

TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401  
400 Chestnut Street Tower II

July 27, 1983

Director of Nuclear Reactor Regulation  
Attention: Ms. E. Adensam, Chief  
Licensing Branch No. 4  
Division of Licensing  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Dear Ms. Adensam:

In the Matter of the Application of ) Docket Nos. 50-390  
Tennessee Valley Authority ) 50-391

Please refer to your April 1, 1983 letter to H. G. Parris and L. M. Mills' May 19, 1983 letter to you concerning the environmental qualification of safety-related mechanical equipment located in harsh environment areas at the Watts Bar Nuclear Plant (WBN).

A program plan for performing an evaluation of the environmental qualification of mechanical equipment, as discussed in L. M. Mills' previously mentioned May 19, 1983 letter, has been established and is enclosed for NRC review. Our target completion date for this evaluation is December 2, 1983; however, the evaluation should have progressed sufficiently to allow NRC review of a representative sample by September 1, 1983.

We wish to reiterate that TVA's position is such that completion of this program (or approval by NRC) is not required for unit 1 licensing. We believe this program constitutes a "good faith" effort to systematically establish that essential safety-related mechanical equipment at Watts Bar conforms to GDC-4.

If you have any questions concerning this matter, please get in touch with D. B. Ellis at FTS 858-2681.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

*D S Kammer*

D. S. Kammer  
Nuclear Engineer

8308030076 830727  
PDR ADOCK 05000390  
A PDR

Sworn to and subscribed before me  
this 27<sup>th</sup> day of July 1983

*Paulette N. White*  
Notary Public  
My Commission Expires 9-5-84

Enclosure

cc: See page 2

A048  
111

U.S. Nuclear Regulatory Commission

July 27, 1983

cc: U.S. Nuclear Regulatory Commission (Enclosure)  
Region II  
Attn: Mr. James P. O'Reilly, Regional Administrator  
101 Marietta Street, NW, Suite 2900  
Atlanta, Georgia 30303

ENCLOSURE

PROGRAM PLAN

Environmental Qualification of Safety-Related Mechanical Equipment

Watts Bar Nuclear Plant

1.0 INTRODUCTION

1.1 Purpose: To determine that active safety-related pumps and valves conforms to the applicable requirements of General Design Criterion 4 (GDC-4) of Appendix A to 10 CFR 50 and to determine that this equipment will adequately perform its required safety functions when subjected to the environmental conditions associated with normal operation and postulated accidents.

1.2 Scope: A documented materials analysis will be performed of the essential nonmetallic subcomponents of active safety-related pumps and valves to determine the effects of material degradation upon equipment operability. Excluded from this analysis is any equipment or portion of equipment that is being evaluated as part of TVA's environmental qualification program for electrical equipment.

1.3 Definitions:

Degrading Property Change: Any significant material property change that infringes on the integrity of the component.

Threshold Radiation Level: The radiation exposure above which there is a degrading property change in the material.

Maximum Service Temperature: The temperature above which there is a degrading property change in the material.

Service Life: The duration of time which a subcomponent is to function prior to being replaced during routine maintenance of the equipment.

Harsh Environment: An environment that would be significantly more severe during a design basis accident than the environment in the same area during normal operation, including anticipated operational occurrences.

## 2.0 EVALUATION

### 2.1 Methodology

This analysis will consist of the following steps:

- Identification of harsh environmental areas.
- Identification of active safety-related pumps and valves.
- Identification of essential nonmetallic subcomponents.
- Identification of any substitutions which TVA may have made to equipment with respect to nonmetallic subcomponents.
- Identification of nonmetallic subcomponents material capabilities.
- Evaluation of nonmetallic subcomponents material capabilities versus harsh environment.

#### 2.1.1 Identification of Harsh Environmental Areas

The environmental data to be used for this analysis will be the same data TVA has compiled for use in the electrical equipment qualification program.

Of the environmental service conditions (temperature, pressure, humidity, submergence, radiation, etc.) only temperature and radiation will be considered and evaluated. TVA considers the effects of the remaining conditions not to be significantly detrimental to mechanical equipment operability. Radiation values will be those resulting from the most limiting credible postulated accident and the 40-year dosage. Temperature values will be those resulting from the most limiting credible postulated accident.

#### 2.1.2 Identification of Active Safety-Related Mechanical Equipment

An equipment list will be prepared by system (see attachments 1 and 2) identifying all active safety-related valves and pumps which are located in a harsh environment area and are required for safe hot shutdown of the unit.\*

\*Equipment in the systems referenced in NUREG 0737, section III.D.1.1 are considered to be in a harsh environment area.

2.1.3 Identification of Substitutions Made to Equipment by TVA With Respect to Nonmetallic Subcomponents

A review of existing documentation will determine if any modifications to the originally furnished nonmetallic subcomponents were made by TVA after receipt of the equipment. Disassembly of equipment will not be required.

2.1.4 Identification of Essential Nonmetallic Subcomponents

A nonmetallic subcomponents list will be prepared (see attachment 3) from the latest revision of the manufacturer's bills of material and incorporating any of TVA's changes as determined in 2.1.3. Where required, additional information on these subcomponents will be obtained from the equipment manufacturer.

2.1.5 Identification of Nonmetallic Subcomponent Material Capabilities

Each different material identified in section 2.1.4 will be listed on a separate material listing sheet (see attachment 4).

Material handbooks, textbooks, reference books, EPRI and other industry accepted organization's testing efforts, government reports, manufacturer's test reports, etc., will be researched to obtain material capabilities data.

Threshold radiation level and maximum service temperature will be conservatively chosen from the above-mentioned data sources.

2.1.6 Evaluation of Nonmetallic Subcomponents Material Capabilities Versus Environment

A comparison between the nonmetallic subcomponents material capabilities as determined in section 2.1.5 and the maximum postulated environmental conditions to which they may be exposed will be made based on the cumulative environmental effects experienced by the components during their intended service life plus 100 days duration at postulated accident conditions. The normal (service life) environmental effects on the nonmetallic subcomponents in equipment in the systems referenced in NUREG-0737, section III.D.1.1 are considered negligible.

It is reasonable to assume that a particular nonmetallic subcomponent will be found in several different harsh environmental areas, with different postulated environmental conditions. If the comparison shows that the nonmetallic subcomponent is acceptable in the maximum harsh environmental conditions to which it may be exposed, then it shall be acceptable for all lesser harsh environmental areas.

If the comparison shows that the nonmetallic subcomponent is not acceptable in its maximum postulated environmental conditions, then the nonmetallic subcomponent's material capabilities shall be compared with its next lower set of harsh environmental conditions. If it is not acceptable for these conditions, then this process will continue until the nonmetallic subcomponent's material capabilities are found to be acceptable within a harsh environmental area.

The nonmetallic subcomponents which are found to be not acceptable in certain harsh environmental areas shall be evaluated in further detail to determine the following:

- a. Degree of material degradation
- b. Degree of functional degradation
- c. Effect on service life
- d. Effect on equipment operability and functionality
- e. Effect on plant safety

This additional evaluation will determine in what harsh environmental areas the subcomponent is acceptable.

The evaluation described in this section will determine the following regarding the nonmetallic subcomponent:

- a. Acceptable for use in all harsh environmental areas
- b. Acceptable for use in specific harsh environmental areas by direct comparison
- c. Acceptable for use in specific harsh environmental areas as determined by additional evaluation
- d. Not acceptable for use

### 3.0 IMPLEMENTATION OF PROGRAM RESULTS

- 3.1 Where nonmetallic subcomponents are determined to not be acceptable in certain harsh environmental areas, a nonconforming condition report (NCR) shall be initiated to replace the subcomponent or equipment with acceptable material or equipment as appropriate, when replacements are available, or be replaced on an accelerated schedule of normal plant operation maintenance.

### 4.0 REPORT TO NRC

- 4.1 The results of all phases of this program shall be documented and forwarded to the NRC, and an auditable file will be maintained.

### 5.0 ATTACHMENTS

1. Equipment List Inside Containmentment
2. Equipment List Outside Containmentment
3. Essential Subcomponent Listing Sheet
4. Material Type Listing





MECHANICAL EQUIPMENT QUALIFICATION  
SUBCOMPONENT LISTING SHEET

Sheet No. \_\_\_\_\_  
MEQ ID \_\_\_\_\_  
Contract No. \_\_\_\_\_  
Mfg \_\_\_\_\_  
Mfg Dwg No. & Rev \_\_\_\_\_  
Model \_\_\_\_\_  
Size \_\_\_\_\_  
Type \_\_\_\_\_

SUBCOMPONENT    MFG & MODEL    MATERIAL TYPE    MATERIAL TYPE ID    SERVICE LIFE    STATUS

Prepared by: \_\_\_\_\_ Date \_\_\_\_\_

Reviewed by: \_\_\_\_\_ Date \_\_\_\_\_

Revision \_\_\_\_\_

(E63103.03)

MECHANICAL EQUIPMENT QUALIFICATION  
MATERIAL TYPE LISTING

Material Type ID \_\_\_\_\_  
Material Type \_\_\_\_\_  
Trade Name \_\_\_\_\_

	Ref. No.
Threshold (rads) _____	_____
Max Service Temperature (°F) _____	_____

Material used in MEQ ID \_\_\_\_\_

Subcomponent Listing Sheet No. \_\_\_\_\_

References:

Prepared by: \_\_\_\_\_ Date \_\_\_\_\_

Reviewed by: \_\_\_\_\_ Date \_\_\_\_\_

Revision \_\_\_\_\_

(E63103.03)