



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

March 20, 1992

Docket No. 50-255

LICENSEE: Consumers Power Company

FACILITY: Palisades Plant

SUBJECT: SUMMARY OF MEETINGS WITH CONSUMERS POWER COMPANY PALISADES PLANT

Two technical meetings were held with Consumers Power Company (February 11 and February 26, 1992) to discuss their response to the revised Pressurized Thermal Shock (PTS) rule. Palisades' response, dated December 16, 1991, stated that the PTS screening criteria would be exceeded for the reactor vessel axial welds in November, 2005. NRR staff performed a preliminary review of the application, resulting in a series of questions regarding material chemistry data and reactor vessel fluence calculations.

The February 11 meeting was conducted in two sessions - Material Chemistry, followed by Reactor Vessel Fluence. Enclosure 1 provides a list of attendees and the handouts from each session. The meeting on February 26 was held to continue a discussion of fluence calculations for the Palisades Plant. Enclosure 2 provides a list of attendees and the handouts from that meeting.

Following these meetings, CPC officials presented an updated status of the PTS issues affecting the Palisades Plant to NRR senior management on March 3, 1992. Enclosure 3 provides a list of attendees and the handouts from this meeting. The following discussion summarizes all three meetings.

MATERIAL CHEMISTRY

Mr. David Joos, Vice-President for Energy Supply Services, provided a detailed discussion relating the background and current status of the Palisades reactor vessel chemistry. In 1986, under the original PTS rule, the Palisades baseplate metal was the limiting component (i.e., that reactor vessel material which caused the PTS screening criteria to be exceeded). Using the new guidance provided by Regulatory Guide 1.99, Rev. 2, the axial welds became the limiting component in the 1988 timeframe.

Palisades does not have plant specific weld specimens in their surveillance coupons. Palisades' weld chemistry is based upon the best estimate of the specific heat data (obtained from industry searches of weld records and specific weld surveillance test data). NRC review of the Palisades submittal revealed three weld data points, present in an NRC data base, that were not reported. Palisades, continued to perform verifications of its data base, and presented updated copper and nickel material concentrations for the

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critical welds. The expected date for reaching the PTS screening criteria, based on material chemistry composition, was not significantly affected with the inclusion of the new data points.

This conclusion, however, was based on excluding one questionable data point that has been previously reported to the staff. The NRC staff is continuing to review the information relating to both the chemical composition and the applicability of this data point. Additionally, questions regarding the range of weld sample concentrations (and whether the data is normally distributed), quality controls relating to weld wire manufacturing and weld wire heat control, and particulars concerning their 10 CFR 50, Appendix H surveillance program, were posed to the licensee. Additionally, CPC was requested to provide the staff an estimate of fluence accumulated (with the reactor critical at cold leg temperatures less than 525 degrees Fahrenheit).

CPC has committed to submit a revision to their December, 1991 PTS response following final verification of their material chemistry data base. Their final "best estimate" chemistry values are not expected to change significantly from the values reported in Enclosure 3.

#### REACTOR VESSEL FLUENCE

Since 1988, Palisades has employed flux reduction strategies to reduce neutron flux (by approximately a factor of four) in order to provide additional margin to the PTS screening criteria.

CPC has contracted with Westinghouse to perform plant specific reactor vessel fluence calculations. At the first two meetings, Messrs. Stan Anderson and E.P. Lippincott of Westinghouse presented information relating to generic fluence derivations from measurements, generic measurement precision and accuracies, and Palisades specific measurements and calculations.

The NRC staff had requested prior to the meeting that the following three points be addressed:

- a recently reported 13% nonconservative bias in the Westinghouse methodology which is not adequately addressed in the Palisades' submittal,
- surveillance capsule results have historically contained relatively large uncertainties. The code used for Palisades to evaluate uncertainties and modify calculated results has not been reviewed by the NRC staff. Additional data and a detailed description of the applied methodology is needed to evaluate the 10% uncertainty value used in the Palisades' submittal,
- the Palisades' submittal did not address recent information which shows that the iron scattering cross sections used in their calculations may be nonconservative (i.e., ENDF/B-IV versus ENDF/B-VI).

### Bias

CPC indicated at the meetings that their fluence data did not contain a 13% nonconservative bias similar to previously reported Westinghouse data. The Westinghouse bias resulted from calculated/measured (C/M) estimates for about 45 surveillance capsules, which on the average under-predicted fluence by 13%. CPC results, from a single Palisades surveillance capsule, showed that fluence was slightly over-predicted. CPC also contends that data from six cavity dosimetry measurements suggest that the bias does not apply to plants without a thermal shield surrounding the reactor vessel (like Palisades). Although the lack of a thermal shield is a possible explanation for the absence of a similar bias at the Palisades plant, enough information does not appear to be present to disregard potential biases between calculated and "real" fluence values.

Due to the inherent uncertainties in capsule measurements, the staff questioned CPC's position that a single data point provides adequate justification. The spread in the C/M data presented at the meetings shows a spread of 38%, hence conclusions from any single measurement are questionable. Additionally, regarding cavity dosimetry measurements, CPC was reminded that their associated uncertainties are even less well established than for capsules. Also, it was noted that the referenced measurements were not Palisades specific. CPC should evaluate the characteristics of the plants where the measurements were taken in order to rule out other reasons for a systematic difference in measurements.

### Uncertainties

The PTS rule includes a margin term ("M") which adjusts the reference temperature - PTS. This term was determined assuming an uncertainty in the fluence calculation of 20%. The revised Westinghouse method "corrects" the fluence calculation based upon capsule dosimetry and cavity dosimetry measurements. Inherent in this method is the assertion that the measured dosimetry values are the best available information. The staff reminded CPC during the meetings that capsule and cavity dosimetry measurement uncertainties are often large. The analysis provided by CPC asserted an uncertainty level, rather than a summed value determined from various contributing sources (e.g., uncertainties from such apparent sources as location, vessel ovality, neutron streaming in the cavity, dosimeter foil orientation, etc. were not explicitly addressed).

Furthermore, the plant measurement uncertainties discussed appear to imply greater accuracy than those estimated in the Poolside Critical Assembly experiments (a very carefully controlled set of experiments, under laboratory conditions). Therefore, the staff urged CPC to address in detail how the Westinghouse revised method ensures that an uncertainty value of 20%, assumed in the margin term of the PTS rule, is not exceeded.

Cross sections

Recent studies have suggested that the ENDF/B-IV cross sections (particularly iron) may be non-conservative by as much as 20% for deep metal penetrations. It is recognized by the staff that the question concerning ~~iron~~ cross section scattering is of a generic nature. As such, the staff informed CPC that while a rigorous assessment of using the latest cross sections is not required, the potential non-conservatism of lower inelastic scattering cross sections for iron should be addressed. At the meeting, CPC demonstrated that if the more recent cross section data was applied using their current methodology, a more conservative fluence would be calculated at the reactor vessel inner wall. The staff requested a more detailed explanation in their upcoming revised submittal.

SUMMARY

CPC plans on submitting a Topical Report, through Westinghouse, to address staff questions related to fluence calculation methodology. Additionally, CPC will be revising their December 16, 1991 response to the PTS rule to include their revised material chemistry data and expected date upon which they exceed the PTS screening criteria. CPC committed to provide these documents no later than April 30, 1992.

During the management briefing on March 3, 1992, CPC officials provided an updated assessment of both the material chemistry data and fluence calculations. This assessment indicates that the PTS screening criteria will not be exceeded before current license expiration. Additionally, CPC plans for further flux reduction efforts to provide additional margin to the screening criteria.

While the staff is not totally convinced that the screening criteria will not be reached until the year 2005 as proposed by the licensee in its December 16, 1991 submittal, we are confident that near term operation should not be impacted by the PTS issue. The staff will evaluate the upcoming Westinghouse topical report, and CPC revised submittal, before issuing a final safety evaluation addressing the Palisades PTS issue. In addition, the staff will review the licensee's position with respect to establishing an effective surveillance program. In the interim, the staff will document their current assessment in an interim safety evaluation.

Palisades plans on removing additional surveillance samples from both the in-vessel and reactor cavity locations this outage. The staff plans on evaluating data obtained from those measurements in conjunction with reviewing the Westinghouse topical report.

151

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