

NUCLEAR REGULATORY COMMISSION

[NRC-2009-0522]

IDAHO STATE UNIVERSITY

DOCKET NO. 50-284

LICENSE NO. R-110

NOTICE OF ISSUANCE OF DIRECTOR'S DECISION

Notice is hereby given that the Director, Office of Nuclear Reactor Regulation, has issued a Director's Decision with regard to a petition dated June 26, 2009 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML092440721), filed by Dr. Kevan Crawford, hereinafter referred to as the "petitioner." Additionally, the petitioner requested further enforcement action against the licensee, during a transcribed conference call which addressed the Petition Review Board (PRB) on September 1, 2009 (ADAMS Accession No. ML09244072), supplementing the June 26, 2009, petition.

Action Requested

The petitioner requested that the U.S. Nuclear Regulatory Commission (NRC) take the following enforcement actions:

- 1) The reactor operating license should be suspended immediately. All continuing violations, including items that Dr. Crawford alleged were unresolved from the Notice of Violation (NOV) 93-1 as well as 20 violations that Dr. Crawford alleged to be concealed must be reconciled with the regulatory requirements immediately. The alleged violations correspond to regulatory, criminal, and ethical misconduct which Dr. Crawford contends had impacted public health and safety and the environment of Pocatello, Idaho.

- 2) The licensee should be fined for all damages related to the violations and cover-up of violations.
- 3) The licensee should be required to carry a 50-year \$50,000,000 bond to cover latent radiation injuries instead of covering these injuries with unreliable State budget allocations for contingency funds.
- 4) During the fall semester of 1993, Dr. Crawford alleges that students utilizing the reactor lab facilities were handling irradiated samples without permission. Furthermore he alleges that the samples were handled without anti-contamination clothing and no radiological surveys were conducted, although he states neither of which was required.

Dr. Crawford contends said students proceeded to the local hospital to visit friends in the neo-natal unit. Upon this basis, Dr. Crawford requests every potential exposure and contamination victim be identified through facility records, located, and informed of the potential risk to them and their families. The Medical Center in Pocatello, Idaho, should also be informed so that they may do the same. Those who were exposed should be informed of the entire range of expected symptoms and of their right to seek compensation from the licensee.
- 5) The following should warrant immediate revocation of the operating license due to the inability of the licensee to account for, with documentation, controlled byproduct nuclear materials that were:
 - a. Released in clandestine, undocumented shipments before August 4, 1993;
 - b. Possessed by individuals not licensed to control the materials, and were not certified to handle the materials;

- c. Without proper Title 49 Code of Federal Regulations (49 CFR) Department of Transportation (DOT) certified containers;
 - d. Without proper labeling for transport on public roads; and
 - e. Concealed via fraudulent Annual Operating Reports in which the licensee failed to address uncontrolled by-product material distribution and facility modifications and which were never amended after NOV 93-1.
- 6) The licensee must permanently revoke the Broad Form License.
 - 7) The licensee must publicly acknowledge that there was a loss of control of Special Nuclear Material (SNM).
 - 8) The licensee must publicly acknowledge persons that served as an accessory to concealing unlawful distribution of controlled substances, fraud (both Annual Operating Reports and National Whistleblower Center), loss of control of SNM, and child endangerment.

Petitioner's Bases for the Requested Action

The petitioner, Dr. Crawford, stated that during his tenure as the Reactor Supervisor at the Idaho State University research reactor from December 19, 1991 until March 12, 1993, he witnessed regulatory, criminal, and ethical violations associated with the operation of the NRC licensed facility. Furthermore, Dr. Crawford contends that the NRC was grossly negligent in concealing violations in the Notice of Violation (NOV) (Inspection Report 50-284/93-01) (ADAMS Accession No. ML092600304) and that Idaho State University continues to operate its reactor in violation of regulatory requirements. The petitioner provided a detailed historical chronology of events with regards to observed activity and alleged acts of misconduct involving staff who worked during the said period of Dr. Crawford's tenure.

Determination for NRC Review under 10 CFR 2.206

On September 15, 2009, the NRC Petition Review Board (PRB) convened to discuss the petition under consideration and determine whether it met the criteria for further review under the 10 CFR 2.206 process. The PRB comprised NRC technical and enforcement staff and legal counsel, and it was chaired by an NRC senior-level manager. The PRB determined that the petition under consideration met the criteria established in NRC Management Directive 8.11, "Review Process for 10 CFR 2.206 Petitions," and was accepted in part into the 10 CFR 2.206 process.

Issues that were not accepted into the 2.206 petition process did not satisfy the criteria as specified in NRC Management Directive (MD) 8.11, "Review Process for 10 CFR 2.206 Petitions." In such instances: 1) The incoming correspondence does not ask for an enforcement-related action or fails to provide sufficient facts to support the petition, but simply alleges wrongdoing, violations of NRC regulations, or existence of safety concerns and/or, 2) The petitioner raises issues that have already been the subject of NRC staff review and evaluation, either on that facility, other similar facilities, or on a generic basis, for which a resolution has been achieved, the issues have been resolved, and the resolution is applicable to the facility in question. Additionally, portions of the petition raised several concerns not within the jurisdiction of NRC.

The PRB's final recommendation was to accept for review, pursuant to 10 CFR 2.206, the following concerns from the petition:

- 1) Failure to conduct 10 CFR 50.59 safety review of the modification of the Controlled Access Area by the addition of an undocumented roof access for siphon breaker experiment implemented prior to 1991. The June 26,

2009, petition states that the modification allowed random student access to the roof of the reactor room.

- 2) Release of controlled by-product nuclear materials in containers not certified in accordance with 10 CFR Part 71 for transport of such materials on public roads and not labeled with the required labeling.
- 3) Failure to require the reactor operator conducting the startup procedures to wear protective clothing during routine removal of the activated startup channel detector from the reactor core. In the petition Dr. Crawford states that this was cited as an Apparent Violation, but the NRC should not have dropped this item in the final NOV.
- 4) Routine unprotected handling of an unshielded neutron source (reactor start-up source) by licensed operators and uncontrolled access by untrained and unlicensed facility visitors to this neutron source, violating the 10 CFR Part 20 as low as is reasonably achievable (ALARA) requirements.

On September 28, 2009, the petitioner was contacted via telephone and was provided the initial recommendations of the PRB. Pursuant to NRC MD 8.11, Dr. Crawford was afforded the opportunity to comment on the recommendations and to provide any relevant additional explanation and support for the request in light of the PRB's recommendations. Through subsequent e-mail communication, Dr. Crawford declined the opportunity to respond to the PRB's recommendations or to provide further information for support of the petition request (ADAMS Accession Nos. ML092720460 and ML092720824).

The PRB's final recommendation for the petition was documented in the acknowledgment letter dated November 19, 2009 (ADAMS Accession No. ML092800432).

During the week of February 23 -24, 2010, a non-routine inspection (Idaho State University-NRC Non-Routine Inspection Report No. 50-284/2010-201, ADAMS Accession No. ML100321367) was conducted at the Idaho State University research reactor to review logs, records, and observe the performance of licensed activities, pertinent to the issues accepted for Dr. Crawford's 2.206 Petition. Copies of Inspection Report No. 50-284/2010-201 were provided to reactor facility staff at the Idaho State University and to the petitioner.

On March 19, 2010, the NRC sent a copy of the Proposed Director's Decision (ADAMS Accession No. ML104917500) to Dr. Crawford and to staff at Idaho State University for comment. Neither the petitioner nor the licensee responded with comment.

The Director of the Office of Nuclear Reactor Regulation has determined that the request for enforcement action against the Idaho State University AGN-201M research reactor to be denied. The reasons for this decision are explained in the Director's Decision pursuant to 10 CFR 2.206 (DD No. 10-03), the complete text of which is available in ADAMS (Accession No. ML100491750) for inspection at the Commission's Public Document Room, located at One White Flint North, 11555 Rockville Pike (first floor), Rockville, Maryland, and via the NRC's Web site (<http://www.nrc.gov>) on the World Wide Web, under the "Public Involvement" icon.

Summary of Staff Findings

The following lists the four issues from Dr. Crawford's petition which the PRB accepted for review, pursuant to 10 CFR 2.206, and the associated conclusion made during the inspection:

- 1) Failure to conduct 10 CFR 50.59 safety review of the modification of the Controlled Access Area by the addition of an undocumented roof access for siphon breaker experiment implemented prior to 1991.

Observations

The inspectors reviewed numerous records available onsite, dating from 1975 through the present, and interviewed present and former licensee facility employees. From these records and interviews the inspectors ascertained that the Siphon Breaker Experiment (SBE) was an experiment that did not involve, and was not connected to, the licensee's research and test reactor. Because of the height of the piping involved in the SBE, the experiment was conducted inside the Reactor Room. Some of the piping extended out of the roof of the Reactor Room (through a temporary penetration in the equipment hatch cover plate) while the bottom portion of the SBE rested in the Gamma Irradiation pit. This provided sufficient vertical space for the experiment to be conducted but also required people working on the experiment to access the Reactor Room.

No 10 CFR 50.59 review of the SBE was found among the records reviewed by the inspectors. However, upon reviewing the SBE as it was described, evidence does not support that a 10 CFR 50.59 review was required, as the facility Safety Analysis Report (SAR) for the Idaho State AGN-201M Reactor did not describe the equipment access hatch in detail, aside from dimensions and material composition. A 10 CFR 50.59 review by the licensee would have been necessary if the modification would have changed structures, systems, and components as described in the SAR.

During the August 1989 timeframe, there were concerns about the security of the Reactor Room (Room 20) because of various people needing access to the area. These concerns were brought to the attention of the Reactor Supervisor. After a review of the practices and security arrangements for operation of the SBE, a temporary procedure was implemented to restrict access to the Reactor Room and to ensure that the experimenters' activities were in compliance with the Physical Security Plan.

The inspectors also reviewed numerous records available onsite, dating from 1975 through the present, and interviewed present and former licensee facility employees concerning the installation of the personnel roof access ladder and hatch. This was an issue Dr. Crawford identified during the transcribed conference call with the PRB on September 1, 2009 (ADAMS Accession No. ML092650381). It was noted by the inspectors that the ladder and roof hatch were installed to provide a secondary means of escape from the Reactor Room in case of emergency.

Through records review, it was noted that during the meeting of the Reactor Safety Committee (RSC) in 1989, the installation of the emergency escape ladder in either the Reactor Room or Reactor Laboratory (Lab) was discussed, as was the installation of a fire alarm and smoke detector. The personnel roof access hatch was also addressed in Rev. 3 and Rev. 4 of the Physical Security Plan for the facility dated February 23, 1990, and January 27, 2003, respectively. No 10 CFR 50.59 review of the roof access hatch was found among the records reviewed by the inspectors. Regarding the SBE, evidence does not support that a 10 CFR 50.59 review was required since it was not a modification to existing structures and/or equipment, as described in the SAR.

The review of recent licensee 10 CFR 50.59 reviews demonstrated that the licensee is aware of the 10 CFR 50.59 process and that various operating and safety aspects of modifications to existing structures and/or equipment needed to be reviewed (and, if needed, approved by the RSC, or the NRC if applicable) prior to implementing the changes.

Conclusion

Although no 10 CFR 50.59 reviews were found covering the Siphon Breaker Experiment or the personnel roof access ladder and hatch, evidence does not support that such a review was needed since they were not modifications to the existing

structures and/or equipment, as described in the SAR. In addition, the inspectors became aware through record review that the licensee acknowledged and addressed the security aspects of the SBE. Furthermore, the licensee developed a procedure to restrict access to the Reactor Room to be in compliance with the Physical Security Plan during the timeframe which the SBE was in use.

- 2) Release of controlled by-product nuclear materials in containers not certified in accordance with 10 CFR Part 71 for transport of such materials on public roads and not labeled with the required labeling.

Observations

The inspectors reviewed various records dating from 1975 through the present and interviewed present and former licensee facility employees. From these records and interviews the inspectors determined that radioactive materials produced in the reactor were (and are) typically used in the Reactor Room or the adjacent Lab and then left in/returned to the Reactor Room for decay. On occasion radioactive material is transferred to other individuals or groups for use elsewhere. In the past, the NRC noted problems in this area as documented in Inspection Report No. 50-284/93-01, dated November 4, 1993. As a result, the licensee took various actions to correct the problems and deficiencies. One action was to revise and improve the record keeping system for tracking byproduct material. The record system and the forms used in tracking material were reviewed by the inspectors. The material had either been transferred to an authorized/licensed individual or company as required or it was held in the Reactor Room until it had decayed to background or near background activity levels. No violations were noted.

Another action the licensee took as a result of the problems in 1993 was to revise the procedures for shipping radioactive materials from the ISU campus. In reviewing the

current shipping procedures used at ISU, it was noted that radioactive material to be shipped from the reactor facility is required to be transferred to the campus Technical Safety Office (TSO). A person from that office, designated as the ISU Certified Shipper, is responsible for ensuring that the material is shipped in accordance with the rules specified by the DOT in 49 CFR Parts 171 through 180. If assistance is needed, a certified shipper from the Idaho National Laboratory is called in for advice and consultation to ensure that all aspects of the regulations are met including (but not limited to): 1) completion of the appropriate shipping papers, 2) use and marking of properly certified containers, 3) attachment of the proper labeling, and 4) use of appropriate placards for the transport vehicle as needed.

The inspectors also conferred with NRC inspectors from the Region IV office concerning their review of the radioactive material shipping program at ISU. In 1993, inspectors from Region IV indicated that they had reviewed the ISU program for receiving, handling, and shipping byproduct and source material. Recent reviews noted no violations during the last three inspections.

A review of the available records indicated that no shipments of radioactive material from the reactor had been made in the past several years.

Conclusion

The NRC review did not find any inappropriate release of material in uncertified containers and not properly labeled. Regarding present operations, radioactive material to be shipped from the reactor facility is required to be transferred to the TSO and that office is responsible for completing the transfer or shipment. Shipments of radioactive material are verified to be in compliance with the regulations and, if needed, with the help of a consultant. No shipments of radioactive material from or produced in the reactor have been made in the past several years.

- 3) Failure to require the reactor operator conducting the startup procedures to wear protective clothing to routinely remove the activated startup channel detector from the reactor core. The June 26, 2009, letter states that this was cited and mishandled in the 93-1 Notice of Violation (NRC Inspection Report 50-284/93-01).

Observations

NRC Inspection Report (50-284/93-01) (ADAMS Accession No. ML100490079) addressed the Apparent Violation (50-284/9301-07), where the inspectors noted that a radiation detector was used in association with Experimental Procedure 21 (EP-21), "Auto Reactivity Control System Operation" and was placed in the thermal column of the reactor, but not surveyed when removed. The survey would have determined if activation products presented a radiological hazard to persons handling the detector. At the time, 10 CFR 20.201 (b), "Surveys" was cited as the basis for an apparent violation for the licensee's failure to make reasonable surveys under the circumstances to evaluate the extent of radiation hazards that may be present.

The 93-1 NOV contains Enclosure No. 4, "Idaho State University Presentation" which was conducted by the ISU reactor facility staff during the NRC-ISU Enforcement Conference held on October 8, 1993, which discussed the licensee's process for EP-21. The supplemental information showed that upon EP-21's completion the ion chamber was left in the thermal column until another experiment requires the thermal column to be altered, which at that time the surveys would be taken to determine radiation levels which would be recorded in the operations log. Based on the supplemental information provided during the Enforcement Conference, no citation was issued for the apparent violation as surveys of the ion chamber were conducted at the time of thermal column alteration.

The inspectors interviewed facility staff and determined that EP-21 has not been employed since 1995, and equipment is presently not in service at the facility. The inspectors followed-up on the current protocol with regards to handling of the startup channel detector (Channel No. 1). By verification of the procedure and through interviews with facility staff, it was determined that when reactor power reached the target threshold (as stated in Operational Procedure (OP)-1), an operator would depress an automated raise switch which would move the detector from an area of high flux, to an area of lower flux within the water tank. The Channel No.1 detector is not removed from the water tank where it would be reasonable to conduct radiological surveys. The Channel No. 1 detector is lowered back into its fixed position by extending a solenoid arm external to the water tank, without direct contact of potentially contaminated equipment.

The inspectors reviewed contamination and radiation survey records as required by TS Section 4.4c, Radiation Safety manual (RSM) Sections 6.3 and 7.2, and Radiation Safety Procedures (e.g., Experimental Procedure-8). The inspectors reviewed logs of reactor operating and shutdown conditions, interviewed TSO staff, and performed an independent radiation survey and determined that readings were consistent and comparable to those with the licensee.

Conclusion

Supporting information from the 1993 NRC-ISU Enforcement Conference provided is consistent with the 10 CFR Part 20 requirements for conducting reasonable surveys under the circumstances to evaluate the extent of radiation hazards that may be present. Currently, the licensee does not employ EP-21 and the equipment is not in service at the facility. The present handling of the startup channel detector is performed

in accordance with procedure which does not require the use of protective clothing. A review of contamination and radiation survey logs was performed without issue.

- 4) Routine unprotected handling of an unshielded neutron source (reactor start-up source) by licensed operators and uncontrolled access by untrained and unlicensed facility visitors to this neutron source, violating 10 CFR Part 20 ALARA requirements.

Observations

During the inspection period the reactor was inoperable due to maintenance of control systems. The inspectors reviewed contamination and radiation survey records as required by TS Section 4.4c, Radiation Safety Manual Sections 6.3 and 7.2, and Radiation Safety Procedures (e.g., EP-8). Additionally, the inspectors reviewed logs of reactor operating and shutdown conditions, interviewed TSO staff, and performed an independent radiation survey and determined that readings were consistent and comparable to those with the licensee. During the last Reactor Full Power Survey, conducted on July 21, 2009, by ISU TSO staff, the inspectors determined, through record review, that the radiation level at the reactor console during 4 W reactor power was 0.4 mr/hr. Streaming radiation from the one inch diameter access hole or "glory hole" is shielded by 12-inch thick, high density baryte concrete blocks which reduce the radiation levels. The level of radiation on the unshielded side of the glory hole, streaming away from reactor console, was 70 mr/hr at a distance of 1 m.

The inspectors reviewed records for leak checks of the 10 mCi Ra-Be source which is used during reactor startup. The records indicated that recorded levels during analyses were below the threshold for minimum detectable activity of the liquid scintillation counter.

The inspectors interviewed facility staff and reviewed the reactor startup procedure, OP-1. The procedure provides guidance for the operator to insert the Ra-Be

startup source into the glory hole, Thermal Column, or a beam port as needed for startup, however the procedure does not explicitly provide a step for startup source removal and storage. Reactor Operators are trained to remove the startup source at the point where the nominal rod height has been established and power has stabilized. The startup source is removed by hand and is stored in a lead shielded storage receptacle, known as a "pig" for subsequent use.

The procedure does not explicitly state a requirement for protective clothing as the startup source does not directly come in contact with the operator during handling; it is currently threaded onto the end of a 6 foot aluminum rod which facilitates placement into the reactor.

Conclusion

The NRC review did not find unprotected handling of an unshielded neutron source and uncontrolled access to the source. No violations of 10 CFR Part 20 were identified. Radiation surveys performed by TSO staff during reactor operations indicate consistent dose rates on the order of 0.4 mR/hr at the reactor console. Contamination surveys, involving the leak check for the Ra-Be startup source indicate levels below the threshold for minimum detectable activity of the liquid scintillation counter. Handling of the Ra-Be startup source is conducted in accordance with the approved procedure.

A copy of the Director's Decision will be filed with the Secretary of the Commission for the Commission's review in accordance with 10 CFR 2.206 of the Commission's regulations. As provided for by this regulation, the Director's Decision will constitute the final action of the Commission 25 days after the date of the decision, unless the Commission, on its own motion, institutes a review of the Director's Decision in that time.

Dated at Rockville, Maryland this 30th day of July, 2010.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Eric J. Leeds, Director
Office of Nuclear Reactor Regulation