

08/23/82

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

NRC STAFF PROPOSED FINDINGS OF FACT AND
CONCLUSIONS OF LAW ON CHRISTA-MARIA CONTENTION 8
AND O'NEILL CONTENTION III.E.2

I. BACKGROUND

This is a decision on an application by Consumers Power Company (Licensee) to amend its operating license to modify its spent fuel storage pool at Big Rock Point Nuclear Power Plant. The application for amendment is contested by Christa-Maria et al. and John O'Neill (Intervenors) who have submitted a number of contentions opposing the proposed modification of the spent fuel pool. This decision is limited to Contention III.E.2 of John O'Neill and Contention 8 of Christa-Maria which deal with the occurrence of an accident similar to that which occurred at Three Mile Island, Unit 2 (TMI-2) and the possibility that such an accident would prevent ingress to the containment building and thereby make it impossible to maintain the spent fuel pool in a safe condition.

II. O'NEILL CONTENTION III.E.2 AND
CHRISTA-MARIA CONTENTION 8

These contentions are identical and state:

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. (See the Board's Memorandum and Order Concerning Motions for Summary Disposition February 19, 1982, at p. 3).

In its Memorandum and Order of February 19, 1982 the Board admitted the following issues as genuine issues of fact concerning the original contention.

- (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?
- (4) Will Zircaloy react with steam in a fuel pool which is boiling because its cooling system has failed? Will the reaction become self-sustaining?
- (5) Is the concrete in the fuel pool strong enough to resist a temperature of 247°F and point loading from the storage racks?
Memorandum and Order at 18.

This Board must determine whether the makeup line will not be damaged and the recirculation system will continue to function in the

event of a loss of coolant accident (LOCA) so that there is reasonable assurance that in the event of an accident similar to TMI-2 the spent fuel pool can be safely maintained.

III. STATEMENT OF APPLICABLE LAW

10 C.F.R. § 50.57(a)(3)(i) and (ii) require reasonable assurance that all activities authorized by the operating license, such as the ability to maintain the spent fuel pool in a safe condition in the event of an accident similar to TMI-2, can be conducted without endangering the health and safety of the public, and that the makeup system and recirculation system associated with the containment building are adequate to function in the event of a LOCA.

IV. OPINION

At the public hearing held in this proceeding from June 7 through June 12, 1982, testimony on the first three issues was submitted by the Licensee and the Staff in accordance with the schedule adopted by the Board. (Tr. 1720, 1745).

The Licensee presented two witnesses to testify on the adequacy of the makeup system and recirculation system to provide an adequate supply of water in the event of a LOCA. (Further Testimony of David P. Blanchard on Christa-Maria Contention, 8 and O'Neill Contention III E-2, ff. Tr. 2024 (Blanchard); Rolfe B. Jenkins Tr. 2120 et seq.).

Mr. David P. Blanchard, technical engineer at the Big Rock Point Plant, testified on the first four questions admitted as genuine issues by the Board.

In addressing Board question no. 1 related to the reliability of the remotely activated makeup water system Mr. Blanchard noted that the system has no active components and therefore is not subject to single active failures. (Blanchard, p. 5, 20).

The piping of the makeup line inside containment is routed away from the primary coolant piping; therefore, the piping is not vulnerable to pipe whip or steam impingement (Blanchard, p. 6). The components of the makeup line are also located so that the drop of a cask or other heavy objects cannot simultaneously damage primary system lines and components required for makeup to the fuel pool. Therefore, it is extremely unlikely that an event causing a LOCA could also cause a failure of fuel pool makeup system (Blanchard, p. 6).

The core spray recirculation system provides water to the makeup system during recirculation. The majority of the core spray recirculation system components are located outside of the containment where there are no lines containing high energy primary coolant. Therefore, the components are not vulnerable to pipe whip, steam impingement, or the hostile environment conditions inside containment following an accident similar to TMI-2. (Blanchard, p. 6). The system has two active components, the two core spray pumps. These pumps are located outside the containment and they are redundant. Thus, no active components in the recirculation system are located within the containment. (Blanchard, p. 5).

The remaining components in the system are all passive, and they do not have to operate to place the system in service. They merely provide a path for the core spray pumps to draw water from the containment and send it to the pool and core spray systems. (Blanchard, p. 6).

Mr. Blanchard stated that in his opinion he knew of no mechanisms which will result in the failure of the passive components in providing water to the pool following a LOCA. (Blanchard, p. 6).

The fire protection pumps supply the core spray and containment spray systems with water until a sufficient supply of water is available in the sumps for the recirculation system. Mr. Blanchard stated that these pumps have adequate capacity to ensure that enough water is in the sumps by the time the recirculation and makeup systems would be needed. However, Mr. Blanchard also stated that the remote makeup system may be operated by opening valves to allow fire protection water to be pumped directly into the makeup line if the recirculation system is not available. These valves are outside of containment and can be opened from the control room or manually. The fire pumps are redundant and are powered by diverse power supplies (Blanchard p. 11, 12).

The makeup line was designed to be capable of supplying sufficient flow of water to prevent uncovering the fuel in the spent fuel pool in the event of pool boiling. Hydraulic analyses indicate that flow to the pool is approximately thirteen times greater than required to make up for the boil-off rate assuming a TMI-2 event were to occur at Big Rock. Thus, the spent fuel pool makeup line is adequate to maintain the water level of the spent fuel following an accident which prohibits entry to the containment. (Blanchard, p. 20).

In response to a letter presented in a limited appearance statement by Mr. Bridenbaugh, Mr. Blanchard pointed out that the fuel pool makeup line that was installed at Big Rock Point Plant contained no flow orifice, as the letter stated. (Tr. 2028).

There are multiple suction strainers throughout the containment. In this way if some suction strainers were covered, the redundancy built into the system would allow other strainers to function in order to maintain the safe operation of the spent fuel pool (Tr. 2107). In the event an item was washed into the lower containment there would not be a blockage of the containment cooling flow. (Tr. 2109).

On cross-examination by counsel for Intervenors, Mr. Rolfe Jenkins stated that the Licensee has evaluated the plant structurals and specified seismic loadings at various elevations in the plant based upon what has been characterized as a "sample" earthquake. Mr. Jenkins stated he felt that the sample earthquake will bound the NRC Staff's seismic requirements when they are determined. (Tr. 2123). Mr. Jenkins also stated that the makeup line would not be particularly susceptible to corrosion. (Tr. 2129). Mr. Blanchard testified that Licensee tested the makeup line to insure what the flow was adequate. (Tr. 2147). Mr. Blanchard stated that an operator is required to verify that the valve VPI-18 is open in order to insure that makeup water will be available. The operator ensures that the valve is locked in the open position and following his inspection, a second operator checks the valve. (Tr. 2154). Mr. Blanchard noted that the remote makeup system, will add water without jeopardizing the necessary core spray flow of the reactor, even assuming the worst active single failure that could occur in the core spray system. (Tr. 2163). The fuel pool remote makeup system was designed to deliver water in excess of 9 gpm, the maximum pool boil off rate. (Tr. 2176).

The NRC Staff presented three witnesses to testify on the reliability of the makeup line. Mr. Fred Clemenson, a Principal Systems Analyst for the NRC presented joint testimony with Mr. Richard L. Emch, NRC Project Manager for Big Rock Point. Their prefiled written testimony described in detail the functions of the makeup system (Joint Testimony of Fred Clemenson and Richard L. Emch Concerning Christa-Maria Contention 8 and O'Neill Contention II.E-2 ff. Tr. 2341, p. 3, 4 (Clemenson/Emch)). Mr. Clemenson concurred with Licensee's evaluation of the boiloff rate and the elapsed time before the stored fuel would begin to uncover. This conclusion was based on the Staff's independent verification of the Licensee's calculations, assuming the pool water temperature is 91°F at the beginning of the LOCA. The Staff found that (a) the pool water temperature would be 119°F 24 hours later, (b) an additional three days would be required before pool boiling would commence, (c) the boiloff rate would be two gallons per minute, (d) 27½ days of the boiling would have to occur before the pool water level would drop to the point where the spent fuel would commence to be uncovered. (Clemenson/Emch, p. 5, 6).

As a part of the Systematic Evaluation Program (SEP), Consumers Power Company is in the process of verifying that the post incident system is seismically qualified. (Tr. 2348) Mr. Emch and Mr. Clemenson agreed that the reliability of the makeup water system is the same as the post incident system when in the recirculation mode (Clemenson/Emch, p. 7). Although Mr. Clemenson based his decay heat values on 48 hours of decay resulting in a higher decay heat value and a shorter time to reach boiling while Mr. Blanchard calculated it based on 144 hours of decay, the conclusions uphold the reliability of the makeup line. (Tr. 2343).

The NRC Staff also presented Mr. Kenneth S. Herring to respond to questions concerning the seismic integrity of the makeup line. (Tr. 2347). He stated on cross-examination that the seismic evaluation under the SEP is currently scheduled for completion September 30th of this year. Since the SEP review has not been completed he could not state that the line is seismically qualified. (Tr. 2348). However, he also stated that as far as reliability during a seismic event is concerned, he would not anticipate any problems. (Tr. 2348). He based this opinion on this knowledge and review of the building to date and the application of the criteria broadly outlined by Mr. Jenkins. (Tr. 2349). For the same reasons stated above, Mr. Herring affirmed that he had a "good feeling" about this line, and that he does not expect the makeup line to surface as a problem in the SEP review. (Tr. 2348-2353). Mr. Herring added that the area in which the Big Rock Point Plant is located is one of the lowest seismic areas in the country, based on the documents that are on record. (Tr. 2353).

Intervenors presented no evidence on the seismic issue, rather, they relied on cross-examination of Mr. Herring and Mr. Jenkins. In response to questioning Mr. Jenkins testified that when the seismic design basis for the plant is established, the makeup line will meet that basis. (Tr. 2126).

In addressing Board question no. 2 pertaining to the monitoring of spent fuel pool level, Mr. Blanchard stated that the benefits of the Rosemount differential pressure transmitter, model 1152, spent fuel pool monitor appear to be minimal following a reactor accident which prohibits access to the containment. Nevertheless the monitor provides direct

information to the control room operator on the status of the spent fuel pool which was not available prior to this time. The instrumentation is reliable since it is qualified for the LOCA environment, is seismically qualified and is powered from reliable off-site and on-site power systems. (Blanchard, pp. 22, 23, 24).

In addressing Board question no. 2, Mr. Clemenson stated that the NRC does not consider the reliability of the spent fuel pool water level monitor to be a safety concern. Mr. Clemenson explained that the level monitor would play no part in providing makeup to the pool in the event of a LOCA. (Clemenson/Emch, p. 8-9). The remote makeup system operates automatically when the core spray recirculation system operates. (Clemenson/Emch, p. 5).

Board question no. 3 pertained to the function and qualifications of motor operated valves MO-7064 and 7068 which control the containment spray at Big Rock Point Plant. Mr. Blanchard stated that neither the containment sprays nor motor operated valves MO-7064 and 7068 is necessary to control containment pressurization. These valves are qualified for a high temperature-high humidity environment on an interim basis and are used primarily to limit containment temperatures during a LOCA. (Blanchard, p. 26, 29).

In addressing Board question no. 3, Mr. Paul Shemanski, a Senior Electrical Engineer for the NRC, stated that the containment spray valves, motor operated valve MO-7064, is considered by the NRC to be qualified for high temperature and high humidity. (Testimony of Paul Shemanski Regarding Christa-Maria 8 and O'Neill Contention II.E-2 Genuine Issue of Fact 3 ff. Tr. 2332 p. 3 (Shemanski). Mr. Shemanski also stated

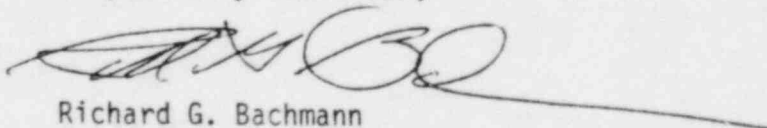
that the back-up containment spray valve, motor operated valve MO-7068, is qualified on an interim basis for high temperature and high humidity. The license has committed to fully qualify the valve actuator to meet NRC regulations. (Shemanski, p. 4).

The Intervenors presented no direct testimony on any of the first three issues in this contention, rather they relied upon cross-examination of the witnesses supplied by the Licensee and the Staff. Nothing in the cross-examination refuted the direct written testimony of the witnesses.

V. CONCLUSIONS OF LAW

The Board finds that there is reasonable assurance that the activities authorized by the operating license can be conducted without endangering the health and safety of the public, and that the makeup system and recirculation system associated with the containment building are adequate to function in the event of a TMI-2 type of accident in accordance with 10 C.F.R. § 50.57(a)(3)(i) and (ii).

Respectfully submitted,


Richard G. Bachmann
Counsel for NRC Staff

Dated at Bethesda, Maryland
this 23rd day of August, 1982