



THE Ames Laboratory  
*Creating Materials & Energy Solutions*  
U.S. DEPARTMENT OF ENERGY

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**Environment, Safety, Health & Assurance**

Interoffice Communication

G40 TASF  
PH: 515/294-7922

**To:** Tom Wessels, Manager, ESH&A  
Shawn Nelson, Assistant Manager, ESH&A

**From:** Michael McGuigan  
Radiation Safety Officer, ESH&A

**Date:** August 13, 2013

**Subject:** Sealed Radioactive Sources

## Sealed Radioactive Sources Topical Appraisal

### 1.0 Scope:

This Topical Appraisal is being conducted to ensure site compliance to 10 CFR 835 requirements for sealed radioactive sources at the Ames Laboratory facility, contract DE-AC02-07CH11358.

### 2.0 Dates:

The appraisal was performed during July, 2013.

### 3.0 Summary Discussion:

Ames Laboratory has two sealed radioactive sources. Sealed radioactive source means a radioactive source manufactured, obtained, or retained for the purpose of utilizing the emitted radiation. The sealed radioactive source consists of a known or estimated quantity of radioactive material contained within a sealed capsule, sealed between layer(s) of non-radioactive material, or firmly fixed to a non-radioactive surface by electroplating or other means intended to prevent leakage or escape of the radioactive material (10 CFR 835.2).

One of the two sealed radioactive source is classified as an accountable sealed radioactive source. This means a sealed radioactive source having a half-life equal to or greater than 30 days and an isotopic activity equal to or greater than the corresponding value provided in 10 CFR 835 Appendix E. At the time of the review the Laboratory possessed one accountable sealed radioactive source (Co-57). The appendix E value for Co-57 is  $2.3 \times 10^2$  uCi. The Co-57 sealed source original activity was 50mCi, decayed to 7-25-2013 the activity is 10.39mCi. This source still meets the definition of an accountable sealed radioactive source according to 10 CFR 835.

The second sealed source is classified as an exempt (non-accountable) sealed radioactive source. An exempt sealed radioactive source is a source that does not meet the accountable sealed radioactive source criteria (10 CFR 835.2(a)). The exempt sealed source has been consigned to waste, Ni-63 foil source ( $1.5 \times 10^4$  uCi). The appendix E value for ni-63 is  $1.3 \times 10^6$  uCi. The Ni-63 does not meet this 10 CFR 835, appendix E value classifying it as an exempt (non-accountable) sealed radioactive source.

Ames Laboratory's sealed radioactive source program is within compliance of 10 CFR 835. The processes and procedures are in place to control sealed radioactive sources at Ames Laboratory to prevent unplanned exposures and loss of sources. Sources are handled, used and stored in a manner commensurate with the hazards associated with operations involving the sources (10 CFR 835.1201).

### 3.1 Requirements:

The Ames Laboratory's sealed radioactive source program regulatory provision is Title 10 of Code of Federal Regulations, Part 835 (10 CFR 835), *Occupational Radiation Protection* and the guidance document is DOE G 441.1-1C, Radiation Protection Programs Guide for use with Title 10 Code of Federal Regulations, Part 835, Occupational Radiation Protection.

Specifically the 10 CFR 835 sections pertaining directly to sealed sources are,

§ 835.605 Labeling items and containers.

Except as provided in § 835.606, each item or container of radioactive material shall bear a durable, clearly visible label bearing the standard radiation warning trefoil and the words "Caution, Radioactive Material" or "Danger, Radioactive Material." The label shall also provide sufficient information to permit individuals handling, using, or working in the vicinity of the items or containers, to take precautions to avoid or control exposures.

**Comment:** The Laboratory's accountable sealed source is labeled and complies with 835.605. The exempted sealed radioactive source, is in waste hold at present, has manufacturers' labeling affixed to it and complies with the requirements of 835.605.

§ 835.1202 Accountable sealed radioactive sources.

- (a) Each accountable sealed radioactive source shall be inventoried at intervals not to exceed six months. This inventory shall:
  - (1) Establish the physical location of each accountable sealed radioactive source;
  - (2) Verify the presence and adequacy of associated postings and labels; and
  - (3) Establish the adequacy of storage locations, containers, and devices.
- (b) Except for sealed radioactive sources consisting solely of gaseous radioactive material or tritium, each accountable sealed radioactive source shall be subject to a source leak test upon receipt, when damage is suspected, and at intervals not to exceed six months. Source leak tests shall be capable of detecting radioactive material leakage equal to or exceeding 0.005  $\mu\text{Ci}$ .
- (c) Notwithstanding the requirements of paragraph (b) of this section, an accountable sealed radioactive source is not subject to periodic source leak testing if that source has been removed from service. Such sources shall be stored in a controlled location, subject to periodic inventory as required by paragraph (a) of this section, and subject to source leak testing prior to being returned to service.
- (d) Notwithstanding the requirements of paragraphs (a) and (b) of this section, an accountable sealed radioactive source is not subject to periodic inventory and source leak testing if that source is located in an area that is unsafe for human entry or otherwise inaccessible.
- (e) An accountable sealed radioactive source found to be leaking radioactive material shall be controlled in a manner that minimizes the spread of radioactive contamination.

**Comment:** Accountable sealed sources are inventoried and leak tests are conducted per 10 CFR 835 requirements, every six months. Sealed radioactive source inventory and leak tests were last conducted June of 2013. Source smear tests showed no leakage detected. All documentation is on file in G40 TASF. The exempt sealed radioactive source has been taken out of service and is not subject to periodic source leak testing per 10 CFR 835.1202 (c). This source is located in waste holding and will remain on the Laboratory's radioactive material inventory. An inventory is conducted annually of all radioactive materials at Ames Laboratory.

### **3.2 Program Documentation:**

Procedure 10202.015, *Sealed Radioactive Source Accountability and Control* represents instructions regarding sealed radioactive sources. This procedure in part is the implementation of the Laboratory's Radiation Protection Program functional element sealed radioactive sources accountability and control, the regulatory provision of which are detailed in 10 CFR 835, Subpart M. The radioactive material section in the Ames Laboratory's Radiation Protection Program Plan (10202.004) applies to groups and departments that use and handle or store radioactive material. The Purchasing and Property Services Office has guidance for making purchases. The Laboratory's Radiation Safety procedures and the Purchasing and Property Services Offices procedures for the procurement of radioactive material guarantees that only authorized personnel purchase radioactive material which includes sealed sources and that the types and amounts of materials at the facility are inventoried and controlled properly. Receipt of radioactive materials is covered under Procedure 10202.014, *Receipt, transfer, and Shipment of Radioactive Materials*.

### **3.3 Training:**

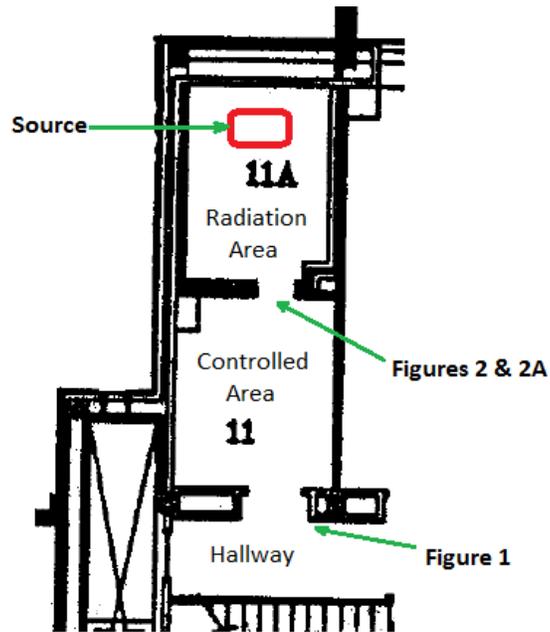
Laboratory personnel are required to take Radiation Worker II Training (AL-077) if they use or possess radioactive materials. Sealed radioactive sources fall under this training requirement. Workers are required to use the Laboratory's Radiation Protection Program Plan in the laboratory. At the time of this review only one person was authorized to use the accountable sealed source. This researcher is up-to-date for their required radiological training.

### **3.4 Performance:**

All radioactive material samples and sources are on the Laboratory's inventory. The radioactive material inventory is reviewed annually. Accountable sealed sources are required to be inventoried and leak tested biannually. The leak test and inventory is on the Laboratory's ALCATS reminders system. Sealed radioactive source leak testing is up-to-date.

The source is located in Spedding Hall room 11. The area is posted according to 10 CFR 835 requirements (See area and figures below). The Laboratory's one accountable sealed radioactive source is radiologically energetic enough to warrant the lab space as a "Radiation Area" (see Figures 2 and 2A). Radiation area means any area, accessible to individuals, in which radiation levels could result in an individual receiving an equivalent dose to the whole body in excess of 0.005 rem (0.05 mSv) in 1 hour at 30 centimeters from the source or from any surface that the radiation penetrates (10 CFR 835.2). Controlled area means any area to which access is managed by or for the US Department of Energy to protect individuals from exposure to radiation and/or radioactive material.

**Spedding Hall Room 11**



**Figure 1**



**Figure 2**



**Figure 2A**



### Source



### **3.5 Conclusion:**

Ames Laboratory's sealed radioactive source program is within compliance of 10 CFR 835. The Laboratory possesses one accountable sealed radioactive source and one exempt sealed radioactive source. This exempt source is in waste holding and awaiting final disposition. The processes and procedures are in place to control sealed radioactive sources at Ames Laboratory to prevent unplanned exposures and loss of sources. Sources are handled, used and stored in a manner commensurate with the hazards associated with operations involving the sources (10 CFR835.1201).

### **4.0 References:**

DOE Guide 441.1C-1C *Radiation Protection Programs Guide*,  
DOE Standard 1098-2008, *Radiological Control*,  
Policy 48300.006, *Ames Laboratory Purchase Card Policy*,  
Manual 10200.003, *Waste Management Program Manual*,  
Plan 10202.004, *Radiation Protection Program*,  
Procedure 10202.014, *Receipt, transfer, and Shipment of Radioactive Material*,  
Procedure 10202.015, *Sealed Radioactive Source Accountability and Control*,  
Title 10 of Code of Federal Regulations, Part 835 (10 CFR 835), *Occupational Radiation Protection*.

### **5.0 Personnel Interviewed:**

- Dr. Serguei Budko, is the only researcher in Dr. Paul Canfield's group and for that matter at the Laboratory as a whole authorized to use the mossbauer system that contains a sealed radioactive source. Dr. Budko informed me that it is planned to bring in a new

researcher who will have mossbauer duties. Dr. Budko informed me that he wears a dosimetry badge when in the lab. He also informed me that the source has not been removed from the system housing since it was installed by the manufacture's technician. Dr. Budko's dosimetry records were reviewed and there have not been any recorded radiation exposures above 100mRem per any given quarter since the mossbauer system inception, January 2012. The Laboratory's administrative dose limit is 0.5 Rems/year (ALARA Policy 10202.001). Plans are to replace the Co-57 source in one year, tentatively.

- William Martin, Plant Safety Sargent, was interview. Sargent Martin said that the guards can only enter the first controlled area of Spedding Hall room 11. They are not authorized to enter the second room, 11A. The second room is a radiation area and a dosimeter is required for entry. The lab is card access only.
- Phyllis Mann, Plant Safety Officer, confirmed what Sargent Martin said. The guards are required to maintain GERT (General Employee Radiation Training).

## **6.0 Assessment Results:**

No deficiencies or opportunities for improvement were identified as a result of this topical appraisal. The program area is operating as designed.

### **6.1 Strengths:**

No Strengths were identified.

### **6.2 Noteworthy Practices**

No noteworthy practices were identified.

### **6.3 Findings**

No findings were identified

## **7.0 Attachments:**

None

## **8.0 Post Performance**

A copy of this report will be filed and saved in G:\Admin\Topical Appraisals\2013, and the results of this review will be categorized according to the Plan 40000.001.