

August 10, 2017

Mr. Clive Townsend, Reactor Supervisor
Purdue University
School of Nuclear Engineering
400 Central Drive
West Lafayette, IN 47907

SUBJECT: PURDUE UNIVERSITY – REGULATORY AUDIT FOR DIGITAL
INSTRUMENTATION AND CONTROL UPGRADE LICENSE AMENDMENT
REQUEST (CAC NO. MF9347)

Dear Mr. Townsend:

By letter dated February 27, 2017, as supplemented by letter dated June 21, 2017 (Agencywide Documents Access and Management System Accession Nos. ML17061A257 and ML17220A077, respectively), Purdue University (the licensee) submitted an application to amend the Purdue technical specifications (application) as part of the upgrade to digital instrumental and control (I&C) for the Purdue University Reactor (PUR-1).

The U.S. Nuclear Regulatory Commission (NRC) staff will conduct an onsite regulatory audit to review the Purdue digital I&C upgrade application on August 22-24, 2017. The intent of the audit is to gain understanding of your application and status of your facility. In addition, the regulatory audit will identify information that will be required to be docketed in order to support the basis of the licensing decision and will allow the NRC staff to more efficiently gain insights on the PUR-1 upgrade. The NRC staff has provided a copy of the audit plan as an enclosure to this letter.

At the completion of the regulatory audit, a regulatory audit summary will be prepared and provided to you. If necessary, you will have the opportunity to supplement the application to provide additional information or the option to withdraw the application.

We appreciate your support in providing space, the requested documentation and access to the necessary personnel and other materials that will assist in an efficiently conducted audit.

C. Townsend

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Should you have any questions on this matter, please contact me at 301-415-3398 or by e-mail at Cindy.Montgomery@nrc.gov.

Sincerely,

/RA/

Cindy K. Montgomery, Project Manager
Research and Test Reactors Licensing Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Docket No. 50-182

License No. R-87

Enclosure:
As stated

cc: w/enclosure: See next page

Purdue University

Docket No. 50-182

cc:

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Test, Research and Training
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INSTRUMENTATION AND CONTROL UPGRADE LICENSE AMENDMENT
REQUEST (CAC NO. MF9347) DATED: August 10, 2017

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NRR-106

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NUCLEAR REGULATORY COMMISSION
INSTRUMENTATION AND CONTROL BRANCH
REGULATORY AUDIT PLAN FOR PURDUE
DIGITAL INSTRUMENTATION & CONTROL UPGRADE
AUGUST 22 - 24, 2017, WEST LAFAYETTE, IN

Background

The U.S. Nuclear Regulatory Commission (NRC) staff is currently engaged in a review of the Purdue University request to upgrade the Purdue University Reactor (PUR-1) reactor's instrumentation and control (I&C) systems, submitted by letter dated February 27, 2017, as supplemented by letter dated June 21, 2017 (Agencywide Documents Access and Management System Accession Nos. ML17061A257 and ML17220A077, respectively). The proposed upgrade of the I&C systems will replace the current neutron flux detector equipment, reactor operator console, reactor protection system and the reactor control system for PUR-1 with new digital systems. This regulatory audit is intended to assist NRC staff in confirming information submitted as part of the licensing amendment request.

Regulatory Audit Bases

The purpose of this audit is to determine if the development processes used, and the outputs of those processes have resulted in components for use at PUR-1 that will meet the regulatory requirements and address applicable criteria in Chapter 7 of NUREG-1537. This audit will provide information necessary to complete the NRC staff's evaluation of the proposed digital upgrade. In addition, the regulatory audit will identify information that will be required to be docketed in order to support the basis of the licensing decision and will allow NRC staff to gain insights on the software development programs and processes.

To support this audit, the NRC audit team will visit PUR-1 in West Lafayette, IN.

Regulatory Audit Scope

As part of the audit, the NRC staff will review non-docketed procedures and records related to the design and development processes followed by Curtiss-Wright when they built the systems and integrated the reactor control system and Mirion components for Purdue, as well as interview key PUR-1 personnel responsible for acceptance and operation of the system. The NRC staff will be evaluating whether the results of these actions substantiate that existing quality assurance processes are being followed.

Information Necessary for the Regulatory Audit

Purdue should be prepared to have the following documentation and information available. Most of this information is identified in the Curtiss-Wright Master Project Document Summary:

- Quality Assurance Documentation
- Project Quality Assurance Plan
- Verification & Validation Plan
- Hardware Design Document
- Human Factors Documentation
- Logic Diagrams and Description

Enclosure

- System Architecture Diagram
- Documentation of how Commercial Grade Items were accepted
- Software Requirements Specification and Software Design Description documents
- Test Plan, Test Procedures, Test Results
- Factory Acceptance Testing Documentation
- Operating and Maintenance Procedures
- Reports documenting results of Verification & Validation
- Secure Development and Operational Environment Documentation

Team Assignments/Resource Estimates

The NRC staff performing this audit will be:

- Daniel Warner (Audit Leader)
- Rossnyev Alvarado (Technical Reviewer)
- Duane Hardesty (Technical Reviewer)
- Huda Akhavannik (Observing)
- Beth Reed (Technical Reviewer)
- Frederick Priester and/or Daphne Collins (Nuclear Security and Incident Response Cyber Security Contractor)

Logistics

The audit will take place at Purdue University. The audit will start on the morning of August 22, 2017 (Tuesday) and conclude in the afternoon on August 24, 2017 (Thursday).

Deliverables

At the completion of the regulatory audit, NRC staff will prepare a regulatory audit report, which will be issued within 30 days after the audit.

Audit Schedule

Tuesday, August 22, 2017

8:00 a.m. Arrive at Purdue
8:30 a.m. Entrance meeting, introductions, and project status
9:00 a.m. Begin Audit
12:00 p.m. Break for Lunch
1:00 p.m. Resume Audit
5:00 p.m. End for the day

Wednesday, August 23, 2017

8:00 a.m. Meeting between NRC staff and Purdue to discuss logistics for the day
8:15 a.m. Begin Audit
12:00 p.m. Break for lunch
1:00 p.m. Resume Audit
5:00 p.m. End for the day

Thursday, August 24, 2017

8:00 a.m. Meeting with NRC staff and Purdue to discuss logistics for the day
8:15 a.m. Resume Audit
12:00 p.m. Break for Lunch
1:00 p.m. Resume Audi
4:00 p.m. Internal NRC staff meeting
4:30 p.m. Exit Meeting – Summary of audit, general overview of observations, and
discussion of open items
5:00 p.m. Conclude Audit