Consumers Power Company

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Director of Nuclear Reactor Regulation
Att: Mr Robert A. Purple, Chief
Operating Reactor Branch No 1
US Nuclear Regulatory Commission
Washington, DC 20555

DOCKET 50-255, LICENSE DPR-20
PALISADES PLANT, AO-75-25

Attached is Abnormal Occurrence Report AO-75-25 which covers the discovery of an error in a computer program used to set in-core detector alarm limits. This error could have led to a nonconservative setting of about 2% which is well below the 10% error allowed for in the calculation.

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CC: JGKeppler, USNRC
File

ABNORMAL OCCURRENCE REPORT
Palisades Plant

1. Report Number: AO-75-25, Docket 50-255.

2. a. Report Date: November 5, 1975.

   b. Occurrence Date: June 19, 1973 (classified as AO on October 29, 1975).

3. Facility: Palisades Plant, Covert, Michigan.

4. Identification of Occurrence: Error in computer program used to compute in-core detector alarm limits.

5. Conditions Prior to Occurrence: Plant operating at essentially full power.

6. Description of Occurrence: Interim Special Technical Specifications, Section 3.c requires that in-core alarms be set to correspond to local power limits used in the ECCS analysis. A computer code is used to compute the appropriate in-core alarm limits.

   On October 22, 1975 while performing routine checking of data used by the in-core analysis program (INCA), it was noticed that the burnup correction curve for the flux-to-power factors for a particular fuel type had a shape contrary to what might be expected. It was immediately noted that the curve in use would, at this point in time, predict a higher peak power than was actually expected and, hence, was probably conservative. Checking against independent Consumers Power Co diffusion theory calculations confirmed that the curve shape was not as our calculations predicted.

   Our fuel supplier, who had generated the flux-to-power factor curves, was then contacted by phone and asked to confirm the shape and range of applicability of the curve in burnup. On October 24, 1975 the fuel supplier reported by phone that the burnup correction factor curves for the flux to power factors were accurate. However, the curves for two sets of two fuel types each had been inadvertently interchanged. He suggested changes to be made to the computer program to assign the curves to the correct fuel types. He further stated that, since the correction factors are small and also are similar in shape for all the fuel types, it was his opinion that a maximum nonconservative error of 1 to 2 percent could have occurred over the period that this data had been in use.

   The suggested changes were reviewed, implemented in the computer program, and checked by October 28, 1975.

7. Designation of Apparent Cause of Occurrence: On May 24, 1973 our fuel supplier sent us a new library of data to be used in the in-core analysis program. The purpose of the revised library was to extend the region of applicability to higher core burnup. This library was reviewed, implemented and tested. It was put into production use on June 19, 1973.

The burnup correction curves for the flux-to-power factors which were included in this library had been, in some cases, inadvertently assigned to the wrong fuel types. At the time of implementation, the error was about 2 percent. Since this is the same magnitude as the difference expected due to the intended library revision, it was not detected in cross-checking. Later, when the error became more significant (6.5 percent in the conservative direction), it was caught by normal Consumers Power Co core follow checking.

8. Analysis of Occurrence: The error was corrected as explained in Item 6 above. The most current in-core data was immediately rerun. The peak kW/ft in the core as predicted by the code dropped 6.5 percent. The correction factor curves were then plotted and ratioed. From inspection of the curves, when appropriate fuel exposures were taken into account, it appears that the maximum nonconservative error occurred immediately at the time of first implementation of the new library. This was June 19, 1973. In-core data from this case was rerun with the corrected code and the error determined to be 2 percent nonconservative. It appears that from this point on the error moved steadily toward the conservative direction ending at approximately 6.5 percent conservative on October 24, 1975.

   We conclude that there were no significant potential consequences to the health and safety of the public for the following reasons. First, the core has rarely been operated within 2 percent of the limits stated in Interim Special Technical Specifications, Section 3.a. For instance, on June 19, 1973 when the maximum nonconserviative error occurred, we were actually operating 12 percent under the limits of Section 3.a. Second, Section 3.a carries a factor of 10 percent to account for measurement-calculational uncertainty. At no time was the error as large as 10 percent nonconservative.

9. Corrective Action: The code was immediately corrected as described in Items 6 and 7 above. Since the error, at the time of discovery, was in the conservative direction, no immediate corrective action in the area of core operation was required.

   Our fuel manufacturer states that since May 24, 1973 they have implemented a Quality Assurance program that should catch this type of error. If the error in the conversion constants exceeds a detectable level (ie, 5 to 7 percent), Consumers Power Company core follow activities, as demonstrated, will detect the error. This occurrence demonstrates the purpose of core follow activities as conducted by Consumers Power Company in assuring that such errors do not exceed the 10 percent uncertainty which is factored into the in-core limits.

10. Failure Data: Not applicable.