



**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 - REPORT OF CONTAINMENT AIR COOLER TUBE LEAKAGE AND SUBSEQUENT REPAIR

On December 23, 1992, a leak was discovered in one of the Palisades containment air coolers. What follows is a brief history of potential leakage conditions which had been previously identified for the containment air coolers and the licensing actions taken in response to those conditions, as well as an accounting of the actions taken to repair the identified leak and the status of the equipment today.

BACKGROUND

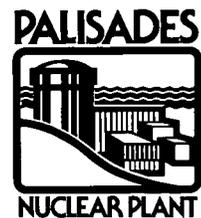
By letter dated January 16, 1991, as amended February 11, and February 27, 1992, Consumers Power Company requested relief from the ASME Boiler and Pressure Vessel Code, Section XI, Table IWD-2500 Examination Category D-B, Item No. D2.10, and IWA-5250, as clarified by Inquiry Number 89-017, for the 5\8-inch tubing sections of Containment Air Coolers VHX-1,2,3,4. The request originated as a result of the plant's limited success at re-brazing leaking containment air cooler cooling coil header-to-tube connections and obtaining leak tight coolers. The request documented how much operational cooler leakage was acceptable, and requested that relief be granted from the zero leakage requirements of the Code. In the March 6, 1991 letter from the NRC, the requested relief was granted for one cycle, as long as the monitored leakage did not exceed the 4 gpm total cooler leakage limit.

During the time that this relief was granted, Consumers Power Company evaluated the alternatives for a final fix or repair of the containment air coolers. As part of that process, it was decided that an interim repair for potential cooler leakage would be needed before longer term final repairs

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could be evaluated and completed. Since the interim repair method that was developed could be categorized as a non-code repair, NRC approval of the repair method was needed.

By letters dated September 9, 1991, January 16, and March 18, 1992, Consumers Power Company requested relief from Section XI of the ASME Code to allow non-code repairs to the containment air coolers at the Palisades Nuclear Plant. An engineered clamp had been designed and tested for two specific potential cooler leak locations. These locations were the cooler manifold-to-tube connections and the miter joints located on the cooling coils input and output headers. In a March 31, 1992 letter from the NRC, the NRC staff determined that code repairs were impractical, found the use of the proposed clamps for repair appropriate, and granted the relief for use of the clamp repair methods through 1996. As part of the request for the relief and use of the engineered clamp as an acceptable non-code repair of cooler leakage, Consumers Power Company had previously committed to replacement of the coolers' cooling coils by the end of the 1996 refueling outage.

VHX-2 COOLER LEAKAGE

A chronological listing of events associated with leak repairs on VHX-2 follows. The leak was identified as a pinhole through wall failure in a cleanable return bend on one tube of the cooler coil. The return bend is an inside component on the No. 4 cooling coil - right side.

Chronology:

12-18-92 - A containment sump level increase indicated an apparent leak inside of the containment. It was initially assumed that the sump indication was due to an increase in the control rod drive system (CRDM) seal leakage, which had been trending upward. The sump level trend indicated that the leak rate was approximately 1000 ml/min or 0.26 gpm. This leakage did not require any immediate action.

12-22-92 - During the weekly containment entry, a puddle of water was discovered on the 590 foot elevation under an area where safety injection piping is located. An initial sample analysis of water from the puddle indicated that the leakage was service water.

12-23-92 - A second containment entry was made to locate the source of the service water leak. Operators observed a pinhole leak on a cleanable return bend fitting on containment air cooler VHX-2. At 1030 hours VHX-2 was declared inoperable due to leakage. (Code criteria does not allow through-wall leakage.)

At approximately 1345 hours, the Palisades NRR Project Manager was notified that a containment air cooler cooling coil leak existed and that it was not in one of the areas for which we have a pre-engineered clamp. Later the same day

following planning and strategy meetings at the plant, a conference call was held with NRR and Region III staffs to appraise them of our repair plans. During this call we determined that the approved relief request for the engineered clamps for the containment air coolers would apply to any clamp configuration that is needed to stop leaks in the coolers, so long as the design does not deviate in principle from the clamp designs described in the request for relief for the non-code repair.

The designer and supplier of the pre-engineered clamp was contracted to repair the leak. Workers entered containment to get measurements and determine the exact location of the leak. Later that night, attempts are made to stop the leak with a newly designed temporary clamp. The clamp could not be secured properly due to close tolerances. More measurements were taken.

12-24-92 - An engineering analysis was initiated to evaluate the design of the new clamp with respect to the previously engineered clamps. A conference call was held to inform the NRC of the leak repair status, discuss the Code relief application to the current situation, and review the administrative aspects of the leak repair, i.e. temporary modification, safety review and engineering analysis. The NRC staff concurred with our repair approach which was to design and install an engineered clamp similar in design to those presented and approved in our non-code repair relief request. As long as this approach was taken, a new relief request for approval of methods to repair cooler leakage at the identified location would not be needed.

12-26-92 - The new engineered clamp was installed at approximately 1700 hours. The leak was stopped, but before closing the work order under which the work was completed, it was decided to wait 24 hours to verify that the repair was satisfactory. Using the final design data for the clamp, the engineering analysis was completed concluding that the design was similar to that previously approved by the NRC. The engineering analysis is attached to the temporary modification package.

12-27-92 - Operations inspected the clamp at approximately 1700 hours and found it to be leaking. A review of containment sump level data showed the clamp started leaking approximately 12 hours after installation.

12-28-92 - The clamp was removed, cleaned, new epoxy applied and then reinstalled. The clamp was heated this time to help the epoxy set up faster. The clamp was reinstalled, stopping the leak at about 0900 hours.

A meeting was held at 1500 hours with Plant staff personnel to go over the contingency plans for stopping the leak in case the clamp began leaking again. The contingency chosen was to proceed with temporary measures (i.e. use expandable tube plugs) to isolate the leak by removing the tube from service.

By 2000 hours containment sump level data showed the clamp to be leaking again. A containment entry was made and the tubing upstream and downstream of the U-bend was plugged with expandable tube plugs at about 2200 hours, and the leak was isolated and the U-bend was removed from service.

12-29-92 - The VHX-2 tube plugs were reinspected about 1000 hours with no leakage observed. It was decided the tube plugs should be checked with the cooler's high capacity outlet valve closed since that would raise service water pressure in the cooler. The high capacity valve was closed and a small (1 drop/second) leak was observed on one tube plug. It was decided to replace the leaking plug. The leaking plug was subsequently replaced and the leak was stopped. The integrity of the plug was again tested by closing the high capacity outlet valve, and this time no leakage was observed. A final inspection was conducted around 1500 hours and the cooler was declared operable.

NOTE: The original tube plug that leaked was found to have been assembled incorrectly by the manufacturer. This led to the plug's failure to seal under the higher pressure. The stop leak clamp was removed, cleaned, epoxy applied, and re-installed after the tube plugs were installed.

1-5-93 A work order was initiated to perform permanent repairs on VHX-2, which will result in removal of the leaking U-bend and replacement with a new U-bend.

FUTURE ACTION:

1. We will evaluate the reason for the failure of the engineered clamp repair of the cleanable U-bend. Necessary actions will be taken to address the impact of the findings upon the present engineered clamp design or installation process as is described in our latest approved relief request.
2. We will implement an improved temporary plugging method to reduce the risk associated with potential present plug leakage. The new method will attempt to plug the tube and allow reinstallation of the cleanable U-bend threaded caps as a back-up to the expandable tube plug.
3. A permanent repair to the leaking VHX-2 cleanable U-bend will be made.


Gerald B Slade
General Manager

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

Attachment