EA-88-182

U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report No: 50-528/88-24

Docket No: 50-528

License No: NPF-41

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

Facility Name: Palo Verde Nuclear Generating Station Unit 1

Inspection Conducted: July 5-8, 1988

Inspector: FOR 7-14-88
T. Polich, Senior Resident Inspector Date Signed

Approved By: 7-14-88
S. Richards, Chief, Engineering Section Date Signed

Summary:

Special Inspection on July 5 through July 8, 1988 (Report Number 50-528/88-24).

Areas Inspected: This special inspection reviewed the inoperability of both trains of Essential Chilled Water at Unit 1 during the period of May 20-29, 1988. During this inspection the following inspection modules were covered: 30703 and 93702.

Results: One violation of Technical Specifications was identified in that two trains of Essential Chilled Water were inoperable for a period of approximately nine days.

DETAILS

1. Persons Contacted:

The below listed technical and supervisory personnel were among those contacted:

Arizona Nuclear Power Project (ANPP)

*J. Allen	Plant Manager, Unit 1
*W. Doyle, Jr.	Manager, Unit 2 Radiation Protection
*J. Driscoll	Assistant Vice President, ANPP Admin.
*R. Gouge	Operations Manager, Unit 3
*J. Haynes	Vice President, Nuclear Production
*W. Ide	Plant Manager, Unit 2
*D. Karner	Exec. Vice President, ANPP Administration
*J. Kirby	Director, Site Services
*R. Logan	Supervisor, Central Radiation Protection
*K. Oberdorf	Manager, Unit 1 Radiation Protection
*T. Schriver	Manager, Compliance
*J. Sills	Supervisor, Radiation Protection Standards

The inspector also talked with other licensee and contractor personnel during the course of the inspection.

*Attended the Exit Meeting on July 8, 1988.

2. Inspection Background

The Essential Chilled Water (EC) system consists of two 100 percent capacity chilled water trains. Each train consists of a single 100 percent capacity essential chiller unit. The EC system supplies chilled water to the Essential Air Cooling Units (ACUs) for the Control Building, Auxiliary Building, and Main Steam Support Structure.

At approximately 0955 MST on May 29, 1988, a manual start attempt was made on the Train "A" Essential Chiller to support surveillance testing of the steam driven Auxiliary Feedwater pump. When the chiller did not start, an Auxiliary Operator (AO) was sent to investigate the chiller breaker and found no indication of an electrical fault. The AO was directed to the local annunciator panel for further investigation and found a low flow alarm indicated. A second attempt was made to start the chiller and was again unsuccessful. The Assistant Shift Supervisor (A/SS) then went to the Control Building to investigate the valve lineup, in accordance with the alarm response procedure. The A/SS found that the root isolation valves for the flow instrumentation loop were closed. The flow instrumentation loop consists of a non-safety related flow indicator gauge with isolation valves; and a safety related flow transmitter, which supplies a signal to satisfy a compressor "run" interlock. The "as found" valve lineup was contrary to the proper system lineup, because the safety related flow transmitter was isolated, preventing the transmitter from sensing system water flow and thereby satisfying the compressor run interlock. The licensee immediately entered Technical Specification Limiting Condition for Operation (LCO) 3.7.6 and concurrently opened the root isolation valves. The chiller was successfully started and the Train "A" EC system was declared operable at 1020 MST.

The operability of Train "B" was then investigated and Train "B" was declared inoperable at 1022 MST. The root isolations for the Train "B" instrumentation loop were also found isolated and subsequently opened. The Train "B" EC system was declared operable at 1040 MST after successfully starting the "B" chiller.

A yellow plastic caution sign was mounted near both sets of root isolation valves. The sign read "CAUTION valves to remain closed except when reading gauge."

The licensee initiated a four hour notification to the NRC Operation Center and initiated an internal report, Potentially Reportable Occurrence (PRO) No. 1-88-065. Subsequently the licensee initiated a Special Plant Event Evaluation and submitted Licensee Event Report (LER) 1-88-017 to the NRC, which describes the above event in detail.

3. Inspection Findings

The inspector performed a review to determine the circumstances which led to this event.

Valve alignment procedures 410P-1EC01 and 410P-1EC02 were revised on May 11, 1988, to include a note indicating the importance of assuring that non-class flow indicators are isolated from the class flow transmitter loop. The valve alignments were properly performed in all three units when the revision was implemented.

A Unit 3 Shift Supervisor, in response to the procedure revision, had a set of yellow laminated plastic signs made for all three units. The signs read, "CAUTION valves to remain closed except when reading gauge." The Shift Supervisor did not inform his management or the management of the other units of his decision to make or install the signs. When the signs were made, Unit 3 installed the signs near the flow indicators' isolation valves and delivered the remaining signs to Units 1 and 2.

On May 19, 1988, both Essential Chillers were operated satisfactorily. On May 20, 1988, Unit 1 received two signs and a note with the flow indicator numbers and no additional instructions as to their intended use. The Assistant Shift Supervisor (A/SS) did not inform the Shift Supervisor of the signs, but directed a Reactor Operator (RO) to research the appropriate Operating Procedures for more information. The RO found the appropriate procedure pages in 410P-1EC01 and 410P-1EC02 and copied those pages. The RO also looked up the valves that were located nearest the flow instrument valves on the system drawing and wrote those valve numbers on the note containing the flow indicator numbers that accompanied the signs. The numbered valves were the flow instrumentation loop root isolation valves, which are the last valves shown and numbered on system drawings. The licensee does not label local instrumentation isolation valves. The RO then called a relief shift Auxiliary Operator (AO) to hang the signs. When the AO arrived in the Control Room he was given the signs, the note containing flow indicator and valve numbers, and the appropriate pages from the valve alignment procedures. The RO told the AO to hang the signs on the flow indicators. A phone call then interrupted the RO, and when he finished the phone conversation, the AO was gone and had not

taken the copies of the valve alignment procedure pages. Since the AO was reading the information when the phone rang, the RO assumed the AO understood the instructions and didn't need the valve alignment procedure pages. The AO proceeded to the Control Building and located the instruments and valves on the note and installed the signs next to the valves which he observed to be root isolation valves. When the AO installed the signs, he also noted that the valves were open and closed them to correspond to the directions on the signs. The AO traced the valves to the flow indicators to ensure that the valves did, in fact, isolate the flow indicator. He also observed that the valves isolated a flow transmitter. The AO returned to the Control Room and informed the A/SS that he had hung the signs, shut the valves, and asked if there was any paper work to fill out. The A/SS assumed that the AO had installed the signs correctly, and that the valves the AO closed were the local instrumentation isolation valves and not the instrumentation root valves. In an interview with the AO, he stated that at the time, he had made a statement, not specifically directed to the A/SS, as to how stupid he thought it was to isolate all flow indication. The A/SS was not aware of the AO's comment and did not respond. The AO stated to the inspector that since he did not get a response and it was not his normal crew, he did not feel free to pursue the matter any further. Thus, the valves remained closed and the signs installed at the incorrect location until the discovery by the licensee on May 29, 1988.

4. Licensee Followup

The licensee has described the event in Licensee Event Report (LER) 88-017-00, dated June 28, 1988. The LER classified the event as a condition prohibited by Technical Specifications, a condition which could have resulted in the plant being in an unanalyzed condition that significantly compromised plant safety, and an event that could have prevented the fulfillment of the safety function of a system needed to mitigate the consequences of an accident.

The licensee determined the root cause to be a cognitive personnel error on the part of the Auxiliary Operator (AO) and Reactor Operator (RO), in that they did not take adequate measures to ensure that the signs were placed properly. First, inadequate communication occurred between the two operators in that the direction given was not sufficient to ensure that the tags were properly placed. Second, the AO repositioned the flow transmitter valves without proper valve position documentation and verification as required by Operating Department Guidelines. Finally, the AO and Assistant Shift Supervisor did not ensure that appropriate actions were taken upon closing of the valves due to inadequate communications.

The licensee is conducting an evaluation to determine the effects of the loss of essential chillers. Based on this evaluation the licensee will provide a supplement to LER 88-017 describing the safety consequences and implications of the event.

The licensee's immediate corrective actions consisted of returning the chillers to service and placing the caution signs in the correct location. The corresponding valves at Units 2 and 3 were checked and found to be properly positioned. As an interim corrective action, warning labels will not be installed without the Plant Manager's approval. Management directives were issued requiring all Unit 1 operations personnel to review administrative requirements governing valve manipulation, and for all Unit 1 personnel to be more formal in communications when discussing plant status and to adopt a more conservative approach when plant conditions or indications are off normal.

As long term corrective action a policy regarding the installation and control of warning tags will be developed and implemented. The administrative controls for conduct of Shift Operations will be revised to delineate communications standards. Additionally, a Human Performance Evaluation System (HPES) review is being performed. The specific corrective actions which result from HPES will also be included in the supplement to the LER.

The licensee conducted a Special Plant Event Evaluation to determine why the Essential Chilled (EC) water flow instrumentation loop root valves were closed, contrary to the valve alignment procedures. The results of the evaluation are documented in Special Plant Event Evaluation Report (SPEER) number 88-01-007. This report was approved by licensee management on June 30, 1988.

The SPEER noted the following three concerns as a result of the investigation.

1. The EC system was rendered inoperable when the flow instrumentation loop root valves were closed instead of the flow indicator isolation valves. The valves were closed during the installation of a laminated information tag. No guidance is provided for control of these tags within the plant.

2. The communications between the individuals performing the installations of the tags was not adequate.

3. The flow transmitter root valves were repositioned without proper valve position verification notification per Operating Department Guidelines.

The resolution and analysis of each concern were discussed in the SPEER, as well as the recommended corrective actions. The corrective actions for concern 1 are scheduled to be complete within 90 days from the approval of the SPEER. And the corrective actions associated with concerns 2 and 3 are to be completed within 60 days.

5. <u>Conclusions</u>

Unit 1 was operating in Mode 1 for the entire period that the Essential Chilled Water Trains "A" and "B" were rendered inoperable. This is a violation of Technical Specification 3.7.6, which requires both trains of Essential Chilled Water to be operable in Modes 1, 2, 3, and 4 (50-528/88-24-01).

The AO showed a disregard for Administrative Controls and Operations Department Guidelines concerning manipulation of safety system valves and the tracking of those manipulations. Ineffective communication was noted between the Unit 3 Shift Supervisor and Unit 1, with regard to the purpose for placement of the warning signs; between the Unit 1 RO and AO as to the instructions to install the signs and not manipulate valves; and between the Unit 1 AO and the A/SS as to the safety system valve manipulations that took place and the documentation required for their manipulation. Additionally, the inspector was concerned with the relief shift AO's apparent reluctance to clearly stress to the A/SS his concern that isolation of all flow indication was improper.

As mentioned in paragraph 4, the licensee's investigation appears to have encompassed the inspector's concerns and conclusions, with the exception of the information which will be obtained by further licensee evaluations and included in a supplement to LER 88-017.

6. Exit Meeting

The inspector met with licensee management representatives periodically during the inspection and held an exit on July 8, 1988. During the exit meeting, the inspector discussed recent operating experiences involving personnel error, emphasizing the need for greater attention to detail and management attention.