

January 7, 2000

Mr. M. L. Marchi  
Site Vice President - Kewaunee Plant  
Wisconsin Public Service Corporation  
Green Bay, WI 54307-9002

SUBJECT: KEWAUNEE NUCLEAR POWER PLANT - PROPOSED DIGITAL UPGRADES  
TO THE REACTOR PROTECTION SYSTEM AND THE ENGINEERED  
SAFETY FEATURES SYSTEMS (TAC NO. MA5396)

Dear Mr. Marchi:

The staff of the U. S. Nuclear Regulatory Commission has performed a preliminary review of the topical report information you have submitted to date for the Kewaunee Nuclear Power Plant concerning proposed replacement of the reactor protection system (RPS) and engineered safety features (ESF) systems using the Westinghouse E3 digital protection system.

The information contained within the documents you have submitted is conceptual in nature and provides proposed system architecture, testing concepts, a high-level diversity and defense-in-depth analysis, and quality and verification and validation (V&V) plans. The staff understands that the final design of the hardware, software, and the overall system is still in progress, and, therefore, the design details are not yet available. The staff understands that the hardware design is scheduled for completion in June 2000, and software design is to be completed by September 2000. The staff expects to receive all design information and the license amendment request by December 2000. The staff anticipates that with submittal of data and documentation as required by the Standard Review Plan (SRP), and as discussed with Kewaunee and Westinghouse personnel, the staff will have completed its safety evaluation review by June 2001.

You have requested that the staff comment on the proposed digital system and upon the documentation submitted to date. The staff has reviewed these documents and has concluded that although the information is not complete, in concept the Westinghouse E3 system will be acceptable for use as a safety-related RPS and ESF systems in nuclear power plants. This conclusion is, of course, preliminary and depends on successful and appropriate hardware, software, and system design, and submittal of the required documentation showing that the development process is consistent with the requirements of 10 CFR 50, Chapter 7 of the SRP, and industry standards for safety-related digital systems.

We have the following specific comments on the submittals:

1. Kewaunee RPS Functional Requirements

This is a draft document and, in concept, is adequate but we are reserving final judgement until we receive and review the final submittal.

2. RPS Upgrade Project Description, Section I, "Protective System Architecture" (Rev 2)

The architecture of the Westinghouse E3 system seems appropriate for safety-related use, but, again, final judgment is highly dependent on design details, and until we receive and review these details, no additional comment is appropriate.

3. RPS Upgrade Project Description, Section II, "Protective System Test Approach"

This document states that the Kewaunee upgrade project uses a combination of operator monitoring, periodic tests, continuous online tests, manual tests, special tests, and hardware and software design tests. In the document the periodic tests are primarily discussed. The test approach appears to be appropriate for a digital system for safety-related use, but until further details of the remaining tests are submitted, and until we review the exact nature of those tests, no additional comment is appropriate.

4. RPS Upgrade Project Description, Section III, "Diversity & Defense-in-Depth Analysis"

The analysis presented is high level, and depends upon manual action for some of the defense in depth required in nuclear power plants. Nothing in the analysis appears to be contrary to NRC requirements, but in many instances, we need more details in order to evaluate the analysis further. We have discussed this requirement with Kewaunee and Westinghouse, and until further details are provided, no additional comment is appropriate.

5. Environmental, Seismic and Electromagnetic Compatibility Qualification Test Plan

This plan discussed qualification level but does not go into detail on how the testing is to be accomplished. These qualification levels appear to conform to the test plan requirement, however, we have not made a detailed comparison. A possible conflict may exist in the environmental temperature and humidity tests as there are no tests that test at both elevated temperature and high humidity. In general, the test plan seems adequate for test of safety-related digital protection systems, but until further details are provided, no additional comment is appropriate.

6. RPS Upgrade Project Quality Plan, (Rev. 2)

This document is primarily a list of applicable policies and procedures, and until we examine those policies and procedures, no comment on the appropriateness is possible.

7. E3 Design, Verification and Validation Plan (Rev. 1)

The V&V plan appears to be in accordance with Institute of Electrical and Electronics Engineering Standard 1012. There has been some discussion of the independence requirements for the second- and third-party review, and although it appears that there will be sufficient organizational independence between design personnel and personnel performing the V&V functions, we will further investigate this independence. In general, the plan appears adequate for safety-related digital systems, but further details are needed.

On the basis of our preliminary review of the submittals to date, we have not identified any significant issues that would preclude NRC's acceptance of the anticipated licensing action by the Kewaunee Nuclear Power Plant Instrumentation and Control Upgrade Project using Westinghouse E3 digital protection equipment in the RPS and ESF systems.

If you have any questions or wish further clarification, please call me at (301) 415-1392.

Sincerely,

*/RA/*

Tae Kim, Senior Project Manager, Section 1  
Project Directorate III  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

7. E3 Design, Verification and Validation Plan (Rev. 1)

The V&V plan appears to be in accordance with Institute of Electrical and Electronics Engineering Standard 1012. There has been some discussion of the independence requirements for the second- and third-party review, and although it appears that there will be sufficient organizational independence between design personnel and personnel performing the V&V functions, we will further investigate this independence. In general, the plan appears adequate for safety-related digital systems, but further details are needed.

On the basis of our preliminary review of the submittals to date, we have not identified any significant issues that would preclude NRC's acceptance of the anticipated licensing action by the Kewaunee Nuclear Power Plant Instrumentation and Control Upgrade Project using Westinghouse E3 digital protection equipment in the RPS and ESF systems.

If you have any questions or wish further clarification, please call me at (301) 415-1392.

Sincerely,

*/RA/*

Tae Kim, Senior Project Manager, Section 1  
 Project Directorate III  
 Division of Licensing Project Management  
 Office of Nuclear Reactor Regulation

**DISTRIBUTION**

File Center (ADAMS)  
 B. Sheron  
 OGC

PDR  
 J. Zwolinski/S. Black  
 ACRS

PD31 r/f

M. Leach, RIII  
 S. Bajwa

**DOCUMENT NAME:** G:\PDIII-1\KEWAUNEE\LTRMA5396.WPD

\* See previous concurrences

To receive copy, indicate: "C" = Copy w/o attachment/enclosure; "A" = Copy with attachment/enclosure; "N" = None

OFC	EEIB*	C	SC:EEIB	C	C:EEIB	DD:DE	D:DE	PM:PD31	LA:PD31	SC:PD31
NAME	PJLoeser		ECMarinos*		JACalvo*	RHWessman*	JRStrosnider*	TJKim	THarris*	CCraig
DATE	12 /13/99		12 /15/99		12 /22 /99	1 / 4 / 00	1 / 4 / 00	1 /7/ 00	1/6/ 00	1/7/00

**OFFICIAL RECORD COPY**

Kewaunee Nuclear Power Plant

cc:

Foley & Lardner  
ATTN: Bradley D. Jackson  
One South Pinckney Street  
P.O. Box 1497  
Madison, WI 53701-1497

Chairman  
Town of Carlton  
Route 1  
Kewaunee, WI 54216

Harold Reckelberg, Chairman  
Kewaunee County Board  
Kewaunee County Courthouse  
Kewaunee, WI 54216

Attorney General  
114 East, State Capitol  
Madison, WI 53702

U.S. Nuclear Regulatory Commission  
Resident Inspectors Office  
Route #1, Box 999  
Kewaunee, WI 54216

Regional Administrator - Region III  
U.S. Nuclear Regulatory Commission  
801 Warrenville Road  
Lisle, IL 60532-4531

James D. Loock, Chief Engineer  
Public Service Commission  
of Wisconsin  
610 N. Whitney Way  
Madison, WI 53707-7854