Consumers Power
POWERING MICHIGAN'S PROGRESS
Palisades Nuclear Plant: 27780 Blue Star Memorial Highway, Covert, MI 49043

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Nuclear Regulatory Commission
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DOCKET 50-255 - LICENSE DPR-20 - PALISADES PLANT - UNREVIEWED SAFETY QUESTION - POTENTIAL FOR LEAKAGE OF CONTAINMENT SUMP WATER TO THE SIRW TANK DURING AN MHA - REGULATORY GUIDE 1.4 SOURCE TERMS USED AS INTERIM CALCULATION INPUTS

In a letter dated June 14, 1991 and supplemented on July 17, 1991, Consumers Power Company (CPCo) notified the NRC that we had determined that a potential leak path existed whereby previously unaccounted for radioactive post accident primary coolant system water could leak to the Safety Injection and Refueling Water (SIRW) tank. Additionally we requested that the Palisades Facility Operating License be amended by granting an exemption from the FSAR requirement to perform the Maximum Hypothetical Accident (MHA) analysis in accordance with the Standard Review Plan.

In a follow-up letter dated January 10, 1992, CPCo provided further supplemental information relating to the scope of the discrepant condition. CPCo met with the NRC staff on January 15, 1992 at the White Flint offices to discuss the ongoing MHA and interim analysis supporting justification for continued plant operation. Following that meeting and as a result of NRC staff reviews, additional clarification and information was requested by the NRC staff. Our reply to the NRC's request as well as the results of our interim analysis supporting continued plant operation were submitted in an April 21, 1992 letter.

On April 29, 1992 CPCo submitted a final MHA analysis which resolves all of the previously identified concerns with the previous analysis. This submittal stated that with NRC approval of our final MHA analysis methodology by November 1, 1992, modifications to bring the Palisades plant in compliance with the final MHA requirements would be completed by the end of the 1994 refueling outage.

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PALISADES NUCLEAR PLANT

On July 2, 1992, in a telephone conference with the NRC staff concerning the status of their review of our previously submitted information, the NRC staff requested that we provide them with the off-site and control room doses using the Regulatory Guide 1.4 source terms as opposed to the plant specific source term used for the justification for continued operation described in our April 21, 1992 submittal. The revised doses are as follows:

	Thyroid	Whole Body
Site Boundary (0-2 hrs)	15.91 rem	0.29 rem
Low Population Zone (LPZ) (30 days)	9.50 rem	0.05 rem
Control Room	17.98 rem	0.070 rem

A computer code was used to perform all of the control room habitability calculations. With one exception, the same computer inputs were used to generate the above numbers as were used to generate the final MHA doses. The exception is the control room air in-leakage was changed from zero to 11.6 cfm to account for the calculated air in-leakage with our existing configuration. In order to provide a timely response to the NRC, as was requested, a specific engineering analysis to support these calculations will not be completed. Instead the revised computer inputs that were used for this revised computer run were independently verified.

In the April 21, 1992 submittal, which provided the results of our interim analysis supporting continued plant operation, it was assumed for the interim calculated control room and off-site doses, that the leakage through the high pressure safety injection (HPSI) recirculation valves was directed to the spent fuel pool tilt pit. For the final MHA calculated doses (in our April 29, 1992 letter), and the doses listed above it is assumed that the leakage through the HPSI recirculation valves goes directly to the SIRW tank. If it were assumed for this revised calculation, using the Regulatory Guide 1.4 source terms, that the leakage was directed to the spent fuel pool tilt pit, all of the thyroid doses would be slightly higher (by approximately 0.1 rem). The control room whole body dose would, however, be slightly lower (by approximately 0.4 rem) based on the shine dose from the SIRW tank as shown in the calculations for the final MHA analysis.

The following assumptions apply to this revised calculation using the Regulatory Guide 1.4 source terms.

1. Regulatory Guide 1.4 and SRP 15.6.5 source terms were used.
2. ICRP 30 dose conversion factors were used.
3. A calculated value of 11.6 cfm of unfiltered air in-leakage into the control room was used.
4. Since NaOH addition to the containment spray and safety injection solution begins at recirculation, no iodine re-evolution from the sump occurs prior to solution pH reaching 7.0.
5. The 0.1 gpm leakage of sump water to the SIRW tank begins at recirculation and continues throughout the event. This value is the acceptable criteria in the test procedure.
6. The fraction of the iodine in the sump water that enters the SIRW tank that is in the volatile form is 3.0E-04. This value is per a letter from E.C. Beahm (ORNL) to J.Y. Lee (NRC) dated February 5, 1992.
7. Iodine in the air volume of the SIRW tank exits the tank at twice the rate at which air is being displaced from the tank due to the water leaking in.

8. The long term iodine partition coefficient in containment is 1250. This value is from NUREG/CR-4697, based upon the expected temperature and iodine concentration in the sump.

Also, as was requested during the July 2, 1992 conference call, we have enclosed as Attachment 1 the engineering analysis that was completed to determine the interim control room operator and off-site doses that were contained in our April 21, 1992 submittal (EA-A-NL-92-012-02 rev.1)

In response to one of the staff questions (No. 2) in the April 21, 1992 letter to the NRC, we provided an evaluation supporting our conclusion that post accident containment pressure head would not result in containment sump water entering into the SIRW tank. We have discovered an error in the evaluation pertaining to the containment water level at recirculation. The error was also included in the revised JCO that we submitted as part of the April 21, 1992 letter. You will also note that the peak containment pressure value has been changed from "about 23 psig (37.7 psia)" to "about 36.4 psia." This change is due to taking data from a graph (23 psig) versus from the calculated output data. Specifically, replace in Attachment 1, Page 1, Item No. 2, the second paragraph, and in Attachment 2, page 4, Section 3.A, of the April 21, 1992 letter with the following information:

> The elevation head between the minimum SIRW tank water level (1.6 feet) and the containment water level (4.3 feet above the containment 590 foot elevation) is 51.13 feet. (The SIRW tank elevation is 643 feet 10 inches and the containment sump elevation is 585 feet.) Using a reference temperature of 120°F, a containment pressure greater than 36.61 psia could force flow from the sump toward the SIRW tank. The peak containment LOCA pressure in the current FSAR analysis following a recirculation actuation signal (RAS) (no containment air coolers in operation) is about 36.4 psia. Therefore, the containment pressure will not push sump water into the SIRW tank.
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> A second case with a higher containment sump level is analyzed to ensure that the above case is bounding. To get a higher water level in the containment, a larger initial SIRW tank volume must be assumed. Using the FSAR analysis model the CONTEMPT computer code was used to calculate a revised containment pressure response. The input data was revised to increase the sump volume after RAS from 2.01 to 2.92 million pounds of water and the time of RAS was increased to 35 minutes. As a result, the containment sump temperature decreased from 220 to 209°F and the peak containment pressure after RAS dropped to 33 psia. Using a sump level of 6.4 feet above the 590 foot elevation and this consistent set of data, the SIRW tank pressure head is higher than the containment pressure head. The pressure head difference is also greater for this case than for the previous case.

The margin between the pressure needed to force water back to the SIRW tank and that calculated as a peak containment LOCA pressure appears to be small. However the containment pressure analysis contains the following conservatism which contributes to this peak pressure. After RAS, the shutdown cooling heat exchanger removes the heat from the containment with Lake Michigan being the ultimate heat sink. The containment analysis uses a bounding service water temperature, conservative service water and component cooling water system flow rates, the heat exchanger design fouling factor and a conservative core decay heat correlation. Each assumed parameter will reduce the heat removal rate causing higher predicted containment pressures following RAS. If the three containment air coolers are operating, the maximum containment pressure following RAS is less than 29 psia. Considering the above results, the dose consequence analysis does not include leakage of containment sump water into the SIRW tank.

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