

APPENDIX

U. S. NUCLEAR REGULATORY COMMISSION
REGION IV

Report: 50-298/82-17

Docket: 50-298

License: DPR-46

Licensee: Nebraska Public Power District
P. O. Box 499
Columbus, Nebraska 68601

Facility Name: Cooper Nuclear Station

Inspection At: Cooper Nuclear Station Site, Nemaha County, Nebraska, and
Nebraska Public Power District Offices, Columbus, Nebraska

Inspection Conducted: June 21, 1982

Inspector: *D M Hunnicutt* 7/22/82
for J. I. Tapia, Reactor Inspector, Engineering Date
Section

Reviewed: *T F Westerman* 7/22/82
T. F. Westerman, Chief, Reactor Project Date
Section A

Approved: *D M Hunnicutt* 7/22/82
D. M. Hunnicutt, Chief, Engineering Date
Section

Inspection Summary

Inspection Conducted During The Period of June 21, 1982 (Report 50-298/82-17)

Areas Inspected: Special, announced followup inspection of the reactor vessel stud evaluation performed by Combustion Engineering, Inc., in response to the failure to detension the studs using a two-pass program. The inspection involved eight inspector-hours by one NRC inspector.

Results: No violations or deviations were identified.

Details1. Persons ContactedNebraska Public Power District

L. Lessor, Plant Superintendent
P. Borer, Engineering Supervisor

2. Reactor Vessel Head Removal

The NRC inspector performed an evaluation of the data and analysis dealing with the failure to detension and unbolt the reactor vessel head studs using a two-pass procedure. Cooper Nuclear Station Operations Manual Maintenance Procedure 7.4.4, "Reactor Vessel Head Removal and Installation," requires that the studs have their load reduced to about three-fourths of their load on the initial pass and subsequently, have their load reduced altogether on the second pass. Initial load reduction is to be accomplished by reducing the pressure on the pumping unit of the stud tensioner to 6,300 psi and then resetting the nuts. Full load pump pressure is equal to 8,100 psi.

As reported in NRC Inspection Report 50-298/82-16, 12 of 13 sets, with 4 studs each set, were fully detensioned in one pass. During the single-pass detensioning, the pump pressures required to stretch the bolts enough to release the nuts were noted by the maintenance personnel involved. The last set of four nuts could not be turned at a pump pressure of 11,500 psi. The refusal of the nuts at this pressure prompted a review of the procedure and a subsequent retensioning of all studs to the intermediate load of 6,300 psi prior to complete load removal.

Combustion Engineering, Inc., subsequently performed an evaluation to determine whether the last set of four studs had been overstressed beyond the minimum yield strength. The projected pump pressure for release of the four studs in set 13 along with the Biach Industries, Inc., Tensioner Manual curves were used to determine the theoretical axial stress applied. Stud bending stresses resulting from the combined rotation of the vessel head flange and the vessel body flange were calculated and combined with the axial stress to give the total maximum bolt stress for purposes of comparison to the certified mill test report minimum yield strength. The results of this analysis indicate that the studs were stressed to within 92 percent of their yield stress. The NRC inspector independently verified the calculations. The quantitative evaluation of the four studs also included elongation measurements which yielded no evidence of permanent strain, thereby verifying the stress calculations. Qualitative evaluation techniques included liquid penetrant dye examination and ultrasonic testing. The results of these nondestructive examinations were reviewed by the NRC inspector.

Since the studs in question satisfied both quantitative and qualitative acceptance criteria, the studs are considered acceptable for continued use.

3. Exit Interview

The NRC inspector met with Mr. L. C. Lessor, Station Superintendent, on June 21, 1982, and summarized the purpose and findings of the inspection.