

Central file



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

October 29, 1993

MEMORANDUM FOR: Bruce A. Boger, Director
Division of Reactor Controls
and Human Factors
Office of Nuclear Reactor Regulation

FROM: Jared S. Wermiel, Chief
Instrumentation and Controls Branch
Division of Reactor Controls
and Human Factors

SUBJECT: MEETING WITH THE BOILING WATER REACTOR OWNERS GROUP
RESPONSE TIME TESTING COMMITTEE

A meeting was held with members of the Boiling Water Reactor Owners Group (BWROG) Response Time Testing (RTT) Committee at 8:00 AM on October 5, 1993, to discuss the Topical Report NEDC-32013P, "System Analyses for Elimination of Selected Response Time Testing Requirements", and the staff Safety Evaluation Report (SER) of the Topical which was sent to the BWROG by letter dated August 19, 1993. In the topical report the BWROG has proposed to eliminate RTT for selected components of safety-related instrumentation and control systems. The meeting was also attended by members of the Westinghouse Owners Group and members of the public. Enclosure 1 is a list of attendees.

The meeting consisted of two presentations and a general discussion period. The first presentation, by Les England, stated the purpose of the meeting and the effect of elimination of RTT on plant safety. The second presentation, by Dale Spencer, described the BWROG approach and summarized the BWROG position and conclusions on the eight concerns identified by the staff in the SER. Enclosure 2 is a copy of the briefing slides used for the presentations. The discussion period that followed consisted of an exchange of views and identified a path to resolution of the issues.

The path to resolution agreed to consisted of a redirection of the justification for elimination of RTT in order to address safety significance. The BWROG will perform an analysis which compared the Chapter 15 design basis accident analysis assumption for safety system actuation time to actual response times of instrumentation loop components. The large time differences between analysis values (on the order of seconds to minutes) compared to instrument response (on the order of milliseconds) is considered the primary justification for elimination of RTT. The BWROG also agreed to provide further discussion on their judgement that current technical specification required instrument calibrations are adequate to identify degradation in the instrument loop components. The BWROG stated they intend to resubmit the topical report after rework to address the items the staff identified in the SER. The BWROG addressed some of the methods they intended to use to address the deficiencies of the previous submittal, particularly improving the Failure Modes and Effects Analysis, and providing a more complete database of past history of RTT results.

0411-6 (mtg.)
X RD-8-2 (Westinghouse)
X RD-8-2 (General Design Criteria)
X L-41, Part 50 (General Design Criteria)

JF03

NRC FILE CENTER COPY

002056

020004

9311050200 931029
PDR TOPRP EMVGENE
C PDR

Schedules for future actions were also discussed. The BWROG indicated their desire to resubmit the topical report by early 1994, and stated that an additional meeting with the staff later in 1993 may be desirable before resubmission to discuss the progress they have made on the new analysis. No specific date was committed to for the resubmission. Fermi 2 was identified by the BWROG as the lead plant for this proposed relaxation. The staff agreed to review the topical promptly and to treat it as a cost-beneficial licensing action. In addition to the above, the staff asked if the instrument manufacturers had agreed that elimination of RTT, and dependence upon calibration was a viable method of insuring instrument integrity. The BWROG said they had not asked, but that this would be explored and addressed in the revised topical report. The staff emphasized that with any change to the current system, it was incumbent upon the utilities to demonstrate that the elimination of RTT would not result in a decrease in safety, and that there needed to be confidence that the instrumentation would continue to function as designed.

Original signed by:

Jared S. Wermiel, Chief
 Instrumentation and Controls Branch
 Division of Reactor Controls
 and Human Factors

Enclosures:

1. List of Attendees
2. Meeting Handout

cc:

Meeting Attendees, w/enclosure 1 only

Distribution: w/enclosures

Central File

PDR

HICB R/F

P. Loeser

J. Wermiel

HICB	BC:HICB:DRCH
P. Loeser:lm <i>R</i>	J. Wermiel <i>JW</i>
10/28/93	10/28/93

Name: RTT.MTS

Enclosure 1

ATTENDANCE LIST FOR
BWROG MEETING
OCTOBER 5, 1993

Bruce Boger	NRC/NRR/DRCH
Timothy Colburn	NRC/NRR/PD31
Richard Correia	NRC/NRR/RPEB
Cliff Doust	NRC/NRR/HICB
John Ganiere	NRC/NRR/HICB
Brian Hughes	NRC/NRR/CBLA Task Force
Robert Jones	NRC/NRR/SRXB
Paul Loeser	NRC/NRR/HICB
Tad Marsh	NRC/NRR/CBLA Task Force
Jerry Mauck	NRR/NRC/HICB
Charles Petrone	NRC/NRR/RPEB
Muhammad Razzaque	NRC/NRR/SRXB
Carl Schulten	NRC/NRR/OTSB
Jared Wermiel	NRC/NRR/HICB
Don Alexander	Detroit Edison
John Carolan	PECo Nuclear Engineering
Jim Eaton	NUMARC
Les England	BWROG/OSU
Ray Fain	Analysis & Measurement Services
Tom Green	GE Nuclear Energy
Jim Heishmen	CEI Perry Plant
Revis James	EPRI
George King	Georgia Power
Dick Miller	Westinghouse
Chris Morgan	Westinghouse
Kent Peterson	Analysis & Measurement Services
Clayton Price	Penn. Power & Light
Bill Schmik	PSE&G
Dale Spencer	CECO/RTT Comm. Chairman
Douglas Spencer	Detroit Edison, Sr. VP
Bill Sullivan	GE

BWR Owners' Group Response Time Testing Committee

**Meeting with NRC Staff and management, WOG
Response Time Testing Committee, NUMARC, and EPRI**

**October 5, 1993
Rockville, Maryland**

**Doug Gipson, Sr. Vice President, Detroit Edison
Les England, BWROG Chairman
Dale Spencer, BWROG RTT Committee Chairman**

Agenda

- Meeting Purpose L. England
- Positive Effect on Plant Safety L. England
- BWROG Approach D. Spencer
- Response to 8 Specific Topics Listed in SER D. Spencer
- Summary of BWROG Position/Conclusions D. Spencer
- Open Discussion All
- Agree on Resolution Plan and Schedule All

Meeting Purpose

- **Develop mutual understanding of Industry/NRC positions**
 - **Proposed cost beneficial licensing action results in net safety gain**
 - **Changes in selected response times beyond acceptable limits are detected during other periodic tests**
 - **Significant industry and NRC investment over previous 3 years**

Meeting Purpose (Continued)

- **Improve communication channels**
 - Understand technical basis of NRC SER to permit resolution of issues
 - SER appears to be inconsistent with specific NRC Regulatory Guides and NUREGs

- **Develop mutually acceptable resolution plan and schedule for implementation and review**
 - Lead plant submittal is docketed
 - Cost beneficial licensing action is win-win when approved

Positive Effect On Plant Safety

- Reduce inadvertent safety system actuations
- Increase safety system availability
- Positive effect on shutdown risk
- Reduce personnel errors (human factors)
- Reduce personnel exposure (ALARA)
- Utilize resources for safety significant tasks
 - 1500 to 2600 I&C man-hours/outage
 - Other supporting personnel (Operations, HP, scheduling, etc.)

BWROG Approach

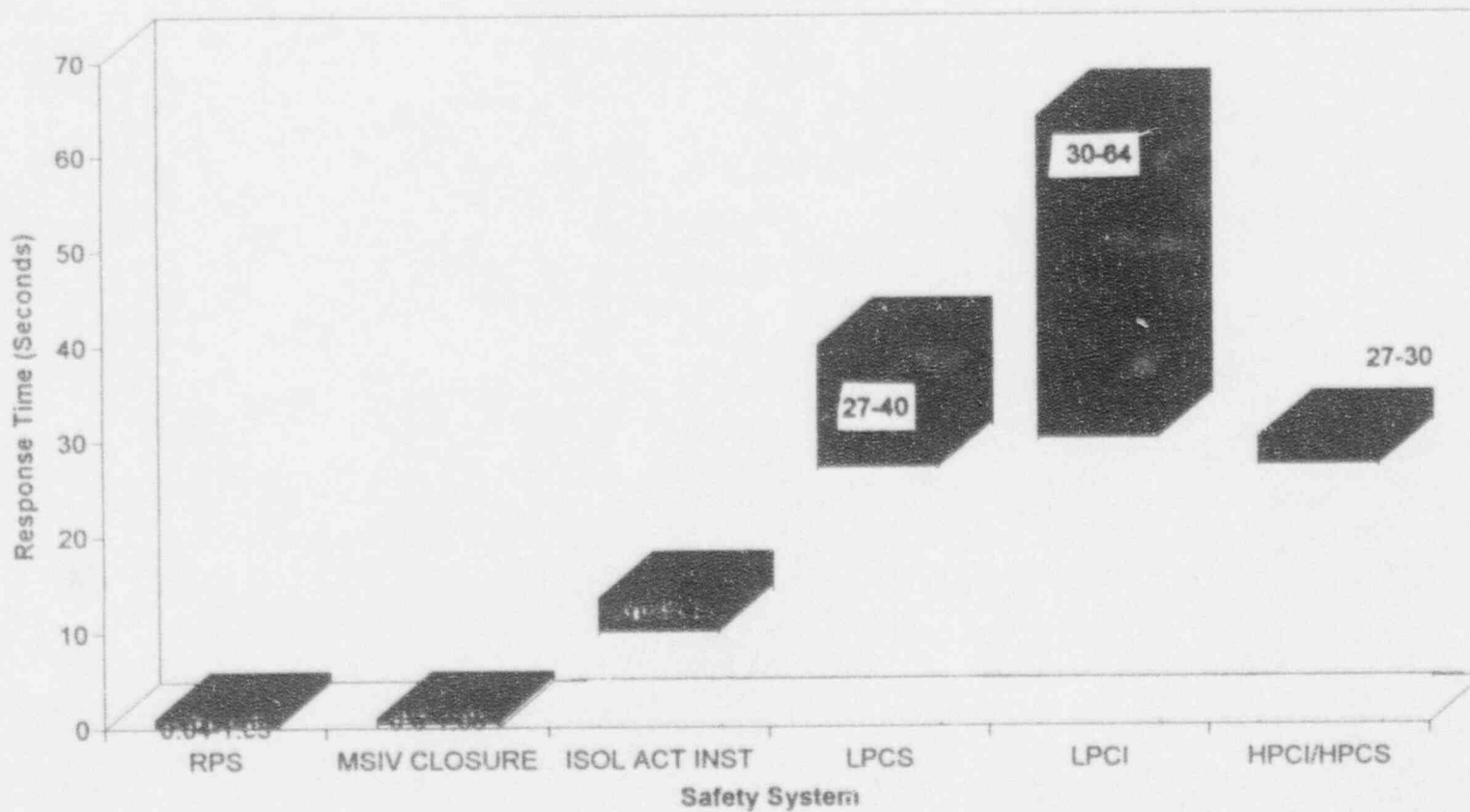
- Reg Guide 1.118 Rev 3 endorses IEEE 338-1977
 - RTT of Safety Related equipment, per se, is not required if, in lieu of RTT, the response time of the safety equipment is verified by functional testing, calibration checks, or other tests
 - Acceptable if it can be demonstrated that changes in response time beyond limits are accomplished by changes which are detectable during periodic tests
- Demonstrate changes in response time beyond acceptable limits are detected by change in performance characteristics during other periodic testing

Elimination of selected RTT is not safety significant

Response Time Tests Considered For Elimination

- Response time tied to Diesel Generator start time (>10 sec.)
 - All ECCS actuation instrument loops (entire channel)
 - All Isolation System actuation instrument loops (entire channel) except for Main Steam Isolation Valves (MSIVs)
- Response time for sensors only (< 1 sec.)
 - Selected RPS actuation instrumentation loops
- Selected MSIV closure actuation instrumentation loops

Response Time Comparison



Response to Eight Specific Topics Listed in SER

- NRC SER stated "any re submission of the GE Topical Report ... should address the following topics"
 1. Purpose and goals of RTT
 2. Information gained from RTT
 3. How information is used
 4. If RTT eliminated, what tests would replace and still provide above information
 5. How would information from (4) be used
 6. Frequency of replacement tests
 7. Application of maintenance rule effect on maintenance and calibration methodology
 8. Failure analysis expansion to include interaction between parts

1. Purpose and Goals of RTT

- Insure that changes in response time beyond acceptable limits assumed in safety analyses are detected during periodic Tech Spec and other testing
 - Real need is to detect changes "Beyond Acceptable Limits" not to verify design values
- Testing other than conventional RTT adequately insures instrument performance
- Maintaining response time requirements for selected instrumentation results in no safety gain

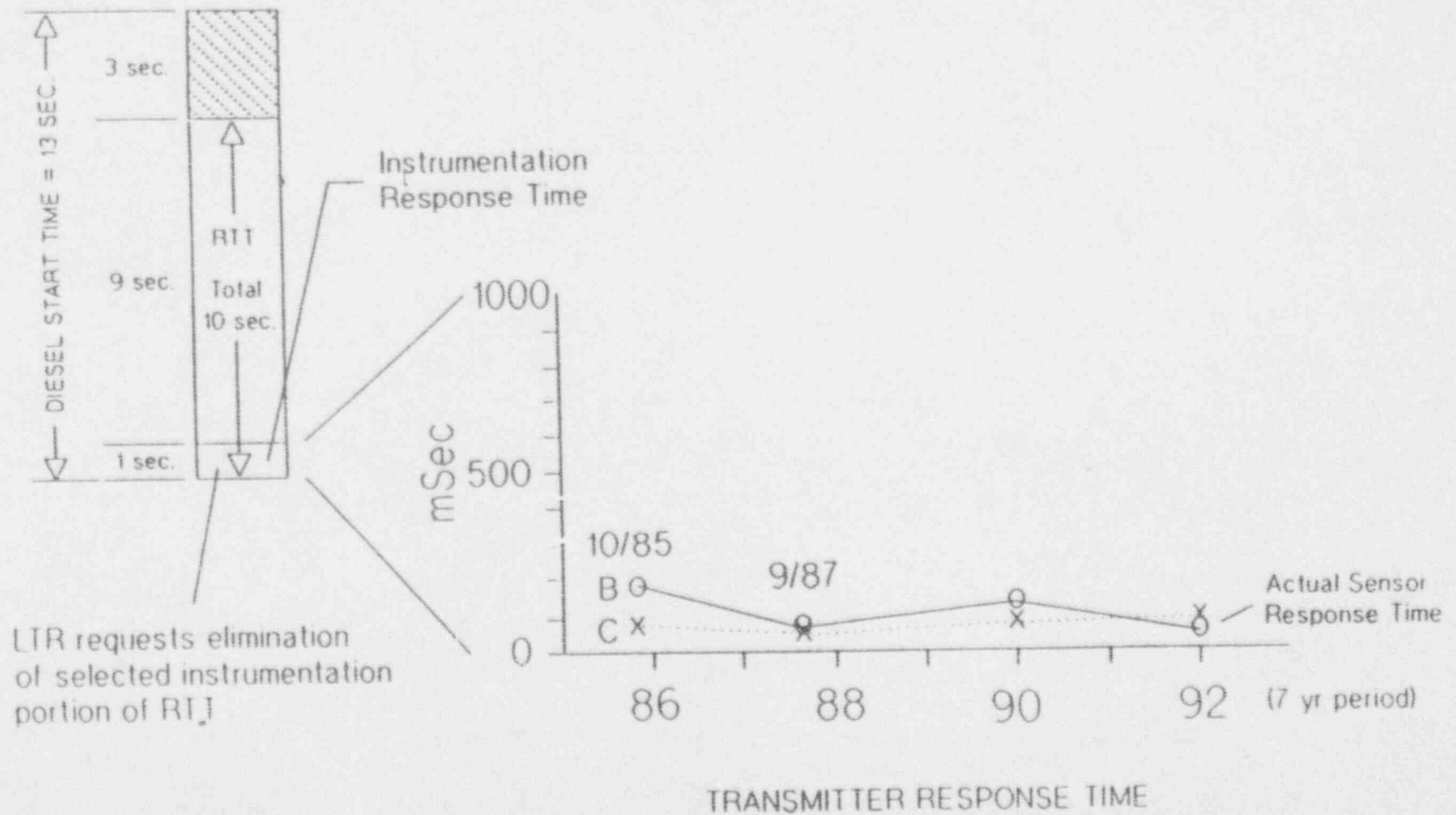
Purpose and Goals of RTT (Continued)

NUREG-1366 (December 1992) improvements to Technical Specification surveillance requirements concludes:

- "Non-MSIV isolation response time testing is difficult, time consuming, and has risk of tripping the reactor"
- "The test criteria are not meaningful compared to measured isolation response time"
- "Delete requirement from both BWR and PWR Technical Specifications to perform response time testing where the required response time corresponds to the diesel start time"

BWROG approach consistent with these conclusions

Comparison of Total Response Time Requirement Versus Actual Response Time Data (Sensor Only) Over 7 Year Period (1985-1992) confirms no safety benefits



2. Information Gained From RTT

- . Provides measurement of specific sensor, trip unit and/or loop response time**
- . Confirms instrumentation RT is much faster than required**

3. How is the Information Used?

- **Actual RT is compared to Tech Spec requirements to demonstrate the specified performance is met**

4. If RTT Eliminated, What Tests Would Replace and Still Provide Above Information ?

None required; failure modes resulting in response time degradation are readily detected by existing surveillance testing

- **Current Testing Required by Technical Specifications**
 - **Calibrations**

 - **Functional Testing**

 - **Logic System Functional Testing**

 - **Channel Checks**

Current Testing Required by Technical Specifications

- **Calibrations**

- Qualitative adjustment of output to correspond with a known applied input
- Single or overlapping tests such that entire channel including sensor, trip functions, and alarms covered
- Performed on sensors, trip units, and time delay relays
- Typically performed at refuel outages (18 - 24 months) although some instruments calibrated while on-line
- Response time measurement for time delay relays
- Personnel aware of degradation in instrument response

Current Testing Required by Technical Specifications

- **Functional Testing**
 - **Essentially same as calibration except with a qualitative assessment of operability including alarm and/or trip functions**
 - **Performed more frequently (monthly/quarterly) than calibrations-typically with unit on-line**
 - **Personnel awareness of response time degradation same as for calibrations**

Current Testing Required by Technical Specifications

- **Logic System Functional Testing**
 - Tests all relays and components of a logic circuit from sensors to actuated device including sensors, relays, trip units, solid state electronics, and contacts. May be performed in overlapping portions
 - Ensures all logic paths are tested
 - Includes verification of delays when applicable
 - Typically performed when plant is shutdown (18-24 month frequency)
 - Includes overall system response

Current Testing Required by Technical Specifications

- **Channel Checks**
 - **Qualitative assessment of channel behavior during operation by observation**
 - **Comparison of channel indication/status to other known values**
 - **Typically performed each shift or daily**
 - **Immediate indication of degraded performance**

Other Plant Specific Means to Evaluate Instrument Performance

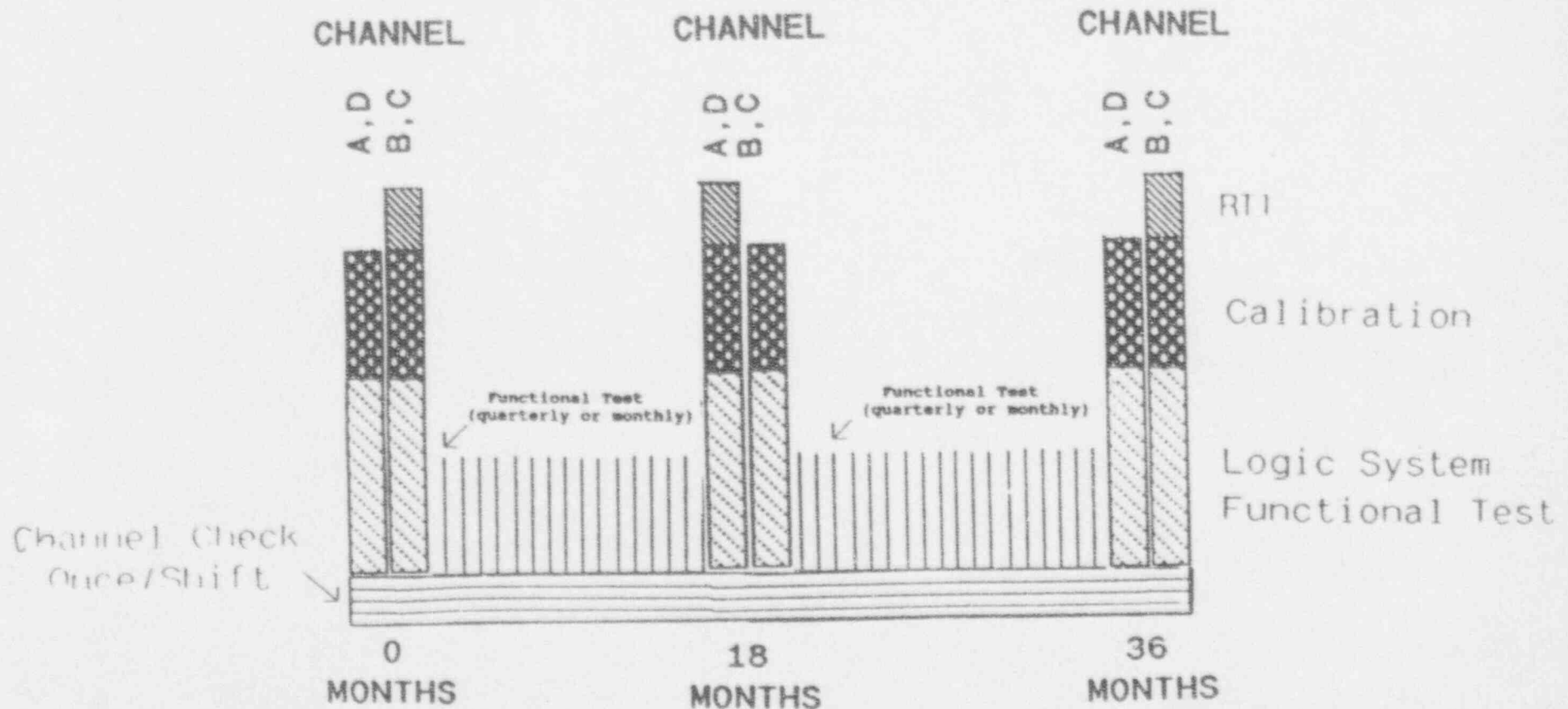
- Assessment of As Found Calibration Data
- Operator And Technician Awareness
- Post trip data review

5. How Would Information From 4. Be Used?

- . As proposed, Item 4. tests would verify that performance is well within allowable limits**
- . Unacceptable test results within Item 4 would require appropriate repairs or replacements and retesting (identical to what is presently required for conventional RTT failures)**

6. Frequency of Replacement Tests

Frequency (Typical) of Redundant Instrumentation Testing Assures Safety Function(s) Are Maintained



7. How Will Application of 10CFR 50.65 Affect Safety Related Instrumentation Maintenance and Calibration Methodology?

- **Maintenance rule is performance based and permits specific monitoring or calibration methodology to be set by the licensee**
- **Extent to which rule requires safety related instrumentation to be monitored is determined by:**
 - **Safety significance of instrumentation**
 - **Whether performance or condition of instrumentation is effectively controlled by appropriate preventive maintenance (PM)**

Deletion of RTTs in Technical Specifications for Selected Instrumentation is Consistent with Maintenance Rule Implementation

- **Response time changes beyond acceptable limits are detected during periodic tests**
 - **Channel checks**
 - **Functional testing**
 - **Logic system functional testing**
 - **Calibrations**
- **Includes detection of maintenance preventable functional failures (MPFFs)**
- **Need for additional PM to address MPFFs is covered by maintenance rule**

7. How Will Application of 10CFR 50.65 Affect Safety Related Instrumentation Maintenance and Calibration Methodology?

- **Maintenance rule is performance based and permits specific monitoring or calibration methodology to be set by the licensee**
- **Extent to which rule requires safety related instrumentation to be monitored is determined by:**
 - **Safety significance of instrumentation**
 - **Whether performance or condition of instrumentation is effectively controlled by appropriate preventive maintenance (PM)**

FMEA Issues

- GE analyses of remaining components in selected instrumentation trains are based on detailed engineering evaluations using expert knowledge in equipment manufacturing, components design, and industry experience
- Evaluations included interactions between parts that could affect response times beyond acceptable limits
 - Appendix D of LTR includes many examples of failure modes that involve interaction between moving and static parts

Summary of BWROG Position and Conclusion

- Proposed cost beneficial licensing action results in net safety gain
- Selected RTTs are redundant to other Tech Spec testing currently being performed and should be eliminated
- Topical report and supplementary explanation provide a thorough and sufficient basis for the elimination of the identified RTT
 - Consistent with RG 1.118 positions
- BWROG believes the proposal will result in improvement in plant safety that should be implemented expeditiously