Project Title: ***UFTR DIGITAL CONTROL SYSTEM UPGRADE***

UFTR-QA1-09, Software Operation and Maintenance Plan

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1. Introduction

The mission of the Software Operations and Maintenance Plan (SOMP) is to identify the process to implement a change in the software, based on one or all of the following three alternatives.

a) The identification and correction of software errors, performance failures, and/or implementation problems (corrective maintenance).
b) Modifications to permit the software system to run in a different operating environment, with different types of data, or to incorporate new requirements (adaptive maintenance).
c) Modifications to enhance performance, improve cost effectiveness, or otherwise improve the software system (perfective maintenance).

1.1 Purpose

The SOMP follows the life cycle planning for operations and maintenance guidance of IEEE Std. 1074, /6/, as endorsed by NRC Regulatory Guide 1.173, /8/. After the system has been turned over to the University of Florida Training Reactor (UFTR), software modifications and maintenance shall be performed following this plan.

The plan describes the activities and resources that enable UFTR Digital Control System Upgrade Project Team to support and maintain TELEPERM XS (TXS) protection software after the software has been installed and is operational. The main tasks of this plan are responding to changes in the UFTR requirements, offering upgrades, and reporting and correcting any defects or anomalies discovered in the software.

1.2 Scope

This plan serves as an UFTR internal document set up to bring software engineering from the identification stage of a software issue to the implementation and reporting stage of a resolution. Any software maintenance effort involves, at a minimum, the technical and management activities necessary to perform the following five steps:

a) Understand the existing system
b) Understand the problem or the desired improvement
c) Modify the system in a specified manner
d) Revalidate the updated system
e) Update documentation

1.3 Applicability

University of Florida Training Reactor (UFTR).

1.4 Effectivity

This Procedure takes effect upon the date of issue.

1.5 References

NOTE: The following list of documents includes required developmental input as well as general input references.

1.5.1 UFTR Documents

/1/ UFTR-QAP "Quality Assurance Program (QAP)"
/2/ UFTR-QAP-01-P "Conduct of Quality Assurance"
/3/ UFTR-QA1-QAPP, "Quality Assurance Project Plan (QAPP)"
/4/ UFTR-QA1-02, "Software Configuration Management Plan (SCMP)"
/5/ UFTR-QA1-03, "Software Verification and Validation Plan (SVVP)"

1.5.2 Industry Standards

/6/ IEEE Standard 1074-1995, "IEEE Standard for Developing Software Life Cycle Processes"

1.5.3 Regulatory Policy and Guidance

/7/ 10 CFR Part 21, "Reporting of Defects and Noncompliance"

/8/ Regulatory Guide 1.173, "Developing Software Life Cycle Processes for Digital Computer Software Used in Safety Systems of Nuclear Power Plants," September 1997

1.6 Abbreviations

BTP	Branch Technical Position
CFR	Code of Federal Regulations
HICB	Human, Instrumentation and Controls Branch
I&C	Instrumentation and Control
ICS	I&C Systems
IEEE	Institution of Electrical and Electronic Engineers
SIVAT	Simulation and Validation Tool

1.7 Definition

Event: a notable occurrence at a particular point in time. In the context of this document, a software error, software flaw, software design change, software performance improvement, software documentation clarification, test deviation, system malfunction, and inconsistence between software and documentation constitute types of events.

2. Organization

The organization, complete with roles and responsibilities, is identified in the Section 1 of the UFTR-QA1-QAPP "Quality Assurance Project Plan (QAPP)," /3/.

3. Software Operation and Maintenance Plan Activities

3.1 Identification of Event

The initial identification of the event will come from UFTR or AREVA.

Any identified events shall be entered into the corrective action according to UFTR-QAP "Quality Assurance Program (QAP)," /1/, and UFTR-QAP-01-P, "Conduct of Quality Assurance" procedure, /2/, and identify the time and date of discovery and the identity of the person making the report.

Condition reports shall be evaluated to determine whether a nonconformance exists. A software problem or issue that is discovered during the operations and maintenance phase and proves to be a nonconformance shall be handled in the corrective action according to UFTR QAP," /1/, and UFTR-QAP-01-P, "Conduct of Quality Assurance" procedure, /2/. The UFTR shall make any required operability determinations.

For any identified error or flaw in design, a nonconformance shall be initiated. Identifying the configuration and system input and operating conditions shall be the first activity in responding to the nonconformance. A 10 CFR Part 21, /7/, evaluation shall be performed for evaluation and reporting of safety significant issues.

If a software change is necessary to resolve a condition report or a nonconformance, the software change shall be made in accordance with the UFTR-QA1-02, "Software Configuration Management Plan (SCMP)," /4/.

Software change condition reports shall be evaluated and approved following the corrective action procedures outlined in the UFTR-QAP "Quality Assurance Program (QAP)," /1/, and UFTR-QAP-01-P, "Conduct of Quality Assurance," /2/. Once approved, an authorized software change shall be implemented following the UFTR SCMP, /4/. Approved software change requests shall be grouped as appropriate and implemented together as a single software version release.

3.2 Classification of Corrective Action

After identification of the event, the event must then be classified into one of three possible maintenance types: corrective, adaptive, or perfective. These maintenance types are discussed further in the following sections.

3.2.1 Corrective Maintenance

Corrective maintenance follows the discovery of a software design or implementation error. This is a necessary change that should have been caught in the initial design and testing phases of the software. In the event that corrective maintenance is required, a condition report shall be initiated to determine the root cause of the error. From the condition report the proper steps shall be taken according to UFTR QAP, /1/, and UFTR-QAP-01-P, "Conduct of Quality

Assurance" procedure, /2/, to evaluate the need for and initiate a 10 CFR Part 21 notification, /7/.

3.2.2 Adaptive Maintenance

Adaptive maintenance will generally be initiated by a design change at the plant. This design change will affect the design of the software and will require the necessary changes to be made accordingly. Adaptive maintenance does not require a condition report as the need for the maintenance was initiated by a design change and not by a system malfunction. This type of maintenance requires an approved change order or purchase order and an approved set of design inputs prior to the start of work.

3.2.3 Perfective Maintenance

Perfective maintenance is not a correction of a flaw, but merely an implementation of a more efficient design and will generally be initiated by AREVA. Perfective maintenance does not require a condition report as the need for the maintenance was initiated by a design change and not by a system malfunction. This type of maintenance requires an approved change order or purchase order and an approved set of design inputs prior to the start of work.

3.3 Implementation of Corrective Maintenance

The implementation of the corrective maintenance, including the design, implementation, testing, installation, and documentation of the corrective action, shall be governed by the UFTR SCMP /4/. The verification activities for the corrective action shall be governed by the UFTR-QA1-03 "Software Verification and Validation Plan (SVVP), /5/. This process is outlined in APPENDIX 1, the Maintenance and Implementation flow chart.

To ensure that the most current version of the software is utilized during the corrective action process, the plant shall be consulted to ensure that all changes, including parameter changes, between the final delivered system and the current, operating system are taken into consideration. These changes shall be transmitted in an official document that can be utilized as a design input.

3.4 Implementation of Adaptive and Perfective Maintenance

The implementation of Adaptive and Perfective Maintenance shall be set up as a new TXS project, according to UFTR-QAP-01-P "Conduct of Quality Assurance," /2/. This process is outlined in APPENDIX 1, the Maintenance and Implementation flow chart.

Appendix 1 Maintenance and Implementation Flow Chart