



**Environment, Safety, Health & Assurance**

Interoffice Communication

G40 TASF  
PH: 515/294-9769

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**To:** Tom Wessels  
**cc:** Shawn Nelson  
Topical Appraisal File 2012

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

**Date:** August 14, 2012

**Subject:** Radioactive sample shipment process

The Topical Appraisal is attached.

## **Topical Appraisal- Radiological Background Levels for Ames Laboratory Buildings**

### **1.0 Scope**

This topical appraisal is being conducted to review the Laboratory's shipping process for radioactive materials (RAM). In order to ensure control of the types and amounts of radioactive materials entering Ames Laboratory, all shipments of these materials are reviewed and processed, in part, by the ESH&A Office.

### **2.0 Dates**

The appraisal was performed during the month of July, 2012.

### **3.0 Methodology**

The Laboratory's RAM shipping process was reviewed.

#### **3.1 References**

The following references were reviewed for this appraisal;

- Title 10 of Code of Federal Regulations, Part 835 (10 CFR 835), *Occupational Radiation Protection*,
- DOE Guide 441.1C, *Radiation Protection Programs Guide*,
- DOE Standard 1098-99, *Radiological Control*,
- 49 CFR 105-180, Hazardous Materials Regulations.

The transportation of radioactive material is regulated by two Federal agencies, the Nuclear Regulatory Commission (NRC) and the Department of Transportation (DOT). The NRC requires RAM to be shipped in accordance with hazardous materials transportation safety regulations of DOT. The NRC regulates users of radioactive materials in only 17 states, (otherwise known as non-agreement states). The remaining 33 states have entered into an agreement to regulate materials within their borders (commonly called agreement states). The State of Iowa is an agreement state. US Department of Energy is exempt from NRC licensing requirements for radioactive materials as well as State of Iowa RAM licensing regulations.

Per US Department of Energy contract DE-AC02-07CH11358, Ames Laboratory is required to adhere to the Department of Transportation's (DOT) Hazardous Materials Regulations, 49 Code of Federal Regulations Parts 105-180, for shipping radioactive materials. There have been no changes to the DOT regulations in the past year that affect the Laboratory's RAM shipping processes. There have been no changes to the primary regulation, 10 Code of Federal Regulations 835, which affect the Laboratory's radioactive materials shipping processes.

#### **3.2 Program Documentation**

The following programmatic documents were reviewed;

- Radiation Protection Program Plan (10202.004),
- Ames Laboratory ESH&A Program Manual, Section 7(10200.002),
- Radiation Safety Manual (10202.001),
- Ames Laboratory Transportation Safety Manual (48303.001).

### 3.3 References

DOE Order 5400.5, Chg. 2 Radiation Protection of the Public and the Environment  
[Note: This Order has been canceled by a new order, DOE O 458.1 Radiation Protection of the Public and the Environment. DOE O 5400.5 is presently on the Ames Laboratory, Contract No DE-AC02-07CH11358, list of directives.]

DOE Order 231.1B, Environmental, Safety and Health Reporting

DOE Order 474.2, Nuclear Material Control and Accountability

DOE Order 435.1, Radioactive Waste Management

Title 10, Code of Federal Regulations, Part 835, Occupational Radiation Protection,

Plan 10202.004, Radiation Protection Program (RPP)

Manual 10202.001, Radiation Safety Manual

Manual 58304.001, Transportation Safety Manual

All references are still applicable.

### 3.4 Training

All employees involved with the packaging, marking, labeling, measuring, loading, transporting, and storage of packages containing radioactive materials are classified as “Hazmat Employees” and must have DOT training within 90 days of employment and every 3 years thereafter. This training must include the following topics: general awareness, function-specific training, safety training, security awareness training, and proof that the person has been trained in these areas.

The most current certificate documenting training and testing must be on file and available at all times (49 CFR 172. 704). All ancillary shipping personnel are hazmat employees and are up to date on required training per their functional area (See attached training records). Persons who’s training were reviewed are; Jim Brazelson, Vickie Sieve, Keith Schulke, Jeff Peters, Gary Walters, Dan Kayser, and Mike McGuigan.

Ames Laboratory has one person with radioactive material shipping categorization and packaging certification, Michael McGuigan (expires 04/2013). Dan Kayser’s certificate expired in 2010.

### 3.4 Personnel Interviewed

Internal interview, data collection volume, analysis and methods were discussed with the following person below. No issues were determined.

- Jim Brazelton, Supervisor, Materials and Transportation, Ames Laboratory of US DOE.

## 4.0 Assessment Results & Discussion

Results of this appraisal are as follows:

The Radiation Protection Program Plan (#10202.004), Control of Radiological Contamination Procedure (#10202.008), and Conducting Radiological Surveys Procedure (#10202.060) were all in compliance with 10 CFR 835 requirements.

The Ames Laboratory Transportation Safety Manual was reviewed; it was last reviewed and updated in 2010. The Laboratory’s Radiation Safety Manual is due for review May, 2012. No changes are necessary in section 10 which deals with radioactive material transportation and shipping. Revisions are being vetted by ALARA Committee members.

Shipping process – A shipping order is completed by the researcher requesting shipment and forwarded to ESH&A, HP group. Radioactive material samples being shipped are transferred to ESH&A, HP group. RadCalc, DOT material classifications are done by the HP group. Radiation contamination

surveys/smears are conducted as per the Ames Laboratory's Radiation Protection Program. Samples are run through gamma spectroscopy analysis if necessary for sample activity verification. The HP group verifies consignee radioactive material license and acquires a copy, if applicable. Ames Laboratory cannot and does not ship radioactive materials to entities not authorized to possess the material. The licensing verification does not apply if the consignee is another USDOE Laboratory. The US Department of Energy is exempt from NRC licensing requirements and does not have a license. The Chicago Site Office is informed of all radioactive material shipments. If the material is a limited quantity or greater then authorization to ship is requested from the Chicago Site Office before shipment. The consignee is informed of the shipment scheduled departure from the Ames Laboratory. Material Transportation Department packages and labels the sample packaging per DOT classification. They also prepare shipping papers. After the samples have been packaged and labeled the package is surveyed and exposure readings are taken to verify proper package labeling. The samples are shipped. To date, FY2012, the Laboratory has done 4 radioactive material sample shipments with one scheduled in the coming weeks. Also two sealed radioactive sources were shipped back to the manufacturer for disposal. There are no issues.

Radcalc – US Department of Energy ships radioactive materials in support of its research and development. Radcalc is an analytical tool for shippers of radioactive materials and waste. It is a NQA-1 validated software program to provide consistency, accuracy, compliance and appropriate documentation to shippers of RAM and waste throughout the DOE complex. Radcalc performs transportation classifications based on US Department of Transportation (DOT) definitions and methods as per 49 CFR, Subchapter C. Radcalc also derives its calculations from methods prescribed by the USDOE, USNRC, USEPA and the International Commission on Radiological Protection (ICRP). See the table one below for a list of the current Radcalc capacities.

**Table 1**  
Radcalc 4.1, Packaging and Transportation classification Capabilities

Radioactive	49 CFR 173.403, 173.433, 173.435, 173.436
Type A or Type B	49 CFR 173.403, 173.433, 173.435
Effective A1 or A2 for mixture	49 CFR 173.433
Limited quantity	49 CFR 173.403, 173.421
Low specific activity	49 CFR 173.403, 173.427
Highway route controlled quantity	49 CFR 173.403
Fissile	49 CFR 173.403
Fissile excepted	49 CFR 173.453
Reportable quantity	49 CFR 172.101, Table 2 to Appendix A
Transuranic	DOE M 435.1-1, Chg. 1
239Pu fissile gram equivalent	CH-TRAMPAC, Rev. 2, NRC Docket No. 71-9218 (WTS 2005)
239Pu-equivalent activity	DOE/WIPP-02-3122, Rev. 6.2
Container category I, II, III	Regulatory Guide 7.11 (NRC 1991)
239Pu dose-equivalent curie	ICRP Publications 71/72; FGR11
Facility/onsite shipment Hazard Category 2 and Category 3	DOE-STD-1027, Chg 1

#### **4.1 Strengths**

None

#### **4.2 Noteworthy Practices**

None

#### **4.3 Findings**

Level 3 finding, the Laboratory's Radiation Safety Manual (10202.001) is past its review date. The manual is being reviewed by the ALARA Committee. Estimated completion is January 2013.

### **5.0 Overall Conclusions**

The Ames Laboratory is fully compliant with the requirements of 49 CFR 105-180, Hazardous Materials Regulations. The Laboratory's shipping process for radioactive materials ensures the control of the types and amounts of radioactive materials leaving Ames Laboratory are categorized, packaged, and shipped per DOT regulations. The Laboratory's Transportations Office, ESH&A and the researchers are all part of this process.

One comment as a result of this topical appraisal would be an opportunity for improvement. The Laboratory's capacity to ship radioactive material may be limited in the future due to the fact that only one employee has the DOT radioactive material shipping certification. It may be prudent to have more than one person at the Laboratory with radioactive material shipping certification.

### **6.0 Attachments**

Training profiles for the following persons;

- Jim Brazelson,
- Gary Walters,
- Jeff Peters,
- Keith Schulke,
- Vickie Sieve,
- Dan Kayser, and
- Mike McGuigan.