



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

Report Nos.: 50-269/88-23, 50-270/88-23, and 50-287/88-23

Licensee: Duke Power Company
 422 South Church Street
 Charlotte, NC 28242

Docket Nos.: 50-269, 50-270,
 and 50-287

License Nos.: DPR-38, DPR-47, and
 DPR-55

Facility Name: Oconee 1, 2, and 3

Inspection Conducted: August 1-5, 1988

Inspector: Rich C. Chau
 R. C. Chau

9-2-88
 Date Signed

Approved by: J. J. Blake
 J. J. Blake, Chief
 Materials and Processes Section
 Engineering Branch
 Division of Reactor Safety

9/6/88
 Date Signed

SUMMARY

Scope: This routine, announced inspection was conducted in the areas of pipe support base plate designs using concrete expansion anchor bolts (IEB 79-02), seismic analysis for as-built safety-related piping systems (IEB 79-14), and the previous open items.

Results: Two Unresolved Items (UNR) were identified on pipe supports discrepancies and inadequate pipe support calculations, paragraph 4.

The licensee did a better job on pipe support modifications during the latest Unit 1 outage. Fewer discrepancies were found in the field during comparison of work with the as-built drawings. The major work for IEB 79-02 and 79-14 have been completed by the licensee. The licensee is currently working on the final documentation of revised calculations and as-built drawings based on the modifications and as-built conditions. Based on this inspection IEB 79-02 and 79-14 for all three units were closed.

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REPORT DETAILS

1. Persons Contacted

Licensee Employees

- *E. Anderson, Design Engineer at Site
- *T. A. Barron, QA Technical Support Supervisor
- *C. Boyd, Design Office Manager at Site
- *R. Brown, Compliance
 - D. Carpenter, QC Mechanical Inspector, Level II
 - S. G. Crews, Supervising Design Engineer - General Office
- *W. G. Davis, CMD Technical Support Engineer
- *C. Harlin, Compliance Engineer
 - R. Leatherwood, Project Engineer
- *J. R. McLean, Design Engineer - General Office
- *F. Owens, Compliance Supervisor
 - J. B. Reeves, Senior Engineer - General Office
 - P. Sherriff, QC Welding Inspector, Level II
- M. S. Sills, Principal Engineer - General Office
- *M. J. Tuckman, Station Manager

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

NRC Resident Inspectors

- P. H. Skinner, Senior Resident Inspector
- *L. D. Wert, Resident Inspector

*Attended exit interview

2. Action On Previous Inspection Findings

- a. (Open) Violation 50-269,270,287/87-31-01, As-Built Drawing Discrepancies Compared with As-Built Conditions. This matter concerned the numerous discrepancies found between the as-built drawings and as-built conditions during the previous inspections. The licensee response to the violation dated October 19, 1987, was received, evaluated, and found that it met the requirements of 10 CFR 2.201. The licensee response in the basis for denial was insufficient and no proposal for resolution was presented.

Per response, visual approximations were used instead of actual measurements for some of the dimensions on supports which were not critical to the ability of the supports to function as identified by the piping analysis. The inspector reviewed the Oconee Procedure No. MP/O/A/3019/01, Pipe Surveillance Procedure for IE Bulletin 79-02 and 79-14 dated December 19, 1979 (Note, this procedure was for IEB 79-02 and 79-14 only and was deleted after completion of the walk-down). This procedure did not include the visual approximation method as an inspection method. Furthermore per the response, personnel of varied backgrounds, including technicians and engineers, were trained to conduct the surveillance using Specification No. OS-0020.00-00-0002 and they were not sufficiently trained to make judgements and identify all discrepancies. The Oconee surveillance procedure for IEB 79-02 and 79-14 as stated above, had prerequisites for personnel training and, in Section 6.1, stated that all team members must attend a training session on Specification No. OS-0020.00-00-0002. Therefore, the impermissible method used and insufficient training or personnel background created the numerous discrepancies in walkdown verifications for IEB 79-02 and 79-14. The licensee is requested to propose a resolution as a general solution for discrepancies between as-built drawings and as-found conditions. Pending the licensee resolution, this item remains open. The corrective actions for examples listed in the violation, such as justifications and revisions for drawings and calculations were reviewed and found adequate.

- b. (Closed) Unresolved Item (UNR) 50-269, 270,287/87-31-02, Additional Information Required to Evaluate Pipe Supports. This matter concerned that 1" steel shim block for Support No. 1-07A-0-6-0-400A-H41 was not shown on the drawing and an anchor spacing for Support No. 1-14B-0-4361-ASR13 appeared to have a violation with the adjacent support. The inspector discussed the matter with the licensee's responsible engineer and reviewed the information provided. The response for File Nos. OS-161 and OS-27 dated October 15, 1987, was reviewed. Variation Notice (VN) No. OP-4231 had been written to identify the additional shims on the expansion anchors. The support drawing and calculation will be revised to show these shims which are acceptable as installed. The 3-1/2" anchor bolt edge distance for Support No. 1-14B-436L-WJB-1011 to the edge of the adjacent unistrut was measured by the licensee engineer. This meets edge distance requirements of 3-1/2" for 1/2" self-drill anchors. VN No. OP-4230 was written for the corrected actions. Calculation Rev. 2 and Drawing Rev. 2 were revised to show the center distance from the adjacent support. To resolve this problem, the licensee's Concrete Expansion Anchor Installation Procedure No. MP/O/A/1800/35 dated August 8, 1983, requires that, for new installation of wedge and sleeve type expansion anchors, the spacing between an anchor and unistrut meet the specified minimum edge distance or install the anchor so that the depth of the anchor is equal to its minimum embedment plus the depth of the embedded unistrut. This item is considered closed.

- c. (Closed) Inspector Followup item (IFI) 50-269,270,287/87-31-03, Safety-related Piping Systems Maintenance. This concerned the piping system maintenance such as a loosened nut, bolt, damaged part, contacting with other pipe or support, corrosion, etc. The inspector discussed this matter with the licensee's responsible engineer and reviewed the information provided (File No. OS-161 and OS-27, dated October 15, 1987). Work Request No. 95826C has been written to tighten the clevis on the rod for the loosened Support No. 1-07A-400B-TLM-2113. A Station Problem Report was written to resolve the two rod supports for other pipe contacting the pipe supported by Support No. 1-14B-0-436L-ASR14. Specification No. OS-0027.00-00-0002 was revised in January 1984 to ensure adequate clearances are maintained on new installations. Work Request No. 95823C was written to correct the identification tags on Support No. 2-01A-4-0-1400-H4, 2-51A-436E-FAC-2803, and 2-51A-1444-WSS-2902. Problem Investigation Report No. 4-087-0171 was written and documented that Support No. 3-53B-5-0-2435B-SR38 had a Hydraulic Snubber Reservoir contacting the vertical member of the support. This information has been shown on the support sketch and documented in the calculation. In addition to the above corrected actions, the licensee engineer also stated that the inservice inspection program such as QA QCPM Procedure No. OCL-14, Inservice Inspection (ISI) Visual Examination VT-3 and VT-4 is to provide the examination requirements for personnel performing ISI Visual Examination for the general mechanical and structural condition of components and pipe supports such as loose, missing, broken parts, bolting, fasteners, corrosion, distortion, deformation, etc. Based on the licensee corrected actions as stated above, this item is considered closed.
- d. (Closed) Violation 50-287/87-31-04, Inadequate Pipe Support Qualification

This matter concerned the Design Calculations for Support No. 3-07A1-0-2400A-R1 used the wrong member properties in the computer model and analyses (STRUDL). The member properties of a 6-inch beam (W6 x 20) was used for Item No. 7 in computer model to qualify the support. The actual size of the member was a 4-inch beam (W4 x 13) as shown on the design drawing and verified in field. The response to the violation dated October 19, 1987, and the information provided was reviewed by the inspector. The Design Calculation and Drawing for this support were revised to reflect Problem Investigation Report (PIR) No. 4-087-0157 which was written to indicate the actual field condition on the member edges cut-off and no weld at cut-off area. The revised calculation also included the justification for the wrong member size input for computer, member cut-off, and the weld not existing in field. Both revisions for calculation and drawing did not reflect the actual conditions clearly. The licensee engineer agreed to revise the calculation and drawing again to show the

conditions clearly. The response denied the violation. On the basis of denial, the licensee admitted that a discrepancy was noted during the IE Bulletin 79-14 surveillance, in that Item No. 7 was actually a W4 x 13 beam instead of a W6 x 20 beam as shown on the previous design drawing and as modeled in the calculation. The response also stated that the responsible engineer attached an updated drawing to the calculation package to show the corrected beam size but did not update the support calculation to note the acceptability of the beam. Both the walkdown surveillance sketch and Drawing Rev. 0 showed the W4 x 13 for Item No. 7 for this support were included in the design calculation. The support design calculation and computer model were based on one of them. No evidence was found to show that the licensee engineer reviewed the member size change. Therefore the basis for denial is unacceptable. The violation 50-287/87-31-04 remains but the item is considered closed based on the licensee corrected action shown above.

3. Unresolved Items

Unresolved items are matters about which more information is required to determine whether they are acceptable or may involve violations or deviations. Two unresolved items identified during this inspection is discussed in Paragraph 4.

4. (Closed) Pipe Support Base Plate Using Concrete Expansion Anchor Bolts (IEB 79-02) and Seismic Analysis for As-Built Safety-Related Piping Systems (IEB 79-14)

a. Status Report

A brief report from the licensee on the current status of IEB 79-02 and 79-14 at Oconee Nuclear Station dated February 4, 1988, was received. The report listed 13 pipe supports with modification work remaining as of December 1, 1987.

It means that the licensee have completed about 260 support modifications for Unit 1 during the latest outage around November 1987. The report stated that the target date for the completion of all paperwork on Units 2 and 3 is the fourth quarter of 1988, with Unit 1 to be scheduled for a later date. The majority of support modifications for all three units have been completed.

b. Walkdown Reinspection

To check the licensee performance on the pipe support modifications on Unit 1 which were completed during the latest outage, the inspector randomly selected 18 pipe supports which were accepted by the licensee QC inspection. The walkdown reinspection was completed

with the assistance from the licensee engineer, QC mechanical inspector, and QC welding inspector. The supports were partially reinspected against their detail drawings for configuration, identification, fastener/anchor installations, member size, weld sizes, component identification numbers, dimensions, rust, maintenance, and damage/protection. Listed below contains supports with walkdown reinspection, calculation review or workplan review. All pipe supports are in Unit 1 except 2-03A-1-0-400B-SR17 is in Unit 2.

TABLE I

SUPPORTS REINSPECTED, WORK PLANS REVIEWED AND CALCULATIONS REVIEWED

SUPPORT NO.	REV. NO.	SUPPORT		WORK PLAN		CALCULATION	
		REIN-SPECTED	COMMENTS	RE-VIEWED	COMMENTS	RE-VIEWED	COMMENTS
1-01A-1-2-0-401A-H50	1	✓	None	✓	None	✓	Note 5
2-03A-1-0-400B-SR17	2	✓	Note 1	✓	None	✓	None
1-07A-400A-DE032	3	✓	Note 2	✓	None	✓	None
1-07A-6-0-402A-H10	3	✓	None	✓	None	✓	None
1-03-0-551-DE002	2	✓	None	✓	None	✓	None
1-08-400H-H4043	C	✓	None	✓	None	✓	None
1-14B-0-436L-ASR15	3	✓	Note 3	✓	None	✓	Note 6
1-14B-0-1436C-ASR21	3		N/A	✓	None	✓	None
1-51-0-437B-ARM-2004	3	✓	None	✓	None	✓	None
1-54A-1-0-435B-H35	0*	✓	None	✓	None	✓	N/A
1-54A-1-0-435B-H34	0	✓	Note 4			✓	None
1-51-0-439C-DE095	B	✓	None			✓	None
1-51-0-439C-DE096	1	✓	None			✓	None
1-03-0-439B-H54	3		N/A			✓	Note 7
1-03A-1-0-439A-H24	1	✓	None			✓	None
1-53B-0-435B-DE066	3	✓	None			✓	None
1-53B-5-0-435-R8	3	✓	None			✓	None

SUPPORT NO. (cont'd)	REV. NO.	SUPPORT		WORK PLAN		CALCULATION	
		REIN- SPECTED	COMMENTS	RE- VIEWED	COMMENTS	RE- VIEWED	COMMENTS
1-53B-5-0-435B-R24	0	✓	None			✓	None
1-53B-0-435B-DE065	1	✓	None			✓	None
1-53B-0-435B-DE067	2	✓	None			✓	None

* Rev. 0 and Variation Notice (VN) OP-4147
N/A - Not Applicable

Notes:

1. (a) Fillet weld was measured less than 3/16" at a connection between top of Item Nos. 2 and 1 and drawing showed 1/4".
(b) Extra weld at a connection between bottom of Item No. 1 and column flange.
2. (a) W dimensions for Item No. 12 were measured 3'-8-3/4" and drawing showed 2'-6".
(b) Fillet welds were measured 3/8" at connections at Section Q-Q between Item No. 31 and the exist beam W24 x 68, between Item Nos. 22 and 31, and between Nos. 22 and 29.
3. Two vertical angles L2 x 2 existed at field for restraints at the lateral direction and drawing was not shown.
4. The plate thicknesses for Item No. 1 were measured 5/8" and drawing showed 3/4".
5. Joint release for joint 8 at page 3 of computer analysis should be member end release.
6. Anchor bolt (sleeve) capacity for Item No. 18 (HN 3440) should be Ft = 9200#, FV = 11500# per page 21 of Specification No. OS-0027.00-00-0001, Rev. 7. Calculation page 55 uses Ft = 11500#, FV = 17000# which is for wedge anchor bolts.
7. (a) In page 37 of calculation, the following changes should be made:
 - (i) For f2, Cy = 2.5" should be used instead of Cx = 3"
 - (ii) f3 should be calculated for shear loads at X-direction due to torston = 106229"#

(b) In page 38 of calculation, the following changes should be made:

- (i) For f_2 , shear load due to $F_y = 11182\#$ should be added.
- (ii) f_3 should be calculated for shear loads at x-direction due to torsion = $106229\#$

After the calculation was revised, the weld required doubled from the original calculation. Fortunately, the weld provided was triple the original calculation required.

c. Work Plan Reviewed

Ten support work plans verified by QC inspectors were reviewed as shown in Table 1. Oconee Specification No. OS-0027.00-00-002 was used for inspection for support drawings and tolerances. Anchor bolts were installed in accordance with Oconee Procedure. Generally, work plan includes (a) Enclosure 13.1, Procedure Checklist and Anchor Data, (b) Enclosure 13.2, Pipe Support Data Sheet, (c) Enclosure 13.3, Task Description and Required Work, (d) Enclosure 13.4, Data Sheet for Anchor Replacement and U-Bolt Installation (Tight Fit), (e) Enclosure 13.6, QC Acceptance Requirements, and (f) Enclosure 13.8, Discrepancy Worksheet plus the other special procedures for components such as snubbers, spring can, sway strut, grouting, etc. Procedure MP/O/A/3018/58, Mechanical Snubber - Removal, Installation, and Repair of Structural Connections was used for Support No. 1-07A-400A-DE032 to check the snubber installation which include log sheet, snubber diagram, mechanical snubber sketch, spacer washer, and torque specification. Procedure No. MP/O/A/3019/05, Spring Can - Removal, Repair Installation, Adjustment, Locking and Unlocking was used for Support No. 1-07A-6-0-402A-H10 to check hot load and cold load setting, travel stop removal, and legibility of load indication plate. Procedure No. MP/O/A/3019/09, Sway Struts and Snubber Extension Pieces - Field Modification was used for Support No. 1-03-0-551-DE002 to check the extension piece dimensions and welding. Preheat was used for welding preparation in supports which had the plate or member thickness greater than $3/4"$. No discrepancies were found in the work plan review.

d. Calculation Reviewed

Nineteen pipe support design calculations were partially reviewed and evaluated for thoroughness, clarity, consistency, and accuracy. In general, the design calculations were of good quality except as stated in Notes 5, 6, and 7 in Table 1. The calculation contains the loading data, calculation and analysis, support sketch, computer input and output, and baseplate analysis input and output.

e. Finding and Results

The above discrepancies found in Table 1 for walkdown reinspection and calculation review were discussed with the licensee engineers and OC inspectors. The licensee responsible engineers had evaluated the discrepancies found and concluded no operability concern. Pending the licensee review and revisions on the drawings and calculations, the discrepancies found during the walkdown reinspection as stated Notes 1, 2, 3, and 4 in Table 1, are identified as a new open item Unresolved Item (UNR) 50-269/88-23-04, Pipe Support Discrepancies between the As-built Drawings and Field Conditions. Pending the licensee review and revisions on the pipe support calculations due to the inadequate qualification as stated in Notes 5, 6, and 7 in Table 1, this item is identified as a new open item UNR 50-269/88-23-05, Inadequate Pipe Support Calculations. No violation or deviations were identified during the inspection.

f. Bulletin Closure

The NRC Region II Inspection Report Numbers 50-269/79-17, 79-22, 79-27, 79-39, 80-02, 81-20, 82-18, 85-13, 87-31 for Unit 1, 50-270/79-20, 79-25, 79-36, 80-01, 81-20, 82-18, 85-13, 87-31 for Unit 2, and 50-287/79-13, 79-16, 79-22, 79-27, 80-01, 81-20, 82-18, 85-13, 87-31 for Unit 3 were performed for IEB 79-02 to verify and review the procedures, inspection programs, analytical methods, modifications, and documentations for the concrete expansion anchor bolts. The NRC Region II Inspection Report Numbers 50-269/79-27, 79-39, 80-02, 81-20, 82-18, 85-13, 87-31 for Unit 1, 50-270/79-25, 79-36, 80-01, 81-20, 82-18, 85-13, 87-31 for Unit 2, and 50-287/79-27, 80-01, 81-20, 82-18, 85-13, 87-31 for Unit 3 were performed for IEB 79-14 to verify and review the procedure, inspection programs, analytical methods, modifications, and documentations for the as-built safety-related piping systems. The majority of the required modifications and documentations for IEB 79-02 and 79-14 has been completed by the licensee. The status report submitted by the licensee stated at Paragraph 4.a listed 13 pipe support modifications remaining and to be completed at the later date. Pending the licensee completion on the remaining support modifications, this item is identified as a new open item IFI 50-269, 270, 287/88-23-01, Pipe Support Modifications Remaining for IEB 79-02 and 79-14. The same status report also stated that all documentations are to be completed by end of 1988 for Units 2 and 3 and 1989 for Unit 1. The above documentation completing schedules also were confirmed by the licensee station manager during the exit meeting. The final summary reports for IEB 79-02 and 79-14 for all three units are to be submitted to the NRC Region II after each unit is completed in documentation at the separate time. Pending the licensee completion on documentations and final summary report submissions for each unit for IEB 79-02 and 79-14, these items are identified as new open items IFI 50-269,270,287/88-23-02, Final Summary Report for IEB 79-02 and IFI 50-269,270,287/88-23-03, Final Summary Report for IEB 79-14.

The inspector also performed walkdowns and reviews in this inspection as stated in Paragraphs 4.b, 4.c, and 4.d to verify the licensee performance and commitments on IEBs 79-02 and 79-14. Based on the previous inspection reports, this inspection, and the licensee agreement on the status report and exit meeting, IEBs 79-02 and 79-14 for Units 1, 2, and 3 are considered closed except for violation 50-269,270,287/87-31-01 and the new open items as stated in Paragraphs 4.e and 4.f.

5. Exit Interview

The inspection scope and results were summarized on August 5, 1988, with those persons indicated in Paragraph 1. The inspector described the areas inspected and discussed in detail the inspection results listed below. Although reviewed during this inspection, proprietary information is not contained in this report. Dissenting comments were not received from the licensee.

(Open) IFI 50-269,270,287/88-23-01, Pipe Support Modifications Remaining for IEBs 79-02 and 79-14

(Open) IFI 50-269,270,287/88-23-02, Final Summary Report for IEB 79-02

(Open) IFI 50-269,270,287/88-23-03, Final Summary Report for IEB 79-14

(Open) UNR 50-269/88-23-04, Pipe Support Discrepancies Between the As-built Drawings and Field Conditions

(Open) UNR 50-269/88-23-05, Inadequate Pipe Support Calculations