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Committed to Nuclear Excellence

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Kewaunee / Point Beach Nuclear
Operated by Nuclear Management Company, LLC

NRC-02-018

February 28, 2002

10CFR50, Appendix A, Criterion 4

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

Ladies/Gentlemen:

Docket 50-305
Operating License DPR-43
Kewaunee Nuclear Power Plant
<u>Response to NRC Request For Additional Information Concerning Leak Before Break Analysis For Kewaunee Nuclear Power Plant</u>

References

1) Letter from Mark E. Reddeman (NMC) to Document Control Desk (NRC) dated February 23, 2001, "Request to Exclude Dynamic Effects Associated with Postulated Pipe Ruptures From Licensing Basis for Residual Heat Removal, Accumulator Injection, and Safety Injection System Piping Based Upon Leak Before Break Analysis."

2) Letter from John G. Lamb (NRC) to Mark E. Reddemann (NMC), dated January 31, 2002, "Request For Additional Information Related To Request To Exclude Dynamic Effects Associated With Postulated Pipe Ruptures From Licensing Basis For Residual Heat Removal, Accumulator Injection, And Safety Injection System Piping Based Upon Leak Before Break Analysis (TAC NO. MB1301)."

By reference 1, the Nuclear Management Company, LLC, (NMC) requested Nuclear Regulatory Commission (NRC) review and approval to exclude the dynamic effects associated with postulated pipe ruptures from the Kewaunee Nuclear Power Plant (KNPP) licensing basis. This request is for portions of the KNPP Residual Heat Removal (RHR), Accumulator Injection, and Safety Injection (SI) system piping.

In reference 2 the NRC requested additional information associated with NMC's submittal. Enclosed, as attachment 1, is NMC's response to this request for additional information. In this response, NMC makes no new commitments.

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Please contact Mr. Gerald Riste at (920) 388-8424, if there are any questions or if we can be of assistance regarding the review of this request.

Sincerely,

Mark E. Warner
Site Vice President – Kewaunee and Point Beach Nuclear Power Plants

GOR

Attachment 1, NMC Response

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

ATTACHMENT 1

Letter from Mark E. Warner (NMC)

To

Document Control Desk (NRC)

Dated

February 28, 2002

Nuclear Management Company, LLC Response to NRC's Request for Additional Information Regarding Request to Exclude Dynamic Effects Associated with Postulated Pipe Ruptures From Licensing Basis for Residual Heat Removal, Accumulator Injection, and Safety Injection System Piping Based Upon Leak Before Break Analysis.

NRC Question #1.

In the submittal, dated February 23, 2001, the licensee indicated that assuming complete dispersion of leaking radioactive solids consistent with very little or no fuel cladding leakage, containment system air particulate monitor (R-11) is capable of detecting leaks as small as approximately 0.013 gpm within 20 minutes. Following a small RCS leakage, it is difficult to achieve a complete dispersion (or mixing) in the containment. The capability of the RCS leakage detection systems is influenced by the factors such as the size of containment free volume, the proximity of the leak detection sensors, pipe insulation, and variation of reactor coolant radioactivity. Including the above factors of uncertainty, what is the capability of R-11 at Kewaunee in detecting the fluid leakage from the proposed SI lines and RHR lines? Provide the bases for your determination of this capability.

NMC Response

Nuclear Management Company, LLC, (NMC) performed a review of the capability of the containment air particulate radiation monitor (R-11), the containment gas monitor (R-12) and the containment vent monitor (R-21), under various conditions. In the calculations, NMC included such factors as containment free volume, dispersion of the radionuclides, and variation of reactor coolant radioactivity. NMC did not account for the proximity of the leak detection sensors and pipe insulation, because these did not appear to be factors in the sensitivity of the radiation monitors, as explained in the following paragraphs.

The size of containment is 1.32E+6 ft^3 as stated in KNPP's Updated Safety Analysis Report (USAR).

To account for variation in the dispersion of the particulates contained in the RCS fluid that leaks, dispersion factors of 100 % and 1 % were used. An upper bound dispersion factor value of 100 % was used to verify the sensitivity of the R-11 monitor stated in the USAR. A lower bound dispersion factor value of 1 % was used to represent worst case dispersion of the particulates due to leak location – sensor location mismatches and to account for particulate entrapment in piping insulation and plateout on containment structures and components. The dispersion factor for noble gases was assumed to be 100 %.

Fuel failure assumptions ranged from 1% to 0.1%. Fuel failure of 1 %, along with 100 % dispersion, was assumed to verify the USAR statement for R-11 sensitivity. The USAR states:

> *Assuming a low background of containment air particulate radioactivity, a reactor coolant corrosion product radioactivity (Fe, Mn, Co, Cr) of 0.2 μCi/cc (a value consistent with little or no fuel cladding leakage) and complete dispersion of the leaking radioactive solids into the containment air, the air particulate monitor is capable of detecting leaks as small as approximately 0.013 gpm (50 cc/minute) within twenty minutes after they occur. If only 10% of the particulate activity is actually dispersed in the air, leakage rates of the order of 0.13 gpm (500 cc/minute) are well within the detectable range.*

NMC verified that the above USAR statement concerning the sensitivity of R-11 is correct. Fuel failure of 0.1 %, along with 1 % dispersion, was assumed to calculate the sensitivity of the R-11, R-12 and R-21 monitors under more realistic operating conditions.

The calculations also assumed that any radioactivity dispersed into the containment atmosphere was immediately mixed throughout the net free volume of the containment atmosphere. The sensor location and the design and operation of the Containment Fan Coil Units (CFCUs) validate this assumption.

The location of KNPP's leak detection tube end is in the free air space above the containment operating floor, elevation 649 feet. KNPP's containment vessel is 105 feet in diameter by 206 feet high. As stated above, it has a free air volume of 1.32E+6 cubic feet. The location of the leak detection sensor is approximately 3 feet in from the containment vessel wall and four feet above the operating floor elevation. The sensor inlet is also in close proximity to two of the Containment Fan Coil Units. This location provides unobstructed access to the free volume atmosphere in containment and provides air movement past the sensor thus preventing stagnation.

KNPP normally operates all four of its Containment Fan Coil Units (CFCU's). Each CFCU has an air flow capability of 44,000 cfm minimum. If all CFCU's are out-of-service (OOS), KNPP has a maximum of 72 hours to return one CFCU train to service or commence a plant shutdown to Cold Shutdown (≤ 200 °F). If one or two CFCU's are OOS, if part of the same train, then KNPP has a maximum of 7 days to return the train to service or commence a plant shutdown to Cold Shutdown conditions. The CFCU's duct distribution system design is to promote good mixing of the containment air and ensure that the recirculated cooled air will reach all areas. The system includes a ring header and branch ducts to the primary compartments for distribution of cooled air from the fan-coil discharge. The cooled air is circulated upward from the lower primary compartments, through the steam generator compartments to the operating floor level. With only one CFCU operating, there is a complete turnover of containment air once every 30 minutes (1.32E+6 cubic feet/ 44,000 cfm = 30 minutes). During normal operation, with all four CFCU's operating, the containment atmosphere is recirculated once every 7.5 minutes (1.32E+6 cubic feet/44,000 cfm/4 = 7.5 minutes).

The piping from containment to R-11/12 and R-21 is not insulated. During normal operation, all four CFCU's are operating with Service Water (SW) cooling supplied. This maintains the humidity and temperature inside containment low. As the pipe is not exposed to the outside environment, it is relatively warm. With this arrangement, plateout of radionuclides on the pipe is minimized because the pipe will stay dry and thus the radionuclides will be transported to the detectors.

Under the conditions of 0.1 percent failed fuel with one percent dispersion, R-11 was calculated as able to detect a 0.5 gpm RCS leak within 60 minutes and a 0.25 gpm RCS leak within 90 minutes. This capability meets the assumptions set forth in the submitted Leak-Before-Break analysis and exceeds the guidance given in Nuclear Regulatory Commission (NRC) Regulatory Guide 1.45, "Reactor Coolant Pressure Boundary Leakage Detection System." Regulatory Guide 1.45 states that a leakage detection system should be able to detect a one gpm leak in less than one hour.

In our submittal, the analysis shows the minimum leakage rate required to be detected is in the 6-inch Hot Leg Capped Nozzles. This leak rate is 3.740 gpm. If this is reduced by a factor of 10, per NUREG 1061 volume 3, then the minimum required detectable leak rate is 0.374 gpm. As stated above, R-11 is capable of detecting 0.25 gpm within 90 minutes and therefore is acceptable as a leak detection monitor for Leak-Before-Break.

NRC Question #2.

Provide the information about the availability of the containment system air particulate monitor, based on the operating experience at Kewaunee.

NMC Response

The availability of the R-11 monitor was calculated from the Kewaunee Nuclear Power Plant (KNPP) Plant Information System (PI). This system interfaces with the KNPP Plant Process Computer System (PPCS) to record various system parameters. The availability was calculated from the KNPP PI system computer data for five calendar years, 1997 – 2001. The Excel spreadsheet recorded the time the R-11 monitor was out-of-service (OOS) due to paper changes, paper jams, low count excursions, and maintenance activities. This time was compared to in-service time to calculate the percent availability number. This calculation produced an availability for R–11 of 98.5%.

NRC Question #3.

In the submittal, the licensee indicates its similarity of LBB application at Ginna using the containment system air particulate monitor as the main leakage detection method. As shown in the safety evaluation of the LBB application at Ginna (Reference 6 of the submittal), Rochester Gas and Electrical Company (RG&E) committed several compensatory actions in its TSs such as to increase the frequency of the RCS water inventory balance or the frequency of the analyses of containment atmosphere grab samples when R-11 is unavailable. Would the licensee make a similar commitment in the application of LBB at Kewaunee?

NMC Response

NMC does not believe that additional compensatory actions are necessary. KNPP TS state the following:

> *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.*

Under these TS requirements, if R-11 is made or found to be out-of-service (OOS) then the plant can only continue to operate if within 12 hours another reactor coolant leak detection system sensitive to radiation is placed in service. At KNPP this other leak detection system that is capable of detecting radioactivity is a gaseous radiation monitor R-21, "Containment Vent Monitor." KNPP Operating Procedures address the condition where R-11 is found OOS. It states that if R-11 is found OOS then the operators are directed to align R-21 to sample containment.

Analysis has shown that this radiation monitor channel, R-21 and for that matter R-12, is as capable of detecting RCS leakage as R-11. NMC has performed calculations associated with the containment radiation monitors at KNPP. These calculations determined the sensitivity by which the radiation monitors could detect RCS leakage. Table 1 shows the results of these calculations.

In the Leak-Before-Break analysis performed by Structural Integrity for KNPP, 0.25 gpm RCS leakage was the acceptance criteria used. The calculations NMC performed showed that R-11, R-12, and R-21 are all capable of detecting RCS leakage at or below the minimum analysis levels, thus ensuring a leak is detected magnitudes below the leakage level at which pipe failure would occur.

Therefore, NMC concludes that the requirements contained in KNPP TS are adequate to ensure safe operation of the KNPP under LBB conditions.

TABLE 1

KNPP CONTAINMENT MONITORS DETECTION CAPABILITY

MINUTES TO DETECTION

Detector	RCS Leak Rates			Assumptions
	1 gpm	0.374 gpm	0.25 gpm	
R-11	40	70	90	Failed Fuel Fraction 0.001 Dispersion Fraction 0.01
R-12/21	< 20	< 20	< 20	Failed Fuel Fraction 0.001 Dispersion Fraction 1.0

NMC
Committed to Nuclear Excellence

Nuclear Management Company, LLC
Prairie Island Nuclear Generating Plant
1717 Wakonade Dr. East • Welch MN 55089

March 1, 2002

10 CFR 72.44(d)(3)

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

PRAIRIE ISLAND NUCLEAR GENERATING PLANT
Docket No. 72-10
Materials License No. SNM-2506

Annual ISFSI Effluent Report
for the Period of January 2001 through December 2001

Attached is the Annual Effluent Report for the Prairie Island Independent Spent Fuel Storage Installation (ISFSI) for the period of January 2001 through December 2001. This report is submitted pursuant to the requirements of 10 CFR Part 72, Section 72.44(d)(3) and Section 6.3 of the Prairie Island ISFSI Technical Specifications.

In this letter we have made no new Nuclear Regulatory Commission commitments. If you have any additional questions related to the attached information, please contact Jack Leveille (651-388-1121).

Mano K. Nazar
Site Vice President
Prairie Island Nuclear Generating Plant

c: (see next page)

c: Director, Office of Nuclear Material Safety and Safeguards, NRC
Spent Fuel Project Office Project Manager, NRC
Regional Administrator -- Region III, NRC
Senior Resident Inspector, NRC
NRR Project Manager, NRC
J E Silberg

Attachment:

Prairie Island Nuclear Generating Plant Annual ISFSI Effluent Report, January through December 2001

NORTHERN STATES POWER COMPANY

PRAIRIE ISLAND NUCLEAR GENERATING PLANT ANNUAL ISFSI EFFLUENT REPORT

January through December 2001

Independent Spent Fuel Storage Installation

During the 2001 calendar year, Two additional casks were loaded and placed in the ISFSI. The total number of casks loaded in the ISFSI is fourteen.

Airborne Effluent Releases from the ISFSI

0.00E+00 Curies

There were no airborne effluent releases from the Prairie Island ISFSI during the calendar year 2001.

Liquid Effluent Releases from the ISFSI

0.00E+00 Curies

There were no liquid effluent releases from the Prairie Island ISFSI during the calendar year 2001.

Dose to Individuals Due to ISFSI Effluent Releases

0.00E+00 mrem