RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

8/10/2016

SAFETY SYSTEM DIGITAL PLATFORM
- MELTAC (MITSUBISHI ELECTRIC TOTAL ADVANCED CONTROLLER) -
TOPICAL REPORT

Mitsubishi Electric Corporation

TAC NO.:	**MF4228**
RAI NO.:	**#1**
DATE OF RAI ISSUE:	**6/29/2016**

QUESTION NO.: 2 for JEXU-1041-1008, "Safety System Digital Platform – MELTAC"

On page 2 of the TR, the following General Design Criteria (GDC) are also applicable to the Mitsubishi Electric Total Advanced Controller (MELTAC) platform. Please review criteria provided in these GDC's and describe how the platform satisfies each GDC. If regulatory compliance is dependent on application specific development activities, please state this.

a. GDC 13 "Instrumentation and Control" is applicable. MELTAC and the qualified displays, with no identified limitations within the system descriptions, will monitor variables and systems during normal operations, Anticipated Operational Occurrences (AOOs) and accident conditions as well as those which affect the fission process and core pressure boundaries. Include a full explanation applicable to this GDC.

b. GDC 20 "Protection System Functions" is applicable. MELTAC will automatically initiate reactivity control systems. Include a full explanation applicable to this GDC.

c. GDC 25 "Protection system requirements for reactivity malfunctions' is applicable. The MELTAC platform will be used for safety and non-safety systems for reactivity control systems without limitations identified by the topical report. Also the capability to protect against reactivity control malfunctions is not an exception therefore this requirement should be included.

ANSWER:

MELTAC is a generic safety platform suitable for use in complying with the criteria in GDC 13, 20, 25. However, the configuration of the MELTAC platform to achieve that compliance is application dependent. Therefore, that configuration is described in plant specific application licensing documentation.

Impact on Topical Report
The answer above will be added to Section 3 of the Topical Report (see Attachment-1).

3.0 APPLICABLE CODE, STANDARDS AND REGULATORY GUIDANCE

This section identifies conformance to applicable codes, standards, and regulatory guidance required by NUREG-0800 and ISG-06. Unless specifically noted, the latest version issued on the date of this Topical Report is applicable.

Appendix D shows the compliance matrix of codes, standards, and regulatory guidance required by NUREG-0800 and ISG-06. Also, Appendix D points to the corresponding location within this Topical Report that describes design information related to the applicable codes, standards, and regulatory guidance of the MELTAC platform.

Code of Federal Regulations

1. 10 CFR Part 50 Appendix A: General Design Criteria for Nuclear Power Plants

GDC 1: Quality Standards and Records

The lifecycle process for the Basic components of the MELTAC platform that meets all requirements of 10 CFR Part 50 Appendix B is described in Section 6. This is referred to as the App.B-based quality assurance program (QAP).

MELTAC was developed under a Japanese QA program and has undergone a one-time commercial grade dedication (CGD) by MELCO for use in US safety - related applications. The details of that CGD program are provided in this report by reference. MELTAC is now maintained and manufactured under MELCO's 10 CFR 50 Appendix B QAP.

GDC 2: Design Bases for Protection against Natural Phenomena

This Equipment is seismically qualified. The Equipment must be located within building structures that provide protection against other natural phenomena. Specific buildings and Equipment locations are described in Application Licensing Documentation.

GDC 4: Environmental and Dynamic Effects Design Bases

This Equipment is qualified for use in a mild environment that is not adversely affected by plant accidents as described in Section 5.

GDC 13: Instrumentation and control

The MELTAC platform is capable and suitable for providing monitoring and control functions to maintain variables and systems within prescribed operating ranges for normal operation, anticipated operational occurrences, and accident conditions to assure adequate safety. The monitoring and control functions implemented within the MELTAC platform that maintain the variables within the prescribed operating ranges are described in application licensing documentation.

ToR-2

GDC 20: Protection system functions

The MELTAC platform is capable and suitable for providing monitoring functions to sense anticipated operational occurrences and accident conditions, and to initiate and control the operation of appropriate systems(automatically and/or manually), including reactivity control systems and systems and components important to safety. The monitoring and control functions implemented within the MELTAC platform to perform these safety related functions are described in application licensing documentation. ToR-2

GDC 21: Protection System Reliability and Testability

This Equipment includes automated testing with a high degree of coverage, and additional overlapping manual test features for the areas that are not covered by automated tests. All manual tests may be conducted with the plant on line, with consideration of plant specific accessibility, and with the Equipment bypassed or out of service. Depending on the system design for a specific plant, the Equipment is configured with N or N+1 redundancy, where N is the number of divisions needed for single failure compliance and to meet the plant reliability goals. For systems with N+1 redundancy, this GDC is met with one division continuously bypassed or out of service. The redundancy configuration for each plant system is described in Application Licensing Documentation.

GDC 22: Protection System Independence

Redundant divisions are physically and electrically isolated to ensure that failures that originate in one division cannot propagate to other divisions. Physical isolation is discussed in Application Licensing Documentation. Platform features to accommodate electrical isolation are discussed in this Topical Report.

All Equipment is qualified to ensure that the Equipment is unaffected by adverse conditions that may concurrently affect multiple divisions. The qualification limits of this equipment are described in this Topical Report. Application Licensing Documentation describes the specific analysis for each plant.

Interlocks between redundant divisions and administrative controls ensure maintenance is performed on one division at a time. Interlocks and administrative controls are described in Application Licensing Documentation.

GDC 23: Protection System Failure Modes

Signals are generated for all detected failures. These signals can be configured at the application level to generate alarms. Functions can be designed to fail to an actuated trip state on loss of all power, on failures that are not automatically detected, or on failures that are automatically detected and would prevent proper execution of the function. Functions can also be designed to fail to an unactuated state. The unactuated state may be desirable to avoid spurious plant transients. Compliance for reactor trip and engineered safety features actuation functions are application specific and described in Application Licensing Documentation.

GDC 24: Separation of Protection and Control Systems

The separation of protection and control systems is an application specific design characteristic. Redundant divisions of the protection systems are physically and electrically isolated from the non-safety control systems. Where safety sensors are shared between control and protection systems, signal selection logic is typically used in the control system to prevent erroneous control actions due to single sensor failures. Eliminating these erroneous control actions prevents challenges to the protection system while it is degraded due to the same sensor failure. Where non-safety signals control safety systems or components, logic in the safety systems is typically used to ensure prioritization of safety functions. The details regarding the separation of protection and control systems are described in Application Licensing Documentation.

GDC 25: Protection system requirements for reactivity control malfunctions
The MELTAC platform is capable and suitable for providing monitoring and control functions to assure that fuel design limits are not exceeded for any single malfunction of the reactivity control systems. The monitoring and control functions implemented within the MELTAC platform to perform this safety related function are described in application licensing documentation. ToR-2

2. 10 CFR Part 50.55a

(a)(1) Quality Standards for Systems Important to Safety
Section 6 describes the App.B-based QAP, which is fully compliant to 10 CFR 50 Appendix B.

MELCO has undergone an inspection by NRC to verify the implementation of an adequate QAP.

(h) Invokes IEEE Std. 603-1991

See conformance to IEEE Std. 603-1991

NRC Regulatory Guides

3. RG 1.22 Periodic Testing of Protection System Actuation Functions (Rev. 0, February 1972)

See GDC 21 conformance. The functions controlled by this Equipment can be configured at the application level to be completely testable through a combination of overlapping automatic and manual tests.

4. RG 1.29 Seismic Design Classification (Rev. 4, March 2007)

The Equipment is designated Seismic Category I.

5. RG 1.53 Application of the Single-Failure Criterion to Safety Systems (Rev. 2, November 2003)

endorses IEEE Std. 379-2000