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MFN- 023-88

March 25, 1988

U.S. Nuclear Regulatory Commission  
Division of Engineering and Systems  
Technology  
Washington, D.C. 20555

NEW  
"WHITE PAPER"

Attention: Ashok C. Thadani  
Assistant Director for Systems

Subject: **QUALITY OF PARTS IN CONTROL PANELS**

Reference: July 2, 1987 Letter to Ashok Thadani from R. Artigas, "GE White Paper on Quality of Parts in Safety Related Assemblies".

As discussed in our March 2 phone conversation, attached is a clarified and expanded paper addressing the quality of parts in control panels. It is intended as a replacement for the reference letter. This letter is also being transmitted to all domestic BWR Owners.

I trust that this letter is responsive to your needs. If you have any questions or comments please feel free to call me or Dave Robare (408) 925-3141.

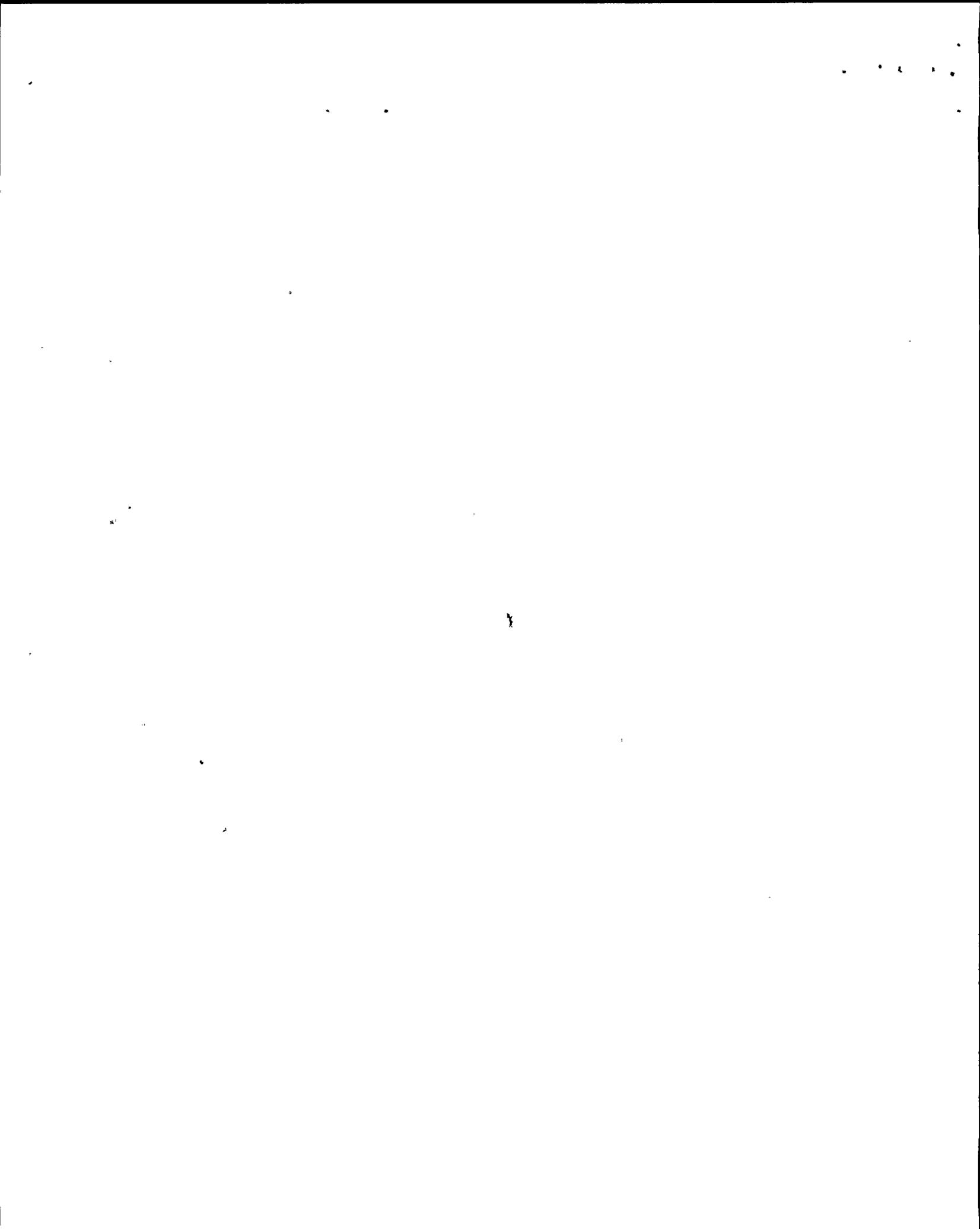
Sincerely,

*R. Artigas for*  
R. Artigas, Manager  
Licensing & Consulting Services

RA:GS/DJR:md

cc: L. S. Gifford  
H. R. Peffer  
R. E. Skavdahl

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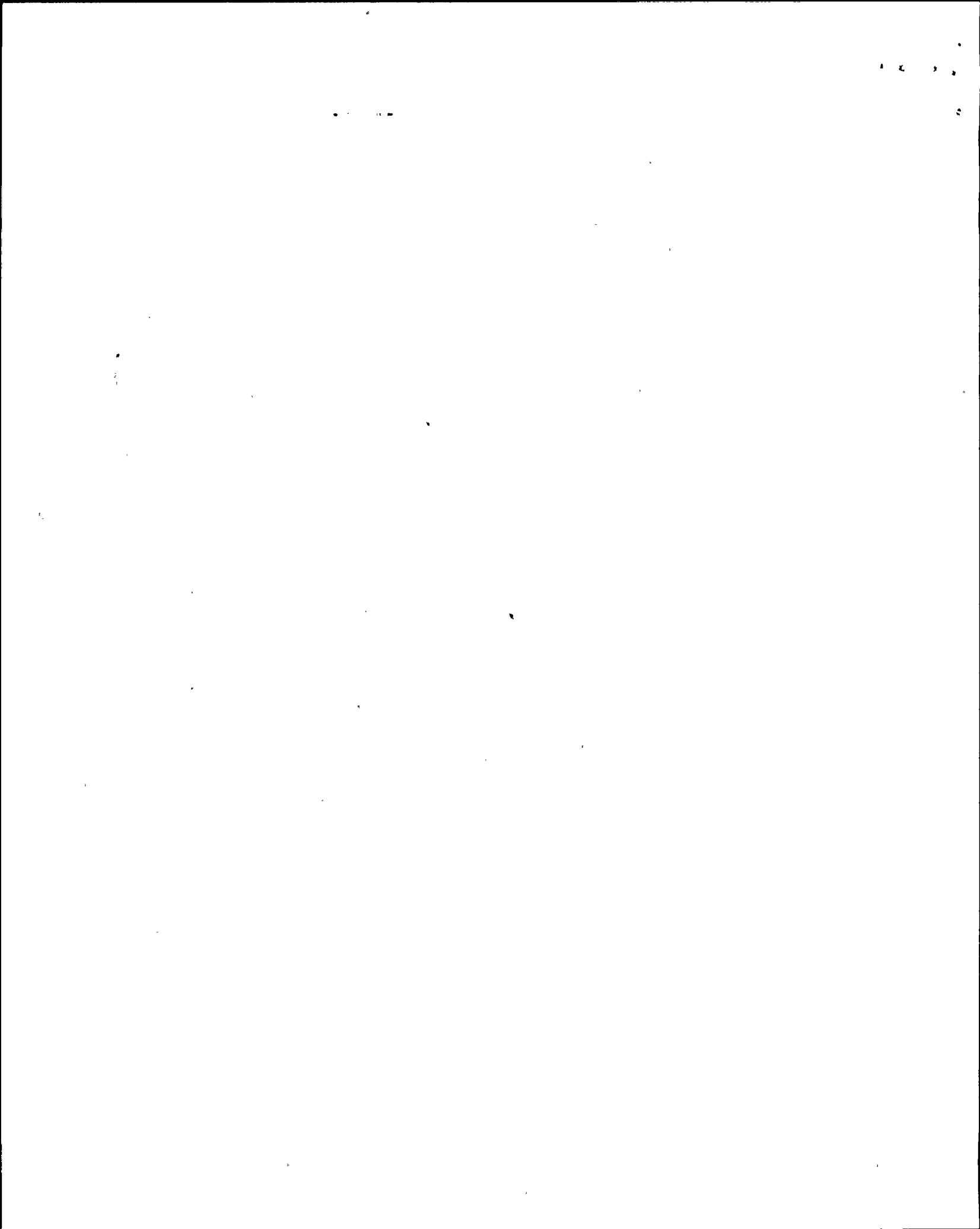


## INTRODUCTION

This paper is both a clarification and expansion of the information supplied to the NRC in a July 2nd letter containing the White Paper on the Quality of Parts in Safety Related Assemblies. It is provided to explain how GE has assured the appropriate quality of control panel components, including safety related, associated and non-safety related. This paper addresses general topics which have been identified and discussed with the NRC during audits in San Jose and at our January 22, 1988 meeting with NRR. Figure 1 provides a pictorial representation of classification of functions for all equipment and circuits and how GE performed design, purchasing and quality assurance to assure compliance with applicable regulatory requirements.

The paper necessarily includes only overview descriptions of these processes for safety related, associated, and non-safety related circuits. The internal GE procedures contain the steps and tasks employed over the last two-plus decades of design and manufacturing of original electrical equipment assemblies for BWR plants. Since these steps and tasks have evolved over time, they can only be covered here in a general summary fashion. The only appropriate audit base would therefore be the procedures themselves.

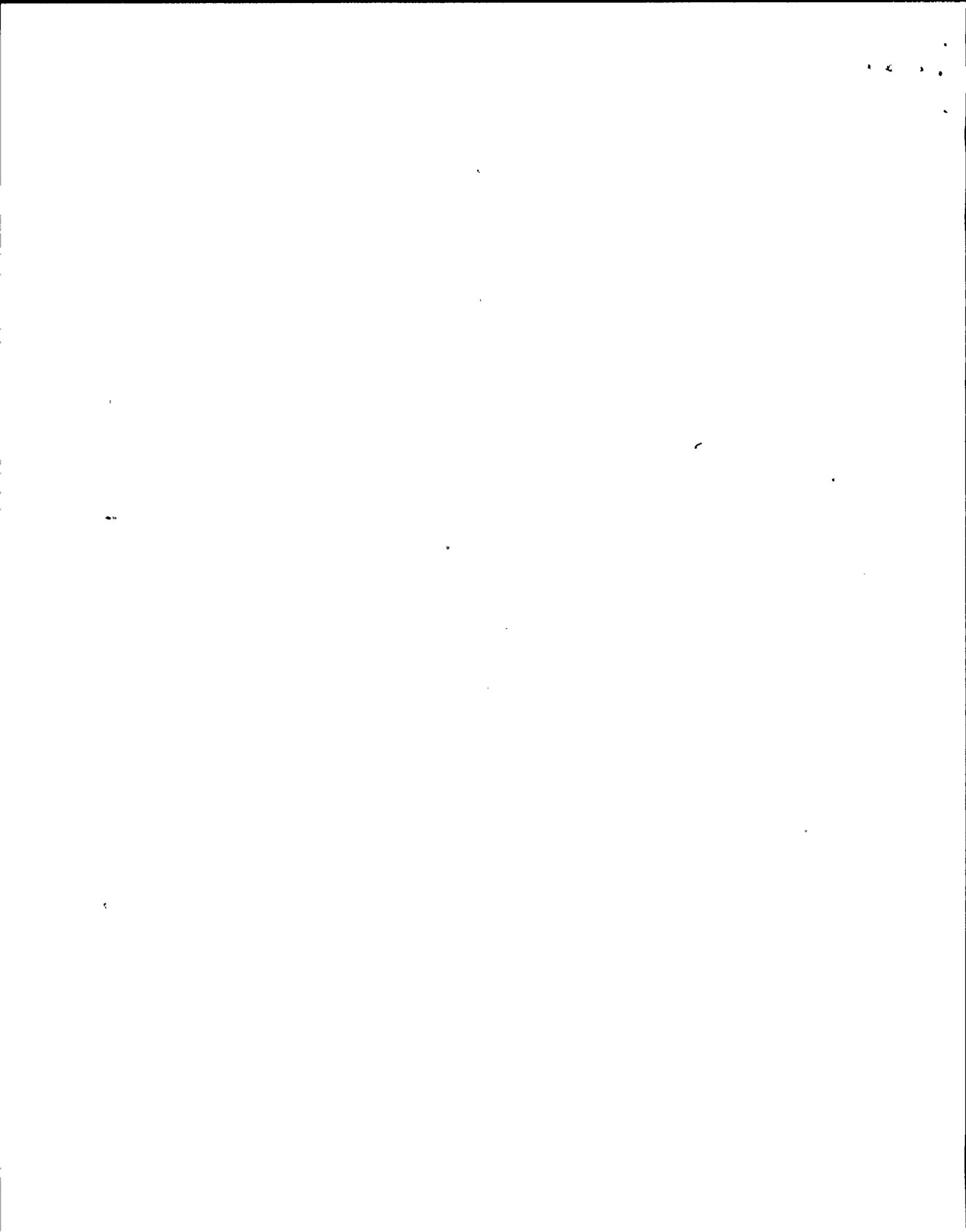
The section entitled Safety Related Circuits includes both parts purchased and supplied as safety related, and parts originally purchased as non-safety related but ultimately performing safety functions within safety related assemblies. The Associated Circuits section is provided to address those parts "contained within safety related assemblies that are not performing safety functions, but are associated (electrically connected) with the safety functions." Also included is information on non-safety related parts which do not ever perform any safety function.



### SAFETY RELATED CIRCUITS

Many components utilized in safety related assemblies which are required to perform safety functions are themselves designed, purchased and assembled in accordance with codes and standards required for safety related equipment. In other cases, it has been necessary to purchase non-safety related components for incorporation into safety related assemblies. This is due to the necessary, and appropriate, practice of designing safety-related equipment to utilize standard industrial-grade parts generally because safety-related versions of such piece-parts are simply not available. At GE the following measures were implemented for these parts procured as non-safety related but utilized to perform safety functions in safety related assemblies:

1. An NRC approved Quality Assurance (QA) plan (NEDO 11209) and the supporting and implementing procedures followed during the assembly process were generated and meet 10CFR50 Appendix B.
2. The requirements for the parts were developed and documented as part of the engineering design process of the equipment. These requirements once established, were subject to a rigorous change control program. The application of the parts to the assembly was independently verified.
3. The parts were purchased to the documented engineering requirements, plus appropriate QA requirements defined during the QA review.
4. Based on item 3 above, QA defined inspection requirements. Upon receipt the parts were inspected and tested as required to establish their conformance to these requirements.
5. The parts were installed in safety-related assemblies, e.g., panels, using approved and controlled processes, and were subject to various documented QA inspections and tests.
6. Prior to release for operation, the safety-related assemblies were subjected to specified performance tests.
7. In addition, engineering performed the required qualification of the various safety-related assemblies, either by test or combined test and analysis, and documented the results. Such qualification was in accordance with all applicable requirements between GE and the individual purchasing utility.



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8. Throughout the above process, the QA program generated records, inspection reports for defective or nonconforming materials and corrective actions as required, in accordance with applicable QA procedures. Records retention occurred consistent with the designation of the assembly at the point of identification as safety related (i.e. from step 5 above).

#### ASSOCIATED CIRCUITS

General Electric supplied safety-related assemblies contain features which are not necessary for the performance of safety functions. In some cases these features are electrically connected to safety-related circuits and parts. These are defined as "associated" circuits or as being a part in an "associated" circuit. The "associated" circuits term is defined in IEEE 384-1981.

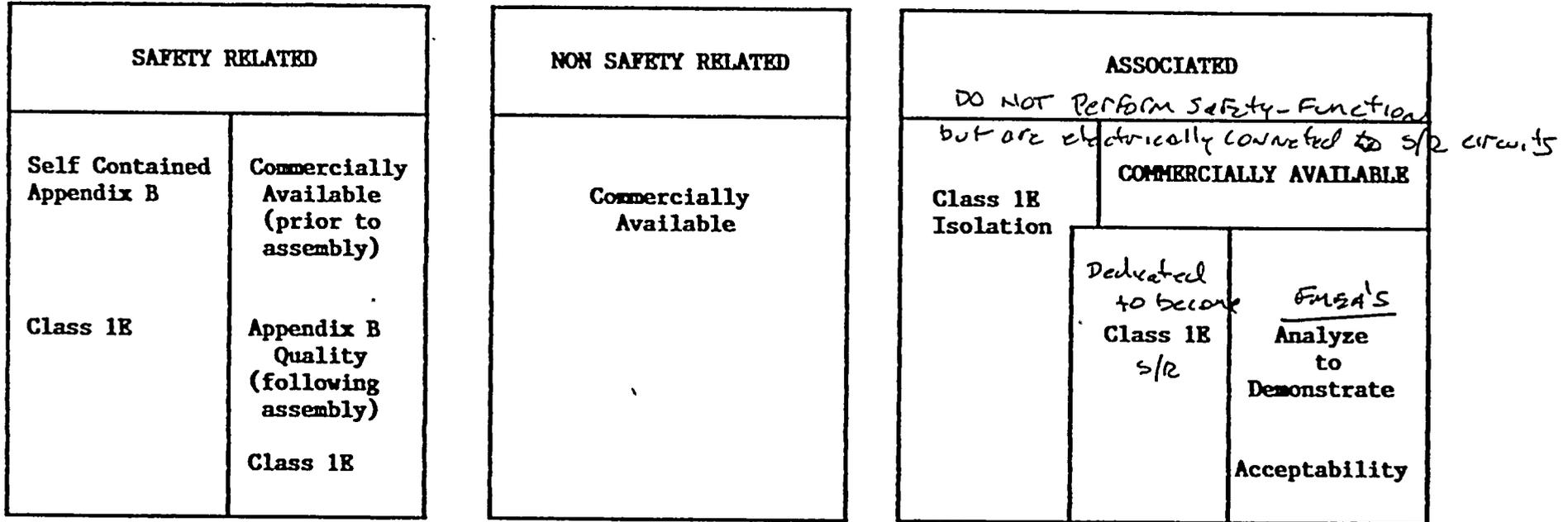
GE has designed associated circuits in compliance with the guidance in IEEE 279-1968 & 1971 and later its daughter standards (IEEE 308, & 384). GE has incorporated such associated circuits into the system designs contained in safety related assemblies. The recognized design methods for associated circuits are 1) use of safety-related parts in the circuits, 2) isolation of the circuits, or 3) analysis or testing of the circuit or parts "to demonstrate Class 1E circuits are not degraded below an acceptable level" (IEEE 384). This analysis approach is consistent with the requirements of IEEE 279-1968 and 1971 and has been formally established in the daughter standards (ie. IEEE 384-1981). This design approach was used by GE and accepted by the NRC staff during the licensing review of BWR plants.

#### NON-SAFETY RELATED CIRCUITS

General Electric supplied safety and non-safety related assemblies also contain parts which do not perform any safety function, are not electrically connected to parts performing safety functions, and cannot prevent the performance of safety functions. They have been applied to supply satisfactory performance for their intended non-safety function.



CLASSIFICATION OF ELECTRICAL EQUIPMENT AND CIRCUITS



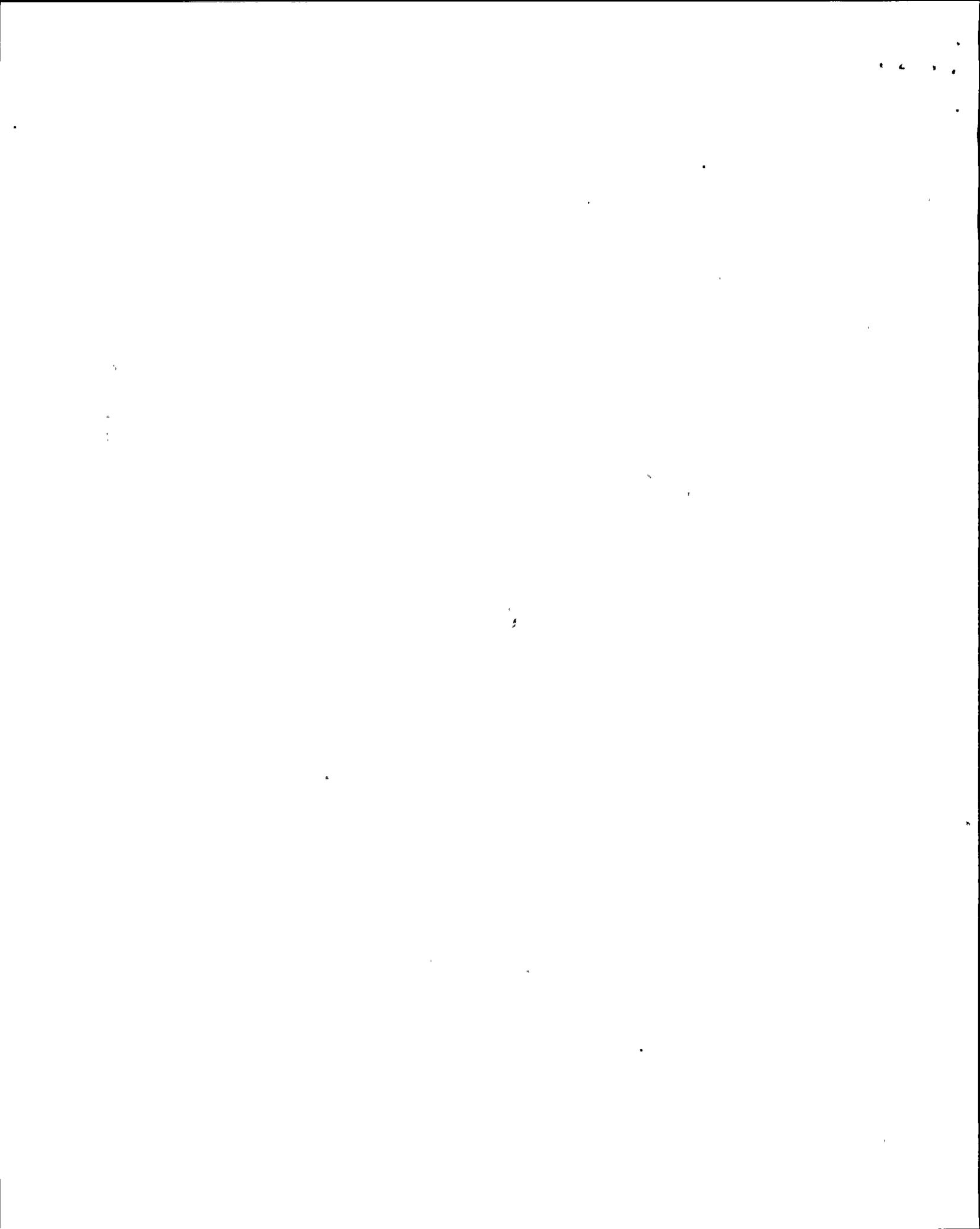
Definitions

**Safety Related** - Performs safety function

**Associated** - Does not perform a safety function but is connected to a safety function circuit

**Non Safety Related** - Does not perform a safety function and is not connected to a safety function circuit

FIGURE 1



MS 9D4

MAR 22 1988

Mr. R. Artigas, Manager  
Licensing & Consulting Services  
General Electric Company  
175 Curtner Avenue  
San Jose, California 95125

Dear Mr. Artigas:

SUBJECT: ASSOCIATED CIRCUITS IN CONTROL ROOM PANELS

Reference: GE letter MFN-016-88 dated March 7, 1988 from  
R. Artigas (GE) to A. Thadani (NRC)

The purpose of this letter is to confirm receipt of and to respond to your letter (MFN-016-88) dated March 7, 1988 (issued pursuant to commitments made during our March 2, 1988 telecon) which provides clarification as to the meeting (January 22, 1988) the NRC had with GE to discuss "associated" circuits and equipment.

Your March 7, 1988 letter discussing associated circuits in control room panels states that GE will submit summaries of analyses and tests and that NMP-2 would be the plant for evaluation. However, as reflected in the attached meeting summary dated February 22, 1988, the staff requested that a detailed FMEA (not a summary) including type test data should be submitted which addresses all of the electrical components classified as "associated" within GE's scope of supply which were analyzed and tested (10%) to demonstrate acceptability for their applications. The meeting summary also reflects that the information should encompass all components within the NMP-2 scope of supply which fall within this category and should be, as a minimum, to the level of detail as the information supplied on the NMP-2 docket (letters dated May 18 and June 16, 1987) during the licensing process. It was never our understanding that any one plant such as NMP-2 would be selected for the evaluation.

If there are any questions or comments on this letter, please contact me (301-492-0774) or Scott Newberry of my staff (301-492-0782).

Ashok C. Thadani, Assistant Director  
for Systems  
Division of Engineering & Systems  
Technology  
Office of Nuclear Reactor Regulation

Enclosure: As stated  
cc: D. Robare (GE)  
B. Grim (GE)

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