50-259
2/6/89
P

EMPLOYEE CONCERNS

SPECIAL PROGRAM

VOLUME 2
ENGINEERING CATEGORY

SUBCATEGORY REPORT 22500
BATTERY SUPPORT DESIGN

UPDATED

TVA

NUCLEAR POWER

TVA EMPLOYEE CONCERNS SPECIAL PROGRAM

REPORT NUMBER: 22500

REPORT TYPE: SUBCATEGORY REPORT FOR ENGINEERING

REVISION NUMBER: 3

TITLE: BATTERY SUPPORT DESIGN

REASON FOR REVISION:

1. Revised to incorporate initial SRP and TAS comments, additional Review Committee comments, and CAPs.

2. Revised to incorporate additional TAS comments; added Attachment C (References).

3. Revised to incorporate additional SRP and TAS comments.

PREPARATION

PREPARED BY:

SIGNATURE 11/06/87 DATE

REVIEWS

~~PEER~~ REVIEW COMMITTEE:

SIGNATURE 11-10-87 DATE

TAS:

James E Wortley III
SIGNATURE 11/24/87 DATE

CONCURRENCES

CEG-H: George R McNutt 11-24-87

SRP: Jimmie W Goff 12-3-87
SIGNATURE* DATE

APPROVED BY:

ECSP MANAGER 11/25/87 DATE

NA
MANAGER OF NUCLEAR POWER DATE
CONCURRENCE (FINAL REPORT ONLY)

* SRP Secretary's signature denotes SRP concurrences are in files.

EXECUTIVE SUMMARY

This subcategory deals with battery support design and addresses activities such as calculations, seismic qualification reports, licensing commitments, and procedures. The employee concerns cited a perceived inadequacy in the design of battery supports in that they have no vertical tiedowns and that Unistrut material should not have been used as a structural component of the battery racks. The concern presumption was not substantiated for Watts Bar, Sequoyah, and Bellefonte. However, the support design documentation at Browns Ferry was found to be incomplete or unavailable for review.

The evaluation team found that Unistrut is an acceptable and common material used to construct the battery racks. The evaluation further found that the use of battery tiedowns may or may not be required depending upon the results of seismic qualification.

The causes of the negative findings were diverse, with causes in the design process effectiveness category dominating. One of the three corrective actions may require minor hardware modifications for Browns Ferry. The other corrective actions will need documentation changes to remove discrepancies.

Although the employee concerns and other issues assessed during the evaluation identified a few valid problems that require resolution, the number of such negative findings is too small to warrant any assignment of collective significance. It can be concluded that battery support design does not constitute a significant problem for the Watts Bar, Sequoyah, Browns Ferry, and Bellefonte nuclear power plants. Other programmatic issues associated with the FSAR and CSSC list are identified in Subcategory Report 20900.

The causes identified and other evaluation results are being reexamined from a wider perspective in the Engineering category evaluation.

Preface

This subcategory report is one of a series of reports prepared for the Employee Concerns Special Program (ECSP) of the Tennessee Valley Authority (TVA). The ECSP and the organization which carried out the program, the Employee Concerns Task Group (ECTG), were established by TVA's Manager of Nuclear Power to evaluate and report on those Office of Nuclear Power (ONP) employee concerns filed before February 1, 1986. Concerns filed after that date are handled by the ongoing ONP Employee Concerns Program (ECP).

The ECSP addressed over 5800 employee concerns. Each of the concerns was a formal, written description of a circumstance or circumstances that an employee thought was unsafe, unjust, inefficient, or inappropriate. The mission of the Employee Concerns Special Program was to thoroughly investigate all issues presented in the concerns and to report the results of those investigations in a form accessible to ONP employees, the NRC, and the general public. The results of these investigations are communicated by four levels of ECSP reports: element, subcategory, category, and final.

Element reports, the lowest reporting level, will be published only for those concerns directly affecting the restart of Sequoyah Nuclear Plant's reactor unit 2. An element consists of one or more closely related issues. An issue is a potential problem identified by ECTG during the evaluation process as having been raised in one or more concerns. For efficient handling, what appeared to be similar concerns were grouped into elements early in the program, but issue definitions emerged from the evaluation process itself. Consequently, some elements did include only one issue, but often the ECTG evaluation found more than one issue per element.

Subcategory reports summarize the evaluation of a number of elements. However, the subcategory report does more than collect element level evaluations. The subcategory level overview of element findings leads to an integration of information that cannot take place at the element level. This integration of information reveals the extent to which problems overlap more than one element and will therefore require corrective action for underlying causes not fully apparent at the element level.

To make the subcategory reports easier to understand, three items have been placed at the front of each report: a preface, a glossary of the terminology unique to ECSP reports, and a list of acronyms.

Additionally, at the end of each subcategory report will be a Subcategory Summary Table that includes the concern numbers; identifies other subcategories that share a concern; designates nuclear safety-related, safety significant, or non-safety related concerns; designates generic applicability; and briefly states each concern.

Either the Subcategory Summary Table or another attachment or a combination of the two will enable the reader to find the report section or sections in which the issue raised by the concern is evaluated.

The subcategories are themselves summarized in a series of eight category reports. Each category report reviews the major findings and collective significance of the subcategory reports in one of the following areas:

- management and personnel relations
- industrial safety
- construction
- material control
- operations
- quality assurance/quality control
- welding
- engineering

A separate report on employee concerns dealing with specific contentions of intimidation, harassment, and wrongdoing will be released by the TVA Office of the Inspector General.

Just as the subcategory reports integrate the information collected at the element level, the category reports integrate the information assembled in all the subcategory reports within the category, addressing particularly the underlying causes of those problems that run across more than one subcategory.

A final report will integrate and assess the information collected by all of the lower level reports prepared for the ECSP, including the Inspector General's report.

For more detail on the methods by which ECTG employee concerns were evaluated and reported, consult the Tennessee Valley Authority Employee Concerns Task Group Program Manual. The Manual spells out the program's objectives, scope, organization, and responsibilities. It also specifies the procedures that were followed in the investigation, reporting, and closeout of the issues raised by employee concerns.

ECSP GLOSSARY OF REPORT TERMS*

classification of evaluated issues the evaluation of an issue leads to one of the following determinations:

Class A: Issue cannot be verified as factual

Class B: Issue is factually accurate, but what is described is not a problem (i.e., not a condition requiring corrective action)

Class C: Issue is factual and identifies a problem, but corrective action for the problem was initiated before the evaluation of the issue was undertaken

Class D: Issue is factual and presents a problem for which corrective action has been, or is being, taken as a result of an evaluation

Class E: A problem, requiring corrective action, which was not identified by an employee concern, but was revealed during the ECTG evaluation of an issue raised by an employee concern.

collective significance an analysis which determines the importance and consequences of the findings in a particular ECSP report by putting those findings in the proper perspective.

concern (see "employee concern")

corrective action steps taken to fix specific deficiencies or discrepancies revealed by a negative finding and, when necessary, to correct causes in order to prevent recurrence.

criterion (plural: criteria) a basis for defining a performance, behavior, or quality which ONP imposes on itself (see also "requirement").

element or element report an optional level of ECSP report, below the subcategory level, that deals with one or more issues.

employee concern a formal, written description of a circumstance or circumstances that an employee thinks unsafe, unjust, inefficient or inappropriate; usually documented on a K-form or a form equivalent to the K-form.

evaluator(s) the individual(s) assigned the responsibility to assess a specific grouping of employee concerns.

findings includes both statements of fact and the judgments made about those facts during the evaluation process; negative findings require corrective action.

issue a potential problem, as interpreted by the ECTG during the evaluation process, raised in one or more concerns.

K-form (see "employee concern")

requirement a standard of performance, behavior, or quality on which an evaluation judgment or decision may be based.

root cause the underlying reason for a problem.

*Terms essential to the program but which require detailed definition have been defined in the ECTG Procedure Manual (e.g., generic, specific, nuclear safety-related, unreviewed safety-significant question).

Acronyms

AI	Administrative Instruction
AISC	American Institute of Steel Construction
ALARA	As Low As Reasonably Achievable
ANS	American Nuclear Society
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWS	American Welding Society
BFN	Browns Ferry Nuclear Plant
BLN	Bellefonte Nuclear Plant
CAQ	Condition Adverse to Quality
CAR	Corrective Action Report
CATD	Corrective Action Tracking Document
CCTS	Corporate Commitment Tracking System
CEG-H	Category Evaluation Group Head
CFR	Code of Federal Regulations
CI	Concerned Individual
CMTR	Certified Material Test Report
COC	Certificate of Conformance/Compliance
DCR	Design Change Request
DNC	Division of Nuclear Construction (see also NU CON)

DNE	Division of Nuclear Engineering
DNQA	Division of Nuclear Quality Assurance
DNT	Division of Nuclear Training
DOE	Department of Energy
DPO	Division Personnel Officer
DR	Discrepancy Report or Deviation Report
ECN	Engineering Change Notice
ECP	Employee Concerns Program
ECP-SR	Employee Concerns Program-Site Representative
ECSP	Employee Concerns Special Program
ECTG	Employee Concerns Task Group
EEOC	Equal Employment Opportunity Commission
EQ	Environmental Qualification
EMRT	Emergency Medical Response Team
EN DES	Engineering Design
ERT	Employee Response Team or Emergency Response Team
FCR	Field Change Request
FSAR	Final Safety Analysis Report
FY	Fiscal Year
GET	General Employee Training
HCI	Hazard Control Instruction
HVAC	Heating, Ventilating, Air Conditioning
II	Installation Instruction
INPO	Institute of Nuclear Power Operations
IRN	Inspection Rejection Notice

L/R	Labor Relations Staff
M&AI	Modifications and Additions Instruction
MI	Maintenance Instruction
MSPB	Merit Systems Protection Board
MT	Magnetic Particle Testing
NCR	Nonconforming Condition Report
NDE	Nondestructive Examination
NPP	Nuclear Performance Plan
NPS	Non-plant Specific or Nuclear Procedures System
NQAM	Nuclear Quality Assurance Manual
NRC	Nuclear Regulatory Commission
NSB	Nuclear Services Branch
NSRS	Nuclear Safety Review Staff
NU CON	Division of Nuclear Construction (obsolete abbreviation, see DNC)
NUMARC	Nuclear Utility Management and Resources Committee
OSHA	Occupational Safety and Health Administration (or Act)
ONP	Office of Nuclear Power
OWCP	Office of Workers Compensation Program
PHR	Personal History Record
PT	Liquid Penetrant Testing
QA	Quality Assurance
QAP	Quality Assurance Procedures
QC	Quality Control
QCI	Quality Control Instruction

QCP	Quality Control Procedure
QTC	Quality Technology Company
RIF	Reduction in Force
RT	Radiographic Testing
SQN	Sequoyah Nuclear Plant
SI	Surveillance Instruction
SOP	Standard Operating Procedure
SRP	Senior Review Panel
SWEC	Stone and Webster Engineering Corporation
TAS	Technical Assistance Staff
T&L	Trades and Labor
TVA	Tennessee Valley Authority
TVTLC	Tennessee Valley Trades and Labor Council
UT	Ultrasonic Testing
VT	Visual Testing
WBECSP	Watts Bar Employee Concern Special Program
WBN	Watts Bar Nuclear Plant
WR	Work Request or Work Rules
WP	Workplans

CONTENTS

TABLES

1. INTRODUCTION

This subcategory report summarizes and evaluates the results of the ECSP element evaluations prepared under Engineering Subcategory 22500, Battery Support Design. The evaluations discuss the perceived problem of a lack of vertical tiedowns and the use of Unistrut members for battery racks.

The employee concerns provide the basis for the element evaluations and are listed by element number in Attachment A. Attachment A also shows the site location where the concern in this subcatgory was originated and its applicability to other TVA nuclear plant sites.

The evaluations are summarized in the balance of this report as follows:

- Section 2 -- summarizes, by element, the issues stated or implied in the employee concerns
- Section 3 -- outlines the process followed for the element and subcategory evaluations and cites documents reviewed, and addresses the determination of generic applicability
- Section 4 -- summarizes, by element, the findings and identifies the negative findings that must be resolved
- Section 5 -- highlights the corrective actions required for resolution of the negative findings cited in Section 4 and relates them to element and to plant site
- Section 6 -- identifies causes of the negative findings
- Section 7 -- assesses the significance of the negative findings
- Attachment A -- lists, by element, each employee concern evaluated in the subcategory. The concern's number is given along with notation of any other element or category with which the concern is shared, the plant sites to which it could be applicable are noted, the concern is quoted as received by TVA, and is characterized as safety related, not safety related, or safety significant
- Attachment B -- contains a summary of the element-level evaluations. Each issue is listed, by element number and plant, opposite its corresponding findings and corrective actions. The reader may trace a concern from Attachment A to an issue in Attachment B by using the element number and applicable plant. The

reader may relate a corrective action description in Attachment B to causes and significance in Table 3 by using the CATD number which appears in Attachment B in parentheses at the end of the corrective action description.

The term "Peripheral finding" in the issue column refers to a finding that occurred during the course of evaluating a concern but did not stem directly from a employee concern. These are classified as "E" in Tables 1 and 2 of this report

- Attachment C -- lists the references cited in the text

2. SUMMARY OF ISSUES

The four employee concerns listed in Attachment A, which are essentially identical for each of the four plant sites, have been examined and the potential problems raised by the concerns have been identified as issues for each plant. Review of these issues constitutes the one element evaluation for each of the four plants.

The issues summarized below deal with presumed deficiencies or inadequacies in the design of the battery support systems.

225.0, Battery Support Design - Battery support design is inadequate in that:

- Batteries are unacceptably supported since they have no vertical tiedowns.
- Unistrut members should not have been used for the battery racks.

A statement describing each issue reviewed within the element evaluations is provided in Attachment B. This attachment also lists findings and corrective actions, which are discussed in Sections 4 and 5 of this report.

As the following sections show, the issues were found to be invalid for Sequoyah, Watts Bar, and Bellefonte. The support design documentation for Browns Ferry was not available.

3. GENERIC APPLICABILITY/EVALUATION PROCESS

This subcategory report is based on the information evaluated to address the specific employee concerns related to the issues broadly defined in Section 2. The evaluation process is described in the following subsections.

3.1 Generic Applicability Review

As part of the evaluation process, the employee concerns were evaluated for their generic applicability to all TVA nuclear plant sites. The generic review for this subcategory determined that the concerns are safety related and applicable to all four nuclear plant sites.

3.2 General Evaluation Process

This subsection describes the general evaluation process that was used to evaluate the elements identified under this subcategory. Additional specific evaluation processes are described in subsection 3.3 by element as applicable.

a. Defined issues for each element from the employee concerns.

b. Determined generic applicability of elements on the basis of their plant-uniqueness and their effects on safety-related structures, systems, and components.

c. Reviewed applicable FSAR (References 2, 24, 49, and 67), and Safety Evaluation Report (SER) (References 2 and 46), to understand TVA's commitments related to the specific design issues.

d. Reviewed applicable regulatory requirements and practices to understand related engineering design requirements (References 2, 24, 49, and 67).

e. Reviewed relevant TVA design criteria (References 2, 24, and 67), specifications (References 2, 10, 28, 31, and 51), drawings (References 2, 3, 25, and 50), and calculations (References 2, 32, 36, and 50) to develop an understanding of the design basis.

f. Performed plant walkdowns (References 2, 38, and 66), as appropriate, to develop a first-hand understanding of the issues.

g. Reviewed issue-related correspondence, test reports, and nonconforming condition reports (NCRs) to evaluate actions taken by TVA.

h. On the basis of this composite review, evaluated the issues for each element and described findings (see Section 4).

i. Reviewed and concurred with corrective action plans prepared by TVA for the issues requiring specific corrective actions.

j. Tabulated the issues, findings, and corrective actions arranged first by elements and then by plants (in Attachment B).

3.3 Specific Evaluation Process

In addition to the general evaluation, as described above, performed by the evaluation team for each element, specific documents also were reviewed for each plant based on their applicability to the issues. These documents and other unique information are identified below, and in Attachment C.

The evaluation process for the element evaluations consisted of the following general steps:

a. Prepared a list of class 1E batteries in each of the four plants.

b. Identified the locations of these batteries in each plant.

c. Requested TVA to provide seismic qualification reports for the class 1E batteries and battery racks.

d. Performed plant walkdowns (References 2, 38, and 66), as appropriate, to determine if tiedowns exist for the class 1E batteries and if strut members have been used for battery rack construction.

e. Reviewed plant-unique licensing commitments as described in the FSAR.

f. Reviewed the seismic qualification reports and supplier drawings (References 2, 11, 12, 16, 19, 20, 23, 34, 55, and 58) showing the battery racks details, particularly to identify strut members used.

g. Reviewed results of NRC Seismic Qualification Review Team (SQRT) audit of Sequoyah and Watts Bar (References 1, and 4 through 9).

h. Reviewed TVA NSRS Report I-86-274-SQN for Sequoyah (Reference 2).

i. Reviewed available transcripts of NRC investigative interviews (References 2, 41, 42, 59, and 60).

j. Determined the validity of the concerns.

In addition, plant-unique additional correspondence, internal memos, etc., were reviewed as appropriate.

For Browns Ferry, the seismic qualification report was not available for judging the adequacy of the battery support system.

4. FINDINGS

The findings from each plant for this subcategory are contained in Attachment B. The findings for each plant element are summarized below.

4.1 Watts Bar, Sequoyah, and Bellefonte

The review of licensing documents and the seismic qualification reports for class 1E batteries and the battery racks provides the necessary design details to conclude that the battery supports were adequate. The vertical tiedowns were provided for the batteries where required by the seismic qualifications. The Unistrut members used in the construction of battery racks had been included in the seismic qualification for all three of the plants. Therefore, the adequacy has been established for the battery support systems with or without vertical tiedowns and of using Unistrut for the battery rack structural members.

NRC General Design Criterion 2 requires Category I structures, systems, and components to be designed to withstand the effects of natural phenomena such as earthquakes. The SQN, WBN, and BLN commitments to comply with this criterion are contained in the following FSAR sections:

- Section 3.1 for SQN
- Section 3.1 for WBN
- Section 3.1 for BLN

The seismic design bases of Category I items are described in the following FSAR sections:

- Sections 2.5, 3.7, and 3.10 for SQN
- Sections 2.5, 3.7, and 3.10.3 for WBN
- Sections 3.2, 3.7, and 8.3 for BLN

For all of these plants, TVA had required the supplier to qualify the Battery Support System for class 1E application. The purchase specifications included the method of qualifying the batteries and the battery racks in accordance with licensing commitments. The qualification of batteries was, in general, based on shake table testing to show their functionality before, during, and after testing. The test response spectra (TRS) enveloped the required response spectra (RRS).

In addition, the NRC Seismic Qualification Review Team (SQRT) audited Watts Bar and Sequoyah to verify seismic qualification of Category I equipment. The subject of battery vertical tiedowns was discussed and resolved with NRC during the respective audits.

4.2 Browns Ferry

The Browns Ferry commitment to comply with NRC General Design Criterion 2, as summarized above, is contained in BFN FSAR, Appendix A. The seismic qualification reports for class 1E batteries and battery racks were not available. A walkdown confirmed that no battery tiedowns were provided and that Unistrut members were used in the battery rack construction. The preliminary review of the available information showed that the vertical seismic acceleration for the batteries may exceed 1.0 g in the Diesel Generator Building. Therefore, it is essential to assess the need for vertical tiedowns of batteries in the Diesel Generator Building before restart. Therefore, the adequacy of battery supports for Browns Ferry could not be established.

During the process of evaluating the concerns for Browns Ferry, two peripheral issues were identified.

- The first is that the NRC has a generic safety task action plan to verify the adequacy of equipment, including batteries, under seismic loading at all operating plants in lieu of requiring these plants to meet the criteria that are applied to new plants. The margin of safety provided in existing nuclear power plant equipment to resist seismically induced loads and perform required safety functions may vary considerably because of significant changes in design criteria and methods for the seismic qualification of equipment over the years. Therefore, the seismic qualification of equipment in operating plants must be reassessed to determine whether requalification is necessary. TVA plans to ascertain the adequacy of strut members and the need for vertical tiedowns in the rack as part of the program to be developed in response to NRC Unresolved Safety Issue (USI) A-46, which is the topic of NUREG-1030 and NUREG-1211.

- The second is discrepancies between the project "critical structures, systems, and components" (CSSC) list and the FSAR. As a result of these discrepancies, it was not possible to determine directly from the available documentation which batteries are class 1E. This is also the subject of Subcategory Report 20900, "Q-List."

4.3 Summarized Subcategory Findings

Each of the detailed findings in Attachment B has been classified in accordance with the defined finding classifications. The classified findings are summarized in Table 1. Class A and B findings indicate there is no problem and that corrective action is not required. Class C, D, and E findings require corrective actions. The corrective action class is identified in the table by the numeral combined with the finding class.

The summary of findings by classification is given in Table 2. Table 2 identifies one finding for each issue evaluated. Of the nine findings identified by a classification in Table 2, six require no corrective action. Of those remaining, two findings had corrective actions identified, and one requiring corrective action was a peripheral issue uncovered during the ECTG evaluation.

5. CORRECTIVE ACTIONS

The general areas of corrective action are described below for the element reviewed in this subcategory. Following this is a summary discussion of the information presented in Table 3. The corrective actions are applicable only to Browns Ferry.

225.0, Battery Support Design:

- o Assess the need for providing vertical tiedown for class 1E batteries in the Reactor and Diesel Generator Buildings
- o Assess the adequacy of battery racks that support class 1E batteries to resist seismic loads
- o Revise documents to remove inconsistencies between and within the FSAR and CSSC

Table 2 identifies three findings that require corrective action. The corrective actions, along with their finding/corrective action classifications, are summarized in Table 3. The corrective action descriptions in the table are a condensation of the more detailed corrective action information provided in Attachment B. Table 3 indicates the plant or plants to which a corrective action is applicable in the Corrective Action Tracking Document (CATD) column, where the applicable plant is identified by the CATD number.

The Finding/Corrective Action Classification column of Table 3 shows that of the three corrective actions identified, two involve further evaluation. The remaining corrective action has resulted from a peripheral issue of inconsistencies between the FSAR and the CSSC list in the identification of class 1E batteries.

The evaluation team has reviewed the Browns Ferry corrective action plans (CAPs) and has concluded that the stated CAPs are acceptable resolutions of the concerns.

6. CAUSES

Table 3 identifies one or more causes for each issue requiring corrective action. An attempt was made to identify only the most important cause for each corrective action; however, in some instances, it was felt that the issues were the result of a combination of causes, each of which should be identified. Therefore, more than one cause is identified for some corrective actions.

Eight causes of the three negative findings have been identified for the three corrective action descriptions listed in Table 3. These causes are shown in the table and totaled at the end. The most frequent causes for two of the negative findings are "Inadequate Calculations" and "Insufficient Verification Documentation." Proper documentation in the form of design calculations and/or seismic qualification reports was unavailable to audit the adequacy of the battery support design. Hence, improvements to the design process in the area of documentation appears warranted.

The third corrective action is mainly necessary because the procedures were not followed, which resulted in inconsistencies between the FSAR and other project documents such as the CSSC list. Causes for this corrective action are presented in Subcategory 20900 (Reference 1).

7. COLLECTIVE SIGNIFICANCE

The battery support design at Watts Bar, Sequoyah, and Bellefonte is adequately documented and is acceptable. The Browns Ferry support design review is incomplete because documentation is not available.

In addition, the evaluation also revealed discrepancies between the FSAR and the CSSC list in the identification of class 1E batteries for Browns Ferry. These discrepancies will require changes to the documents but will not impact hardware.

Earlier improvements in the design review process could have mitigated the findings for Browns Ferry. However, it is important for purposes of this subcategory report to take a historical perspective. There were no negative findings for Sequoyah, Watts Bar, and Bellefonte. The nature of the findings for Browns Ferry are representative of what might be found on similar vintage plants. It is for this reason that the NRC has established a seismic qualification program for operating nuclear power plants.

Althougn the employee concerns and otner issues assessed during the evaluation identified a few valid problems that require resolution, the number of such negative findings is too small to warrant any assignment of collective significance. Overall, it can be concluded that the issues in the Battery Support Design subcategory for the four TVA plant sites investigated do not represent a significant technical or management problem and that no broader issues can be identified in this area. Other programmatic issues associated with the FSAR and CSSC list are identified in Subcategory Report 20900 (Reference 1).

On the basis of these conclusions, the subject matter of this subcategory report does not require specific treatment in the TVA Nuclear Performance Plan.

The findings of this subcategory are being combined with the other subcategory reports and collectively reassessed in the Engineering category evaluation.

TABLE 1

CLASSIFICATION OF FINDINGS AND CORRECTIVE ACTIONS

	Element	Issue/ Finding**	Finding/Corrective Action Class* SQN	WBN	BFN	BLN
225.0	Battery Support Design	a	A	A	D6	A
		b	A	A	C6	A
		c	-	-	-	-
		d	-	-	E3	-

*Legend:

*Classification of Findings and Corrective Actions

A. Issue not valid. No corrective action required.
B. Issue valid but consequences acceptable. No corrective action required.
C. Issue valid. Corrective action initiated before ECTG evaluation.
D. Issue valid. Corrective action taken as a result of ECTG evaluation.
E. Peripheral issue uncovered during ECTG evaluation. Corrective action required.

1. Hardware
2. Procedure
3. Documentation
4. Training
5. Analysis
6. Evaluation
7. Other

**Defined for each plant in Attachment B.

TABLE 3
MATRIX OF ELEMENTS, CORRECTIVE ACTIONS, AND CAUSES
SUBCATEGORY 22500

ELEM	FINDING/ CORRECTIVE ACTION CLASS.**	CORRECTIVE ACTION	CATD	CAUSES OF NEGATIVE FINDINGS *																		Significance of Corrective Actions*		
				MANAGEMENT EFFECTIVENESS							DESIGN PROCESS EFFECTIVENESS							TECHNICAL ADEQUACY						
				1 Fragmented Organization	2 Inadequate Q-trny	3 Inadequate Procedures	4 Procedures Not Followed	5 Inadequate Communication	6 Untimely Resolution of Issues	7 Lack of Mgt Attention	8 Inadequate Design Bases	9 Inadequate Calcs	10 Inadequate As-blt Reconcil.	11 Lack of Design Detail	12 Engrg Judgmt not Documented	13 Design Crit./ Commit Not Met	14 Insuf. Verif Documentation	15 Stds Not Followed	16 Engrg Error	17 Vendor Error	D	M	H
225.0	D6	Assess the need for providing vertical tiedown for class 1E batteries in Reactor and Diesel Generator Buildings.	BFN 01									X					X				A	-	P
	C6	Assess the adequacy of battery racks that support class 1E batteries to resist seismic loads.	BFN 02									X					X				A	-	-
	E3	Revise documents to remove inconsistencies between and within FSAR and CSSC.	BFN 03	See Subcategory Report 20900, Section 6																	-	-	-
			TOTALS									2					2						

* Defined in the Glossary Supplement.

** Defined in Table 1.

TABLE 2

FINDINGS SUMMARY

Classification of Findings	Plant SQN	WBN	BFN	BLN	Total
A. Issue not valid. No corrective action required.	2	2	0	2	6
B. Issue valid but consequences acceptable. No corrective action required.	0	0	0	0	0
C. Issue valid. Corrective action initiated before ECTG evaluation.	0	0	1	0	1
D. Issue valid. Corrective action taken as a result of ECTG evaluation.	0	0	1	0	1
E. Peripheral issue uncovered during ECTG evaluation. Corrective action required.	0	0	1	0	1
Total	2	2	3	2	9

GLOSSARY SUPPLEMENT
FOR THE ENGINEERING CATEGORY

Causes of Negative Findings - the causes for findings that require corrective action are categorized as follows:

1. Fragmented organization - Lines of authority, responsibility, and accountability were not clearly defined.

2. Inadequate quality (Q) training - Personnel were not fully trained in the procedures established for design process control and in the maintenance of design documents, including audits.

3. Inadequate procedures - Design and modification control methods and procedures were deficient in establishing requirements and did not ensure an effective design control program in some areas.

4. Procedures not followed - Existing procedures controlling the design process were not fully adhered to.

5. Inadequate communications - Communication, coordination, and cooperation were not fully effective in supplying needed information within plants, between plants and organizations (e.g., Engineering, Construction, Licensing, and Operations), and between interorganizational disciplines and departments.

6. Untimely resolution of issues - Problems were not resolved in a timely manner, and their resolution was not aggressively pursued.

7. Lack of management attention - There was a lack of management attention in ensuring that programs required for an effective design process were established and implemented.

8. Inadequate design bases - Design bases were lacking, vague, or incomplete for design execution and verification and for design change evaluation.

9. Inadequate calculations - Design calculations were incomplete, used incorrect input or assumptions, or otherwise failed to fully demonstrate compliance with design requirements or support design output documents.

10. Inadequate as-built reconciliation - Reconciliation of licensing or design documents with plant as-built condition was lacking or incomplete.

11. Lack of design detail - Detail in design output documents was insufficient to ensure compliance with design requirements.

GLOSSARY SUPPLEMENT (Cont'd)

12. Failure to document engineering judgments - Documentation justifying engineering judgments used in the design process was lacking or incomplete.

13. Design criteria/commitments not met - Design criteria or licensing commitments were not met.

14. Insufficient verification documentation - Documentation (Q) was insufficient to audit the adequacy of design and installation.

15. Standards not followed - Code or industry standards and practices were not complied with.

16. Engineering error - There were errors or oversights in the assumptions, methodology, or judgments used in the design process.

17. Vendor error - Vendor design or supplied items were deficient for the intended purpose.

Classification of Corrective Actions - corrective actions are classified as belonging to one or more of the following groups:.

1. Hardware - physical plant changes

2. Procedure - changed or generated a procedure

3. Documentation - affected QA records

4. Training - required personnel education

5. Analysis - required design calculations, etc., to resolve

6. Evaluation - initial corrective action plan indicated a need to evaluate the issue before a definitive plan could be established. Therefore, all hardware, procedure, etc., changes are not yet known

7. Other - items not listed above

Peripheral Finding (Issue) - A negative finding that does not result directly from an employee concern but that was uncovered during the process of evaluating an employee concern. By definition, peripheral findings (issues) require corrective action.

Significance of Corrective Actions - The evaluation team's judgment as to the significance of the corrective actions listed in Table 3 is indicated in the last three columns of the table. Significance is rated in accordance with the type or types of changes that may be expected to result from the corrective action. Changes are categorized as:

- Documentation change (D) - This is a change to any design input or output document (e.g., drawing, specification, calculation, or procedure) that does not result in a significant reduction in design margin.

- Change in design margin (M) - This is a change in design interpretation (minimum requirement vs actual capability) that results in a significant (outside normal limits of expected accuracy) change in the design margin. All designs include margins to allow for error and unforeseeable events. Changes in design margins are a normal and acceptable part of the design and construction process as long as the final design margins satisfy regulatory requirements and applicable codes and standards.

- Change of hardware (H) - This is a physical change to an existing plant structure or component that results from a change in the design basis, or that is required to correct an initially inadequate design or design error.

If the change resulting from the corrective action is judged to be significant, either an "A" for actual or "P" for potential is entered into the appropriate column of Table 3. Actual is distinguished from potential because corrective actions are not complete and, consequently, the scope of required changes may not be known. Corrective actions are judged to be significant if the resultant changes affect the overall quality, performance, or margin of a safety-related structure, system, or component.

ATTACHMENT A

EMPLOYEE CONCERNS
FOR SUBCATEGORY 22500

Attachment A -- lists, by element, each employee concern evaluated in the subcategory. The concern's number is given, along with notation of any other element or category with which the concern is shared; the plant sites to which it could be applicable are noted; and the concern is quoted as received by TVA and characterized as safety related, not safety related, or safety significant.

ATTACHMENT A

EMPLOYEE CONCERNS FOR SUBCATEGORY 22500

ELEMENT	CONCERN NUMBER	PLANT LOCATION	APPLICABILITY SQN	WBN	BFN	BLN	CONCERN DESCRIPTION*
225.0	WI-85-100-006	WBN	X	X	X	X	"Class 1E and non-Class 1E batteries are unacceptably supported (no battery tie downs), and Unistrut supports are unacceptably used. CI has no further information. Anonymous concern via letter." (SR)
	XX-85-122-017	SQN	X	X	X	X	"Sequoyan: Class 1E and non-Class 1E batteries are unacceptably supported (no battery tie downs), and Unistrut supports are unacceptably used. CI has no further information. Anonymous concern via letter." (SS)
	XX-85-122-018	BLN	X	X	X	X	"Bellefonte: Class 1E and non-Class 1E batteries are unacceptably supported (no battery tie downs), and Unistrut supports are unacceptably used. CI has no further information. Anonymous concern via letter." (SR)
	XX-85-122-019	BFN	X	X	X	X	"Browns Ferry: Class 1E and non-Class 1E batteries are unacceptably supported (no battery tie downs), and Unistrut supports are unacceptably used. CI has no further information. Anonymous concern via letter." (SR)

* [redacted]YSS indicates safety related, not safety related, or safety signif[redacted]per ECTG determination criteria in the ECTG Program manual
[redacted]plied by TVA before evaluations.

ATTACHMENT B

SUMMARY OF ISSUES, FINDINGS, AND
CORRECTIVE ACTIONS FOR
SUBCATEGORY 22500

Attachment B -- contains a summary of the element-level evaluations. Each issue is listed, by element number and plant, opposite its corresponding findings and corrective actions. The reader may trace a concern from Attachment A to an issue in Attachment B by using the element number and applicable plant. The reader may relate a corrective action description in Attachment B to causes and significance in Table 3 by using the CATD number which appears in Attachment B in parentheses at the end of the corrective action description.

The term "Peripheral finding" in the issue column refers to a finding that occurred during the course of evaluating a concern but did not stem directly from a employee concern. These are classified as "E" in Tables 1 and 2 of this report.

Issues	Findings	Corrective Actions
********** Element 225.0 - Battery Support Design **********		
SQN	SQN	SQN
a. Class 1E and non-1E batteries are unacceptably supported since they have no tie downs.	a. Class 1E batteries are acceptably supported with or without use of tie downs as required by seismic qualifications; non-1E batteries are acceptably supported.	No corrective action is required.
b. Unistrut supports are unacceptably used.	b. The struts (Unistrut) used in the battery racks supporting the class 1E batteries are adequately qualified by testing and analysis; the struts used in the non-1E battery racks are also acceptable.	
WBN	WBN	WBN
a. Class 1E and non-1E batteries have inadequate supports since no battery tiedowns are provided.	a. Class 1E batteries are acceptably supported with or without use of tiedowns as required by seismic qualifications; non-1E batteries are acceptably supported. These batteries along with the rack system were selected by the NRC as an audit item during a SQRT audit in April 1982. The item dealing with non-inclusion of battery vertical tiedowns was discussed and closed by the NRC.	No corrective action is required.
b. Unistrut members used for the battery rack are unacceptable and should not have been used.	b. The struts (Unistrut) used in the battery racks supporting the class 1E batteries are adequately qualified by testing and analysis; the struts used in the non-1E battery racks are also acceptable.	

Issues	Findings	Corrective Actions
BFN	BFN	BFN
a. Class 1E and non-1E batteries are unacceptably supported since they have no tiedowns.	a. Non-1E batteries are acceptably supported. The class 1E batteries located within the Reactor Building (250 volt dc unit battery supply systems for units 1, 2, and 3, and 250 volt dc shutdown board battery supply systems for units 1 and 2) may be acceptable without vertical tiedown. However, no TVA documentation of adequacy is available. The class 1E batteries located within the DG Building (250 volt dc shutdown board battery supply system for unit 3 and the 125 volt dc DG battery supply system for units 1, 2, and 3) have been determined by the evaluation team to be unacceptable without either vertical tiedowns (on the basis of the diesel building response spectra) or justification for not providing tiedowns.	a. Evaluation of the need for 1E battery vertical tiedowns in the Reactor Building will be performed under the Unresolved Safety Issue (USI) A-46 program as a post-restart activity. This program is covered by NUREG-1030 and -1211 and batteries are specifically covered by Section 2.4.1 of NUREG-1030. Tiedowns will be provided if required by the evaluation results. Evaluation of the need for 1E battery vertical tiedowns in the Diesel Generator Building will be performed utilizing appropriate methodology such as the A-46 process prior to restart of each unit. Tiedowns will be provided if required by the evaluation results. (CATD 225 00 BFN 01)
b. Unistrut supports are unacceptably used.	b. The acceptability of the battery rack system with the use of Unistrut members as battery supports is indeterminate as no seismic qualification report or complete information was available for evaluation team review.	b. Evaluation of the seismic qualification of 1E battery racks will be performed under the USI A-46 program as a post-restart activity. Rack modifications will be provided if required by the evaluation results. (CATD 225 00 BFN 02)
c. Peripheral finding.	c. In addition, the evaluation team noted that TVA plans to ascertain the adequacy of strut members and the need for vertical tiedowns in the rack as part of the program to be developed after plant restart. This program is in response to NRC USI A-46 which is the topic of NUREG-1030 and NUREG-1211. TVA's commitment to comply with this program is contained in a letter from R. Gridley to J. Youngblood, dated March 19, 1986.	c. None required.

Issues	Findings	Corrective Actions
Element 225.0 - BFN (Continued)		
d. Peripheral finding.	d. Also, the evaluation team noted that there are several inconsistencies between and within the FSAR and the CSSC list for the identification of the proper design classification of the following battery systems: o 48 volt dc annunciation supply system o 48 volt dc communication supply system o 24 volt dc neutron monitoring supply system o 250 volt dc station supply system	d. The BFN FSAR will be revised to clarify the appropriate safety classification of the annuciation and communication batteries. In addition the CSSC list of BF-1.11 will be replaced by one BFN Q-list as a result of CATD 209 01 BFN 02 which will ensure that, among other things, all safety-related batteries are clearly indicated. (CATD 225 00 BFN 03)
BLN	BLN	BLN
a. Class 1E and non-1E batteries are unacceptably supported since they have no tiedowns.	a. Class 1E and non-1E batteries are acceptably supported without the use of vertical tiedowns. The seismic qualification of batteries was carried out by Wyle Laboratories by testing without the use of vertical tiedowns.	No corrective action is required.
b. Unistrut supports are unacceptably used.	b. The use of Unistrut members as battery supports is also acceptable for class 1E and non-1E batteries. As mentioned in (a) above, the test specimen of the rack used Unistrut members as battery supports.	

ATTACHMENT C

REFERENCES

1. TVA Employee Concerns Special Program Subcategory Report 20900, "Q-List," Rev. 0

Sequoyah Documents

2. TVA Employee Concerns Special Program Sequoyah Element Report 225.00, "Battery Support Design," Rev. 0 (12/31/86)

Watts Bar Documents

3. TVA Drawings:

45N218, R8, Electrical Equipment Battery and DC Equipment Rooms Plans, Sections, and Details

45W217-1, R3, Electrical Equipment 125V Vital Battery V - Elevation 772.0 Plans and Details

15N210-4, R7, Diesel Generator Building, Electrical Equipment General Arrangement, Elevation 742.0

15N211-2, R2, Electrical Equipment General Arrangement, Elevation 742.0

18W332-1, R8, Miscellaneous Steel Frames, Covers, Grating, Plates, Anchor Bolts, and Ladders

4. TVA letter to NRC, L. M. Mills to E. Adensam, WBN 142, Transmittal of Supplemental Information on Seismic Qualification, [NEB 820203 601], (02/01/82)

5. NRC letter to TVA, T. M. Novak to H. G. Parris, WBN 1, Seismic and Dynamic Qualification Review of Safety Related Equipment, [NEB 820929 221], (09/23/82)

6. TVA letter to NRC, L. M. Mills to E. Adensam, WBN 1 and 2, Additional Information to Resolve Concerns of NRC Seismic Qualification Review Team, [NEB 821206 613], (12/01/82)

7. NRC letter to TVA, T. M. Novak to H. G. Parris, SSER Regarding the Seismic and Dynamic Qualification of Safety Related Electrical and Mechanical Equipment for the Watts Bar Nuclear Plant, Unit 1, [NEB 840501 608], (04/25/84)

8. TVA letter to NRC, L. M. Mills to E. Adensam, WBN, Additional Information to Resolve Concerns Related to Seismic Qualification of Equipment, [NEB 840521 611], (05/17/84)

9. TVA letter to NRC, D. S. Kammer to E. Adensam, WBN, Corrective Actions, Seismic Qualification of Equipment, [NEB 840620 615], (06/19/84)

10. TVA Specification 1980, Reissue 3-85763 [no RIMS number]

11. Wyle Laboratory Report 43479-1 for TVA Contract 76K3-85763 [EEB 770418 924], (01/26/77)

12. Gould Report 60 NCX-2550 and S07-074526-806 transmitted to TVA with letter [EEB 770429 013], (04/26/77)

13. Memo from J. B. Kelly, G. Martzin, and C. H. Sudduth to Electrical Engineering Files, WBN, 125V Vital Batteries, Contract 76K3-85763, Gould, Inc., Seismic Qualification Type-Tests, [EEB 770128 902], (01/26/77)

14. Memo from R. G. Domer to F. W. Chandler, WBN Contract 76K3-85763, Squadcheck EE-09681 - Seismic Qualification of Gould, Inc., 125V Vital Battery Assembly - Rack Seismic Analysis, [CEB 770519 010], (05/19/77)

15 TVA letter to W. C. Smith, Gould, Inc., from F. W. Chandler, WBN, 125V Vital Batteries, Contract 76K3-85763, [EEB 770525 925], (05/23/77)

16. Gould Drawings [no RIMS number]:

    059469C, RB, Layout for Three Cells - For Type, See Table On Special Test Rack with "666" Rack Bracing

    062823D, RE, Layout for 60 Cells NCX-2250 Battery ON-2-S07-074526 - 806 and 1-507-074526-816 Two Step Racks; 13' -0" LG. (Heavy Seismic Restraint)

17. TVA letter from F. W. Chandler to U. Ortiz, Gould, Inc., (GNB Batteries), WBN 125V Vital Battery and Rack, [EEB 841030 907], (10/30/84)

18. Memo from F. H. Coleman to CEB Files, Contract 76K3-85763, Squadcheck EE83-29346, Seismic Qualification of Modification of the 125-V Vital Battery Rack Incorporating the Gould Universal Steel Corner Fitting, [CEB 841029 251], (10/29/84)

19. C&D Battery Report UL7610-02, TVA Contract 80K8-827334, Seismic Qualification Test, Two-Step Rack of "D" Battery Sizes 3DCU-9 Battery Units, ARR130HK50 Battery Charger, [no RIMS number], (11/18/76)

20. Wyle Laboratory Report 43368-1, TVA Contract 80K8-827334, Seismic Simulation Test Program, [no RIMS number], (09/22/76)

21. CEB memo R. O. Barnett to F. W. Chandler, SQN, WBN Seismic Qualification of 125-V Diesel Generator Batteries and Racks, [CEB 800909 002], (09/09/80)

22. TVA letter to C&D from F. W. Chandler to G. Walker, SQN Units 1 and 2 125-V Diesel Generator Batteries and Racks, [EEB 800924 919], (09/24/80)

23. C&D Drawing M-7739, R5 [no RIMS number]

24. Watts Bar regulations, licensing commitments, design requirements:

    FSAR Sections 2.5, 3.1, 3.7, and 3.10, including Subsection 3.10.3 and Table 3.10, Amendment 54, (04/02/85)

    Design Criteria WB-DC-30-2, "125V Vital Battery System," Rev. 1

    Design Criteria WB-DC-30-2.1, "125V Fifth Vital Battery System," Rev. 0

    Nuclear Regulatory Commission, "General Design Criteria for Nuclear Power Plants," Title 10, Code of Federal Regulations, Part 50 (10 CFR 50), Appendix A; Washington: GPO; (07/71)

Browns Ferry Documents

25. TVA Drawings:

47N230, R13	(Control Bay U-1 and 2) "Electrical Equipment; Battery and DC EQPT Rooms; Plans, Sections and Details"
47N232, R11	(Control Bay and Turbine Building units 1, 2, and 3) "Electrical Equipment Battery and DC Equipment Rooms - Plans and Sections"
47N234, R1	(Powerhouse, Reactor Building, units 1 and 2) "Electrical Equipment, 250 volt Battery and DC Equipment RMS SB-A, B, C, and D Plans, Sections and Details"
48N958, R16	(Reactor Building, units 1 and 2) "Miscellaneous Steel - Control Bay Embedded Parts El. 593.0"
48N949, R13	(Reactor Building, unit 3) "Miscellaneous Steel - Control Bay, Embedded Parts, El. 593.0"
48N889, R9	(DG Building) "Miscellaneous Steel Frames, Covers, Grating and Stairs, El. 583.5"
48N897-5, R5	(DG Building, unit 3) "Miscellaneous Steel Frames and Covers"

48N885, R4 (DG Building) "Miscellaneous Steel, Heating and Vent Frames and Electrical Equipment Anchorage"

45N202, R5 (Reactor Building, units 1 and 2) "Electrical Equipment; General Arrangement; Plans and Sections"

45N206, R5 (Reactor Building, unit 3) "Electrical Equipment; General Arrangement; Plans and Sections"

45N337-5, R2 (Diesel Generator Building, unit 3) "Electrical Equipment, Diesel Generator Rooms 3A, 3B, 3C, and 3D; Outline and General Arrangement"

45N329, R3 (Diesel Generator Building, units 1 and 2) "Electrical Equipment; Diesel Generator Rooms A, B, C, and D; Outline and Generator Arrangement"

26. "Report on the Earthquake Analysis of the Reacator Building, Floor Response Spectra," transmitted by John A. Blume and Associates, transmitted by letter from E. J. Kieth, Blume, to W. Boop, TVA, [no RIMS number] (07/13/67)

27. Letter from M. N. Sprouse, TVA to C&D Batteries, "250 volt Shutdown Batteries," Contract 73C8-84065, [no RIMS number], (01/29/73)

28. Specification 1708 for "250 volt Shutdown Batteries and Racks," (Requisition 8-84065), [no RIMS number]

29. BFN Nonconformance Report (NCR) BFN TDP 8204 [BWP 830606 020], (06/06/83)

30. Letter from D. R. Patterson, TVA, to H. N. Bankus, General Electric, "Replacement of Diesel Generator Batteries - BFN 104-1 and BFN 104-2," Contract 66060-90744, [no RIMS number], (11/28/75)

31. Requisition package from TVA to C&D Batteries, TVA Requisition 8-826823, "Batteries and Battery Racks for Diesel Generator Control and Field Flashing," [QEB 800115 125], (11/06/79)

32. DNE Calculations, "125 Volt Diesel Generator Battery Rack Anchorage," [B22 851101 114], (11/01/85)

33. Engineering Change Notice (ECN) P5304, Anchorage Detail for the 125 Volt Diesel Generator Battery Racks, [B22 850927 500], (09/27/85)

34. Vendor Drawing, C&D Batteries K-4363, TVA Contract 66-90744, [no RIMS number], (02/19/70)

35. TVA memo from H. R. Beasley to G. R. Hall, "Browns Ferry Nuclear Plant - Safety Evaluation - Battery Rack Installation," [B22 850424 011], (04/24/85)

36. DNE Calculation, "Battery Rack Installation Evaluation," (Reactor Building and Diesel Generator Building), Branch Project Identifier No.: BFEPCI-212, [B22 860324 142], (03/24/86)

37. TVA memo from R. O. Barnett, Chief Civil Engineer to N. T. Henrich, Acting Chief, Electrical and Instrument and Controls Services, "Browns Ferry Nuclear Plant (BFN) - Seismic Qualification of the 250-Volt DC Main Battery Bank Racks," [B41 870320 002], (03/20/87)

38. Letter from G. L. Parkinson, Bechtel, to G. R. McNutt, TVA, BLT-150, "Browns Ferry Nuclear Plant, Trip Report," [no RIMS number], (03/19/87)

39. Quality Information Release (QIR CEB-86-011), "Browns Ferry Nuclear Plant - Seismic Qualification of Safety-Related Equipment," [B41 860815 003], (08/15/86)

40. Quality Information Release (QIR CEB-86-100), "Browns Ferry Nuclear Plant - Seismic Qualification of Replacement Spare Parts in Safety-Related Equipment," [B41 870102 002], (01/02/87)

41. Letter from B. J. Youngblood, Director PWR Project Directorate #4, NRR to S. A. White, TVA Manager of Nuclear Power, Subject: "Concerns Regarding TVA Nuclear Program," [L44 860226 001], (02/18/86)

42. Letter from B. J. Youngblood, NRC, to S. A. White, TVA with the attached transcript of the investigative interview conducted by the NRC on 02/21/86 at the First Tennessee Bank Building in Knoxville, TN [B45 860714 832], (06/23/86)

43. BFN CSSC and Non-CSSC Listing, Standard Practice BE-1.11, R0 (01/30/87), [no RIMS number]

44. BFN FSAR Update Appendix C, "Structural Loading Criteria," Amendment 04, (08/06/86)

45. BFN responses to FSAR Questions C.1, C.3.4, C.5, C.9, and C.12, BFN FSAR Update through Amendment 04, (08/06/86)

46. Safety Evaluation of the TVA, BFNP units 1, 2, and 3; Docket Nos: 50-259, 50-260 and 50-296, issued by U. S. Atomic Energy Commission, Directorate of Licensing, Washington, D.C., (06/26/72)

47. TVA BFN, "Seismic Design Basis, Status Report," [no RIMS number], (03/86)

48. Diesel Generator Building, Earthquake Analysis Report, [CEB 800619 010], (02/06/69)

49. Browns Ferry Regulations, Licensing Commitments, Design Requirements:

BFN FSAR Update through Amendment 04, (08/06/86)

Section 1.6.2.17	"D-C Power Supply"
Section 8.1	"Electric Power System - Summary Description"
Section 8.5	"Standby A-C Power Supply and Distribution"
Section 8.6	"250 Volt D-C Power Supply and Distribution"
Section 8.8	"Auxiliary D-C Power Supply and Distribution"
Appendix A	"Conformance to AEC Proposed General Design Criteria"
Appendix C	"Structural Loading Criteria"

NRC NUREG-1030, "Seismic Qualification of Equipment in Operating Nuclear Power Plants," Final Report, (02/87)

NRC NUREG-1211, "Regulatory Analysis for Resolution of Unresolved Safety Issue A-46, Seismic Qualification of Equipment in Operating Plants," (02/87)

Comment Draft of 27 General Design Criteria for Nuclear Power Plants, 10 CFR 50, Appendix A, (11/22/65)

Comment Draft of 70 General Design Criteria for Nuclear Power Plant Construction Permits, 10 CFR 50, Appendix A, (07/10/67)

Bellefonte Documents

50. TVA Drawings:

3BW0200-00-2, R6	Equipment Plan El. 686.0
4AW0830-X2-1, R8	Miscellaneous Steel Embedded Parts, El. 686.0, and Walls to El. 704.5
4AW0830-X2-2, R7	Miscellaneous Steel, Embedded Parts, El. 686.0, and Walls to El. 704.5

5AW0248-EU-1, R3	Electrical Equipment - 125V Vital Battery Rooms, Part Plan - El. 686.0
5AW0248-EU-2, R5	Electrical Equipment - 125V Vital Battery Rooms Part Plan - El. 686.0
4AW0334-X1-1, R6	Concrete Equipment Foundations, Fl. El. 686.0 Outline and Reinforcement
4AW0830-X2-22, R12	Miscellaneous Steel Embedded Parts El. 686.0 and Walls to El. 704.5

51. TVA Invitation Bid and Acceptance Document for BLN, Contract 78K4-823476, [QAS 780301 567], (02/17/78)

52. Letter from C&D Batteries to B. H. Mathews, TVA, Contract 78K4-823476, [no RIMS number], (05/18/78)

53. Letter to C&D Batteries from TVA [no RIMS number], (02/17/87), 780628C0044

54. Letter from F. W. Chandler to C&D Batteries, Contract 78K4-823476, [EEB 780609 930], (06/09/78)

55. C&D Battery report for TVA Contract 78K4-823476; "Qualification Certification and Qualification Report For Batteries; No. 78061460457," [no RIMS number]

56. TVA memo from R. M. Hodges to L. S. Cox, "Nonconformance Report 3008," [BLP 840518 048], (05/18/84)

57. Engineering Change Notice (ECN) 2986, "EU, 125 V DC Battery Rack (Anchoring)," [BLP 840523 001], (05/22/84)

58. C&D Drawing M-7131-1, R1, for TVA Contract 78K4-823476 [no RIMS number]

59. Letter from B. J. Youngblood, Director PWR Project Directorate #4, NRR to S. A. White, TVA Manager of Nuclear Power, Subject: "Concerns Regarding TVA Nuclear Program," [L44 860226 001], (02/18/86)

60. Letter from B. J. Youngblood, NRC, to S. A. White, TVA with the attached transcript of the investigative interview conducted by the NRC on 02/21/86 at the First Tennessee Bank Building in Knoxville, TN [B45 860714 832], (06/23/86)

61. Report No. CEB 80-33, R1 and R2, Bellefonte Nuclear Plant, "Dynamic Earthquake Analysis of the Auxiliary - Control Building and Response Spectra for Attached Equipment," [841103E0033]

62 TVA memo from R. O. Barnett to Those Listed, "Bellefonte Nuclear Plant, Auxiliary Control Building, Dynamic Earthquake Analysis and Response Spectra for Attached Equipment." [CEB 821012 013], (10/12/82)

63. TVA memo from J. D. Shubert, Jr. to Civil Engineering Support Branch Files, "Bellefonte Nuclear Plant Units 1 and 2, Auxiliary Control Building, Seismic Design Review Meeting - Meeting Notes," [CEB 830201 005], (11/01/83)

64. TVA Nonconformance Report (NCR) BLN CEB 8201, R0, [CEB 820217 002], (02/16/82); R1, [CEB 831011 020], (07/01/83); and closure [CEB 840103 014], (01/03/84)

65. TVA memorandum from R. O. Barnett, Chief CEB, to R. M. Hodges, BLN Design Project Manager, "BLN - Auxiliary/Control Building - Revised Seismic Analysis," [CEB 820527 002]

66. Letter from G. L. Parkinson, Bechtel, to G. R. McNutt, TVA, "Bellefonte Trip Report," BLT 232, (06/04/87)

67. Bellefonte regulations, licensing commitments, design requirements:

BLN FSAR Section 3.1, 3.2, 3.7, and 8.3, Amendment 27, (06/20/86)

General Design Criteria N4-50-D702, "Design of Civil Structures," Rev. 5, [805 860815 507], (08/12/86)

Design Criteria N4-E-V-D775, "125V Class IE DC Power Distribution System," Rev. 2, [B42 860103 513], (12/18/85)

Nuclear Regulatory Commission, "General Design Criteria for Nuclear Power Plants," Title 10, Code of Federal Regulations, Part 50 (10 CFR 50), Appendix A; Washington: GPO; (07/71)