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SUBJECT: Final deficiency rept re mounting of component cooling water pumps. Specific problem will be corrected by adding shear pins to all component cooling water pump-to-pump pedestal interfaces. Bechtel will evaluate all applicable pumps.

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 TITLE: Construction Deficiency Report (10CFR50.55E)

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L. T. PAPAY  
VICE PRESIDENT

August 21, 1980

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Mr. R. H. Engelken, Director  
Office of Inspection and Enforcement  
U. S. Nuclear Regulatory Commission  
Region V  
Suite 202, Walnut Creek Plaza  
1990 North California Boulevard  
Walnut Creek, California 94596

Dear Mr. Engelken:

Subject: Docket Nos. 50-361 and 50-362  
San Onofre Nuclear Generating Station, Units 2 and 3

In a letter to your office dated July 25, 1980, we identified a condition which we consider reportable in accordance with 10CFR50.55(e). The condition involves a deficiency in the design of the mounting bases for Component Cooling Water System Pumps. This design deficiency allowed excessive relative movement between pump and driver motor, resulting in pump bearing failure.

Enclosed in accordance with 10CFR50.55(e) are twenty-five (25) copies of a report entitled, "Final Report on Design Deficiency in the Mounting of the Component Cooling Water Pumps, San Onofre Nuclear Generating Station, Units 2 and 3".

If you have any questions regarding this report, we would be pleased to discuss this matter with you at your convenience.

Very truly yours,

Enclosures

cc: Victor Stello (NRC, Director I&E) ✓  
R. J. Pate (NRC, San Onofre Units 2 and 3)

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FINAL REPORT ON DESIGN DEFICIENCY IN THE MOUNTING  
OF THE COMPONENT COOLING WATER PUMPS

San Onofre Nuclear Generating Station, Units 2 and 3

INTRODUCTION

This report is submitted pursuant to 10CFR50.55(e)(3). It describes design deficiencies related to the failure of the Component Cooling Water (CCW) pumps to maintain alignment during prerequisite testing. This report also includes an analysis of safety implications and a summary of the corrective action taken. By letter dated July 25, 1980 Edison confirmed notification to the NRC of this condition.

BACKGROUND

During startup testing of the CCW system, the CCW pump bearings were found to be leaking oil. When the bearings were disassembled to repair the oil leaks, they were found to be wiped (bearing material was removed by the shaft due to lack of adequate clearance).

Upon investigation it was determined that the bearings wiped as a result of the pump moving out of alignment relative to the drive motor while operating. The movement was confirmed by dial indicators which monitored relative movement. The pump/motor relative movement was determined to be caused by two factors as follows:

1. An untied expansion joint is installed in the suction of each CCW pump. Since the expansion joints are untied, an operational load equal to the pump suction pressure multiplied by the effective area of the expansion joint is transmitted to the pump suction. The operational force is approximately 18,500 lbf.

The pump specification defines a pump suction nozzle load of approximately 80,000 lbf for hydrostatic testing. The normal operating thrust load of approximately 18,500 lbf was not explicitly defined by Bechtel. The pump supplier, Goulds Pumps, did not design the pump pedestal for a normal operating thrust load since the pump is not running during hydrostatic testing and no normal operating thrust load, due to untied bellows, was defined. As a result of the above, the normal suction thrust load of 18,500 lbf results in pump movement and resulting pump/motor misalignment. The pump/motor misalignment resulted in bearing failures.

2. A small oil leak exists on each bearing housing. This has lubricated the pump pedestals and has aggravated the problem by allowing the pumps to slide on the pump pedestals more easily than they would if the pedestal were dry.

## DISCUSSION

The following discussion is responsive to 10CFR50.55(e)(3).

### Description of Deficiency

The manner in which the design on nozzle loads were transmitted to the pump supplier left it unclear that the load due to the untied expansion joint was to be included as an operational load. As a result, the pump-to-pump pedestal interface was not designed for the normal operating horizontal thrust force. The pump supplier did check the structural integrity of the design to assure that the pump-to-pump pedestal interface would withstand the hydrostatic test force of approximately 80,000 lbf when not operating.

### Analysis of Safety Implication

The CCW pumps are in the CCW system. The CCW system provides cooling to various plant components required for normal plant operation, plant shutdown, and for mitigation of various design basis accidents.

Failure of the CCW pumps would impair the ability to safely shutdown the plant and/or mitigate various design basis accidents.

### Corrective Action

The pump supplier has been advised in writing that the CCW pumps are subjected to a steady state operating suction nozzle thrust load of 18,500 lbf in addition to all other operational loads. In order for the pump and drive motor to remain in alignment with this additional loading, the pump supplier has provided a design revision which consists of adding two 1/2 inch diameter by 4-1/2 long pins horizontally at the interface between the pump and the pedestal. This design provides approximately 4-1/2 square inches of metal in shear to resist the thrust force. This physical modification should be completed in September, 1980.

This modification and the normal operational thrust load will also be reflected in Goulds' seismic analysis which will be submitted by September 30, 1980.

In addition, the project is checking Bechtel equipment specifications for all safety related pumps to insure that any thrust forces due to untied expansion joints have been properly identified. Also, Bechtel is reviewing supplier calculations to verify that these forces have been adequately addressed. The above work will be documented in a project formal calculation by about October 30, 1980.

In conclusion, the specific problem has been defined and will be corrected by adding shear pins to all CCW pump-to-pump pedestal interfaces. A Bechtel task force will evaluate all other safety related pumps with suction and/or discharge bellows to insure that the pump design adequately considers all operational loads. This effort will be completed by about October 30, 1980.