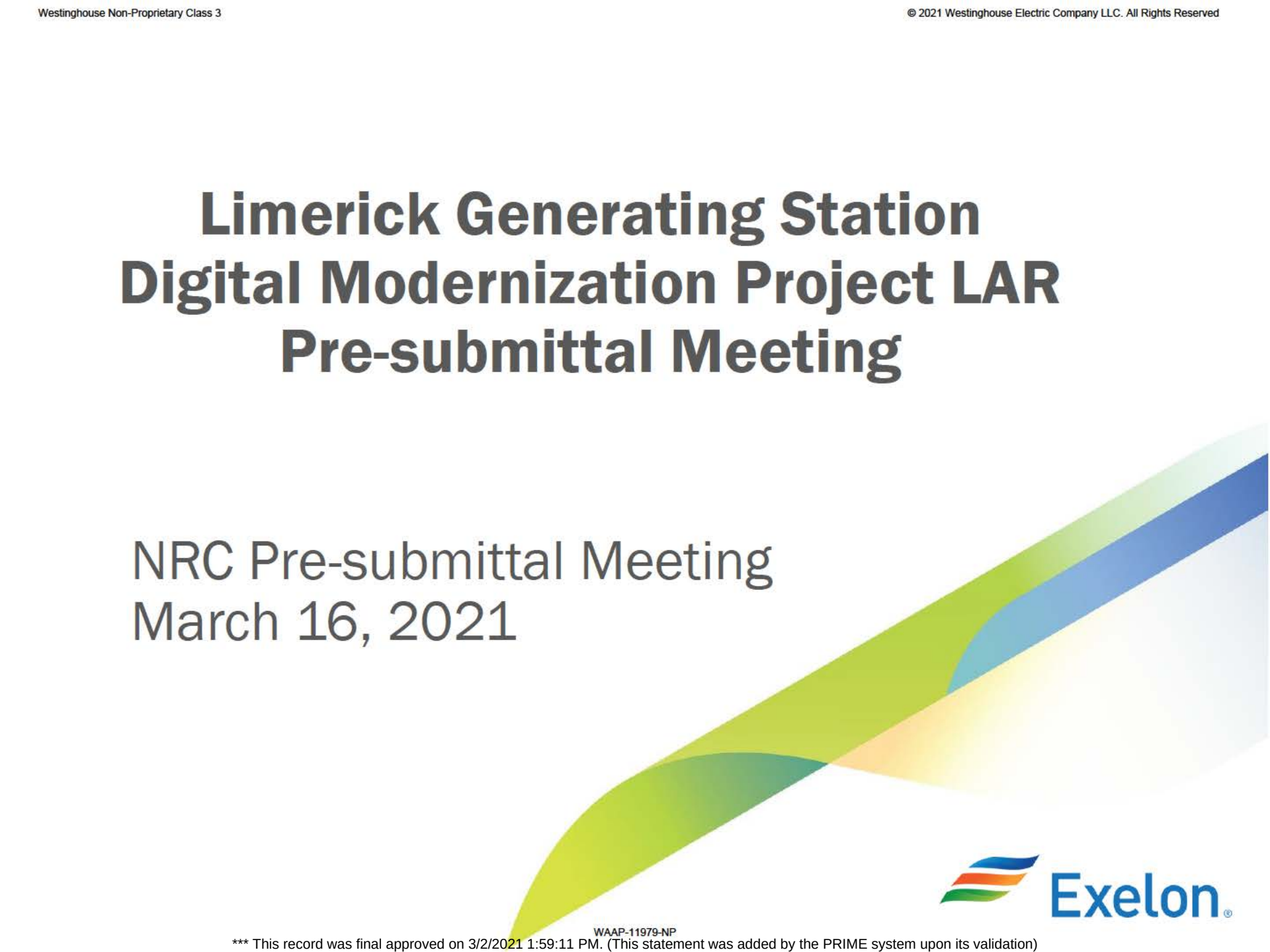
Limerick Generating Station Digital Modernization Project LAR Pre-submittal Meeting

NRC Pre-submittal Meeting
March 16, 2021



Exelon

Agenda / Opening Remarks

Open / Public Session

- Introductions
- Expected outcome for meeting
- Project overview
- LAR overview
- Vendor Oversight Plan (VOP)

Closed Session

- Architecture and Fundamental Design Principles
- Applicability of Regulatory Precedent
- Defense-in-Depth and Diversity (D3) Approach
- NRC & Exelon Closing Remarks

Introductions – Exelon Project Team

- Licensing
  - Shannon Rafferty-Czincila, Licensing Director
  - Dave Helker, Licensing Manager
  - Frank Mascitelli, Licensing Lead
  - Laura Lynch, LGS Regulatory Assurance Manager
  - George Budock, LGS Regulatory Assurance
  - Pareez Golub, Digital Licensing SME

- Engineering
  - John Connelly, Central Design Organization (CDO) Manager
  - Mark Samselski, CDO - Lead Responsible Engineer
  - George Bonanni, CDO - Senior Staff Engineer
  - Mike Foote, CDO - Senior Staff Engineer
  - Scott Schumacher, Systems Engineering

Introductions – Exelon Project Team

- Project Management
  - Steve Hesse, Project Director
  - Dave Molteni, Senior Manager and Station Lead
  - Jerry Segner, Principal Project Manager
  - Kayla Marriner, Project Manager

- Operations
  - Paul Krueger, Operations
  - Craig Myers, Operations Support

- Nuclear Oversight
  - Dave Peiffer, Performance and Assessment Lead

Introductions – Westinghouse Project Team

- Project Management
  - Chris Crefeld, Project Director
  - Stefan Levine, Senior Manager
  - Bill Bennett, Project Manager
  - Tom Pietryka, Project Manager

- Engineering
  - Terry Tuite, Lead - Engineering
  - Warren Odess-Gillett, Lead – Licensing
  - Steve Merkiel, System Design Engineer
  - Cal Tang, BWR Technical Advisor

Expected Outcome of Meeting

Provide the NRC a more detailed view of the Limerick Modernization Project and gain staff feedback on core concepts that underlie the project:

- Project scope/schedule/milestones
- LAR contents and proposed use of ARP
- Approach to addressing defense-in-depth and diversity
- Architecture and approach to fundamental design principles
- Applicability of previous generic licensing approvals
- Migration of Redundant Reactivity Control System (ATWS) to a DCS Platform

Project Overview

Project Scope

- Upgrade analog, Safety-Related, protection systems to Westinghouse Common Q™ digital platform integrated into PPS:
  - Reactor Protection System (RPS)
  - Nuclear Steam Supply Shutoff System (NSSSS)
  - Emergency Core Cooling System (ECCS)
- Upgrade analog Redundant Reactivity Control System (RRCS) to Ovation™ DCS platform and reclassify to non-safety in accordance with the ATWS Rule (10 CFR 50.62)
- Install Data Display System (DDS) to display sources of information in an environment that improves the ability to synthesize plant data

Current Main Control Room Configuration

General Arrangement for Main Control Room

Potential Arrangement with Monitor Visuals

Potential Arrangement with View from RO Console

Potential Arrangement with View from SRO Station

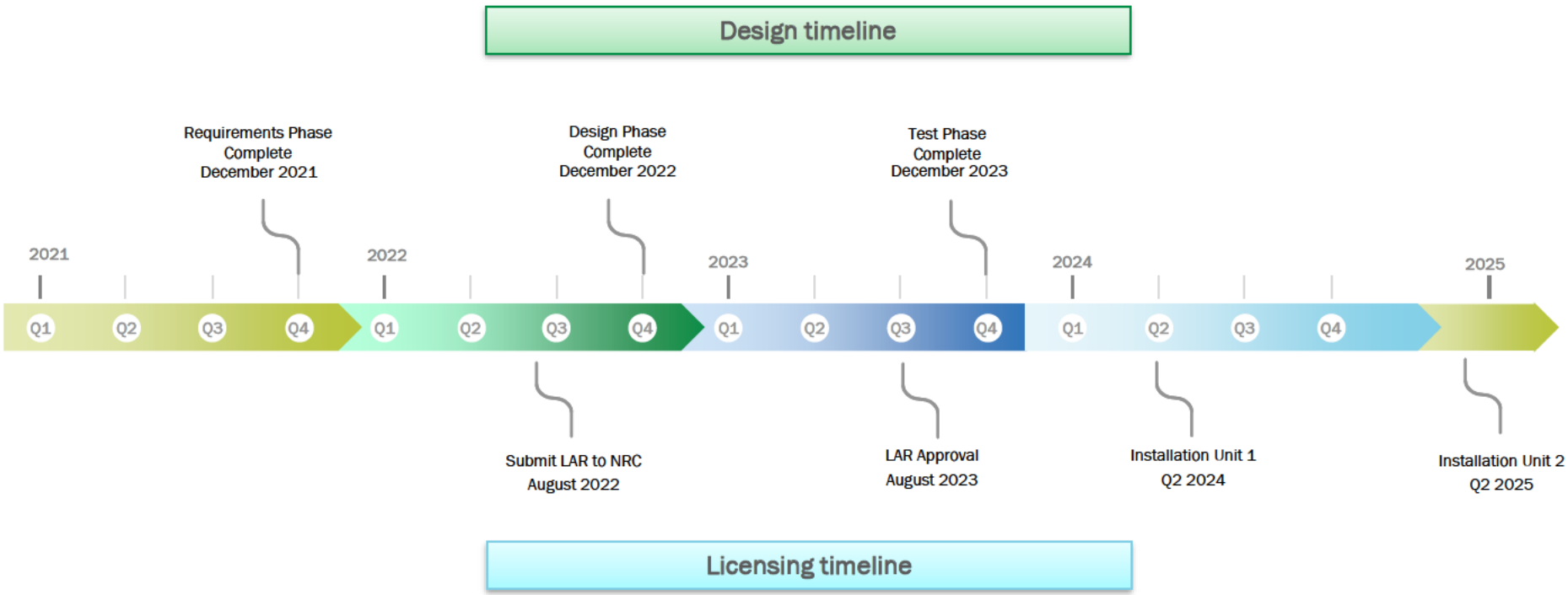
LAR Overview

LAR Scope and Attachments

LAR will include the following:

- Required information per ISG-06 Enclosure B Alternate Review Process
- Licensing Technical Report (LTR)
- Technical Specification changes
- System Requirements Specification (SyRS)
- System Design Specification (SyDS)
- FMEA to support TS SR eliminations
- Equipment Qualification Summary Report (EQSR)
- Human Factors Summary
- VOP Summary
- Regulatory commitments
- Conceptual FSAR Mark-ups (Info Only)

Project Design/Licensing Timeline



Timeline Supporting Alternate Review Process (ARP) Licensing Review

Licensing Technical Report

- Will address:
  - DI&C-ISG-06 Sections D.1 – D.8
  - TS surveillance elimination
  - Common Cause Failure analysis summary
  - Plant Specific Action Items (PSAI)
  - Common Q platform changes subsequent to generic NRC approval

- Similar structure to Waterford LTR

Vendor Oversight Plan

VOP Scope

The VOP is a critical part of the Project Quality Management Plan (QMP):

- Leverages existing Exelon Quality Assurance, Engineering, and Project Management processes for oversight of Westinghouse Common Q development
- Ensures high quality vendor products through QA program implementing procedures
- Includes NRC acceptance criteria provided to industry, adapted for project use (ML19087A230)
- Performs vendor audits as part of oversight activities
- Ensures vendor is complying with NRC approved Common Q Software Program Manual (WCAP-16096-P-A, Rev. 5)
- Validate PSAIs have been properly addressed

Closed Portion

Architecture and Fundamental Design Principles

Integrated Architecture

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Potential Arrangement with Monitor Visuals

PPS High-Level System Design Concept

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PPS High-Level System Design Concept

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PPS High-Level System Design Concept (cont.)
Bistable Processing Logic (BPL) – Level 1

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PPS High-Level System Design Concept (cont.)
Local Coincidence Logic (LCL) – Level 2

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PPS High-Level System Design Concept (cont.)
Integrated Logic Processor (ILP) – Level 3

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PPS High-Level System Design Concept (cont.)
RT Matrix/RPS TU Scram

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PPS High-Level System Design Concept (cont.)
Interface and Test Processor (ITP)

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PPS High-Level System Design Concept (cont.)
Flat Panel Display System – Safety Displays

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PPS High-Level System Design Concept (cont.)
Flat Panel Display System – MTP

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High-Level System Design Concept (cont.)

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Fundamental Design Principles

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Fundamental Design Principles (cont.)

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Fundamental Design Principles (cont.)

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Fundamental Design Principles (cont.)

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Fundamental Design Principles (cont.)

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Fundamental Design Principles (cont.)

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Fundamental Design Principles (cont.)

Defense-in-depth and Diversity (D3)

D3 coping analysis – SECY 93-087 Position 1 – 3

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Fundamental Design Principles (cont.) - split content over two slides

Defense-in-depth and Diversity (D3)

D3 coping analysis – SECY 93-087 Position 1 – 3 (cont.)

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SECY 93-087 Position 4 Displays and Controls

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Fundamental Design Principles (cont.) - split content over two slides

Defense-in-depth and Diversity (D3)

D3 coping analysis – SECY 93-087 Position 1 – 3 (cont.)

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CCF Approach (cont.)

SRM-SECY 93-087 Position 4 Displays and Controls

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Priority Module

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Priority Module

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Priority Module (Cont.)

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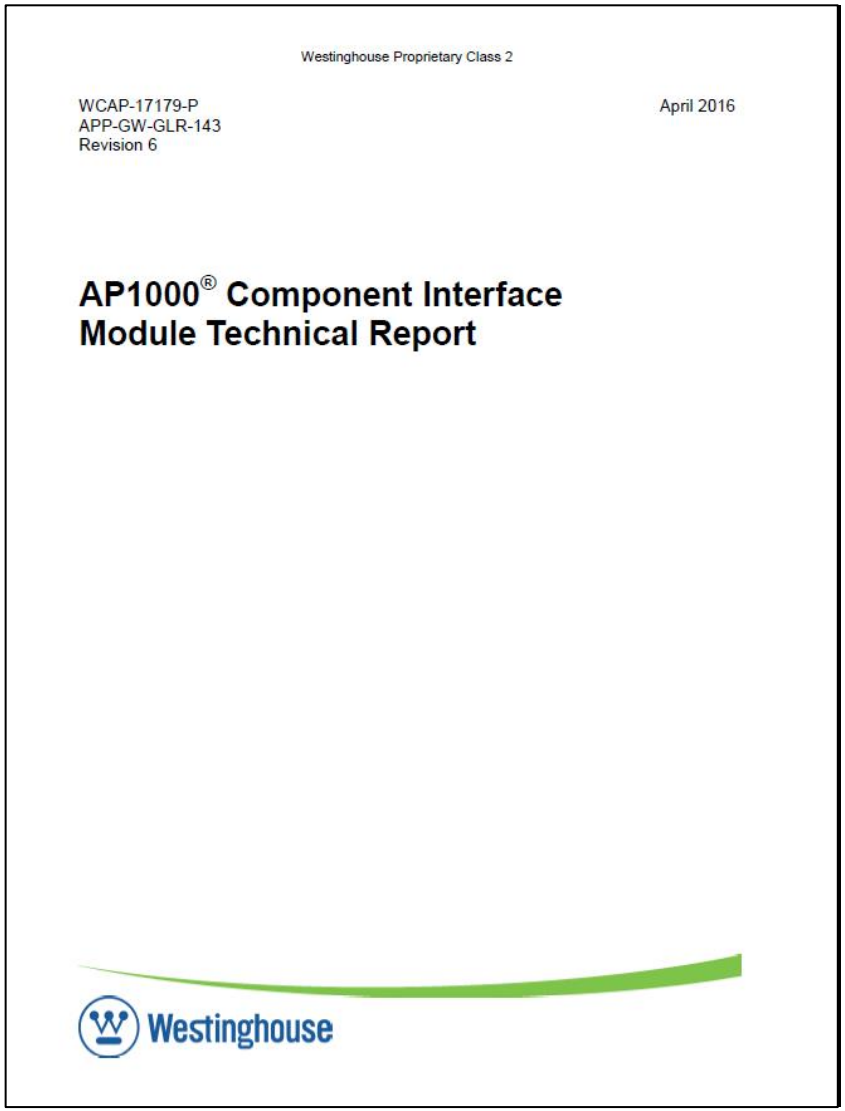
Prior NRC Review of the CIM

- The CIM was reviewed as part of the AP1000 PMS
  - The CIM technical report, WCAP 17179, Revision 2 was docketed July 2010 (ML102170259)
  - It is a Tier 2* document incorporated by reference (IBR) in the Vogtle 3&4 UFSAR
  - WCAP-17179 is currently at Revision 6, April 2016
  - August 2016, SNC Vogtle 3&4 submitted a LAR 16-021 (ML16293A033) capturing all the changes since WCAP-17179, Revision 2 into an Appendix 7A in the UFSAR


Westinghouse Proprietary Class 2

WCAP-17179-P
APP-GW-GLR-143
Revision 6

April 2016

AP1000® Component Interface Module Technical Report

Westinghouse

Prior NRC Review of the CIM (cont.)

- The CIM went through the 10 CFR 52 NRC ITAAC inspection process
  - ITAAC 2.5.02.14 covers the complete CIM development life cycle.
- The following ADAMS Accession Numbers are the NRC ITAAC inspection reports:
  - ML111890000
  - ML111890005
  - ML14058A995
  - ML14262A351
  - ML15363A360

553	2.5.02.14	14. The Component Interface Module (CIM) is developed using a planned design process which provides for specific design documentation and reviews. {Design Acceptance Criteria}	An inspection and or an audit will be performed of the processes used to design the hardware, development software, qualification and testing.	A report exists and concludes that CIM meets the below listed life cycle stages. Life cycle stages: a. Design requirements phase, may be referred to as conceptual or project definition phase b. System definition phase c. Hardware and software development phase, consisting of hardware and software design and implementation d. System integration and test phase e. Installation phase

Applicability of previous NRC Approvals

Applicability of Other Previous NRC Approvals

The LAR will reference the following approved topical reports:

Platform topical report, WCAP-16097-P-A, *Common Qualified Platform*

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Applicability of Other Previous NRC Approvals (cont.)

Application development topical report, WCAP-16096-P-A, *Software Program Manual*

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Applicability of Previous NRC Approvals (cont.)

Surveillance reduction topical report, WCAP-18461-P-A, *Common Q Platform and Component Interface Module Elimination of Technical Specification Surveillance Requirements*

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*** This record was final approved on 3/2/2021 1:59:11 PM. (This statement was added by the PRIME system upon its validation)

Scope for Non-safety related DCS Changes

Redundant Reactivity Control System (RRCS)

- The LAR will request downgrading the existing safety-related Redundant Reactivity Control System (RRCS) to non-safety and enhanced reliability, since its purpose is to meet the ATWS Rule (10 CFR 50.62)
- It will be replaced with a separate and diverse non-safety Westinghouse Ovation product
  - Use redundant Ovation controllers as a dedicated drop from DCS

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  - Sensors (RPV water level, RPV pressure, Reactor power status) to be hardwired from PPS prior to connecting into PPS analog input modules (i.e., signal share w/ isolation)

Closing Comments

Acronyms

ADS	Automatic Depressurization System
AER	Auxiliary Equipment Room
ARP	Alternate Review Process
ASAI	Application Specific Action Item
ATWS	Anticipated Transient Without Scram
BPL	Bistable Protection Logic
BWR	Boiling Water Reactor
CCF	Common Cause Failure
CDO	Central Design Organization
CIM	Component Interface Module
CPU	Central Processing Unit
CS	Core Spray
D3	Defense-in-Depth and Diversity
DCS	Distributed Control System
DDS	Data Display System
ECCS	Emergency Core Cooling System
EDG	Emergency Diesel Generator
EOP	Emergency Operating Procedures
EQSR	Equipment Qualification Summary Report
FMEA	Failure Modes and Effects Analysis
FMEDA	Failure Modes, Diagnostics, and Effects Analysis
FPGA	Field Programmable Gate Array
FSAR	Final Safety Analysis Report
HPCI	High Pressure Core Injection
HSL	High Speed Link
IBR	Incorporated by Reference
ILP	Integrated Logic Processor
ITAAC	Inspection, Test, Analysis, and Acceptance Criteria
LAR	License Amendment Request
LCL	Local Coincidence Logic
LGS	Limerick Generating Station
LRA	Licensee Required Action
LTR	Licensing Technical Report
MCR	Main Control Room
MPB	Manual Partial Bypass
MPT	Manual Partial Trip
MSFIS	Main Steam and Feedwater Isolation System
NSSSS	Nuclear Steam Supply Shutoff System
PC	Personal Computer
PMS	Protection and Monitoring System
PSAI	Plant Specific Action Items
QMP	Quality Management Plan
RCIC	Reactor Core Isolation Cooling
RHR	Residual Heat Removal
RPS	Reactor Protection System
RPV	Reactor Pressure Vessel
RRCS	Redundant Reactivity Control System
SDV	Scram discharge volume
SPDS	Safety Parameter Display System
SPM	Software Program Manual
SRNC	Safety Remote Node Controller
SyDS	System Design Specification
SyRS	System Requirements Specification
TS	Technical Specifications
TU	Trip Unit
UFSAR	Updated Final Safety Analysis Report
VOP	Vendor Oversight Plan