Idaho State University

ADAMS Accession no. ML21125A333

Idaho State University
PEC Presentation
EA-20-134
May 10, 2021

Pocatello, Idaho

ROAR

Idaho State University

Introductions ISU Team

- Kevin Satterlee - President
- Donna Lybecker - Acting Vice President for Research
- John Longley - Radiation Safety Officer (RSO)
- Jon Stoner – Chair of the Radiation Safety Committee (RSC)
- Mary Lou Dunzik-Gougar - Reactor Administrator
- Kermit Bunde – Chair of the Reactor Safety Committee (ReSC)
- Blake Christensen – University General Counsel
- William Horin – Attorney, Winston & Strawn, Washington DC

ROAR

Idaho State University

Executive Management Commitment

- Appreciate the opportunity to meet NRC staff to discuss responses
- ISU philosophy of safety and quality
- Personal attention to NRC findings and team response. Active participation in action meetings
- Support for corrective actions including providing necessary funding.

ROAR

Idaho State University

Team Statement

- Status of Previous Inspections
- Confirmatory Order EA-18-153
  - Submitted 2nd Effectiveness Review April 1, 2021
  - Two items in progress from corrective action plan.
    - Hiring of CAES assistant safety officer. Expected completion date: July 2021
    - Training of Radiation Safety Department Staff. Expected completion date: June 30, 2021

ROAR

Idaho State University

Response to EA-20-134

- Committee formed to review the circumstances, evaluate causes, evaluate corrective actions implemented, status of on-going corrective actions, need for specific prompt corrective actions, and propose long-term corrective actions to prevent recurrence. Committee considered programmatic and safety significance as well.
- Committee Members
  - John Longley
  - Jon Stoner
  - Mary Lou Dunzik-Gougar
  - Kermit Bunde
- Methodology
  - Evaluated 20 questions in IN 96-28
  - Professional knowledge and experience with ISU programs

ROAR

Idaho State University

Presentation Format

- Five apparent violations discussed in the following outline
  - Statement of apparent violation
  - Review of circumstances
  - Causes of the violation
  - Corrective actions and timelines
    - Purpose – correct the finding and address causes to prevent recurrence
    - Immediate corrective actions
    - Long-term to prevent recurrence

ROAR

Idaho State University

Apparent Violations Addressed

1 - Apparent violation of Condition A of the Order dated May 2, 2019 (p. 18). ISU did not complete inventory across all four licenses. Evaluation committee Longley, Stoner, Dunzik-Gougar

2 - Apparent violation of License SNM-1373 (p. 25). No written procedures for SCA activities. Evaluation committee Longley, Bunde, Dunzik-Gougar

3 - Apparent violation of 10 CFR 74.19(c) (p. 29). ISU did not perform physical inventory on a measured basis. Evaluation committee Longley, Stoner, Dunzik-Gougar, Bunde

4 – Apparent violation of 10 CFR 70.9, 10 CFR 74.13 (p. 29). Failure to report accurate information (one gram difference). Evaluation committee Longley, Bunde, Dunzik-Gougar

5 – Apparent violation of 10 CFR 33.13(c)(3)(ii). Failure to establish procedures for use of the Am-Be source. Committee Longley, Dunzik-Gougar, Stoner

ROAR

Idaho State University

1 - Apparent Violation of Condition A of the Confirmatory Order May 2, 2019 EA-20-134 Enclosure 3 Page 18

- Apparent Violation:
  - ISU did not perform independent inventory across all four licenses. Materials on the SNM-1373 and R-110 licenses were not included in the inventory.
- Circumstances:
  - RSO, RSC committee chair, and ISU management were new to radiation safety management particularly for the reactor and SCA. Therefore they did not include the reactor personnel and the reactor safety committee when responding to the confirmatory order.

ROAR

Idaho State University

1 - Apparent Violation of Condition A cont.

- Cause:
  - ISU management, the RSC, and RSO incorrectly assumed the requested inventory was specific to the Broad Scope because the required inventory was a result of an inspection relative to that license. In addition, ISU personnel failed to carefully read the confirmatory order prior to commencing the inventory.
- Immediate Corrective Actions:
  - ISU performed a full measurement based inventory of materials on the R-110 license to resolve the excess material in reactor inventory at the date of inspection March 9 - 13, 2020. Action completed May 27, 2020.
  - ISU retained an independent contractor to complete an independent inventory of all material on the R-110 and SNM-1373 licenses. Action completed June 10, 2020.

ROAR

Idaho State University

1 - Apparent Violation of Condition A cont.

- Long Term Corrective Actions to Prevent Recurrence:
  - ISU added the Reactor Administrator to the radiation safety management meetings to ensure that issues affecting the R-110 and SNM-1373 licenses were properly addressed. Action Completed Fall 2020.
  - ISU invited the Reactor Safety Committee chairperson to attend radiation safety management meetings when available. Action completed Spring 2021.
  - ISU will develop a measurements based physical inventory procedure and implement the procedure annually in March starting in March 2022.

ROAR

Idaho State University

2 - Apparent Violation of License Condition 9 of License SNM-1373, Amendment 5 EA-20-134 Enclosure 3 Page 25

- Apparent violation: ISU did not have written procedures that were reviewed and approved by the Reactor Safety Committee for usage of materials in the subcritical assembly.
- Circumstances: ISU relied on existing laboratory manual procedures for operation of the SCA. Safety controls were in place including a posting on the laboratory door that restricted use of moderator materials (heavy water, beryllium, and graphite) and additional special nuclear material (SNM) in the SCA laboratory. In addition, a criticality alarm gamma monitor was operated and would trigger draining moderator at an alarm level of 10 mR/hr. Operations are authorized by the Reactor Administrator who holds a PhD in nuclear engineering. Also, a licensed Reactor Operator is present to oversee the operation.
- Cause: ISU personnel based operation of the SCA on procedures related to experimental activities because these were the only operations originally envisioned for the SCA. Personnel did not perform a periodic review of these procedures and related expansion of activities because there was no procedural mechanism to require periodic reviews.

ROAR

Idaho State University

2 - Apparent Violation of SNM-1373 Cond 9. cont.

- Immediate Corrective Actions
  - ISU developed a procedure for operation of the SCA and it was approved by the Reactor Safety Committee on October 29, 2020.
- Long-term Corrective Actions to Prevent Recurrence
  - Reactor Safety Committee and Reactor Management will review all reactor and SCA operations to ensure they have procedures specific to appropriate activities. Expected completion date August 30, 2021.
  - Radiation Safety Department will update procedure RS-06, Radioactive Material Evaluations, to address inspection of the SCA. Staff members will be required to read and understand; applicable technicians trained per RS-21, Radiation Safety Technician Qualifications. Expected completion date September 30, 2021.
  - SCA training process for reactor personnel will be updated to include a three step process. Review procedure, staff demonstrates procedure, and staff observes trainee implementation of procedure. Expected completion date September 30, 2021

ROAR

Idaho State University

2 - Apparent Violation of SNM-1373 Cond 9. cont.

- Long-term Corrective Actions to Prevent Recurrence cont.
  - ISU will develop a procedure for review and update of procedures on a scheduled basis for Radiation Safety Department and Authorized Users. New procedure will be sent to all authorized material users for review and implementation. Expected Completion Date: September 30, 2021.
- RSO Periodic Scheduled Inspection March 2021 Identified the Following Errors
  - Instruments not source checked prior to operation.
  - Cf-252 source not signed out correctly on single barrier log in some cases.
  - An Am-Be source was used in the SCA without updating the procedure. Had been approved the Reactor Safety Committee.
  - Source plates were logged in the SCA logbook rather than single barrier log because of ambiguity in the procedure.
  - Surveys required in the license application were not all fully implemented. Personnel frisked drying wipes to verify fuel plates were not leaking.

ROAR

Idaho State University

2 - Apparent Violation of SNM-1373 Cond 9. cont.

- Immediate Corrective Actions from the RSO Inspection
  - RSO suspended operation of the SCA until procedure updates are completed and approved by the Reactor Safety Committee and training is revised and completed.
- Long-term Corrective Actions to Prevent Recurrence (RSO Inspection)
  - ISU will update the SCA procedure with the Reactor Safety Committee to address use of the Am-241-Be source, to require recording of dose rate surveys, to specify user survey requirements from the license application, to clarify logging of plate removal and return, and to specifically link to emergency procedures. Expected completion date: August 30, 2021
  - Management oversight of SCA operation will be conducted by the Reactor Administrator or Reactor Safety Committee members for initial operations using the updated procedure. Expected completion date: May 31, 2022.

ROAR

Idaho State University

3 - Apparent Violation of 10 CFR 74.19(c) EA-20-134 Enclosure 3 Page 29

- Apparent violation:
  - ISU did not perform a physical inventory on a measured basis to determine the quantity of U-235 on hand at a given time.
- Circumstances:
  - ISU performed inventory of nuclear materials by visually verifying the presence of each item on the material lists for the R-110, SNM-1373, and 11-27380-01 licenses.
- Cause:
  - ISU did not recognize that measurement, rather than item identification, was required for applicable items.

ROAR

Idaho State University

3 - Apparent Violation of 10 CFR 74.19(c) cont.

- Immediate Corrective Actions:
  - ISU performed a full measurement based inventory of materials on the R-110 license to resolve the excess material in reactor inventory at the date of inspection March 9 - 13, 2020. Action completed May 27, 2020.
- Long-term Corrective Actions to Prevent Recurrence
  - ISU personnel (RSO and CAES safety officer) will attend NRC NMMSS training when available.
  - ISU will develop a physical inventory procedure with the following elements based on ANSI N15.8, Material Control Systems – Special Nuclear Material Control and Accounting Systems for Nuclear Power Plants. Procedure will be reviewed by Reactor and Radiation Safety Committees. Expected completion date for the written procedure October 31, 2021.

ROAR

Idaho State University

3 - Apparent Violation of 10 CFR 74.19(c) cont.

- Physical inventory procedure cont.
  - Sealed items (clad fuel plates, sealed sources, fission counters, etc.)
    - Verify all are present by serial number, where applicable, and examine for damage. (Referred to as item count or piece count in ANSI N15.8) Perform 100 % leak test. If leaking or damaged evaluate following guidance of ANSI N15.8.
  - Non-sealed materials
    - Material on License R-110 and License 11-27380-01 – Materials stored as permitted in plastic bags or plastic vials. ISU will weigh items in their current configuration (plastic bags and plastic vials) to establish a baseline.
    - During the inventory ISU will repeat measurements and compute weight difference from the baseline. If the difference changes the rounded reporting value for the transaction by the reporting threshold for isotopic weight in the NMMSS Users Guide, ISU will report the difference to the NRC and submit a 741 form to adjust the NMMSS inventory.
  - Reactor – The reactor will be inventoried as a single item based on ANSI N15.8. ISU will weigh fuel plates and control rods if the core is accessed in the future.
  - Containerized material with Tamper Indicating Devices (TID) will be considered out of process and not subject to measurements based on ANSI N15.8. Condition and serial numbers of TIDs will be verified.

ROAR

Idaho State University

4 - Apparent Violation of 10 CFR 70.9 and 10 CFR 74.13 EA-20-134 Enclosure 3 Page 29

- Apparent violation:
  - ISU did not report accurate data to NMMSS. There is a one gram difference between material present and material reported to NMMSS.
- Circumstances:
  - ISU performed physical inventory on an item identification basis in March 2021 to support the inventory reported to NMMSS.
- Cause:
  - ISU used rounded values for three transactions (reactor receipt, SCA receipt, and university fuel receipt) and then added to determine the total mass. If unrounded values are summed and then rounded, the total mass is one gram less. The cause of the discrepancy was the difference in rounding techniques

ROAR

Idaho State University

4 - Apparent Violation of 10 CFR 70.9 and 10 CFR 74.13 cont.

- Discussion
  - ISU weighed materials from the 1967 reactor receipt and materials transferred from another university in 1997.
  - 1967 Transaction: The mass measurements of the reactor materials yielded a small amount less than the original reported value. The difference was less than the reporting weight unit for isotopic mass in the NMMSS Users Guide. The total transaction mass rounded to the reporting unit for isotopic mass agreed with the rounded amount transferred to ISU in 1967.
  - 1997 Transaction: The mass measurements of the university materials agreed with the original mass within the reporting weight unit for isotopic mass in the NMMSS Users Guide. The total mass rounded to the reporting unit for isotopic mass agreed with the rounded amount transferred to ISU in 1997.

ROAR

Idaho State University

4 - Apparent Violation of 10 CFR 70.9 and 10 CFR 74.13 cont.

- Discussion cont.
  - ISU verified the presence of all materials on the SNM-1373 license by item identification.
  - ISU summed the rounded values for the three transactions (receipt of reactor, receipt of SNM-1373 material, and receipt of university material) and reported the total in the annual report to NMMSS.
  - ISU believes this approach is appropriate because the material was received under shipper/receiver agreements with the rounded values in accordance with Section 2.3.3 of the NMMSSS Users Guide. In addition, using the rounded values will ensure consistency when the materials are returned to the Department of Energy in the future.

ROAR

Idaho State University

4 - Apparent Violation of 10 CFR 70.9 and 10 CFR 74.13 cont.

- Long Term Corrective Actions:
  - ISU will implement the physical inventory procedure annually in the month prior to submitting the annual NMMSS inventory report. Expected completion date of first physical inventory March 2022.
  - ISU will request modification of license SNM-1373 to specify the exact mass values from the original manufacturer data when prepared for another university. This will ensure the total in the license rounded to the NMMSS reporting unit for isotopic mass agrees with the number reported in the original transfer and recorded in NMMSS. ISU will include this request in the renewal application for license SNM-1373 that will be submitted on or before July 11, 2021.

ROAR

Idaho State University

5 - Apparent Violation of 10 CFR 33.13(c)(3)(ii) EA-20-134 Enclosure 3 Page 33

- Apparent violation:
  - ISU failed to establish written operating and emergency procedures for use of the Category 2 Am-Be source.
- Circumstances:
  - A usage procedure for the Am-Be source was developed on June 6, 2011. The source configuration was changed from an aluminum housing to a PVC cradle in 2017 under a procedure approved by the RSO. The source was placed into its current configuration in a polyethylene shielded drum in Ph.D research in 2017. On November 1, 2017, the RSO requested that the reactor supervisor write a procedure for access to and use of the source. However, the reactor supervisor left ISU on December 14, 2018 and the procedure was not completed.

ROAR

Idaho State University

5 - Apparent Violation of 10 CFR 33.13(c)(3)(ii) cont.

- Cause:
  - The procedure for using the Am-Be source was not revised after reconfiguration in the 2017-2018 time frame. The cause is personnel turnover in the reactor supervisor position, RSO, and other reactor personnel. In addition, there were incomplete procedural control processes.
- Immediate Corrective Actions:
  - ISU developed a revised procedure for use of the Am-Be source. It was approved by the Reactor Safety Committee on July 23, 2020 and the Radiation Safety Committee on August 6, 2020.

ROAR

Idaho State University

5 - Apparent Violation of 10 CFR 33.13(c)(3)(ii) cont.

- Long-term Corrective Actions to Prevent Recurrence
  - ISU Reactor Department will update the training process for the Am-Be procedure to include a three step process: Review procedure, staff demonstrate procedure, and staff observe trainee implementing procedure. Expected completion date: May 30, 2021.
  - ISU Radiation Safety Department will update training under Procedure RS-21, Radiation Safety Technician Qualifications, to include the Am-Be source procedure for personnel who perform leak tests and NSTS inventory. Expected completion date: May 30, 2021.
  - ISU Radiation Safety Department will develop an emergency response procedure for radiation emergencies and events. The procedure will ensure response considers all potential hazards as applicable (dose rate, contamination, and airborne radioactivity). Staff members will be required to read and understand; applicable technicians trained per RS-21, Radiation Safety Technician Qualifications. Expected completion date: August 30, 2021.
  - ISU Radiation Safety Department will add a section to user permits to specifically list applicable procedures. Expected completion date: December 31, 2021.

ROAR

Idaho State University

5 - Apparent Violation of 10 CFR 33.13(c)(3)(ii) cont.

- Long-term Corrective Actions to Prevent Recurrence cont.
  - ISU Reactor Department will update the Am-Be source procedure to specify emergency response instructions and clarify dose rate surveys. In the event of an emergency, these instructions will invoke contact with the Radiation Safety Department who will implement the emergency response procedure. Expected completion date: September 30, 2021.
  - ISU will update the Radiation Safety Manual to require authorized users to develop specific handling procedures for exposed radioactive sources that will create a Radiation Area when in use. Expected Completion Date July 31, 2021. User procedures by September 30, 2021.
  - ISU Radiation Safety Department will update the general procedure for safe handling of sources, TSO 04-14. New procedure will be sent to all authorized material users for review and implementation. Expected completion date: September 30, 2021.

ROAR

Idaho State University

Additional Observations

- ISU Management is fully supportive of the evaluations and responsive actions noted herein. It is our, and our collective, responsibility to maintain and constantly seek to improve our programs to ensure the safety of our students, staff, and the public.
- We are glad that these matters (under our existing practices, training and existing/employed procedures) did not involve or present a serious safety event through any personnel exposures, loss of material (except for the rounding matter) or loss of control of material, nor actual loss through improper transfer or disposal of any materials.
- Nonetheless, we fully recognize the importance of all the findings. Those are unacceptable for our program. We view each of these as opportunities to enhance our programs and processes and are proud of our current staff and faculty in their dedication for the same.

ROAR

Idaho State University

Conclusion

ISU believes that the implemented and proposed corrective actions address, in the contexts of prompt, intermediate and long-term perspectives, broad corrective actions for the issues identified in the NRC inspection conducted March 9-13, 2020. Such actions will provide additional assurance of maintaining the safety for the students and staff at ISU and the community of Pocatello.

ROAR