UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

February 16, 2021

EA-20-144

Dr. Robert Bean, Director
Purdue University Radiation Laboratory
School of Nuclear Engineering
400 Central Drive
West Lafayette, IN 47904-2017

SUBJECT: PURDUE UNIVERSITY REACTOR – NOTICE OF VIOLATION

Dear Dr. Bean:

This letter refers to the U.S. Nuclear Regulatory Commission (NRC) special inspection conducted during October 27 – November 6, 2020, at the Purdue University Research Reactor facility. The special inspection was conducted pursuant to event notification 54958 on October 20, 2020, later supplemented on November 3, 2020 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML20311A264), describing the causes of, and corrective actions for, operation of the Purdue University Research Reactor at power levels in excess of the licensed maximum power level. The NRC inspectors discussed the preliminary inspection findings with you at the conclusion of the on-site portion of the special inspection on October 29, 2020. A final exit briefing was conducted via teleconference with you on November 6, 2020. Special Inspection Report 05000182/2020-201 was issued on December 7, 2020 (ADAMS Accession No. ML20332A083), and documented the results of the inspection. The inspection report also identified two apparent violations that were considered for escalated enforcement.

In the letter transmitting the inspection report, the NRC staff provided you with the opportunity to address the apparent violations identified in the inspection report by either attending a predecisional enforcement conference or by providing a written response before we made our final enforcement decision. By letter dated January 6, 2021 (ADAMS Accession No. ML21035A014), you provided a written response to the apparent violations.

Based on the information developed during the inspection and the information that you provided in your response, the NRC has determined that two violations of NRC requirements occurred. These violations are cited in the enclosed Notice of Violation (Notice), and the circumstances surrounding the violations are described in detail in the inspection report. The first violation involves the Purdue University Research Reactor operating at steady state power levels in excess of 12 kilowatts (thermal) on several occasions between October 31, 2019, and September 15, 2020, contrary to Purdue University Research Reactor License Condition 2.C.1. The second violation involves Purdue's failure to perform appropriate surveillance testing before considering the nuclear instrument (NI) system operable following replacement of the NI system and detectors, contrary to Purdue technical specification (TS) 4.2.g. The NRC considers the violations described above to be significant because the two violations are related to operation of the Purdue University Research Reactor at steady state levels above the licensed maximum

power level of 12 kilowatts (thermal) on several occasions over an approximately one-year period. Therefore, these violations are categorized collectively in accordance with the NRC Enforcement Policy as a Severity Level III problem. The Enforcement Policy can be found on the NRC's website at http://www.nrc.gov/about-nrc/regulatory/enforcement/enforce-pol.html.

In accordance with NRC Enforcement Policy, a base civil penalty in the amount of $7,500 is considered for a Severity Level III problem. Because your facility has not been the subject of an escalated enforcement action within the last 2 years, the NRC considered whether credit was warranted for Corrective Action in accordance with the civil penalty assessment process in Section 2.3.4 of the Policy. Corrective actions taken to date have included preparing and implementing a new written Standard Operating Procedure (SOP) for properly calibrating the NI system High Purity Germanium (HPGe) detector that was approved by the Purdue's Committee on Reactor Operations (CORO); reviewing and verifying other facility procedures; and submitting a license amendment request (LAR) for proposed TS changes to allow reactor operation for the purpose of performing calibration of the NI by foil activation. The LAR and TS change was approved by the NRC on December 11, 2020. In addition, the Purdue University Research Reactor will perform a calibration of the NI system by foil activation (0-100 percent of the licensed reactor power limit) using the new SOP for the HPGe detector and revised Restart Plan approved by the CORO.

Therefore, considering that prompt and comprehensive corrective actions of the violations were taken, and in recognition of the absence of previous escalated enforcement action, I have been authorized, after consultation with the Director, Office of Enforcement, not to propose a civil penalty in this case. However, significant violations in the future could result in a civil penalty.

The NRC has concluded that information regarding: (1) the reasons for the violations; (2) the corrective actions that were taken and the results achieved; and (3) the date when full compliance will be achieved is already adequately addressed on the docket in Special Inspection Report 05000182/2020-201, and your letter dated January 6, 2021. Therefore, you are not required to respond to this letter unless the description therein does not accurately reflect your corrective actions or your position. In that case, or if you choose to provide additional information, you should follow the instructions specified in the enclosed Notice.

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) Part 2, "Agency Rules of Practice and Procedure," Section 2.390, "Public inspections, exemptions, requests for withholding," a copy of this letter, its enclosure, and your response will be made available electronically for public inspection in the NRC Public Document Room and ADAMS, accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html. To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request withholding of such information, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information). The NRC also includes significant enforcement actions on its Web site at (http://www.nrc.gov/reading-rm/doc-collections/enforcement/actions).

Additionally, if you choose to provide a response, it should be sent to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with a copy mailed to Mr. Mohamed Shams, Director, Division of Advanced Reactors and Non-Power Production and Utilization Facilities, Office of Nuclear Reactor Regulation, 11555 Rockville Pike, Rockville, MD 20852-2738.

If you have any questions concerning this matter, please contact Mr. Travis Tate, Chief, Non-Power Production and Utilization Facilities Oversight Branch at (301) 415-3901.

Sincerely,

Mohamed K. Shams

Digitally signed by Mohamed K. Shams
Date: 2021.02.16 16:00:24 -05'00'

Mohamed K. Shams, Director
Division of Advanced Reactors and Non-Power Production and Utilization Facilities
Office of Nuclear Reactor Regulation

Docket No. 50-182
License No. R-87

Enclosure:
As stated

cc: w/enclosure: See next page

cc:

Dr. Mung Chiang, Dean of Engineering
Purdue University
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West Lafayette, IN 47907

Mayor
City of West Lafayette
1200 N. Salisbury Street
West Lafayette, IN 47906

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2525 N. Shadeland Avenue, Suite E3
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Howard W. Cundiff, P.E., Director
Consumer Protection
Indiana State Department of Health
2 North Meridian Street, 5D
Indianapolis, IN 46204

Test, Research and Training
Reactor Newsletter
Attention: Amber Johnson
Dept of Materials Science and Engineering
University of Maryland
4418 Stadium Drive
College Park, MD 20742-2115

SUBJECT: PURDUE UNIVERSITY REACTOR – NOTICE OF VIOLATION AND SPECIAL INSPECTION REPORT 05000182/2020-201 DATED: FEBRUARY 16, 2021

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ADAMS Accession No.: ML21035A348 **NRC-002**

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NAME	RFretz	TTate	MShams
DATE	2/10/2021	2/12/2021	2/16/2021

OFFICIAL RECORD COPY

NOTICE OF VIOLATION

Purdue University
Purdue University Research Reactor
West Lafayette, IN

Docket No. 50-182
License No. R-87
EA-20-144

During a U.S. Nuclear Regulatory Commission (NRC) special inspection conducted during October 27-November 6, 2020, violations of NRC requirements were identified. In accordance with the NRC Enforcement Policy, the violations are listed below:

A. Purdue University Reactor (PUR-1) License Condition 2.C.1, "Maximum Power Level," states: "The licensee is authorized to operate the facility at stead-state power levels not in excess of 12 kilowatts (thermal)."

   Contrary to the above, PUR-1 was operated at steady-state power levels in excess of 12 kilowatts (thermal) (kW(t)) on several occasions between October 31, 2019, and September 15, 2020. Specifically, the reactor was inadvertently operated at steady-state power levels greater than 12 kW(t) during this time due to nuclear instrument (NI) calibration calculation errors. These errors caused the NIs to indicate reactor power levels that were approximately three times lower than actual reactor power. Therefore, when the licensee operated the reactor above 4 kW(t) (indicated power) several times between October 31, 2019, and September 15, 2020, the actual reactor power exceeded the maximum authorized power level of 12 kW(t).

B. PUR-1 technical specification (TS), Section 4.2.g states, in part, "Appropriate surveillance testing on any technical specification required system shall be conducted after replacement, repair, or modification before the system is considered operable and returned to service."

   Contrary to the above, on August 27, 2019, the licensee considered the NI system to be operable and returned the PUR-1 reactor to service, after replacement of the system during an extended shutdown in 2019, before completing the appropriate surveillance testing. The licensee operated the reactor without completing the required TS surveillance testing between August 27, 2019, and October 9, 2020.

This is a Severity Level III problem (Section 6.1).

The NRC has concluded that information regarding the reason for the violations, the corrective actions taken and planned to correct the violation and prevent recurrence and the date when full compliance will be achieved is already adequately addressed on the docket in Special Inspection Report 05000182/2020-201, and your letter dated January 6, 2021. However, you are required to submit a written statement or explanation pursuant to 10 CFR 2.201, "Notice of violation," if the description therein does not accurately reflect your corrective actions or your position. In that case, or if you choose to respond, clearly mark your response as a "Reply to a Notice of Violation," include EA-20-144 in the subject line, and send it to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with a copy mailed to Mr. Mohamed Shams, Director, Division of Advanced Reactors and Non-Power Production and Utilization Facilities, Office of Nuclear Reactor Regulation, 11555 Rockville Pike,

Rockville, MD 20852-2738, within 30 days of the date of the letter transmitting this Notice of Violation (Notice).

If you choose to respond, your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system Agencywide Documents Access and Management System, accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html. Therefore, to the extent possible, the response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction.

In accordance with 10 CFR 19.11, "Posting of notices to workers," you may be required to post this Notice within two working days of receipt.

Dated this 16th day of February 2021