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

January 27, 1981

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Docket Nos.: 50-266
and 50-301

60 day reply reqd
Copies to:

Mr. Sol Burstein
Executive Vice President
Wisconsin Electric Power Co.
231 W. Michigan Street
Milwaukee, Wisconsin 53201

- C. S. McNeer
- R. H. Gorske/A. W. Finke
- C. W. Fay
- D. K. Porter
- G. A. Reed ✓
- Gerald Charnoff

ATL

Dear Mr. Burstein:

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ca 5.5.1 12.5.4
SB 79-06A
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Our letter of September 21, 1979 forwarded our requirements regarding the auxiliary feedwater system at Point Beach Nuclear Plant, Units 1 and 2. You provided responses to these requirements in letters dated October 29, 1979, December 17, 1979, February 4, 1980 and July 8, 1980.

Our evaluation of your responses is contained in the enclosed Safety Evaluation Report (SER).

The SER contains seven items for which our review is not complete:

1. Short Term Recommendation GS-1 - The licensee has not met our recommendation for revision to the Point Beach Technical Specifications for plant operation with inoperable AFW pumps in accordance with current Standard Technical Specifications.
2. Additional Short Term Recommendation 1 - The licensee has not provided sufficient information to assure that no inadvertent means exists for defeating the redundancy in the condensate storage tank level indication system or that adequate protection against such occurrences is provided.
3. Additional Short Term Recommendation 3 - The safety grade design (long term requirement) for auxiliary feedwater flow indication is under review. The evaluation will be contained in a supplement to this SER.
4. Long Term Recommendation GL-3 - The licensee has not met our long term recommendation for assuring AFW system flow independent of any AC power sources for two hours.
5. Long Term Recommendation GL-4 - The licensee has not met our long term recommendation for providing AFW pump protection for plants with unprotected normal AFW system water supplies.

FOR INFORMATION ONLY

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NES will probably solicit
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POINT BEACH

Mr. Sol Burstein

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6. Long Term Recommendation GL-5 - The safety grade² design for auxiliary feedwater automatic initiation signals and circuits is under review. The evaluation will be contained in a supplement to this SER.

! No response

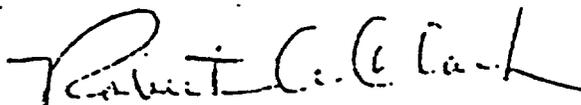
7. Recommendation (Enclosure 2) - The licensee has not provided a response to Enclosure 2 of our September 21, 1979 letter concerning a request for information on AFW system flow requirements.

You are requested to respond to the unresolved items within 60 days of your receipt of this letter.

Note for planning purposes that recommendations GS-1, GL-5 and additional short term recommendations 1 and 3 have a 7/1/81 implementation date and recommendations GL-3 and GL-4 have a 1/1/82 implementation date (i.e., NUREG-0737 II.E.1.1 and II.E.1.2).

Please contact us if you have any questions.

Sincerely,



Robert A. Clark, Chief
Operating Reactors Branch #3
Division of Licensing

Enclosure: SER

cc: w/enclosure
See next page

SAFETY EVALUATION REPORT
POINT BEACH NUCLEAR PLANT, UNITS 1 & 2
IMPLEMENTATIONS OF RECOMMENDATIONS FOR
AUXILIARY FEEDWATER SYSTEMS

I. - Introduction and Background

The Three Mile Island Unit 2 (TMI-2) accident and subsequent investigations and studies highlighted the importance of the Auxiliary Feedwater System (AFWS) in the mitigation of transients and accidents. As part of our assessment of the TMI-2 accident and related implications for operating plants, we evaluated the AFW systems for all operating plants having nuclear steam supply systems (NSSS) designed by Westinghouse (NUREG-0611) or Combustion Engineering (NUREG-0635). Our evaluations of these system designs are contained in the NUREGs along with our recommendations for each plant and the concerns which led to each recommendation. The objectives of the evaluation were to: (1) identify necessary changes in AFW system design or related procedures at the operating facilities in order to assure the continued safe operation of these plants, and (2) to identify other system characteristics of the AFW systems which, on a long term basis, may require system modifications. To accomplish these objectives, we:

- (1) Reviewed plant specific AFW system designs in light of current regulatory requirements (SRP) and,
- (2) Assessed the relative reliability of the various AFW systems under various loss of feedwater transients (one of which was the initiating event of TMI-2) and other postulated failure conditions by determining the potential for AFW system failure due to common causes, single point vulnerabilities, and human error.

We concluded that the implementation of the recommendations identified during this review will considerably improve the reliability of the AFW systems for each operating plant.

The following generic recommendations did not apply to this plant: GS-3, GS-8, GL-1, and GL-2. The basis for these recommendations can be found in Appendix III of NUREG-0611, and the system description which determined the specific reason for not applying these recommendations to this plant can be found in Appendix X of NUREG-0611.

II. Implementation of Our Recommendations

A. Short-Term Recommendations

1. Recommendation GS-1 - The licensee should propose modifications to the Technical Specifications to limit the time that one AFW system pump and its associated flow train and essential instrumentation can be inoperable. The outage time limit and subsequent action time should be as required in current Standard Technical Specifications; i.e., 72 hours and 12 hours, respectively.

For Point Beach Units 1 and 2 there are four AFW pumps; two pumps are motor-driven and two pumps are turbine-driven. The two turbine-driven pumps are dedicated to their respective reactor facility. The two motor-driven pumps can be aligned to either reactor unit.

In response to Recommendation GS-1, the licensee proposed revised Technical Specifications in a letter dated July 8, 1980, which specifies the following: (1) All four AFW pumps shall be operable

prior to taking the reactor critical for two unit operation and three of the four AFW pumps (including both motor-driven pumps and the reactor's dedicated turbine-driven pump) shall be operable for single unit operation. The above meets the requirements of our position letter dated May 16, 1980, and is, therefore, acceptable; (2) For one or two unit operation, with a turbine-driven AFW pump inoperable for more than 72 hours, the associated reactor will be shut down. We find this Technical Specification acceptable; (3) With two units operating and one motor-driven AFW pump becomes inoperable for more than 72 hours, only one reactor need be shutdown. We find this Tech-

we tried

nical Specification unacceptable. We recommend that both units be shutdown when a motor-driven pump is inoperable beyond 72 hours; (4) For single unit operation, either one of the two motor-driven auxiliary feedwater pumps may be out of service for an indefinite period of time. This proposed Technical Specification change is not in compliance with our recommendations and is, therefore, unacceptable. We recommend that the licensee revise the proposed Point Beach Technical Specifications to state that for one unit operation with one motor-driven AFW pump inoperable, plant operation is limited to 72 hours with a subsequent action time of 12 hours. Resolution of this recommendation will be contained in a supplement to this SER.

2. Recommendation GS-2 - The licensee should lock open single valves or multiple valves in series in the AFW system pump suction piping and lock open other single valves or multiple valves in series that could interrupt all AFW flow. Monthly inspections should be performed to verify that these valves are locked and in the open position.

Satisfied

These inspections should be proposed for incorporation into the surveillance requirements of the plant Technical Specifications. See Recommendation GL-2 for the longer-term resolution of this concern.

In response, the licensee indicated in a letter dated October 29, 1979, that all manual valves in the AFW system that could interrupt all AFW flow are presently locked open. Point Beach Nuclear Plant administrative controls include monthly valve lineup checks to verify that these valves remain locked open. These monthly valve lineup checks are required by Technical Specification. Therefore, we conclude that the incorporation of the monthly valve position verification inspection of the auxiliary feedwater system suction piping into the plant's Technical Specifications is not necessary, and that the licensee is in compliance with this recommendation.

4. Recommendation GS-4 - Emergency procedures for transferring to alternate sources of AFW supply should be available to the plant operators. These procedures should include criteria to inform the operator when, and in what order, the transfer to alternate water sources should take place. The following cases should be covered by the procedures:

Satisfies

- The case in which the primary water supply is not initially available. The procedures for this case should include any operator actions required to protect the AFW system pumps against self-damage before water flow is initiated; and,
- The case in which the primary water supply is being depleted. The procedure for this case should provide for transfer to the alternate water sources prior to draining of the primary water supply.

In response to the first part of this recommendation, the licensee, in a letter dated February 4, 1980, responded that the Point Beach Technical Specifications require that the normal source of water to the AFW pumps be available at all times, thus discounting the need to proceduralize for a lack of primary water supply. In response to the second part of this recommendation, the licensee stated that the depletion of the primary water source has been added to the emergency procedures per the requirements of both Bulletin 79-06C and NUREG-0578.

We requested the Office of Inspection and Enforcement to verify that this revised procedure would cover both parts of this recommendation. We received a positive response from the I&E Resident Inspector that the procedure was satisfactory to assure transfer of the AFW suction supply to an alternate source for both the case where the primary source was suddenly lost and the case where it was being gradually depleted. Therefore, we find the licensee's response acceptable, and conclude that the licensee is in compliance with this recommendation.

5. Recommendation GS-5 - The as-built plant should be capable of providing the required AFW flow for at least two hours from one AFW pump train independent of any alternating current power source. If manual AFW system initiation or flow control is required following a complete loss of alternating current power, emergency procedures should be established for manually initiating and controlling the system under these conditions. Since the water for cooling of the lube oil for the turbine-driven pump bearings may be dependent on alternating current power, design or procedural changes shall be made to eliminate this dependency as soon as practicable. Until this is done, the

emergency procedures should provide for an individual to be stationed at the turbine-driven pump in the event of the loss of all alternating current power to monitor pump bearing and/or lube oil temperatures. If necessary, this operator would operate the turbine-driven pump in an on-off mode until alternating current power is restored. Adequate lighting powered by direct current power sources and communications at local stations should also be provided if manual initiation and control of the AFW system is needed. (See Recommendation GL-3 for the longer-term resolution of this concern.)

In response to this recommendation, the licensee indicated in a letter dated July 8, 1980, that emergency operating procedures will be changed to include a Special Order requiring the turbine-driven AFW pump to be continuously manned and manually operated in the event of a total loss of AC power until long term design changes are made. The operator manning these pumps will be provided with both portable battery-powered radio communication facilities and emergency battery-powered lanterns. We conclude that recommendation GS-5 is adequately met, and therefore, acceptable pending verification that the emergency operating procedures are in place by the Office of Inspection and Enforcement. (See Recommendation GL-3 for long term.)

TJK

6. Recommendation GS-6 - The licensee should confirm flow path availability of an AFW system flow train that has been out of service to perform periodic testing or maintenance as follows:

Satisfied

- Procedures should be implemented to require an operator to determine that the AFW system valves are properly aligned and a second operator to independently verify that the valves are properly aligned.

- The licensee should propose Technical Specifications to assure that prior to plant startup following an extended cold shutdown, a flow test would be performed to verify the normal flow path from the primary AFW system water source to the steam generators. The flow test should be conducted with AFW system valves in their normal alignment.

In response to this recommendation, the licensee in a letter dated July 8, 1980, indicated that plant administrative controls have been modified such that a second independent operator verification is required for all critical valves [those in the major flow paths and the isolation valves for the motor-driven auxiliary feedwater pump pressure transmitter (see Additional Short Term Item 5 for details on the pressure transmitter isolation)]. These valve lineup checklists are performed following major maintenance and periodic testing. We conclude that this response is acceptable pending verification of the revised administrative controls by the Office of Inspection and Enforcement. TJK

In a letter dated February 4, 1980, the licensee stated that "the addition of a new Technical Specification to verify the normal flow path of the auxiliary feedwater system after each extended cold shutdown does not appear to be necessary since the operability of the AFW pumps must be demonstrated by present Technical Specifications prior to criticality." In addition, the auxiliary feedwater system is always used during plant startup and shutdown. Based on the licensee's agreement to test the operability of the pumps after each extended cold shutdown and on the fact that the auxiliary feedwater system is always used during plant startup, we agree that no Technical Specification

9 FEB 19 : Note: TMI Tech Specs will require check of Aux Feed flow indicators

changes are necessary and we conclude that the response is acceptable. Therefore, the licensee is in compliance with this recommendation.

7. Recommendation GS-7 - The licensee should verify that the automatic start AFW system signals and associated circuitry are safety-grade. *satisfactory*
- If this cannot be verified, the AFW system automatic initiation system should be modified in the short-term to meet the functional requirements listed below. For the longer term, the automatic initiation signals and circuits should be upgraded to meet safety-grade requirements as indicated in Recommendation GL-5.

- (1) The design should provide for the automatic initiation of the auxiliary feedwater system flow. ✓
- (2) The automatic initiation signals and circuits should be designed so that a single failure will not result in the loss of auxiliary feedwater system function. ✓ 2/3 L. C.
- (3) Testability of the initiation signals and circuits shall be a feature of the design.
- (4) The initiation signals and circuits should be powered from the emergency buses.
- (5) Manual capability to initiate the auxiliary feedwater system from the control room should be retained and should be implemented so that a single failure in the manual circuits will not result in the loss of system function.

- (6) The alternating current motor-driven pumps and valves in the auxiliary feedwater system should be included in the automatic actuation (simultaneous and/or sequential) of the loads to the emergency buses.
- (7) The automatic initiation signals and circuits shall be designed so that their failure will not result in the loss of manual capability to initiate the AFW system from the control room.

In response, the licensee provided sufficient information on the Point Beach AFW in a letter dated December 17, 1979, to satisfy control grade requirements.

For the short term, the licensee's response to this recommendation adequately satisfies the "control grade" requirements of this recommendation and is, therefore, acceptable. Refer to GL-5 for long term "safety grade" implementation of this item.

B. Additional Short Term Recommendations

1. Recommendation - The licensee should provide redundant level indications and low level alarms in the control room for the AFW system primary water supply to allow the operator to anticipate the need to make up water or transfer to an alternate water supply and prevent a low pump suction pressure condition from occurring. The low level alarm setpoint should allow at least 20 minutes for operator actions, assuming that the largest capacity AFW pump is operating.

In response to this recommendation, the licensee stated in a letter dated October 29, 1979, that each of the two condensate storage tanks is equipped with an independent level indicating system providing indication both locally and in the control room. Each level indication system is powered from a separate battery backed bus.

High and low level alarms for each tank are annunciated in the control room with the low level alarm allowing over 25 minutes for operator actions.

*Need
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alarm
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7:3*

Because the two condensate storage tanks are normally operated cross connected with split operation only occurring approximately two weeks in a year (under off normal operating conditions), the licensee concluded that the installation of additional redundant instrumentation on each tank would be unnecessary.

We understand the licensee's response to state that the condensate storage tank level indicators/alarms are completely redundant and separate all the way from the detectors at the tanks to the read outs in the control room, are powered from separate battery backed supplies and that indication and alarm is available to the control room operators of both units. However, in order to completely satisfy our concern in this area, we request that the licensee perform an analysis to verify that no inadvertent means exists for defeating the redundancy in the condensate storage tank level instrumentation other than a single failure within the indication system itself. If this redundancy can be defeated, discuss the measures taken to protect against such an occurrence. We conclude the licensee's response is not complete, and we will report resolution of this concern in a supplement.

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2. Recommendation (This recommendation has been revised from the original recommendation in NUREG-0611) - "The licensee should perform a 48-hour endurance test on all AFW system pumps, if such a test or continuous period of operation has not been accomplished to date. Following the 48-hour pump run, the pumps should be shut down and cooled down and then restarted and run for one hour. Test acceptance criteria should include demonstrating that the pumps remain within design limits with respect to bearing/bearing oil temperatures and vibration and that pump room ambient conditions (temperature, humidity) do not exceed environmental qualification limits for safety-related equipment in the room.

Satisfactory

In response to this recommendation, the licensee indicated in a letter dated February 4, 1980, that 72 hour endurance tests were completed on all AFW pumps by December 30, 1979. In our position letter of May 16, 1980, we stated that in order for us to review the test results, a copy of the test procedure and resulting test data was needed. We require that the information provided be in accordance with the NRC memorandum dated December 3, 1979, which reduced the tests from 72 to 48 hours. In a letter dated July 8, 1980, the licensee enclosed copies of their 72-hour endurance test results. The information provided indicated that bearing/bearing oil temperatures were monitored on all pumps over the duration of the test and design temperature limits were not exceeded. Pump room ambient conditions were within acceptable bounds for environmental qualification of safety related equipment in the room during the test. Pump vibration was monitored and did not exceed acceptable limits.

We conclude that the licensee's response to this recommendation is acceptable and, therefore, the licensee is in compliance with our requirements.

- 3. Recommendation - The licensee should implement the following requirements as specified by Item 2.1.7.b on page A-32 of NUREG-0578:

"Safety-grade indication of auxiliary feedwater flow to each steam generator shall be provided in the control room. The auxiliary feedwater flow instrument channels shall be powered from the emergency buses consistent with satisfying the emergency power diversity requirements for the auxiliary feedwater system set forth in Auxiliary Systems Branch Technical Position 10-1 of the Standard Review Plan, Section 10.4.9."

*Awaiting
NRC
action*

In response, the licensee stated in a letter dated December 17, 1979, that:

"Indication of AFW flow to the steam generators at Point Beach currently consists of locally mounted flow meters on the discharge of each pump. This is backed up by the steam generator level indication in the control room. A modification to the flow instrumentation is in progress which will provide AFW pump flow indication in the control room, powered by vital instrument buses. This modification was completed on January 1, 1980. Further modification, consisting of direct flow indication for each steam generator, will be completed by January 1, 1981."

*NES should inform
NRC that this date
was changed in another
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*Changed in submitted
for NUREG-0737
7-3*

From this response we conclude that the "control grade" requirements of this recommendation have been met and it is, therefore, acceptable. "Safety-grade" requirements for this recommendation are under review and a safety evaluation will be provided at a later date.

4. Recommendation - Licensees with plants which require local manual *Subsection* realignment of valves to conduct periodic tests on one AFW system train and there is only one remaining AFW train available for operation, should propose Technical Specifications to provide that a dedicated individual who is in communication with the control room be stationed at the manual valves. Upon instruction from the control room, this operator would re-align the valves in the AFW system train from the test mode to its operational alignment.

In a letter of February 4, 1980, the licensee responded to this recommendation by stating that only one pump train will be removed from service for testing at a time and the design of Point Beach has additional AFW pumps available during normal testing of an AFW pump (the two motor-driven auxiliary feedwater pumps shared between the two units and one steam-driven pump per unit), there is no reason to propose a Technical Specification change for Point Beach. In addition, the operator performing the pump test is in continuous communication with the control room by two-way radio and would realign the valves upon instructions to do so. This response is acceptable and, therefore, the licensee is in compliance with our recommendation.

5. Licensee Event Report No. 80-001/01T-0

We have the following additional concern based on Licensee Event Report No. 80-001/01T-0 dated February 15, 1980. The report describes an incident where the pressure transmitters on the discharge of the two motor driven AFW pumps were valved out. The transmitters sense pump pressure and open the motor driven pump discharge valves. Isolation of these transmitters and the associated pump discharge valves results in failure of the motor-driven pumps to deliver auxiliary feedwater to the steam generators. Describe the measures taken such as independent operator verification or other procedural changes to prevent occurrence of similar errors in the future.

Safety function

In response to this additional recommendation presented in our positions of May 16, 1980, the licensee indicated in a letter dated July 8, 1980, that to prevent future occurrences of this event, the isolation valves for the motor-driven auxiliary feedwater pump pressure transmitter have been locked open and are included in the valve check procedure which requires a second independent operator verification. These measures are acceptable, and, therefore, the licensee is in compliance with this additional recommendation pending verification of the procedure by the Office of Inspection and Enforcement.

C. Long Term Recommendations

1. Recommendation GL-3 - At least one AFW system pump and its associated flow path and essential instrumentation should automatically initiate AFW system flow and be capable of being operated independently of any alternating current power source for at least two hours. Conversion of direct current power to alternating current is acceptable.

The licensee, in response to this recommendation in a letter dated July 8, 1980, proposed to supply the turbine-driven auxiliary feed-water pump bearing coolers with service water during normal conditions and with fire protection water supplied by the diesel-driven fire water pump during loss of all AC power. This will be accomplished through the use of a passive design concept in which the bearing cooler will be automatically supplied by the fire water header through a system pressure-controlled regulator valve as service water pressure decays from loss of all AC power. The diesel-driven fire water pump will in turn automatically start as a result of the subsequent pressure decrease in the fire water header due to demand by the turbine driven pump bearing cooler. No operator action will be required to accomplish the above. We have reviewed the licensee's response and conclude that it is unacceptable. It is our position that the licensee has not provided sufficient information to demonstrate why bearing lube oil cooling for the turbine driven AFW pump cannot be provided by a design involving no other external plant systems to the AFW system in the event of a total loss of AC power for a two hour period. We will report resolution of this item in a supplement to this report.

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2. Recommendation GL-4 - Licensees having plants with unprotected normal AFW system water supplies should evaluate the design of their AFW systems to determine if automatic protection of the pumps is necessary following a seismic event or a tornado. The time available before pump damage, the alarms and indications available to the control room operator, and the time necessary for assessing the problem and taking action should be considered in determining whether operator action can be relied on to prevent pump damage. Consideration should be

given to providing pump protection by means such as automatic switchover of the pump suction to the alternate safety-grade source of water, automatic pump trips on low suction pressure or upgrading the normal source of water to meet seismic Category I and tornado protection requirements.

In response to this recommendation, the licensee indicated in a letter dated February 4, 1980, that neither automatic switchover of the AFW system pumps to the alternate source (service water) nor the addition of automatic pump trips on low suction pressure is a viable alternative for automatic AFW pump protection. In a July 8, 1980 response, the licensee stated that the design of the condensate storage tanks for a ground acceleration of 0.06g in any horizontal direction and 0.04g vertically occurring simultaneously and in conjunction with other loads without exceeding code allowable stresses qualified it, in part, as a Class I seismic water source. The licensee's proposed resolution to the recommendation is unacceptable. We require that the licensee commit to and propose modifications necessary to meet our initial recommendations as reflected in our letter of May 16, 1980: that the licensee (1) provide automatic switchover to the service water system on low suction pressure to the AFW pumps, or (2) provide automatic pump trips on low suction pressure, or (3) upgrade the primary water supply to meet both seismic Category I and tornado missile protection requirements. We will report resolution of this item in a supplement to this report.

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5. Recommendation GL-5 - The licensee should upgrade the AFW system automatic initiation signals and circuits to meet safety-grade requirements.

*NRC
action*

In response to this recommendation, the licensee described his AFW system automatic initiation design in a letter dated December 17, 1979, (refer to Recommendation GS-7). The licensee's "safety-grade design is under review and an evaluation will be provided in a supplement to this SER.

D. Basis for Auxiliary Feedwater System Flow Requirement

In a letter dated February 4, 1980, the licensee indicated that he feels a response to Enclosure 2 of our September 21, 1979 letter concerning a request for information on AFW system flow requirements is unnecessary in view of the already performed AFW system review. The licensee's response dated July 8, 1980, referred to both the FFDSAR and a recently submitted steam line break analysis for the necessary information. These proposed alternatives are not acceptable. We request that the licensee formally address this requirement by responding to Enclosure 2 of our September 21, 1979 letter as expeditiously as possible. Resolution of this issue will be contained in a supplement to this SER.