ACCELERATED DOCUMENT DISTRIBUTION SYSTEM

REGULAT[redacted]Y INFORMATION DISTRIBUTIO[redacted]YSTEM (RIDS)

ACCESSION NBR:9212180049 DOC.DATE: 92/12/16 NOTARIZED: YES DOCKET #
FACIL:50-315 Donald C. Cook Nuclear Power Plant, Unit 1, Indiana M 05000315
50-316 Donald C. Cook Nuclear Power Plant, Unit 2, Indiana M 05000316
AUTH.NAME AUTHOR AFFILIATION
FITZPATRICK,E. American Electric Power Service Corp.
RECIP.NAME RECIPIENT AFFILIATION
COOK,D.C. Document Control Branch (Document Control Desk)

SUBJECT: Application for amends to licenses DPR-58 & DPR-74, consisting of proposed TS pages.

DISTRIBUTION CODE: A001D COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 24+362
TITLE: OR Submittal: General Distribution

NOTES: See Tech Specs and Report

	RECIPIENT ID CODE/NAME		COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL
	PD3-1 LA		1	1	PD3-1 PD	1	1
	DEAN,W		2	2			
INTERNAL:	NRR/DET/ESGB		1	1	NRR/DOEA/OTSB11	1	1
	NRR/DST/SELB	7E	1	1	NRR/DST/SICB8H7	1	1
	NRR/DST/SRXB	8E	1	1	NUDOCS-ABSTRACT	1	1
	OC/LFMB		1	0	OGC/HDS2	1	0
	REG FILE	01	1	1	RES/DSIR/EIB	1	1
EXTERNAL:	NRC PDR		1	1	NSIC	1	1

NOTE TO ALL "RIDS" RECIPIENTS:

PLEASE HELP US TO REDUCE WASTE! CONTACT THE DOCUMENT CONTROL DESK. ROOM P1-37 (EXT. 504-2065) TO ELIMINATE YOUR NAME FROM DISTRIBUTION LISTS FOR DOCUMENTS YOU DON'T NEED!

TOTAL NUMBER OF COPIES REQUIRED: LTTR 16 ENCL 14

RIDS/ADDS

RIDS/ADDS

AA-2 dbp

American Electric Power
Service Corporation
1 Riverside Plaza
Columbus, OH 43215
614 223 1000

AMERICAN ELECTRIC POWER

AEP:NRC:1159C

Donald C. Cook Nuclear Plant Units 1 and 2
Docket Nos. 50-315 and 50-316
License Nos. DPR-58 and DPR-74
REACTOR PROTECTION SYSTEM MODIFICATION

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, D. C. 20555

Attention: T. E. Murley

December 16, 1992

Dear Dr. Murley:

An upgrade to the Donald C. Cook Nuclear Plant's reactor protection system instrumentation is necessary due to the increased maintenance required on the existing Foxboro protection system and the difficulty in obtaining qualified replacement parts. The upgrade involves the installation of Foxboro's SPEC 200 and SPEC 200 MICRO lines of instrumentation. We believe that this modification will enhance overall plant safety due to the reduced drift, enhanced reliability, and greater flexibility provided by microprocessor-based hardware. This line of instrumentation has been approved by the NRC for use in the reactor protection system at Haddam Neck in 1990, and it is used in nuclear and non-nuclear applications throughout the world.

On April 21, 1992 a meeting was held among personnel from American Electric Power Service Corporation (AEPSC), Foxboro, and your staff to discuss the plans, schedules, and interfaces to support an upgrade to the reactor protection system for Cook Nuclear Plant Units 1 and 2. At that meeting, we agreed to submit the majority of the engineering information and a license change request to support this upgrade by November 30, 1992. Details of this meeting were reiterated in our letter AEP:NRC:1159B dated May 1, 1992. On December 1, 1992 a meeting was held among AEPSC, Foxboro, and the NRC to discuss the format of the information to be submitted. During this meeting, your staff advised us that the majority of the engineering information should be made available for their audit, currently anticipated to take place in January 1993 at Foxboro's offices in Foxboro, Massachusetts.

170096

A001

In addition, we were requested to submit our request for a license amendment, as well as various summary reports, by December 15, 1992. As such, this letter serves to transmit a license amendment request and the requested summary reports.

It should be stated that, while most of the documentation delineating and supporting the engineering design and application of the new instrumentation is complete, several items still remain open. As indicated in our May 1, 1992 submittal, the factory acceptance test report is scheduled to be completed in April 1993. In addition, the final electromagnetic interference/radio frequency interference (EMI/RFI) test report will not be completed until January 1993. All of these documents will be made available for your staff's review upon their completion.

Attachment 1 to this letter provides our request for a license amendment and our proposed determination of no significant hazards consideration performed pursuant to 10 CFR 50.92. Attachment 2 contains the existing license pages marked to reflect the proposed changes. Attachment 3 contains the proposed license pages.

Attachment 4 provides an explanation of how the detailed engineering data that AEPSC will provide the staff during their audit of this project is organized. Specifically, Attachment 4 contains the Issues Tracking List and the Documentation Tracking List, as presented at the December 1, 1992 meeting.

Attachment 5 provides summaries of the reports that have been written on the major topics associated with this instrumentation upgrade. These include reports on the subjects of hardware and firmware, environmental effects, seismic qualification, EMI/RFI, power supply/electrical, independence, failure modes and effects, reliability, functional requirements, performance requirements, verification and validation, testing, and diversity. These summary statements are being submitted in response to your staff's request during the December 1, 1992 meeting.

It is our understanding that your staff will be able to support a review schedule that will allow shipment of equipment in May 1993. We will provide whatever support is needed in order to meet this schedule.

We believe that the proposed instrumentation upgrade and the associated license amendment will not result in (1) a significant change in the types of any effluent that may be released offsite, or (2) a significant increase in individual or cumulative occupational radiation exposure.

In compliance with the requirements of 10 CFR 50.91 (b)(1), copies of this letter and its attachments have been transmitted to the Michigan Public Service Commission and the Michigan Department of Public Health.

This letter is submitted pursuant to 10 CFR 50.54(f) and, as such, an oath statement is enclosed.

Sincerely,

E. E. Fitzpatrick
Vice President

rag

Attachments

cc: D. H. Williams, Jr.
A. A. Blind - Bridgman
J. R. Padgett
G. Charnoff
NFEM Section Chief
A. B. Davis - Region III
NRC Resident Inspector - Bridgman

bc: S. J. Brewer
M. L. Horvath - Bridgman
J. B. Kingseed/V. VanderBurg/R. A. Green
D. H. Malin/K. J. Toth
J. B. Shinnock
W. G. Smith, Jr.
W. M. Dean, NRC - Washington, D. C.
AEP:NRC:1159C
DC-N-6015.1

STATE OF OHIO)
COUNTY OF FRANKLIN)

E. E. Fitzpatrick, being duly sworn, deposes and says that he is the Vice President of licensee Indiana Michigan Power Company, that he has read the forgoing Reactor Protection System Modification and knows the contents thereof; and that said contents are true to the best of his knowledge and belief.

E E Fitzpatrick

Subscribed and sworn to before me this 16TH day of December, 1992.

NOTARY PUBLIC

Commission expires 3-9-96

Attachment 1 to AEP:NRC:1159C

10 CFR 50.92 Analysis for Changes to
The Donald C. Cook Nuclear Plant
Operating License

1.0 Request for License Amendment

This submittal constitutes a request for an amendment to the Cook Nuclear Plant Units 1 and 2 operating licenses. These amendments will allow the use of the proposed digital instrumentation in the reactor protection system.

In a memorandum dated July 1, 1991 to Ashok C. Thadani, Director-Division of Systems Technology, Mr. Steven A. Varga, Director-Division of Reactor Projects-I/II, states:

> After reviewing 50.59, its history, and the NRC endorsed guidance (NSAC 125), it is our opinion that this type of technology replacement [use of digital instrumentation in the reactor protection system] cannot be performed under 50.59.
>
> As noted in this memo, we are aware of the DC Cook RPS replacement project and we do not believe this modification should be performed under the 50.59 rule.

Subsequently, during the April 21, 1992 meeting, AEPSC was advised that this instrumentation change would require a license amendment.

Specifically, we are proposing to add the following condition as item number 2.K to the Unit 1 license and item 2.L to the Unit 2 license:

> The licensee is authorized to use digital signal processing instrumentation in the reactor protection system.

2.0 Scope of Reactor Protection System Instrumentation Upgrade

The proposed design change will install the following equipment in the reactor protection systems of both Cook Nuclear Plant units. This equipment will perform the same functions as the equipment it replaces.

1. Foxboro SPEC 200 type analog input signal conditioning equipment, which changes the various types and values of input signals from the sensors into a common type of analog output signal that represents the input values at the channel level.

2. Foxboro SPEC 200 MICRO digital signal processing equipment, which takes the analog signal from the SPEC 200 analog input equipment at the channel level and:

   a. Changes the analog signals to digital signals.
   b. Processes the digital signals and compares them against predetermined limits, as well as performs dynamic functions and calculations.
   c. Changes the processed digital signals back to analog output signals.

3. Foxboro SPEC 200 analog output signal conditioning equipment, which takes the analog output signals from the SPEC 200 MICRO and conditions them for use in the control system, as well as for indication and recording use.

4. Foxboro SPEC 200 type contact output equipment, which produces discrete trip signals from the SPEC 200 MICRO and provides trip signals for input to the reactor protection logic equipment (SSPS).

5. Foxboro SPEC 200 type power distribution equipment, which powers the signal conditioning and processing equipment discussed above.

6. 75 VDC multi-loop and ± 15 VDC multi-nest power supplies, which provide power for the field transmitters and SPEC 200 equipment.

3.0 Justification

This modification is necessary due to the increased maintenance required on the existing Foxboro protection system and the difficulty in obtaining qualified replacement parts. In addition, the changes described above represent a compilation of modifications and enhancements to the reactor protection system that will improve the system's reliability and availability.

A nearly identical system was approved for use by the NRC at the Haddam Neck Plant in 1990. In addition, digital instrumentation was approved for use in both the Sequoyah Nuclear Plant and Zion Station reactor protection systems.

4.0 No Significant Hazards Consideration

We have evaluated the proposed instrumentation changes and have determined that these changes will not involve a significant hazards consideration based on the criteria established in 10 CFR 50.92(c). Operation of the Cook Nuclear Plant in accordance with the proposed changes will not:

1. Involve a significant increase in the probability or consequences of an accident previously evaluated.

   The Foxboro SPEC 200 and SPEC 200 MICRO lines of instrumentation are designed to mitigate anticipated operational occurrences and design basis accidents by actuating the reactor trip and engineered safeguards signals credited in the Cook Nuclear Plant safety analyses (see Attachment 5, Report No. 2985-WGS-03, "SPEC 200/SPEC 200 MICRO Hardware and Firmware System Description"). This instrumentation is designed to monitor and process signals for temperature, pressure, fluid flow, and fluid level (see Attachment 5, Report No. 2985-HEI-01, "Summary Report for Response Time Evaluations," and Report No. 2985-SKF-01, "Technical Specification Compliance Assessment"). While it is a form, fit and functional replacement for the existing Foxboro reactor protection system instrumentation, its reliability and availability is better than that of the present instrumentation (see Attachment 5, Report No. 2985-HEI-15, "Reliability and MTBF Analysis"). As such, in the highly unlikely event that the new instrumentation experiences a failure, the consequences will not exceed those caused by a failure of the existing system. The new instrumentation's failure modes and effects are discussed in Attachment 5 in Report No. 2985-HEI-14, "Failure Modes and Effects Analysis Protection Set 1 Foxboro SPEC 200."

   Since the ability of the reactor protection system to detect faults and initiate protective action is not reduced and since the FSAR analyses remain bounding as indicated above, the probability or consequences of accidents previously analyzed are not increased.

2. Create the possibility of a new or different kind of accident from any previously analyzed.

   The Foxboro SPEC 200 and SPEC 200 MICRO instrumentation is designed to mitigate anticipated operational occurrences and design basis events by actuating reactor trip or engineered safeguards signals credited in the safety analyses. The instrumentation is designed to monitor and process signals

for temperature, pressure, fluid flow, and fluid levels. It is a form, fit and functional replacement for the existing Foxboro analog instrumentation.

To ensure that the equipment will perform as required, extensive measures have been taken to ensure that the response of the new instrumentation is enveloped by the design basis accident analyses contained in Chapter 14 of the Cook Nuclear Plant FSAR. This is demonstrated, in part, in reports that are summarized in Attachment 5 including: Report No. 2985-VDV-01, "Reactor Protection Functional Diversity Assessment;" Report No. 2985-HEI-01, "Summary Report for Response Time Evaluations;" and Report No. 2985-SKF-01, "Technical Specification Compliance Assessment."

Application of the Foxboro instrumentation in the Cook Nuclear Plant reactor protection system includes, among other things, such considerations as single failure, independence, functional diversity, and separation criteria. In addition, the response of the instrumentation during events such as station blackout and design basis earthquake was assessed. The reports contained in Attachment 5 summarize these efforts.

An analysis of the response times of the instrumentation indicates that they will be bounded by the existing FSAR analyses and the existing Cook Nuclear Plant technical specification limits (see Attachment 5, Report No. 2985-HEI-01, "Summary Report for Response Time Evaluations").

With regard to the application of digital technology in the Cook Nuclear Plant reactor protection system, a battery of EMI/RFI evaluations was performed, as discussed in Report No. 2985-HEI-03, "Preliminary EMI/RFI Evaluation." These evaluations concluded that the EMI/RFI environment at Cook Nuclear Plant is suitable for the application of this type of equipment.

The SPEC 200 and SPEC 200 MICRO have been designed, verified, and validated to be in compliance with the protection system functional requirements. This statement is supported by Report No. 2985-DPS-01, "Functional Requirement Summary," and Report No. 2985-HHH-01, "Qualification Compliance," both of which are provided in Attachment 5. Additionally, reliability studies of the instrumentation, as well as the verification and validation studies and the equipment qualification programs, indicate that the susceptibility of the reactor protection system to

common mode failure mechanisms will be reduced. (See Attachment 5, Report No. 2985-HEI-15, "Reliability and MTBF Analysis.")

A failure of the digital instrumentation will not create a new or different accident. In the highly unlikely event that the new reactor protection system instrumentation should fail, the consequences experienced would be equivalent to those experienced if the existing equipment failed. (See Attachment 5, Report No. 2985-HEI-14, "Failure Modes and Effects Analysis Protection Set 1 Foxboro SPEC 200," and Report No. 2985-VDV-01, "Reactor Protection Functional Diversity Assessment.")

Consequently, this change does not create the possibility of a new or different kind of accident from any accident previously evaluated for the Cook Nuclear Plant.

3. Involve a significant reduction in a margin of safety.

The proposed change will not reduce the margin of safety. The accuracy and reliability of the reactor protection system will be improved with the installation of the Foxboro SPEC 200 and SPEC 200 MICRO instrumentation (see Attachment 5, Report No. 2985-HEI-15, "Reliability and MTBF Analysis"). The various reactor trip and engineered safeguard actuation circuits continue to provide signals to automatically open the reactor trip breakers or actuate engineered safeguards equipment, as applicable, whenever a condition monitored by the reactor protection system or the engineered safeguards features actuation system reaches a preset or calculated level. In addition to redundant channels and trains, the protection system will continue to monitor numerous system variables, thereby providing protection system functional diversity (see Attachment 5, Report No. 2985-VDV-01, "Reactor Protection Functional Diversity Assessment").

In addition, since it is assumed that our overall response times and setpoint and allowable values will continue to remain bounding (See Attachment 5, Report No. 2985-HEI-01, "Summary Report for Response Time Evaluations," and Report No. 2985-SKF-01, "Technical Specification Compliance Assessment"), the results and conclusions of the accident analyses remain valid, as supported by Report No. 2985-VDV-01, "Reactor Protection Functional Diversity Assessment," contained in Attachment 5. Response time testing performed as part of the factory acceptance testing will verify that the response times assumed in the accident analyses are not exceeded.

Attachment 2 to AEP:NRC:1159C

Existing Licenses

for Donald C. Cook Nuclear Plant Units 1 and 2

Marked to Reflect Proposed Changes

Unit 1 marked-up license

* 2.I Iodine Monitoring

Amendment No. 49

The license shall implement a program which will ensure the capability to accurately determine the airborne concentration in vital areas under accident conditions. This program shall include the following:

1. Training of personnel,

2. Procedures for monitoring, and

3. Provisions for maintenance of sampling and analysis equipment.

Amendment No. 114

2.J In all places of this license, the reference to the Indiana and Michigan Electric Company is amended to read "Indiana Michigan Power Company."

2.K (Insert A)

Amendment No. 157

3. This amended license is effective as of the date of issuance and shall expire at midnight October 25, 2014.

* Amendment No. 70 superseded the following Amendments for numbering: Nos. 33, 45 and 49.

FOR THE NUCLEAR REGULATORY COMMISSION

Roger S. Boyd, Director
Division of Project Management
Office of Nuclear Reactor Regulation

Enclosure:

Appendix A - Technical Specifications

Date of Issuance: March 30, 1976

Insert A:

The licensee is authorized to use digital signal processing instrumentation in the reactor protection system.

Unit 2 marked-up license

→ 2.L (Insert A)

Amendment 3. This license is effective as of the date of issuance and shall
No. 141 expire at midnight, December 23, 2017.

Roger S. Boyd, Director
Division of Project Management
Office of Nuclear Reactor Regulation

Attachments:

1. Preoperational Tests, Start-up Tests and Other Items Which Must-be Completed Prior to Proceeding to Succeeding Operational Modes.
2. Appendix A - Technical Specifications

Date of Issuance: December 23, 1977

Insert A:

The licensee is authorized to use digital signal processing instrumentation in the reactor protection system.

Attachment 3 to AEP:NRC:1159C

Proposed Licenses

for Donald C. Cook Nuclear Plant Units 1 and 2

* 2.I Iodine Monitoring

Amendment No. 49

The license shall implement a program which will ensure the capability to accurately determine the airborne concentration in vital areas under accident conditions. This program shall include the following:

1. Training of personnel,

2. Procedures for monitoring, and

3. Provisions for maintenance of sampling and analysis equipment.

Amendment No.114

2.J In all places of this license, the reference reference to the Indiana and Michigan Electric Company is amended to read Indiana Michigan Power Company."

2.K The licensee is authorized to use digital signal processing instrumentation in the reactor protection system.

Amendment No. 157

3. This amended license is effective as of the date of issuance and shall expire at midnight October 25, 2014.

* Amendment No. 70 superseded the following Amendments for numbering: Nos. 33, 45 and 49.

FOR THE NUCLEAR REGULATORY COMMISSION

Roger S. Boyd, Director
Division of Project Management
Office of Nuclear Reactor Regulation

Enclosure:

Appendix A - Technical Specifications

Date of Issuance: March 30, 1976

2.L The licensee is authorized to use digital signal processing instrumentation in the reactor protection system.

Amendment 3. No. 141

This license is effective as of the date of issuance and shall expire at midnight, December 23, 2017.

Roger S. Boyd, Director
Division of Project Management
Office of Nuclear Reactor Regulation

Attachments:

1. Preoperational Tests, Start-up Tests and Other Items Which Must be Completed Prior to Proceeding to Succeeding Operational Modes.
2. Appendix A - Technical Specifications

Date of Issuance: December 23, 1977

Attachment 4 to AEP:NRC:1159C

Organization of the Engineering Data

Attachment 5 to AEP:NRC:1159C

Requested Summary Reports

This attachment contains the summary reports for each of the topical areas listed below. The detailed information supporting these reports will be made available to the NRC staff during their audit of the instrumentation upgrade, as discussed at the December 1, 1992 meeting.

System Summary

Report No. 2985-WGS-03	"SPEC 200/SPEC 200 MICRO Hardware and Firmware System Description"

Environmental

Report No. 2985-HEI-12	"Engineering Analysis of Temperature and Humidity Effects on Foxboro SPEC 200 Instrumentation"

Seismic

Report No. 2985-HEI-07	"Seismic Qualification Assessment of Foxboro SPEC 200 Equipment"

EMI/RFI

Report No. 2985-HEI-03	"Preliminary EMI/RFI Evaluation"

Power Supply/Electrical

Report No. 2985-HEI-06	"Summary Report for System Power Quality Evaluation"
Report No. 2985-HEI-02	"Engineering Analysis of Grounding Issues"

Independence

Report No. 2985-NCF-01	"Regulatory Requirements and Industry Standards Associated with the Reactor Protection and Control Process Instrumentation Replacement Project"

Failure Modes and Effects

Report No. 2985-HEI-14	"Failure Modes and Effects Analysis Protection Set 1 Foxboro SPEC 200"

Reliability

Report No. 2985-HEI-15	"Reliability and MTBF Analysis"

Functional Requirements

Report No. 2985-DPS-01	"Functional Requirement Summary"

Performance Requirements

Report No. 2985-HEI-01	"Summary Report for Response Time Evaluations"
Report No. 2985-SKF-01	"Technical Specification Compliance Assessment"

Verification and Validation

Report No. 2985-HHH-01	"Qualification Compliance"

Testing

Report No. 2985-BJB-01	"Test Program Summary"

Diversity

Report No. 2985-VDV-01	"Reactor Protection Functional Diversity Assessment"