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NOTE: This Section's Sign-Off Record is maintained in the ESH&A Office, G40 TASF.

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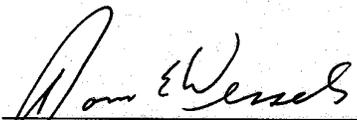
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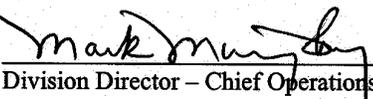
REVISION / REVIEW LOG**SECTION 7 – RADIOLOGICAL PROTECTION PROGRAM**

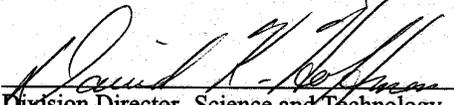
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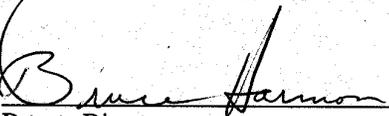
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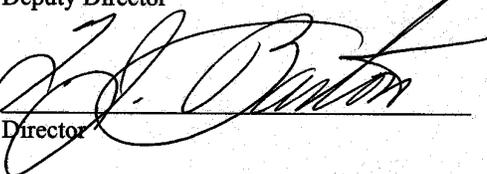
The Environment, Safety, Health and Assurance Program Manual has been reviewed and approved as documented below.

Reviewed by:  **Date:** 10/17/99
Environment, Safety, Health & Assurance

Approved by:  **Date:** 10/24/99
Division Director – Chief Operations Officer

Approved by:  **Date:** 10/25/99
Division Director- Science and Technology

Approved by:  **Date:** 10/28/99
Deputy Director

Approved by:  **Date:** 10/29/99
Director

7.0 RADIOLOGICAL PROTECTION PROGRAM

This section deals only with IONIZING radiation. Non-ionizing radiation is managed by the Industrial Hygiene Program and information concerning on non-ionizing radiation is found in section 4 of this manual.

7.1 RADIOACTIVE MATERIALS

Applicability Statement: This section applies to groups/departments that use, handle or store radioactive materials in a laboratory environment. This section also applies to employees who transfer, ship or receive radioactive materials.

7.1.1 REFERENCES

DOELAP DOE Laboratory Accreditation Program
DOE Order 441.1 Radiation Protection of the Public and the Environment
DOE Order 474.1 Control and Accountability of Nuclear Materials
Title 10, Code of Federal Regulations, Part 835, Occupational Radiation Protection, Federal Register, Tuesday, December 14, 1993, Vol. #58, No. 238, Pages 65458 - 65512
567 Iowa Administrative Code 132 Transportation of Radioactive Material in Iowa
Form 10200.004 Readiness Review Activity Approval Form
Manual 10202.001 Radiation Safety Manual
Policy 10202.004 Radiation Protection Program (RPP)
Policy 10202.006 Radioactive and Mixed Waste Disposal
Procedure 10202.009 Preparation of Radioactive and Mixes Waste for Disposal
Procedure 10202.028 General Radiological Work Permit (RWP)

7.1.2 BACKGROUND

Use, handling, storage, receipt, shipping, transferring, and disposal of radioactive materials are important aspects to many of the Laboratory's research programs. The hazards associated with radioactive materials can be significant and demand an effective management program. This section describes the health physics protection mechanisms designed to ensure worker and environmental protection from radioactive materials.

7.1.3 PROGRAM INFORMATION

7.1.3.1 General

The activities of radioactive material commonly used in research at the Laboratory today are typically quite small (microcurie or millicurie amounts) and the doses recorded on personnel dosimetry records are far less than 100 millirem in a year. However, radiological conditions are continually monitored by the Health Physics Group in order to promptly detect, and correct, if necessary, potentially unsafe conditions. New projects or modifications to existing projects involving the use of sources of radioactive materials must be approved through the Readiness

Review approval process before beginning operations. Special projects, such as mitigation of contaminated equipment or areas, are performed under guidance of a Radiological Work Permit issued by ESH&A.

Ames Laboratory follows the requirements listed in the Radiation Protection Program (RPP). The RPP, along with the information contained in this section of the Ames Laboratory Program Manual and the training modules, "Radiation Worker II –Radioactive Materials", (AL-077) constitute the Laboratory's written program.

The basic elements of the Laboratory's program are: ESH&A Radiation Safety Training Program, ESH&A periodic inspection of radioactive materials usage areas, the ESH&A personnel dosimetry program, Readiness Review procedure and the Group-specific safety training for radioactive materials users.

The ALARA Committee must specifically authorize each activity, which involves the use of radioactive material. See Section 4.0 of the Radiation Safety Manual for detailed explanation of these requirements.

NOTE: Use Authorizations that have been approved by the ALARA Committee are required to be submitted to the ESH&A Office for Activity Readiness Reviews or Activity Status Reviews associated with the research activity.

Detailed programmatic information is provided via the training modules listed in Section 7.1.4.

7.1.3.2 General Laboratory Rules for Radiation Safety

Each person using radioactive materials in an activity shall observe the following general laboratory safety rules for radiation safety:

- Lab coats or equivalent shall be worn when unsealed radionuclides with activities greater than 1 millicurie are used. Lab coats should be buttoned up, not worn open. Users of high energy beta or gamma nuclides should wear eye protection, such as safety glasses or eye glasses.
- Gloves shall be worn when working with unsealed radioactive materials.
- Closed-toe shoes shall be worn when working in a radioactive material laboratory.
- Monitor hands and clothing for contamination after each procedure or before leaving an area.
- Monitor area where unsealed radioactive materials are used after each procedure and document the result.
- Individuals responsible for contamination control will be required to decontaminate the work area(s), as necessary.
- Remote handling tools and shielded containers should be used whenever necessary to minimize doses.
- Do not eat, drink, smoke, use tobacco products or apply cosmetics in any area where radioactive materials are used or stored. Do not store food, drinks, eating utensils, or cups and other food and drink containers in laboratories or refrigerators where radioactive material use or storage is authorized. Do not use ice from a laboratory ice machine for personal use.

- Do not use a laboratory microwave oven to heat food.
- Dispose of radioactive materials only in conspicuously labeled, ESH&A-approved containers. Segregate wastes by nuclide, half-life, and physical characteristics per instructions provided by the ESH&A Health Physics Group.
- Use absorbent paper and spill trays to confine radioactive liquids that may spill.
- Store and transport radioactive materials in containers, which prevent breakage and spillage. Secondary containment is important. When transporting radioactive materials, use trays or carts.
- Use ventilation hoods or glove boxes if the radioactivity may become airborne and for high activity uses, such as stock solutions.
- Survey meters must be calibrated and fume hoods must be inspected annually by the ESH&A or other organizations approved to perform these evaluations.
- Do not dispose of empty shipping boxes or return Styrofoam inserts to the vendor without first surveying them to ensure that they are not contaminated. Remove or obliterate all radioactive signs and symbols before discarding a shipping box.
- If one or more radiation dosimeters have been issued to you, wear it (them) whenever working with or near radioactive material. Wear the dosimeter(s) according to instructions provided by the ESH&A.
- Keep any radioactive materials secure from unauthorized access or removal.

7.1.4 TRAINING

GENERAL EMPLOYEE RADIOLOGICAL TRAINING (GERT) #AL-074	
<i>Intended Audience:</i>	<i>Mandatory for plant protection personnel, custodial personnel, and others who have not had Radiological Worker II Training but who may routinely enter a Controlled Area and encounter radiological barriers, postings, or radioactive materials.</i>
<i>Module Format:</i>	<i>Classroom instruction with quiz. Estimated completion time: 1.0 hour.</i>
<i>Associated Retrain Period & Format:</i>	<i>No retrain required.</i>

RADIOLOGICAL WORKER II (RADIOACTIVE MATERIALS) #AL-077	
<i>Intended Audience:</i>	<i>Mandatory for all workers whose job assignment involves entry into Radiological Buffer Areas, Radiation Areas, and Radioactive Materials Areas.</i>
<i>Module Format:</i>	<i>Module is self-study. Please call 4-9972 to request a study guide. Module consists of video, challenge exam and a practical factors evaluation. Estimated completion time: 1.5 hours/exam and 1 hour/PFE.</i>
<i>Associated Retrain Period & Format:</i>	<i>Two-year retrain. Retrain module consists of study guide training and challenge exam.</i>

Group / activity-specific training shall be given to each employee prior to work that includes a discussion of radiological hazards, contamination control, and other safety information. In addition, the group/activity training shall review emergency response measures and any other procedural information. This training shall be documented by the Group Leader / Department Manager.

7.1.5 PERFORMANCE CHECKLISTS

Group Leader / Department Manager shall:

- Attend Ames Laboratory “Radiological Worker II” training, (AL-077).
- Assure Hazard Inventory/Job Task Analysis packets and Training Needs Questionnaires (TNQs) for all personnel are complete and current.
- Conduct and document group/activity-specific hazard communication training for each employee prior to work that includes a discussion of radioisotopes used, hazard mitigation, contamination control and emergency procedures.
- Assure that group Standard Operating Procedures (SOPs) are current and that work is performed within established guidelines.
- Assure that inventory sheets and necessary survey records for all radioactive sources are present and accessible.
- Submit radiological inventories to ESH&A annually.
- Assure that radiological package or container marking and labeling is complete and in accordance with guidelines given in the Ames Laboratory RPP.

Employees shall:

- Attend Ames Laboratory “Radiological Worker II” training, (AL-077).
- Receive activity/experiment-specific training prior to working with radioactive materials.
- Perform work in accordance with group Standard Operating Procedures (SOPs).

7.2 ANALYTICAL X-RAY SYSTEMS

Applicability Statement: This section applies to groups/departments that use analytical x-ray systems.

7.2.1 REFERENCES

ANSI N43.2 Radiation Safety for X-ray Diffraction and Fluorescence Analysis Equipment
ANSI N43.3 Installations Using Non-Medical X-Ray and Sealed Gamma Sources
Manual 10202.001 Radiation Safety Manual
Policy 10202.003 Analytical X-Ray Safety
Title 10, Code of Federal Regulations, Part 835 Occupational Radiation Protection

7.2.2 BACKGROUND

Use of analytical x-ray systems is an important part of several of the Laboratory's research programs. The hazards associated with analytical x-ray systems are significant and demand an effective management program. This section describes the health physics protection mechanisms designed to ensure worker protection from analytical x-ray systems.

7.2.3 PROGRAM INFORMATION

Ames Laboratory follows the requirements listed in ANSI N43.2 and Policy 10202.003. These documents, along with the information contained in this section of the Ames Laboratory Program Manual and the training module "Radiological Worker II – X-Ray", (AL-076), constitute the Laboratory's written program.

The basic elements of the Laboratory's program are: ESH&A Radiation Safety Training Program, ESH&A periodic inspection of analytical x-ray laboratories, the ESH&A personnel dosimetry program, Readiness Review procedure, Activity Status Review procedure, and the Group-specific safety training for analytical x-ray users.

Detailed programmatic information is provided via the training modules listed in Section 7.2.4.

The ALARA Committee must specifically authorize each activity, which involves the use of a radiation-producing device, (e.g., analytical x-ray system). See Section 4.0 of Ames Laboratory Radiation Safety Manual for detailed explanation of these requirements.

NOTE: Use Authorizations that have been approved by the ALARA Committee are required to be submitted to the ESH&A Office for Activity Readiness Reviews or Activity Status Reviews associated with the research activity.

7.2.4 TRAINING

RADIOLOGICAL WORKER II (ANALYTICAL X-RAY USERS) #AL-076	
Intended Audience:	<i>Mandatory for all workers whose job assignment involves using Analytical X-ray Systems.</i>
Module Format:	<i>Module is self-study. Please call 4-9972 to request a study guide. Module consists of study guide preparation and a challenge exam. Estimated completion time: 1.5 hours.</i>
Associated Retrain Period & Format:	<i>Two-year retrain. Retrain module consists of study guide preparation and challenge quiz.</i>

RADIOLOGICAL WORKER I #AL-126	
Intended Audience:	<i>Mandatory for all workers whose job assignment involves servicing X-ray equipment.</i>
Module Format:	<i>Module consists of computer based training, with site specific, practical guidance from the participants Group/Program. Estimated completion time: 1 hour.</i>
Associated Retrain Period & Format:	<i>Two-year retrain.</i>

Group / activity-specific training shall be given to each employee prior to work that includes a discussion of analytical x-ray hazards and other safety information. In addition, the group/activity training shall review emergency response measures and any other procedural information. This training shall be documented by the Group Leader / Department Manager.

7.2.5 PERFORMANCE CHECKLISTS

Group Leader / Department Manager shall:

- Attend Ames Laboratory “Radiological Worker II Training for Analytical X-ray Users”, (AL-076).
- Assure Hazard Inventory/Job Task Analysis packets and Training Needs Questionnaires (TNQs) for all personnel are complete and current.
- Conduct and document group/activity-specific hazard communication training for each employee prior to work that includes a discussion of x-ray hazards and emergency procedures.
- Assure that group Standard Operating Procedures (SOPs) are current and that work is performed within established guidelines.
- Assure that maintenance data and user logs are present and accessible.
- Assure that the x-ray room and barriers are properly marked and labeled in accordance with guidelines given in the Ames Laboratory RPP.

Employees shall:

- Attend Ames Laboratory “Radiological Worker II Training for Analytical X-ray Users”, (AL-076).
- Receive activity/experiment-specific training prior to working with radioactive materials.
- Perform work in accordance with group Standard Operating Procedures (SOPs).