U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report Nos. 50-528/89-09, 50-529/89-09, 50-530/89-09

Docket Nos. 50-528, 50-529, 50-530

License Nos. NPF-41, NPF-51, NPF-74

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

Facility Name: Palo Verde Nuclear Generating Station (PVNGS) Units 1, 2 and 3

Inspection at: Palo Verde Site, Wintersburg, Arizona

Inspection Conducted: February 13 - March 3, 1989

Inspector: _____ for
C. A. Clark, Reactor Inspector — Date Signed: 3-23-89

Approved by: _____
S. A. Richards, Chief
Engineering Section — Date Signed: 3-23-89

Inspection Summary:

Inspection During the Period February 13 - March 3, 1989 (Report Nos. 528/89-01, 50-529/89-01, 50-530/89-01)

Areas Inspected: An unannounced routine inspection by one regional inspector of activities involved in inservice testing of pumps and valves, and followup of a Part 21 notification. Inspection Procedure Nos. 30703, 73756 and 92701 were used as guidance for the inspection.

Results:

General Conclusions

While the licensee's existing basic IST program appeared to be adequate in the areas reviewed, the inspector had two concerns. First, the licensee IST and/or system engineer procedures do not appear to clearly identify what licensee corrective actions are required, once the trended IST performance parameters indicate licensee corrective action is needed. The existing procedures also do not identify when corrective actions shall be initiated. Second, the licensee engineering evaluation department procedures do not identify that a documented engineering review is required when the operational readiness of ASME code pumps and valves is questioned by an increase in the frequency of IST surveillance testing. The licensee is in the process of revising IST program, and issuing new IST procedures, as the result of the

latest NRR program review. The licensee is also taking actions to improve the system engineering training and procedures. The two IST concerns identified above were discussed with licensee personnel during this inspection and should be included in any revisions in these two areas.

Significant Safety Matters: None

Summary of Violations or Deviations: None

Open Items Summary: Two new followup items (paragraphs 2.b and 2.c) were identified and one Part 21 (paragraph 3) was closed during this inspection.

DETAILS

1. Persons Contacted

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

Arizona Nuclear Power Project (ANPP)

*R. Kropp, Supervisor, Technical Support
T. Weber, Lead Engineer, Technical Support
G. Irick, Section XI Engineer
B. McCaskey, Associate Engineer
S. Karimi, Compliance Engineer
*T. Shriver, Compliance Manager
W. Simko, Supervisor, Civil/Mechanical Engineering
H. Maxweld, Technical Engineer

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

*Attended the Exit Meeting on February 17, 1989.

2. Inservice Testing of Pumps and Valves (73756)

a. IST Program Status

The NRR staff's Safety Evaluation Report (SER) of the Palo Verde Nuclear Generating Station, Units 1, 2 and 3, Inservice Testing (IST) program for pumps and valves was issued to the licensee on November 15, 1988. The November 15, 1988 letter from G. W. Knighton (NRR) to D. B. Karner (ANPP), identified that the first ten year intervals started on the date of commercial operation for each unit. The first ten year intervals were identified as January 28, 1986 to January 28, 1996 for Unit 1; September 30, 1986 to September 30, 1996 for Unit 2; and January 8, 1988 to January 8, 1998 for Unit 3. This letter identified that the SER incorporated the Technical Evaluation Report (TER) and findings prepared by EG&G Idaho Inc., and that the licensee IST program was acceptable for implementation, provided the omissions and inconsistencies identified in Appendix C of the TER were addressed within three months of the receipt of the SER.

As of the date of this inspection, the licensee was in the process of generating new site procedures, and procedure changes to address the information identified in Appendix C of the TER. The new procedures and procedure changes required to implement the changes to the IST program, are scheduled to be issued toward the end of March of 1989.

b. IST Procedures

The licensee implemented the policies and procedures for inservice testing of pumps and valves through various site procedures. During this inspection the inspector performed a cursory review of the latest revisions of the following procedures:

- 73AC-9ZZ04, Rev. 6, "Surveillance Testing"
- 73AC-0X102, Rev. 1, "Inservice Testing of Safety Related Pumps and Valves"
- 32MT-9ZZ66, Rev. 2, "Vibration Monitoring"
- Various other issued surveillance test procedures and maintenance documents related to IST pump and valve testing

During the review of IST procedures, the following was noted.

- While these procedures assigned responsibilities to persons and organizations for the majority of IST activities, and discussed indoctrination of the administrative aspects of surveillance testing with appropriate personnel, they did not appear to cover any detailed training for licensee personnel implementing IST surveillance procedures. After this concern was discussed with the licensee, they identified they were aware of the need to provide training in this area, and were working on this item.

- These procedures discussed trending of performance parameters per the ASME code, for both pumps and valves, and increasing the frequency of testing when trending results required an increase. What these procedures did not appear to identify was what corrective actions the licensee was going to take once trended data indicated corrective action was required and who would identify the corrective action.

These procedures should clearly identify what licensee corrective actions are required, and that all corrective actions, follow-up investigations and evaluations performed, shall be formally documented in the appropriate licensee formal records. After this concern was discussed with the licensee, they identified that they were in the process of issuing new IST procedures, improving the System Engineer program and procedures (such as 70PR-0AP01, Revision 0, "System Engineer Program"), and that this concern should be addressed in the new procedures and program improvements. The question on what IST or system engineering procedure instructions the licensee has issued to their personnel, to ensure acceptable corrective actions are identified and followed per ASME code Section XI requirements, will be carried as a followup item (50-528/89-09-01). To close this item, the licensee will have to identify which procedures ensure that acceptable ASME code section XI corrective actions are identified, and document, for equipment that has indicated an unacceptable change in trended performance parameters.

c. IST Records

Various IST records for pumps and valves were examined, and the following was identified:

(1) There appeared to be a reoccurring problem with valves CHB-HV203 and CHA-HV205, which are two inch solenoid actuated globe valves in the Unit One chemical and volume control system. These valves are RCS pressure boundary valves. These pressurizer auxiliary spray valves received full stroke time testing per Appendix A of procedure 73ST-1ZZ08, Revision 0, PCN No. 11, "Section XI valve stroke timing - Mode 5 and 6." The maximum stroke time for these ISI class 1 valves is 5 seconds in the open or close direction, per the pump and valve Inservice Testing Program PV-1, Unit 1, Revision 0. The auxiliary spray is a manually operated system.

The licensee records show the following ASME Section XI history stroke times for valve CHB-HV203 and CHA-HV205.

Valve 1J-CHB-HV203

Test Date	Stroke Times: Open	Closed (seconds)	
1-22-87	0.57	0.40	
2-10-87	0.35	0.49	
4-29-87	0.57	0.41	
7-22-87	0.98	3.48	increased over 748%*
8-20-87	0.66	3.02	
8-31-87	0.80	3.00	
12-21-87	0.60	0.40	after valve repair
1-12-88	0.71	0.27	
1-28-88	0.41	0.31	
2-27-88	0.84	3.59	increased over a 1000%*
3-1-88	0.85	2.94	
3-25-88	0.63	3.17	
4-22-88	1.10	3.10	
5-18-88	0.99	2.39	
6-15-88	0.74	2.49	
7-13-88	0.67	3.56	
8-9-88	0.41	0.52	after valve repaired**

* placed on an increased frequency test schedule

** returned to normal testing frequency 8-17-88

Valve 1J-CHA-HV 205

Test Date	Stroke Times: Open	Close (seconds)	
4-29-87	0.52	0.43	
7-21-87	0.57	3.09	increased over 618%*
8-20-87	0.59	2.05	

8-31-87		0.70	2.12	
12-21-87		0.58	0.30	after valve repair
1-12-88		0.43	0.19	
1-28-88]	5 months	0.43	0.26	
7-13-88]	between IST tests	1.42	4.50	increased over 1631%*
8-9-88		0.61	0.56	after valve repair

* placed on an increased frequency test schedule

** returned to normal testing frequency 8-17-88

On July 20, 1988, Engineering Evaluation Request (EER) #88-CH-108 was written on the increased valve stroke times observed during the testing of the Unit 1 pressurizer auxiliary spray valves CHB-HV203 and CHA-HV205. This EER identified the following information:

- Valve CHA-HV205 stroke time in the close direction increased from 0.26 seconds to 4.50 seconds during a July 13, 1988 test, or approximately a 1630% increase.
- A TSCCR #1-88-496 was written July 18, 1988 based on observed excessive stroke times and the valves were declared inoperable.
- During testing on July 20, 1988, valve CHA-HV205 failed to fully close during one stroke test.
- Both valves had been reworked prior to December 21, 1987, to correct unacceptable increases in valve stroke times.
- Engineering recommended that the valves be reworked.
- The engineering analyses noted that degradation of these valves is a generic problem. Due to the equipment qualification effort for NUREG 0588, the target rock auxiliary spray valves for Units 2 and 3 were replaced with valcor valves to meet plant schedules. The valcor valves have a better operability record and are not subject to the same type of degradation that occurs with the target rock valves. Unit 1 should consider replacement of the existing valves with the valcor valves.

As a result of the corrective action follow per ERR #88-CH-108, EER #88-CH-117 was issued August 4, 1988 to document the latest evaluation of the root cause for the increase in valve stroke times. This EER recommended the following:

- Valves should be stroke time tested in modes 5 or 6 with no flow to maintain consistency in comparisons of the valve stroke times.

° Target rock valves should be replaced with valcor valves at the first convenient outage when the parts are available.

Based on review of the above information, it does not appear that the licensee took effective corrective actions after the failure of these valves prior to December of 1987, until they were declared inoperable in July of 1988. The licensee could not provide any documentation that they had investigated the February 27, 1988 1000% increase in valve CHB-HV203 stroke time, until five months later when both valves were declared inoperable. The inspector concluded that the licensee should be particularly sensitive to these valves due to the important function they serve during events requiring depressurization of the reactor coolant system.

(2) Valve SIA-UV645, a twelve inch motor actuated globe valve in the Unit 1 safety injection system, with a maximum open stroke time of 10 seconds, has exhibited erratic valve stroke times as identified below:

Test Date	Open Stroke Time (seconds)	
9-20-88	2.50	
11-22-88	6.06	increased over 142%
12-19-88	2.58	
1-15-89	2.70	

The licensee could not provide any documentation that they had investigated or analyzed this 142% increase in valve stroke time.

(3) Valve SIA-UV660, a four inch solenoid actuated globe valve in the Unit 2 safety injection system, with a maximum closing stroke time of 10 seconds, has exhibited erratic valve stroke times as identified below:

Test Date	Close Stroke Times (seconds)	
2-18-88	5.34	
5-31-88	7.52	
6-1-88	1.30	
6-22-88	4.59	increased over 250%
7-25-88	1.16	
8-9-88	2.23	
9-8-88	3.95	
10-7-88	2.99	
11-8-88	4.37	
11-27-88	2.76	
12-2-88	4.56	
12-23-88	4.67	
1-19-89	4.85	

The licensee could not provide any documentation that they had investigated or analyzed these erratic valve stroke times.

The licensee's IST group reviews section XI performance parameters data, trends the required data and initiates the increase testing frequency for applicable equipment. Applicable system engineers in the Engineering Evaluation Department (EED) are notified when plant equipment has been placed on an increase frequency testing schedule, by receipt of a copy of the increased frequency data sheet. As the result of recent changes in EED, the applicable system engineer is now required to trend section XI valve and pump test data.

It is at this point that another weakness in the section XI data review system appears. The licensee could not identify during this inspection, which licensee procedures identify when corrective actions should be initiated after section XI equipment exhibits unacceptable trended test quantities. It appears the licensee is insensitive to the trended section XI test data, which indicates that the acceptable operational readiness of this section XI equipment is being questioned. In some of the records reviewed, it appears the system engineers did not initiate corrective action until either a valve failed or a scheduled outage. There was no documentation that an engineering analysis of section XI equipment placed on an increased frequency of testing for several months, had been performed. When this concern was discussed with the licensee, they stated they would take a look at this area during the review of the system engineer program, and the improvements in this area they are working on. This is a followup item (50-529/89-09-02). To close this item the licensee procedures providing guidance in this area will have to be reviewed by an inspector. These procedures should ensure that the trended testing data that generated the placement of section XI tested equipment on an increase frequency testing schedule, receives immediate documented engineering review for operational readiness.

d. Work Observations

The inspector observed the following surveillance testing:

(1) The Unit 1, February 16, 1989 test per procedure 73ST-1ZZ05, Rev. 0, PCN No. 1-8, essential cooling water train 'A' surge tank supply from DW check valves EWA-V018 and EWA-V103. The performance of this test appeared to provide acceptable results, and the inspector did not identify any concerns.

(2) A Unit 2, February 14, 1989 test per procedure 42ST-2AF01, Rev. 2, "Aux feedwater pump AFN-P01 operability 4.7.1.2.a" was delayed for various reasons. During the inspector preliminary review of the test procedure and test area, the inspector identified that the location of one of the orange IRD checkout sticker/paint markers installed on the A (plant south) end of

the Unit 2 pump (for vibration testing), did not agree with the locations on the same pumps in Units 1 and 3. These markers locate the vibration pickup probe attachment point. Since vibration data for these pumps are sometimes compared between units, the vibration readings should all be taken from similar locations on the pumps. This concern was discussed with the licensee, and they agreed to perform a survey of the placement of all existing vibration target/location markers on Section XI equipment. The licensee agreed to change the locations as required to ensure that the vibration data is measured in similar locations on similar equipment from unit to unit. The licensee stated they would try to complete this survey and any relocation work over the next six months, or by August 1989.

No violations or deviations were identified in the areas reviewed.

3. Followup (92701)

(Closed) Part 21 Report 88-14-P, "Cooper Bessemer Standby Diesel/ Generator KSV-20-T Fuel Nozzle Tips - Cracks"

This Part 21 was issued by Cooper Bessemer, to identify that some fuel nozzle tips had been found with cracks, permitting diesel fuel to be sprayed into the affected cylinders of an engine in an uncontrolled manner. The defective bendix spray nozzles (P/N 10-37597) appear to have had a high failure rate due to improper heat treatment. A January 23, 1989 letter identified that Cooper-Bessemer had found bendix lot no. 001124 and 150008 susceptible to cracking. This letter requested the licensee to identify the quantities and serial numbers of the tips the licensee had on-site, so arrangements could be made to exchange the questionable tips for new ones.

A February 13, 1989 licensee letter identified that six fuel injector tips from lot number 001124 were installed in unit 3 engines and thirty one fuel injector tips from lot number 150008 were located in the licensee warehouse as spares.

In this letter, the licensee identified that they were awaiting directions from Cooper as to the details of returning the subject fuel injector tips for replacement.

It appears the licensee is aware of this problem and is taking appropriate corrective action to preclude any problems.

This item is closed.

4. Exit Meeting

The inspector met with licensee management representatives denoted in paragraph 1 on February 17, 1989. The scope of the inspection and the inspector's finding up to the time of the meeting were discussed. At this meeting the inspector identified that he had obtained some information and requested additional information be sent to the regional office, that would be reviewed later in the region, with the findings

documented in this report. The information was reviewed and the findings included in paragraphs 2 and 3 of this report.