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Maintenance Plan for the Replacement MSFIS Controls, Revision 0

MAIN STEAM & FEEDWATER ISOLATION SYSTEM (MSFIS) CONTROLS REPLACEMENT



MAINTENANCE PLAN

REVISION 0

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1 Overview

1.1 Purpose

The purpose of the Maintenance Plan is to discuss the roles and responsibilities and the deliverables of the MSFIS Controls Replacement Project to ensure successful on-going maintenance of the system.

1.2 Project Summary

The purpose of the MSFIS Controls Replacement Project is to replace the existing MSFIS controls with an Advanced Logic System (ALS). The replacement installation is scheduled for Refueling Outage 16, spring 2008. The MSFIS Controls Replacement Project is one aspect of an overall project to replace the existing Main Steam Isolation Valve (MSIV) bodies and actuators as well as the Main Feedwater Isolation Valve (MFIV) bodies and actuators. The existing MSFIS controls do not support the operation of the replacement MSIV and MFIV actuators. A modified or replacement controls system is required to operate the new valve actuators. In addition to the lack of capability, the existing MSFIS controls are based on obsolete technology and that has become less reliable as the system ages. A recent plant trip (August 2003) was due to a failed circuit card in the existing MSFIS controls. Several single points of failure exist in the existing MSFIS controls.

1.3 Detailed Description of Project

The scope of the MSFIS Controls Replacement Project is to replace the existing controls, with a control system based on the Advanced Logic System (ALS) technology.

The MSFIS Controls Replacement Project replaces the existing safety related electronic MSFIS with a hardware-based system to perform the control functions of the MSIVs and MFIVs. The replacement MSFIS will be installed in conjunction with replacement of the existing electro-pneumatic-hydraulic MSIVs and MFIVs by new MSIVs and MFIVs with system-medium actuators. The MSFIS controls, existing and replacement, has two redundant subsystems located in separate cabinets:

MSFIS Channel I (1) located in MSFIS Cabinet SA075A

MSFIS Channel IV (4) located in MSFIS Cabinet SA075B

The replacement project will retain the existing cabinets, external power supply feeds, and channel separation scheme in the overall plant configuration. The replacement project will include changes to the functions by which the replacement MSFIS controls the replacement MSIVs and MFIVs. These changes account for the differences in the function of the existing and replacement MSIVs and MFIVs, that is, electro-pneumatic-hydraulic actuators replaced by system medium actuators.

The replacement project will implement a new digital control system, new power supplies, new assembly panels and new vendor wiring. The replacement project will retain without modifications, the existing cabinets including mechanical structures used to mount racks and components, field-wiring and terminal blocks within the cabinets. The replacement project will modify the functionality of the current MSFIS (per J-105A (Q) Rev. 2 requirements) [1]. This will include changes to the functions by which the replacement MSFIS controls the replacement MSIVs and MFIVs. These changes account for the differences in the function of the existing and replacement MSIVs and MFIVs, that is, electro-pneumatic-hydraulic actuators, replaced by system-medium actuators. The replacement project will not re-use existing electronic boards, sub-racks, interconnecting wiring/cables, fuse blocks, circuit breakers, test panel, switches, indicators, power supplies, actuation relays, and assembly panels.

After replacement, each cabinet will contain the following components:

- 2 ALS Racks: One Main Steam (MS) rack and one Feedwater (FW) rack. Each rack is identical and will contain the following circuit boards:
 - 1 Core Logic board (ALS-101)
 - 2 Digital Input board (ALS-301)
 - 1 Solid-state output board (ALS-401)
 - 3 Solid State FET & Sensor output board (ALS-411)
 - 1 Service & Test board (ALS-201)
 - 2 Power supply modules (ALS-905)
- 1 **Assembly panel**, with MS and FW components
 - Terminal and distribution block for 125Vdc class I E power train
 - Fuse blocks for solenoid outputs and ALS rack
- **Cables** between vendor and field terminal blocks

An overview of the replacement MSFIS can be seen in Figure 1 below.

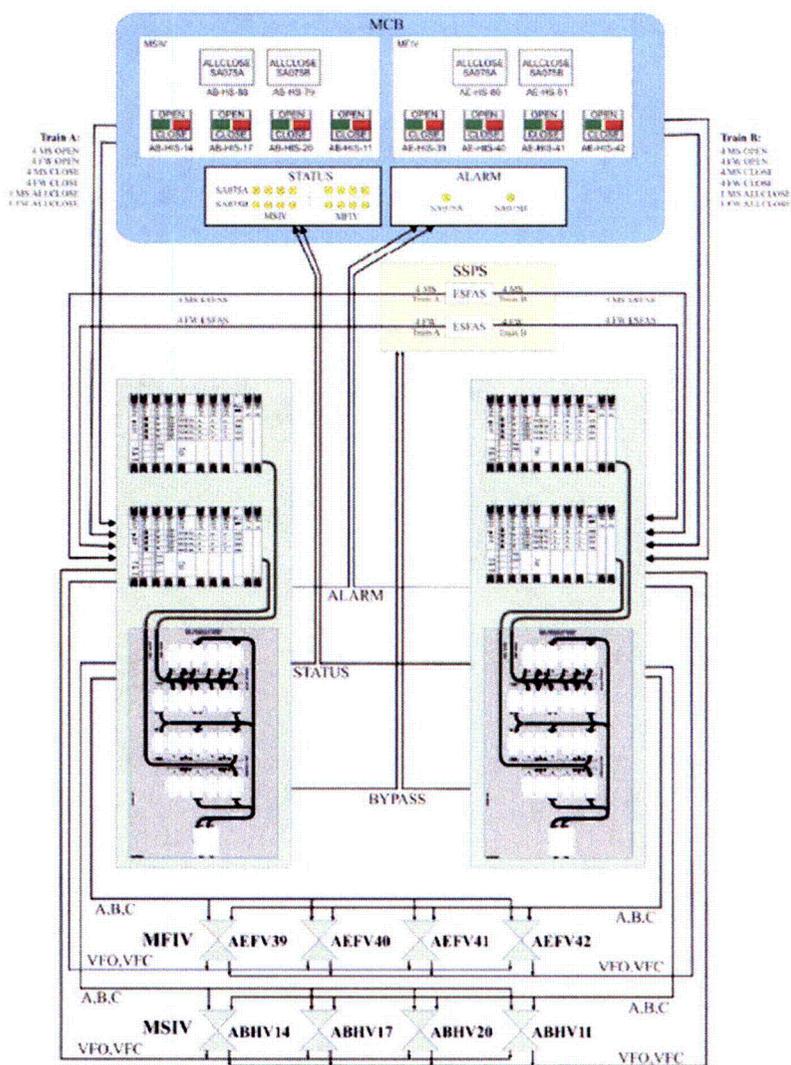


Figure 1: MSFIS Overview

1.4 References

1.4.1 MSFIS Project Plan

1.4.2 J-105A(Q)

1.4.3 MSFIS Level 1 Specification

2 Maintenance Plan

2.1 Roles and Responsibilities

The following sections outline the roles and responsibilities for the operation of the replacement MSFIS Controls.

2.1.1 WCNOG

WCNOG is the system owner and is ultimately responsible for the on-going maintenance of the replacement MSFIS Controls. The WCNOG Maintenance Department, specifically the Instrumentation and Controls (I&C) group, has direct responsibility for maintaining the equipment. The WCNOG System Engineering group has the overall ownership of the equipment to ensure it is operating and maintained properly.

2.1.2 Platform Owner and Design Consultant

The Platform Owner and Design Consultant does not have direct responsibilities for the maintenance of the equipment. Documentation provided by the Platform Owner and Design Consultant is utilized by WCNOG in the development of the maintenance procedures and preventative maintenance schedules.

2.1.3 Qualification and Dedication Contractor

The Qualification and Dedication Contractor does not have any direct responsibilities for the maintenance of the equipment. Documentation provided by the Qualification and Dedication Contractor is utilized by WCNOG in the development of the maintenance procedures and preventative maintenance schedules. The Qualification and Dedication Contractor does have 10 CFR 50, Appendix B Part 21 responsibility of the replacement MSFIS controls.

2.2 Project Deliverables Critical to System Maintenance

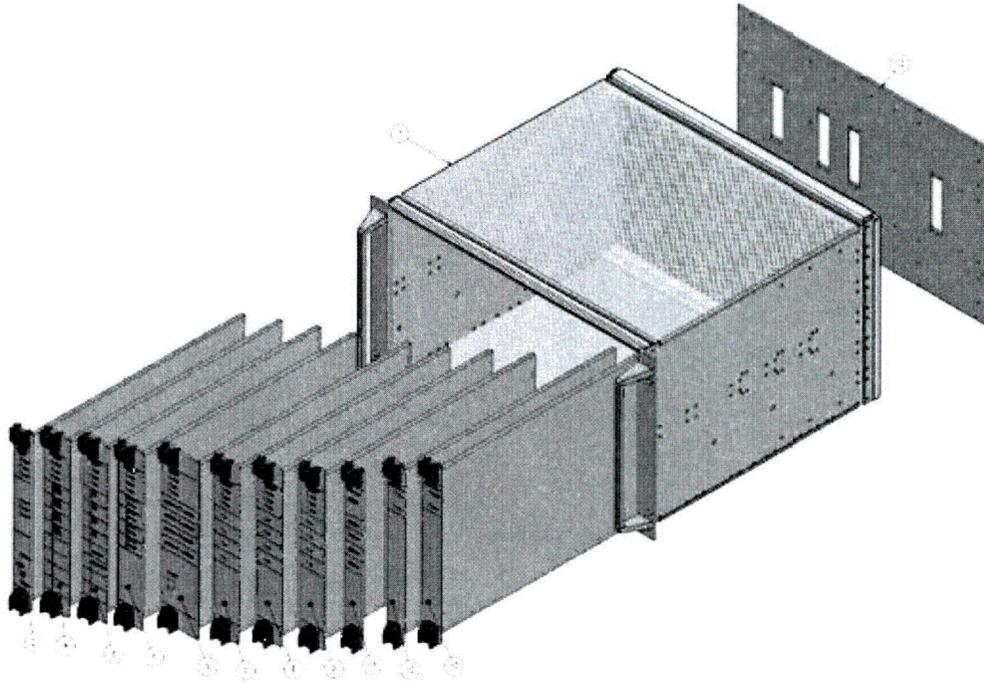
The following outputs from the MSFIS Controls Replacement Project are critical to ensure WCNOG has the information and tools required to maintain the system.

- Outline Drawings
- Control Logic Diagram
- Assembly Drawings
- Wiring Diagrams
- Handling, Shipping, and Storage Procedures
- Repair Parts List
- Operations and Maintenance Manual
- ALS Service Unit (ASU).

2.3 Implementation Characteristics

The replacement MSFIS controls is a rack-based hardware system consisting of several circuit cards inserted into a card rack. The individual cards each have a specific function within the system. The cards are hot swappable, which means they can be inserted and removed without powering down the rack. The troubleshooting of the rack is intended to be at the circuit card level. The replacement MSFIS controls allocates all functions to hardware; none of the system functionality has been implemented in software. The replacement MSFIS controls will be treated the same as other

hardware-based systems in the plant. Therefore the existing procedures for controlling plant equipment can be employed as-is. The figure below provides an overview of one of the replacement MSFIS controls racks.



The ALS supports several advanced diagnostic techniques which are accessed and applied using the ALS Service Unit (ASU). The ASU is a dedicated notebook computer provided by the Platform Owner and Design Consultant for troubleshooting and maintenance of the ALS MSFIS. The ASU is connected to the ALS MSFIS via a front panel USB port, and allows the technician to view internal states such as the status of each board and event recorder data (e.g. trip data).

2.4 Maintenance Procedures

- All procedures required for maintenance of the replacement MSFIS controls will be generated or existing procedures revised as a part of the WCNOG Plant Modification Process. The ALS MSFIS Operations and Maintenance Manual is the source document for maintenance and troubleshooting procedures, however there are several aspects of the equipment maintenance that were implemented to limit the impact on the changes required in the existing procedures.

2.5 Maintenance Challenges

As discussed above the ALS MSFIS will be treated the same as other hardware-based systems in the plant. Although the board designs consist almost entirely of surface mount components, this will not be an issue for I&C as spare boards will be stocked and all troubleshooting and replacement will be at the board level only. ESD precautions and procedures will be covered in the I&C training class and reiterated in the maintenance procedures. The remaining system components consist of cables, connectors, fuseholders and terminal boards which are essentially the same as other I&C equipment. The primary ALS MSFIS diagnostic tool will be the ASU. Efficient use of the ASU will be covered in the I&C training classes.