ENCLOSURE 1

WATTS BAR NUCLEAR PLANT

EQUIPMENT SEISMIC QUALIFICATION

Corrective Action Program Plan

Revision 0

WATTS BAR

TVA NUCLEAR

WATTS BAR NUCLEAR PLANT

EQUIPMENT SEISMIC QUALIFICATION

CORRECTIVE ACTION PROGRAM PLAN

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EQUIPMENT SEISMIC QUALIFICATION
CORRECTIVE ACTION PROGRAM PLAN

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EQUIPMENT SEISMIC QUALIFICATION
CORRECTIVE ACTION PROGRAM PLAN

1.0 INTRODUCTION

This plan describes the Corrective Action Program (CAP) for Equipment Seismic Qualification (ESQ) activities at the Watts Bar Nuclear Plant (WBN).

The WBN ESQ program was audited in April 1982 by the Nuclear Regulatory Commission (NRC) Seismic Qualification Review Team (SQRT). The NRC staff concluded in Safety Evaluation Report (SER) Supplement 3 (Reference 1) that an appropriate seismic and dynamic qualification program has been defined and substantially implemented, with the exception of eight open items (see Attachment 1, page 1). Responses to the eight open items were subsequently provided to the NRC. However, NRC concurrence is still pending. The open items are primarily in the configuration and document control areas.

Subsequent to the SQRT audit, some conditions adverse to quality (CAQs) were identified through TVA internal reviews and were documented in problem identification reports (PIRs), Employee Concerns, nonconforming condition reports (NCRs), significant condition reports (SCRs), and condition adverse to quality reports (CAQRs) (see Attachment 1, pages 4 and 5). These CAQs are primarily in the instrument/control mounting area.

Review teams were established during 1986 and 1987 to review the CAQs and to determine their significance and root causes. Based on a more recent evaluation of the existing CAQs and previous review team findings, the following four categories of issues were defined:

- Documentation retrievability.
- Interface control among engineering disciplines, and between engineering and other organizations.
- Some discrepancies between design documents and installed conditions.
- Some discrepancies between the inspection documentation and the installed conditions

The root causes of the above issues are listed in order below:

- Documents not properly entered in the Records Information Management System (RIMS) and indexed for retrieval.
- Inconsistent application of interface control procedures or unclear procedures.
- Inconsistent application of installation requirements or unclear requirements.
- Some unclear inspection requirements and inconsistency in specifying the essential inspection attributes.

Additionally, issues from other related TVA programs and activities such as lessons learned from Sequoyah (SQN) (Reference 2) will be evaluated in this CAP as necessary.

Attachment 1, page 2, provides supplemental background information related to WBN ESQ.

2.0 OBJECTIVE

The objective of this CAP is to provide assurance that Category I and I(L) equipment for WBN unit 1 are adequately qualified for design basis seismic events and are in compliance with the WBN criteria, procedures, and licensing requirements. Revisions will be made to the applicable design criteria and to the Final Safety Analysis Report (FSAR) as required to ensure consistency of the design criteria with the licensing requirements.

3.0 SCOPE

The scope of this CAP includes WBN unit 1 and common, Category I and I(L) equipment as defined in FSAR Section 3.2.1.

4.0 PROGRAM DESCRIPTION

4.1 Program Plan

A flow chart and fragnet for the CAP are provided in Attachments 2 and 3, respectively. The program plan is described in the following sections:

4.1.1 Review and Revise Design Basis Document

The Design Baseline and Verification Program (DBVP) review of those design criteria applicable to ESQ (References 3, 4, 5, and 6) verified consistency with licensing commitments in the FSAR and identified calculations which are required to support the ESQ design criteria. These calculations are defined in Section 8.4 of Reference 3, Section 6.4 of Reference 4, and Section 7.4 of Reference 5. Development of these calculations will be done as part of this CAP, which will also support the WBN essential calculation activity described in the DBVP.

The ESQ design criteria and FSAR will be reviewed for any additional revisions required to establish a complete and technically adequate design basis. Licensing commitment changes will be proposed when technically justified.

4.1.2 Develop and Maintain an ESQ List

The latest WBN Q-list (see Q-list Cap) will be used as a basis for developing a procedurally controlled ESQ list which

will index the pertinent qualification documentation for all reviewed equipment. It will also be used as a means of tracking completion of ESQ activities. Updates to the ESQ list will reflect the latest revision of the Q-list.

4.1.3 Documentation Retrieval For Category I Equipment

This activity will ensure that the following types of documents as identified by the ESQ list are readily retrievable for future use:

- Design information including technical specifications, seismic design requirements, acceptance criteria and calculations.

- Procurement and qualification information including vendor seismic reports, records (e. g., TVA review/approval memoranda, contracts, and material receiving reports), calculations, drawings, and qualification procedures.

- Installation information including installation-related documentation, drawings, procedures, and records.

- Change and modification information including change control documentation, modification records, and engineering review approval of the change documents.

In order to increase program efficiency and to minimize duplication, close coordination will be maintained with the ongoing Sequoyah Vendor Seismic Qualification Documentation Retrieval Program (Reference 7) by sharing common information.

4.1.4 Engineering Evaluations For Category I Equipment

The documentation of Section 4.1.3 will be reviewed for completeness and adequacy relative to the resolution of concerns defined from open audit items, CAQs, and other related programs and activities described in Section 1.0.

Review findings will be documented. Actions will be taken to correct adverse conditions. These may include such activities as obtaining documents from vendors/suppliers, preparing calculations, or performing tests.

Resolution of discrepancies between designed and installed conditions will require engineering walkthrough of equipment for the specific attributes identified by the issues (i.e., engineering observations to compare and document the essential attributes of actual conditions versus design conditions). These walkthroughs will be identified on an as-needed basis. Parameters such as equipment anchorage, orientation, and mounting configuration will usually be assessed based on visual observations. However, actual

measurements will be taken as necessary. The walkthrough will be performed by teams of engineering personnel familiar with the equipment seismic qualification design basis for WBN. Technical evaluation of the walkthrough results will be performed to demonstrate compliance with the design basis.

In order to determine the extent to which a condition exists, similar types of equipment having the attributes identified by the concerns (Section 1.0) will be evaluated. For example, those equipment types having similar vendor qualification, mounting details, or design basis will be evaluated. The similarities identified during the evaluation will be used for in-process trending and will form the basis for redefining the boundary of items requiring evaluation. The scope of the evaluation will therefore be either limited or expanded based on the results of the trending.

Required modifications will be implemented.

4.1.5 Compilation of Documentation For Category I Equipment

ESQ documentation will be assembled into equipment review packages, which will include the following (as applicable):

- Qualification criteria
- Technical and procurement specifications
- Location information with equipment identification
- Vendor/TVA drawings and interface documents
- Seismic summary review forms and supporting seismic response analysis
- Vendor qualification reports and supporting documents
- Calculations
- Comments and resolutions from TVA internal design review
- Related correspondence and problem reports
- Field walkthrough summary and resolution of discrepancies
- Applicable portions of the ESQ list

Equipment review packages will include sufficent documentation from that described in Sections 4.1.3 and 4.1.4, such that a qualified reviewer can independently assess ESQ adequacy.

4.1.6 Category I(L) Equipment

Acceptability of category I(L) equipment, as identified by the ESQ List, will be confirmed by area walkthroughs and development of required documentation and/or review of existing documentation. This activity will include the following:

- Retrieval of existing ESQ documentation for category I(L) equipment purchased with QA requirements and indexing in the ESQ list.
- Walkthroughs for category I(L) equipment in Seismic Category I structures.
- The walkthrough will address the adequacy of the interactions of Category I(L) equipment installation with Category I equipment/commodities, for relative seismic movement, position retention and pressure boundary retention, as applicable.
- A documentation package will be compiled for each area to reflect the results of the walkthrough evaluation and necessary supporting documents.
- Required modifications will be implemented.

4.2 Recurrence Control

The following specific actions either have been or will be accomplished for the purpose of recurrence control:

- The document retrievability will be improved by revised Watts Bar Engineering Procedures (WBEPs) ensuring entry into RIMS and maintenance of the equipment review packages and ESQ List.
- Interface review requirements have been strengthened through issuance of Nuclear Engineering Procedure NEP-3.3, "Internal Interface Control," and NEP-5.3, "External Interface Control."
- Applicable installation procedures will be revised to clearly define the installation requirements, and training will be provided to assure compliance with these requirements.
- Applicable quality control instructions and quality control procedures will be revised to clearly specify the inspection requirements and essential attributes.

4.3 Licensing Assessment

In order to resolve the issues identified in this ESQ CAP, and to establish an appropriate design basis for ESQ activities, revisions

to the design criteria and FSAR may be necessary. Any changes to the licensing commitments will be proposed only when technically justified.

5.0 PROGRAM INTERFACES

For the purposes of this CAP, two types of program interfaces are considered: production and programmatic. Production interfaces are those interfaces with other programs where one program's output impacts the scope of another program, but does not impact program methodology. Programmatic interfaces with other programs are those interfaces where one program's methodology or progress is contingent upon or at risk with respect to the results of another program.

5.1 Production Interfaces

- Q-List CAP - The ESQ list will be updated using the final Q-list
- Replacement Items Program CAP - The existing unqualified replacement items identified by this CAP will be addressed by ESQ CAP.

5.2 Programmatic Interfaces

- Hanger Analysis and Update Program (HAAUP) - This program will provide piping interface loads on mechanical equipment. The ESQ CAP will require tracking of these interface loads to a satisfactory resolution.
- Instrument Line CAP - This program and the ESQ CAP will require the same type of interface activity as described for HAAUP.
- DBVP - The ESQ design criteria is a portion of the Design Basis Document output by DBVP.
- Seismic Analysis CAP - This program will provide required input for equipment seismic qualification.
- Electrical issues CAP - This program will provide equipment and electrical hardware interface conditions for the equipment seismic qualification evaluation.
- Quality Assurance (QA) Records Program - The documentation resulting from the ESQ Program will be used to demonstrate the adequacy of existing equipment installation.

6.0 PROGRAM IMPLEMENTATION

The CAP Plan will be implemented by Nuclear Engineering (NE), Nuclear Construction (NC), and Nuclear Quality Assurance (NQA). Additionally, Nuclear Maintenance (NM) will be affected by revised NE output. The specific responsibilities are as listed below:

- NE is responsible for retrieving, reviewing, and compiling documents; investigating and bounding the problems; issuing revised design criteria and procedures; walkthrough of equipment items; evaluating results of walkthrough and issuing revised design output documents; preparing equipment review packages, ESQ list, and other required documentation, trending reports, and the final report.

- NC is responsible for revising any NC procedures required to implement revised NE output, providing support to NE during document retrieval and the engineering walkthrough, and performing any required modifications.

- Nuclear Quality Assurance (NQA) and Engineering Assurance (EA) will perform audits and reviews to ensure the adequacy and effectiveness of program activities and deliverables. Additionally, NQA is responsible for revision of QC inspection procedures in accordance with revised design output.

- NM is responsible for revising any maintenance procedures required to implement revised NE output.

7.0 PROGRAM DOCUMENTATION

Documentation developed and/or compiled under this CAP will be made readily retrievable. These documents will include the ESQ list and equipment review packages.

The CAP plan activities will be performed in accordance with approved instructions or procedures. Field data will be gathered in accordance with approved engineering walkthrough procedures. Calculations will be performed and documented in accordance with TVA's NEPs.

A final summary report will be issued upon completion of the ESQ CAP activities.

8.0 CONCLUSION

The implementation of this CAP will ensure that equipment seismic qualification is in conformance with WBN licensing requirements.

9.0 REFERENCES

1. NUREG-0847, "USNRC Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plants 1 & 2," Supplement 3, January 1985.

2. Sequoyah Nuclear Plant, Lessons Learned Task, RIMS number B41 880325 003.

3. Design Criteria WB-DC-40-31.2, "Seismic Qualification of Category I Fluid System Components and Electrical or Mechanical Equipment," Revision 3.

4. Design Criteria WB-DC-40-31.6, "Seismically Qualifying Tanks and Reservoirs and Their Supports," Revision 1.

5. Design Criteria WB-DC-40-31.12, "Seismic Qualification of Category I and I(L) Valves and Other Inline Fluid System Components," Revision 2.

6. Design Criteria WB-DC-40-31.13, "Seismic Qualification of Category I(L) Fluid System Components and Electrical or Mechanical Equipment," Revision 1.

7. Sequoyah Nuclear Plant, Vendor Seismic Qualification Documentation Retrieval Program (RIMS number B25 880811 025).

Attachment 1

BASIS FOR CORRECTIVE ACTION PROGRAM PLAN

The NRC SQRT audit identified the following open items:

- The issue of the adequacy of using single-frequency and single-axis seismic qualification tests for Westinghouse-supplied electrical equipment at WBN.
- The issue of most of the electrical cabinets being bolt-mounted during the seismic qualification tests but being weld-mounted in the field.
- The issue of items sensitive to aging, such as insulated electrical equipment, and the requirement for surveillance and maintenance program to prevent excess material deterioration that will affect their structural integrity.
- The issue of the reactor trip switchgear being bolt-mounted during qualification testing but being weld-mounted in the field.
- The first two issues above applied to the reactor protection system cabinets.
- The issue of the spot-welded mounting details of main control board panels with respect to potential flexibility where the qualification assumed fixed mounting.
- The issue of verification that spacers were installed for 124-V dc vital service battery racks in the same manner as when they were tested.
- The first issue above applied to the Barksdale Pressure Switch/Square-D relay.

See page 2 of this attachment for supplemental background information.

Attachment 1

BASIS FOR CORRECTIVE ACTION PROGRAM PLAN

Supplemental Background Information:

In pursuit of acceptable seismic qualification documentation, the Watts Bar Engineering Project (WBEP) set standards for seismic qualification of equipment from the onset of the Watts Bar Nuclear (WBN) Project. These commitments were deemed to be consistent with the industry and Nuclear Regulatory Commission (NRC) requirements. The basis for seismic Category I Equipment Seismic Qualification (ESQ) follows the recommendations of IEEE 344-1971 (Reference a) as a minimum and for equipment purchased after September 1, 1974, IEEE 344-1975 (Reference b) was used to the extent practical and technically justified. This approach is documented in the WBN Final Safety Analysis Report (FSAR), Section 3.9.2.2 (Reference c) and Section 3.10 (Reference d). It is consistent with the industry practice for plants docketed before October 27, 1972 as defined in NUREG-0800 "NRC Standard Review Plan," (Reference e) and WBN FSAR Section 3.10.

A Seismic Qualification Review Team (SQRT) audit of unit 1 was conducted by NRC in April 1982. In Section 3.10 of the WBN Safety Evaluation Report (SER) (Reference g), and during the SQRT site audit of safety-related electrical and mechanical equipment, several generic and specific concerns were identified. These concerns are discussed in SER Supplements 1 through 4 (References g through j) as well as in a letter from NRC to TVA dated September 23, 1982 (Reference k). In an effort to resolve those concerns, TVA provided responses to NRC in submittals up to January 1986. The current status of each concern is documented in SER Supplement 3 of January 1985 (Reference i); however this status does not address submittals made after the issuance of SER Supplement 4. Currently ESQ remains identified as an "outstanding issue" with three generic and five specific items remaining open through SER Supplement 4. Therefore, a need exists to obtain NRC concurrence for closure of the open items.

References for supplemental background information include:

a. IEEE 344-1971, "Guide for Seismic Qualification of Class 1 Electric Equipment for Nuclear Power Generating Stations," Institute of Electrical and Electronics Engineers.

b. IEEE 344-1975, "Recommended Practices for Seismic Qualification of Class 1E Electric Equipment for Nuclear Power Generating Stations," Institute of Electrical and Electronics Engineers.

c. Tennessee Valley Authority, Watts Bar Nuclear Power Station Final Safety Analysis Report, Section 3.9.2.2, "Seismic Qualification Testing of Safety-Related Mechanical Equipment."

d. Tennessee Valley Authority, Watts Bar Final Safety Analysis Report, Section 3.10, "Seismic Design of Category I Instrumentation and Electrical Equipment."

Attachment 1

BASIS FOR CORRECTIVE ACTION PROGRAM PLAN

References (continued)

e. NUREG-0800, USNRC Standard Review Plan, Section 3.10, "Seismic and Dynamic Qualification of Mechanical and Electrical Equipment," July 1981.

f. NUREG-0847, "USNRC Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant Units 1 & 2," June 1982.

g. NUREG-0847, "USNRC Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant Units 1 & 2," Supplement 1, September 1982.

h. NUREG-0847, "USNRC Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant Units 1 & 2," Supplement 2, January 1984.

i. NUREG-0847, "USNRC Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plants 1 & 2," Supplement 3, January 1985.

j. NUREG-0847, "USNRC Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant Units 1 & 2," Supplement 4, March 1985.

k. Letter from the NRC to TVA dated September 23, 1982, "Seismic and Dynamic Qualification Review of Safety Related Equipment for WBN Unit 1" (RIMS # NEB '82 0929 22).

Attachment 1

BASIS FOR CORRECTIVE ACTION PROGRAM PLAN

Current List of Open CAQs:

CAQ Number	Description	References
NCR WBNEEB8522	The moisture seal between flex conduit and solenoid valve needs seismic qualification.	
PIR WBNCEB8551	Where loads on nozzles exceed the vendor's allowables, the procurement file should include this information.	
PIR WBNCEB8637	The remote valve operator systems do not have sufficient seismic qualification.	
PIR WBNEEB8665	Will the additional 1/2 in. tubing weight on the 1041 lb. FCV affect its seismic qualification?	
PIR WBNNEB8678 and WBNNEB8679	Do the instruments attached to CAT-I ductwork need to be seismically qualified?	
PIR WBNMEB8688 and WBNMEB86106	Do the instruments for CAT-I ductwork in mild environment need to be seismically qualified?	SQN PIRMEB8637
CAQR WBP 870709 and WBP 870710	Design output documents do not adequately address some CAT-I(L) small equipment mounting in CAT-I structures.	
WBN NCR 6296, SCR 7038-S, and SCR W-487-P-S	Instrument mounting bracket detail B-19 were damaged or installed incorrectly.	NRC violation 390/86-21, 391/86-21 EC IN-85-973-002
WBN SCR 6298-S and SCR 6566-S (50.55[e])	ASCO solenoid valves were installed and disassembled incorrectly.	NRC Violation 390/86-02-01, 391/86-02-01 WBRD-50-390/85-52 WBRD-50-391/86-14
WBN NCR 6397 and SCR 6449-S (50.55[e])	Unclear inspection requirements of instrument mounting bolt type and tightness.	WBRD-50-390/85-61 WBRD-50-391/85-57 EC IN-85-398-003

Attachment 1

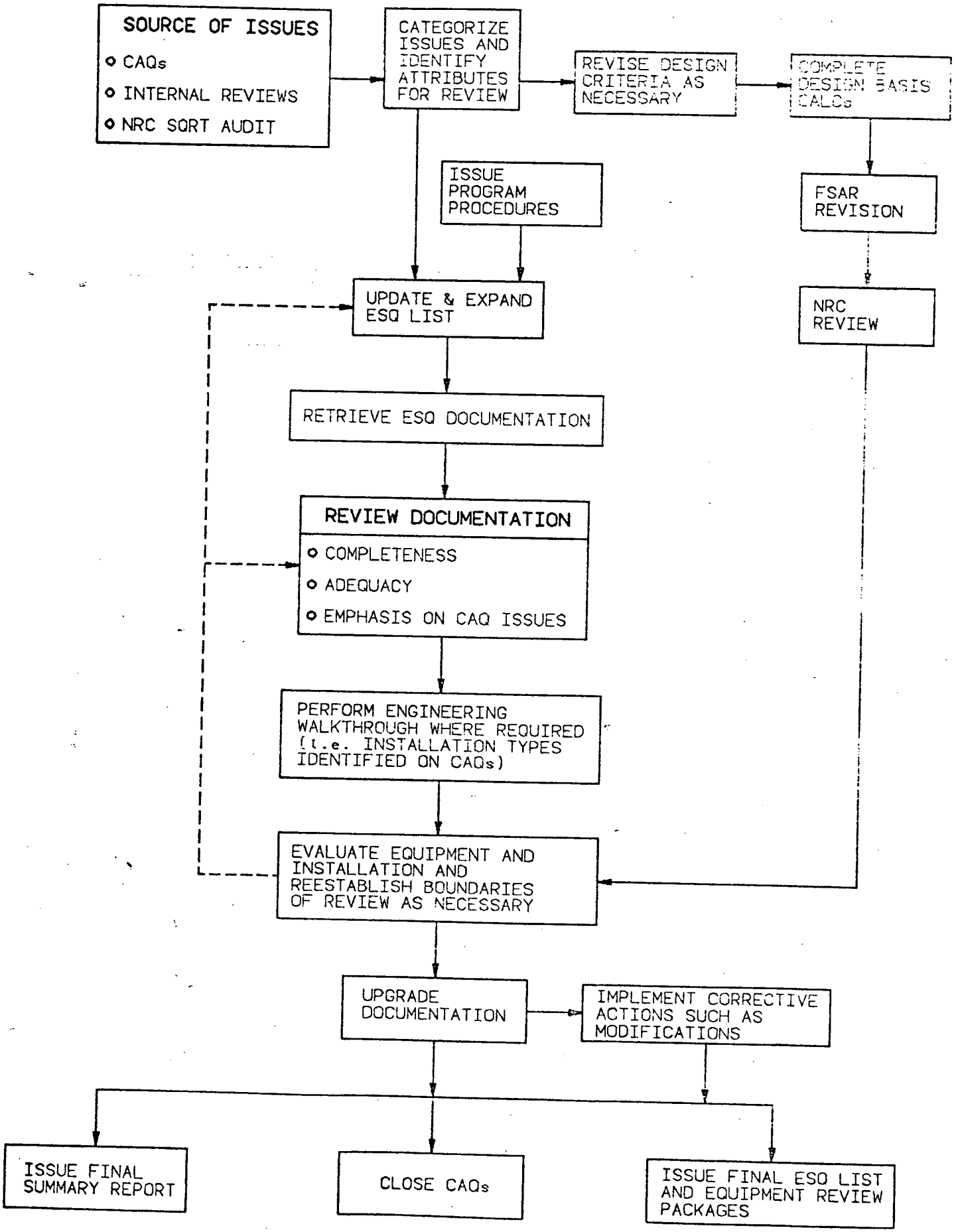
BASIS FOR CORRECTIVE ACTION PROGRAM PLAN

Current List of Open CAQs (Continued):

CAQ Number	Description	References
WBN SCR W-556-P-S	Unclear inspection requirements of bolt connections between the adjacent floor mounted panels for bolt type and tightness.	SCR 7114-S
WBN NCR 6590 and NCR W-411-P (50.55[e])	Unclear inspection requirements of drill-in-anchors for instrument installation.	WBRD-50-390/86-56 WBRD-50-391/86-53 EC IN-85-845-001
WBN SCR 6713-S and SCR W-559-P-S (50.55[e])	Failure to complete and file inspection documentation properly for wall-mounted instrument panels.	WBRD-50-390/87-08 WBRD-50-391/87-08
WBN NCR W-476-P	NE has not provided sufficient vendor information for the installation and inspection of bracket-mounted instruments.	EC IN-85-463-006 NRC Violation 390/86-18-03
CAQR WBP880406	Discrepancies of weld symbols exist on design drawing, and the weld spacings were violated during installation.	
WBN SCR 7093-S and NCR 7094	The shop (TVA)-fabricated electrical junction boxes lack of documentation for deviations from design requirements.	
WBN NCR 7075	NE has not, in all cases, provided controlled documents for acceptance criteria of instrument installation.	EC IN-85-886-N04

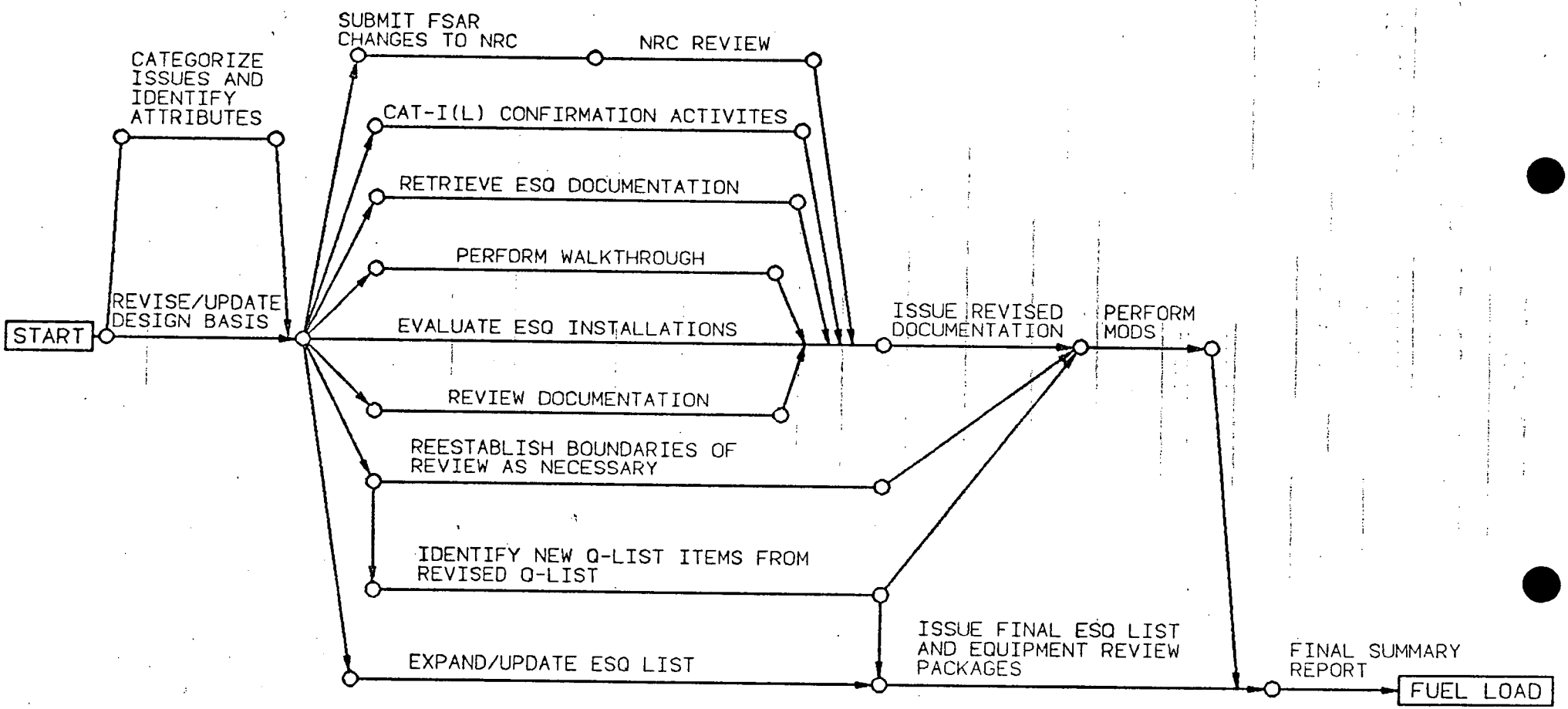
ATTACHMENT 2

FLOWCHART OF CAP ACTIVITIES



ATTACHMENT 3

FRAGNET



ENCLOSURE 2

For the Watts Bar Nuclear Plant, TVA commits to:

- The ESQ design criteria and FSAR will be reviewed for any additional revisions required to establish a complete and technically adequate design basis.

- The latest WBN Q-list (see Q-list Cap) will be used as a basis for developing a procedurally controlled ESQ list which will index the pertinent qualification documentation for all reviewed equipment. It will also be used as a means of tracking completion of ESQ activities.

- Ensure that the following types of documents as identified by the ESQ list are readily retrievable for future use: design information, procurement and qualification information, installation information, and change and modification information.

- The documentation of category I equipment will be reviewed for completeness and adequacy relative to the resolution of concerns defined from open audit items, CAQs, and other related programs and activities.

- ESQ documentation will be assembled into equipment review packages.

- Acceptability of category I(L) equipment, as identified by the ESQ List, will be confirmed by area walkthroughs and development of required documentation and/or review of existing documentation.

- Applicable installation procedures will be revised to clearly define the installation requirements, and training will be provided to assure compliance with these requirements.

- Applicable quality control instructions and quality control procedures will be revised to clearly specify the inspection requirements and essential attributes.