8/23/82

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	Docket No. 50-155-OLA
CONSUMERS POWER COMPANY	)	(Spent Fuel Pool
	)	Modification)
(Big Rock Point Nuclear Power Plant)	)	

CONSUMERS POWER COMPANY'S PROPOSED PARTIAL INITIAL DECISION ON CERTAIN ADMITTED ISSUES WITH RESPECT TO CHRISTA-MARIA CONTENTION 8 AND O'NEILL CONTENTION III E-2 (THE "TMI-2 CONTENTION")

I. BACKGROUND

Evidentiary hearings were held on June 7 through June 12, 1982 in Boyne Falls, Michigan on the Application of Consumers Power Company ("Licensee") for a license amendment which would increase the storage limit of spent fuel assemblies in the spent fuel pool at Licensee's Big Rock Point Plant. The hearings are presently recessed. However, several issues were concluded and the Atomic Safety and Licensing Board ("Licensing Board") is prepared to issue, from time to time, partial initial decisions on these matters. This partial initial decision is the third such decision and is limited to certain admitted genuine issues of fact with respect to Christa-Maria Contention 8 and O'Neill Contention III E-2. Licensee's Proposed Findings of Fact and Conclusions of Law on these issues submitted simultaneously with this

Proposed Partial Initial Decision are incorporated by reference herein.

Christa-Maria Contention 8 and O'Neill Contention III E-2 were consolidated and rewritten by the Licensing Board in its Order Following Special Prehearing Conference dated January 17, 1980. As such, the consolidated contention states:

> The occurrence of an accident similar to TMI-2 which would prevent ingress to the containment building for an extended period of time would render it impossible to maintain the expanded spent fuel pool in a safe condition and would result in a significantly greater risk to the public health and safety than would be the case if the increased storage were not allowed.

In its Memorandum and Order Concerning Motions for Summary Disposition dated February 19, 1982, the Licensing Board considered several specific factual allegations asserted by Intervenors with respect to the Consolidated Contention. Several of the allegations were dismissed for failure to create a genuine issue of fact. Five allegations were considered by the Licensing Board to pass muster, and five specific issues for evidentiary hearing were admitted. Presentation of evidence on three of the admitted specific issues was concluded at the June, 1982 hearings. Those three admitted issues are the subject of this Partial Initial Decision, namely:

(1) How reliable is the remotely activated makeup water system which will be added to the spent fuel pool. How reliable does it need to be? How many gallons per minute will it be able to makeup?

(2) How reliable are the spent fuel pool water level monitors which applicant is planning to install? Is applicant required to install and maintain these monitors?

(3) Are motor operated valves MO-7064 and 7068 necessary to control containment pressurization? Are they qualified for high temperature and high humidity?

II. ISSUE (1) CAPABILITY AND RELIABILITY OF THE SPENT FUEL POOL MAKEUP WATER SYSTEM

The Big Rock Point Plant spent fuel pool is located inside the containment building which also houses the reactor. In the event of a loss-of-coolant-accident ("LOCA") such as occurred at TMI-2, it is assumed that dangerous conditions in the containment building would prevent access to spent fuel pool. Intervenors contend that the inability to maintain pool cooling during a LOCA would aggravate an already dangerous condition. The added danger lies in the possibility of evaporative loss of water in the fuel pool through boiling. The spent fuel assemblies could eventually become uncovered which in turn could lead to heating of the fuel rods followed by cladding failure and release of additional fission products into the containment atmosphere.

In its motion for summary disposition of the

Consolidated Contention, Licensee described its proposal to install a remotely operated water makeup line to the fuel pool which could be activated from outside the containment building.[1/] The remotely operated makeup water system is intended to compensate for the failure of the spent fuel pool cooling system[2/] and the subsequent loss of water in the pool due to boiling.[3/]

Appendix A to 10 C.F.R. Part 50 sets forth general design criteria as well as a reliability standard for nuclear power plants. Although it was promulgated after the Big Rock Point Plant was constructed and licensed, Appendix A provides a useful guide against which the engineered safety systems of the Big Rock Point Plant may be compared.

A guiding precept of Appendix A is the so-called "single failure criterion." This guideline states:

1/ "Testimony of David P. Blanchard concerning Christa-Maria Contention 8 and O'Neill Contention III E-2," and accompanying "Affidavit of David P. Blanchard" submitted with Licensee's motion for summary disposition, October 5, 1981.

2/ The components of the fuel pool cooling system have not been qualified for conditions of a LOCA environment. Id., pp. 5-6. Hence, failure of the cool pooling system was assumed for purposes of conservative analysis. "Further Testimony of David P. Blanchard on Christa-Maria Contention 8 and O'Neill Contention III E-2" following Tr. 2024 (hereinafter "Blanchard Testimony"), p. 4.

3/ Pool boiling would result from the heat generated by spent fuel in the now stagnant water. It is assumed that the only loss of water would be due to boiling. The ability of the pool itself is to withstand the effects of boiling and maintain integrity is the subject of another admitted issue to be considered when hearings resume.

> A single failure criterion means an occurrence which results in the loss capability of a component to perform its intended safety functions. Multiple failures resulting from a single occurrence are considered to be a single failure. Fluid and electric systems are considered to be designed against an assumed single failure if neither (1) a single failure of any active component (assuming passive components function properly) nor (2) a single failure of a passive component (assuming active components function properly), results in a loss of the capability of the system to perform its safety functions.[4/]

Under this Contention, the failure of passive components of fluid systems are not considered. As indicated in Appendix A., the consideration of this matter is "under development."

David P. Blanchard, a Technical Engineer at the Big Rock Point Plant, detailed the operation and reliability of the remotely activated spent fuel pool makeup water system (hereafter sometimes referred to as the "makeup line").[5/] Mr. Blanchard also analyzed the makeup line against the Appendix A single failure criterion.

The remotely activated fuel pool makeup line is supplied by the core spray recirculation system and is thus dependent on that system. The only two active components in the portion of the recirculation system leading to the fuel makeup line are the core spray pumps. Each pump alone

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4/ See the "Definitions and Explanations" section of Appendix A.

5/ Blanchard Testimony, pp. 1-20.

has the capability of providing sufficient flow to the core spray system and the fuel pool makeup line. (Finding No. 7 Blanchard Testimony, pp. 5, 13). Thus, the pumps are redundant to each other and a single failure of one will not preclude performance of the safety function of the recirculation system and the remotely activated makeup line.

Since the pumps are located outside the containment, they would not be subject to the accident environment in the containment during a LOCA. (Finding No. 8; Blanchard Testimony, p. 5.) The power for each pump is supplied from a separate AC bus. In the event that the off-site power source is lost, either AC bus can be transferred to an emergency bus which is powered by either of two redundant diesel generators. (Finding No. 9; Blanchard Testimony pp. 5-6.) This redundancy of generators for the core spray pumps insures the availability of power for the pumps.

Although the conditions under which a single failure of a passive component in a fluid system should be considered in designing the system against a single failure are under development by the Commission (supra, p. 5), Mr. Blanchard nevertheless detailed the reliability of the passive components for the makeup line. The passive components do not have to operate to place the system in service but merely provide a path for the core spray pumps to draw water

from the containment and route it to the pool and core spray systems. The passive components include the suction and discharge of the pumps, the core spray heat exchanger, and the makeup line or piping and valve to the fuel pool. (Finding No. 10, Blanchard Testimony, p. 6.)

The majority of the passive components in the spent fuel pool makeup water system are located outside the containment and thus would not be subject to pipe whip or steam impingement from high energy reactor coolant lines or to hostile environmental conditions inside the containment during a LOCA. (Finding No. 11; Blanchard Testimony p. 6). Inside the containment, the makeup line is routed such that it is not located near the reactor primary coolant line and thus both could not be damaged by the drop of a heavy object such as a cask. This routing also makes it unlikely that a failure of the primary coolant system leading to a LOCA could simultaneously cause a failure of the pool makeup system. (Findings No. 12, 13; Blanchard Testimony, pp. 6-7).

One surveillance test is performed while the plant is at power which temporarily removes the core spray heat exchanger from service. During the period of time the heat exchanger is isolated for this test, the pumps of the core spray recirculation system will be unable to pump water throughout the heat exchanger. Upon completion of the test, the heat

exchanger is returned to service in accordance with extensive step-by-step procedures like those described for surveillance tests performed during refueling shutdowns. The heat exchanger surveillance test occurs monthly and isolates the heat exchanger for no more than four hours and thus is extremely unlikely to coincide with a LOCA. In any event, the valve which isolates the heat exchanger is located outside containment and thus entry into containment is not required to return the heat exchanger to service. The operator is instructed to return the heat exchanger to service any time a reactor trip occurs regardless of the cause of the reactor trip. (Finding Nos. 15, 16; Blanchard Testimony, pp. 9-10).

Administrative controls insure that the pertinent hand operated valves routinely remain in the position necessary for the fuel pool makeup system to function. These valves are positioned otherwise only for testing and maintenance during reactor shutdowns at which time no LOCA could occur. Before the plant resumes operation the valves are returned to their correct positions in accordance with extensive surveillance procedures. The valves are locked into position after at least two individuals have verified that the valve is positioned correctly. Another check then assures that the valves have been locked in the correct position. (Finding No. 14; Blanchard Testimony p. 7-8).

Despite the redundancy built into the core spray pumps and their power supplies and despite the elaborate measures for assuring proper positioning of valves and the return to service of the core spray heat exchanger, Licensee has taken additional steps to assure reliability of the fuel pool makeup line. Specifically, water can be routed to the makeup line through the fire protection system. The operator may accomplish this activity by opening motor-operated valve MO-7072, which is a DC powered valve independent of off-site or on-site AC power sources. The valve may be manually operated from outside the containment or remotely activated by a switch in the control room. This source of water for the fuel pool makeup line can also be used in a situation other than a loss-of-coolant-accident since it does not rely on recirculation of water in the containment. (Finding No. 18; Blanchard Testimony pp. 11-12. Tr. 2161-63).

The redundancy built into the core spray pumps and the additional diversity provided by the fire protection system through motor-operated valve MO-7072 are more than adequate to assure that a single failure of an active component of the remotely operated fuel pool makeup line will not result in a loss of the system to perform its intended safety function.

Measured against the single failure criterion of Appendix A to 10 C.F.R. Part 50 and the other actions taken by Licensee to assure reliability of the makeup line, the

Licensing Board concludes that the remotely operated spent fuel pool makeup water system is reliable and will be able to perform its intended safety function when and if needed.

The remaining question is whether the pool makeup line provides sufficient flow to compensate for the loss of pool water due to boiling. Working on the assumption that the spent fuel pool is filled to capacity with spent fuel bundles, including a one month old refueling discharge from the reactor,[5/] it is conservatively calculated that the decay heat from the fuel would cause the pool to begin boiling 144 hours after the loss of the normal fuel pool cooling system at a rate of one gallon per minute.[6/] At that rate, the spent fuel would not be uncovered for 1400

5/ In his testimony on motions for summary disposition, (supra, p. 4; fn. 1), Mr. Blanchard indicated that one month is the shortest period of time in which refuelings can take place at the Big Rock Point Plant. A LOCA could occur during that month since the plant would not be in operation.

6/ Boiling may in fact never occur. Mr. Blanchard's calculations apply the conservative assumptions that no heat is dissipated through the concrete walls of the pool and that no water is added to the pool through containment sprays. These factors alone or in combination could possibly prevent fuel boiling. Further the normal cool pooling system could possibly survive a LOCA. (Blanchard Testimony pp. 4-5.)

Under conditions of a two day old full core reactor discharge in the pool, Licensee's analysis showed that the boil-off rate would be just under 8 gallons per minute. Staff's independent analysis indicated a maximum boil-off rate of 9 gpm under such conditions. However, a LOCA cannot occur while the reactor is shutdown and the core is in the pool. Thus, the minimum makeup flow required would be one gallon per minute. (Finding 4; Blanchard Testimony pp. 15-16).

hours, almost two months. The hydraulic analyses presented Mr. Blanchard showed that the fuel pool makeup line will provide a minimum of 13 gallons per minute to the pool even assuming the worst single failure in the core spray system, from which the makeup water originates. (Finding No. 6; Blanchard Testimony, p. 16-20). This makeup capability is more than adequate to assure that the remotely activated makeup line will be capable of compensating for any loss of water due to boiling.

A collateral but important concern about the fuel pool makeup line is the fact that it will draw water away from the emergency core cooling system and thus potentially reduce the effectiveness of that vital system. Mr. Blanchard testified that Licensee was very sensitive to that problem and designed the fuel pool makeup system such that it will not jeopardize the necessary core spray flow even assuming the worst single active component failure that could occur to the core spray system. This capability fulfills the design requirements for emergency core coolant systems as established by 10 CFR Part 50, Appendix K. (Finding No. 19; Blanchard Testimony, pp. 17-20; Tr. 2163).

III. ISSUE (2) - RELIABILITY OF SPENT FUEL POOL WATER LEVEL MONITOR

Prior to designing the remotely operated fuel pool makeup line, Licensee committed itself to the installation of a pool level monitor that is qualified for a LOCA environment and with readout in the control room. Intervenors questioned the reliability of this monitor.

With the installation of the fuel pool makeup line, it has become apparent that the fuel pool monitor has only limited usefulness. The fuel pool makeup line will activate automatically upon the initiation of core spray recirculation and Licensee has demonstrated its reliability and capability to overcome the loss of water due to pool boiling. Nonetheless, the pool monitor does provide direct information to the control room operator of the status of fuel pool and Licensee has undertaken to install the pool level monitor and demonstrate its reliability.

The standard by which instruments are qualified for LOCA conditions are found in IEEE-323-1971. The monitor meets that standard. The monitor is also qualified to withstand the radiation dose rates for a 100 percent core damage situation in accordance with NUREG-0737 and Regulatory Guide 1.3. The monitor is qualified as seismic Class I equipment in accordance with IEEE-344-1975. In the event the off-site power source is lost, power for the monitor is

automatically supplied from a diesel generator. (Finding No. 21; Blanchard Testimony, p. 23).

The installation of a reliable and capable fuel pool makeup system has reduced the safety concern associated with monitoring the water level in the spent fuel pool. In any event, the Licensing Board concludes that Licensee is installing a water level monitor which is sufficiently reliable to perform its intended function.

IV. ISSUE (3) - RELIABILITY OF THE MOTOR OPERATED VALVES

Containment spray serves the functions of reducing containment temperature and washing down iodine that may be present in containment atmosphere during a loss of coolant accident. Intervenors questioned the ability of Motor operated MO-7064 and 7068 which are associated with the containment spray systems to withstand a LOCA environment. Further, the Licensing Board noted that the NRC Staff, in their motion for summary disposition, relied on the containment spray system to control containment overpressurization. Thus, we admitted the following specific issue:

> Are motor operated valves MO-7064 and 7068 necessary to control containment pressurization? Are they qualified for high temperature and high humidity?

Mr. Blanchard testified that neither the containment spray nor motor operated valves are necessary to control

containment pressurization. No postulated LOCA can result in a containment pressure greater than the 27 psig which the containment is designed to withstand (Finding No. 25; Blanchard Testimony pp. 24-26).

Licensee submitted documentation to the NRC on March 15, 1981, in accordance with NUREG-0588, demonstrating the reliability of the motor operated valves under conditions of a worst case LOCA. The NRC Staff reviewed the documentation and found justification for "interim" safe operation. (Finding No. 26; Blanchard Testimony, pp. 26-27 and Attachment 3.) The use of the term "interim" refers to the fact that in 1980 the Commission directed all operating plants to complete environmental qualification of safety related equipment by June 30, 1982. Petition for Emergency and Remedical Action, CLI-80-21, 11 NRC 707, 714-715 (1980). The Commission recently suspended that deadline since rulemaking is still pending with respect to the environmental qualification requirements discussed in NUREG-0588. 47 Fed. Reg. 28363 (June 30, 1982).

Based on the uncontradicted evidence, the Licensing Board concludes that the motor operated valves which control containment spray are not necessary for control of containment pressure during a loss of coolant accident and that these valves are qualified for the high temperature and high humidity environment of such an event.

V. CONCLUSION

For the reasons stated herein, the Licensing Board concludes that Licensee has demonstrated that the makeup line, pool water level monitor and motor-operated valves MO-7064 and MO-7068 are adequate and sufficiently reliable to perform their intended safety functions in the event of an accident similar to TMI-2 which precludes entry to the containment.

Respectfully submitted,

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