

Palisades Nuclear Plant: 27780 Blue Star Memorial Highway, Covert, MI 49043

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Nuclear Regulatory Commission ATTN: Document Control Desk Washington, DC 20555

DOCKET 50-255 - LICENSE DPR-20 - PALISADES PLANT INDIVIDUAL PLANT EXAMINATION (IPE) - PROPOSED MODIFICATIONS TO PREVENT CORE DEBRIS FROM ENTERING THE CONTAINMENT SUMP

Kurt M. Haas

Plant Safety and Licensing Director

Consumers Power Company provided the Palisades Individual Plant Evaluation (IPE) results to the NRC in a submittal dated January 29, 1993. The NRC reviewed the submittal and, in a letter dated April 22, 1994, requested additional information related to the internal event analysis and the containment performance improvement program for the Palisades Plant. This information was provided in our July 22, 1994 letter to the NRC. As a result of the continuing NRC reviews, including the staff's Diagnostic Evaluation Team (DET) report, the NRC's October 19, 1994 letter requested that additional information be submitted concerning the Palisades IPE results. This information was provided in our December 5, 1994 letter to the NRC.

As a part of the December 5, 1994 submittal, we stated that we would inform the NRC of the management decisions concerning potential modifications to prevent postulated post accident core debris from entering the containment sump.

It has been decided that, during the 1997 refueling outage, the reactor cavity drain lines to the containment sump will be plugged. Attachment 1 contains a summary of the issue and the results of our evaluation.

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SUMMARY OF COMMITMENTS

This letter contains one new commitment, as follows:

Palisades will plug the reactor cavity drain lines to the containment sump during the 1997 refueling outage.

Kurt M Haas Plant Safety and Licensing Director

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

Attachment

ATTACHMENT 1

Consumers Power Company Palisades Plant Docket 50-255

INDIVIDUAL PLANT EXAMINATION (IPE) PROPOSED MODIFICATIONS TO PREVENT CORE DEBRIS FROM ENTERING THE CONTAINMENT SUMP

3 Pages

PROPOSED MODIFICATIONS TO PREVENT CORE DEBRIS FROM ENTERING THE CONTAINMENT SUMP

BACKGROUND

On November 23, 1988, the NRC issued Generic Letter 88-20 (INDIVIDUAL PLANT EXAMINATION FOR SEVERE ACCIDENT VULNERABILITIES - 10 CFR §50.54(f)). Each plant was requested to perform a limited risk assessment. The purpose of the assessment, as stated in the generic letter, is included below.

"The general purpose of this examination, defined as an Individual Plant Examination (IPE), is for each utility (1) to develop an appreciation of severe accident behavior, (2) to understand the most likely severe accident sequences that could occur at its plant, (3)to gain a more quantitative understanding of the overall probabilities of core damage and fission product releases, and (4) if necessary, to reduce the overall probabilities of core damage and fission product releases by modifying, where appropriate, hardware and procedures that would help prevent or mitigate severe accidents. It is expected that the achievement of these goals will help verify that at U.S. nuclear power plants severe core damage and large radioactive release probabilities are consistent with the Commission's Safety Goal Policy Statement. Besides the Individual Plant examinations, closure of severe accident concerns will involve future NRC and industry efforts in the areas of accident management and generic containment performance improvements."

As a result of the completion of the IPE for Palisades, we have determined that the containment performance is not in line with the expectations established by the Commission in its Safety Goal Policy Statement. While the root cause of the issue is not in violation of the plant's design basis or current licensing basis, actions have been initiated to reduce the risk associated with this condition. The results of our evaluation and management decision are provided below.

The majority (54%) of the early containment failure rate for Palisades is a result of events in which core melt occurs, the reactor vessel fails at low pressure, and a significant volume of core debris is deposited on the reactor cavity floor. Because the containment sump is directly underneath the reactor cavity, the core debris would subsequently flow from the reactor cavity into the containment sump through the reactor cavity drain lines. The core debris could then flow from the containment sump into the Engineered Safeguards Systems (ESS) pump suction lines. A subsequent failure of the ESS pump suction lines could then put core debris into the auxiliary building, resulting in radiological release from a containment failure (Figure 1).

This reactor cavity and containment sump design was identified as unique during the Individual Plant Examination (IPE) (REF.1), and contributed to a higher than expected early containment failure rate for the Palisades large dry containment. A commitment was made to the NRC following the submittal of the Palisades IPE, to evaluate the need to modify the containment sump.

EVALUATION

The evaluation considered reducing the likelihood of a containment failure occurring as a result of the core transporting to the sump and ultimately to the auxiliary building by;

- considering ways to reduce the probability of core damage sequences occurring which contribute most strongly to the potential for core relocation; and
- considering ways to delay or prevent relocation of the core debris from the reactor cavity to the containment sump or from the sump to the auxiliary building.

The evaluation determined that considering ways to delay or prevent relocation of the core debris from the reactor cavity to the auxiliary building would be most prudent.

While prevention or delay of core relocation has the potential to provide significant reduction in early containment failure, neither can completely eliminate early containment failure since other mechanisms are responsible for approximately 46% of the early containment failure mode. The evaluation of potential modifications was performed (Ref.3) to provide a recommended approach to addressing this issue. This evaluation identified five alternatives (one was to do nothing), of which only two were deemed technically feasible. A cost benefit analysis was performed for these two feasible alternatives as part of the evaluation. The results of the evaluation are provided below.

- ► A modification was identified which would prevent core relocation and reduce early containment failure by 54%, but was not cost beneficial.
- ► A modification was identified which would provide a substantial delay of core relocation, would reduce early containment failure by 39%, and is cost beneficial.

The cost-beneficial modification was recommended to, and accepted by, management.

CONCLUSIONS

The result of the evaluation recommends plugging the reactor cavity drain lines. Plugging the reactor cavity drain lines would delay core debris from entering the containment sump until the core debris eroded and penetrated the reactor cavity floor. Implementation of the recommended modification would provide the following:

- reduce the total off-site dose consequences by 39%;
- reduce the probability of early containment failure rate to 1.2E-06, which is in line with the NRC goal 1.0E-06.

Based on this conclusion, Palisades will plug the reactor cavity drain lines during the 1997 refueling outage.

REFERENCES

- 1) Palisades IPE, submitted to NRC January 29, 1993
- 2) Request for Modification RFM-1512, Evaluation of the Need to Modify the Containment Sump, Rev. O



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