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

Report No.: 50-348/92-08 and 50-364/92-08

Licensee: Southern Nuclear Operating Co., Inc.
P. O. Box 1295
Birmingham, AL 35201-1295

Docket No.: 50-348 and 50-364 License No.: NPF-2 and NPF-8

Facility Name: Farley 1 and 2

Inspection Conducted: March 23-27, 1992

Inspector: Rich C. Chou 4-20-92
Rich C. Chou Date Signed

Approved by: Jerome J. Blake 4/21/92
Jerome J. Blake, Chief Date Signed
Materials and Processes Section
Engineering Branch
Division of Reactor Safety

SUMMARY

Scope:

This routine, unannounced inspection was conducted in the areas of Unit 2 snubber and pipe support Inservice Inspection (ISI), and previous open items.

Results:

In the areas inspected, violations or deviations were not identified.

Two previous open items were closed involving cracked welds in Main Steam Line pipe supports and design capacity for Wej-It anchor bolts. The licensee revised snubber inspection procedures to inspect the gaps adjacent to spherical bearings and to require a quick overview inspection of snubber supporting structures and foundations, looking for cracked welds or deformed members.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*R. Badham, System Performance Engineer
*W. Bayne, Supervisor Safety Audit and Engineering Review
*R. Coleman, Modification Manager
*S. Hill, Assistant General Manager - Plant Support
*D. Morey, General Manager
S. Norman, Maintenance Supervisor
*B. Yance, System Performance Manager

Other licensee employees contacted during this inspection included craftsmen, engineers, mechanics, technicians, and administrative personnel.

NRC Resident Inspectors

*G. Maxwell, Senior Resident Inspector
M. Morgan, Resident Inspector

*Attended exit interview

2. Inservice Inspection (ISI) - Unit 2

a. Procedure Review

The inspector reviewed the procedure listed below to determine whether this procedure was consistent with regulatory requirements and licensee commitments. The procedure was also reviewed in the areas of procedural approval, requirements for qualification of examination personnel, and compilation of required records.

Procedure No.	Rev. No.	Title
FNP-O-NDE-157.16	2	Visual Examination VT3 1983 Code

b. Visual Examination of Pipe Supports

The licensee had completed all ISI inspections on 20 pipe supports during the 1992 Unit 2 spring refueling outage. One support was found to have recordable indications due to a minor problem with concrete chipping.

To verify the licensee examination results, the inspector randomly selected 11 pipe supports, some containing snubbers, for walkdown reinspection. The 11 pipe supports, in various systems, were located

in the Auxiliary Building. The inspection results were compared with the applicable procedure, FNP-0-NDE-157.16, Revision 2. The visual inspection included a check for defects including: distortion, cracks, bent members, and weld failures induced by plant operations; and/or component settings. The inspector's observations generally agreed with the information reported by the licensee's ISI examiners.

Table 1

Pipe Support Walkdown Reinspection

Support No.	Rev. 0	Discrepancies
2SI-R102	D.2	
2SI-R106	D.1	
2SI-R107	D.3	
2SI-R108	D.4	
2MS-R1	D.1	
2MS-R511	D.10	
2MS-R513	D.9	
2MS-R515	D.2	
2MS-R516	D.6	
2MS-R517	D.4	
2AFW-R106	D.3	

c. Data Review and Evaluation

Records of completed ISI examinations for the pipe supports listed in Table 1 were reviewed. These records were reviewed to determine whether the methods, techniques, and extent of the examination complied with the ISI plan and applicable procedure and findings were properly recorded and evaluated by qualified personnel.

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

3. Snubber Inspection for Technical Specification (70370) - Unit 2

In accordance with Section 4.7.9a, b of the Unit 2 Technical Specification, each snubber shall be demonstrated operable by the performance of visual inspections and functional tests during each refueling outage. All safety-related snubbers shall be visually examined to verify snubber operability. At least once every 18 months, during shutdown, a representative sample of 10 percent of the total of each type (hydraulic or mechanical) of safety-related snubbers in use in the plant shall be functionally tested either in place or bench tested.

Farley Nuclear Power Plant Unit 2 has 696 snubbers in safety-related piping systems. Surveillance Test Procedures, FNP-2-STP-610.2, Rev. 11, "Accessible Snubbers Visual Inspection" and FNP-2-STP-610.6, Rev. 6, "Inaccessible Snubber Visual Inspection" were used for the snubber visual inspection before and during the refueling outage.

The licensee had completed the visual inspection on all snubbers. No major problems were found. Some minor problems were found. The inspector conducted independent visual verification of 24 snubbers selected at random. These verifications were conducted to evaluate the adequacy of the surveillance procedures, and to assess the information being reported by the examiners. Listed below are the snubber supports verified by the inspector:

Table 2

Snubber Walkdown Reinspection

Support No.	Snubber No.	Accessible Area	Discrepancies
2CF-R30	H-2061	Yes	
2CF-R49	H-2063	Yes	
2CF-R50	H-2064	Yes	
2CF-R53	H-2065	Yes	A 1/8" gap was found between the washer and spherical bearing at the pipe clamps.
2CF-R64	H-2102	Yes	
2CF-R66	H-2103	Yes	
2FW-R68	H-2104	Yes	
2FW-R69	H-2105	Yes	
2FW-R71	H-2106	Yes	
2FW-R74	H-2107	Yes	A 3/16" gap was found between the washer and clevis at the pipe clamps.
2FW-R88	H-2109	Yes	
2FW-R88	H-2110	Yes	A 3/16" gap was found between the washer and clevis at the rear bracket.
2FW-R95	H-2111	Yes	
2FW-R97	H-2112	Yes	
2MS-R78	H-2127	No	

2MS-R79	H-2128	No	
2MS-R81	H-2129	No	
2MS-R81	H-2130	No	
2MS-R85	H-2133	NO	
2MS-R91	H-3008	No	
2MS-R91	H-2138	No	
2MS-R93	H-2139	No	A 1/4" gap was found between the washer and clevis at the pipe clamps.
2MS-R94	H-2140	No	
2MS-R96	H-2141	No	

The inspector's examination generally agreed with the findings of the visual examiners except the discrepancies noted in Table 2. During the review of the inspection procedures and the verification examinations of snubbers, the inspector noted that the procedures did not require inspection of the gaps and tolerances between the spherical bearings and washers or clevis at each end of the snubbers; nor did they require an overall examination of the supporting structures and foundations (including gang supports). If excessive gaps exist between the spherical bearings and washers or clevis, the bearings could shift and the connections could be damaged. Therefore, inspection and established tolerances for the gaps are necessary. Currently, the licensee performs snubber inspection between pin to pin, without including an overall examination of the supporting structures and foundations. Defects or degradation of the structural components can have a safety impact on the systems operability and the ability of the snubber to function properly. The defects or degradations could include cracks of welds and members, deformation of members, loose nuts, corrosion, etc.

The two procedure problems were identified in Inspection Report No. 50-348, 50-364/90-31. The same inspection report also recorded that the licensee agreed to add the above items to the inspection procedures in the next revision.

The current licensee engineer stated that the engineers who handled the previous NRC Inspection, and agreed to revise the inspection procedures, did not provide input to the tracking systems and therefore forgot to revise the procedures. The licensee engineers took quick action, before the end of this NRC inspection, in processing the required inspection procedure revisions for the next refueling outage.

No violations or deviations were identified in the areas inspected.

4. Licensee Action on Previous Inspection Findings (92701)

a. (Closed) Inspector Followup Item (IFI) 50-364/90-12-03, Evaluation of Cause and Corrective Action on Failure of Steam Line Supports 2MS-R84 and 2MS-R85

This matter concerned the weld and member cracks on Support 2MS-R84 and 2MS-R85 for Main Steam Line C. Support 2MS-R84 had a history of cracks and repairs. The licensee, through consulting company analyses, concluded that the root cause of the cracks in the welds and members was the vibration caused by main steam flow. The consulting companies included Southern Company Services (SCS), Bechtel Power Corporation, and SMC O'Donnell Inc. The fillet welds used for previous repairs on the connections between the gusset plates and 8x8x½ inch steel tube were weaker than full penetration welds in resisting the vibration environment. O'Donnell Inc. performed the finite element analysis and concluded that the fillet welds between the gusset plates and steel tube should be replaced with full penetration welds and should be repaired during the last refueling outage in the fall of 1990. (The history of cracks and repairs and extended analyses were recorded in Inspection Report No. 50-348, 364/90-31.)

The inspector reviewed the information provided, discussed this matter with the licensee's engineers, and walked down the supports to inspect the repair and look for any cracks on the welds or members. The licensee report "Form NIS-2 Owner's Report For Repairs or Replacements For Supports 2MS-R84, 85" was reviewed. This report recorded the weld repair which changed the weld to full penetration plus 3/16" fillet weld reinforcement, from the 1/4" fillet weld used in the previous repairs. The licensee reinstalled the system for the measurement of vibration and displacement immediately after the weld repair during the last refueling outage. On March 15, 1991, Bechtel Power Corporation issued "Vibration Data Report, Main Steam Pipe Support 2MS-R84 at Farley Nuclear Plant for Alabama Power Company", to O'Donnell Inc. with the monitoring results of vibration and displacement. On April 5, 1991, while Unit 2 was in cold shutdown, an inspection of the main steam pipe support 2MS-R84 was conducted. A telecopy of the walkdown result was sent to O'Donnell from Bechtel. No cracks of welds and members were found during the walkdown. O'Donnell inputted the new vibration data into the finite element analysis and the predicted displacement output matched the report from the monitoring system. O'Donnell concluded that the gusset plates and welds as designed are acceptable for the assumed fatigue loading conditions in Report No. 2066.02-400-001-00, "Comparison of Three Dimensional Finite Element Analysis Result to Vibration Test Data for Main Steam Pipe Support 2MS-R84 Farley Nuclear Plant, Unit 2", dated July 9, 1991.

Based on the weld repair during the last refueling outage, the monitoring results for the vibrations and displacements, the O'Donnell finite element reanalyzes results to sustain the fatigue loading due to vibration, and no cracks on welds or members being found during the inspector's walkdown inspection, this item is considered closed.

b. (Closed) IFI 50-348, 364/90-31-01, Possible Design Capacity Problem For Wej-IT Anchor Bolts

This matter concerned Wej-It anchor bolts that were used in Farley Nuclear Plant which might have low design capacity problems similar to Crystal River and Turkey Point Nuclear Power Plants. The Crystal River and Turkey Point Nuclear Power Plants both tested the Wej-It anchor bolts on site and found that the tested capacity was about 50 to 60 percent of the capacity stated in the manufacturer's catalog. The apparent cause of the poor Wej-It anchor bolts performance was determined to be the low hardness value of the materials, such as aggregate (dolomite), sand, etc. used in the binding concrete.

The inspector reviewed the information provided and discussed the matter with the licensee's engineers. The following reference documents were reviewed by the inspector:

Reference 1: Bechtel Letter AP-18636 (File A-88) to Alabama Power Company, Evaluation of Florida Power Corporation Testing Wej-It Anchor Bolts at Crystal River 3 (ES 90-1887), dated February 28, 1991.

Reference 2: Alabama Power Company, "Hilti Kwik Bolt Two Anchor Qualification Testing, Plant Modifications Procedure, FNP-0-PMP-1145", dated July 10 and 11, 1990 by Hilti Regional Engineer.

Reference 3: Current Hilti Catalog for the Hilti Kwik Bolt II System

Reference 4: Inquiry No. SS-1102-6, Technical Specification for Concrete for Farley Units 1 and 2, Alabama Power Company

Reference 5: Concrete Batch Adjust Form for Pour No. 2AS-44, Mix Class D-1 and D-2 for Farley Nuclear Plant, dated October 24, 1974 by Daniel Construction Company.

Reference 6: Floor Slab at El. 1551-0" NW QUAD. Concrete - Auxiliary Building, Farley Unit 2, Drawing No. D-206517, Rev. 8 by Southern Services Inc. for Alabama Power Company

In Reference 1, it stated the hard granite aggregate was used in concrete at Farley Plant and the soft dolomite aggregate was used in concretes at Crystal River and Turkey Point. Bechtel stated the hardness for dolomite aggregate would be around four per Mohs scale of hardness and estimated the hardness of six to seven for granite aggregate. Therefore, Bechtel concluded that the granite aggregate, similar to the regular aggregate, used in Farley plant was harder and stronger than the dolomite aggregate used in Crystal River and Turkey Point. A negative effect of dolomite limestone aggregate on expansion anchors has been brought to the attention of the NRC in a part 21 report by Hilti Inc. to NRC Region IV. This report states that in dolomite aggregate concrete, expansion anchor factors of safety as low as 1.2 rather than the usual four are possible. Bechtel also used the Test Results of Hilti Kwik Bolt Two Anchor (Reference 2) tested on site of Farley Plant to compare the Hilti catalog and concluded the granite aggregate strength met the national average. Bechtel concluded that the design capacity used in Farley and based on the manufacturer's catalog was adequate without a field test in Farley for the design capacity of Wej-It anchor bolts.

In review of Reference 4, the inspector noted that the flyash was used in concrete designated classes C to E per page four of Reference 4. The concrete classes C to E could be used in the slab, wall, foundation, and other structures of containment and auxiliary buildings. References 5 was reviewed to verify that the flyash was a powder type and could be used as a cohesive agent in cement. The 3/4" or 1½" diameters granite coarse aggregates were still used in the concrete. The dolomite coarse aggregates were used in Crystal River and Turkey Point to replace the regular granite coarse aggregates. The test strength for 30-day or 90-day (with flyash) for Concrete Classes D-1 and D-2 in Reference 5 also were reviewed and it exceeded the specified strength required. Reference 6 was reviewed to verify that the concrete area which was tested for Hilti Kwik Bolt Two Anchor was a pour No. 2AS44 which contained flyash and met the specified strengths. Based on all the information presented in References 1 to 6, it appeared that it was adequate for Farley Nuclear Plant to base the design capacity of Wej It anchor bolts on the manufacturer's catalog without a design capacity test on site. This item is considered closed.

5. Exit Interview

The inspection scope and results were summarized on March 27, 1992, with those persons indicated in paragraph 1. The inspector described the areas inspected and discussed in detail the inspection results. Proprietary information is not contained in this report. Dissenting comments were not received from the licensee.