PDR

Wisconsin Electric POWER COMPANY
231 W. MICHIGAN, P.O. BOX 2046, MILWAUKEE, WI 53201

January 5, 1981

Mr. James G. Keppler, Regional Director
Office of Inspection and Enforcement,
Region III
U. S. NUCLEAR REGULATORY COMMISSION
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Dear Mr. Keppler:

DOCKET NOS. 50-266 AND 50-301
RESPONSE TO IE BULLETIN 80-24
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

The subject bulletin described conditions at a power reactor facility which resulted in the undetected flooding of the containment floor with service water from multiple piping and fan cooler leaks. The bulletin directed that licensees provide summary descriptions of all open cooling water systems inside containment and verify the existence of various means to detect the presence of leakage from such systems.

The Point Beach Nuclear Plant Units 1 and 2 have one open cooling water system inside containment. A summary description of the service water system is provided below. The information is given in the format suggested by the bulletin.

1a. Mode of Operation: During normal operation, the service water system provides approximately 515 gpm to each of four containment ventilation coolers. Under design basis accident conditions, the service water flow to each cooler is increased to approximately 1,050 gpm. Service water also provides approximately 100 gpm to the containment cavity coolers.

1b. Source of Water: The service water source is Lake Michigan. Extensive data on the water chemistry of Lake Michigan has been provided by Licensee in previous reports on non-radiological environmental monitoring. A summary report of this monitoring was provided by letter to Mr. Edson Case dated July 3, 1978.

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1c. Materials: The piping used in the service water system associated with the containment coolers is ASTM A-53B carbon steel. The containment ventilation cooler coils are copper tubes with vertical copper plate fins.

1d. Leakage Experience: There has been no leakage experienced in this system during the 18 reactor-years of Point Beach Nuclear Plant Units 1 and 2 operation.

1e. History and Type of Repairs: None.

1f. Provisions for Isolating: Valving exists outside containment which permits independent isolation of each of the four containment ventilation coolers. Final Facility Description and Safety Analysis Report (FFDSAR) Figure 9.6-2a presents a flow diagram of the service water system including the isolation valves. Table 5.2-1 and Figures 5.2-11 and 5.2-11a present details of the isolation provisions.

1g. Provisions for Appendix J Testing: Neither Appendix J to 10 CFR Part 50 nor the Point Beach Nuclear Plant Technical Specifications at Item 15.4.4.III establish any requirements for leakage rate testing of containment isolation valves of the type found in the service water system. Although it may be possible to establish a program of Type C testing of these valves, no leakage rate testing is presently done.

1h. Instrumentation: Each of the service water cooling lines from the containment ventilation coolers is provided with temperature, pressure and flow indicators. The return lines from the cavity coolers are provided with temperature and pressure indicators. The differential service water pressure across each containment ventilation cooler is also monitored. All service water return lines from the containment are monitored by a common radioactivity monitor.

1i. Detection of Radioactive Contamination: As mentioned above, radiation detector RE-16 monitors the service water discharge lines from the containment. High radioactivity levels would be alarmed in the control room.

The second portion of IE Bulletin 80-24 required licensees to take certain additional action to verify means for detection and monitoring of significant accumulations of water inside containment. The design of the Point Beach Nuclear Plant Units 1 and 2 is such that relatively small accumulations of liquid in the containment A sumps are immediately alarmed in the control room. These amounts are approximately 25 gallons for Unit 1 and 42 gallons for Unit 2. These alarms cannot be cleared except by positive manual action by the reactor operator. The sumps are drained by gravity to the auxiliary building sump when the operator opens a spring return to close switch in the control room. Any drainage, and the time interval of drainage, from the containment building sump is recorded in the control room log. Based on time to drain and intervals between alarms, an accurate and sensitive leakage rate determination may be calculated. The containment A sump is located in the reactor vessel pit. Any leakage to the containment floor level will be directed to this sump via floor drains. Any leakage originating from the containment ventilation coolers is collected in drain pans and piped directly to the containment sump.

Throughout its history of operations, the staff of the Point Beach Nuclear Plant have practiced containment leakage surveillance measures equal to or better than the measures suggested in the bulletin. The containment leakage surveillance measures are described in PBNP Procedure PBNP4.11 found in the "Administrative Control Policies and Procedures Manual", Volume 1. For your convenience, a copy of this procedure is attached. The key and controlling verification in this procedure is a multi-point plot kept at the control console of each reactor which is used to record and trend the five parameters described in the procedure. Review of these parameters by the Shift Supervisor and Duty and Call Superintendents assures that no significant accumulations of liquid would occur in the Point Beach containments.

We have, in addition to these measures, maintained a schedule of biweekly inspections of each containment since the units were put into operation. These inspections include a visual observation of the containment elevation 8' floors for liquid leaks.

The Technical Specification reporting requirements of Item 15.6.9.2.3 presently require the prompt notification (within 24 hours) of any abnormal degradation discovered in a primary containment boundary. We will notify the NRC of any service water system piping leaks within containment by means of a licensee event report submitted in accordance with this reporting provision.

Based upon the past history of no significant containment liquid leakage problems and the design of the Point Beach Nuclear Plant containment sump and sump drainage facilities, together with the leakage detection measures described above and in the attached procedure, we are confident that the accumulation of significant amounts of undetected liquids in the containments at Point Beach is extremely improbable and unlikely. Accordingly, we do not plan any additional actions or equipment modifications in response to this bulletin. Should you have any questions regarding this response, please contact me for clarification.

Very truly yours,

C. W. Fay, Director
Nuclear Power Department

Attachment

Subscribed and sworn to before me
This 5th day of January, 1981.

Cindy L. Trenier
Notary Public, State of Wisconsin

My Commission expires 7-8-84

Copy to: Director, Office of Inspection
and Enforcement
NRC Resident Inspector

REACTOR COOLANT SYSTEM LEAKAGE DETERMINATION

1.0 PURPOSE

The purpose of this instruction is to detail the method for following trends of reactor coolant system leakage and to determine quantities, in conformance with Technical Specifications commitments, Section 15.3.1.D. Of first importance is the need to ascertain that there is no "exterior wall" leakage from the reactor vessel, reactor system piping, reactor system valve bodies, pressurizer, reactor coolant pump bodies, or the reactor coolant system side of the steam generators. Of second importance is to ascertain that if any leaks occur in gasketed closures or packings of the reactor coolant system they are well under control with quantities according to Technical Specifications commitments.

It is not the purpose of this instruction to quantitively determine reactor coolant system to other system cross-leakage or flow, such as primary-to-secondary steam generator tube leakage (evaluated by Chemistry and Health Physics), or reactor coolant system to component cooling leakage (under continuous evaluation by the component cooling radiation monitor), or reactor coolant system leakage to connecting systems such as reactor coolant drain or pressurizer blowdown or charging and volume control. Such uncontrolled leakages as these noted above must remain so small in quantity for reasons of other limits that the leakages are not significant in the first evaluation limit of the Technical Specifications at 1 gpm.

2.0 METHOD AND RESPONSIBILITY

2.1 As shown in the Technical Specifications Section 15.3.1.D, there are six methods of discovering or evaluating reactor coolant system leakage into the containment. They are as follows:

- 2.1.1 Air particle monitor
- 2.1.2 Radiogas monitor
- 2.1.3 Relative humidity
- 2.1.4 Sump A drainage
- 2.1.5 Computer and/or manual water balance
- 2.1.6 In-containment physical inspection

2.2 In order to maintain evaluation type surveillance of reactor coolant system leakage, the following observations and actions shall take place:

2.2.1 During hot pressurized operation, the Control Operator shall periodically observe the air particle monitor reading, the radiogas monitor reading and the relative humidity reading.

2.2.2 During hot pressurized operation, the "eye ball" average readings or values of the following shall be plotted, if available, on a graph once per day:

a. Air particle monitor

b. Radiogas monitor

c. Relative humidity

d. Sump A drainage

e. Computer and/or manual water balance leakage number

f. Service water temperature

2.2.3 The six line graph shall be reviewed once per day by the Duty Shift Supervisor for Technical Specifications compliance.

2.2.4 The six line graph shall be reviewed once per week by the Duty and Call Superintendent and the Operations Superintendent.

2.2.5 A physical inspection inside containment for leakage evaluation reasons may be ordered by the Duty Shift Supervisor, the Duty and Call Superintendent, or the Operations Superintendent, at any time felt necessary.

2.2.6 During hot pressurized operation, a physical inspection inside containment shall be made at intervals not greater than once every two weeks, with time and results noted in the station log.

2.2.7 The Operations Superintendent shall periodically review the primary-to-secondary leakage and determine that when added to Sump A leakage, the 1 gpm figure is not exceeded or that additional Technical Specifications evaluations occur as required.

3.0 EVALUATION

Some keys to evaluating in-containment leakage as itemized above are as follows:

3.1 A rising air particulate monitor reading (under steady-state conditions) can mean an increasing leak in the reactor coolant system, and, if it is the single leading indicator, may mean the leak is in the liquid phase of the reactor coolant system.

3.2 A rising radiogas monitor reading (under steady-state conditions) can mean an increasing leak in the reactor coolant system, and if it is the single leading indicator may mean the leak is in the gaseous phase of the reactor coolant system such as pressurizer steam space levels.

3.3 A rising relative humidity reading, under steady-state conditions, as the single leading indicator can mean an in-containment leak from systems other than the reactor coolant system, a reactor coolant system liquid leak, or can mean an increasing service water system temperature. Relative humidity readings should not exceed 50% if all in-containment systems are reasonably leaktight.

3.4 The gallons discharged from Sump A (under steady-state conditions) is the principal quantitative indicator and if rising in quantity can mean a leak from in-containment systems or the reactor coolant system.

3.5 The water balance calculation, Item 3.4 above, Sump A drainage, is the basis for correlating quantitively the readings of 3.1, 3.2 and 3.3 above to approximate gallons per minute. The correlations are important since Items 3.1, 3.2 and 3.3 above are fast indicators of a change in leakage.

3.6 The service water system temperature is important to evaluating corrections to trends of Sump A drainage and relative humidity, and a decreasing service water temperature can cause a decreasing humidity and increasing Sump A drainage.

For convenience to the evaluation, Technical Specifications Section 15.3.1.D is attached to this instruction and follows.

D. LEAKAGE OF REACTOR COOLANT

Specification:

1. If leakage of reactor coolant from the reactor coolant system is indicated to exceed 1 gpm by the means available such as water inventory balances, monitoring equipment or direct observation, a follow-up evaluation of the safety implications shall be initiated as soon as practicable but no later than within 4 hours. Any indicated leak shall be considered to be a real leak until it is determined that either (1) a safety problem does not exist or (2) that the indicated leak cannot be substantiated by direct observation or other indication.

2. If the indicated reactor coolant leakage is substantiated and is not evaluated as safe or is determined to exceed 10 gpm, reactor shutdown shall be initiated as soon as practicable, but no later than within 24 hours after the leak was first detected.

3. The nature of the leak as well as the magnitude of the leak shall be considered in the safety evaluation. If plant shutdown is necessary per specification 2 above, the rate of shutdown and the conditions of shutdown shall be determined by the safety evaluation for each case and justified in writing as soon thereafter as practicable. The safety evaluation shall assure that the exposure of offsite personnel to radiation from the primary system coolant activity is within the guidelines of 10 CFR 20.

4. If the leakage is determined to be primary to secondary steam generator leakage in excess of 500 GPD in either steam generator, the reactor shall be shutdown and the plant placed in the cold shutdown condition within 30 hours after detection.

5. 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, pressurizer or steam generator head), the reactor shall be shutdown, and cooldown to the cold shutdown condition shall be initiated within 24 hours of detection.

6. The reactor shall not be restarted until the leak is repaired or until the problem is otherwise corrected.

7. When the reactor is in power operation, two reactor coolant leak detection systems of different operating principles shall be in operation, with one of the two systems sensitive to radioactivity. The systems sensitive to radioactivity may be out-of-service for 48 hours provided two other means are available to detect leakage.

8. Secondary coolant gross radioactivity shall be monitored continuously by an air ejector gas monitor.

   Secondary coolant gross radioactivity shall be measured weekly. If the air ejector monitor is not operating, the secondary coolant gross radioactivity shall be measured daily to evaluate steam generator leak tightness.

Basis:

Water inventory balances, monitoring equipment, radioactive tracing, boric acid crystalline deposits, and physical inspections can disclose reactor coolant leaks. Any leak of radioactive fluid, whether from the reactor coolant system primary boundary or not, can be a serious problem with respect to in-plant radioactivity contamination and cleanup or it could develop into a still more serious problem; and therefore, first indications of such leakage will be followed up as soon as practicable.

Every reasonably effort will be made to reduce reactor coolant leakage to the lowest possible rate. Although some leak rates may be tolerable from a dose point of view, especially if they are to closed systems, it must be recognized that leaks in the order of drops per minute through any of the walls of the primary system could be indicative of materials failure such as stress corrosion cracking. If depressurization, isolation and/or other safety measures are not taken promptly, these small leaks could develop into much larger leaks. Therefore, the nature of the leak, as well as the magnitude of the leakage, must be considered in the safety evaluation. The provision pertaining to a non-isolable fault in a reactor coolant system component is not intended to cover steam generator tube leakages, valve or packings, instrument fittings or similar primary system boundaries not indicative of major component exterior wall leakage.

The specific leak rate limit identified for primary-to-secondary leakage of 500 GPD per steam generator provides an additional margin of safety with regard to the potential for large steam generator tube failure in that action to shutdown the plant will be explicitly required at a low leakage rate threshold.

When the source and location of leakage has been identified, the situation can be evaluated to determine if operation can safely continue. This evaluation will be performed by the Manager's Supervisory Staff according to routine established in Section 15.6. Under these conditions, an allowable leakage rate of 10 gpm has been established. The explained leakage rate of 10 gpm is also well within the capacity of one charging pump, and makeup would be available even under the loss of offsite power condition.

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 rate of leakage to which the instrument is sensitive is 0.013 gpm within 20 minutes, assuming the presence of corrosion product activity.

b. The containment radiogas monitor is less sensitive but can be used as a backup to the air particulate monitor. The sensitivity range of the instrument is approximately 2 gpm to greater than 10 gpm.

c. The humidity detector 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 which determines leakage losses from water and steam systems within the containment collects and measures moisture condensed from the containment atmosphere by cooling coils of the main recirculation units. This system provides a dependable and accurate means of measuring total leakage, including leaks from the cooling coils themselves which are part of the containment boundary. Condensate flows from approximately 1/2 gpm to 10 gpm can be measured by this system.

e. Indication of leakage from the above sources shall be cause to require a containment entry and limited inspection at power of the reactor coolant system. Visual inspection means, i.e., looking for steam floor wetness or boric acid crystalline formations, will be used. Periodic inspections for indications of leakage within the containment will conducted to enhance early detection of problems and to assure best on-line reliability.

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

Continuous monitoring of steam generator tube leakage is accomplished by either he individual unit Air Ejector Radiation Monitor, the combined Air Ejector Radiation Monitor, or the Steam Generator Blowdown Radiation Monitor in combination with periodic surveillance of the primary coolant activity. Backup monitoring can be accomplished by sampling secondary coolant gross activity.

References

FFDSAR Section 6.5, 11.2.3