Consumers Power
POWERING MICHIGAN'S PROGRESS
General Offices: 1945 West Parnall Road, Jackson, MI 49201 • (517) 788-1636

Kenneth W Berry
Director
Nuclear Licensing

January 31, 1989

Nuclear Regulatory Commission
Document Control Desk
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DOCKET 50-255 - LICENSE DPR-20 - PALISADES PLANT -
RESPONSE TO GENERIC LETTER 88-17, LOSS OF DECAY
HEAT REMOVAL (90 DAY RESPONSE)

Nuclear Regulatory Commission letter dated October 17, 1988 (Generic Letter 88-17, Loss of Decay Heat Removal) discussed loss of decay heat removal events during nonpower operation and recommended expeditious actions and longer term programmed enhancements. The letter required submittal of actions taken to implement the recommended expeditious actions within 60 days of receipt of the letter and a submittal of a description of enhancements, specific plans and an implementation schedule for each of the six recommended programmed enhancements within 90 days of receipt of the letter. Consumers Power Company's response to the recommended expeditious actions for Palisades Plant was provided by letter dated January 3, 1989. Attached is Consumers Power Company's response to the recommended programmed enhancements for Palisades Plant. Throughout the development of both our responses, we have actively participated in CE Owners Group reviews and have considered their corrective action recommendations.

Kenneth W Berry

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Director, Nuclear Licensing

CC Administrator, Region III, NRC
NRC Resident Inspector - Palisades

Attachment

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OC0189-0019-NL04

CONSUMERS POWER COMPANY

Palisades Plant
Docket 50-255 License DPR-20

90 Day Response to Generic Letter No 88-17 dated October 17, 1988

At the request of the Commission and pursuant to the Atomic Energy Act of 1954 and the Energy Reorganization Act of 1974, as amended, and the Commission's Rules and Regulations thereunder, Consumers Power Company submits our response to NRC letter dated October 17, 1988, entitled, "Loss of Decay Heat Removal (Generic Letter No. 88-17)". Consumers Power Company's response is dated January 31, 1989.

CONSUMERS POWER COMPANY

By _____
David P Hoffman, Vice President
Nuclear Operations

Sworn and subscribed to before me this 31st day of January 1989.

_____
Elaine E Buehrer, Notary Public
Jackson County, Michigan
My commission expires October 31, 1989

OC0189-0019-NL04

ATTACHMENT

Consumers Power Company
Palisades Plant
Docket 50-255

RESPONSE TO GENERIC LETTER 88-17
RECOMMENDED PROGRAMMED ENHANCEMENTS

January 31, 1989

9 Pages

RESPONSE TO GENERIC LETTER 88-17 RECOMMENDED PROGRAMMED ENHANCEMENTS

Recommended Programmed Enhancement (1): INSTRUMENTATION

Provide reliable indication of parameters that describe the state of the RCS and the performance of systems normally used to cool the RCS for both normal and accident conditions. At a minimum, provide the following in the CR:

(a) two independent RCS level indications

(b) at least two independent temperature measurements representative of the core exit whenever the RV head is located on top of the RV (we suggest that temperature indications be provided at all times)

(c) the capability of continuously monitoring DHR system performance whenever a DHR system is being used for cooling the RCS

(d) visible and audible indications of abnormal conditions in temperature, level, and DHR system performance

Response

(a) Our one existing level indication which meets the GL 88-17 recommendation, as well as available supplementary indication, were described in detail in our 60-day response, dated Janaury 3, 1989.

Within the 60-day response, we also committed to make a determination regarding a second level indication which will address the Generic Letter 88-17 recommendations. Accordingly, we have determined that we will add another differential pressure type level transmitter which will provide control room indication and alarm capability. We have decided to utilize a tap off the Loop 2 hot leg. The existing level indicator utilizes a tap off the Loop 1 hot leg. Similarly, the lowest available indication will be approximately 6.5 inches above the bottom of the Loop 2 hot leg. For the top tap, we have a choice of either a lower pressurizer tap, which would make this an equivalent indication to the currently existing "Generic Letter 88-17" indication, only from the opposite hot leg; or a tap off the top of the Loop 2 hot leg. The latter approach would cover approximately 14.5 inches above and below the hot leg centerline. We intend to implement the latter approach because we believe the diversity of indication and improved accuracy obtainable in the critical area where vortexing could originate more than compensates for the lack of fully redundant "Generic Letter 88-17" indication at elevations above the top of the hot leg, where specific level has no critical implications.

This second level indication will be installed and implemented (with appropriate procedure revision) prior to the end of our next refueling outage, which is scheduled to occur in 1990.

With regards to our installed level glass and attached tygon tube extension discussed in our 60-day response, we recognize this equipment does not meet the Generic Letter 88-17 requirements for level indication. However, we intend to continue use of the level glass when establishing a desired Primary Coolant System (PCS) level as a cross check to other available level instrumentation. We have previously established in our procedures that the level glass remains isolated from the PCS except when actually being used to obtain a reading. We believe continuation of this practice affords us the opportunity to utilize an available means for determining PCS level, when desired, during normal operation of the Shutdown Cooling System without the level glass itself contributing to an adverse situation.

(b) For temperature measurement, we will utilize redundant Core Exit Thermocouples (CETs) as described in our 60-day response. The CETs are available when the reactor vessel head is installed, but must be disconnected prior to actual head removal. Consequently, short periods of time will exist when the head is installed for which temperature indication from the CETs is unavailable.

The following actions will be taken to minimize the impact during this situation. Primary Coolant System (PCS) water level will be raised to near the reactor vessel flange area (out of reduced inventory condition) prior to termination of CET cables in preparation for head removal. The PCS water level will be maintained above the reduced inventory condition while the head is being removed, until two CETs can be reconnected at the time of head reinstallation. We will also reasonably avoid premature termination of CET cables before actual head removal necessitates this action. At reinstallation of the head, we will reasonably avoid delays in reconnecting at least two CETs. Procedure revisions to reflect these actions will be completed by June 1, 1989.

A supplementary means of temperature indication is also available from two hot leg RTDs, one in each loop, which can display wide range hot leg temperature in the control room. Use of these instruments, is limited to situations where sufficient water exists in the hot legs. Additionally, since they are not located in the reactor vessel near the fuel, they will not represent peak PCS temperature. However, in a loss of shutdown cooling situation with the head removed and sufficient water in the PCS, the hot leg RTDs will provide a reasonable indication of PCS temperature and allow for monitoring temperature trending.

(c)(d) At Palisades, monitoring of Shutdown Cooling System parameters can be readily accomplished via instrumentation and alarms which are provided in the control room.

Total system flow indication is available, as well as indication of flow through each of the four injection paths. By use of these indications, sufficient flow for adequate heat removal and PCS mixing can be quickly verified. Flow can also be balanced between the injection paths, when desired.

Shutdown Cooling System temperature indication is available from a chart recorder which displays the trend in temperature for the outlet from the PCS and the return to the PCS. In this manner, continuing indication of heat removal within the Shutdown Cooling Heat Exchangers is provided. Verification of Shutdown Cooling Pump operation is available via indicating lights representing the position of the pump breakers. A pump trip is alarmed in the control room.

We also utilize a Shutdown Cooling/Low Pressure Safety Injection Pump low discharge pressure alarm and corresponding discharge pressure indicator. We believe the low discharge pressure alarm to be an excellent means by which the onset of pump performance degradation, resulting from but not limited to air entrainment, can be detected. The alarm setpoint of 150 psig is approximately 80% of normal discharge pressure. We believe this feature and alarm to be equivalent to pump motor amp trending or acoustical monitoring in detecting pump performance problems. Therefore, we do not plan to implement these features.

Low reactor vessel water level is also alarmed in the control room. Based on previous experience, while operating in reduced inventory conditions, the level alarm initiates above the level at which pump vortexing is expected to occur.

Recommended Programmed Enhancement (2): PROCEDURES

Develop and implement procedures that cover reduced inventory operation and that provide an adequate basis for entry into a reduced inventory condition. These include:

(a) procedures that cover normal operation of the NSSS, the containment, and supporting systems under conditions for which cooling would normally be provided by DHR systems.

(b) procedures that cover emergency, abnormal, off-normal, or the equivalent operation of the NSSS, the containment, and supporting systems if an off-normal condition occurs while operating under conditions for which cooling would normally be provided by DHR systems.

(c) administrative controls that support and supplement the procedures in items (a), (b), and all other actions identified in this communication, as appropriate.

Response

Implementation of procedural enhancements are scheduled for applicable system operating procedures, administrative procedures and revised Technical Specifications as detailed elsewhere in this response. In addition to these procedural enhancements, improved procedural guidance which addresses the administrative controls necessary for both entrance into and sustained operation in a reduced inventory condition will be implemented by June 1, 1989.

Our off-normal procedures, which cover loss of shutdown cooling, will be revised to address the status of the Primary Coolant System (PCS) at the time of the loss of cooling capability. The subsequent actions to be taken will also be aligned with the state of the PCS and the cooling system failure mechanism. Supporting information from analyses which we have conducted (on the time available to the initiation of boiling and necessary make-up rate to prevent core uncovery) will also be added. The off-normal procedure revisions will be completed by August 1, 1989.

Recommended Programmed Enhancement (3): EQUIPMENT

(a) Assure that adequate operating, operable, and/or available equipment of high reliability is provided for cooling the RCS and for avoiding a loss of RCS cooling.

(b) Maintain sufficient existing equipment in an operable or available status so as to mitigate loss of DHR or loss of RCS inventory should they occur. This should include at least one high pressure injection pump and one other system. The water addition rate capable of being provided by each equipment item should be at least sufficient to keep the core covered.

(c) Provide adequate equipment for personnel communications that involve activities related to the RCS or systems necessary to maintain the RCS in a stable and controlled condition.

Response

Although equipment operability requirements for Shutdown Cooling System operation are not specified in Palisades Plant Technical Specifications, we have administratively established suitable equipment operability requirements to assure that adequate equipment is available to maintain cooling of the Primary Coolant System and to avoid a loss of the Shutdown Cooling System.

The following equipment operability requirements are in effect:

1) Equipment required to be operable

- 2 Shutdown Cooling Pumps of which at least 1 is a LPSI pump. (A Containment Spray Pump with operable cross tie valves and flow path may serve as the other pump.)
- 1 Component Cooling Water Pump
- 1 Component Cooling Water Heat Exchanger
- 1 Service Water Pump
- 2 Shutdown Cooling Heat Exchangers
- 1 Emergency Diesel Generator (as emergency electric power supply to operable LPSI, CCW, SW pumps and available HPSI pump)
- 1 Safety Injection and Refueling Water (SIRW) Tank Level >50% and boron ≧1720 ppm
- 1 Fuel Handling Area Exhaust Fan and Charcoal Filter
- 2 Core Exit Thermocouple Indications (when reactor vessel head is installed)
- 2 Low Pressure Safety Injection/Shutdown Cooling Flow Indicators
- 1 Primary Coolant System Level Indication
- 1 Boric Acid Flow Path for inventory addition
- 1 Heat Junction Thermocouple Reactor Vessel Level Indication (when reactor vessel head is installed)

2) Equipment required to be available within 30 minutes

   - 1 High Pressure Safety Injection Pump for inventory addition
   - 1 Gravity Feed Flow Path from SIRW tank to the PCS

3) Capability of containment closure being accomplished prior to the PCS attaining 200°F.

The above equipment requirements are currently addressed in a plant operating procedure concerning reduced inventory operation only. Accordingly, we will incorporate these equipment requirements (including personnel communication) into our equipment control administrative procedures, by June 1, 1989.

System operating procedures which govern the specific operation of Shutdown Cooling System equipment and draining of the Primary Coolant System will be enhanced with appropriate information and clarifications to increase the potential for reliable system operation. The enhancements will include information on system flow rates, system flow balancing, heat up rate determination, and monitoring of Primary Coolant System draining. The system operating procedure upgrades will be completed by June 1, 1989.

The Palisades Plant design does not incorporate an autoclosure interlock feature. Consequently, no potential exists for any decrease in Shutdown Cooling System equipment reliability due to such a feature.

Recommended Programmed Enhancement (4): ANALYSES

Conduct analyses to supplement existing information and develop a basis for procedures, instrumentation installation and response, and equipment/NSSS interactions and response. The analyses should encompass thermodynamic and physical (configuration) states to which the hardware can be subjected and should provide sufficient depth that the basis is developed. Emphasis should be placed upon obtaining a complete understanding of NSSS behavior under nonpower operation.

Response

To date, Palisades has actively participated in Combustion Engineering Owners Group (CEOG) analyses sessions which have been organized to address the topics contained in Generic Letter 88-17. We plan to continue with our involvement in future analyses workshops, as we have found the information exchange on specific topics to be beneficial in our ability to properly analyze issues relative to decay heat removal.

As stated in our 60-day response, we have completed analyses regarding the time available prior to the occurrence of Primary Coolant System (PCS) boiling following a loss of shutdown cooling, necessary inventory addition rate to maintain core coverage, and the appropriate vent size for periods when both hot legs are simultaneously blocked.

We will continue to perform analyses as needed to support our forthcoming equipment and procedure upgrades. We will also continue to evaluate generic CEOG analysis results as well as related information from other industry sources as it is made available, implementing information as appropriate.

Recommended Programmed Enhancement (5): TECHNICAL SPECIFICATIONS

Technical Specifications (TSs) that restrict or limit the safety benefit of the actions identified in this letter should be identified and appropriate changes should be submitted.

Response

To date, the Palisades Plant has utilized custom Technical Specifications which have not contained Limiting Conditions for Operation during periods when Shutdown Cooling System equipment is in service for decay heat removal purposes.

We are currently aware of only one conflict between our Technical Specifications and the safety benefit of the recommended actions of Generic Letter 88-17. Our Technical Specifications contain a requirement to render both High Pressure Safety Injection (HPSI) Pumps inoperable whenever the Primary Coolant System temperature is less than 300°F, unless the reactor vessel head is removed. While this requirement ensures that a pressurization event which could exceed 10CFR50, Appendix G limits will not occur, the use of a HPSI Pump for inventory addition following a loss of shutdown cooling capability during a reduced inventory condition is also precluded. To resolve the conflict, future system modifications are planned which will allow operation of a HPSI pump during low temperature/low pressure operation.

To address this situation in the short term, when in a reduced inventory condition we will be requiring a HPSI Pump to be available (although rendered inoperable electrically) for use within 30 minutes for inventory addition. The departure from Technical Specifications resulting from the use of a HPSI Pump in mitigating a loss of decay heat removal event will be allowed if the provisions of 10CFR50.54(x) are determined to apply.

To provide permanent resolution for this recommendation, we will submit a Technical Specification change request which will add appropriate requirements for decay heat removal conditions, and incorporate the applicable elements of a recent Combustion Engineering Owners Group review of Technical Specifications which address Shutdown Cooling System operation when in a reduced inventory condition. The Technical Specification Change Request will be submitted by April 1, 1989.

Recommended Programmed Enhancement (6): PCS PERTURBATIONS

Item (5) of the expeditious actions should be reexamined and operations refined as necessary to reasonably minimize the likelihood of loss of DHR.

Response

As detailed in our 60-day response regarding the issue of system perturbations, we believe the Operations Scheduling Group which we had previously established, provides an excellent means to preclude activities that could potentially result in adverse consequences on the Primary Coolant System, or our ability to maintain stable Shutdown Cooling System operation.

While our 60-day response was tailored to reduced level operation, the applicability of the response is also generic to other decay heat removal situations. Accordingly, we will incorporate expanded guidance regarding the authorization of activities which have potential to cause system perturbations during Shutdown Cooling System operation into our equipment control administrative procedures, by June 1, 1989.