



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF SPECIAL PROJECTS  
EMPLOYEE CONCERNS ELEMENT REPORT CO 11301-SQN, REVISION 8

"DESIGN OF PLATES

TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR POWER PLANT UNITS 1 AND 2

DOCKET NOS. 50-327 AND 50-328

I. SUBJECT

Construction (10000)  
Subcategory: Hangers/Supports (11100)  
Element: Design of Plates (11301).  
Concerns: IN-85-031-001, IN-85-033-001, IN-85-103-001, IN-85-109-X04,  
OE-QMS-8

The bases for element Report CO 11301-SQN Revision 8, dated July 8, 1987 are five employee concerns which question TVA's design of plates.

II. SUMMARY OF ISSUES

The Employee Concerns Task Group (ECTG) report identified the following four issues from the employee concerns:

- a. Errors, omissions, and incorrect assumptions were not corrected in design calculations.
- b. EnDes Procedure 4.03, Appendix 4, which addresses visual acceptance of load additions to embedded plates (embeds), is not adequate.
- c. TVA is not in compliance with Nuclear Regulatory Commission (NRC) IE Bulletin 79-02 in that base plate flexibility is not a design consideration.
- d. Concrete anchor bolt load allowables for wedge bolt anchors are greater for Unit 1 than for Unit 2.

III. EVALUATION

A technical review of Employee Concerns Element Report Co 11301-SQN, Revision 8 was performed by an NRC contractor under NRC Contract No. 05-86-156. The results of this review are summarized in the attached contractor technical evaluation report dated January 21, 1988 on Employee Concerns Element Report CO 11301-SQN, Revision 8.

Element Report CO 11301-SQN, Revision 8 found that all of the employee concerns were verified as being true for Watts Barr and that three of the employee concerns were applicable to Sequoyah. The ECTG report found that one additional concern, IN-85-033-001, was indirectly applicable to Sequoyah. The element report further found that these concerns were being adequately addressed by sampling plans that had been initiated at Sequoyah. The element report identified nine corrective actions associated with these concerns. These corrective actions involved disposition and closure various of SCR's, NCR's and Potential Generic Condition Reports as well as the development of procedural controls for attachments. The resolution of these corrective actions were not considered restart items in the ECTG report. The contractor review of Element Report CO11301-SQN, Revision 8 found that TVA's evaluation of the employee concerns was adequate. The staff concurs with the conclusions presented in the contractor technical evaluation report.

The contractor technical evaluation report recommended that TVA's corrective actions associated with base plate flexibility analysis and structural steel attachments be reviewed when they are completed. These areas will be reviewed as part of the NRC's review of TVA's calculation program.

#### IV. CONCLUSIONS

Based on the review of Employee Concerns Element Report CO 11301-SQN, Revision 8 the staff concludes that Employee Concerns IN-85-031-001, IN-85-033-001, IN-85-103-001, IN-85-109-X04 and OE-QMS-8 have been adequately addressed at Sequoyah. The staff will review TVA's calculations on structural steel connections and pipe supports as part of the review of TVA's calculation program.

Report #  
CO 11301 SQN

SEQUOYAH NUCLEAR POWER PLANT, UNITS 1 & 2  
TECHNICAL EVALUATION REPORT FOR EMPLOYEE  
CONCERNS ELEMENT REPORT CO 11301-SON  
"DESIGN OF PLATES"

1. Subject

Construction (10000)

Sub Category: Hangers/Supports (11100)

Element: Design of Plates (11301). Design did not consider all loads, plate flexibility (79-02) and contained errors and incorrect assumptions.

Concerns: IN-85-031-001, IN-85-033-001, IN-85-103-001, IN-85-109-X04, & OE-QMS-8

The basis for element Report CO 11301 SQN REV.#8 dated 7/8/87 are the following concerns:

o IN - 85 - 031 - 001

"IN REVIEWING PREVIOUSLY APPROVED DESIGN CALCULATIONS FOR STRUCTURAL STEEL ACCESS PLATFORMS LOCATED IN THE REACTOR BUILDINGS UNITS 1 & 2. CI HAS AT TIMES FOUND ERRORS, OMISSIONS OR INCORRECT ASSUMPTIONS WHICH COULD HAVE AN AFFECT ON QUALITY/SAFETY. WHEN CI MADE REQUEST TO SUPERVISOR (NAME KNOWN) TO CORRECT ERRORS, CI WAS TOLD THAT THERE WAS NO TIME OR MAN-HOURS AVAILABLE TO MAKE CORRECTIONS. CI STATED THAT SOME CALCULATION WENT UNCORRECTED. THIS OCCURRED DURING ALL OF 1984. CI COULD NOT PROVIDE ANY SPECIFICS/DETAILS."

o IN - 85 - 033 - 001

"EN DES PROCEDURE EP 4.03 APP. 4 IS INADEQUATE. EP 4.03 APP. 4 ALLOWS ACCEPTANCE OF MINOR LOADS TO EMBEDDED PLATES BY PERFORMING VISUAL INSPECTIONS OF ATTACHMENTS TO EMBEDDED PLATES. SINCE PROCEDURE EP 4.03 APP .4 DOES NOT DEFINE WHAT A MINOR LOAD IS, THERE IS NO-LIMIT TO WHAT CAN BE ACCEPTED BY VISUAL INSPECTION. EXAMPLE: FCR EP03784 ILLUSTRATES PROBLEM WITH PROGRAM OF VISUAL INSPECTION. NO FOLLOW-UP REQUIRED."

o IN - 85 - 103 - 001

"TVA IS NOT IN COMPLIANCE WITH NRC BULLETIN 79-02 (SUPPORT OF RIGID PLATE ASSUMPTIONS IN ANALYSIS) IN THAT BASE PLATE FLEX IS NOT A DESIGN CONSIDERATION. NO ADDITIONAL CONTACT REQUIRED."

o IN - 85 - 109 - X04

"CONCRETE ANCHOR BOLT (WEDGE BOLTS) IN UNIT 1 & 2. THE ALLOWABLE BOLT LOADS FOR UNIT 1 ARE GREATER THAN UNIT 2. THE DESIGN PHILOSOPHY TO DETERMINE THE ACTUAL ALLOWABLES ON ANCHOR BOLTS HAS CHANGED. FOR UNIT 1, THE DESIGN GROUP DID NOT CONSIDER FLEXIBLE PLATE THEORY, INSTEAD THEY CONSIDERED THE BASE PLATE AS RIGID. CI QUESTIONS THESE TWO DIFFERENT ALLOWABLES."

o OE - QMS - 8

"TWO AREAS REGARDING DESIGN METHODS FOR PIPE SUPPORTS ARE NOT RECEIVING PROPER CONSIDERATION. 1) EFFECT OF BASEPLATE FLEXIBILITY ON ANCHOR LOADS. 2) DETAILING METHODS FOR WELDS."

These concerns were evaluated by TVA to be potentially nuclear safety-related and safety significant.

## II. Summary of Issues

The problem as defined by TVA is as follows:

- a) Errors, omissions and incorrect assumptions were not corrected in design calculations.
- b) EnDes Procedure 4.03 Appendix 4 allows for visual acceptance of load additions to embedded plates.
- c) Plate Flexibility as required by IE Bulletin 79-02 was not adequately considered in the design.
- d) Concrete anchor bolt load allowables for wedge bolt are greater for Unit #1 than for Unit #2.

## III. Evaluation

The TVA Employee Concern Task Group (ECTG) evaluators reviewed applicable documents and interviewed cognizant Sequoyah engineering personnel to determine if the above concerns are valid.

Concern IN-85-031-001 will be addressed directly at SQN by the Potential Generic Condition evaluation (PGCE) for SCR WBN CEB-8650. This SCR will address structural steel attachments and will also serve to identify errors, omissions and incorrect assumptions in the design calculations. Concern IN-85-031-001 was verified as being true at WBN and that is applicable to SQN.

Concern IN-85-033-001 was verified as being true at WBN and that portion of the concern which addressed minor loads attached to embeds is indirectly applicable to SQN. SQN has a program in place which will evaluate minor loads attached to embeds. However, this program has been in place for approximately 6 months and only recent attachments will be evaluated. All other existing embeds will not be evaluated as part of this program. Also minor loads are not defined.

The TVA ECTG concluded that the program for evaluating minor load attached to embeds are adequate with the following comments:

- a) Guidelines should be established to define minor loads
- b) Existing programs should be expanded to include all attachments to embedded plates

Concern IN-85-103-001 and OE-QMS-8 will be answered by the evaluation NCR-SQN CEB-8404. This NCR addresses the issue of base plate flexibility which was a requirement of 79-02.

TVA has committed to recalculate the loads on the concrete anchorages for the approximately 5600 pipe supports which are presently being generated. These calculations will take into account plate flexibility. Also TVA has committed that the factors of safety of all expansion anchors installed in SQN unit #2 will be in accordance with I&E bulletin 79-02 prior to the next refueling outage and will meet interim criteria (factor of safety of 2) during the period between start up and the next refueling outage. All factors of safety will be based on actual expansion anchor tests.

Concern IN-85-109-X04 was verified to be true at WBN but was not applicable to SQN.

#### IV. Conclusions

Element report #CO 11301-SQN Rev. #8-Design of Plates, General Construction specification #C-32 Rev 11-Bolt, Anchors Set in Hardened Concrete, Modification and Additions Instruction - M&AI -09 Rev #7, Modification and Additions Instruction M&AI - 11 - Rev #15 and TVA design standard DS-C1.7.1 were reviewed.

TVA's investigation of these concerns are adequate, and TVA's conclusions, resolutions and commitments to resolve the concerns described in this element report are satisfactory.

It is recommended that the results of the PGCE for SCR WBN CEB-8650 (Errors, omissions and incorrect assumptions were not corrected in design calculation), the resolution of NCR-SQn CEB-8404 (Base Plate Flexibility) and the proposed procedure changes which address minor load be reviewed after these items are completed.