

January 11, 2006

Mr. Bruce H. Hamilton
Vice President, Oconee Site
Duke Energy Corporation
7800 Rochester Highway
Seneca, SC 29672

SUBJECT: REVIEW ISSUES FOR DIGITAL UPGRADE OF RPS/ESPS FOR OCONEE
NUCLEAR STATION, UNITS 1, 2, AND 3 (TAC NOS. MC5895, MC5896, AND
MC5897)

Dear Mr. Hamilton:

This letter is to notify you of concerns about your February 14, 2005, license amendment request for a digital upgrade of the reactor protective system (RPS) and the engineered safeguards protective system (ESPS) for Oconee Nuclear Station, Units 1, 2, and 3. You have proposed to replace the current analog-based RPS/ESPS with a digital-based Framatome TELEPERM XS system that will perform all the functions that are now being performed by separate analog systems.

On July 27, 2005, the Nuclear Regulatory Commission (NRC) sent you a detailed letter containing a number of staff concerns on the design process and system architecture in which the staff stated that it was premature to assume that the concerns could be favorably resolved or that approval would be received by your need date. Although progress has been made on the issues identified in the July 27, 2005, letter, most of our concerns have not been completely resolved. Factors contributing to the delays in resolving these issues include (1) incomplete response to our September 6, 2005, request for additional information, (2) many documents we have requested have been provided in a preliminary form that are either draft, under revision, or have not received final approval, and (3) much of the preliminary information is un-docketed.

When we conducted our review at your vendor's offices in November 2005, we found your development of the design was not complete. While this limited review did not identify any specific issues with software development, the NRC noted that many of your planning, requirements and specification documents were in either draft form or undergoing revision. Consequently, additional review of the design and development processes is required.

The preliminary status of key documents has significantly delayed our ability to evaluate the adequacy of your design and quality assurance processes. As you know, our review is focusing on these processes to ensure development of a safe and high-quality system. It is important to note that digital instrumentation and control (I&C) systems are fundamentally different from analog I&C systems because (1) minor errors in design and implementation can cause these systems to exhibit unexpected behavior, (2) the performance of digital systems over the entire range of input conditions cannot generally be inferred from testing of a sample of input conditions, and (3) the use of inspections, type testing, and acceptance testing of digital systems and components does not alone accomplish design qualification at high confidence levels. With this in mind, the NRC's approach to the review of design qualification for digital

systems, depends, to a large extent, on confirming that you employ a high-quality development process that incorporates disciplined specification and implementation of design requirements. NRC also reviews the inspection and testing used to verify correct implementation and to validate desired functionality of the final product. However, confidence that isolated, discontinuous point failures will not occur is derived from the discipline of your development process. Therefore, our assessment that you have implemented a disciplined, high-quality development process will be an important aspect of our overall conclusion on this application.

At this point in our review, there are also unresolved technical issues. Some of the significant issues are the lack of isolation between safety and non-safety systems and interconnections between safety-related channels, both discussed in the July 27, 2005, letter. The NRC staff continues to evaluate the overall acceptability of the consolidation of all RPS and ESPS functions as previously discussed with you at numerous meetings. Further, our review of the preliminary documentation has identified possible specification and design errors. Additionally, there a number of new features associated with the design, such as lead/lag modules, emergency override functions, and unused time delays which are complicating the review.

The NRC is committed to the licensing of advanced designs including digital technology provided that they assure the necessary levels of safety delivered by current systems are maintained. We have identified issues that raise concerns regarding the completeness and adequacy of your design and of your verification and validation processes. These issues, in turn, raise concerns about the reliance on those processes to develop a high-quality product. Because of the issues identified to date, NRC will not complete its review by the October 2006 outage at Unit 1. This letter alerts you to this situation so you can make contingency plans. Further, NRC has suspended its review of your application until such time as final information related to your application has been submitted and docketed. Enclosed with this letter is a list of the areas where final documentation is required to support the review. This information needs to be docketed by February 14, 2006, for NRC to be able to complete its review by February 2007. When the information is docketed, NRC will conduct an acceptance review and notify you of the results.

My staff is available, at your convenience, to discuss these issues and your plans for their resolution. If you have any questions, please contact Leonard N. Olshan at 301 415-1419.

Sincerely,

/RA/

Catherine Haney, Director
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-269, 50-270, and 50-287

Enclosure: Documents Needed to Support
Review of Digital RPS/ESPS

cc w/encl: See next page

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Review of Digital RPS/ESPS

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DOCUMENTS NEEDED TO SUPPORT REVIEW ISSUES FOR DIGITAL UPGRADE OF
REACTOR PROTECTIVE SYSTEM/ENGINEERED SAFEGUARDS PROTECTIVE SYSTEM
(RPS/ESPS) FOR OCONEE NUCLEAR STATION, UNITS 1, 2, AND 3
(OCONEE 1/2/3, ONS 1, 2, & 3)

The documents listed below are needed to support the review and prepare the Nuclear Regulatory Commission (NRC) staff's safety evaluation (SE). It will take at least 12 months to review and analyze these documents and to write the SE. In order to meet a February 2007 completion date, these documents need to be docketed in their final approved version no later than February 14, 2006. If you have previously submitted a document in the list, please indicate when, and how, that document was submitted to meet the requirements of Title 10 of the *Code of Federal Regulations* Part 50, Section 50.4.

This list represents the basic information needed to restart the review. During the course of the review, the documents below may reference documents which may also be required. NRC will initiate requests for additional information as appropriate. This list does not include the procedures and test reports for the factory acceptance tests and site acceptance tests. This information needs to be provided when it is available. However, submission after July 1, 2006, could delay the February 2007 completion date.

<u>Document Title</u>	<u>Doc. No.</u>
Detailed System Architecture	Unknown
Oconee 1 RPS&ESFAS (Engineered Safety Features Activation System) Requirements Traceability Matrix	RTM
Teleperm XS Product Information on Release 3.0.7A of TXS Software	2005/26
Oconee Nuclear Station TXS RPS/ESPS Replacement System Cabinet Design: 1PPSCA0005	38-5069821
Oconee Nuclear Station TXS RPS/ESPS Replacement System Cabinet Design: 1PPSCA0006	38-5069822
ONS Units 1,2, & 3 RPS/ESFAS Controls Upgrade Failure Mode and Effects Analysis	51-5023886
ONS 1, 2, & 3 RPS/ESF Controls Upgrade, Design Specification for Key Locks and Key Switches*	51-5045379
Software Requirements Specification, ONS-1 RPS/ESF Software Requirements Specification (QA1)	51-5045380
Oconee Unit 1: RPS and ESFAS Replacement Project Open Item Form, "HW Typicals for CRD (Control Rod Drive) UV (under voltage) Test Jacks," Doc Step 3.12*	51-5052833
ONS 1, 2, & 3 RPS/ESF Controls Upgrade Hardware Design Solutions	51-5052833
ONS Unit 1 - RPS & ESFAS Configuration Management Plan	51-5055761
Oconee Nuclear Station, Units 1, 2, & 3 RPS/ESF Controls Upgrade ID Coding Concept*	51-5058134
ONS Units 1,2, & 3 RPS/ESFAS Controls Upgrade Verification and Validation Plan	51-5058661
ONS Unit 1 RPS/ESFAS Controls Upgrade Software Design Description	51-5065423

* Document not requested in September RAI

<u>Document Title</u>	<u>Doc. No.</u>
Oconee Nuclear Station, Unit 1 RPS/ESFAS Controls Upgrade Software Requirements Review Report	51-5066516
ONS Unit 1 - RPS & ESFAS Factory Acceptance Test Plan	51-9001334
Dedication Package for Absopulse Power Supply	51-9002116
ONS Units 1,2, & 3 RPS/ESFAS Controls Upgrade Software Safety Plan	51-9005043
ONS Units 1,2, & 3 RPS/ESFAS Controls Upgrade Software Installation Plan	51-9008803
TXS Supplemental EQ (Equipment Qualification) Summary Test Report	66-5015893
ONS RPS/ESFAS Replacement Project EQ Summary Test Report	66-5065212
TÜV Certificate on Communication Processor	968/K 110/02
TÜV Documentation on SCP2 Testing	968/K 110.01/02
TÜV Certificate on Processing Module	968/K 109/02
FANP (Framatome ANP) Report, "TELEPERM XS Simulation - Concept of Validation and Verification,"*	NGLP/2004/en/0094
Configuration Management	NSD 106
Software and Data Quality Assurance (SDQA Program	NSD 800
Reactor Building Narrow Range Pressure Instrument Loop Accuracy Calculation (ESFAS)	OSC-2495
Setpoint Calculations - Wide Range RCS (Reactor Coolant System) Pressure Uncertainty, (ESFAS HPI (High-Pressure Injection) & LPI (Low-Pressure Injection) Setpoints)	OSC-2759
Setpoint Calculations - RPS Main Feedwater Pump Pressure Instrument Loop Accuracy Calculation	OSC-3395
Setpoint Calculations - RPS Flux/Flow Ratio Uncertainty Evaluation	OSC-3416
Setpoint Calculations - Reactor Building Pressure Instrument Loop Accuracy Calculation (ESFAS & RPS)	OSC-3446
Setpoint Calculations - RPS RCS Pressure & Temperature Trip Function Uncertainty Analysis and Variable Low Pressure Safety Limit	OSC-4048
Setpoint Calculations - Power-Imbalance Safety Limits and Tech. Spec. Setpoints Using Error-Adjusted Flux/Flow Ratio of 1.094	OSC-5604
Setpoint Calculations - RPS High Flux and Pump/Power Monitor Trip Function Uncertainty Analysis	OSC-7237
ONS Unit 1 - RPS & ESFAS System Functional Description	OSC-8623
Engineered Safeguard Feature Actuation System (ESFAS) Replacement Project Specification	OSS-0311.00-00-0012
Reactor Protection System (RPS) Replacement Project Specification	OSS-0311.00-00-0013
Duke Power Company, Oconee Nuclear Station, "Nuclear Instrumentation RPS Removal from and Return to Service for Channels A, B, C and D, Rev. 031, ETQS No. RPS-Q-ENTRY"*	Procedure No. IP/0/A/0305/015
Documentation of Software Requirements and SDQA for RPS/ESFAS System Replacement	SDQA-10143-ONS

* Document not requested in September RAI

Document Title

SIVAT LSELS Specifications, Job 4310002, Outputs: EFHV0037*
Teleperm XS Function Blocks, Version 2.60
FB-ADDON, Version 1.2*
SIVAT-TXS Simulation Based Validation Tool, Version 1.4.0*

Doc. No.

Test Case L010400A
TXS-1003-76-V10.0/01.04
TXS-1047-76-V2.0/01.04

* Document not requested in September RAI

Oconee Nuclear Station, Units 1, 2, and 3

cc:

Ms. Lisa F. Vaughn
Duke Energy Corporation
526 South Church Street
P. O. Box 1006
Mail Code = EC07H
Charlotte, North Carolina 28201-1006

Manager, LIS
NUS Corporation
2650 McCormick Dr., 3rd Floor
Clearwater, FL 34619-1035

Senior Resident Inspector
U.S. Nuclear Regulatory Commission
7812B Rochester Highway
Seneca, SC 29672

Mr. Henry Porter, Director
Division of Radioactive Waste Management
Bureau of Land and Waste Management
Dept. of Health and Env. Control
2600 Bull St.
Columbia, SC 29201-1708

Mr. Michael A. Schoppman
Framatome ANP
1911 North Ft. Myer Dr.
Suite 705
Rosslyn, VA 22209

Mr. B. G. Davenport
Regulatory Compliance Manager
Oconee Nuclear Site
Duke Energy Corporation
ON03RC
7800 Rochester Highway
Seneca, SC 29672

Ms. Karen E. Long
Assistant Attorney General
NC Department of Justice
P.O. Box 629
Raleigh, NC 27602

Mr. R. L. Gill, Jr.
Manager - Nuclear Regulatory
Issues and Industry Affairs
Duke Energy Corporation
526 S. Church St.
Mail Stop EC05P
Charlotte, NC 28202

Division of Radiation Protection
NC Dept of Environment, Health, & Natural
Resources
3825 Barrett Dr.
Raleigh, NC 27609-7721

Mr. Peter R. Harden, IV
VP-Customer Relations and Sales
Westinghouse Electric Company
6000 Fairview Road
12th Floor
Charlotte, NC 28210

Mr. Henry Barron
Group Vice President, Nuclear Generation
and Chief Nuclear Officer
P.O. Box 1006-EC07H
Charlotte, NC 28201-1006