**UNITED STATES**
**NUCLEAR REGULATORY COMMISSION**
REGION IV
1600 E. LAMAR BLVD.
ARLINGTON, TX 76011-4511

February 7, 2018

EA-17-206
NMED NO. 170485

Cornelis Van der Schyf
Vice President for Research
Idaho State University
921 South 8th Ave., Stop 8103
Pocatello, ID 83209-8103

SUBJECT: NRC INSPECTION REPORT 030-32322/2017-001

Dear Dr. Van der Schyf:

This letter refers to the event reported to the U.S. Nuclear Regulatory Commission (NRC) on October 13, 2017 (NRC Event Notification 53012) involving a lost sealed source containing special nuclear material at your facility in Pocatello, Idaho. You submitted to the NRC a written report, dated November 13, 2017 (NRC's Agencywide Documents Access and Management System (ADAMS) Accession ML18011A069), which presented the facts and circumstances surrounding the event, as well as supporting documentation about the lost source. The enclosed report presents the results of the NRC's review of the event, the associated timeline, as well as the NRC's understanding of the actions taken by Idaho State University to either find the lost source or determine its final disposition. A final exit briefing was conducted (telephonically) with you and Dr. Richard Brey, Radiation Safety Officer, on January 25, 2018, to discuss the NRC's understanding of the event and preliminary results of our review.

Based on the results of our review, two apparent violations were identified and are being considered for escalated enforcement action in accordance with the NRC Enforcement Policy. The current Enforcement Policy is included on the NRC's Web site at http://www.nrc.gov/about-nrc/regulatory/enforcement/enforce-pol.html. The apparent violations involve the failure to control and maintain surveillance of licensed special nuclear material (10 CFR 20.1801) and the failure to provide information required by regulation to the Commission that was complete and accurate in all material respects (10 CFR 70.9). The circumstances surrounding these apparent violations, the significance of the issues, and the need for lasting and effective corrective action were discussed with you and Dr. Richard Brey during the telephonic exit briefing on January 25, 2018.

Since the apparent violations involve the loss of special nuclear material the NRC is considering proposing imposition of a civil monetary penalty. Section 2.3.4, Civil Penalty, of the NRC Enforcement Policy states that for violations where a licensee has lost required control of its regulated licensed material for any period of time, the NRC normally will impose at least a base civil penalty. The base civil penalty amount is based on approximately three times the expected average cost of authorized disposal; however, the NRC may exercise its discretion to mitigate or

escalate a civil penalty amount based on the merits of a specific case. Therefore, you may provide information regarding the actual expected cost of authorized disposal that you believe the NRC should consider in making a final enforcement decision. However, the NRC will not normally decrease the civil penalty to an amount below the lowest base civil penalty for such cases.

Since the NRC has not made a final determination in this matter, a Notice of Violation is not being issued for these inspection findings at this time. In addition, please be advised that the number and characterization of apparent violations described in the enclosed report may change as a result of further NRC review. Before the NRC makes its enforcement decision, a predecisional enforcement conference (PEC) to discuss the apparent violations has been scheduled for March 21, 2018, at the Region IV office. This conference will be open to public observation in accordance with Section 2.4, "Participation in the Enforcement Process," of the NRC Enforcement Policy.

The decision to hold a PEC does not mean that the NRC has determined that a violation has occurred or that enforcement action will be taken. This conference is being held to obtain information to assist the NRC in making an enforcement decision. This may include information to determine whether a violation occurred, information to determine the significance of a violation, information related to the identification of a violation, and information related to any corrective actions taken or planned. The conference will include an opportunity for you to provide your perspective on these matters and any other information that you believe the NRC should take into consideration in making an enforcement decision. In presenting your corrective actions, you should be aware that the promptness and comprehensiveness of your actions will be considered in assessing any civil penalty for the apparent violations. Following the PEC, you will be advised by separate correspondence of the results of our deliberations on this matter. No response regarding these apparent violations is required at this time.

The guidance in NRC Information Notice 96-28, "Suggested Guidance Relating to Development and Implementation of Corrective Action," may be helpful. You can find an updated excerpt from NRC Information Notice 96-28, on the NRC Web Site at http://www.nrc.gov/docs/ML0612/ML061240509.pdf.

In accordance with 10 CFR 2.390 of the NRC's "Agency Rules of Practice and Procedure," a copy of this letter, its enclosure, and your response, if you choose to provide one, will be made available electronically for public inspection in the NRC Public Document Room and from the NRC's Agencywide Documents Access and Management System (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 or proprietary information so that it can be made available to the public without redaction.

If you have any questions concerning this matter, please contact Mr. Michael Hay of my staff at 817-200-1455.

Sincerely,

***/RA/***

Mark R. Shaffer, Director
Division of Nuclear Materials Safety

Docket No. 030-32322
License No. 11-27380-01

Enclosure:
NRC Inspection Report 030-32322/2017-001

NRC INSPECTION REPORT 030-32322/2017-001 - DATED FEBRUARY 7, 2018

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RSun, NMSS

ADAMS ACCESSION NUMBER: ML18017A373

☒SUNSI Review: By: **JEV** | ADAMS: ☒ Yes ☐ No | ☐ Non-Publicly Available ☒ Publicly Available | ☒Non-Sensitive ☐ Sensitive | Keyword: EA-17-206

| OFFICE | DNMS:MLIB | DNMS:C:MLIB | TL:ACES | ARC | NMSS | OE |
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| NAME | JEvonEhr | MCHay | GMVasquez | SKirkwood | RXSun | JDPeralta |
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| DATE | 01/17/18 | 01/17/18 | 01/25/17 | 02/02/18 | 01/29/18 | 02/07/18 |
| OFFICE | D:DNMS | | | | | |
| NAME | MRShaffer | | | | | |
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U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

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|---|---|
| Docket: | 030-32322 |
| License: | 11-27380-01 |
| Report: | 2017-001 |
| EA No.: | 17-206 |
| Licensee: | Idaho State University<br>Technical Safety Office |
| Location Inspected: | N/A |
| Inspection Dates: | N/A |
| Exit Meeting Date: | January 25, 2018 |
| Inspectors: | Jason E. vonEhr, Health Physicist<br>Materials Licensing and Inspection Branch<br>Division of Nuclear Materials Safety |
| Approved By: | Michael C. Hay, Chief<br>Materials Licensing and Inspection Branch<br>Division of Nuclear Materials Safety |
| Attachment: | Supplemental Inspection Information |

Enclosure

## EXECUTIVE SUMMARY

**Idaho State University**
**Technical Safety Office**
**NRC Inspection Report 030-32322/2017-001**

The NRC conducted an in-office review of a lost source event reported by Idaho State University (ISU) to the U.S. Nuclear Regulatory Commission (NRC) on October 13, 2017, (NRC Event Notification 53012) in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 20.2201. The report concerned the discovery of a lost sealed source containing special nuclear material in excess of 1,000 times the associated quantity listed in Appendix C of 10 CFR Part 20.

A licensee employee was conducting a routine inventory of special nuclear material (SNM) held under ISU's broad-scope license, NRC License 11-27380-01, and its SNM license, NRC License SNM-1373, when the employee discovered a discrepancy between the licensee's internal inventory and the inventory reported to the NRC through the Nuclear Materials Management and Safeguards System (NMMSS). The NMMSS report indicated the licensee had 14 one-gram plutonium sources, while the licensee's inventory indicated there were 13 one-gram plutonium sources. The licensee conducted a records search and found documents from 2003 and 2004 identifying the source and indicating it was still on campus awaiting disposal. However, no documents of the licensee's, its academic partners, or its waste vendors could be found indicating the source had been transferred or properly disposed. The licensee conducted a physical search of the campus and was not able to locate the missing source.

Following this search, the licensee contacted the NRC to report the loss of the 1 gram plutonium source AP-237. The licensee has concluded that the source is most likely not on ISU's campus, but ISU cannot show that the source was shipped to another licensed entity or waste broker. In response to this loss, senior university officials have planned to return ISU's remaining plutonium sources to the U.S. Department of Energy at the first available opportunity.

## REPORT DETAILS

### 1. Program Overview

1.1. Licensee

Idaho State University (ISU) holds three NRC licenses: a Type-A Academic broad-scope license, NRC License 11-27380-01, a special nuclear materials (SNM) license, NRC License SNM-1373, and a license covering accelerator-produced materials and their distribution, NRC License 11-27380-04.

Special nuclear materials is authorized for possession and use under both the SNM license and the broad-scope license. However, only the broad-scope license authorizes plutonium-239 (License Conditions 6, 7, 8, under E, V, W, CC, DD, and HH).

1.2. Nuclear Accident Dosimeter Source AP-237

The source that ISU reported as lost is a nuclear accident dosimeter (NAD) plutonium source, serial number AP-237, and contains approximately one-gram of plutonium. It contains primarily plutonium-239, as well as a mixture of other plutonium isotopes and daughter isotopes. Source AP-237, as well as the 13 other one-gram NAD plutonium sources, were loaned to ISU by the U. S. Department of Energy, through the Idaho National Laboratory (INL) in 1991.

Source AP-237 was authorized under the broad-scope license (License Condition 6, 7, and 8.E.) as a plutonium-239 registered sealed source, with a maximum total authorized possession of 6.2 curies (100 grams). As of 2007, the isotopic mixture for ISU's AP-series plutonium sources included 62 mCi Pu-239 (primary), as well as minority activities of Pu-238, Pu-240, Pu-241, and Am-241. All of these isotopes are relatively long-lived with radiological half-lives between 14.3 years (Pu-241) and 24,100 years (Pu-239).

Physically, the source is best described as a metal matrix (non-dispersible) about the size of a quarter (see Figure 1, below). On February 18, 2003, ISU documented in a memorandum to the radiation safety officer (RSO) and the Radiation Safety Committee (RSC) chairman that source AP-237 had a routine leak test conducted and the results were elevated (two wipes reported 0.306 and 0.294 nanocuries of removable contamination), but below the NRC threshold requiring a report for a leaking sealed source (5 nanocuries). Idaho State University concluded that the source had experienced a loss-of-integrity and removed it from active use.

During a previous NRC inspection of ISU, documented in NRC Inspection Report 030-32322/2010-001 (NRC's Agencywide Documents Access and Management System (ADAMS) Accession ML12053A232), the NRC conducted an independent radiation survey of another AP-series plutonium source and reported the radiation levels to be 14 mrem/hour on contact. The licensee confirmed this dose rate and added that the rate is approximately 1 mrem/hour at 1 meter in a letter submitted to the NRC in 2010 (ADAMS Accession ML111450699).

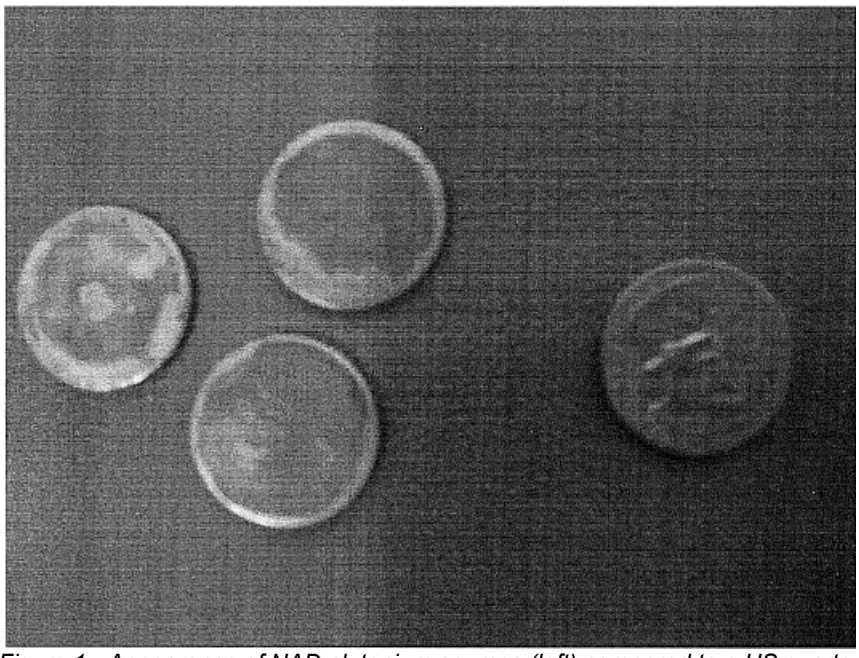

*Figure 1 - Appearance of NAD plutonium sources (left) compared to a US quarter (right). Image taken from ISU 30-day Report from 2010 (ADAMS Accession ML111450699).*

## 2. Loss of Source AP-237

The licensee's 30-day report, dated November 13, 2017 (ADAMS Accession ML18011A069), described the actions ISU implemented upon discovery of the missing source. The description and details of the event are provided below. Additional information was provided by ISU after the 30-day report was submitted, as requested by NRC staff during their review of the event.

### 2.1. 2017 Discovery of Loss of Material

While a licensee employee was performing a routine physical inventory on October 5, 2017, a discrepancy was noted between the ISU internal inventory and the inventory reported to the NRC for the Nuclear Materials Management and Safeguards System (NMMSS). The NMMSS report indicated the licensee had 14 one-gram plutonium sources, while the licensee's inventory indicated there were 13 one-gram plutonium sources. This discrepancy was brought to the RSO's attention.

### 2.2. Immediate Actions by Idaho State University

Idaho State University records indicated the missing source had an integrity issue, identified in 2003, and was taken out-of-service at that time. Some documented references were found in the 2003 and 2004 timeframe that suggested the source had been removed from service and was intended to be sent back to INL. When no records regarding transfer of the source to INL were located, ISU expanded its search to include INL staff, former ISU RSOs and employees, ISU waste brokers, and other university academic partners. Waste manifests were reviewed for drums

currently on campus and those that had been transferred since 2003, and in some cases waste drums were opened and physically examined. Interviews with past personnel produced a variety of recollections, but did not yield any definitive statements on the final status of the source AP-237.

Idaho State University, with three independent teams, conducted a physical search of the university campus and did not locate the missing source AP-237. Subsequently, on October 13, 2017, the RSO contacted the NRC to report the loss of the plutonium source.

2.3. Timeline of ISU and NRC historical records

Several ISU documents were found with information related to source AP-237.

The first of these is a memorandum to the RSO and RSC chairman, dated February 18, 2003, regarding the loss-of-integrity of source AP-237 (described above in Section 1.2). As previously stated, the licensee performed a routine leak test and the results were elevated, but below the NRC threshold requiring a report for a leaking sealed source. The memorandum states that source AP-237 was removed from service, triple-bagged, and placed in storage in the custody of the ISU Technical Safety Office. The memorandum states that INEEL [Idaho National Engineering and Environmental Laboratory] (currently INL) had been contacted to arrange the return of source AP-237.

Another record, an email dated February 14, 2003, from ISU contacting INEEL requested that source AP-237 be returned to INEEL. Idaho State University found minutes from the RSC meeting held on March 14, 2003, in which the loss of integrity if source AP-237 is discussed, and the RSC re-confirmed that ISU planned to return the source to INEEL.

In a record regarding an Annual Briefing on Radiation Control at ISU, dated November 23, 2004, AP-237 is mentioned in Item 12. The document states that "INEEL recently indicated that they do not wish to accept this source back into their inventory and has suggested that ISU dispose of it. The TSO [Technical Safety Office] has custody of the source pending disposal with the next waste shipment." This is the last record that references source AP-237.

The current RSO of ISU was able to find the first inventory record where source AP-237 is not listed, which appears to be dated June 24, 2004. However, this may not indicate it was transferred at this point, or prior to this, given the November 23, 2004, record which suggested that ISU still possessed the source in November 2004.

The NRC reviewed the NMMSS reports from 2002 through 2017 and throughout the time period, only one transfer was recorded for plutonium. That was an exchange of 8 grams of plutonium to Duke University in 2013 (transferred to Duke University on March 4, and returned to ISU on May 2). During the remainder of the time period, ISU reported possession of all 14 grams of plutonium. The NMMSS reports, including transfers and inventory reconciliation, are required by 10 CFR 74.13.

2.4. 2010 NRC Reactive Inspection

An NRC reactive inspection was performed at ISU in October 2010, in response to a notification on September 2, 2010, that 2 (of the 14) NAD plutonium sources were missing. These 2 sources, AP-229 and AP-243, were later reported recovered on April 6, 2011, after their discovery in a storage vault. However, the inspection identified several inadequacies, including management oversight of SNM-related activities and a lack of disciplined source-accountability.

Idaho State University implemented corrective actions that included the purchase of new safes to store the SNM, implementing a new procedure that required two-person verification for both check-out and check-in of all sources designated "two barrier" sources (all plutonium, uranium, and thorium sources are considered "two barrier" sources), and strictly limiting access to the SNM safes.

## 3. Inspection Findings

3.1. Observations and Findings

The NRC identified two apparent violations, which are as follows:

**Apparent Violation of 10 CFR 20.1801**

Title 10 CFR 20.1801 requires that the licensee secure from unauthorized removal or access licensed materials that are stored in controlled or unrestricted areas.

Title 10 CFR 20.1802 requires that the licensee control and maintain constant surveillance of licensed material that is in a controlled or unrestricted area and that is not in storage.

Contrary to the above, from approximately 2004 to present, the licensee failed to secure from unauthorized removal or access material stored in a controlled or unrestricted area and failed to maintain constant surveillance of licensed material (plutonium-239 sealed source) that was in a controlled or unrestricted area and that was not in storage. Specifically, nuclear accident dosimeter (NAD) plutonium source, serial number AP-23737, was reported missing to the NRC on October 13, 2017, and the licensee could not, using historical records, determine the location or final disposition of the source since approximately 2004.

The licensee's failure to secure from unauthorized removal or access material stored in a controlled or unrestricted area and failure to maintain constant surveillance of licensed material that was in a controlled or unrestricted area and that was not in storage was identified as an apparent violation of 10 CFR 20.1801 and 10 CFR 20.1802. (030-32322/2017-001-01)

**Apparent Violation of 10 CFR 70.9**

Title 10 CFR 70.9 requires, in part, that information provided to the Commission by a licensee required by the Commission's regulations shall be complete and accurate in all material respects.

Title 10 CFR 74.13 requires, in part, that each licensee possessing, or who had possessed in the previous reporting period, at any one time and location, special nuclear material in a quantity totaling one gram or more of contained plutonium shall complete and submit, in computer-readable format Material Balance Reports concerning special nuclear material the licensee has possessed, transferred, disposed of, or lost. The Physical Inventory Listing Report must be submitted with each Material Balance Report. Each licensee shall prepare and submit the reports described above as specified in the instructions in NUREG/BR-0007 and NMMSS Report D-24 "Personal Computer Data Input for NRC Licensees."

Contrary to the above, from approximately November 2004 through March 2017, the licensee failed to provide information required by the Commission's regulations that was complete and accurate in all material respects. Specifically, a NAD plutonium source, serial AP-237, was lost without apparent trace or record, but was still confirmed to be in ISU's possession in Material Balance Reports (NRC NMMSS Report I-010E and Report M-742R) submitted in accordance with 10 CFR 74.13 through March 2017, until the discrepancy was identified in October 2017.

The licensee's failure to provide information required by the Commission's regulations that was complete and accurate in all material respects was identified as an apparent violation of 10 CFR 70.9. (030-32322/2017-001-02)

3.2 Conclusions

The NRC identified two apparent violations of NRC requirements during the review of the event, as described above.

## 4. Corrective Actions

The ISU RSO discussed the lost source with the University President, General Counsel, the Vice President for Advancement, and the Vice President for Research. The RSO recommended that ISU should return the remaining Pu-239 NAD sources to the U.S. Department of Energy at its first opportunity. Senior university officials accepted the RSO's recommendation.

In accordance with 10 CFR 20.2201(b), the licensee prepared and submitted a 30-day report to the NRC, dated November 13, 2017, which detailed ISU's understanding of the circumstances and history of the loss of the radioactive source.

## 5. Exit Meeting Summary

A final exit briefing was conducted at the conclusion of the NRC's in-office review on January 25, 2018, with Dr. Cornelis Van der Schyf, Vice President for Research and Dr. Richard Brey, RSO at ISU. The licensee acknowledged the NRC's findings.

## SUPPLEMENTAL INSPECTION INFORMATION

### LIST OF PERSONS CONTACTED

Dr. Richard Brey, Radiation Safety Officer
Dr. Cornelis Van der Schyf, Vice President for Research

### INSPECTION PROCEDURES USED

IP87103, "Inspection of Materials Licensees Involved in an Incident or Bankruptcy Filing"

### ITEMS OPENED, CLOSED, and DISCUSSED

Opened

| | | |
|---|---|---|
| 030-32322/2017-001-01 | AV | The licensee failed to secure from unauthorized removal or access licensed material. (10 CFR 20.1801, 10 CFR 20.1802) |
| 030-32322/2017-001-02 | AV | The licensee failed to provide information required by regulation to the Commission that was complete and accurate in all material respects (10 CFR 70.9, 10 CFR 74.13) |

Closed

None

Discussed

None

### LIST OF ACRONYMS AND ABBREVIATIONS USED

| | |
|---|---|
| ADAMS | Agencywide Documents Access and Management System |
| AV | Apparent Violation |
| CFR | *Code of Federal Regulations* |
| ISU | Idaho State University |
| INL | Idaho National Laboratory |
| INEEL | Idaho National Engineering and Environmental Laboratory |
| NAD | Nuclear Accident Dosimeter |
| NMMSS | Nuclear Materials Management and Safeguards System |
| NRC | Nuclear Regulatory Commission |
| PEC | Predecisional Enforcement Conference |
| RSC | Radiation Safety Committee |
| RSO | Radiation Safety Officer |
| SNM | Special Nuclear Materials |