U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-255/90023(DRS)

Docket No. 50-255 License No. DPR-20

Licensee: Consumers Power Company
1945 West Parnall Road
Jackson, MI 49201

Facility Name: Palisades Nuclear Generating Plant

Inspection At: Bechtel Power Corporation, Gaithersburg, MD

Inspection Conducted: September 4-6, 1990 - Bechtel Power Corporation
August 30, 1990 - NRC Headquarters

Inspector: J. A. Gavula 9-25-90
J. A. Gavula Date

Approved By: D. H. Danielson 9/25/90
D. H. Danielson, Chief Date
Materials and Processes Section

Inspection Summary

Inspection on August 30 through September 6, 1990 (Report No. 50-255/90023(DRS))
Areas Inspected: Special safety inspection of licensee action associated with the Safety-Related Piping Reverification Program (37701). Piping and pipe support evaluations were reviewed for adequacy.
Results: No violations or deviations were identified. During the course of the inspection, the following strengths and weaknesses were noted:

- Because of the higher than expected re-analysis rates, the licensee acknowledged a potential for over-extension of the project management staff for oversight of its contractors.
- The extent of the Phase I portion of the reverification program was apparently not well understood by the licensee at the time the commitment was made to the NRC.
- Recent independent design verification activities are much more comprehensive than previous efforts.

DETAILS

1. Persons Contacted

Consumers Power Company (CPCo)

D. Malone, Plant Project Support Supervisor
M. Cimock, Plant Project Senior Engineer

Bechtel Corporation

R. Mays, Project Engineer
R. Jackson, Engineering Manager
R. Awan, Group Supervisor
S. Kalavar, Plant Design Staff
N. Kalyanam, Assistant Project Engineer
J. Brother, Chief Quality Engineer
D. Kasal, Manager, Quality Assurance

Nuclear Regulatory Commission (NRC)

B. Holian, Palisades Project Manager, NRR
A. Lee, Mechanical Engineer, NRR
J. Petrosino, Vendor Inspection Branch Inspector, NRR

2. Safety-Related Piping Reverification Program (SRPRP) Review

a. Background

During a 1989 NRC inspection of Palisades' snubber reduction design efforts, the validity of the calculations used as the design bases for these analyses was questioned. These calculations were, for the most part, performed for IE Bulletin (IEB) 79-14 during the 1979-1981 time frame. Because of the extent and fundamental nature of the errors found in these calculations, additional inspections to specifically review IEB 79-14 records were performed in order to evaluate the significance of the problem. Based on the findings from these inspections, CPCo committed to perform a comprehensive review of a portion of their safety-related piping systems in order to verify the adequacy of the existing plant configurations.

b. Management Meeting to Review Preliminary Results of SRPRP

A meeting was held on August 30, 1990, at the NRC Headquarters offices with representatives from CPCo, NRR and Region III staff members. This meeting was requested by CPCo to provide interim results of the piping reverification program. To date, five of the original 18 subsystems in the Phase I program have been completely reconciled. Of the five, three subsystems contained discrepancies which required a new computer analysis of the piping. The reanalyses resulted in significant support load increases which would require seven support modifications to return the systems to within FSAR

commitments. The other two subsystems had discrepancies which were reconciled using hand calculations only. Eight other subsystems have undergone partial reconciliation evaluations to demonstrate acceptability with regard to interim operability criteria.

c. Review of Piping and Pipe Support Calculations

The following calculations were reviewed for compliance with NRC requirements and licensee commitments:

- As-Built Reconciliation Report #03356, "Auxiliary Feed Pump Suction", August 17, 1990.

- As-Built Reconciliation Report #03360, "Low Pressure Safety Injection", August 16, 1990.

These two analyses were reconciled to FSAR criteria. The discrepancies in the first package which had to be evaluated included locations of supports, spring settings and nozzle thermal movements. All of these discrepancies were reconciled using simple hand calculations. No modifications were required. The discrepancies in the second package which had to be evaluated, included an unanalyzed restraint, valve weights, seismic response spectra, and seismic anchor movements. These discrepancies required a new computer analysis. A total of five support modifications will be required to return the piping system to within FSAR requirements.

- Calculation No. PD-GS-90-003, "H.P. Safety Injection Piping (Short Term Operability)", August 21, 1990.

- Calculation No. PD-GS-90-006, "Safety Injection Bottle to Primary Loops 1A, 2A, 1B, and 2B", August 10, 1990.

These two calculations were performed to confirm short term operability only. The piping analysis for the first system could not be readily retrieved, therefore a new analysis was required to reconcile the as-built configuration. Because of excessive gaps in the Z direction, two of the supports were initially considered inactive in the analysis. Subsequent analyses indicated that a total of six supports would need to be considered inactive because they exceeded the pipe support operability criteria. Operability was eventually demonstrated after several iterations.

For the second calculation, a new piping analysis was required to reconcile multiple design and as-built discrepancies. These discrepancies included seismic anchor motions, stress intensification factors, seismic response spectra, thermal anchor movements and excessive support gaps. Three supports were considered inactive in the analysis. The resulting piping stresses marginally exceeded FSAR limits but were well within the interim operability criteria.

During the reviews of the above calculations, several comments were made by the NRC inspector regarding minor oversights in the calculation. These oversights did not alter the conclusion of any of the analyses. In general, the calculations were well documented and no deficiencies were noted.

3. Deviation Report Review

During the course of the support inspections being performed under SRPRP, the licensee discovered gross deformation of pipe supports GCI-H747 and GCI-H765. These restraints support risers that are attached to two of the four Safety Injection Bottles inside containment. The wide flange structural members had buckled, the riser clamps were bent in the strong direction and threaded rods exhibited obvious necking. The cause of the observed damage according to Palisades Deviation Report No. D-PAL-90-098 was attributed to a waterhammer event, most likely in 1987.

The NRC inspector reviewed Palisades Calculation EA-SC-90-094-01, Revision 0, April 26, 1990, "Support GCI-H765(Q) Evaluation". This calculation documents the new support design which replaced the damaged supports. The overall support configuration was maintained; however, heavier structural sections and heavier pipe clamps were utilized to increase the safety margin of the design.

In addition, the NRC inspector reviewed Bechtel Calculation No. PD-GH-90-3365-001, Revision 0, May 29, 1990, "Qualification of Pipe Support No. GC-1-H765 and GC-1-H747". The purpose of this calculation was to evaluate the operability of the support, given the damaged conditions. Since the supports were replaced prior to restarting the unit, the evaluation was performed to assess past operability as opposed to justifying interim operation. During the review, the following questions were raised:

- Based on the observed deformation with only one wide flange being deformed, why is it valid to assume that the load will equally split between the two beams?

- In the deviation report event description section, the discussion refers to "cracklike weld indications for welds connecting the Y-flange to the shelf on the liner." How is this factored into the weld evaluation?

Subsequent NRC inspection at Bechtel Gaithersburg for this same system revealed that additional as-built and design discrepancies also existed in the piping analysis associated with this hanger. It was noted during the inspection that these other items were not factored back into the previous operability evaluation. Pending a review of the licensee's action to evaluate the consequences of this aspect as well as the above noted questions, this will be considered an Unresolved Item (255/90023-01).

No violations or deviations were noted.

4. Unresolved Items

An unresolved item is a matter about which more information is required in order to ascertain whether it is an acceptable item, an open item, a deviation, or a violation. The unresolved item disclosed during this inspection is discussed in Paragraph 3 of this report.

5. Exit Interview

The Region III inspector met with licensee representatives (denoted in Paragraph 1) at the conclusion of the inspection on September 6, 1990. The inspector summarized the purpose and findings of the inspection. The licensee representatives acknowledged this information. The inspector also discussed the likely informational content of the inspection report with regard to documents or processes reviewed during the inspection. The licensee representatives did not identify any such documents/processes as proprietary.