

**Regulatory Audit Plan HF Controls HFC-6000 Topical Report
Carrollton, Texas, October 6-9, 2009**

Background

By letter dated March 5, 2008, as supplemented by letters dated November 15, 2007, and January 16, 2009, Doosan HF Controls Corporation (HFC) requested approval for the "HFC-6000 Safety System Topical Report," document number PP901-000-01, Rev. C. The supplemental documents provided under cover letters dated November 15, 2007, and January 16, 2009, provided additional information that clarified the application and did not expand the scope of the application.

The topical report was accepted for review by letter dated September 16, 2008. In support of this review effort, this proposed Design Review Audit will provide clarification of design details of the HFC-6000 platform and demonstration of the associated processes and procedures employed to ensure its quality.

The objective of a regulatory audit is to examine and evaluate technical, procedural, and process information in addition to observing the physical hardware at the host's facility. The intent is to improve understanding and verify information as well as to identify information that may require docketing to support the basis of the safety evaluation decision for the HFC-6000 platform.

Regulatory Audit Bases

An audit is necessary to identify and confirm design and process information that supports evaluation of claims by HFC in the Topical Report PP901-000-01, "HFC-6000 Safety System Topical Report," Revision C. The topical report was submitted for review in anticipation of future licensing submittals under Title 10 of the *Code of Federal Regulations*, Part 50 and Part 52 that would involve safety application of the HFC-6000.

Regulatory Audit Scope

HFC has been requested to provide information and supportive documentation at their Carrollton, Texas, office for the NRC staff to facilitate a timely review of said topical report. This information would also contribute to verification of the claims made in Topical Report PP901-000-01 that the platform components dedicated under an acceptable qualification program and maintained under the current quality assurance program will be acceptable for use in U.S. nuclear applications.

High priority objectives for the on-site audit by NRC staff are to observe the base hardware of the platform in typical system configurations, observe implementation of applications demonstrating use of the functionality of the platform, discuss the implementation and execution of the HFC-6000 Qualification Program, and confirm evidence of conformance to cited guidance and criteria. Of particular significance for the NRC staff's review of the HFC topical report is improved understanding of the original quality assurance processes and the dedication approach employed for previously developed software (PDS). Each objective of this audit supports clarification of technical evidence necessary to enable resolution of whether the HFC-6000 platform and its life cycle processes are of a quality suitable for use in U.S. nuclear safety system applications.

The on-site audit permits inspections and clarifying discussions. The audit includes test facilities, record keeping facilities, PDS dedication records and testing/maintenance tools, and other components that require access to HFC's offices for inspection.

Information and Other Material Necessary for the Regulatory Audit

- HFC-6000 software code inspection reports for all PDS software modules (SR###-###-##)
- HFC-6000 code listings for all PDS software modules
- User Manuals, UG004-000-##
- TS002-000-01 ICL Functional Test
- TS002-000-03 C-Link Functional Test
- TR002-000-14 ICL Operation, Baseline Performance, Component Functional Test Report
- TR002-000-15 C-Link Operation, Baseline Performance, Component Functional Test Report

Regulatory Audit Team

Norbert Carte, Team Leader
Richard Wood, Nuclear Engineer (Contractor)
Jonathan Rowley, Project Manager

Regulatory Audit Activities and Assignments

1. Observe HFC error reporting and correction system and confirm operating experience data for HFC-6000 and predecessor platforms.
2. Observe configuration of main and expander chassis and configuration of HFC-6000 components.
3. Observe capability to identify components and capability to identify status of components.
4. Observe operation of redundant controller configuration in presence of faults.
5. Observe demonstration that self-diagnostics are capable of detecting faults in the controllers and communication links. This demonstration should specifically include the watchdog timer action, communication node failure (both C-Link and ICL), and controller sanity determination.
6. Observe configuration of redundant power supplies and confirm their capability to function during faults.
7. Confirm failure modes and effects analysis and reliability analysis determinations.
8. Observe demonstration of testing and maintenance capabilities, including maintenance failover mechanism for redundant controllers.

9. Observe demonstration of loading basic software and application software into HFC-6000, including capability to enable or inhibit downloads.
10. Observe demonstration of the means by which response time of HFC-6000 system is calculated and verified.
11. Observe software development environment for document generation, configuration management, provisions for security, testing, and other indications of a quality process. This activity should include observation of process for modification of system software using Word editors and the Intel x86 Assembler, Linker and Locator, configuration control of the system software using Microsoft SourceSafe, and installation of basic system software.
12. Ensure that software quality assurance processes are implemented for maintaining system software (i.e., PDS).
13. Observe software lifecycle planning and implementation documentation, including software safety, maintenance, operation, and training plans and source code listings and review reports.
14. Ensure that configuration management processes are implemented, with a focus on record keeping, documentation, and management activities (including identification of documents associated with safety related components).
15. Perform thread audits for selected set of software requirements, specifically addressing forward and backward traceability.

Logistics

The audit is to be performed at HFC's Carrollton, Texas, office. The audit will be conducted over four days from October 6 through 9.

Deliverables

At the conclusion of the audit, the NRC staff will conduct an exit briefing and will provide a summary of audit results. A final Regulatory Audit Summary will be provided to HFC within four weeks of the completion date of the audit. The Regulatory Audit Summary will contain the following information:

- Identification of any specific materials that require docketing in support of a safety determination.
- Identification of specific materials for reference (procedures/processes) that provide support of the determination of whether 1) the HFC-6000 Qualification Program is commensurate with the requirements for NRC safety system applications; and 2) Definitions and scope of the original quality assurance program and the current commercial dedication approach support the conclusions drawn about critical characteristics for the HFC-6000 base platform.

Review report of items specifically reviewed.