Central File

WISCONSIN PUBLIC SERVICE CORPORATION

P.O. Box 1200, Green Bay, Wisconsin 54305

June 20, 1979

Mr. James G. Keppler, Reg Dir
Office of Inspection & Enforcement
Region III
U. S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, IL 60137

Gentlemen:

Docket 50-305
Operating License DPR-43
Letter to Mr. J. G. Keppler from Mr. E. R. Mathews
dated April 31, 1979 in response to IE Bulletin 79-06A, Rev. 1

During discussions with the NRC staff concerning the referenced letter and the Three Mile Island incident relative to the Kewaunee Nuclear Power Plant, it has become apparent that the bulletin and our subsequent response did not reflect the in depth information the staff is requesting. In response to the NRC staff's concerns we are submitting the attached updated and expanded responses with the paragraph numbers corresponding to the bulletin action items.

Also, in order to more broadly scope the generic aspects of the Westinghouse plant design as the incident at Three Mile Island relates to it, we have formed an owners group and have contracted Westinghouse Electric Corporation to perform certain analysis and procedural reviews to ensure our design is best employed to deal with similar events. The results of the analysis and review should be completed and submitted to the NRC by the end of June, 1979.

Very truly yours,

E. R. Mathews

E. R. Mathews, Vice President
Power Supply and Engineering

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1. No additional information to be provided.

2. Review the actions required by your operating procedures for coping with transients and accidents, with particular attention to:

   a. Recognition of the possibility of forming voids in the primary coolant system large enough to compromise the core cooling capability, especially natural circulation capability.

   b. Operator action required to prevent the formation of such voids.

   c. Operator action required to enhance core cooling in the event such voids are formed (e.g., remote venting).

   RESPONSE

   a. The Kewaunee procedures were reviewed in detail by a team of SRO's well versed on the TMI-2 incident. All applicable information that applied to Kewaunee was incorporated into the procedures. Particular attention was given to void formation and its effects on cooling. The Kewaunee design considered some voiding post LOCA and the safety evaluation indicated adequate core cooling with this voiding. We will receive additional information on those accidents and system conditions that will cause significant voiding from the Westinghouse Analysis of small breaks requested by the Owners Group. We will make additional modifications to our procedures or write new procedures, if necessary, when we have this detailed information. The operators have been instructed on which instruments can be used to indicate that void formation is possible. These instruments are reactor coolant temperature (RTDs and thermocouples), reactor coolant pressure, pressurizer pressure and comparison of the above to a saturation curve.

   b. The instructions provided to the operators to prevent void formation are: to maintain RC pressure above the saturation curve during accident conditions utilizing the high head safety injection pumps, to close the Pressurizer Power Operated Relief Valve block valves during accident conditions, and to insure that heat removal is provided by the auxiliary

feedwater pumps. The high head safety injection pumps are not capable of overpressurizing the system, therefore, a solid system is not a reason for stopping the high head safety injection pumps.

c. The Kewaunee plant design and physical layout places the piping for both loops, the steam generators and the pressurizer at higher elevations than the reactor core. This design facilitates true natural circulation as the heat source is the lowest point in the system and heat removal is accomplished at the high point in the system. Westinghouse has verified that the production of steam voids actually increases the thermal driving head increasing natural circulation. However, this condition would likely be caused by either a loss of heat removal capability or a decrease in pressure as a result of a loss of reactor coolant water inventory. The corrective action for this condition, therefore, is to insure that heat is being removed by the auxiliary feed system and that the high head safety injection pumps are in operation with an adequate water supply. Formation of noncondensible voids requires action in the form of venting or degassing to insure natural circulation. The pressurizer can be used as a means to remove noncondensible gases. The specific action to be taken in this event will be dictated by the circumstances at the time of occurrence. Additionally more information is required from Westinghouse (See 2a), with respect to plant conditions, to develop an effective procedure.

3. Kewaunee has modified the safety injection actuation logic to two of three low pressurizer pressure signals. Therefore, no further information is necessary.

4. Review the containment isolation initiation design and procedures, and prepare and implement all changes necessary to permit containment isolation whether manual or automatic, of all lines whose isolation does not degrade needed safety features or cooling capability, upon automatic initiation of safety injection.

RESPONSE

Table 4.1 indicates those services which are not isolated following a containment isolation signal. All other process lines are isolated via the isolation signal or, for lines not required for normal operation, by valves kept in their normally closed position.

Table 4.1 also includes the system concerned and the post-accident function of the un-isolated services. Since the seal water supply and the cooling water to the thermal barrier and bearings is continued to the reactor coolant pumps, both reactor coolant pumps remain available following containment isolation.

TABLE 4.1

SERVICES NOT ISOLATED FOLLWOING CONTAINMENT ISOLATION

Service	System[1]	POST-LOCA Function
Charging Line	CVCS	Continues to make-up
R.C. Pump Seal Water Supply	CVCS	Continues Seal water supply to Reactor Coolant Pumps
Internal Containment Spray	ICS	Cool Containment POST-LOCA
Component Cooling to RCP's 1A & 1B	ACS	Supplies Cooling to RCP thermal barrier and bearings
Service Water to and from Containment Fancoil Units 1A, 1B, 1C, 1D	SW	Provide Cooling of Containment Atmosphere
Auxiliary Feedwater to S/G 1A & 1B	FW	Decay Heat Removal
Residual Heat Removal	ACS/SIS	Safety Injection/ Long term POST-LOCA cooling
Cold Leg Safety Injection	SIS	Injection Path into Cold Leg
Low Head Safety Injection to Reactor Vessel	SIS	Injects Water Into Reactor Vessel

(1) CVCS = Chemical and Volume Control System
ICS = Internal Containment Spray System
ACS = Auxiliary Coolant System
SW = Service Water System
FW = Feedwater System
SIS = Safety Injection System

5. Since Kewaunee has an automatically initiated auxiliary feedwater system, no further information is necessary.

6. For your facilities, prepare and implement immediately procedures which:

   a. Identify those plant indications (such as valve discharge piping temperature, valve position indication, or valve discharge relief tank temperature or pressure indication) which plant operators may utilize to determine that pressurizer power operated relief valve(s) are open, and

   b. Direct the plant operators to manually close the power operated relief block valve(s) when reactor coolant system pressure is reduced to below the set point for normal automatic closure of the power operated relief valve(s) and the valve(s) remain stuck open.

RESPONSE

The Kewaunee Plant includes instrumentation which clearly indicates that a pressurizer power operated relief valve or safety valve has opened. This instrumentation includes temperature indication downstream of the valve, and temperature, pressure and level indication of the pressurizer relief tank. Additionally, the PORV's at Kewaunee have stem position indication switches which indicate in the control room if the valve is closed, midstroke or open.

As part of the review with licensed operators of the events at TMI, the recognition of a stuck open PORV and subsequent actions by the operator were discussed. The ability of the operator to isolate the relief valves with the motor operated isolation valves was reiterated.

The overpressure protection system for low temperature operation at Kewaunee is an installed relief valve on the RHR system suction. This valve discharges to the containment sump B.

The indications of an open LTOP relief valve are the reactor coolant system pressure, containment sump level, and, if the RCP's are running, the #1 RCP differential pressure alarm.

7. Review the action directed by the operating procedures and training instructions to ensure that:

   a. Operators do not override automatic actions of engineered safety features, unless continued operation of engineered safety features will result in unsafe plant conditions. For example, if continued operation of engineered safety features would threaten reactor vessel integrity then the HPI should be secured (as noted in b(2) below).

   b. Operating procedures currently, or are revised to, specify that if the high pressure injection (HPI) system has been automatically actuated because of low pressure condition, it must remain in operation until either:

      (1) Both low pressure injection (LPI) pumps are in operation and flowing for 20 minutes or longer; at a rate which would assure stable plant behavior; or

      (2) The HPI system has been in operation for 20 minutes, and all hot and cold leg temperatures are at least 50 degrees below the saturation temperature for the existing RCS pressure. If 50 degrees subcooling cannot be maintained after HPI cutoff, the HPI shall be reactivated. The degree of subcooling beyond 50 degrees F and the length of time HPI is in operation shall be limited by the pressure/temperature considerations for the vessel integrity.

   c. Operating procedures currently, or are revised to, specify that in the event of HPI initiation with reactor coolant pumps (RCP) operating, at least one RCP shall remain operating for two loop plants and at least two RCPs shall remain operating for 3 or 4 loop plants as long as the pump(s) is providing forced flow.

   d. Operators are provided additional information and instructions to not rely upon pressurizer level indication alone, but to also examine pressurizer pressure and other plant parameter indications in evaluating plant conditions, e.g., water, inventory in the reactor primary system.

RESPONSE

We are participating in the Westinghouse PWR Owners Group and will address item 7 as part of that effort.

Our philosophy at Kewaunee has never been one which advocates the override of a safeguards signal or action. This philosophy has been stressed in our training and our procedures. We have, as a result of TMI-2, placed additional emphasis in this area.

Kewaunee has criteria which permits Safety Injection termination when the plant is in a stable, subcooled condition. This criteria is:

a. Wide range reactor coolant pressure is over 2000 psig, and increasing; AND

b. Narrow range level indication on at least one steam generator; AND

c. Pressurizer level is greater than 50%.

In addition, Kewaunee has provided criteria for reinitiation of Safety Injection when reactor coolant pressure decreases by 200 psi or more after Safety Injection is terminated to bring pressure back to the point where Safety Injection was originally terminated.

Following a steam line break, the Kewaunee criteria also addresses the need for termination of Safety Injection to prevent overpressurization of the Reactor Coolant System. This protection must be provided for transients where subcooling is not the only criterion which must be addressed.

This criteria is:

a. Hot leg temperature less than 350^{o}F, AND

b. Reactor Coolant System pressure increasing, AND

c. Pressurizer level greater than 20% and increasing.

Following a steam generator tube rupture, the Kewaunee criteria also addresses the need for termination of Safety Injection flow to minimize break flow to the faulty steam generator. This criteria specifies that when water level returns in the pressurizer the operator is to verify that both pressurizer PORV's are closed and to stop as many safety injection pumps as necessary to maintain pressurizer level. If level cannot be maintained with normal letdown and charging, the procedures require the operator to restart the Safety Injection pump(s). The procedure also has a precaution that when pressurizer level is

being maintained by Safety Injection flow, the pressurizer pressure and level should be rising and falling together. If this is not the case, the operator is instructed to verify his symptoms to insure that a loss of coolant is not occurring.

Kewaunee requires continued operation of High Pressure Injection until flow can be verified from the Low Pressure Injection pumps following a shift in suction from the Refueling Water Storage Tank to the containment Sump. This is accomplished by running both the high head and low head pumps into the system. If LPI flow cannot be achieved, LPI is directed to the HPI pump suction for continued recirculation. The Kewaunee criteria calls for continued operation of the Low Head SI as long as the system is delivering flow to the reactor coolant system.

However, in the event that the reactor coolant system pressure stabilizes at a value above the shutoff head of the Low Head SI pumps, it is specified that the Low Head SI pumps be stopped and placed in a standby mode for manual reinitiation, if required.

b. The Kewaunee criteria for termination of SI are based on several considerations, including subcooling (See Item 7A). This criteria provides for the termination of high head Safety Injection only when the plant is in a stable condition. These conditions are determined from several process variables and are, in general, more familiar and conveniently available to the operator than is a single subcooling criterion. This criteria provides for subcooling equal to or greater than that present during normal full power operation. (Approximately 15° to 20°F subcooling very early in a transient.) In addition, after about 20 minutes into the transient, the criteria provides subcooling

of approximately 50°F (based on natural circulation flow following a small break LOCA and 2% decay heat).

The Kewaunee criteria provides compliance with the requirements in Items 7a and 7b by providing for subcooling and avoids placing the plant in an undesirable or unsafe condition.

c. When forced circulation enhances core cooling and helps mitigate the consequences of an accident, Kewaunee has incorporated the continued operation of the Reactor Coolant Pumps into the emergency procedures.

The Kewaunee procedures trip the Reactor Coolant Pumps on a Steamline Break to limit the cooldown of the Reactor Coolant System and also for a large LOCA to minimize the loss of primary coolant to containment. Except for the above two cases, Kewaunee believes that at least one Reactor Coolant Pump should remain running.

d. The Kewaunee criteria for termination of Safety Injection are discussed in 7a. The criteria does not recommend operator action based solely on pressurizer level indications. Our instructions are to seek confirmatory indications for all parameters when possible and to follow the most conservative parameter.

8. Review all safety-related valve positions, positioning requirements and positive controls to assure that valves remain positioned (open or closed) in a manner to ensure the proper operation of engineered safety features. Also review related procedures, such as those for maintenance, testing, plant and system startup, and supervisory periodic (e.g., daily/shift checks) surveillance to ensure that such valves are returned to their correct positions during all operational modes.

RESPONSE

Kewaunee utilizes valve lineup sheets in the form of valve checklists for each system operating procedure. These checklists specify the required

position for each valve and require that the operator making the line up initial the sheet after positioning the valve. The completed sheets for each system are then signed and retained by the Shift Supervisor and reviewed by the Operations Supervisor. They are used for system startup following an outage or major maintenance on the system. The safety related procedures (checklists) were reviewed to ensure the positioning requirements for safety related valves were correct and the positioning requirements were found to be correct. A physical check of the safety related valves was then performed. That check and system review ensured that all safety related valves in the Kewaunee Plant are properly positioned. A surveillance procedure based on the above review and valve check is being written to be implemented when the required reviews of the surveillance procedure are complete.

Kewaunee Technical Specifications do not require surveillance of locked valves. These locked valves will be included in the surveillance procedure; however, those located in the containment building require special mention. These motor operated valves have their power supply locked open outside containment. They have remote position indication located in the control room that is independent of the power supply to the motor. We will verify that the position of these valves is correct using the position indication and will verify that the power supplies are locked open. Additionally, there are four (4) manually operated globe valves located in containment that were used to set the flows for the various High Head Safety Injection flow paths. After these flows were set and verified the valves were locked using stem mounted locking devices that are tack welded to the valve yoke. This provides assurance that these valves remain in the required position without entering the containment building during operation. There are no other manual valves in the High Head or Low Head Flow paths in the containment building.

9. Review your operating modes and procedures for all systems designed to transfer potentially radioactive gases and liquids out of the primary containment to assure that undesired pumping, venting or other releases of radioactive liquids and gases will not occur inadvertently.

   In particular, ensure that such an occurrence would not be caused by the resetting of engineered safety features instrumentation. List all such systems and indicate:

   a. Whether interlocks exist to prevent transfer when high radiation indication exists, and

   b. Whether such systems are isolated by the containment isolation signal.

   c. The basis on which continued operability of the above features is assured.

RESPONSE

Table 9.1 lists the systems at Kewaunee which are designed to transfer potentially radioactive liquids or gases outside of the containment. Table 9.1 also indicates if these systems are isolated following containment isolation. For those systems not completely isolated, Table 9.1 includes a brief description of their post-LOCA function.

Resetting of the engineered safeguards at Kewaunee does not automatically unisolate any system, and therefore will not permit inadvertent transfer of any radioactive gases or liquids out of the containment. All systems at Kewaunee must be manually realigned for operation following a reset of the engineered safeguards. Operability of the containment isolation valves is checked every refueling as required by Technical Specifications.

Table 9.2 summarizes those systems at Kewaunee which contain radiation interlocks. In addition to the radiation interlocks, Kewaunee utilizes an extensive radiation monitoring system with control room indication of the radiation levels throughout the plant. This system also alarms on high radiation.

TABLE 9.1

SYSTEMS DESIGNED TO TRANSFER RADIOACTIVE FLUIDS OUTSIDE OF CONTAINMENT

System	Isolated POST-LOCA	POST-LOCA Function
Containment Ventilation	Yes	
Containment Sampling	Yes	
Containment Purge	Yes	
Hydrogen Control System Sampling	Yes	
Reactor Coolant System Sampling	Yes	
Waste Disposal System	Yes	
Component Cooling	No	Supply cooling to RCP thermal barrier and bearings
Steam Generator Blowdown	Yes	
Containment Sump Discharge (low head recirculation)	No	Safety Injection
Chemical and Volume Control System	No	Continues RCS make-up
Residual Heat Removal System	No	Safety Injection

TABLE 9.2

RADIATION INTERLOCKS

System	Interlock Function
Containment Ventilation	Stops venting by closing dampers
Auxiliary Bldg. Ventilation	Stops supply and exhaust fans Starts special ventilation fans Close boundary dampers Routes exhaust through HEPA's
Waste Disposal System	Prevents liquid effluent releases
Containment Purge	Stops purging by closing dampers
Control Room Ventilation	Starts Recirculation fans Recirculates Control Room air through HEPA's

10. Review and modify as necessary your maintenance and test procedures to ensure that they require:

    a. Verification, by test or inspection, of the operability of redundant safety-related systems prior to the removal of any safety-related system from service.

    b. Verification of the operability of all safety-related systems when they are returned to service following maintenance or testing.

    c. Explicit notification of involved reactor operational personnel whenever a safety-related system is removed from and returned to service.

RESPONSE

a. This is required by our Technical Specifications. It is accomplished by the performance of the applicable portion of the surveillance procedure associated with the safety related system or component, prior to removing the redundant system or component from service. When the system or component that was removed from service is returned to service, it is tested for operability. Component testing is allowed as there are active safety related systems, such as Service Water, that remain operational while components are removed from service for maintenance. Our procedure review indicates that full flow testing of the Auxiliary Feedwater System is desirable. The initial analysis by Westinghouse indicates that the additional thermal cycles of the steam generators are within acceptable limits. The Westinghouse analysis did not consider the thermal cycles associated with the nozzle connecting Auxiliary Feedwater to the main feedwater line at the steam generator. We have requested additional analysis on this point and are prepared to change over procedures upon receiving acceptable results. Resolution of this item will complete implementation of the bulletin requirement.

b. The existing administrative procedures require a demonstration of operability for safety related systems following completion of the

maintenance activity. This is accomplished in the manner described above and the same reviews apply. When testing requires that a safety related system be removed from service visual inspection of the system provides verification that it has been returned to the required lineup.

c. All maintenance or testing activities performed within the Kewaunee Plant require approval of the Shift Supervisor prior to the start of the activity and notification of the Shift Supervisor upon completion. These activities are logged in the Shift Supervisors Log. Kewaunee also has a manually operated panel of safety system status lights. When a system is removed from service its light is turned on which provides a visual indication of status. The control room has Safety Injection System Active and Ready Status panels that provide the operators with visual indication of safety system status. Additionally, when any safety system is removed from service it is logged in the Control Room Log by the control operators. At shift turnover these logs and panels are reviewed by the oncoming shift. This provides assurance that the safety system status is relayed from one shift to the other.

11. Review your prompt reporting procedures for NRC notification to assure that NRC is notified within one hour of the time the reactor is not in a controlled or expected condition of operation. Further, at that time an open continuous communication channel shall be established and maintained with NRC.

RESPONSE

The reporting requirements of the Kewaunee license are specified in Section 6.9.2.a of the Technical Specifications and Section F of the Kewaunee Plant Emergency Plan. WPS has and will comply with the specific notification requirements and commitments made in the forementioned documents.

Additionally, if an off-site emergency is declared, the NRC Region III office will be contacted within one hour of the declaration. The emergency plan will be revised to reflect this one hour commitment.

WPSC has indicated to the NRC verbally that we would cooperate in prompt reporting of any incident.

12. Review operating modes and procedures to deal with significant amounts of hydrogen gas that may be generated during a transient or other accident that would either remain inside the primary system or be released to the containment.

RESPONSE

The Kewaunee Plant design has considered hydrogen generation post-LOCA and has developed procedures for handling hydrogen gas concentration in the containment. These procedures are based on the worst case accident and assure that the hydrogen concentration can be maintained below explosive mixtures without violating 10 CFR 20 limits.

WPSC has initiated an investigation to consider the installation of recombiners. There has already been correspondence with several manufacturers of recombiners, and WPSC will be engaging the services of a consultant to determine if recombiners or procedural changes are necessary.

Kewaunee Nuclear Power Plant currently has no formal procedures to handle non-condensible gases in the reactor coolant system. KNPP relies on venting through the pressurizer PORV or stripping the gases with the chemical and volume control system. If specific procedures are required post-LOCA, there will be time to formulate appropriate procedures which reflect the individual circumstances of the event.