of the KNPP Steam Generator In-Service-Inspection (ISI) Program, OSG tubes were plugged or repaired. The Nuclear Regulatory Commission (NRC) approved voltage-based alternate repair criteria for KNPP to use in determining the point at which OSG tubes must be repaired. These criteria are not applicable to RSG design and this request removes reference to their use from KNPP Technical Specification (TS) 3.1.d.2 for Leakage of Reactor Coolant. A subsequent license amendment request will remove references from remaining TS.

KNPP is currently analyzed to, and licensed for use of, a 500 gallon per day (gpd) rate of reactor coolant leakage from the primary system side of steam generator tubes to the secondary system side of steam generator tubes. TS 3.1.d.2 establishes this limit for steam generators (SG) that have not been repaired under voltage-based alternate repair criteria. It further establishes a lower limit of 150 gpd for SG repaired under less stringent voltage-based alternate criteria.

Nuclear Energy Institute (NEI) is coordinating an industry initiative to standardize steam generator in-service inspection (ISI) programs. NEI 97-06, "Steam Generator Program Guidelines," (Reference 1) gives instruction for implementing this initiative. NEI 97-06 incorporates the Electric Power Research Institute (EPRI) established primary to secondary reactor coolant leakage guideline of 150 gpd from EPRI Report TR-104788, "PWR Primary-to-Secondary Leak Guidelines," (Reference 2). Nuclear Management Company, LLC, (NMC) has decided to implement the resultant NEI 97-06 limit of 150 gpd for primary to secondary leakage as part of the KNPP steam generator replacement (SGR). This proposal requests NRC permission to remove the 500 gpd limit from TS 3.1.d.2, thus restricting maximum allowable SG Leakage of Reactor Coolant to the NEI 97-06 guideline rate of 150 gpd. This is a significant change in the conservative direction.

NRC approval of this TS change is requested by September 1, 2001, for implementation prior to restart from steam generator replacement outage.

Description of Change to TS 3.1.d, "Leakage of Reactor Coolant"

TS Paragraph 3.1.d.2 is revised to read as follows:

> Paragraph 3.1.d.2 is revised to say, "Reactor coolant-to-secondary leakage through the steam generator tubes shall be limited to 150 gallons per day through any one steam generator. With tube leakage greater than the above limit, reduce the leakage rate within 4 hours or be in COLD SHUTDOWN within the next 36 hours."

TS Basis for TS 3.1.d.2 is revised to read as follows:

> Limiting the leakage through any single steam generator to 150 gpd ensures that tube integrity is maintained during a design basis main steam line break or loss-of-coolant accident. Remaining within this leakage rate provides reasonable assurance that no single tube-flaw will sufficiently enlarge to create a steam generator tube rupture as a result of stresses caused by a LOCA or a main steam line break accident within the time allowed for detection of the accident condition and resulting commencement of plant shutdown. This operational leakage rate is less than the condition assumed in design basis safety analyses and conforms to industry standards established by the Nuclear Energy Institute through its NEI 97-06, "Generic Steam Generator Program Guidelines."

Safety Evaluation for Proposed Change to TS 3.1.d

Limiting conditions for operation (LCO) play a significant role in assuring safe operation. Technical Specification 3.1.d, for Leakage of Reactor Coolant establishes one of these LCOs and is the subject of this request.

Steam generator tubes serve multiple functions. Principle among these are:

(1) providing a path for transfer of heat from the primary reactor coolant to secondary system feedwater to create steam and

(2) providing a portion of the reactor coolant pressure boundary (RCPB).

System design relies on RCPB integrity to ensure retention of fission products within the primary system. SG tube design balances the mutually exclusive characteristics of thinner tube walls to improve heat transfer with thicker tube walls to improve strength.

SG tubes are subject to a variety of wear or damage mechanisms that degrade their ability to perform their design function. Some of these mechanisms result in flaws that extend through the wall of a SG tube and allow primary to secondary leakage. Such a flaw does not necessarily indicate that a tube is approaching its engineered strength limit nor does it allow release of significant amounts of fission products. Other Technical Specifications establish specific safe limits for release of fission products and this request does not address that subject.

Due to the properties of metals used in manufacture of SG tubes, once a tube flaw exceeds a certain size, it could rapidly propagate to a size sufficient to pass the full flow capacity of the tube from the primary to the secondary system. This failure mechanism becomes more likely under stresses imposed by a steam generator tube rupture or main steam line break design basis accident. However, as long as the size of the flaw remains within established limits, there is no realistic probability of such a failure and the tube may safely remain in service without repair.

Methodologies, experiments, and empirical data necessary to determine the maximum safe flaw size were developed by EPRI as part of their industry generic Steam Generator Management Program (SGMP), which established the recommendation for a 150 gpd maximum leak rate. NEI 97-06, "Steam Generator Program Guidelines," incorporates results of SGMP studies and recommends the 150 gpd value proposed in this request. This request complies with NEI 97-06.

Voltage-based repair is currently licensed for use at KNPP and establishes criteria by which degraded tubes are allowed to remain in service without repair that otherwise would have been required to be repaired or plugged. Deleting the less restrictive voltage-based option defaults to the more restrictive criteria and results in a lower threshold for plugging or repairing flawed tubes. Change from a less restrictive standard to a more restrictive standard is conservative and is bounded by the less restrictive standard. Deleting the currently licensed and less restrictive voltage-based alternate repair criteria from TS is a change in the conservative direction and is bounded by existing design bases accident and transient analyses. Thus, deletion of voltage-based repair criteria from KNPP TS preserves design basis accident and transient assumptions, preserves effectiveness of accident mitigation systems, preserves currently licensed dose consequence and, hence, does not involve an unreviewed safety question.

All current KNPP analyses of record are performed assuming a higher leak rate thus, the proposed 150 gpd value is bounded by their results.

Significant Hazards Determination for Proposed Change to TS 3.1.d.2

NMC reviewed the proposed change in accordance with provisions of 10 CFR 50.92 and determined that it produces no significant hazards. The proposed change does not:

1) Involve a significant increase in the probability or consequences of an accident previously evaluated.

   The change in Leakage of Reactor Coolant value proposed by this request for TS 3.1.d.2 complies with NEI 97-06, "Steam Generator Program Guidelines." NMC evaluated accident analyses affected by SG tube leakage and determined that this change continues to be bounded by the existing licensing and design basis. Design basis accidents and transients, including steam generator tube rupture (SGTR), were analyzed using Westinghouse Model 54F steam generator assumptions as part of steam generator replacement. These evaluations show that the proposed 150 gpd value for Leakage of Reactor Coolant is bounded by the larger value used in applicable existing design basis accident and transient analyses. The 150 gpd leak rate provides increased margin to acceptance criteria found in these analyses. All acceptance criteria are satisfied and SG primary to secondary leakage values for the RSG conform to the existing design bases and are bounded by the existing safety analyses. Changing the technical specification within limits of the bounding accident analyses cannot change the probability or consequence of an accident previously evaluated. Removal of an allowance for voltage-based alternate repair criteria defaults to a more conservative repair criteria. Thus, nothing in this proposal will cause an increase in the probability or consequence of an accident previously evaluated.

2) Create the possibility of a new or different kind of accident from any accident previously evaluated.

   The 150 gpd value proposed for maximum allowable Leakage of Reactor Coolant is consistent with current plant design bases and does not adversely affect any fission product barrier, nor does it alter the safety function of safety significant systems, structures and components or their roles in accident prevention or mitigation. The proposed value for maximum allowable leakage through any one steam generator is bounded by currently

licensed design basis accident and transient analyses of record. Removal of a reference in the TS to voltage-based repair criteria leaves in its place a more conservative, more restrictive criteria for repair or plugging of steam generator tubes. Thus, this proposal does not create the possibility of a new or different kind of accident.

3) Involve a significant reduction in the margin of safety.

The proposed change does not alter the manner in which Safety Limits, Limiting Safety System Setpoints, or Limiting Conditions for Operation are determined. It sets TS 3.1.d.2 for Leakage of Reactor Coolant to a lower, thus more conservative, value than that previously specified and approved for use by the NRC. It conforms to plant design bases, is consistent with current safety analyses, and limits actual plant operation within analyzed and licensed boundaries. Analyses of applicable transients were performed using a primary to secondary leakage rate greater than the rate proposed by this request. All safety analysis acceptance criteria are satisfied at this value and all KNPP safety requirements continue to be met. The 150 gpd leak rate proposed by this amendment request is bounded by these analyses. Removal of reference to use of voltage-based repair criteria from TS 3.1.d.2 and its basis leaves an existing and more conservative repair criteria in place. Thus, changes proposed by this request do not involve a significant reduction in the margin of safety.

Environmental Considerations

This proposed amendment involves a change to the Technical Specifications. It does not modify any facility components located within the restricted area, as defined in 10 CFR 20. NMC has determined that the proposed amendment involves no significant hazards considerations and no significant change in the types of effluents that may be released offsite and that there is no significant increase in the individual or cumulative occupational radiation exposure. This proposed amendment accordingly 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 need be prepared in connection with this proposed amendment.

References:

1. NEI 97-06, "Steam Generator Program Guidelines," Revision 1, January 2001
2. EPRI Report TR-104788-R2, "PWR Primary-to-Secondary Leak Guidelines," April 2000
3. "Kewaunee Nuclear Power Plant Steam Generator Replacement and T_{avg} Operating Window Program Licensing Report," November 2000, by Westinghouse Electric Company, LLC

ATTACHMENT 2

Letter from M. E. Reddemann (NMC)

To

Document Control Desk (NRC)

Dated

February 5, 2001

Proposed Amendment 173

Strike-Out Pages for Technical Specification

TS 3.1-9
TS B3.1-11

d. Leakage of Reactor Coolant

1. Any Reactor Coolant System leakage indication in excess of 1 gpm shall be the subject of an investigation and evaluation initiated within 4 hours of the indication. Any indicated leak shall be considered to be a real leak until it is determined that no unsafe condition exists. If the Reactor Coolant System leakage exceeds 1 gpm and the source of leakage is not identified within 12 hours, the reactor shall be placed in the HOT SHUTDOWN condition utilizing normal operating procedures. If the source of leakage exceeds 1 gpm and is not identified within 48 hours, the reactor shall be placed in the COLD SHUTDOWN condition utilizing normal operating procedures.

2. Reactor coolant-to-secondary leakage through the steam generator tubes shall be limited to ~~500~~150 gallons per day through any one steam generator ~~except when the tube support plate, voltage-based repair criteria is applied. Primary to secondary leakage is limited to 150 gallons per day through any one steam generator when the tube support plate voltage-based repair criteria is applied~~. With tube leakage greater than the above limit, reduce the leakage rate within 4 hours or be in COLD SHUTDOWN within the next 36 hours.

3. If the sources of leakage other than that in 3.1.d.2 have been identified and it is evaluated that continued operation is safe, operation of the reactor with a total Reactor Coolant System leakage rate not exceeding 10 gpm shall be permitted. If leakage exceeds 10 gpm, the reactor shall be placed in the HOT SHUTDOWN condition within 12 hours utilizing normal operating procedures. If the leakage exceeds 10 gpm for 24 hours, the reactor shall be placed in the COLD SHUTDOWN condition utilizing normal operating procedures.

4. If any reactor coolant leakage exists through a non-isolable fault in a Reactor Coolant System component (exterior wall of the reactor vessel, piping, valve body, relief valve leaks, pressurizer, steam generator head, or pump seal leakoff), the reactor shall be shut down; and cooldown to the COLD SHUTDOWN condition shall be initiated within 24 hours of detection.

5. When the reactor is critical and above 2% power, two reactor coolant leak detection systems of different operating principles shall be in operation with one of the two systems sensitive to radioactivity. Either system may be out of operation for up to 12 hours provided at least one system is operable.

Leakage directly into the containment indicates the possibility of a breach in the coolant envelope. The limitation of 1 gpm for an unidentified source of leakage is sufficiently above the minimum detectable leak rate to provide a reliable indication of leakage, and is well below the capacity of one charging pump (60 gpm).

Twelve (12) hours of operation before placing the reactor in the HOT SHUTDOWN condition are required to provide adequate time for determining whether the leak is into the containment or into one of the closed systems and to identify the leakage source.

TS 3.1.d.2

~~The 150 gpd leakage limit~~Limiting the leakage through any ~~one~~single steam generator ~~is specified~~ to 150 gpd ensures that tube integrity is maintained ~~in the event of~~ during a design basis main steam line break or ~~under~~ loss-of-coolant accident ~~conditions. This reduced operational leakage rate is applicable in conjunction with the tube support plate voltage-based plugging criteria as specified in TS 4.2.b.5~~. Remaining within this leakage rate provides reasonable assurance that no single tube-flaw will sufficiently enlarge to create a steam generator tube rupture as a result of stresses caused by a LOCA or a main steam line break accident within the time allowed for detection of the accident condition and resulting commencement of plant shutdown. This operational leakage rate is less than the condition assumed in design basis safety analyses and conforms to industry standards established by the Nuclear Energy Institute through its NEI 97-06, "Generic Steam Generator Program Guidelines."

TS 3.1.d.3

When the source of leakage has been identified, the situation can be evaluated to determine if operation can safely continue. This evaluation will be performed by the plant operating staff and will be documented in writing and approved by either the Plant Manager or his designated alternate. Under these conditions, an allowable Reactor Coolant System leak rate of 10 gpm has been established. This explained leak rate of 10 gpm is within the capacity of one charging pump as well as being equal to the capacity of the Steam Generator Blowdown Treatment System.

TS 3.1.d.4

The provision pertaining to a non-isolable fault in a Reactor Coolant System component is not intended to cover steam generator tube leaks, valve bonnets, packings, instrument fittings, or similar primary system boundaries not indicative of major component exterior wall leakage.

ATTACHMENT 3

Letter from M. E. Reddemann (NMC)

To

Document Control Desk (NRC)

Dated

February 5, 2001

Proposed Amendment 173

Revised Pages for Technical Specification

TS 3.1-9
TS B3.1-11
TS B3.1-12

d. Leakage of Reactor Coolant

1. Any Reactor Coolant System leakage indication in excess of 1 gpm shall be the subject of an investigation and evaluation initiated within 4 hours of the indication. Any indicated leak shall be considered to be a real leak until it is determined that no unsafe condition exists. If the Reactor Coolant System leakage exceeds 1 gpm and the source of leakage is not identified within 12 hours, the reactor shall be placed in the HOT SHUTDOWN condition utilizing normal operating procedures. If the source of leakage exceeds 1 gpm and is not identified within 48 hours, the reactor shall be placed in the COLD SHUTDOWN condition utilizing normal operating procedures.

2. Reactor coolant-to-secondary leakage through the steam generator tubes shall be limited to 150 gallons per day through any one steam generator. With tube leakage greater than the above limit, reduce the leakage rate within 4 hours or be in COLD SHUTDOWN within the next 36 hours.

3. If the sources of leakage other than that in 3.1.d.2 have been identified and it is evaluated that continued operation is safe, operation of the reactor with a total Reactor Coolant System leakage rate not exceeding 10 gpm shall be permitted. If leakage exceeds 10 gpm, the reactor shall be placed in the HOT SHUTDOWN condition within 12 hours utilizing normal operating procedures. If the leakage exceeds 10 gpm for 24 hours, the reactor shall be placed in the COLD SHUTDOWN condition utilizing normal operating procedures.

4. If any reactor coolant leakage exists through a non-isolable fault in a Reactor Coolant System component (exterior wall of the reactor vessel, piping, valve body, relief valve leaks, pressurizer, steam generator head, or pump seal leakoff), the reactor shall be shut down; and cooldown to the COLD SHUTDOWN condition shall be initiated within 24 hours of detection.

5. When the reactor is critical and above 2% power, two reactor coolant leak detection systems of different operating principles shall be in operation with one of the two systems sensitive to radioactivity. Either system may be out of operation for up to 12 hours provided at least one system is operable.

Leakage directly into the containment indicates the possibility of a breach in the coolant envelope. The limitation of 1 gpm for an unidentified source of leakage is sufficiently above the minimum detectable leak rate to provide a reliable indication of leakage, and is well below the capacity of one charging pump (60 gpm).

Twelve (12) hours of operation before placing the reactor in the HOT SHUTDOWN condition are required to provide adequate time for determining whether the leak is into the containment or into one of the closed systems and to identify the leakage source.

TS 3.1.d.2

Limiting the leakage through any single steam generator to 150 gpd ensures that tube integrity is maintained during a design basis main steam line break or loss-of-coolant accident. Remaining within this leakage rate provides reasonable assurance that no single tube-flaw will sufficiently enlarge to create a steam generator tube rupture as a result of stresses caused by a LOCA or a main steam line break accident within the time allowed for detection of the accident condition and resulting commencement of plant shutdown. This operational leakage rate is less than the condition assumed in design basis safety analyses and conforms to industry standards established by the Nuclear Energy Institute through its NEI 97-06, "Generic Steam Generator Program Guidelines."

TS 3.1.d.3

When the source of leakage has been identified, the situation can be evaluated to determine if operation can safely continue. This evaluation will be performed by the plant operating staff and will be documented in writing and approved by either the Plant Manager or his designated alternate. Under these conditions, an allowable Reactor Coolant System leak rate of 10 gpm has been established. This explained leak rate of 10 gpm is within the capacity of one charging pump as well as being equal to the capacity of the Steam Generator Blowdown Treatment System.

TS 3.1.d.4

The provision pertaining to a non-isolable fault in a Reactor Coolant System component is not intended to cover steam generator tube leaks, valve bonnets, packings, instrument fittings, or similar primary system boundaries not indicative of major component exterior wall leakage.

TS 3.1.d.5

If leakage is to the containment, it may be identified by one or more of the following methods:

A. The containment air particulate monitor is sensitive to low leak rates. The rates of reactor coolant leakage to which the instrument is sensitive are dependent upon the presence of corrosion product activity.

B. The containment radiogas monitor is less sensitive and is used as a backup to the air particulate monitor. The sensitivity range of the instrument is approximately 2 gpm to > 10 gpm.

C. Humidity detection provides a backup to A. and B. The sensitivity range of the instrumentation is from approximately 2 gpm to 10 gpm.

D. A leakage detection system is provided which determines leakage losses from all water and steam systems within the containment. This system collects and measures moisture condensed from the containment atmosphere by fancoils of the Containment Air Cooling System and thus provides a dependable and accurate means of measuring integrated total leakage, including leaks from the cooling coils themselves which are part of the containment boundary. The fancoil units drain to the containment sump, and all leakage collected by the containment sump will be pumped to the waste holdup tank. Pump running time will be monitored in the control room to indicate the quantity of leakage accumulated.

   If leakage is to another closed system, it will be detected by the area and process radiation monitors and/or inventory control.

Maximum Reactor Coolant Oxygen, Chloride and Fluoride Concentration (TS 3.1.e)

By maintaining the oxygen, chloride and fluoride concentrations in the reactor coolant below the limits as specified in TS 3.1.e.1 and TS 3.1.e.4, the integrity of the Reactor Coolant System is assured under all operating conditions.[17]

If these limits are exceeded, measures can be taken to correct the condition, e.g., replacement of ion exchange resin or adjustment of the hydrogen concentration in the volume control tank.[18] Because of the time-dependent nature of any adverse effects arising from oxygen, chloride, and fluoride concentration in excess of the limits, it is unnecessary to shut down immediately since the condition can be corrected. Thus, the time periods for corrective action to restore concentrations within the limits have been established. If the corrective action has not been effective at the end of the time period, reactor cooldown will be initiated and corrective action will continue.

The effects of contaminants in the reactor coolant are temperature dependent. The reactor may be restarted and operation resumed if the maximum concentration of any of the contaminants did not exceed the permitted transient values; otherwise a safety review by the Plant Operations Review Committee is required before startup.

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[17] USAR Section 4.2

[18] USAR Section 9.2