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January 31, 1978

Docket No. 50-305

Wisconsin Public Service Corporation
ATTN: Mr. E. W. James
Senior Vice President
Post Office Box 1200
Green Bay, Wisconsin 54305

Gentlemen:

The Commission has issued the enclosed Amendment No. 18 to Facility Operating License No. DPR-43 for the Kewaunee Nuclear Power Plant. The amendment consists of changes to the Technical Specifications in response to your request dated November 15, 1976, as supplemented September 6, 1977.

The amendment to the Technical Specifications established (1) provisions for steam generator tube inspection that are consistent with the guidance contained in Regulatory Guide 1.83, Revision 1, dated July 1975, (2) provisions for monitoring secondary water chemistry and (3) a new limit on reactor coolant to secondary leakage.

Copies of the Safety Evaluation and the Notice of Issuance are also enclosed.

Sincerely,

/s/
A. Schwencer, Chief
Operating Reactors Branch #1
Division of Operating Reactors

Enclosures:
1. Amendment No. 18 to DPR-43
2. Safety Evaluation
3. Notice

cc w/encl:
See next page

Const. 1
GD

OFFICE	DOR:ORB#1	OELD	DOR:ORB#1	EB	ORB 4
SURNAME	JDNeighbors:lb	Lawrence subject to attached memo	ASchwencer	SHAO	FAIRTILE
DATE	12/07/77	1/18/78	1/23/78	1/11/78	1/12/78

NRC Form 318 (2-76) NRCM 02040 ☆U.S. GOVERNMENT PRINTING OFFICE: 1976-634-782

January 18, 1978

Note to D. Neighbors, LPM

KEWAUNEE TECH SPEC CHANGE - SURVEILLANCE REQUIREMENTS

The following changes should be made:

A. Safety Evaluation

1. p. 3, fifth line from bottom - delete last word in line until end of sentence. Insert "... category C-3 which is defined in Specification 4.2.b.2 as "more than 10% of the total tubes inspected are degraded tubes or more than 1% of the inspected tubes are defective."

2. p. 6, first full paragraph, next to last line - It is uncertain what is meant by "most severe." Relative to categories C-1 and C-2 it is a less strict standard to meet. I suggest a change in the sentence to "Immediate reporting, as indicated by Table TS 4.2.2, would be required only if the inspection results reached the relatively greater level of tube degradation and defect found in Category C-3.

3. p. 4, first paragraph, next to last line - delete "but"

4. p. 5, third paragraph, fifth line change form to from

5. p. 5, footnote, case title should be "In the Matter..."

6. p. 7, first paragraph, second line - envelope or envelop?

7. p. 7, second paragraph, second word - change prupose to purpose.

8. p. 7, footnote - same as item 5 above.

B. Notice of Issuance

1. p. 1, second paragraph, fourth line - insert between July 1975, and (2): "with the exception of deviations determined by the Staff to enhance the overall inspection program"

Jeffrey Lawrence
Attorney, OELD

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

January 31, 1978

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Wisconsin Public Service Corporation
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1. Amendment No. 18 to DPR-43
2. Safety Evaluation
3. Notice

cc w/encl:
See next page

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Chairman Kewaunee County Board
Kewaunee County Courthouse
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Mr. Lester Huber
Chairman, Town of Carlton
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Mr. Norman M. Clapp, Chairman
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Chicago, Illinois 60604

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

WISCONSIN PUBLIC SERVICE CORPORATION

WISCONSIN POWER AND LIGHT COMPANY

MADISON GAS AND ELECTRIC COMPANY

DOCKET NO. 50-305

KEWAUNEE NUCLEAR POWER PLANT

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 18
License No. DPR-43

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Wisconsin Public Service Corporation, Wisconsin Power and Light Company and Madison Gas and Electric Company (the licensee) dated November 15, 1976, as supplemented September 6, 1977, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment and paragraph 2.C(2) of Facility License No. DPR-43 is hereby amended to read as follows:

   "(2) Technical Specifications

   The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 18 , are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment will be effective within 30 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

A. Schwencer, Chief
Operating Reactors Branch #1
Division of Operating Reactors

Attachment:
Changes to the Technical
Specifications

Date of Issuance: January 31, 1978

ATTACHMENT TO LICENSE AMENDMENT NO. 18

FACILITY OPERATING LICENSE NO. DPR-43

DOCKET NO. 50-305

Revise Appendix A as follows:

1. Remove the following pages and replace with identically numbered pages:

   TS 3.1-11
   TS 4.2-1
   TS 4.2-2
   TS 4.2-3
   Table TS 4.1-2

2. Add the following pages
   TS 3.1-11a
   TS 4.2-4
   TS 4.2-5
   TS 4.2-6
   TS 4.2-7
   TS 4.2-8
   TS 4.2-9
   Table TS 4.2-2

d. LEAKAGE OF REACTOR COOLANT

Specification

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 gallons per day through any one steam generator. With tube leakage greater than the above limit reduce the leakage rate within four 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 25 gpm shall be permitted. If leakage exceeds 25 gpm, the reactor shall be placed in the hot shutdown condition within 12 hours utilizing normal operating procedures. If the leakage exceeds 25 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 ofdifferent 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.

Basis

Leakage from the Reactor Coolant System is collected in the containment or by the other closed systems. These closed systems are: the Steam and Feedwater

4.2 REACTOR COOLANT SYSTEM IN-SERVICE INSPECTION

Applicability

Applies to pre-operational and in-service structural surveillance of the reactor coolant system boundary.

Objective

To assure the continued integrity of the reactor coolant system boundary.

Specification

a. Reactor Vessel, Coolant Piping, Pump and Steam Generator Channel Heads

1. Prior to initial plant operation, a survey, using ultrasonic, visual and surface techniques, shall be made to establish pre-operational system integrity and establish baseline data.
2. Post-operational non-destructive inspections listed in Table TS4.2-1 shall be performed as specified. The results obtained from compliance with this specification shall be evaluated after five years and the conclusions of this evaluation shall be reviewed with the NRC.
3. The structural integrity of the primary system boundary shall be maintained at the level required by the original acceptance standards throughout the life of the plant. Any evidence as a result of the inspections listed in Table TS4.2-1 that defects have initiated or grown shall be investigated, including evaluation of other comparable areas of the primary system.
4. Corrective action will be taken if warranted and the details of the findings and corrective action shall be reported to the Office of Nuclear Reactor Regulation with a copy to the Regional Director, Office of Inspection and Enforcement, Region III.
5. Detailed records of each inspection shall be maintained to

allow comparison and evaluation of future inspections.

6. The inspection interval shall be ten years.

7. The following definitions shall apply to the inspection methods employed in Table TS4.2-1. The paragraphs referenced are corresponding paragraphs of Section XI of the ASME Code for In-Service Inspection of Nuclear Reactor Coolant Systems dated July 1, 1971 and Summer 1971 Addenda.

   a. UT - Ultrasonic examination per paragraph IS 213.2.

   b. RT - Radiographic examination per paragraph IS 213.1. Ultrasonic testing is an acceptable alternate for RT.

   c. MT - Magnetic particle examination per paragraph IS 212.1.

   d. PT - Liquid penetrant examination per paragraph IS 212.2.

   e. V - Visual examination per paragraphs IS 211.1 or IS 211.2.

8. Examinations which reveal unacceptable structural defects in a category shall be extended to include an additional number (or areas) of system components or piping in the same category approximately equal to that initially examined. In the event further unacceptable structural defects are revealed, all remaining system components or piping in the category shall be examined to the extent specified in that examination category.

9. With the exception of those components or areas for which the examination may be deferred to the end of the inspection interval, at least 25 percent of the required examinations shall have been completed by the expiration of one-third of the inspection interval (with credit for no more than 33-1/3 percent if additional examinations are completed) and at least 50 percent shall have been completed by the expiration of two-thirds of the inspection interval (with credit for no more than 66-2/3 percent). The remaining required examinations shall be completed by the end of the inspection interval. Successive inspections shall meet the requirements of Paragraph ISI-243 of the ASME Rules for In-Service Inspection of Nuclear Reactor Coolant Systems.

TABLE TS 4.1-2

MINIMUM FREQUENCIES FOR SAMPLING TESTS

	Sampling Tests	Test	Frequency	Maximum Time Between Tests (Days)
1.	Reactor Coolant Samples	Gross Beta-Gamma activity (excluding tritium)	5/week	3
		Tritium activity	Monthly	37
		*Chemistry (Cl & O_2)	3/week	4
2.	Reactor Coolant Boron	*Boron concentration	2/week	5
3.	Refueling Water Storage Tank Water Sample	Boron concentration	Monthly *****	37
4.	Boric Acid Tanks	Boron concentration	Weekly	8
5.	Accumulator	Boron concentration	Monthly	37
6.	Spent Fuel Pool	Boron concentration	Monthly **	37
7.	Secondary Coolant	pH	5/week	3
		Ammonia	5/week	3
		Sodium	5/week	3
		Gross Beta-Gamma activity	Weekly	8
		Iodine concentration	weekly when gross Beta-Gamma activity $\geq$ 1.0 μCi/cc	8
8.	Waste Disposal System Liquid Effluent Monitor	Gross Beta-Gamma activity	Prior to each batch release	N.A.
9.	Circulating Water Monitor	Radioactivity analysis	Continuous ***	N.A.
10.	Auxiliary Building Vent Monitor	Gross Beta-Gamma activity	Continuous ****	N.A.
11.	Containment Vessel Vent Air Particulate Monitor	I-131 and particulate activity	Continuous ***	N.A.
12.	Containment Vessel Vent Radiogas Monitor	I-131	Continuous ***	N.A.

Notes

* See Spec. 4.1.D
** Sample will be taken monthly when fuel is in the pool.
*** Continuous monitoring takes place when reactor is in operation.
**** Operable during refueling also.
***** And after adjusting tank contents.

TABLE 4.2-2

STEAM GENERATOR TUBE INSPECTION

1ST SAMPLE INSPECTION			2ND SAMPLE INSPECTION		3RD SAMPLE INSPECTION	
Sample Size	Result	Action Required	Result	Action Required	Result	Action Required
A minimum of S Tubes per S. G.	C-1	None	N/A	N/A	N/A	N/A
	C-2	Plug defective tubes and inspect additional 2S tubes in this S. G.	C-1	None	N/A	N/A
			C-2	Plug defective tubes and inspect additional 4S tubes in this S.G.	C-1	None
					C-2	Plug defective tubes
					C-3	Perform action for C-3 result of first sample
			C-3	Perform action for C-3 result of first sample	N/A	N/A
	C-3	Inspect all tubes in this S.G., plug defective tubes and inspect 2S tubes in the other S. G. Prompt notification to NRC pursuant to specification 6.9.1	The other S.G.'s are C-1	None	N/A	N/A
			Some S.G.'s C-2 but no additional S.G. are C-3	Perform action for C-2 result of second sample	N/A	N/A
			Additional S.G. is C-3	Inspect all tubes in each S.G. and plug defective tubes. Prompt notification to NRC pursuant to specification 6.9.1.	N/A	N/A

S = 6%/n Where n is the number of steam generators inspected during an inspection.

b. Steam Generator Tubes

Examinations of the steam gnerator tubes shall be in accordance with the in-service inspection program described herein. The following terms are defined to clarify the requirements of the inspection program.

Imperfection is an exception to the dimension, finish, or contour required by drawing or specification.

Degradation means a service-induced cracking, wastage, wear or general corrosion occurring on either inside or outside of a tube.

% Degradation is an estimated % of the tube wall thickness affected or removed by degradation.

Degraded Tube means a tube containing imperfections $\geq$20% of the nominal wall thickness caused by degradation.

Defect means an imperfection of such severity that it exceeds the plugging limit. A tube containing a defect is defective.

Tube inspection means an inspection of the steam generator tube from the point of entry (e.g., hot leg side) completely around the U-bend to the top support of the opposite leg (cold leg).

1. Steam Generator Sample Selection and Inspection - The in-service inspection may be limited to one steam generator on a rotating schedule encompassing 6% of the tubes in the single inspected generator, provided the previous inspections indicated that the two steam generators are performing in a like manner.

2. Steam Generator Tube Sample Selection and Inspection - The tubes selected for each in-service inspection shall:

a. Include at least 3% of the total number of tubes in all steam generators. The tubes selected for these inspections shall be selected on a random basis except as noted in 4.2.b.2.b.

b. Concentrate the inspection by selection of at least 50% of the tubes to be inspected from critical areas where experience in similar plants with similar water chemistry indicates higher potential for degradation.

c. Include the inspection of all non-plugged tubes which previous inspections revealed in excess of 20% degradation. The previously degraded tubes need only be inspected about the area of previous degradation indication if their inspection is not employed to satisfy 4.2.b.2.a and 4.2.b.2.b above.

d. The second and third sample inspections during each inservice inspection may be less than the full length of each tube by concentrating the inspection on those areas of the tube sheet array and on those portions of the tubes where tubes with imperfections were previously found.

e. If a tube does not permit the passage of the eddy current inspection probe the entire length and through the U-bend, this shall be recorded and an adjacent tube shall be inspected. The tube which did not allow passage of the eddy current probe shall be considered degraded.

The results of each sample inspection shall be classified into one of the following three categories:

Category	Inspection Results
C-1	Less than 5% of the total tubes inspection are degraded tubes and none of the inspected tubes are defective.
C-2	One or more tubes, but not more than 1% of the total tubes inspected are defective, or between 5% and 10% of the total tubes inspected are degraded tubes.

Category	Inspection Results
C-3	More than 10% of the total tubes inspected are degraded tubes or more than 1% of the inspected tubes are defective.

NOTE: **In all inspections, previously degraded tubes must exhibit significant (>10%) further wall penetrations to be included in the above percentage calculations.**

3. Inspection Frequencies - The above required in-service inspections of steam generator tubes shall be performed at the following frequencies:

   a. Inservice inspections shall be performed at refueling intervals not more than 24 calendar months after the previous inspection. If two consecutive inspections following service under AVT conditions, not including the preservice inspection, result in all inspections results falling into the C-1 category or if two consecutive inspections demonstrate that previously observed degradation has not continued and no additional degradation has occurred, the inspection interval may be extended to a maximum of once per 40 months.

   b. If the results of the inservice inspection of a steam generator conducted in accordance with Table 4.2-2 fall in Category C-3, the inspection frequency shall be increased to at least once per 20 months. The increase in inspection frequency shall apply until a subsequent inspection meets the conditions specified in 4.2.b.3.a and the interval can be extended to a 90 month period.

   c. Additional, unscheduled inservice inspections shall be performed on each steam generator in accordance with the first sample inspection specified in Table 4.2-2 during the shutdown subsequent to any of the following conditions:

1. Primary-to-secondary tube leaks (not including leaks orginating from tube-to-tube sheet welds) in excess of the limits of Specification 3.1.d and 3.4.a.5,
2. A seismic occurrence greater than the Operating Basis Earthquake,
3. A loss-of-coolant accident requiring actuation of the engineered safeguards, where the cooldown rate of the reactor coolant system exceeded 100°F/hr, or
4. A main steam line or feedwater line break, where the cooldown rate of the reactor coolant system exceeded 100°F/hr.

d. If the type of steam generator chemistry treatment is changed significantly, the steam generators shall be inspected at the next refueling following 3 months of power operation since the change.

4. Any tube which exhibits one or more of the following conditions shall be plugged prior to returning the steam generator to service:
   a. Tube leak.
   b. Tube wall degradation of 50% or more. If significant general tube thinning occurs this criteria will be reduced to 40% wall penetration.

5. Reports

a. Following each inservice inspection of steam generator tubes, if there are any tubes requiring plugging, the number of tubes plugged shall be reported to the Commission within 15 days.

b. The results of the steam generator tube inservice inspection shall be included in the Annual Operating Report for the period in which this inspection was completed. This report shall include:

1. Number and extent of tubes inspected.
2. Location and percent of wall-thickness penetration for each indication of a degradation.
3. Identification of tubes plugged.

c. Results of steam generator tube inspection which fall into Category C-3 and require prompt notification of the Commission shall be reported pursuant to Sepcification 6.9.2.a. prior to resumption of plant operation. The written followup of this report shall provide a description of investigations conducted to determine cause of the tube degradation and corrective measures taken to prevent recurrence.

Basis

The inspection program will be in accordance with the requirements of Section XI of ASME Code 1971 Edition and Summer and Winter 1971 addenda. The Examination requirements will be met to the extent practical through limitations on component configuration, accessibility and material composition.

The extent to which systems will be subject to the examination requirements of Table IS-251 have been determined in accordance with the criteria of IS-120.

The exclusion criteria of IS-121 have been applied to determine which parts of systems or components are subject to surface or volumetric examinations and which parts are subject to a visual examination for evidence of leakage during the system hydrostatic test. A description of the system boundaries, delineating those parts subject to volumetric examination, those parts subject to surface examination and those parts requiring visual inspection during hydro are given in the notes to FSAR Table 4.4-2, titled Tables 4.4-2A, 4.4-2B and 4.4-2C.

The plant was not specifically designed to meet the requirements of Section XI of the code; therefore, 100 percent compliance may not be feasible or practical. However, access for inservice inspection was considered during the design, and modifications have been made where practical to make provision for maximum access within the limits of the current plant design.

The Reactor Coolant System shall initially be free of gross defects, and the system has been designed such that gross faults or defects should not occur throughout the plant lifetime. The ten-year surveillance program will reveal possible fault areas before any leak develops, should such problems actually occur.

The Surveillance Requirements for inspection of the steam generator tubes ensure that the structural integrity of this portion of the RCS will be maintained. The program for inservice inspection of steam generator tubes is based on the general guidance of Regulatory Guide 1.83, Revision 1. Inservice inspection of steam generator tubing is essential in order to maintain surveillance of the conditions of the tubes in the event that there is evidence of mechanical damage or progressive degradation due to design, manufacturing errors, or inservice conditions that lead to corrosion. Inservice inspection of steam

generator tubing also provides a means of characterizing the nature and cause of any tube degradation so that corrective measures can be taken.

It is WPS policy to operate in a manner such that the secondary coolant will be maintained within those chemistry conditions found to result in negligible corrosion of the steam generator tubes. The allowable defects during plant operation would be limited by the limitation of steam generator tube leakage between the reactor coolant system and the secondary coolant system (reactor coolant-to-secondary leakage in excess of the limits of Specification 3.1.d.) Steam generators having leakage less than these limits during operation are judged to have an adequate margin of safety between tube inspection intervals to withstand the loads imposed during normal operation and by postulated accidents. Operating plants have demonstrated that reactor coolant-to-secondary leakage of Specification 3.1.d can readily be detected by the secondary coolant radiation monitors. Leakage in excess of this limit will require plant shutdown and an unscheduled inspection, during which the leaking tubes will be located and plugged.

Wastage-type defects are unlikely with proper chemistry treatment of the secondary coolant. However, even if a defect should develop in service, it will be found during scheduled inservice steam generator tube examinations. Plugging will be required for all tubes with imperfections exceeding the plugging limit. Steam generator tube inspections of operating plants have demonstrated the capability to reliably detect 20% tube degradation.

Whenever the results of any steam generator tubing inservice inspection fall into Category C-3, these results will be promptly reported to the Commission pursuant to Specification 6.9.2.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 18 TO FACILITY LICENSE NO. DPR-43

WISCONSIN PUBLIC SERVICE CORPORATION

WISCONSIN POWER AND LIGHT COMPANY

MADISON GAS AND ELECTRIC COMPANY

KEWAUNEE NUCLEAR POWER PLANT

DOCKET NO. 50-305

Introduction

By letter dated November 15, 1976, as supplemented September 6, 1977, Wisconsin Public Service Corporation (the licensee) requested changes to the Technical Specifications appended to Facility Operating License DPR-43 for Kewaunee Nuclear Power Plant. The proposed changes would establish surveillance requirements for steam generator tubes. Based on discussions with the licensee, additional provisions have been incorporated which would establish maximum reactor coolant to secondary side steam generator leak rate limits, and monitoring requirements for secondary water chemistry.

Discussion

In August 1974, we requested that the licensee submit proposed Technical Specification changes that would establish requirements for a program of steam generator tube inspection. To provide guidance in developing an inspection program at that time, the licensee was to refer to Regulatory Guide 1.83, "Inservice Inspection of Pressurized Water Reactor Steam Generator Tubes", dated June 1974 (R.G. 1.83). The licensee submitted a program for Kewaunee on September 30, 1974. However, we made a decision to delay requiring Technical Specification incorporation of the program at that time because of a need to revise R.G. 1.83 to reflect developments in the state of the art of steam generator tube inspection techniques and to more directly take into account the inspection experience that was being gained at operating plants. In making that decision we took into account the industry wide practice which already included voluntary inspection of steam generator tubes that in many respects, was comparable to inspections that R.G. 1.83 specified. Revision 1 to R.G. 1.83 was issued after receiving comments

from the industry. We are now taking steps to require incorporation of steam generator tube inservice inspections into the Technical Specifications. By letter dated November 15, 1976, the licensee proposed Technical Specifications which reflect the provisions of R.G. 1.83, Revision 1, with exceptions as discussed with the NRC staff.

The Technical Specifications proposed for the Kewaunee steam generator tube inspections are, therefore, in general agreement with R.G. 1.83, Rev. 1, dated July 1975, but deviate in those areas where we have determined that the overall inspection program would be enhanced over that covered in R.G. 1.83, Rev. 1.

The licensee's proposed changes, as modified by discussions with the NRC staff, will not only implement steam generator tube inservice inspection requirements, but will also institute a reactor coolant to secondary side steam generator leakage limit and secondary water chemistry monitoring parameters. The leakage limit is intended to provide an additional margin of safety with regard to steam generator tube integrity by requiring plant shutdown at a specific leakage rate threshold.

Evaluation

1. Surveillance Requirements for Steam Generator Tubes

Structures, systems, and components, important to safety of a nuclear power plant are designed, fabricated, constructed, and tested so as to provide reasonable assurance that the facility can be operated without undue risk to the health and safety of the public. To continuously maintain such assurance, General Design Criterion 32 requires that components which are part of the reactor coolant pressure boundary (RCPB) be designed to permit periodic inspection and testing of important areas and features to assess their structural and leaktight integrity. The steam generator tubing is part of the RCPB and is an important part of a major barrier against fission product release to the environment. It also acts as a barrier against steam release to the containment in the event of a Loss of Coolant Accident (LOCA). For this reason, a program of periodic inservice inspection is being established to assure the continued integrity of the steam generator tubes over the service life of the plant.

Generally, the major elements of the steam generator tube inservice inspection program for Kewaunee consist of specified: (a) sample selection, (b) examination methods, (c) inspection intervals, (d) acceptance criteria, and (e) reporting requirements. Each of these major elements of the program is separately evaluated below.

(a) Sample Selection

The proposed sampling program is patterned after R.G. 1.83, Rev. 1, except for those deviations that we have determined will improve the program and thereby reduce the potential radiation exposures especially for personnel that must perform the inspections. The sampling procedures are contained in Table 4.2-2 of the proposed Technical Specifications. The principal deviations from R.G. 1.83, Rev. 1, supplementary sampling requirements are evaluated below.

(i) Regulatory Position C.5.a, "Supplementary Sampling Requirements," recommends that if the eddy current inspection results during an inservice inspection indicate any tubes with previously undetected imperfections of 20% or greater depth, additional steam generators, if any, should be inspected. In other words, because of a single tube in one steam generator with a previously undetected imperfection of 20%, or greater, depth, but still well below the plugging limit, all steam generators in the unit would be inspected. This would be unreasonably severe and would increase unnecessarily the radiation exposures of inspection personnel. The supplementary sampling requirements, as modified, would still require inspection of additional steam generators where significant, but only if the inspection results of the particular steam generator fall in category C-3 which is defined in Specification 4.2.b.2 as "more than 10% of the total tubes inspected are degraded tubes or more than 1% of the inspected tubes are defective." By thus minimizing the inspection of other steam generators, the exposure to personnel can be kept low as is reasonably achievable.

(ii) Revision 1 of R.G. 1.83 recommends additional tube inspections in a steam generator if the inspection of a sample of tubes results in more than 10% of the tubes in that initial sample having detectable wall penetration of greater than 20% or if one or more tubes in the sample have an indication in excess of the plugging limit. The first additional inspection recommended by the guide would be the inspection of an additional 3% of the tubes in that steam generator concentrating on those areas where imperfections have been found. If 10% of these additionally inspected tubes fail to meet the criteria applied to the initial inspection sample, a third sample consisting of at least 6% of the tubes in that steam generator in the area of the imperfections would be expected.

For additional inspections, if required after the initial inspections, the program set forth in the Kewaunee Technical Specifications would require that all tubes in the affected steam generator be inspected and, further, that twice the number of tubes initially inspected in the affected steam generator be inspected in each of the other steam generators. Again, if more than 10% of the tubes inspected in any steam generator have indications of wall thinning of greater than 20% or more than 1% of the tubes are defective a third inspection is required of all tubes in each steam generator with such indications. The primary purpose of the additional inspections is to confirm the initial inspection results and to ensure steam generator integrity. By requiring that all tubes in the affected steam generator be inspected, and by requiring that the other steam generators be inspected when problems are detected, the Kewaunee program represents an improvement to R.G. 1.83, Rev. 1.

Based on the considerations discussed above, we have concluded that the sample selection scheme proposed by the licensee is acceptable.

(b) Examination Method

The proposed examination methods, as modified by the NRC staff and concurred in by the licensee, include nondestructive examination by eddy current testing. The specified methods are capable of locating and identifying stress corrosion cracks and tube wall thinning from chemical wastage, mechanical damage or other causes. Based on our review of these methods, and experience gained using these methods by the industry, we have concluded that the examination methods are acceptable.

(c) Inspection Intervals

The proposed inspection intervals are compatible with those recommended in R.G. 1.83, Rev. 1; and thus, are acceptable.

(d) Acceptance Criteria

The principal parameter used to determine whether any one steam generator tube is acceptable for continued service is the measured imperfection depth. A tube plugging limit has been established and defined in the Technical Specifications as the imperfection depth beyond which the tube must be removed from service. The plugging limit, as modified by the staff and concurred in by the licensee, is 50% degradation of the nominal tube wall-thickness.

The plugging limit is based on (1) the minimum tube wall thickness needed to maintain steam generator tube integrity during the limiting stress loadings associated with a LOCA combined with a Safe Shutdown Earthquake (SSE), and (2) an operational allowance to account for the time interval between inspections. Based on other evaluations made by the NRC staff[1], analyses performed by Westinghouse on steam generator tube designs similar to the Kewaunee tube design, and Regulatory Guide 1.121, Bases for Plugging Degraded PWR Steam Generator tubes, we conclude

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[1] Supplemental Testimony of James P. Knight before the Atomic Safety and Licensing Appeal Board In The Matter of Northern States Power Company, Docket Nos. 50-282/306.

that the proposed 50% degradation plugging limit will ensure the required factors of safety of three against tube rupture under normal operating conditions and will provide a margin of safety consistent with Section III of the ASME Boiler and Pressure Vessel Code under postulated accident conditions including LOCA & SSE. Furthermore, the proposed plugging limit includes a sufficient thickness degradation allowance to compensate for possible continued degradation between inservice inspections. Based on previous inservice inspections there is no evidence of tube thinning in the Kewaunee Plant steam generators. In the event that significant tube thinning does occur, the licensee will reevaluate the 50% plugging limitation terms of the degradation allowance between inservice inspections. Therefore, we find that the proposed 50% degradation plugging limit is acceptable.

(e) Reporting of Inspection Results

Regulatory Position C.7.d of R.G. 1.83, states that a licensee should report to the Commission, for resolution and approval, proposed remedial action if the inspection results excees the limits specified in the Guide. It also states that additional sampling and more frequent inspection may be required. The proposed Technical Specifications, as modified by the NRC staff and concurred in by the licensee, clearly specify additional inspections the licensee must perform for those inspection results that fall in Categories C-1 and C-2. Immediate reporting of these results would not be required. Immediate reporting, as indicated by Table TS 4.2.2, would be required only if the inspection results reached the relatively greater level of tube degradation and defect found in Category C-3.

We conclude that the above described reporting requirements, as proposed by the licensee and modified by us, are reasonable and will facilitate reporting of pertinent information without unnecessarily increasing plant downtime, and thus constitute an acceptable alternative method for complying with the Commission's regulations.

In summary, we have concluded that the proposed steam generator tube inservice inspection program will provide added assurance of the continued integrity of the steam generator tubes, and thus is acceptable.

2. Reactor Coolant to Steam Generator Secondary Side Leak Rate Limit

(a) The existing Technical Specification 3.1.d specifies a reactor coolant leak rate limit that is intended to envelop various leakage paths, including reactor coolant to steam generator secondary side leakage. However, it does not contain an explicit steam generator leakage rate limit. The proposed change would specify a reactor coolant leakage rate limit of 500 GPD (about 0.35 GPM) from any one steam generator, and would require that the leakage be reduced to within limits within 4 hours or that the plant be placed in cold shutdown within 36 hours if the leak rate is exceeded. The licensee has agreed with this change.

The purpose of establishing a specific leakage rate limit for reactor coolant through the steam generator path is to assure that an acceptable level of tube integrity will be maintained during all normal or postulated accident conditions. Steam generator tube integrity needs to be maintained to ensure (1) that reactor coolant leakage is limited such that secondary coolant activity levels are maintained within acceptable limits during normal operation, (2) that for a postulated LOCA, excessive steam and feedwater shell-to-tube side inleakage would not occur, and (3) that for a postulated main steam line break accident excessive reactor coolant leakage, with resultant activity releases to the environment, would not occur.

Based on other evaluations made by the NRC staff[2], and the results of tests performed on similar steam generator tubes, we consider it unlikely that a tube failure could occur in any tube having a through-wall crack limited to 0.5 inches in length under any normal or accident condition. This crack length, as demonstrated by test, would result in a tube leakage rate of only 0.4 GPM under normal operating conditions.

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[2] Testimony of Raymond R. Maccary before the Atomic Safety and Licensing Appeal Board, In The Matter of Northern States Power Company, Docket Nos. 50-282/306.

Consequently, it is our position that with a Technical Specification limit of 500 GPD (0.3 GPM) for each steam generator and controlled secondary water chemistry conditions, there is reasonable assurance that the Kewaunee steam generator tube integrity would be maintained under all normal and postulated accident conditions. We have therefore, concluded that a 500 GPD leakage rate limit for each steam generator is acceptable.

3. Secondary Water Chemistry Monitoring Requirements

The licensee has proposed in the letter of November 15, 1976, surveillance requirments for secondary water chemistry. We have not, at this time, established criteria for limiting conditions for operation or surveillance requirements for secondary water chemistry. However, we conclude that the monitoring program proposed by the licensee would provide information regarding the magnitude of impurity buildup and would make it possible to detect the presence of a potentially corrosive environment. We conclude that these monitoring provisions are acceptable until such time as we establish criteria in this area.

Environmental Consideration

We have determined that the amendment does not authorize a change in effluent types or total amounts nor an increase in power level and will not result in any significant environmental impact. Having made this determination, we have further concluded that the amendment involves an action which is insignificant from the standpoint of environmental impact and pursuant to 10 CFR §51.5(d)(4), that an environmental impact statement or negative declaration and environmental impact appraisal need not be prepared in connection with the issuance of this amendment.

Conclusion

We have concluded, based on the considerations discussed above, that: (1) because the amendment does not involve a significant increase in the probability or consequences of accidents previously considered and does not involve a significant decrease in a safety margin, the amendment does not involve a significant hazards consideration, (2) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (3) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

Date: January 31, 1978

UN ED STATES NUCLEAR REGULATORY CC ISSION

DOCKET NO. 50-305

WISCONSIN PUBLIC SERVICE CORPORATION

WISCONSIN POWER AND LIGHT COMPANY

MADISON GAS AND ELECTRIC COMPANY

NOTICE OF ISSUANCE OF AMENDMENT TO FACILITY OPERATING LICENSE

The U.S. Nuclear Regulatory Commission (the Commission) has issued Amendment No.18 to Facility Operating License No. DPR-43 issued to Wisconsin Public Service Corporation, Wisconsin Power and Light Company, and Madison Gas and Electric Company which revised Technical Specifications for operation of the Kewaunee Nuclear Power Plant located in Kewaunee, Wisconsin. The amendment is effective within 30 days of the date of issuance.

The amendment to the Technical Specification establishes, (1) provisions for steam generator tube inspection that are consistent with the guidance contained in Regulatory Guide 1.83, Revision 1, dated July 1975, with the exception of deviations determined by the staff to enhance the overall inspection program, (2) provisions for monitoring secondary water chemistry, and (3) a new limit on reactor coolant to secondary leakage.

The application for the amendment complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations. The Commission has made appropriate findings as required by the Act and the Commission's rules and regulations in 10 CFR Chapter I, which are set forth in the license amendment. Prior public notice of this amendment was not required since the amendment does not involve a significant hazards consideration .

The Commission has determined that the issuance of this amendment will not result in any significant environmental impact and that pursuant to 10 CFR §51.5(d)(4) an environmental impact statement or negative declaration and environmental impact appraisal need not be prepared in connection with the issuance of this amendment.

For further details with respect to this action, see (1) the application for amendment dated November 15, 1976, as supplemented September 6, 1977, (2) Amendment No. 18 to Facility Operating License No. DPR-43, and (3) the Commission's related Safety Evaluation. All of these items are available for public inspection at the Commission's Public Document Room, 1717 H Street, NW., Washington, D.C. 20555, and at the Kewaunee Public Library, 314 Milwaukee Street, Kewaunee, Wisconsin 54216. A copy of items (2) and (3) may be obtained upon request addressed to the U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, Attention: Director, Division of Operating Reactors.

Dated at Bethesda, Maryland, this 31st day of January 1978.

FOR THE NUCLEAR REGULATORY COMMISSION

A. Schwencer, Chief
Operating Reactors Branch #1
Division of Operating Reactors