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

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General Manager

March 18, 1992

Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

DOCKET 50-255 - LICENSE DPR-20 - PALISADES PLANT - REQUEST FOR RELIEF FROM SPECIFIC ASME B&PV REQUIREMENTS - CONTAINMENT AIR COOLER CODE REPAIR - RESULTS OF MARCH 11, 1992 CONFERENCE CALL

In a letter dated September 9, 1991, Consumers Power Company (CPCo) requested relief from specific ASME B&PV Code repair requirements for the Palisades containment air coolers. CPCo proposed alternatives for the repair of the coolers cooling coils as it was determined that, due to the design, geometry and materials of construction of the Palisades containment air coolers cooling coils, the ability to complete a code repair as required by ASME B&PV Code, Section XI, was impractical.

In response to the NRC staff questions, CPCo's January 16, 1992 submittal provided additional information on the subject.

A conference call was held on March 11, 1992. In that conference call CPCo summarized previous information that it had submitted, and provided some additional information concerning the containment air coolers ability to respond to various accident scenarios. Attached is a summary of the new information that was provided during that conference call.

Gerald B Slade
general Manager

CC: NRC Administrator, Region III
Resident Inspector

Attachment

260049

A047

ATTACHMENT

Consumers Power Company
Palisades Plant
Docket 50-255

REQUEST FOR RELIEF FROM SPECIFIC ASME B&PV CODE REQUIREMENTS
CONTAINMENT AIR COOLER CODE REPAIR
RESULTS OF MARCH 11, 1992 CONFERENCE CALL

March 18, 1992

3 Pages

On March 11, 1992, a conference call was held between Consumers Power Company (CPC) and the NRC staff to discuss the relief request that had been submitted for the repair of the Palisades Plant containment air coolers. In general the NRC staff wanted to discuss the plants reason for determining that the containment air coolers were operable and able to perform their design basis functions. The plant staff reviewed the following design basis topics and summarized some of the information that it had used for a basis for showing that the coolers would be able to perform their design function for the time interval that the relief was requested, until the end of the 1996 refueling outage.

Seismic

The containment air coolers were designed to meet certain seismic requirements. These requirements were spelled out in the cooler design specification (M-60) as horizontal and vertical seismic loads. In a follow-up letter, dated April 11, 1968, the plant architectural engineer sent a letter to the cooler supplier referring to the purchase order for the coolers and the requirements that the design of the equipment meet certain seismic criteria. The letter requested that in order for the buyer to review and assure that the design meets the specified seismic criteria, that the vendor furnish a description of the tests, design procedures or details which have been performed or incorporated to assure that the design of the equipment furnished under this specification conforms to the applicable seismic criteria specified. Test report RS-1003, "Cooling Coil Thermal and Structural Capacity Evaluation For The Palisades Plant of Consumers Power Company," state that it gives objective data on which to base the judgement of equipment compliance with the purchasers specifications and suitability to the design conditions, but the report itself has no definitive statements concerning the seismic qualification of the coolers.

The January 16, 1992 response to the first four NRC staff questions also addressed the structural and seismic capabilities of the coolers. Additional information provided during the conference call is as follows:

> For seismic design, analysis and testing purposes, the containment air coolers have been separated into three parts. These parts consist of: (1) the cooler coil assemblies, (2) the external tube/manifold/header assembly, and (3) the external supply and return piping. The coil assemblies have been tested in order to evaluate seismic capacity. The external piping has been subjected to detailed piping analysis under the auspices of IE Bulletin 79-14. The external tube/manifold/header assembly has not been subjected to detailed analysis or testing.
>
> The tube/manifold/header assembly is not amenable to detailed analysis. It consists of many 5/8 inch tubes inserted into three manifolds which in turn are connected to supply or return headers. The assemblies also include brazed miter joints and brazed manifold/header connections. The piping analysis which has been conducted to date employs the flange

connections on the headers as anchors. Therefore, the loads the analysis has imposed on the assemblies are very conservatively determined.

The analysis problems associated with this tube/manifold/header assembly are due to the connection detail. There is a significant amount of uncertainty in the application of joint quality factors or stress intensification factors to the miters or tube-to-manifold or manifold-to-header connections. The stress intensification factors are largely fatigue based numbers. Because of this uncertainty, rigorous analysis has not been attempted.

The configuration of the assembly was inspected by structural engineers. The piping analysis loading was reviewed as well. Based upon this inspection and review, it was concluded that the assembly configuration possessed a seismic ruggedness not easily ascribed to it by analysis. No attempt was made to develop the position that no assembly joint would leak or that no joint would fail. However, it was concluded that the overall assembly would maintain its configuration and structural integrity during a design seismic event. The basis for the conclusion is as follows:

- The configuration is redundant. There are many individual tubes leading to the manifold and three manifolds (hence three miter joints) leading to the header. Therefore, a single joint leak or failure does not compromise functionality.

- The copper material is very ductile. The material can sustain significant physical distortion before joint separation would be expected.

- The amplitude of seismic demand is low. The coolers are on the lower level of the containment building where the peaks of the input response spectra are low with respect to the rest of the plant.

- The natural frequency of the attached piping is low. The low frequency implies low seismic response with respect to a given response spectra. That is because the plant response spectra peak in the 5 to 7 hertz range is well above the fundamental natural frequencies of this system.

- The number of cycles input into the system due to a seismic event is low. Low natural frequency content implies few cycles. The vulnerability of the ductile material with geometric joint discontinuity is due to fatigue and fatigue needs cycles.

In summary, the containment air coolers and the external assembly to the supply and return piping are judged to be capable of withstanding the design seismic event while maintaining overall structural integrity and the capability to function. That judgment is based upon an inspection of the cooler assembly and associated piping analyses. This determination does not suggest that individual joint leakage or local joint separation will not occur. However, it does mean that the configuration and very low seismic demand imply overall structural adequacy.

Loss of Coolant Accident

The plant is designed to mitigate a loss of coolant accident (LOCA) with the containment air coolers and the containment spray pumps. The worst case LOCA analysis assumes that off-site power is lost, coincident with the single failure of one of the diesel generators to start. The remaining diesel generator powers one containment spray pump and three containment air coolers. The results of this analysis shows that the single containment spray pump will limit containment pressure to a value below the containment design rating. Therefore, the containment air coolers have been shown to not be needed to mitigate a LOCA.

Main Steam Line Break

Credit is also taken in our accident analysis for the coolers to mitigate the affects of a main steam line break (MSLB) by limiting containment pressure. The worst case MSLB analysis assumes that off-site power is available so that the mass an energy release is maximized. The worst single failure is assumed to be the failure of an Safety Injection Signal relay which disables two containment spray pumps. The remaining containment cooling equipment is a single spray pump and three containment air coolers. As shown in the FSAR, the containment pressure and temperature are held below the containment design limits.

A sensitivity study was done to determine the impact of degraded air cooler performance in this scenario. The same assumptions made for the FSAR analysis were used for the study. The results showed that the MSLB analysis yielded acceptable results with a reduction in heat removal capacity of approximately 40% for all three coolers. Therefore, if during a main steam line break the performance of the containment air coolers could degrade by as much as 40% due to leakage, and still perform their design function.

Availability of the Containment Spray Pumps

To support these scenarios the operability and availability of the containment spray pumps was questioned. The availability for the containment spray system has historically been very high. The spray system availability for 1989 was 99.95 percent, for 1990 was 99.74 percent, for 1991 was 95.48 percent, and so far for 1992 is 99.78 percent. (The preceding availability levels were calculated using SSPI criteria.) A breaker problem in 1991 accounted for the slight drop in availability. This breaker problem has been rectified and continued high system availability as shown in previous years is expected.

Transmittal Date: 3/18/92

TO: 145
USNRC/WASHINGTON/

PROCEDURE NUMBER: APPENDIX I
TITLE: NUREG-0654 CROSSREFERENCE PALISADES SITE EMERGENCY PLAN

TRANSMITTAL NUMBER:	470921

TRANSMITTAL: LISTED BELOW ARE NEW/REVISED PROCEDURES WHICH MUST BE IMMEDIATELY INSERTED INTO OR DISCARDED FROM YOUR PROCEDURE MANUAL.

Action Required

Remove and Destroy	APPENDIX I REV/0 PAGES 1 THRU 6
Replace with	APPENDIX I REV/0 PAGES 1 THRU 5 (EDITORIAL CHANGES)

SIGN, DATE AND RETURN THE ACKNOWLEDGEMENT FORM WITHIN 10 DAYS TO THE PALISADES PLANT DOCUMENT CONTROL.

SIGNATURE OR INITIALS DATE

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TITLE: NUREG-0654 CROSSREFERENCE

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