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Safety-related
 Non-Safety-related
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 Others ()

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NRW-FPGA-Based I&C System Qualification Project

Study Report

Title: Aging Analysis Report for
Safety-Related Oscillation Power Range Monitor (OPRM)

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1 Purpose

The purpose of this report is to document the Aging Analysis for the Oscillation Power Range Monitor (OPRM) designed for Advanced Boiling Water Reactor (ABWR) plants. Toshiba developed the OPRM as a Field Programmable Gate Array (FPGA) Based Instrumentation and Control (I&C) System.

2 Scope

This Aging Analysis is performed for the FPGA-Based OPRM for ABWR plants.

3 Acronyms

ABWR	Advanced Boiling Water Reactor
EPRI	Electric Power Research Institute
FPGA	Field Programmable Gate Array
FTA	Fault Tree Analysis
I&C	Instrumentation and Control
OPRM	Oscillation Power Range Monitor
RG	Regulatory Guide

4 References

- (1) EPRI TR-107330,
“Generic Requirements Specification for Qualifying a Commercially Available PLC for Safety-Related Applications in Nuclear Power Plants,” December 1996
- (2) USNRC Regulatory Guide 1.209
“Guidelines for Environmental Qualification of Safety-Related Computer-Based Instrumentation and Control Systems in Nuclear Power Plants,” March 2007

5 Evaluation and Conclusion

Section 6.3.1 of EPRI TR-107330 (Reference (1)) requires performing aging analysis. However, aging analysis is not necessary where equipment is qualified for use only in mild environments, where USNRC RG 1.209 (Reference (2)) does not require equipment aging. Toshiba states that there are no significant aging mechanisms in this FPGA-based equipment.