



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION II  
101 MARIETTA STREET, N.W.  
ATLANTA, GEORGIA 30323

Report No.: 50-348/85-30 and 50-364/85-30

Licensee: Alabama Power Company  
600 North 18th Street  
Birmingham, AL 35291

Docket Nos.: 50-348 and 50-364

License Nos.: NPF-2 and NPF-8

Facility Name: Farley 1 and 2

Inspection Conducted: July 10-12, 1985

Inspector: M. A. Scott  
M. A. Scott

8/13/85  
Date Signed

Approved by: FOR R. W. Wright  
G. A. Belisle, Section Chief  
Division of Reactor Safety

8/13/85  
Date Signed

SUMMARY

Scope: This routine, unannounced inspection entailed 14 inspector-hours on site in the areas of surveillance testing and calibration control.

Results: One violation was identified - Failure to follow administrative procedure FNP-0-AP-63.

## REPORT DETAILS

### 1. Persons Contacted

#### Licensee Employees

T. Arute, Unit 1 Control Room Shift Supervisor  
\*T. Cherry, Instrument and Control (I&C) Supervisor  
\*R. Coleman, System Performance Supervisor  
S. Fulner, Unit 2 Control Room Shift Supervisor  
\*R. Hill, Operations Supervisor  
J. Isler, Unit Operator  
M. Lovett, Unit Operator  
\*J. McGowan, Manager, Safety Audit and Engineering Review (SAER) Staff  
\*D. Morey, Assistant Plant Manager - Operations  
J. Odom, Unit Supervisor  
\*B. VanLandingham, Unit Supervisor  
\*L. Ward, Maintenance Supervisor  
\*W. Ware, SAER Supervisor  
\*W. Warren, SAER Staff  
R. Wiggins, Sector Supervisor, Operations - Training  
\*L. Williams, Training Director

Other licensee employees contacted included engineers, technicians, operators, and office personnel.

#### NRC Resident Inspector

\*W. Bradford

\*Attended exit interview

### 2. Exit Interview

The inspection scope and findings were summarized on July 12, 1985, with those persons indicated in paragraph 1 above. The inspector described the areas inspected and discussed in detail the inspection findings listed below.

Violation: Failure to Follow Administrative Procedure FNP-0-AP-63, paragraph 4a .

Inspector Follow Item: Pump Vibration Testing, paragraph 4b.

The above inspector followup item had been identified to the licensee as a violation at the exit interview. Subsequent NRC management review determined that a violation was not warranted; however, questions remain relating to some aspects of vibration measurements. The licensee was

informed of this determination during a telephone conversation conducted on August 9, 1985.

The licensee did not identify as proprietary any of the material provided to or reviewed by the inspector during this inspection.

3. Licensee Action on Previous Enforcement Matters

This subject was not addressed in the inspection.

4. Surveillance Testing and Calibration Control (61725)

- References:
- (a) 10 CFR 50, Appendix B, Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants
  - (b) Regulatory Guide 1.33, Quality Assurance Program Requirements (Operation)
  - (c) ANSI N18.7-1972, Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants
  - (d) Technical Specifications, Section 4
  - (e) Inservice Testing Program, FNP-2-M-019, Revision 3
  - (f) Inservice Plan for Pump and Valve Testing, FNP-2-M-008, Revision 1

This inspection was a continuation of the inspection effort initiated with Inspection Report 50-348/85-25 and 50-364/85-25 during June 3-7, 1985. The inspector examined certain details of the surveillance test and inservice test program.

The I&C laboratory had three types of portable vibration meters (Vitec Model 368, IRD Model 306, and IRD Model 320) available for use in testing. The inspector reviewed surveillance test packages on a number of safety-related pumps for identification of meter type; the type of meters used on the tests were the IRD Model 306 and 320. The inspector reviewed meter technical specifications and found the two models compatible. The unit operators have been instructed to use the IRD models.

The pump surveillance test data book for each unit contains the reference or baseline values indicated in Article IWP-3110 of Section XI of the ASME Boiler and Pressure Vessel Code for pump differential pressure and vibration. The data books are loose leaf binders kept in the control rooms. When a surveillance test is performed, the surveillance procedure directs the tester to obtain the reference value from the data book prior to performing the test since individual procedures do not contain reference values. Although the process would be time consuming and, should it be

necessary, test data packages could be retrieved from files which would contain reference values.

There are two sets of vibration reference values for the component cooling water (CCW) pump 2A in the surveillance test data book. The double set of values was due to pump system alignment with different trains in operation which caused variations in vibration levels in each mode. The set of values taken in the non-normal alignment was higher in level than the set taken in the normal alignment. The inspector asked which set of values was used during performance of the surveillance test. Although the use of lower level values is not specifically documented, it was indicated that they were used. The inspector reviewed selected CCW 2A pump test packages and verified that the lower level values were utilized.

Within this area, one violation and one inspector followup item were identified and are discussed in the following paragraphs.

a. Failure to Follow Administrative Procedure FNP-O-AP-63

The licensee is committed to reference (c). Section 5.1.2 stated that procedures shall be followed. Section 17.2.5 of the FSAR reiterates this requirement. FNP-O-AP-63, Conduct of Operations - System Performance Group, Revision 1, paragraph 4.2 requires that surveillance tests be reviewed and evaluated, a list of tests shall be maintained, and the review shall be documented by signature. The inspector reviewed the System Performance Group's list of components to be evaluated. The inspector reviewed 165 test review sheets from completed tests and found that 35 of the tests had not been reviewed or evaluated. This failure to review and evaluate completed surveillance tests is identified as violation 348, 364/85-30-01.

b. Pump Vibration Testing

The licensee is committed to ASME Boiler and Pressure Vessel Code, Section XI, requirements as indicated in references (d), (e) and (f). Section 4.0.5 of reference (d) indicates that inservice testing of ASME Code pumps shall be performed in accordance with Section XI except where specific written relief has been granted. References (e) and (f), which are approved by the NRC, do not provide relief from vibration testing requirements for pumps. Section XI, articles IWP-3110, IWP-4115, and IWP-4520 require that instruments whose readings are position sensitive shall be either permanently mounted or provision shall be made to duplicate position for each test and that for a portable-type vibration indicator, the probe or measurement reference point shall be clearly identified to permit subsequent duplication in both location and plane.

As indicated previously, the IRD models 306 and 320 vibration meters are used for pump testing. The probes have parallel magnetic bars which attach to the pump's bearing housing to provide sensory pick up.

The parallel bars are approximately two inches in length, approximately one inch apart, and are flat at the point of housing contact.

The inspector observed CCW pumps and meter probe mounting locations. The mounting sites were areas where paint had been removed by the multiple applications of the probes. The sites where the paint had been removed were approximately 3 inches x 3 inches with scars in the paint outside of the main denuded areas; the total area where the probe could be mounted was approximately 4 inches x 4 inches. The mounting locations were rough, nicked and slightly curved which would make proper probe attachment improbable. Some percentage of the probe's parallel bars would not make contact with the bearings housing. There were no clear markings present on the bearing housing where the probe could be positioned to duplicate measurement.

Prior to this inspection, vibration meter training for licensee personnel performing surveillance tests had occurred during operator license training. The inspector reviewed the License Training Program Qualification Requirements, On-Shift Requirements of December 1984. The operations employees in training observed qualified personnel perform vibration measurements, they performed the measurement themselves, and a licensed operator signed the completion of the trainee's on-the-job-training.

During the inspection, the inspector was informed that new, additional vibration meter training for operations personnel was taking place. The inspector reviewed the vibration course handout, dated July 1985. The inspector was informed that there was no practical application section associated with the course where the trainee could learn or demonstrate a level of proficiency with the meters on actual pump configurations. The handout discussed vibration theory and aspects of the IRD 306 and 320 meters. Attached to the handout was a copy of General Maintenance Procedure GMP-5.0, Vibration Measurement Using Hand Held Detector, Revision 2. The contents of GMP-5.0 were not addressed in the testable, course objectives listed in the handout, nor was the procedure referenced in the text of the handout. GMP-5.0, which is used by Maintenance personnel, conflicted with the handout in that GMP-5.0, which dealt with the IRD 306 meter only, indicated that the probe should be firmly held during vibration measurement while the handout indicated that the probe may be hand held or mounted in position. Neither document made a distinction as to which probe type, straight or magnetic base, was to be used. GMP-5.0 addressed locating the probe as close as possible to the centerline of bearing and addressed the 90 degree planar orientation (horizontal and vertical) of the two measurement locations relative to the pump shaft centerline while the handout did not. The pump's bearing housing centerline does not always reflect the center line of the bearing within the housing and often the housing could be integral with a portion of the pump body or nonsymmetrical such that locating the bearing centerline would be difficult. Neither the handout or GMP-5.0 addressed use of the meter's probe on a rough or curved surface, orientation of the magnetic bars of



the probe relative to the shaft's axis, or what to do should obstructions around the pump make measurement difficult. Neither document addressed locating the probe on defined points or areas which could be duplicated in subsequent testing.

The inspector separately interviewed two unit operators who perform surveillance tests about aspects of vibration testing. Both operators had only used the magnetic base probe and neither had attended the vibration course nor was familiar with GMP-5.0. Points covered in the discussion were as follows:

- The inspector asked whether or not their training had stressed the horizontal or vertical (planar) orientation of the probe. One operator indicated yes while the other indicated no.
- The inspector questioned if the specific area on a bearing housing for measurement was identified. Both personnel indicated that there was no identification. The inspector was told that no safety related pumps had markings on their bearing housings where vibration measurements were to be taken.
- The inspector asked whether or not the probe was hand held during measurement. One operator indicated that he did not hold the probe due to the fact that applying pressure dampened the levels of the output of the meter. The other operator indicated that he did hand hold the probe in the horizontal plane.
- Both operators indicated that stable measurements were difficult to achieve on some pumps due to surface roughness, paint buildup, and curvature of the bearing housing not allowing the probe to mount solidly.
- The unit operators were asked which orientation they placed the parallel bars of the magnetic probe. One operator aligned the bars with the shaft while the other aligned the bars cross shaft. One employee said in some instances a diagonal orientation may be required due to bearing housing configuration and/or curvature.
- The personnel indicated that calculated averaging of multiple readings was not performed as indicated in Article IWP-4114 of Section XI of the ASME Code. The probe was moved around on the bearing housing until a stable reading was achieved. One operator indicated that he had seen a change of two mils (reading level) at different locations in one plane while taking one measurement.
- The operators indicated that by test procedure requirement they would record the reference value from the test data book prior to performing a given test.

Administrative Procedure FNP-0-AP-63, which was discussed previously, addresses trending of pump surveillance test data. The inspector

analyzed randomly selected vibration data on CCW pump 2A which is displayed as follows:

Date of Test	Horizontal Vibration In Mils	Vertical Vibration In Mils
4-83	1.1	7.6*
6-83	2.8	1.3
9-83	1.9	7.5
12-83	1.0	7.3
6-84	0.9	8.2
9-84	1.3	5.2
3-85	1.1	7.8
Mean	1.5	6.2
Standard Deviation	$\pm 0.7$	$\pm 2.6$

\*baseline reference value established

The mean and standard deviation (SD) indicated above are the statistical averages and the associated deviation about the mean, respectively. The six sets of data which were statistically reduced were taken chronologically after the establishment of new reference values in April 1983; some data sets within the above indicated time span were not recorded although the tests were performed. The SDs are slightly less than one half the mean which would cause problems should SDs remain the same or increase proportionally as vibration levels approached alert or action range (i.e., as the pump degrades) in that entry into these ranges may not be recognizable. The higher vibration levels in the above data sets do not occur in the latest tests which makes trending pump degradation difficult. More vibration data for more pumps and different types of pumps will require analysis to resolve trending questions.

Until vibration testing performed during pump surveillance testing can be demonstrated to meet ASME Code requirements, and the pump vibration data can be reviewed for adequate trending analysis, this item is identified as Inspector Followup Item 348, 364/85-30-02.