

U. S. NUCLEAR REGULATORY COMMISSION  
REGION V

Report No: 50-528/87-26

Docket No: 50-528

License No: NPF-41

Licensee: Arizona Nuclear Power Project  
P. O. Box 52034  
Phoenix, Arizona 85072-2034

Facility Name: Palo Verde Nuclear Generating Station Unit 1

Inspection Conducted: July 15, 1987 through July 17, 1987

Inspectors: Robert J. Pate 8/14/87  
R. Pate, Chief, Reactor Safety Branch Date Signed

M. G. McCullough 8-11-87  
M. G. McCullough, Engineering Aide Date Signed

Approved By: Robert J. Pate / for 8/14/87  
S. Richards, Chief, Engineering Section Date Signed

Summary:

Inspection on July 15, 1987, through July 17, 1987 (Report No. 50-523/87-26)

Areas Inspected: A special reactive inspection on the mechanical seal failure on low pressure safety injection pumps. Inspection procedure 93702 was used for this inspection.

Results: Of the areas inspected, no violations were identified.



## DETAILS

### 1. Persons Contacted

- \*J. Bynum, Plant Manager
- \*R. Baron, Commitment Supervisor, Compliance
- \*I. Zeringue, Manager, Technical Support
- \*T. Shriver, Manager, Compliance
- \*W. Simko, Supervisor, Operations Engineering (Mechanical)
- \*L. Souza, Assistant Director, Quality Assurance/Quality Control
  - E. Gouvier, Senior Electrical Engineer, Environmental Qualifications
  - B. Kuntz, Engineer, Combustion Engineering
  - T. Hall, Engineer, Operations Engineering
  - R. Papworth, Manager, Operations Engineering

\*Attended exit meeting on July 17, 1987.

### 2. Low Pressure Safety Injection Pump Seal Failure

On July 4, 1987, with the Unit 1 reactor in Mode 4, the low pressure safety injection (LPSI) "A" pump tripped from a motor overcurrent condition. The "A" pump had been placed in service on July 2, 1987, when the "B" LPSI pump was placed in standby due to excessive pump seal leakage. At the time of the LPSI "A" pump trip, a smoke alarm had been received from the LPSI "A" pump room. However, investigation revealed that no fire had occurred. Following the pump trip, the LPSI "B" pump was placed into service and the reactor was cooled until it reached Mode 5.

Once the reactor was placed in Mode 5 following the "A" pump trip, the LPSI "B" pump was shut off and the Containment Spray (CS) "B" pump was placed in shutdown cooling mode. The "B" LPSI pump was estimated to be leaking at a rate of approximately 1 gpm on July 4, 1987. On July 17, 1987, the last day of this inspection, the LPSI "B" pump was being disassembled in order to determine what caused the leak.

An inspection of the "A" LPSI pump mechanical seal was completed by the licensee on July 10, 1987. The shaft packing "O-ring" was found swollen but pliable. At the time of the inspection, the licensee stated that the two remaining "O-rings" were not swollen. Both the tungsten-carbide rotating seal face and the stationary carbon seal face were worn and chipping had occurred on the face of the inner diameter of the stationary seal.

The licensee believes that the motor failure was a direct result of the pump seal failure.

The failed "A" LPSI pump "O-ring" has been sent to Westinghouse for chemical analysis. The licensee believes that the most probable cause of the "O-ring" swelling is due to a chemical reaction with some type of solvent. However, at this time, they are still pursuing heat degradation as a possible failure mechanism.

As a part of this analysis, the licensee will be autoclaving a new "O-ring" and an "O-ring" from the Unit 3 containment spray pump believed to have been treated with a chemical solvent called "Enviroguard", to observe heat degradation effects. A new "O-ring" was sprayed with "Enviroguard" and it swelled overnight.

Inspection of the LPSI "A" pump motor bearing by the licensee revealed the lower oil reservoir to be low on oil and the oil contaminated with a black foreign substance. An analysis of the oil revealed the black substance to be magnetite, a form of iron oxide.

Based on the preliminary analysis of seal failure of the Unit 1 LPSI pump, a justification for continued operation was submitted for Unit 2 on July 13, 1987. The licensee found no evidence to indicate that an undesirable lubricant or solvent was used in assembly of the Unit 2 LPSI or CS pumps. Additionally, water slingers have been installed on all Unit 2 LPSI and CS pump shafts to prevent water from leaking into the lower motor bearing in the event of a seal failure. Maintenance procedures have been modified to include instructions prohibiting use of any type of petroleum based lubricant or solvent on the LPSI or CS pumps.

Disassembly of the Unit 3 CS pump revealed degraded "O-rings" in the mechanical seal. All three "O-rings" were swollen, and one of the "O-rings" smelled like orange peel, leading the licensee to believe the most probable cause of the degradation to be the solvent "Enviroguard", which also smells like orange peel. These "O-rings" are also being sent to Westinghouse for chemical analysis.

Since the licensee's investigation of the event is not complete and there are several unanswered questions, this is an unresolved item. (87-26-01)

### 3. Exit Meeting

The inspectors met with licensee management representatives denoted in paragraph 1 on July 17, 1987. The scope of the inspection, observations and findings as noted in this report were discussed.

