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

Report Nos.: 50-348/88-11 and 50-364/88-11

Licensee: Alabama Power Company
600 North 18th Street
Birmingham, AL 35291-0400

Docket Nos.: 50-384 and 50-364 License Nos.: NPF-2 and NPF-8

Facility Name: Farley 1 and 2

Inspection Conducted: March 28-31, 1988

Inspectors: R. W. Newsome 4-21-88
R. W. Newsome Date Signed

B. R. Crowley 4/21/88
B. R. Crowley Date Signed

Approved by: J. J. Blake 4/22/88
J. J. Blake, Chief Date Signed
Materials and Processes Section
Division of Reactor Safety

SUMMARY

Scope: This routine, unannounced inspection was in the areas of documentation review for welding activities and Nondestructive Examinations (NDE) associated with events related to Unit 2, Loop B, Safety Injection System (SIS), six inch pipe replacement welds as a result of the through wall crack detected in December 1987 and commitments agreed to by the licensee at that time. Also, a review of examination data generated during the Unit 2 Inservice Inspection (ISI) was accomplished. Order for modification of license relative to primary coolant pressure isolation valves (Unit 1) and IE Bulletin 87-02 (Fastener Testing) (Units 1 and 2) were reviewed.

Results: No violations or deviations were identified.

REPORT DETAILS

1. Persons Contacted

*S. Burns, Senior Project Engineer
*D. Canady, Safety Audit and Review Supervisor
*R. Coleman, Systems Performance Supervisor
*M. Dove, Senior Engineer
*D. Hartline, Systems Performance Engineering, Supervising
*C. Levy, General Plant Engineer
*R. Martin, General Plant Engineer
*D. Morey, Assistant General Manager, Operations
S. Norman, Maintenance Specialist
*W. Shipman, Assistant General Manager, Support
*L. Stinson, Manager, Preventative Maintenance
*J. Thomas, Maintenance Manager
W. Ware, Quality Control Engineer
*G. Waymire, General Plant Engineer

Other licensee employees contacted included engineers, technicians, mechanics, security force members, and office personnel.

NRC Resident Inspectors

*W. Bradford, Senior Resident Inspector
*W. Miller, Resident Inspector

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on March 31, 1988, with those persons indicated in paragraph 1 above. The inspectors described the areas inspected and discussed in detail the inspection findings. No dissenting comments were received from the licensee.

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

Note: An alphabetical tabulation of acronyms used in this report is listed in Paragraph 9.

3. Licensee Action on Previous Enforcement Matters

This subject was not addressed in the inspection.

4. Unresolved Items

Unresolved Items were not identified during this inspection.

5. SIS Piping Replacement (Unit 2)

a. Background (Refer to NRC Report Number 50-348, 364/87-36 for additional information)

(1) On December 9, 1987, reactor coolant leakage was detected in Unit 2, Loop 2, at a location downstream of Check Valve V051B, on the cold leg SIS at a 90 degree elbow weld identified on ISI isometric drawing APR-I-4210 as weld number 16.

(2) The [illegible] bow and straight runs of pipe at each end of the crac[illegible] oow to pipe weld were removed from the SIS. This port[illegible] the SIS contained Weld 16. The removal effort was acco[illegible]ned by cutting the weld located at Valve V051B (the upstr[illegible]m side of the 90° elbow) and by making a second cut in the SIS at the main coolant loop nozzle to SIS pipe weld. By making the cuts at these locations, no additional welds were introduced into the system. A replacement 90° elbow and a section of 6", schedule 160, [illegible] stainless steel pipe was used for replacement of the removed [illegible]on.

b. Cracked Weld: Metallurgical and Failure Mode Examination Results

The removed section of the Loop 2, SIS, containing the defective pipe weld was shipped to the Westinghouse (W) R&D hot cell laboratory for evaluation to determine the mechanism and causes of the cracking of the weld joint and to develop information that would be helpful in taking corrective actions. The investigation centered around the six inch diameter pipe-to-elbow joint containing the crack and resulted, in part, in the following findings:

(1) Surface Examinations

The OD surface of the pipe appeared generally clean and bright with little evidence of surface attack or deposits. (Evidence of some minor denting and nicking marks was apparent). The OD surface appearance of the leak region as seen by light optical microscopy suggests the presence of minor mechanical dent and scratch marks and evidence of a faintly visible crack-like defect at the leak region. The defect, however, did not appear as a well defined crack. Also, no evidence of seepage or leak stains was apparent. For this reason it could not be conclusively confirmed that the defect corresponds to the actual throughwall crack through which the observed leakage had occurred.

Examination by light optical microscopy of the ID surface of the elbow to pipe weld at the leak region revealed two circumferentially oriented cracks, one on each side of the weld. The crack on the pipe side appeared to have run right along the weld metal

to base metal interface and terminated into the weld metal at the 6 o'clock region. The crack on the elbow side ran along the machining grooves in the counterbore region in the base metal and terminated in the counter bore region of the base metal near the 6 o'clock location. The crack on the pipe side measured approximately 3 inches long, extending circumferentially from approximately the 8 o'clock to 6 o'clock location of the pipe. The crack on the elbow side also measured approximately 3 inches long, and extended from the 4 o'clock to 6 o'clock region of the pipe. No evidence of any link-up of the two cracks was seen on the ID surface.

(2) Metallographic Examinations

The results of the light optical metallographic examinations showed that the cracking appeared to be deepest at the 6 o'clock region of the pipe extending close to the OD surface of the pipe. The cracking on the pipe side was initiated at the weld interface on the ID surface and progressed entirely through the weld metal towards the OD surface. The crack in the elbow appeared to have been initiated at the knee of the counterbore region on the ID surface, progressed through the base metal and terminated into the weld metal. The cracking primarily followed transgranular morphology. The cracking appeared relatively straight with very little branching. No evidence of crack deposits was seen. These observations suggest that the crack progression most likely occurred under the influence of axial loads. The presence of multiple crack initiation sites at the machining grooves in the counter bore region of the elbow confirm that crack initiation occurred at the ID surface. Machining grooves appeared to have served as preferred sites due to the effect of stress concentration.

(3) Fractographic Examinations

The results of the light optical and scanning electron fractographic examinations of the pipe, where leaking was detected, show a wide crack initiation region at the ID surface resembling a typical thumb nail pattern. Radial flow lines originating from the ID surface and extending all the way up to the OD surface suggest that crack progression occurred from the ID to the OD surface. Local regions at the OD surface where the crack has broken throughwall can be seen. Low magnification scanning electron fractographs show typical transgranular fracture morphology seen at the crack mouth and crack-tip regions.

The scanning electron fractographs of the laboratory fractured freshly opened crack on the pipe side show the morphology of the field and the laboratory fractured regions. The laboratory

induced fracture showed dimpled morphology. Evidence of faintly appearing fatigue striations can be seen on the field fracture. The fractographs show clear evidence of fatigue striations all the way up to the crack-tip region of the fracture face. This suggests that the crack progression occurred by cyclic loads axial to the pipe.

(4) Chemistry Evaluations

Energy dispersive X-ray spectra results of the chemistry analysis of the crack deposits failed to confirm any evidence of detrimental elements contributing to the cracking process. The wet chemistry analysis results of the pipe, elbow, and the weld materials show that the elbow and the pipe materials met the type 304 stainless steel requirements while the weld metal meets the type 308 stainless steel stick eletrode requirements.

(5) Hardness Measurements

The hardness levels corresponded to an approximate strength level of 70 ksi for the pipe and elbow materials and 91 ksi for the weld metal. These were within the expected values.

(6) Conclusions

The metallurgical evaluations clearly suggests that the observed cracking in the SIS line weld was initiated at the ID surface and progressed radially outward towards the OD surface of the pipe. The cracking occurred by high cycle fatigue mechanism. Machining marks in the counter bore region (in the elbow) and the weld interface (in the pipe) served as preferred sites for crack initiation. The fatigue striation spacings on the fracture face varied between 3×10^{-6} in. to 8×10^{-6} in.

c. SIS Replacement Welds - NDE Review

The inspectors examined documents, and records as indicated below, to determined whether NDE activities were being conducted in accordance with applicable procedures, regulatory requirements, and licensee commitments. The visual (VT) and liquid penetrant (PT) examinations were being performed by W while the radiography (RT) of the new welds was done by Alabama Power (AP) site personnel.

(1) The inspectors reviewed the procedures indicated below to determine whether the procedures were consistent with regulatory requirements and licensee commitments. The procedures were also reviewed in the areas of procedure approval, requirements for qualification of NDE personnel, and compilation of required records; and if applicable, division of responsibility between the licensee and contractor personnel.

Procedure	Title
(W) NDE-210 (RO)	Liquid Penetrant Examination
(W) NDE-110 (RO)	Visual Examination
(AP) CDM-NDE-01 Proc. No. 3.0 (R2)	Nondestructive Examination Procedure for Radiographic Inspection of Weldments and Components

(a) The inspectors reviewed RT Procedure CDM-NDE-01 No. 3.0. to determined whether it contained sufficient information to assure that the following parameters were specified and controlled within the limits permitted by the applicable code, or any additional specification requirements: type of material to be radiographed; material and weld surface condition requirements; type of radiation source, effective focal spot or effective source size; film brand or type; number of films in cassette; minimum source to film distance; type and thickness of intensifying screens and filters; quality of radiographs; film density and contrast for single and composite viewing; use of densitometers for assuring compliance with film density requirements; system of radiograph identification; use of location markers; methods of reducing and testing for back-scatter; selection of penetrameters including penetrameter placement; number of penetrameters; shims under penetrameters; radiographic technique for double wall viewing; and, evaluation and disposition of radiographs.

(b) The inspectors reviewed visual examination Procedure NDE-110 to determine whether it contained sufficient instructions to assure that the following parameters were specified and controlled within the limits permitted by the applicable code, standard, or any additional specification requirements: method - direct visual, remote visual or translucent visual; application - hydrostatic testing, fabrication procedure, visual examination of welds, leak testing, etc.; how visual examination is to be performed, type of surface condition available; method or implement used for surface preparation, if any; whether direct or remote viewing is used; special illumination instruments or equipment to be used, if any; sequence of performing examination, when applicable; data to be tabulated, if any; acceptance criteria is specified and consistent with the applicable code section or controlling specification; and, report form completion.

(c) The inspectors reviewed liquid penetrant Procedure NDE-210 to ascertain whether it had been reviewed and approved in accordance with the licensee's established QA procedures. The procedure was reviewed for technical adequacy and conformance with the ASME code Section V, Article 6, and other licensee commitments/requirements in the following listed areas: specified method; penetrant material identification; penetrant materials analyzed for sulfur; penetrant materials analyzed for total halogens; acceptable pre-examination surface; drying time; method of penetrant application; surface temperature; solvent removal; surface drying prior to developing; type of developer; examination technique and evaluation technique.

(2) The inspectors reviewed certification records of materials and NDE personnel which had been utilized during the required examinations. The reviews conducted by the inspectors are documented below.

(a) The inspectors reviewed the qualification documentation for 5 PT & 3 VT W and 2 RT AP examiners in the following areas: employer's name; person certified; activity qualified to perform; effective period of certification; signature of employer's designated representatives; basis used for certifications; and annual visual acuity, color vision examination and periodic recertification.

(b) The inspectors reviewed the below listed liquid penetrant materials certification records to ascertain if the sulfur and halogen content of the material was within acceptable content limits.

Materials	Batch Number
Liquid Penetrant	86J018, 84C025
Cleaner/Remover	85G056, 86B001
Developer	85M052, 86J015

(3) The below listed final weld acceptance radiographic films of the replacement welds, as shows on Sketch 87FTS-1213H, were reviewed to determine if radiographic quality was in accordance with the applicable procedure and Code requirements and to specifically verify the following: penetrameter sensitivity; film density and density variation; film identification; film quality; and, weld identification.

Description	Weld No.	Film Reviewed
RCP Nozzle-to-Pipe	FW-1	0-3½, 3½-7, 7-10½, 10½-13½, 13½-16½, 16½-0
Pipe-to-Elbow	FW-2	0-3½, 3½-7, 7-10½, 10½-14, 14-17½, 17½-0
Elbow-to-Pipe	FW-3	0-3½,3½-7, 7-10½, 10½-14, 14-17½, 17½-0
Pipe-to-Valve	FW-4	0-3½, 3½-6½, 6½-11, 11-14, 14-18, 18-0

The inspectors reviewed the accompanying examination records for the above listed welds to determine compliance with procedure requirements for examination records and to determine if disposition of the welds radiographed was in compliance with applicable Code and specification requirements.

d. SIS Replacement Welds - Review of Weld Records (55050)

The inspectors reviewed the weld records, as detailed below, for the SIS pipe replacement. The applicable code for the welding was the ASME B&PV Code, 1974 edition with addenda through S75.

(1) Maintenance Work Request (MWR) 158877 and referenced Maintenance Procedure MP-92.0, Safety Injection Pipe Repair Plan, were reviewed.

(2) Weld records, Weld Data Forms, for Welds 1, 2, 3, 4, 5 and 6 were reviewed. Welds 1, 2, 3 and 4 were 6" diameter welds on the main SI pipe run between valve Q2E11V05B and the B Loop Nozzle. Weld 5 attached a small diameter weldolet to the 6" diameter pipe. Weld 6 was between the weldolet and a small diameter pipe. All materials were stainless steel. Welds 1, 2, 3, 4 and 6 were made by W and Weld 5 was made by APCo.

(3) Welder qualification and qualification status records for the below listed welders, who performed the welding listed in Paragraph (2) above, were reviewed and compared with code requirements.

M50
M61
M96

M122
M126
M136
M152
M167
F14

(4) Welding material certification records for the below listed materials, used for the welds listed in Paragraph (2) above, were reviewed and compared with code requirements.

3/32" ER 308L - Ht. S73395

1/8" ER 308L - Ht. S468433

1/8" ER 308L - Ht. S9E0813

1/8" E 308L-16 - Lot 4094

3/32" E 308L-16 - Ht. P5097

(5) Welding Procedure Specifications 5801 (W), 1800 (W) and 8.23N (APCo), used for the welds listed in Paragraph (2) above, were reviewed and compared with code requirements.

e. Licensee Commitments Associated to SIS Cracked Weld

(1) Refer to NRC report 50-348, 364/87-36 for specific details.

During the review of original fabrication radiographs for all similar system welds in Loops 1 and 3 in Unit 2, a possible indication was noted in Loop 1 weld B. The licensee agreed to radiograph this weld prior to Unit 2 returning to power. Weld B, Loop 1, was radiographed and these film and associated documentation was reviewed by the inspectors. The radiographs reviewed did not show any evidence of the possible indications noted previously. This commitment is considered fulfilled.

(2) Refer to NRC Reports 50-348, 364/87-36 and 50-364/87-27 for specific details.

The licensee agreed to conduct a visual examination of the inside surface of the SIS nozzle to main coolant piping on Loop 2, in Unit 2, following the cracked weld removal and prior to welding the replacement piping into place. This examination was to be conducted in order to assure that no cracking of the nozzle basemetal had taken place when the thermal sleeve at this location was dislodged. The inspectors reviewed the visual examination documentation and the video tape record of the visual examination conducted on the basemetal surface while

using a borescope with variable magnification. The visual examinations did not show any evidence of basemetal cracking in the areas examined. This commitment is considered fulfilled.

Within the areas inspected, no violations or deviations were identified.

6. Inservice Inspection (ISI)/Preservice Inspection (PSI) Unit 2

The inspectors examined documents and records as indicated below to determine whether ISI was being conducted in accordance with applicable procedures, regulatory requirements, and licensee commitments. The applicable code for ISI is American Society of Mechanical Engineers Boiler and Pressure Vessel (ASME B&PV) Code, Section XI, 1974 Edition with addenda through Summer 1975. Westinghouse (W) has the responsibility as the ISI contractor with Southern Company Services (SCS) conducting overview functions. SCS conducted the PSI of the new welds in Loop B, SIS.

a. ISI/PSI Data Review and Evaluation, (73755)

Records of completed nondestructive examinations were selected and reviewed to ascertain whether: the method(s), technique, and extent of the examination complied with the applicable NDE procedures; findings were properly recorded and evaluated by qualified personnel; programmatic deviations were recorded as required; personnel, instruments, calibration blocks, and NDE materials (penetrants, couplants) were designated. Records selected for this review are listed below.

Sketch	Weld/Item No.	NDE Method
APR-1-6200	Valve Body Item 15	VT
APR-2-2110	4-14	MT
APR-2-2110	4-16	MT
APR-2-2310	4-LS	UT
APR-2-2314	52-LS	UT
APR-2-2317	1-LS	UT
APR-2-2317	2-LS	UT
APR-2-2700	258	VT
APR-2-2700	259	VT
APR-2-2700	260	VT
APR-2-2700	261	VT
APR-2-2700	262	VT
APR-1-4210	*15 (FW-4)	UT
APR-1-4210	*16 (FW-3)	UT
APR-1-4210	*17 (FW-2)	UT
APR-1-4210	*18 (FW-1)	UT

*New welds, PSI data reviewed.

b. Work Activities (73753B)

The inspectors reviewed certification records of equipment, materials, and NDE personnel, that was extracted from the examination data records review noted in Paragraph a. above, and were used during the required examinations. The reviews conducted by the inspectors are documented below.

(1) Examiner Qualifications

The inspectors reviewed the qualification documentation for the below listed W and SCS examiners in the following areas: employer's name; person certified; activity qualified to perform; effective period of certification; signature of employer's designated representatives; basis used for certification; and annual visual acuity, color vision examination and periodic recertification.

		Method - Level			
Company	Examiner	UT	MT	PT	VT
W	PJK	II	II	II	I
W	GAM	II	II	II	II
W	RSC	I	--	II	I
W	JDF	II	II	II	II
SCS	RRS	II	--	II	--
SCS	KSJ	III	--	III	II
SCS	ELM	III	--	II	--

(2) The following listed ultrasonic equipment and materials certification records were reviewed:

Ultrasonic Instruments

Manufacturer/Model	Serial No.
USK/7	27276-4309-2
USK/7	27276-4314-2
USK/7	27276-4317-2
SONIC/MK1	11222E
SONIC/MK1	08078E
SONIC/MK1	06208E

Ultrasonic IIW block - Serial No. 793392

Ultrasonic couplant - Sonotrace 40, Batch No. 8662

Ultrasonic Transducers

Size	Frequency	Serial No.
.5	2.25 MHz	J21437
.375	5.0 MHz	F16624
.25	5.0 MHz	60281
.375	2.25 MHz	031294
.25	5.0 MHz	56207
.375	1.5 MHz	15149

(3) The following listed magnetic particle equipment and material certification records were reviewed.

(a) Documentation indicating that a ten pound lift test had been performed on magnetic particle AC Yoke Y-004.

(b) Magnetic particle material certification records for Batch Number 86C083 indicated the sulfur and halogen content of the material was within acceptable content limits.

Within the areas inspected, no violations or deviations were identified.

7. Temporary Instruction (TI) 2515/84 - Verification of Compliance with Order for Modifications of Licensee: Primary Coolant System Pressure Isolation (Event V) Valves (Unit 1)

The Reactor Safety Study (RSS), WASH-1400, identified in a PWR an intersystem Loss of Coolant Accident (LOCA) that is a significant contributor to risk of core melt accidents (Event V). The design examined in the RSS contained in-series check valves isolating the high pressure Primary Coolant System (PCS) from the Low Pressure Injection System (LPIS) piping. The scenario which leads to the Event V accident is initiated by the failure of these check valves to function as a pressure isolation barrier against Reactor Coolant System (RCS) pressure. This causes an overpressurization and rupture of the LPIS low pressure piping which results in a LOCA that bypasses containment.

To better define the Event V concern, all light water reactor licensees were requested by letter, dated February 23, 1980, to provide certain information relative to the valve configurations of concern. Alabama Power Company's response to the February letter is dated March 24, 1980. On April 20, 1981, an order requiring periodic testing of the check valves of concern was issued.

On March 13, 1987, the NRC issued Generic Letter 87-06 requesting licensee's to provide a list of Pressure Isolation Valves (PIV) and details of leak rate testing. The licensee's letter of response is dated June 5, 1987.

The purpose of the current inspection was to verify satisfactory completion of licensee actions in implementation of periodic Event V valve testing specified in the 1981 order.

The following summarizes the inspector's review:

a. The inspectors reviewed the licensee's history of testing PIVs. The 1981 order required periodic testing of Low Head Injection Check Valves Q1E21V077A, Q1E21V077B, Q1E21V076A, and Q1E21V076B. The leakage acceptance criteria of the order included a maximum leakage rate of 5.0 gallons per minute (gpm) provided the latest measured rate had not exceeded the rate determined by the previous test by an amount that reduced the margin between measured leakage rate and the maximum permissible leakage rate and the maximum permissible rate of 5.0 gpm by 50% or greater. The licensee has periodically leak tested these valves and a number of other PIVs in the Safety Injection (SI), Residual Heat Removal (RHR) and Boron Injection (BI) systems from the beginning of operations for both Units 1 and 2.

   The valves covered by the order were added to the Unit 1 Technical Specification (TS) by amendment issued with the order. The issue was first addressed for Unit 2 during the NRC operating license review. The valves covered by the Unit 1 order and a number of other PIVs in the SI, RHR and BI systems were included in the Unit 2 TS. The acceptance criteria for leakage specified a maximum allowable leakage rate of 1.0 gpm for Unit 2. The original list of PIVs being tested included 16 Unit 1 valves and 34 Unit 2 valves.

   By letter dated August 10, 1982, APCo requested that Unit 2 TS be changed to agree with Unit 1 relative to leak rate acceptance criteria. Another letter issued on July 8, 1983, requested a one time temporary TS change for Unit 2 as the August 10, 1982 request was still outstanding. This request was approved by the NRC on November 24, 1982.

   The NRC and APCo continued to review the list of PIVs for Units 1 and 2 as part of the review of the Inservice Testing Program (IST). By letter dated May 2, 1983, the NRC documented completion of review of the Unit 1 IST program and recommended that Unit 1 TS be revised to include a list of PIVs corresponding to the list in the Unit 2 TS. By letters dated July 5, September 27, and November 28, 1983, APCo submitted additional information that enabled NRC and APCo to arrive at an appropriate list of PIV's for Units 1 and 2. The NRC concurred with the list by letter dated January 26, 1984. The lists included 20 valves on each unit including the four Unit 1 valves covered by the 1981 order. On April 10, 1984, APCo submitted a proposed TS change for Units 1 and 2 for leakage testing of RCS PIVs. The proposed change standardized the list of PIVs for the two units and revised the leakage acceptance criteria per guidance included in the September 8, 1983, SER for Amendment 25 to the Unit 2 TS. NRC

concurred with the proposed change and issued Amendments 50 and 41 for Units 1 and 2, respectively, by letter dated October 15, 1984. These amendments contain the current leakage acceptance criteria and list of PIVs.

b. The inspectors reviewed the current Unit 1 TS to assure that the modification required by the order was included in the TS.

c. Surveillance Test Procedure FNP-1-STP-158, Revision 9, covering all PIVs, including Event V valves, was reviewed to verify that test procedures reflected all requirements of the TS including:

- Use of an acceptable test method-direct volumetric leakage rate or other equivalent means capable of demonstrating that leakage rate limits given in the TS were not exceeded. The licensee uses a direct volumetric leakage rate method.

- Procedures to ensure that leakage rates obtained are for individual valves rather than for combined components.

- Procedures requiring that leakage rates received at test pressures less than the maximum potential pressure differential across the valve be adjusted by assuming leakage to be directly proportional to the pressure differential to the one half power as noted in the SER which accompanies the order.

- Technical Specification acceptance criteria and corrective action.

d. The inspectors reviewed the on-site copy of the Event V order, licensee correspondence as detailed in Paragraph a. above, the original SER and the latest revision of the TS. These documents and test methodology were discussed with responsible licensee personnel. In addition, test data, Procedure FNP-1-STP-158, for the four PIVs listed in Paragraph a. above, was reviewed for the following dates:

11/10/80 2nd Refueling Outage
02/16/82 3rd Refueling Outage
03/20/83 4th Refueling Outage
04/19/84 5th Refueling Outage
05/14/85 6th Refueling Outage
11/15/86 7th Refueling Outage
03/26/88 8th Refueling Outage (original test only)

The test data was reviewed in the areas of:

- Recording of major test data, leakage rate adjustment when required (See Paragraph c. above) and acceptance criteria based on trending from previous tests

- Test frequency
- Recording of as-found leakage
- Documentation of leakage rate trending
- Test data anomalies
- Corrective action - if applicable - including post maintenance leak rate testing and resolution of any anomalies

Within the areas inspected, no violations or deviations were identified. TI2515/84 is considered closed.

8. Temporary Instruction (TI) 2500/26, Inspection Requirements for NRC Compliance Bulletin 87-02, Fastener Testing to Determine Conformance with Applicable Material Specifications (Units 1 and 2).

Over the past year, some NRC procurement inspections have included the collection and testing of a small sample of fasteners. This limited program was initiated in response to a concern by the Industrial Fastener Institute over the potential use of inferior fasteners in military and industrial applications, including Nuclear Power Plants. The results indicate that 11 out of 32 fasteners tested do not meet specification requirements for mechanical and/or chemical properties. In a separate effort, one utility tested 1539 fasteners following discovery that commercial grade fasteners had been used in safety-related applications. The test results indicated that 399 failed to meet specification requirements for mechanical and/or chemical properties. Based on evaluations performed by the utility, the fasteners which did not meet specification would have fulfilled their safety function.

Based on the testing described above the NRC issued NRC Bulletin 87-02 on November 6, 1987. The Bulletin requested that licensees perform independent testing on a sample of fasteners and provide information to the NRC as follows:

- Describe characteristics examined during Receipt Inspection (RI) of fasteners and controls for storage and issue.
- Select ten non-safety-related and ten safety-related fasteners from current stock and perform mechanical and chemical testing in accordance with specification requirements - The NRC is to participate in selection of the fasteners for test.
- Forward test results and supporting information to the NRC.
- For any fastener found out of specification, provide an evaluation of the safety significance.

- Based on the results of the testing and review of current procedures, describe any further action being taken to assure fasteners meet specification requirements.

The license's response providing the requested information is dated Janua y 15, 1988.

See NRC Report No. 50-348, 364/87-33 for documentation of NRC's participation in selecting the sample of fasteners to be tested.

The purpose of this inspection was to review licensee's procedures for control of fasteners and compare the procedures with the descriptions provided in the licensee's response. The following summarizes the inspector's review:

a. Receipt Inspection

Relative to receipt inspection, the inspectors reviewed the licensee's response to Bulletin 87-02 and the following procedures:

- FNP-0-AP-9, Revision 14, Procurement and Procurement Document Control

- FNP-0-AP-20, Revision 8, Receipt Inspections

As stated in APCo's response, a QA Review Code is assigned to all equipment, parts, materials, and supplies in accordance with Procedure FNP-0-AP-9. Most fasteners are either QA Review Code A or D. In accordance with Procedure FNP-0-AP-20, verification of identification and marking is required at receipt inspection for QA Code A and D Materials. If the fastener specification requires a Certified Material Test Report (CMTR), the chemical and physical properties on the CMTR are verified to be within specification at receipt inspection. AP's response states that documentation of non-safety-related materials is not required. This is not entirely correct in that QA review codes A or D, safety-related or non-safety-related, receive the same receipt inspection by the same procedure.

b. Storage, Issue, and Control

Relative to storage, issue, and control of fasteners, the inspectors reviewed the licensee's response and the following procedures:

- FNP-0-AP-21, Revision 7, Identification and Control of Materials, Parts, and Components

- FNP-0-AP-23, Revision 5, Handling, Storage, and Shipping of Materials, Components, and Equipment

Per APCo response, fasteners purchased as QA Codes A or D are packaged as required by Procedure FNP-0-AP-23. The procedure additionally requires that an FNP acceptance TAG be attached to the package including information such as heat number, lot number, batch number, part number, serial number, P. O. number, and QA code for traceability purposes. When items are issued, the traceability information is transferred to the material issue form which is cross referenced to the maintenance work request to maintain traceability as required by Procedure FNP-0-AP-21. Procedure FNP-0-AP-23 covers handling, storage, cleaning, preserving, packaging and shipping. These activities are divided into levels based on the degree of protection required. A dedication program has been implemented for the purpose of approving commercial grade materials for safety related applications.

c. The inspectors reviewed the revision histories for the procedures listed in Paragraphs a. and b. above to determine the significance and/or reasons for recent procedure changes. Procedures have been revised, some procedures a number of times, because of problems with the use of commercial grade materials identified by NRC inspections. An NRC Vendor Branch Inspection (Report Number 50-348, 364/87-11) identified a problem with the use of commercial grade parts in safety related applications without proper dedication. Prior to completion of the inspection, on June 6, 1987, procedures were revised on an interim bases to require engineering review for use of commercial grade materials in safety related application. A dedication program was approved on November 13, 1987, to provide clear guidance for the use of commercial grade materials. An NRC EQ inspection (Report 50-438, 364/87-30) identified additional examples of the problem identified by the vendor inspection branch. The problem with commercial grade materials identified by the NRC Vendor Branch inspection branch could affect fasteners. Corrective actions in response to the two NRC inspections have been implemented. However, the findings identified in both the Vendor Branch and the EQ inspections have not been fully resolved. It is anticipated that the final resolution will necessarily address the problem of commercial grade materials for all types of parts including fasteners. The inspectors noted that no discrepancies were found in the safety related test samples examined by the licensee. One minor marking discrepancy was identified in one non-safety related test sample.

d. Based on the results of testing and review of current procedures, AP does not plan any further action.

Within the areas inspected, no violations or deviations were identified.

9. Abbreviations and Acronyms

AC	-	Alternating Current
AP	-	Alabama Power
APCo.	-	Alabama Power Company
ASME	-	America Society of Mechanical Engineers
B&PV	-	Boiler and Pressure Vessel
BI	-	Boron Injection
CMTR	-	Certified Material Test Report
EQ	-	Environmental Quality
FNP	-	Farley Nuclear Plant
GPM	-	Gallons per minute
ID	-	Inside diameter
IIW	-	International Institute of Welding
IN.	-	Inch
ISI	-	Inservice inspection
IST	-	Inservice testing
KSI	-	Kilograms per square inch
LOCA	-	Loss of Coolant Accident
LPIS	-	Low Pressure Injection System
MHz	-	Megahertz
MT	-	Magnetic practical
MWR	-	Maintenance Work Request
NDE	-	Nondestructive Examination
No.	-	Number
NPF	-	Nuclear Power Facility
NRC	-	Nuclear Regulatory Commission
OD	-	Outside diameter
PCS	-	Primary Coolant System
PIV	-	Pressure Isolation Valve
PSI	-	Preservice inspection
PT	-	Liquid penetrant
PWR	-	Pressurized Water Reactor
QA	-	Quality Assurance
R&D	-	Research and Development
RCS	-	Reactor Coolant System
RHR	-	Residual Heat Removal
RI	-	Receipt Inspection
RSS	-	Reactor Safety Study
RT	-	Radiography
SER	-	Safety Evaluation Report
SCS	-	Southern Company Services
SI	-	Safety Injection
SIS	-	Safety Injection System
TI	-	Temporary Instruction
TS	-	Technical Specification
UT	-	Ultrasonic
VT	-	Visual
W	-	Westinghouse Electric Corporation