



Ames Laboratory

Creating Materials & Energy Solutions

U.S. DEPARTMENT OF ENERGY

Radiation Protection Program

Implementation of 10 CFR 835,
Occupational Radiation Protection

April 1, 2016

Contact Person	Michael McGuigan	Revision	10
Document	Plan 10202.004	Effective Date	04/01/16

1.0 APPROVAL RECORD

- Prepared by: Radiation Safety Officer (Michael McGuigan)
- Reviewed by: Document Control Coordinator (Hiliary Burns)
- Reviewed by: Ames Laboratory ALARA Chair (Trevor Riedemann)
- Approved by: Quality Assurance Manager & ESH&A Manager (Sean Whalen)
- Approved by: Legal Council (Barbara Biederman)
- Approved by: Assistant Director for Scientific Planning (Cynthia Jenks)
- Approved by: Associate Laboratory Director for Sponsored Research Administration (Debra L. Covey)
- Approved by: Chief Operations Officer (Mark Murphy)
- Approved by: Chief Research Officer (Duane D. Johnson)
- Approved by: Deputy Director (Thomas A. Lograsso)
- Approved by: Director (Adam Schwartz)

The official approval record for this document is maintained in the Training & Documents Office, 105 TASF.

2.0 REVISION/REVIEW INFORMATION

The revision description for this document is available from and maintained by the author.

Revision Number	Date	Reason for Issuance and Summary of Changes
10	November 30, 2015	Total revision, initial release

3.0 INTRODUCTION

The Ames Laboratory Radiation Protection Program (RPP) establishes the framework for implementing the radiation protection requirements of 10 CFR 835, "Occupational Radiation Protection". The RPP is written to meet the specifications of 10 CFR 835.101 using the guidance in DOE G 441.1-1C, "Radiation Protection Program Guide".

4.0 RPP SUMMARY

- 4.1** This RPP is the compliance basis for Ames Laboratory's implementation of 10 CFR 835. The RPP applies to Ames Laboratory activities that involve the use of radioactive material, radiation emitting devices, and mitigation of legacy radiological contamination. The elements described in the RPP are fully implemented within the current funding of the Laboratory. No radiological activities that vary significantly from current activities are anticipated. The RPP as written is not expected to hinder non-radiological activities at the Laboratory.
- 4.2** Ames Laboratory is currently in compliance with 10 CFR 835 and has programs in place to maintain compliance. For this revision, the RPP refers to the implementation of a new document, the Radiological Safety Program Description (RSPD), Guide 10202.005.
- 4.3** Exemptions. Per 10 CFR 835.402(d)(2) Ames Laboratory holds an exemption from Department of Energy Laboratory Accreditation Program (DOELAP) requirements by substitution of the National Voluntary Accreditation Program (NVLAP).

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5.0 GENERAL INFORMATION

5.1 Management

Ames Laboratory is a government-owned, contractor-operated research facility of the U.S. Department of Energy, operated by and located on the campus of Iowa State University in Ames, Iowa (See Figures 2, 3, and 4). The mission of the Laboratory is to create materials, inspire minds to solve problems, and address global challenges.

The Ames Laboratory radiological safety organization is independent of the line organizational elements responsible for radiological operations at the site. Radiological safety personnel are directed by and accountable to the Radiological Safety Officer (RSO) who reports to the Environment, Safety, Health and Assurance (ESH&A) Manager. The RSO has authority to develop radiological safety policies and procedures, assign radiological safety personnel to support line organizations, and oversee implementation of the radiological safety program across the site. The RSO also reports to the As Low as Reasonably Achievable (ALARA) Director of Ames Laboratory, and as necessary to the Safety Review Committee.

5.2 Mission

Ames Laboratory is at the forefront of current materials research, high-performance computing, and environmental science and management efforts. The Laboratory seeks solutions to energy-related problems of national concern through the exploration of physics, chemistry, engineering, applied mathematics and materials sciences. Ames Laboratory's research and development has four divisions and programs:

- **Chemical and Biological Sciences:** Ames Laboratory conducts fundamental and applied studies of how to control and manipulate chemicals and biological materials, with expertise in developing new tools and methods to understand what drives chemical and biological processes.
- **Critical Materials Institute:** The Ames Laboratory leads the team of researchers from national laboratories, universities, and industry that are committed to addressing the nation's critical and near-critical materials needs.
- **Materials Science and Engineering:** Ames Laboratory is an internationally recognized leader in materials sciences, developing new ways to produce and use existing materials, and discovering new environmentally friendly materials to meet global challenges.
- **Simulation, Modeling and Decision Science:** Ames Laboratory develops computational tools, algorithms, and strategies to analyze, understand, create, design and build complex engineered, natural, or human systems.

6.0 FACILITIES AND ACTIVITIES

Operations at Ames Laboratory governed by this RPP include radiological facilities, all radiation generating devices, and radiation emitting devices. The Ames Laboratory is a government-owned, contractor-operated facility located on the campus of and operated by Iowa State University (ISU) in Ames, Iowa (See Figures 2, 3, and 4). There is no federally owned land at the site. The Laboratory is situated on approximately 10 acres of state-owned land on the ISU campus under long-term, no cost lease. The lease line can be adjusted to accommodate new Laboratory facilities in the future. The real property assets include 13 buildings that total 340,968 gross square feet. The four laboratory research buildings represent 72% of the total area (Figure 3). The newest research building Sensitive Instrument Facility (SIF) (Figure 4) was constructed in 2015 while the remaining research buildings average

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(prorated by area) over 57 years in age. The average age (prorated by area) is 51 years. The buildings are highly utilized with an Asset Utilization Index (AUI) of 0.986. The buildings have been well maintained over their lifetimes and are currently in good condition. Staffing includes over 300 full time staff (FTEs) and approximately 600 associates who access the Ames Laboratory facilities. There are two other real property assets defined in the Facility Information Management System (FIMS), an electrical switch pit and parking lot.

Being located on the University campus allows the Laboratory to take full advantage of the infrastructure services provided by ISU, such as steam, chilled water, water and sewage service, compressed air, grounds maintenance, telecommunication systems, and roads without the need for federal investment to construct, maintain, or recapitalize. The availability of these services allows the Laboratory to focus on maintaining and operating its research and support buildings. The relationship with ISU also enables the Laboratory to use space in University-owned buildings through a space usage agreement without investing in permanent space or long-term leases.

Ames Laboratory performs a limited number of research activities that use small quantities of radioactive materials or emit radiation produced by x-ray systems and/or sealed radioactive material.

Research and development work with small quantities of source and special nuclear materials (i.e., thorium, uranium, depleted uranium, and low enriched uranium) and other radionuclides is mostly done in fume hoods or glove boxes. The source materials and special nuclear materials are maintained in individual materials balance areas and reported quarterly to DOE through the Nuclear Materials Management and Safeguards System (NMMSS). The Laboratory is considered a category IV facility for purposes of the Materials Control and Accountability program. Research involving the use of these materials includes purification of isotopes for use at other research facilities, nebulization of materials and the study of laser-ablated materials. Periodically other facilities request small quantities of purified material (e.g., crystal bar thorium) which are sent as limited quantity shipments.

The site uses sealed radioactive sources for various calibration and testing purposes. The primary radiological hazard for a sealed radioactive source is the potential for external radiation dose. The risk of spreading radioactive contamination is minimal because of the engineered integrity of the sealed radioactive sources. There is minimal potential for the intake of radioactive material for personnel working with these devices. Radiation generating devices (RGD) including analytical x-ray units are used for various purposes including x-ray diffraction and fluorescence studies of materials.

Areas of low-level contamination exist in some buildings of the Laboratory as a result of DOE legacy research and production activities. These areas are not routinely accessed by employees and signs are posted at access points to these areas. Work in the contaminated areas is performed under authority of established radiological work permits and Health Physics Group (HPG) oversight. New activities or modifications to approved activities involving the use of any source of ionizing radiation are approved through the Ames Laboratory Readiness Review process before beginning operations.

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7.0 APPLICABILITY

- 7.1** Ames Laboratory has a single RPP for operations managed under the prime contract # DE-AC02-07CH11358.
- 7.2** University space leased by Ames Laboratory is covered by this RPP to the extent that it is under management control of Ames Laboratory. Operations and staff under management control of the building owner are not covered by this RPP.
- 7.3** In accordance with the exclusion in 10 CFR 835.1(b)(1), the use or possession of commercial products containing radioactive material covered under a general or specific US Nuclear Regulatory Commission (NRC) license (e.g., static eliminators) is not covered by this RPP. Such products are to be handled in accordance with the provision of the license.
- 7.4** This RPP addresses all requirements of 10 CFR 835 and applies to all onsite and offsite operations where Ames Laboratory has primary management responsibility. Ames Laboratory workers conducting work at other DOE sites shall abide by the applicable local RPP. Regardless of where the work is conducted, Ames Laboratory retains responsibility for general requirements for its workers (e.g., ensuring workers are properly trained, maintaining doses below the limits, maintaining dosimetry records).
- 7.5** The following provisions apply to non-Ames Laboratory personnel conducting radiological work at Ames Laboratory or at locations where Ames Laboratory has primary management responsibility:
- 7.5.1** Non-Ames Laboratory workers are required to (and responsible to) conduct operations in a manner that is consistent with Ames Laboratory's RPP.
- 7.5.2** Ames Laboratory employees and programs that use the services of non-Ames Laboratory workers, or that act as hosts for visitors, students, participating guests, or vendors are responsible for ensuring the non-Ames Laboratory personnel receive appropriate training and information regarding applicable safety regulations, and comply with or conduct their operations in a manner that is consistent with the Ames Laboratory RPP.
- 7.5.3** Non-Ames Laboratory personnel shall follow Ames Laboratory requirements governing safety and shall be afforded the same level of safety as required for Ames Laboratory personnel.

8.0 RELATIONSHIP BETWEEN THIS RPP AND OTHER DOCUMENTS

- 8.1** The Ames Laboratory RPP is the primary document for governing radiological safety at Ames Laboratory as required by 10 CFR 835. Ames Laboratory provides implementation detail for the requirements of 10 CFR 835 in the Radiological Safety Program Description, (RSPD, Guide 10202.005). The RSPD provides detail for Ames Laboratory procedures as well as *Environment, Safety, Health and Assurance Manual* chapters, if applicable. The RSPD also guides radiological safety organizational documents such as HPG procedures, instrumentation and dosimetry procedures, technical basis documents, and other necessary program descriptive documents. If there is a conflict between the Ames Laboratory RPP and other Ames Laboratory documents, the RPP has primacy. A graphic showing this document hierarchy is included as Figure 1.

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8.2 The Ames Laboratory RPP Does Not Invoke The Following:

Any guidance documents unless specifically indicated in the RPP, which may include DOE guides, manuals, and standards; International Commission on Radiological Protection (ICRP) publications; National Council on Radiological Protection and Measurements (NCRP) reports; American National Standards Institute (ANSI) Standards.

9.0 AS LOW AS REASONABLY ACHIEVABLE (ALARA)

The RPP includes formal plans and measures for applying the 'as low as reasonably achievable' (ALARA) process to occupational exposure per 10 CFR 835.101(c). ALARA is a philosophy used in radiological safety to manage and control individual and collective dose to employees and visitors to levels as low as is reasonable, taking into account social, technical, economic, practical, and public policy considerations.

9.1 ALARA Policy

It is the policy of Ames Laboratory that its activities shall be conducted in such a manner that worker and public safety, including protection of the environment, is given the highest priority. Ames Laboratory management is committed, in all its activities, to reduce any safety, health, or environmental risks associated with ionizing radiation or radioactive materials to levels that are ALARA. Both individual and collective exposures to workers and the general public shall be maintained as far below the appropriate DOE limits as social, technical, economic, practical, and public policy considerations permit.

9.2 ALARA Implementation

The Ames Laboratory ALARA program is implemented as outlined in the Charter of the Ames Laboratory ALARA Committee, and informed by detailed information in the Ames Laboratory Radiological Safety Program Description, (RSPD), Chapter 2, "ALARA". The program described includes the following attributes:

9.2.1 ALARA training is incorporated into all levels of radiation worker training.

9.2.2 ALARA Plans and Procedures are implemented by line management to ensure that worker and public exposures are consistent with the requirements of 10 CFR 835. Key ALARA personnel include the following:

- The Ames Laboratory HPG within the Environment, Safety, Health and Assurance (ESH&A) Office;
- Division/Institute/Program Directors and Department Managers (herein referred to as Program Directors), and Safety Coordinators/Representatives appointed by individual groups and department leaders.

An ALARA Committee has been established to assist with workplace controls and in the review of facility designs and modifications to ensure the doses associated with radiological work are ALARA. The ALARA Committee chair and members are appointed by the Ames Laboratory Director and reports periodically to the Director. The ALARA Committee is a subcommittee of the Safety Review Committee.

9.3 ALARA Design Objectives

As described in the RSPD, Chapter 1, section 1.6, "Design and Control", and Chapter 2, "ALARA", radiological safety design considerations are applied to the design and

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modification of facilities, so as to limit exposures to individuals and releases to the environment. Cost-benefit considerations play a major role in the decision-making process for optimizing radiological safety.

- 9.4** ALARA internal audits are conducted at least once every 36 months (10 CFR 835.102).
- 9.5** ALARA records are maintained by the Ames Laboratory ESH&A Office. These records are also subject to the records requirements of Subpart H of 10 CFR 835.

10.0 IMPLEMENTATION

10.1 Implementing Methodology

- 10.1.1* Ames Laboratory accepts the provisions of 10 CFR 835, including the appendices, as effective on the date of this RPP and as published on the DOE web site. Ames Laboratory is committed to conducting its radiological operations in a manner consistent with 10 CFR 835 requirements.
- 10.1.2* Ames Laboratory implements its Radiological Safety Program based upon the Radiological Safety Program Description (RSPD). This document cites, as necessary, guidance documents to implement this RPP in Ames Laboratory procedures. Such guidance documents will include as appropriate: DOE guides, manuals, and standards; International Commission on Radiological Protection (ICRP) publications; National Council on Radiological Protection and Measurements (NCRP) reports; or American National Standards Institute (ANSI) Standards. Technical basis documents for Ames Laboratory Radiological Safety Program elements are also used as described in the RSPD.
- 10.1.3* Ames Laboratory line management is committed to maintaining internal policy documents that guide Ames Laboratory policy for key radiological safety commitments.
- 10.1.4* The attached 10 CFR 835 Implementation Matrix, Appendix A, illustrates how the chapter(s) of the RSPD implement each section of 10 CFR 835.
- 10.1.5* Ames Laboratory reserves the right to revise the contents of any individual internal policy and/or procedure as needed, to ensure they are current and appropriate for the intended purpose, provided that the revisions do not decrease the effectiveness of the program and the program continues to meet the requirements of 10 CFR 835. As the individual internal policy(ies) and procedure(s) themselves are not part of this RPP, their revision does not necessitate an update to the RPP.

Figure 1. RPP and Radiological Safety Implementation Document Hierarchy

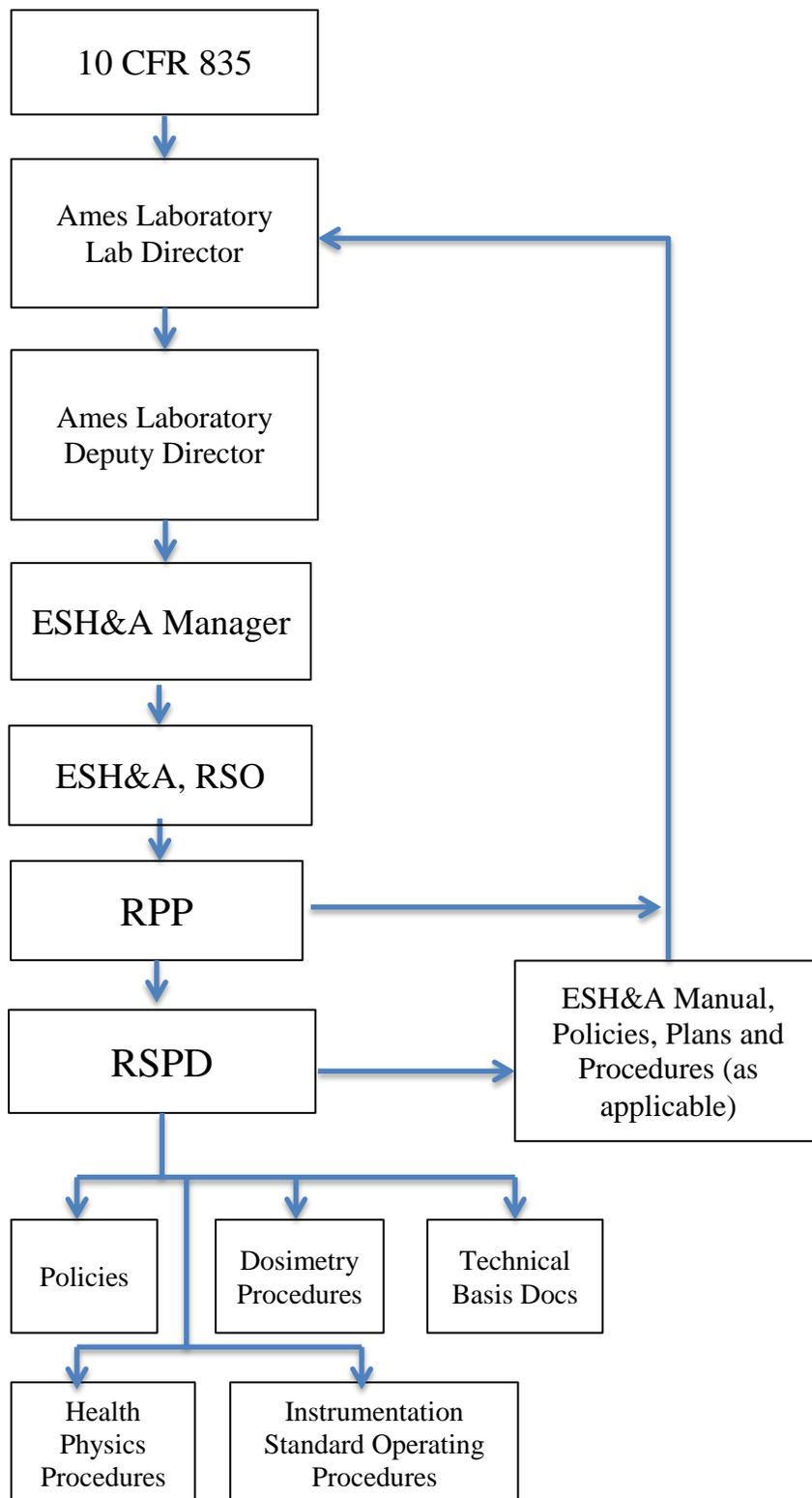


Figure 2. Ames Laboratory Location Relative to Des Moines, the Capital of Iowa.

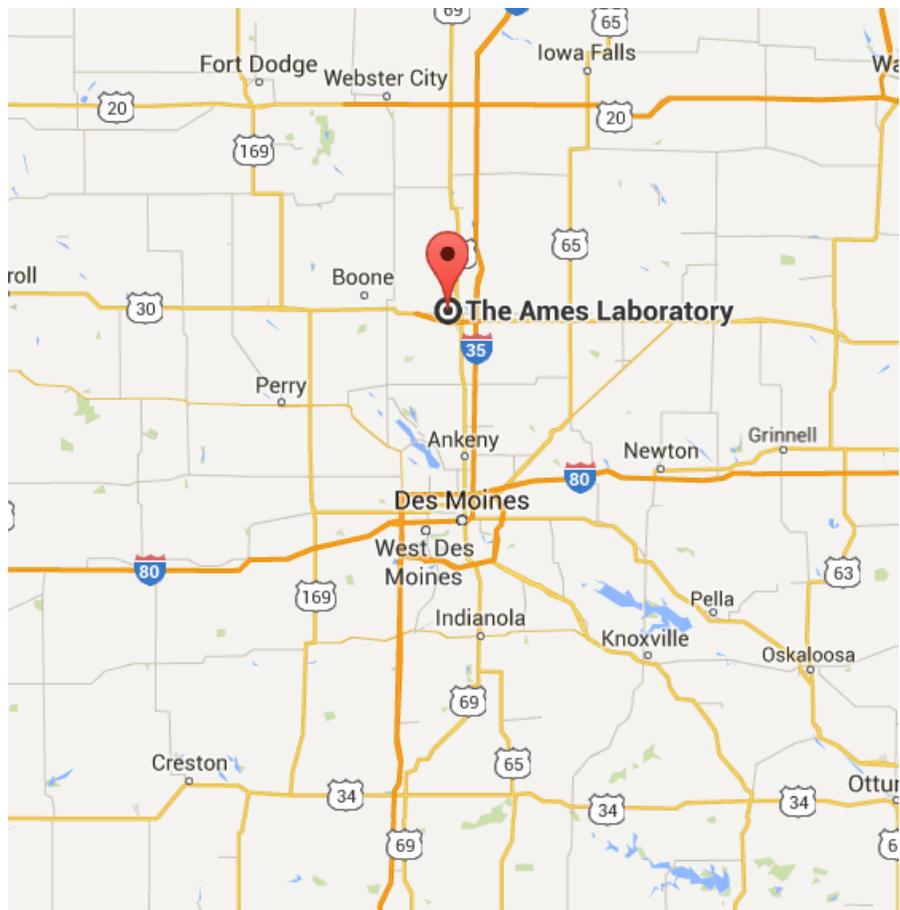


Figure 3. Ames Laboratory at ISU Central Campus

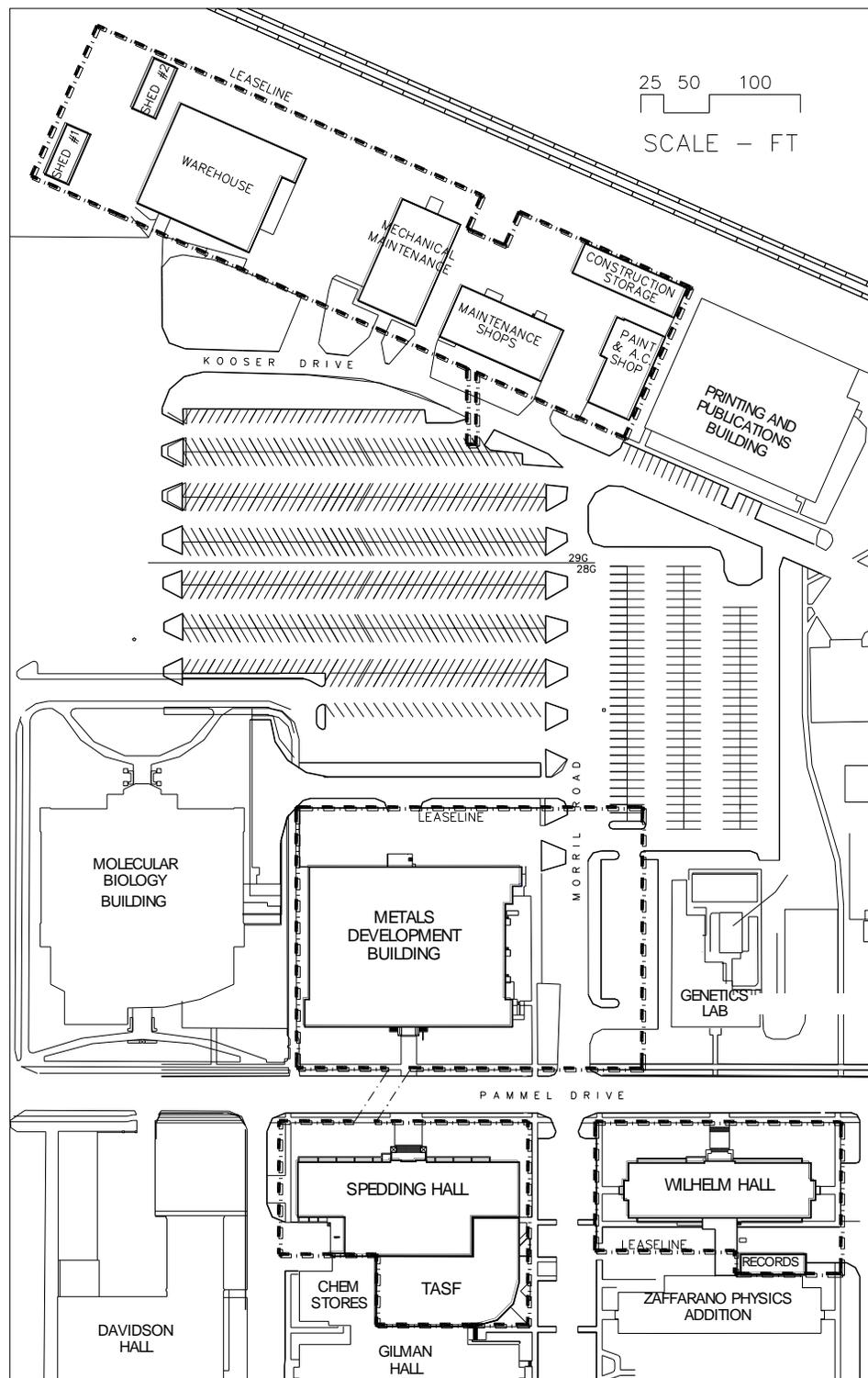
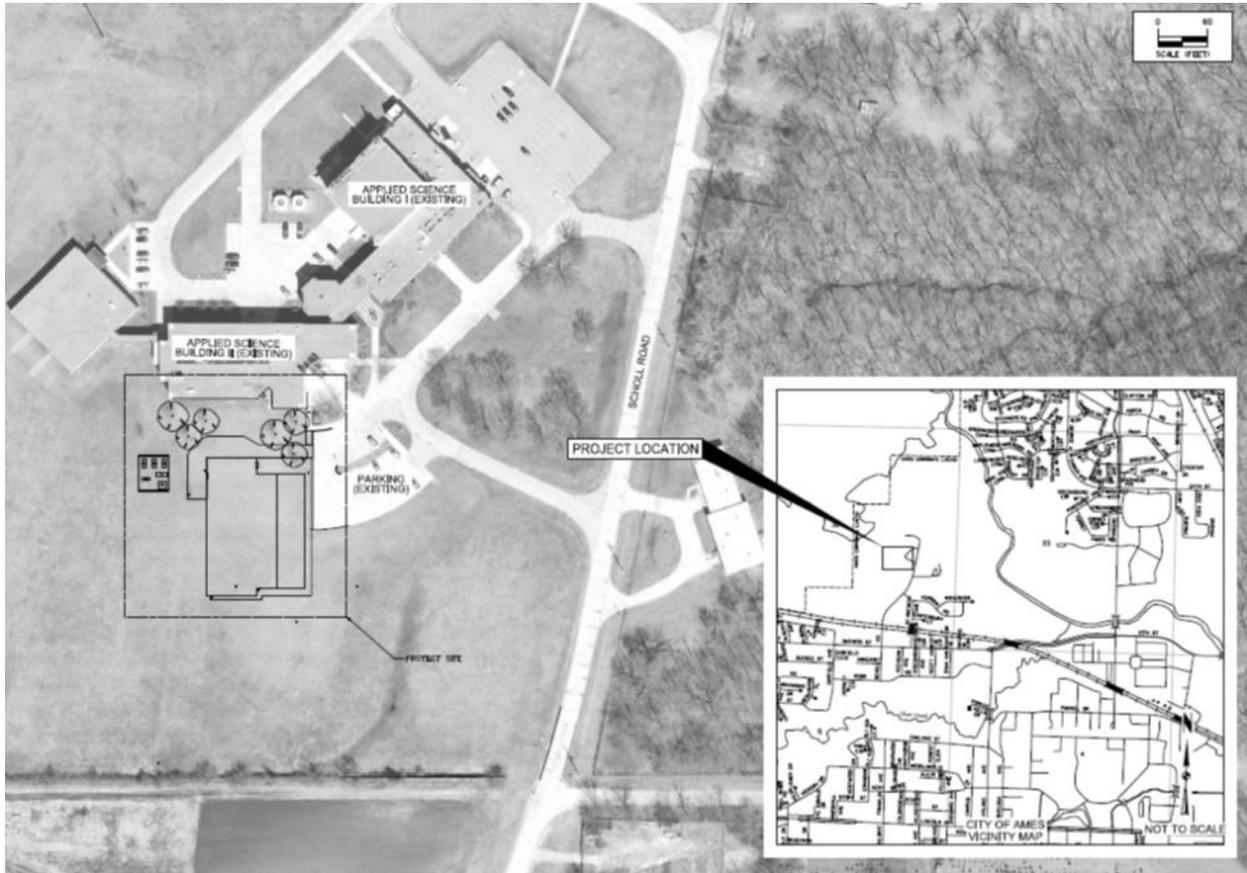


Figure 4. Ames Laboratory Sensitive Instrument Facility (SIF) at the ISU Applied Science Complex



Appendix A.

Policy and Commitment Basis			
RPP No.	Ames Laboratory Implementation Statement (Identical to 10 CFR 835)	10 CFR 835 Section	Ames Laboratory Implementation Basis/Commitment
Subpart A – General Provisions			
1.	General. The rules in this part establish radiation protection standards, limits, and program requirements for protecting individuals from ionizing radiation resulting from the conduct of DOE activities.	835.1(a)	DOE Administrative—not a requirement.
2.	Exclusion. Except as provided in paragraph (c) of this section, the requirements in this part do not apply to:	835.1(b)	Ames Laboratory accepts all listed exclusions as written.
3.	(1) Activities that are regulated through a license by the Nuclear Regulatory Commission or a State under an Agreement with the Nuclear Regulatory Commission, including activities certified by the Nuclear Regulatory Commission under section 1701 of the Atomic Energy Act;	835.1(b)(1)	
4.	(2) Activities conducted under the authority of the Deputy Administrator for Naval Reactors as described in Public Law 98-525 and 106-65.	835.1(b)(2)	
5.	(3) Activities conducted under the Nuclear Explosives and Weapons Surety Program relating to the prevention of accidental or unauthorized nuclear detonations.	835.1(b)(3)	
6.	(4) DOE activities conducted outside the United States on territory under the jurisdiction of a foreign government to the extent governed by occupational radiation protection requirements agreed to between the United States and the cognizant government	835.1(b)(4)	
7.	(5) Background radiation, radiation doses received as a patient for the purposes of medical diagnosis or therapy, or radiation doses received from participation as a subject in medical research programs: or	835.1(b)(5)	
8.	(6) Radioactive material on or within material, equipment, and real property which is approved for release when the radiological conditions of the material, equipment, and real property have been documented to comply with the criteria for release set forth in a DOE authorized limit which has been approved by a Secretarial Officer in consultation with the Associate Under Secretary for Environment, Health, Safety and Security.	835.1(b)(6)	
9.	(7) Radioactive material transportation not performed by DOE or a DOE contractor.	835.1(b)(7)	
10.	Occupational doses received as a result of excluded activities and radioactive material transportation, listed in paragraphs (b)(1) through (b)(4) and (b)(7) of this section, shall be included to the extent practicable when determining compliance with the occupational dose limits at §835.202 and §835.207, and with the limits for the embryo/fetus at §835.206. Occupational doses resulting from authorized emergency exposures and planned special exposures shall not be considered when determining compliance with the dose limits at §835.202 and §835.207.	835.1(c)	
11.	The requirements in subparts F and G of this part do not apply to radioactive material transportation by DOE or a DOE contractor conducted:	835.1(d)(1)	

Policy and Commitment Basis			
RPP No.	Ames Laboratory Implementation Statement (Identical to 10 CFR 835)	10 CFR 835 Section	Ames Laboratory Implementation Basis/Commitment
	(1) Under the continuous observation and control of an individual who is knowledgeable of and implements required exposure control measures, or		
12.	The requirements in subparts F and G of this part do not apply to radioactive material transportation by DOE or a DOE contractor conducted: (2) In accordance with Department of Transportation regulations or DOE orders that govern such movements.	835.1(d)(2)	
13.	<p>[Definitions.] As used in this part</p> <p>* <i>Accountable sealed radioactive source</i> 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 Appendix E of this part.</p> <p>* <i>Activity Median Aerodynamic Diameter (AMAD)</i> means a particle size in an aerosol where fifty percent of the activity in the aerosol is associated with particles of aerodynamic diameter greater than the AMAD.</p> <p>* <i>Airborne radioactive material or airborne radioactivity</i> means radioactive material dispersed in the air in the form of dusts, fumes, particulates, mists, vapors, or gases.</p> <p>* <i>Airborne radioactivity area</i> means any area, accessible to individuals, where: (1) The concentration of airborne radioactivity, above natural background, exceeds or is likely to exceed the derived air concentration (DAC) values listed in appendix A or appendix C of this part; or (2) An individual present in the area without respiratory protection could receive an intake exceeding 12 DAC-hours in a week.</p> <p>* <i>ALARA</i> means "As Low As is Reasonably Achievable," which is the approach to radiation protection to manage and control exposures (both individual and collective) to the work force and to the general public to as low as is reasonable, taking into account social, technical, economic, practical, and public policy considerations. As used in this part, ALARA is not a dose limit but a process which has the objective of attaining doses as far below the applicable limits of this part as is reasonably achievable.</p> <p>* <i>Annual limit on intake (ALI)</i> means the derived limit for the amount of radioactive material taken into the body of an adult worker by inhalation or ingestion in a year. ALI is the smaller value of intake of a given radionuclide in a year by the reference man (ICRP Publication 23) that would result in a committed effective dose of 5 rems (0.05 sieverts (Sv)) (1 rem = 0.01 Sv) or a committed equivalent dose of 50 rems (0.5 Sv) to any individual organ or tissue. ALI values for intake by ingestion and inhalation of selected radionuclides are based on International Commission on Radiological Protection Publication 68, <i>Dose Coefficients for Intakes of</i></p>	835.2(a)	Ames Laboratory accepts all definitions (section 835.2(a)) as written and incorporates them into its program as Chapter 13 of the Ames Laboratory RPSD.

Policy and Commitment Basis			
RPP No.	Ames Laboratory Implementation Statement (Identical to 10 CFR 835)	10 CFR 835 Section	Ames Laboratory Implementation Basis/Commitment
	<p><i>Radionuclides by Workers</i>, published July, 1994 (ISBN 0 08 042651 4). This document is available from Elsevier Science Inc., Tarrytown, NY.</p> <p>* <i>Authorized limit</i> means a limit on the concentration of residual radioactive material on the surfaces or within the property that has been derived consistent with DOE directives including the as low as is reasonably achievable (ALARA) process requirements, given the anticipated use of the property and has been authorized by DOE to permit the release of the property from DOE radiological control.</p> <p>* <i>Background</i> means radiation from:</p> <ol style="list-style-type: none"> (1) Naturally occurring radioactive materials which have not been technologically enhanced; (2) Cosmic sources; (3) Global fallout as it exists in the environment (such as from the testing of nuclear explosive devices); (4) Radon and its progeny in concentrations or levels existing in buildings or the environment which have not been elevated as a result of current or prior activities; and (5) Consumer products containing nominal amounts of radioactive material or producing nominal amounts of radiation. <p>* <i>Bioassay</i> means the determination of kinds, quantities, or concentrations, and, in some cases, locations of radioactive material in the human body, whether by direct measurement or by analysis, and evaluation of radioactive materials excreted or removed from the human body.</p> <p>* <i>Calibration</i> means to adjust and/or determine either:</p> <ol style="list-style-type: none"> (1) The response or reading of an instrument relative to a standard (e.g., primary, secondary, or tertiary) or to a series of conventionally true values; or (2) The strength of a radiation source relative to a standard (e.g., primary, secondary, or tertiary) or conventionally true value. <p>* <i>Contamination area</i> means any area, accessible to individuals, where removable surface contamination levels exceed or are likely to exceed the removable surface contamination values specified in appendix D of this part, but do not exceed 100 times those values.</p> <p>* <i>Controlled area</i> means any area to which access is managed by or for DOE to protect individuals from exposure to radiation and/or radioactive material.</p> <p>* <i>Declared pregnant worker</i> means a woman who has voluntarily declared to her employer, in writing, her pregnancy for the purpose of being subject to the occupational dose limits to the embryo/fetus as provided in Sec. 835.206. This declaration may be revoked, in writing, at any time by the declared pregnant worker.</p>		

Policy and Commitment Basis			
RPP No.	Ames Laboratory Implementation Statement (Identical to 10 CFR 835)	10 CFR 835 Section	Ames Laboratory Implementation Basis/Commitment
	<p>* <i>Derived air concentration (DAC)</i> means, for the radionuclides listed in appendix A of this part, the airborne concentration that equals the ALI divided by the volume of air breathed by an average worker for a working year of 2000 hours (assuming a breathing volume of 2400 m³). For the radionuclides listed in appendix C of this part, the air immersion DACs were calculated for a continuous, non-shielded exposure via immersion in a semi-infinite cloud of radioactive material. Except as noted in the footnotes to appendix A of this part, the values are based on dose coefficients from International Commission on Radiological Protection Publication 68, <i>Dose Coefficients for Intakes of Radionuclides by Workers</i>, published July, 1994 (ISBN 0 08 042651 4) and the associated ICRP computer program, <i>The ICRP Database of Dose Coefficients: Workers and Members of the Public</i>, (ISBN 0 08 043 8768). These materials are available from Elsevier Science Inc., Tarrytown, NY.</p>		
	<p>* <i>Derived air concentration-hour (DAC-hour)</i> means the product of the concentration of radioactive material in air (expressed as a fraction or multiple of the DAC for each radionuclide) and the time of exposure to that radionuclide, in hours.</p>		
	<p>* <i>Deterministic effects</i> means effects due to radiation exposure for which the severity varies with the dose and for which a threshold normally exists (e.g., radiation-induced opacities within the lens of the eye).</p>		
	<p>* <i>DOE</i> means the United States Department of Energy.</p>		
	<p>* <i>DOE activity</i> means an activity taken for or by DOE in a DOE operation or facility that has the potential to result in the occupational exposure of an individual to radiation or radioactive material. The activity may be, but is not limited to, design, construction, operation, or decommissioning. To the extent appropriate, the activity may involve a single DOE facility or operation or a combination of facilities and operations, possibly including an entire site or multiple DOE sites.</p>		
	<p>* <i>Entrance or access point</i> means any location through which an individual could gain access to areas controlled for the purposes of radiation protection. This includes entry or exit portals of sufficient size to permit human entry, irrespective of their intended use.</p>		
	<p>* <i>General employee</i> means an individual who is either a DOE or DOE contractor employee; an employee of a subcontractor to a DOE contractor; or an individual who performs work for or in conjunction with DOE or utilizes DOE facilities.</p>		
	<p>* <i>High contamination area</i> means any area, accessible to individuals, where removable surface contamination levels exceed or are likely to exceed 100 times the removable surface contamination values specified in appendix D of this part.</p>		

Policy and Commitment Basis			
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	<p>* <i>High radiation area</i> 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 0.1 rems (0.001 Sv) in 1 hour at 30 centimeters from the radiation source or from any surface that the radiation penetrates.</p>		
	<p>* <i>Individual</i> means any human being.</p>		
	<p>* <i>Member of the public</i> means an individual who is not a general employee. An individual is not a "member of the public" during any period in which the individual receives an occupational dose</p>		
	<p>* <i>Minor</i> means an individual less than 18 years of age.</p>		
	<p>* <i>Monitoring</i> means the measurement of radiation levels, airborne radioactivity concentrations, radioactive contamination levels, quantities of radioactive material, or individual doses and the use of the results of these measurements to evaluate radiological hazards or potential and actual doses resulting from exposures to ionizing radiation.</p>		
	<p>* <i>Occupational dose</i> means an individual's ionizing radiation dose (external and internal) as a result of that individual's work assignment. Occupational dose does not include doses received as a medical patient or doses resulting from background radiation or participation as a subject in medical research programs.</p>		
	<p>* <i>Person</i> means any individual, corporation, partnership, firm, association, trust, estate, public or private institution, group, Government agency, any State or political subdivision of, or any political entity within a State, any foreign government or nation or other entity, and any legal successor, representative, agent or agency of the foregoing; provided that person does not include DOE or the United States Nuclear Regulatory Commission.</p>		
	<p>* <i>Radiation</i> means ionizing radiation: alpha particles, beta particles, gamma rays, X-rays, neutrons, high-speed electrons, high-speed protons, and other particles capable of producing ions. Radiation, as used in this part, does not include non-ionizing radiation, such as radio waves or microwaves, or visible, infrared, or ultraviolet light.</p>		
	<p>* <i>Radiation area</i> 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.</p>		
	<p>* <i>Radioactive material area</i> means any area within a controlled area, accessible to individuals, in which items or containers of radioactive material exist and the total activity of radioactive material exceeds the applicable values provided in appendix E of this part.</p>		

Policy and Commitment Basis			
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	* <i>Radioactive material transportation</i> means the movement of radioactive material by aircraft, rail, vessel, or highway vehicle. Radioactive material transportation does not include preparation of material or packagings for transportation, storage of material awaiting transportation, or application of markings and labels required for transportation.		
	* <i>Radiological area</i> means any area within a controlled area defined in this section as a "radiation area," "high radiation area," "very high radiation area," "contamination area," "high contamination area," or "airborne radioactivity area."		
	* <i>Radiological worker</i> means a general employee whose job assignment involves operation of radiation producing devices or working with radioactive materials, or who is likely to be routinely occupationally exposed above 0.1 rem (0.001 Sv) per year total effective dose.		
	* <i>Real property</i> means land and anything permanently affixed to the land such as buildings, fences and those things attached to the buildings, such as light fixtures, plumbing and heating fixtures.		
	* <i>Real-time air monitoring</i> means measurement of the concentrations or quantities of airborne radioactive materials on a continuous basis.		
	* <i>Respiratory protective device</i> means an apparatus, such as a respirator, worn by an individual for the purpose of reducing the individual's intake of airborne radioactive materials.		
	* <i>Sealed radioactive source</i> 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. Sealed radioactive sources do not include reactor fuel elements, nuclear explosive devices, and radioisotope thermoelectric generators.		
	* <i>Source leak test</i> means a test to determine if a sealed radioactive source is leaking radioactive material.		
	* <i>Special tritium compound (STC)</i> means any compound, except for H ₂ O, that contains tritium, either intentionally (e.g., by synthesis) or inadvertently (e.g., by contamination mechanisms).		
	* <i>Stochastic effects</i> means malignant and hereditary diseases for which the probability of an effect occurring, rather than its severity, is regarded as a function of dose without a threshold, for radiation protection purposes.		
	* <i>Very high radiation area</i> means any area accessible to individuals in which radiation levels could result in an individual receiving an absorbed dose in excess of 500 rads (5 grays) in one hour at 1 meter from a radiation source		

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	<p>or from any surface that the radiation penetrates.</p> <p>* <i>Week</i> means a period of seven consecutive days.</p> <p>* <i>Year</i> means the period of time beginning on or near January 1 and ending on or near December 31 of that same year used to determine compliance with the provisions of this part. The starting and ending date of the year used to determine compliance may be changed provided that the change is made at the beginning of the year and that no day is omitted or duplicated in consecutive years.</p>		
14.	<p>[Definitions.] As used in this part to describe various aspects of radiation dose:</p> <p>* <i>Absorbed dose</i> (D) means the average energy imparted by ionizing radiation to the matter in a volume element per unit mass of irradiated material. The absorbed dose is expressed in units of rad (or gray) (1 rad = 0.01 gray).</p> <p>* <i>Committed effective dose</i> (E_{50}) means the sum of the committed equivalent doses to various tissues or organs in the body ($H_{T,50}$), each multiplied by the appropriate tissue weighting factor (w_T)-that is, $E_{50} = \sum w_T H_{T,50} + w_{\text{Remainder}} H_{\text{Remainder},50}$. Where $w_{\text{Remainder}}$ is the tissue weighting factor assigned to the remainder organs and tissues and $H_{\text{Remainder},50}$ is the committed equivalent dose to the remainder organs and tissues. Committed effective dose is expressed in units of rem (or Sv).</p> <p>* <i>Committed equivalent dose</i> ($H_{T,50}$) means the equivalent dose calculated to be received by a tissue or organ over a 50-year period after the intake of a radionuclide into the body. It does not include contributions from radiation sources external to the body. Committed equivalent dose is expressed in units of rem (or Sv).</p> <p>* <i>Cumulative total effective dose</i> means the sum of all total effective dose values recorded for an individual plus, for occupational exposures received before the implementation date of this amendment, the cumulative total effective dose equivalent (as defined in the November 4, 1998 amendment to this rule) values recorded for an individual, where available, for each year occupational dose was received, beginning January 1, 1989.</p> <p>* <i>Dose</i> is a general term for absorbed dose, equivalent dose, effective dose, committed equivalent dose, committed effective dose, or total effective dose as defined in this part.</p> <p>* <i>Effective dose</i> (E) means the summation of the products of the equivalent dose received by specified tissues or organs of the body (H_T) and the appropriate tissue weighting factor (w_T)-that is, $E = \sum w_T H_T$. It includes the dose from radiation sources internal and/or external to the body. For purposes of compliance with this part, equivalent dose to the whole body may be used as effective dose for external exposures. The effective dose</p>	835.2(b)	Ames Laboratory accepts all definitions (section 835.2(b)) as written and incorporates them into its program as Chapter 13 of the Ames Laboratory RPSD.

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	<p>is expressed in units of rem (or Sv).</p> <p>* <i>Equivalent dose</i> (H_T) means the product of average absorbed dose ($D_{T,R}$) in rad (or gray) in a tissue or organ (T) and a radiation (R) weighting factor (w_R). For external dose, the equivalent dose to the whole body is assessed at a depth of 1 cm in tissue; the equivalent dose to the lens of the eye is assessed at a depth of 0.3 cm in tissue, and the equivalent dose to the extremity and skin is assessed at a depth of 0.007 cm in tissue. Equivalent dose is expressed in units of rem (or Sv).</p> <p>* <i>External dose or exposure</i> means that portion of the equivalent dose received from radiation sources outside the body (i.e., "external sources").</p> <p>* <i>Extremity</i> means hands and arms below the elbow or feet and legs below the knee.</p> <p>* <i>Internal dose or exposure</i> means that portion of the equivalent dose received from radioactive material taken into the body (e.g., "internal sources").</p> <p>* <i>Radiation weighting factor</i> (w_R) means the modifying factor used to calculate the equivalent dose from the average tissue or organ absorbed dose; the absorbed dose (expressed in rad or gray) is multiplied by the appropriate radiation weighting factor. The radiation weighting factors to be used for determining equivalent dose in rem are as follows:</p> <p style="text-align: center;">----- Radiation Weighting Factors ¹, w_R <i>Table not reproduced.</i> -----</p> <p>¹ All values relate to the radiation incident on the body or, for internal sources, emitted from the source.</p> <p>² When spectral data are insufficient to identify the energy of the neutrons, a radiation weighting factor of 20 shall be used.</p> <p>³ When spectral data are sufficient to identify the energy of the neutrons, the following equation may be used to determine a neutron radiation weighting factor value:</p> <p style="text-align: center;">----- <i>Formula not reproduced. Ames Laboratory accepts the formula for use as described in this definition.</i> -----</p> <p>* <i>Tissue weighting factor</i> (w_T) means the fraction of the overall health risk, resulting from uniform, whole body irradiation, attributable to specific tissue (T). The equivalent dose to tissue, (H_T), is multiplied by the appropriate tissue weighting factor to obtain the effective dose (E) contribution from that tissue. The tissue weighting factors are as follows:</p>		

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	<p>Tissue Weighting Factors for Various Organs and Tissues *****</p> <p>¹ "Remainder" means the following additional tissues and organs and their masses, in grams, following parenthetically: adrenals (14), brain (1400), extrathoracic airways (15), small intestine (640), kidneys (310), muscle (28,000), pancreas (100), spleen (180), thymus (20), and uterus (80). The equivalent dose to the remainder tissues ($H_{\text{remainder}}$), is normally calculated as the mass-weighted mean dose to the preceding ten organs and tissues. In those cases in which the most highly irradiated remainder tissue or organ receives the highest equivalent dose of all the organs, a weighting factor of 0.025 (half of remainder) is applied to that tissue or organ and 0.025 (half of remainder) to the mass-weighted equivalent dose in the rest of the remainder tissues and organs to give the remainder equivalent dose.</p> <p>² For the case of uniform external irradiation of the whole body, a tissue weighting factor (w_T) equal to 1 may be used in determination of the effective dose.</p> <p>* <i>Total effective dose</i> (TED) means the sum of the effective dose (for external exposures) and the committed effective dose.</p> <p>* <i>Whole body</i> means, for the purposes of external exposure, head, trunk (including male gonads), arms above and including the elbow, or legs above and including the knee.</p>		
15.	Terms defined in the Atomic Energy Act of 1954 or in 10 CFR part 820 and not defined in this part are used consistent with their meanings given in the Atomic Energy Act of 1954 or in 10 CFR part 820.	835.2(c)	Ames Laboratory accepts all definitions (section 835.2(c)) as written and incorporates them into its program as Chapter 13 of the Ames Laboratory RPSD.
16.	No person or DOE personnel shall take or cause to be taken any action inconsistent with the requirements of: (1) This part; or (2) Any program, plan, schedule, or other process established by this part.	835.3(a)	Description of implementation can be found in Chapter 1 of the Ames Laboratory RSPD, "General Requirements".
17.	With respect to a particular DOE activity, contractor management shall be responsible for compliance with the requirements of this part.	835.3(b)	Description of implementation can be found in Chapter 1 of the Ames Laboratory RSPD, "General Requirements".
18.	Where there is no contractor for a DOE activity, DOE shall ensure implementation of and compliance with the requirements of this part.	835.3(c)	DOE administrative provision, not a requirement for Ames Laboratory.
19.	Nothing in this part shall be construed as limiting actions that may be necessary to protect health and safety.	835.3(d)	Description of implementation can be found in Chapter 1 of the Ames Laboratory RSPD, "General Requirements".
20.	For those activities that are required by §835.102, §835.901(e), §835.1202(a), and §835.1202(b), the time interval to conduct these activities may be extended by a period not to exceed 30 days to accommodate scheduling needs.	835.3(e)	Description of implementation can be found in Chapter 1 of the Ames Laboratory RSPD, "General Requirements".

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21.	Radiological units. Unless otherwise specified, the quantities used in the records required by this part shall be clearly indicated in special units of curie, rad, roentgen, or rem, including multiples and subdivisions of these units, or other conventional units, such as, dpm, dpm/100 cm ² or mass units. The SI units, becquerel (Bq), gray (Gy), and sievert (Sv), may be provided parenthetically for reference with scientific standards.	835.4	Records required by 10 CFR 835 will use the units listed, as stated in Chapter 1 of the Ames Laboratory RSPD, "General Requirements".
Subpart B – Management and Administrative Requirements			
22.	101 Radiation protection programs. (a) A DOE activity shall be conducted in compliance with a documented radiation protection program (RPP) as approved by the DOE.	835.101(a)	This document provides a commitment basis for the requirements of 10 CFR 835. Implementation is described in the Ames Laboratory RSPD.
23.	101 Radiation protection programs. (b) The DOE may direct or make modifications to a RPP.	835.101(b)	Ames Laboratory accepts this provision as written.
24.	101 Radiation protection programs. (c) The content of each RPP shall be commensurate with the nature of the activities performed and	835.101(c)	Ames Laboratory's approved RPP establishes the documentation to implement §835.101(c) as written. "Commensurate with the nature of the activities performed" means those performed or managed by Ames Laboratory or any of its contractors as defined by contract DE-AC02-07CH11358.
25.	[continued] shall include formal plans and measures for applying the as low as reasonably achievable (ALARA) process to occupational exposure.	835.101(c)	As described in "Radiation Protection Programs Guide for Use with Title 10, Code of Federal Regulations, Part 835, Occupational Radiation Protection", DOE G 441.1-1C (Dated 5/19/2008), Change 1 (Dated 7/8/2011), Section 4.2.0, paragraph 1. The seven elements of an ALARA Program are: 1. Policy and Management Commitment; 2. ALARA Training; 3. Plans and Procedures; 4. Internal Assessments/Audits; 5. ALARA Design Review; 6. Radiological Work/Experiment Administration and Planning; and 7. Records. Ames Laboratory implements this process as described in Chapter 2 of the Ames Laboratory RSPD, "ALARA".

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26.	101 Radiation protection programs. (d) The RPP shall specify the existing and/or anticipated operational tasks that are intended to be within the scope of the RPP.	835.101(d)	Ames Laboratory activities considered within existing and/or anticipated operational tasks are described in contract DE-AC02-07CH11358 between Ames Laboratory and the Department of Energy. These are described in section 4, RPP Summary.
27.	[continued] Except as provided in §835.101(h), any task outside the scope of a RPP shall not be initiated until an update of the RPP is approved by DOE.	835.101(d)	No new radiological task or activity will be initiated (as defined in this RPP, Section 3.0), except as provided in §835.101(h). DOE will provide approval or direction through the Ames Laboratory site area office.
28.	101 Radiation protection programs. (e) The content of the RPP shall address, but shall not necessarily be limited to, each requirement in this part.	835.101(e)	Upon DOE approval, Ames Laboratory's RPP implements §835.101(e) as written. The RPP will be managed and controlled through the establishment of appropriate administrative measures.
29.	101 Radiation protection programs. (f) The RPP shall include plans, schedules, and other measures for achieving compliance with regulations of this part.	835.101(f)	This RPP includes a schedule for implementation with two milestones.
30.	[continued] Unless otherwise specified in this part, compliance with the amendments to this part published on June 8, 2007 shall be achieved no later than July 9, 2010.	835.101(f)	Ames Laboratory achieved compliance with the listed amendments upon approval of the RPP, effective dated January 01, 2008.
31.	101 Radiation protection programs. (g) An update of the RPP shall be submitted to DOE: (1) Whenever a change or an addition to the RPP is made;	835.101(g)(1)	Ames Laboratory accepts requirement §835.101(g)(1) as written. The RPP will be managed and controlled through the establishment of appropriate administrative measures.
32.	101 Radiation protection programs. (g) An update of the RPP shall be submitted to DOE: (2) Prior to the initiation of a task not within the scope of the RPP; or	835.101(g)(2)	This revision of the RPP does not document the initiation of a task not within the scope of the last approved revision to the RPP.
33.	101 Radiation protection programs. (g) An update of the RPP shall be submitted to DOE: (3) Within 180 days of the effective date of any modifications to this part.	835.101(g)(3)	This revision does not reflect a revision to 10 CFR 835.
34.	101 Radiation protection programs. (h) Changes, additions, or updates to the RPP may become effective without prior Department approval only if the changes do not decrease the effectiveness of the RPP and the RPP, as changed, continues to meet the requirements of this part.	835.101(h)	This revision to the Ames Laboratory RPP does not decrease its effectiveness, and continues to meet the requirements of 10 CFR 835.
35.	[continued] Proposed changes that decrease the effectiveness of the RPP shall not be implemented without submittal to and approval by the Department.	835.101(h)	This revision to the Ames Laboratory RPP does not decrease the effectiveness of the RPP.
36.	101 Radiation protection programs. (i) An initial RPP or an update shall be considered approved 180 days after its submission unless rejected by DOE at an earlier date.	835.101(i)	DOE administrative; not a requirement.

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37.	Internal audits of the radiation protection program, including examination of program content and implementation, shall be conducted through a process that ensures that all functional elements are reviewed no less frequently than every 36 months.	835.102	The implementation of audits and assessment requirements under 10 CFR 835 is described in Chapter 1 of the Ames Laboratory RSPD, "General Requirements".
38.	Individuals responsible for developing and implementing measures necessary for ensuring compliance with the requirements of this part shall have the appropriate education, training, and skills to discharge these responsibilities.	835.103	Key radiological safety positions will be consistent with DOE STD 1107-97. Training will be documented and implementation described in Chapter 11 of the Ames Laboratory RSPD, "Radiation Safety Training".
39.	Written procedures shall be developed and implemented as necessary to ensure compliance with this part, commensurate with the radiological hazards created by the activity and consistent with the education, training, and skills of the individuals exposed to those hazards.	835.104	Ames Laboratory procedures implementing part 835 requirements are developed in accordance with the policies, practices, and methods in the Ames Laboratory RSPD, Chapter 1, "General Requirements".
Subpart C – Standards for Internal and External Exposure			
	[Reserved]	835.201	
40.	Except for planned special exposures conducted consistent with §835.204 and emergency exposures authorized in accordance with §835.1302, the occupational dose received by general employees shall be controlled such that the following limits are not exceeded in a year: (1) A total effective dose of 5 rems (0.05 Sv);	835.202(a)(1)	The description of how dose limits in § 835.202(a) are implemented can be found in Chapter 1 of the Ames Laboratory RSPD, "General Requirements", § 1.3, "Radiation Dose Limits".
41.	Except for planned special exposures conducted consistent with §835.204 and emergency exposures authorized in accordance with §835.1302, the occupational dose received by general employees shall be controlled such that the following limits are not exceeded in a year: (2) The sum of the equivalent dose to the whole body for external exposures and the committed equivalent dose to any organ or tissue other than the skin or the lens of the eye of 50 rems (0.5 Sv);	835.202(a)(2)	
42.	Except for planned special exposures conducted consistent with §835.204 and emergency exposures authorized in accordance with §835.1302, the occupational dose received by general employees shall be controlled such that the following limits are not exceeded in a year: (3) An equivalent dose to the lens of the eye of 15 rems (0.15 Sv); and	835.202(a)(3)	
43.	Except for planned special exposures conducted consistent with §835.204 and emergency exposures authorized in accordance with §835.1302, the occupational dose received by general employees shall be controlled such that the following limits are not exceeded in a year: (4) The sum of the equivalent dose to the skin or to any extremity for external exposures and the committed equivalent dose to the skin or to any extremity of 50 rems (0.5 Sv).	835.202(a)(4)	
44.	All occupational doses received during the current year, except doses resulting from planned special exposures conducted in compliance with §835.204 and emergency exposures authorized in accordance with	835.202(b)	

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	§835.1302, shall be included when demonstrating compliance with §835.202(a) and §835.207		
45.	Doses from background, therapeutic and diagnostic medical radiation, and participation as a subject in medical research programs shall not be included in dose records or in the assessment of compliance with the occupational dose limits.	835.202(c)	Description of implementation can be found in Chapter 1 of the Ames Laboratory RSPD, "General Requirements", § 1.3, "Radiation Dose Limits".
46.	The total effective dose during a year shall be determined by summing the effective dose from external exposures and the committed effective dose from intakes during the year.	835.203(a)	Description of implementation can be found in Chapter 1 of the Ames Laboratory RSPD, "General Requirements", § 1.3, "Radiation Dose Limits".
47.	Determinations of the effective dose shall be made using the radiation and tissue weighting factor values provided in §835.2.	835.203(b)	Description of implementation can be found in Chapter 1 of the Ames Laboratory RSPD, "General Requirements", § 1.3, "Radiation Dose Limits".
48.	A planned special exposure may be authorized for a radiological worker to receive doses in addition to and accounted for separately from the doses received under the limits specified in §835.202(a), provided that each of the following conditions is satisfied: (1) The planned special exposure is considered only in an exceptional situation when alternatives that might prevent a radiological worker from exceeding the limits in §835.202(a) are unavailable or impractical;	835.204(a)(1)	Description of implementation can be found in Chapter 1 of the Ames Laboratory RSPD, "General Requirements", § 1.3, "Radiation Dose Limits".
49.	A planned special exposure may be authorized for a radiological worker to receive doses in addition to and accounted for separately from the doses received under the limits specified in §835.202(a), provided that each of the following conditions is satisfied: (2) The contractor management (and employer, if the employer is not the contractor) specifically requests the planned special exposure, in writing; and	835.204(a)(2)	Description of implementation can be found in Chapter 1 of the Ames Laboratory RSPD, "General Requirements", § 1.3, "Radiation Dose Limits".
50.	A planned special exposure may be authorized for a radiological worker to receive doses in addition to and accounted for separately from the doses received under the limits specified in §835.202(a), provided that each of the following conditions is satisfied: (3) Joint written approval is received from the appropriate DOE Headquarters program office and the Secretarial Officer responsible for environment, safety and health matters.	835.204(a)(3)	Description of implementation can be found in Chapter 1 of the Ames Laboratory RSPD, "General Requirements", § 1.3, "Radiation Dose Limits".
51.	Prior to requesting an individual to participate in an authorized planned special exposure, the individual's dose from all previous planned special exposures and all doses in excess of the occupational dose limits shall be determined.	835.204(b)	Description of implementation can be found in Chapter 1 of the Ames Laboratory RSPD, "General Requirements", § 1.3, "Radiation Dose Limits".
52.	An individual shall not receive a planned special exposure that, in addition to the doses determined in §835.204(b), would result in a dose exceeding the following: (1) In a year, the numerical values of the dose limits established at	835.204(c)(1)	Description of implementation can be found in Chapter 1 of the Ames Laboratory RSPD, "General Requirements", § 1.3, "Radiation Dose Limits".

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	§835.202(a); and		
53.	An individual shall not receive a planned special exposure that, in addition to the doses determined in §835.204(b), would result in a dose exceeding the following: (2) Over the individual's lifetime, five times the numerical values of the dose limits established at §835.202(a).	835.204(c)(2)	Description of implementation can be found in Chapter 1 of the Ames Laboratory RSPD, "General Requirements", § 1.3, "Radiation Dose Limits".
54.	Prior to a planned special exposure, written consent shall be obtained from each individual involved. Each such written consent shall include: (1) The purpose of the planned operations and procedures to be used;	835.204(d)(1)	Description of implementation can be found in Chapter 1 of the Ames Laboratory RSPD, "General Requirements", § 1.3, "Radiation Dose Limits".
55.	Prior to a planned special exposure, written consent shall be obtained from each individual involved. Each such written consent shall include: (2) The estimated doses and associated potential risks and specific radiological conditions and other hazards which might be involved in performing the task; and	835.204(d)(2)	Description of implementation can be found in Chapter 1 of the Ames Laboratory RSPD, "General Requirements", § 1.3, "Radiation Dose Limits".
56.	Prior to a planned special exposure, written consent shall be obtained from each individual involved. Each such written consent shall include: (3) Instructions on the measures to be taken to keep the dose ALARA considering other risks that may be present.	835.204(d)(3)	Description of implementation can be found in Chapter 1 of the Ames Laboratory RSPD, "General Requirements", § 1.3, "Radiation Dose Limits".
57.	Records of the conduct of a planned special exposure shall be maintained and a written report submitted within 30 days after the planned special exposure to the approving organizations identified in §835.204(a)(3).	835.204(e)	Description of implementation can be found in Chapter 1 of the Ames Laboratory RSPD, "General Requirements", § 1.3, "Radiation Dose Limits", and Chapter 12, "Occupational radiation protection record-keeping and reporting".
58.	The dose from planned special exposures is not to be considered in controlling future occupational dose of the individual under §835.202(a), but is to be included in records and reports required under this part.	835.204(f)	Description of implementation can be found in Chapter 1 of the Ames Laboratory RSPD, "General Requirements", § 1.3, "Radiation Dose Limits", and Chapter 12, "Occupational radiation protection record-keeping and reporting".
59.	Non-uniform exposures of the skin from X-rays, beta radiation, and/or radioactive material on the skin are to be assessed as specified in this section.	835.205(a)	This description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 4, "External Dosimetry Program".
60.	For purposes of demonstrating compliance with §835.202(a)(4), assessments shall be conducted as follows: (1) Area of skin irradiated is 100 cm ² or more. The non-uniform equivalent dose received during the year shall be averaged over the 100 cm ² of the skin receiving the maximum dose, added to any uniform equivalent dose also received by the skin, and recorded as the equivalent dose to any extremity or skin for the year.	835.205(b)(1)	This description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 4, "External Dosimetry Program".
61.	For purposes of demonstrating compliance with §835.202(a)(4), assessments shall be conducted as follows: (2) Area of skin irradiated is 10 cm ² or more, but is less than 100 cm ² . The	835.205(b)(2)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 4, "External Dosimetry Program".

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	non-uniform equivalent dose (H) to the irradiated area received during the year shall be added to any uniform equivalent dose also received by the skin and recorded as the equivalent dose to any extremity or skin for the year. H is the equivalent dose averaged over the 1 cm ² of skin receiving the maximum absorbed dose, D, reduced by the fraction f, which is the irradiated area in cm ² divided by 100 cm ² (i.e., H = fD). In no case shall a value of f less than 0.1 be used.		
62.	For purposes of demonstrating compliance with §835.202(a)(4), assessments shall be conducted as follows: (3) Area of skin irradiated is less than 10 cm ² . The non-uniform equivalent dose shall be averaged over the 1 cm ² of skin receiving the maximum dose. This equivalent dose shall: (i) Be recorded in the individual's occupational exposure history as a special entry; and (ii) Not be added to any other equivalent dose to any extremity or skin for the year.	835.205(b)(3)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 4, "External Dosimetry Program".
63.	The equivalent dose limit for the embryo/fetus from the period of conception to birth, as a result of occupational exposure of a declared pregnant worker, is 0.5 rem (0.005 Sv).	835.206(a)	Description of implementation can be found in Chapter 1 of the Ames Laboratory RSPD, "General Requirements", § 1.3, "Radiation Dose Limits".
64.	Substantial variation above a uniform exposure rate that would satisfy the limits provided in §835.206(a) shall be avoided.	835.206(b)	Description of implementation can be found in Chapter 1 of the Ames Laboratory RSPD, "General Requirements", § 1.3, "Radiation Dose Limits".
65.	If the equivalent dose to the embryo/fetus is determined to have already exceeded 0.5 rem (0.005 Sv) by the time a worker declares her pregnancy, the declared pregnant worker shall not be assigned to tasks where additional occupational exposure is likely during the remaining gestation period.	835.206(c)	Description of implementation can be found in Chapter 1 of the Ames Laboratory RSPD, "General Requirements", § 1.3, "Radiation Dose Limits".
66.	Occupational dose limits for minors. The dose limits for minors occupationally exposed to radiation and/or radioactive materials at a DOE activity are 0.1 rem (0.001 Sv) total effective dose in a year and 10 percent of the occupational dose limits specified at §835.202(a)(3) and (a)(4).	835.207	Description of implementation can be found in Chapter 1 of the Ames Laboratory RSPD, "General Requirements", § 1.3, "Radiation Dose Limits".
67.	Limits for members of the public entering a controlled area. The total effective dose limit for members of the public exposed to radiation and/or radioactive material during access to a controlled area is 0.1 rem (0.001 Sv) in a year.	835.208	Description of implementation can be found in Chapter 1 of the Ames Laboratory RSPD, "General Requirements", § 1.3, "Radiation Dose Limits", and Chapter 7, "Radiological areas, work planning, and work control".
68.	The derived air concentration (DAC) values given in appendices A and C of this part shall be used in the control of occupational exposures to airborne radioactive material.	835.209(a)	The values in Appendices A and C are not reproduced in this RPP, but the description of implementation can be found in Chapter 3 of the Ames Laboratory RSPD, "Internal Dosimetry Program".
69.	The estimation of internal dose shall be based on bioassay data rather than	835.209(b)	The values in Appendices A and C are not reproduced

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	air concentration values unless bioassay data are: (1) unavailable; (2) inadequate; or (3) internal dose estimates based on air concentration values are demonstrated to be as or more accurate.		in this RPP, but the description of implementation can be found in Chapter 3 of the Ames Laboratory RSPD, "Internal Dosimetry Program".
Subpart D – Reserved			
Subpart E – Monitoring of Individuals and Areas			
70.	Monitoring of individuals and areas shall be performed to: (1) Demonstrate compliance with the regulations in this part;	835.401(a)(1)	Monitoring is conducted in accordance with the programs described in the Ames Laboratory RSPD, Chapter 3, "Internal Dosimetry Program"; Chapter 4, "External Dosimetry Program"; Chapter 5, "Monitoring of radiation and radioactive contamination"; Chapter 6, "Monitoring for Airborne Radioactivity"; and Chapter 7, "Radiological areas, work planning and work control".
71.	Monitoring of individuals and areas shall be performed to: (2) Document radiological conditions;	835.401(a)(2)	Monitoring is conducted in accordance with the programs described in the Ames Laboratory RSPD, Chapter 3, "Internal Dosimetry Program"; Chapter 4, "External Dosimetry Program"; Chapter 5, "Monitoring of radiation and radioactive contamination"; Chapter 6, "Monitoring for Airborne Radioactivity"; and Chapter 7, "Radiological areas, work planning and work control".
72.	Monitoring of individuals and areas shall be performed to: (3) Detect changes in radiological conditions;	835.401(a)(3)	Monitoring is conducted in accordance with the programs described in the Ames Laboratory RSPD, Chapter 3, "Internal Dosimetry Program"; Chapter 4, "External Dosimetry Program"; Chapter 5, "Monitoring of radiation and radioactive contamination"; Chapter 6, "Monitoring for Airborne Radioactivity"; and Chapter 7, "Radiological areas, work planning and work control".
73.	Monitoring of individuals and areas shall be performed to: (4) Detect the gradual buildup of radioactive material;	835.401(a)(4)	Monitoring is conducted in accordance with the programs described in the Ames Laboratory RSPD, Chapter 3, "Internal Dosimetry Program"; Chapter 4, "External Dosimetry Program"; Chapter 5, "Monitoring of radiation and radioactive contamination"; Chapter 6, "Monitoring for Airborne Radioactivity"; and Chapter 7, "Radiological areas, work planning and work control".
74.	Monitoring of individuals and areas shall be performed to: (5) Verify the effectiveness of engineered and administrative controls in containing radioactive material and reducing radiation exposure."	835.401(a)(5)	Monitoring is conducted in accordance with the programs described in the Ames Laboratory RSPD, Chapter 3, "Internal Dosimetry Program"; Chapter 4, "External Dosimetry Program"; Chapter 5, "Monitoring of radiation and radioactive contamination"; Chapter 6, "Monitoring for Airborne Radioactivity"; and Chapter 7, "Radiological areas, work planning and work control".

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75.	Monitoring of individuals and areas shall be performed to: (6) Identify and control potential sources of individual exposure to radiation and/or radioactive material.	835.401(a)(6)	Monitoring is conducted in accordance with the programs described in the Ames Laboratory RSPD, Chapter 3, "Internal Dosimetry Program"; Chapter 4, "External Dosimetry Program"; Chapter 5, "Monitoring of radiation and radioactive contamination"; Chapter 6, "Monitoring for Airborne Radioactivity"; and Chapter 7, "Radiological areas, work planning and work control".
76.	Instruments and equipment used for monitoring shall be: (1) Periodically maintained and calibrated on an established frequency;	835.401(b)(1)	The radiation detection instrumentation program implements this requirement in the Ames Laboratory RSPD, Chapter 8, "Radiation Detection Instrumentation Program".
77.	Instruments and equipment used for monitoring shall be: (2) Appropriate for the type(s), levels, and energies of the radiation(s) encountered;	835.401(b)(2)	The radiation detection instrumentation program implements this requirement in the Ames Laboratory RSPD, Chapter 8, "Radiation Detection Instrumentation Program".
78.	Instruments and equipment used for monitoring shall be: (3) Appropriate for existing environmental conditions; and	835.401(b)(3)	The radiation detection instrumentation program implements this requirement in the Ames Laboratory RSPD, Chapter 8, "Radiation Detection Instrumentation Program".
79.	Instruments and equipment used for monitoring shall be: (4) Routinely tested for operability.	835.401(b)(4)	The radiation detection instrumentation program implements this requirement in the Ames Laboratory RSPD, Chapter 8, "Radiation Detection Instrumentation Program".
80.	For the purpose of monitoring individual exposures to external radiation, personnel dosimeters shall be provided to and used by: (1) Radiological workers who, under typical conditions, are likely to receive one or more of the following: (i) An effective dose of 0.1 rem (0.001 Sv) or more in a year;	835.402(a)(1)(i)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 4, "External Dosimetry Program".
81.	For the purpose of monitoring individual exposures to external radiation, personnel dosimeters shall be provided to and used by: (1) Radiological workers who, under typical conditions, are likely to receive one or more of the following: (ii) An equivalent dose to the skin or to any extremity of 5 rems (0.05 Sv) or more in a year;	835.402(a)(1)(ii)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 4, "External Dosimetry Program".
82.	For the purpose of monitoring individual exposures to external radiation, personnel dosimeters shall be provided to and used by: (1) Radiological workers who, under typical conditions, are likely to receive one or more of the following: (iii) An equivalent dose to the lens of the eye of 1.5 rems (0.015 Sv) or more in a year.	835.402(a)(1)(iii)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 4, "External Dosimetry Program".

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83.	For the purpose of monitoring individual exposures to external radiation, personnel dosimeters shall be provided to and used by: (2) Declared pregnant workers who are likely to receive from external sources an equivalent dose to the embryo/fetus in excess of 10 percent of the applicable limit at §835.206(a);	835.402(a)(2)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 4, "External Dosimetry Program".
84.	For the purpose of monitoring individual exposures to external radiation, personnel dosimeters shall be provided to and used by: (3) Occupationally exposed minors likely to receive a dose in excess of 50 percent of the applicable limits at §835.207 in a year from external sources;	835.402(a)(3)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 4, "External Dosimetry Program".
85.	For the purpose of monitoring individual exposures to external radiation, personnel dosimeters shall be provided to and used by: (4) Members of the public entering a controlled area likely to receive a dose in excess of 50 percent of the limit at §835.208 in a year from external sources; and	835.402(a)(4)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 4, "External Dosimetry Program".
86.	For the purpose of monitoring individual exposures to external radiation, personnel dosimeters shall be provided to and used by: (5) Individuals entering a high or very high radiation area.	835.402(a)(5)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 4, "External Dosimetry Program".
87.	External dose monitoring programs implemented to demonstrate compliance with §835.402(a) shall be adequate to demonstrate compliance with the dose limits established in subpart C of this part and shall be: (1) Accredited, or excepted from accreditation, in accordance with the DOE Laboratory Accreditation Program for Personnel Dosimetry; or	835.402(b)(1)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 4, "External Dosimetry Program".
88.	External dose monitoring programs implemented to demonstrate compliance with §835.402(a) shall be adequate to demonstrate compliance with the dose limits established in subpart C of this part and shall be: (2) Determined by the Secretarial Officer responsible for environment, safety and health matters to have performance substantially equivalent to that of programs accredited under the DOE Laboratory Accreditation Program for Personnel Dosimetry.	835.402(b)(2)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 4, "External Dosimetry Program".
89.	For the purpose of monitoring individual exposures to internal radiation, internal dosimetry programs (including routine bioassay programs) shall be conducted for: (1) Radiological workers who, under typical conditions, are likely to receive a committed effective dose of 0.1 rem (0.001 Sv) or more from all occupational radionuclide intakes in a year;	835.402(c)(1)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 3, "Internal Dosimetry Program".
90.	For the purpose of monitoring individual exposures to internal radiation, internal dosimetry programs (including routine bioassay programs) shall be conducted for: (2) Declared pregnant workers likely to receive an intake or intakes resulting in an equivalent dose to the embryo/fetus in excess of 10 percent of the limit stated at §835.206(a);	835.402(c)(2)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 3, "Internal Dosimetry Program".

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91.	For the purpose of monitoring individual exposures to internal radiation, internal dosimetry programs (including routine bioassay programs) shall be conducted for: (3) Occupationally exposed minors who are likely to receive a dose in excess of 50 percent of the applicable limit stated at §835.207 from all radionuclide intakes in a year; or	835.402(c)(3)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 3, "Internal Dosimetry Program".
92.	For the purpose of monitoring individual exposures to internal radiation, internal dosimetry programs (including routine bioassay programs) shall be conducted for: (4) Members of the public entering a controlled area likely to receive a dose in excess of 50 percent of the limit stated at §835.208 from all radionuclide intakes in a year	835.402(c)(4)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 3, "Internal Dosimetry Program".
93.	Internal dose monitoring programs implemented to demonstrate compliance with §835.402(c) shall be adequate to demonstrate compliance with the dose limits established in subpart C of this part and shall be: (1) Accredited, or excepted from accreditation, in accordance with the DOE Laboratory Accreditation Program for Radiobioassay; or	835.402(d)(1)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 3, "Internal Dosimetry Program".
94.	Internal dose monitoring programs implemented to demonstrate compliance with §835.402(c) shall be adequate to demonstrate compliance with the dose limits established in subpart C of this part and shall be: (2) Determined by the Secretarial Officer responsible for environment, safety and health matters to have performance substantially equivalent to that of programs accredited under the DOE Laboratory Accreditation Program for Radiobioassay.	835.402(d)(2)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 3, "Internal Dosimetry Program".
95.	Monitoring of airborne radioactivity shall be performed: (1) Where an individual is likely to receive an exposure of 40 or more DAC-hours in a year; or	835.403(a)(1)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 6, "Monitoring for Airborne Radioactivity".
96.	Monitoring of airborne radioactivity shall be performed: (2) As necessary to characterize the airborne radioactivity hazard where respiratory protective devices for protection against airborne radionuclides have been prescribed.	835.403(a)(2)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 6, "Monitoring for Airborne Radioactivity".
97.	Real-time air monitoring shall be performed as necessary to detect and provide warning of airborne radioactivity concentrations that warrant immediate action to terminate inhalation of airborne radioactive material.	835.403(b)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 6, "Monitoring for Airborne Radioactivity".
	[Reserved]	835.404	
98.	If packages containing quantities of radioactive material in excess of a Type A quantity (as defined at 10 CFR 71.4) are expected to be received from radioactive material transportation, arrangements shall be made to either: (1) Take possession of the package when the carrier offers it for delivery; or	835.405(a)(1)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 5, "Monitoring of radiation and radioactive contamination".
99.	If packages containing quantities of radioactive material in excess of a Type A quantity (as defined at 10 CFR 71.4) are expected to be received from	835.405(a)(2)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 5,

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	radioactive material transportation, arrangements shall be made to either: (2) Receive notification as soon as practicable after arrival of the package at the carrier's terminal and to take possession of the package expeditiously after receiving such notification.		"Monitoring of radiation and radioactive contamination".
100.	Upon receipt from radioactive material transportation, external surfaces of packages known to contain radioactive material shall be monitored if the package: (1) Is labeled with a Radioactive White I, Yellow II, or Yellow III label (as specified at 49 CFR 172.403 and 172.436-440); or	835.405(b)(1)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 5, "Monitoring of radiation and radioactive contamination".
101.	Upon receipt from radioactive material transportation, external surfaces of packages known to contain radioactive material shall be monitored if the package: (2) Has been transported as low specific activity material(as defined at 10 CFR 71.4) on an exclusive use vehicle (as defined at 10 CFR 71.4); or	835.405(b)(2)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 5, "Monitoring of radiation and radioactive contamination".
102.	Upon receipt from radioactive material transportation, external surfaces of packages known to contain radioactive material shall be monitored if the package: (3) Has evidence of degradation, such as packages that are crushed, wet, or damaged.	835.405(b)(3)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 5, "Monitoring of radiation and radioactive contamination".
103.	The monitoring required by paragraph (b) of this section shall include: (1) Measurements of removable contamination levels, unless the package contains only special form (as defined at 10 CFR 71.4) or gaseous radioactive material; and	835.405(c)(1)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 5, "Monitoring of radiation and radioactive contamination".
104.	The monitoring required by paragraph (b) of this section shall include: (2) Measurements of the radiation levels, if the package contains a Type B quantity (as defined at 10 CFR 71.4) of radioactive material.	835.405(c)(2)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 5, "Monitoring of radiation and radioactive contamination".
105.	The monitoring required by paragraph (b) of this section shall be completed as soon as practicable following receipt of the package, but not later than 8 hours after the beginning of the working day following receipt of the package.	835.405(d)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 5, "Monitoring of radiation and radioactive contamination".
106.	Monitoring pursuant to § 835.405(b) is not required for packages transported on a DOE site which have remained under the continuous observation and control of a DOE employee or DOE contractor employee who is knowledgeable of and implements required exposure control measures.	835.405(e)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 5, "Monitoring of radiation and radioactive contamination".
Subpart F – Entry Control Program			
107.	Personnel entry control shall be maintained for each radiological area.	835.501(a)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological Areas, Work Planning and Work Control".

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108.	The degree of control shall be commensurate with existing and potential radiological hazards within the area.	835.501(b)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological Areas, Work Planning and Work Control".
109.	One or more of the following methods shall be used to ensure control: (1) Signs and barricades;	835.501(c)(1)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological Areas, Work Planning and Work Control".
110.	One or more of the following methods shall be used to ensure control: (2) Control devices on entrances;	835.501(c)(2)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological Areas, Work Planning and Work Control".
111.	One or more of the following methods shall be used to ensure control: (3) Conspicuous visual and/or audible alarms;	835.501(c)(3)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological Areas, Work Planning and Work Control".
112.	One or more of the following methods shall be used to ensure control: (4) Locked entrance ways; or	835.501(c)(4)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological Areas, Work Planning and Work Control".
113.	One or more of the following methods shall be used to ensure control: (5) Administrative controls.	835.501(c)(5)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological Areas, Work Planning and Work Control".
114.	Written authorizations shall be required to control entry into and perform work within radiological areas.	835.501(d)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological Areas, Work Planning and Work Control".
115.	These authorizations shall specify radiation protection measures commensurate with the existing and potential hazards.	835.501(d)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological Areas, Work Planning and Work Control".
116.	No control(s) shall be installed at any radiological area exit that would prevent rapid evacuation of personnel under emergency conditions.	835.501(e)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological Areas, Work Planning and Work Control".
117.	The following measures shall be implemented for each entry into a high radiation area: (1) The area shall be monitored as necessary during access to determine the exposure rates to which the individuals are exposed; and	835.502(a)(1)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological Areas, Work Planning and Work Control".
118.	The following measures shall be implemented for each entry into a high radiation area: (2) Each individual shall be monitored by a supplemental dosimetry device or other means capable of providing an immediate estimate of the individual's integrated equivalent dose to the whole body during the entry.	835.502(a)(2)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological Areas, Work Planning and Work Control".
119.	Physical controls. One or more of the following features shall be used for each entrance or access point to a high radiation area where radiation levels exist such that an individual could exceed an equivalent dose to the whole body of 1 rem (0.01 Sv) in any one hour at 30 centimeters from the source or from any surface that the radiation penetrates:	835.502(b)(1)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological Areas, Work Planning and Work Control", and Chapter 9, "Radiation generating devices and sealed radioactive source control".

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	(1) A control device that prevents entry to the area when high radiation levels exist or upon entry causes the radiation level to be reduced below the level that defines a High Radiation Area.		
120.	Physical controls. One or more of the following features shall be used for each entrance or access point to a high radiation area where radiation levels exist such that an individual could exceed an equivalent dose to the whole body of 1 rem (0.01 Sv) in any one hour at 30 centimeters from the source or from any surface that the radiation penetrates: (2) A device that functions automatically to prevent use or operation of the radiation source or field while individuals are in the area;	835.502(b)(2)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological Areas, Work Planning and Work Control", and Chapter 9, "Radiation generating devices and sealed radioactive source control".
121.	Physical controls. One or more of the following features shall be used for each entrance or access point to a high radiation area where radiation levels exist such that an individual could exceed an equivalent dose to the whole body of 1 rem (0.01 Sv) in any one hour at 30 centimeters from the source or from any surface that the radiation penetrates: (3) A control device that energizes a conspicuous visible or audible alarm signal so that the individual entering the high radiation area and the supervisor of the activity are made aware of the entry;	835.502(b)(3)	The description of how this requirement is implemented can be found in Chapter 7, "Radiological Areas, Work Planning and Work Control", and Chapter 9, "Radiation generating devices and sealed radioactive source control".
122.	Physical controls. One or more of the following features shall be used for each entrance or access point to a high radiation area where radiation levels exist such that an individual could exceed an equivalent dose to the whole body of 1 rem (0.01 Sv) in any one hour at 30 centimeters from the source or from any surface that the radiation penetrates: (4) Entryways that are locked. During periods when access to the area is required, positive control over each entry is maintained;	835.502(b)(4)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological Areas, Work Planning and Work Control".
123.	Physical controls. One or more of the following features shall be used for each entrance or access point to a high radiation area where radiation levels exist such that an individual could exceed an equivalent dose to the whole body of 1 rem (0.01 Sv) in any one hour at 30 centimeters from the source or from any surface that the radiation penetrates: (5) Continuous direct or electronic surveillance that is capable of preventing unauthorized entry.	835.502(b)(5)	The description of how this requirement is implemented can be found in Chapter 7, "Radiological Areas, Work Planning and Work Control", and Chapter 9, "Radiation generating devices and sealed radioactive source control".
124.	Physical controls. One or more of the following features shall be used for each entrance or access point to a high radiation area where radiation levels exist such that an individual could exceed an equivalent dose to the whole body of 1 rem (0.01 Sv) in any one hour at 30 centimeters from the source or from any surface that the radiation penetrates: (6) A control device that will automatically generate audible and visual alarm signals to alert personnel in the area before use or operation of the radiation source and in sufficient time to permit evacuation of the area or activation of a secondary control device that will prevent use or operation of the source."	835.502(b)(6)	The description of how this requirement is implemented can be found in Chapter 7, "Radiological Areas, Work Planning and Work Control", and Chapter 9, "Radiation generating devices and sealed radioactive source control".

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125.	Very high radiation areas. In addition to the above requirements, additional measures shall be implemented to ensure individuals are not able to gain unauthorized or inadvertent access to very high radiation areas.	835.502(c)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological areas, work planning and work control".
126.	No control(s) shall be established in a high or very high radiation area that would prevent rapid evacuation of personnel."	835.502(d)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological areas, work planning and work control".
Subpart G – Posting and Labeling			
127.	Except as otherwise provided in this subpart, postings and labels required by this subpart shall include the standard radiation warning trefoil in black or magenta imposed upon a yellow background.	835.601(a)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological areas, work planning and work control".
128.	Signs required by this subpart shall be clearly and conspicuously posted and may include radiological protection instructions.	835.601(b)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological areas, work planning and work control".
129.	The posting and labeling requirements in this subpart may be modified to reflect the special considerations of DOE activities conducted at private residences or businesses.	835.601(c)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological areas, work planning and work control".
130.	Such modifications shall provide the same level of protection to individuals as the existing provisions in this subpart.	835.601(c)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological areas, work planning and work control".
131.	Each access point to a controlled area (as defined in §835.2) shall be posted whenever radiological areas or radioactive material areas exist in the area.	835.602(a)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 1, "General Requirements", § 1.3, "Radiation dose limits", and Chapter 7, "Radiological Areas, work planning and work control".
132.	Individuals who enter only controlled areas without entering radiological areas or radioactive material areas are not expected to receive a total effective dose of more than 0.1 rem (0.001 sievert) in a year.	835.602(a)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 1, "General Requirements", § 1.3, "Radiation dose limits", and Chapter 7, "Radiological Areas, work planning and work control".
133.	Signs used for this purpose may be selected by the contractor to avoid conflict with local security requirements.	835.602(b)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological areas, work planning and work control".
134.	Each access point to radiological areas and radioactive material areas (as defined at §835.2) shall be posted with conspicuous signs bearing the wording provided in this section.	835.603	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological areas, work planning and work control".
135.	Radiation Area. The words "Caution, Radiation Area" shall be posted at each radiation area.	835.603(a)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 1, "General Requirements", § 1.3, "Radiation dose limits", and Chapter 7, "Radiological Areas, work planning and work control".

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136.	High Radiation Area. The words "Caution, High Radiation Area" or "Danger, High Radiation Area" shall be posted at each high radiation area.	835.603(b)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological areas, work planning and work control".
137.	Very High Radiation Area. The words "Grave Danger, Very High Radiation Area" shall be posted at each very high radiation area.	835.603(c)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological areas, work planning and work control".
138.	Airborne Radioactivity Area. The words "Caution, Airborne Radioactivity Area" or "Danger, Airborne Radioactivity Area" shall be posted at each airborne radioactivity area.	835.603(d)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological areas, work planning and work control".
139.	Contamination Area. The words "Caution, Contamination Area" shall be posted at each contamination area.	835.603(e)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological areas, work planning and work control".
140.	High Contamination Area. The words "Caution, High Contamination Area" or "Danger, High Contamination Area" shall be posted at each high contamination area.	835.603(f)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological areas, work planning and work control".
141.	Radioactive Material Area. The words "Caution, Radioactive Material(s)" shall be posted at each radioactive material area.	835.603(g)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological areas, work planning and work control".
142.	Areas may be excepted from the posting requirements of §835.603 for periods of less than 8 continuous hours when placed under continuous observation and	835.604(a)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological areas, work planning and work control".
143.	control of an individual knowledgeable of, and empowered to implement, required access and exposure control measures.	835.604(a)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological areas, work planning and work control".
144.	Areas may be excepted from the radioactive material area posting requirements of §835.603(g) when: (1) Posted in accordance with §835.603(a) through (f); or	835.604(b)(1)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological areas, work planning and work control".
145.	Areas may be excepted from the radioactive material area posting requirements of §835.603(g) when: (2) Each item or container of radioactive material is labeled in accordance with this subpart such that individuals entering the area are made aware of the hazard; or	835.604(b)(2)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological areas, work planning and work control".
146.	Areas may be excepted from the radioactive material area posting requirements of §835.603(g) when: (3) The radioactive material of concern consists solely of structures or installed components which have been activated (i.e. such as by being exposed to neutron radiation or particles produced by an accelerator).	835.604(b)(3)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological areas, work planning and work control".
147.	Areas containing only packages received from radioactive material transportation labeled and in non-degraded condition need not be posted in accordance with §835.603 until the packages are monitored in accordance with §835.405.	835.604(c)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological areas, work planning and work control".

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148.	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."	835.605	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological areas, work planning and work control".
149.	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.	835.605	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological areas, work planning and work control".
150.	Items and containers may be excepted from the radioactive material labeling requirements of §835.605 when: (1) Used, handled, or stored in areas posted and controlled in accordance with this subpart and sufficient information is provided to permit individuals to take precautions to avoid or control exposures; or	835.606(a)(1)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological areas, work planning and work control".
151.	Items and containers may be excepted from the radioactive material labeling requirements of §835.605 when: (2) The quantity of radioactive material is less than one tenth of the values specified in appendix E of this part and less than 0.1 Ci; or	835.606(a)(2)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological areas, work planning and work control".
152.	Items and containers may be excepted from the radioactive material labeling requirements of §835.605 when: (3) Packaged, labeled, and marked in accordance with the regulations of the Department of Transportation or DOE Orders governing radioactive material transportation; or	835.606(a)(3)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological areas, work planning and work control".
153.	Items and containers may be excepted from the radioactive material labeling requirements of §835.605 when: (4) Inaccessible, or accessible only to individuals authorized to handle or use them, or to work in the vicinity; or	835.606(a)(4)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological areas, work planning and work control".
154.	Items and containers may be excepted from the radioactive material labeling requirements of §835.605 when: (5) Installed in manufacturing, process, or other equipment, such as reactor components, piping, and tanks.	835.606(a)(5)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological areas, work planning and work control".
155.	Items and containers may be excepted from the radioactive material labeling requirements of §835.605 when: (6) The radioactive material consists solely of nuclear weapons or their components.	835.606(a)(6)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological areas, work planning and work control".
156.	Radioactive material labels applied to sealed radioactive sources may be excepted from the color specifications of §835.601(a).	835.606(b)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological Areas, Work Planning and Work Control", and Chapter 9, "Radiation generating devices and sealed radioactive source control".

Policy and Commitment Basis			
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Subpart H – Records			
157.	Records shall be maintained to document compliance with this part and with radiation protection programs required by §835.101.	835.701(a)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, “Occupational radiation protection record-keeping and reporting”.
158.	Unless otherwise specified in this subpart, records shall be retained until final disposition is authorized by DOE.	835.701(b)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, “Occupational radiation protection record-keeping and reporting”.
159.	Except as authorized by §835.702(b), records shall be maintained to document doses received by all individuals for whom monitoring was conducted and to document doses received during planned special exposures, unplanned doses exceeding the monitoring thresholds of §835.402, and authorized emergency exposures.	835.702(a)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, “Occupational radiation protection record-keeping and reporting”.
160.	Recording of the non-uniform equivalent dose to the skin is not required if the dose is less than 2 percent of the limit specified for the skin at §835.202(a)(4). Recording of internal dose (committed effective dose or committed equivalent dose) is not required for any monitoring result estimated to correspond to an individual receiving less than 0.01 rem (0.1 mSv) committed effective dose. The bioassay or air monitoring result used to make the estimate shall be maintained in accordance with § 835.703(b) and the unrecorded internal dose estimated for any individual in a year shall not exceed the applicable monitoring threshold at § 835.402(c).	835.702(b)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, “Occupational radiation protection record-keeping and reporting”.
161.	Reserved.	Reserved.	
162.	The records required by this section shall: (1) Be sufficient to evaluate compliance with subpart C of this part;	835.702(c)(1)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, “Occupational radiation protection record-keeping and reporting”.
163.	The records required by this section shall: (2) Be sufficient to provide dose information necessary to complete reports required by subpart I of this part;	835.702(c)(2)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, “Occupational radiation protection record-keeping and reporting”.
164.	The records required by this section shall: (3) Include the results of monitoring used to assess the following quantities for external dose received during the year: (i) The effective dose from external sources of radiation (equivalent dose to the whole body may be used as effective dose for external exposure);	835.702(c)(3)(i)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, “Occupational radiation protection record-keeping and reporting”.
165.	The records required by this section shall: (3) Include the following quantities for external dose received during the year: (ii) The equivalent dose to the lens of the eye;	835.702(c)(3)(ii)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, “Occupational radiation protection record-keeping and reporting”.

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166.	The records required by this section shall: (3) Include the following quantities for external dose received during the year: (iii) The equivalent dose to the skin; and	835.702(c)(3)(iii)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, "Occupational radiation protection record-keeping and reporting".
167.	The records required by this section shall: (3) Include the following quantities for external dose received during the year: (iv) The equivalent dose to the extremities.	835.702(c)(3)(iv)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, "Occupational radiation protection record-keeping and reporting".
168.	The records required by this section shall: (4) Include the following information for internal dose resulting from intakes received during the year: (i) Committed effective dose;	835.702(c)(4)(i)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, "Occupational radiation protection record-keeping and reporting".
169.	The records required by this section shall: (4) Include the following information for internal dose resulting from intakes received during the year: (ii) Committed equivalent dose to any organ or tissue of concern; and	835.702(c)(4)(ii)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, "Occupational radiation protection record-keeping and reporting".
170.	The records required by this section shall: (4) Include the following information for internal dose resulting from intakes received during the year: (iii) Identity of radionuclides.	835.702(c)(4)(iii)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, "Occupational radiation protection record-keeping and reporting".
171.	The records required by this section shall: (5) Include the following quantities for the summation of the external and internal dose: (i) Total effective dose in a year;	835.702(c)(5)(i)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, "Occupational radiation protection record-keeping and reporting".
172.	The records required by this section shall: (5) Include the following quantities for the summation of the external and internal dose: (ii) For any organ or tissue assigned an internal dose during the year, the sum of the equivalent dose to the whole body from external exposures and the committed equivalent dose to that organ or tissue; and	835.702(c)(5)(ii)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, "Occupational radiation protection record-keeping and reporting".
173.	The records required by this section shall: (5) Include the following quantities for the summation of the external and internal dose: (iii) Cumulative total effective dose.	835.702(c)(5)(iii)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, "Occupational radiation protection record-keeping and reporting".
174.	The records required by this section shall: (6) Include the equivalent dose to the embryo/fetus of a declared pregnant worker.	835.702(c)(6)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, "Occupational radiation protection record-keeping and reporting".

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175.	Documentation of all occupational doses received during the current year, except for doses resulting from planned special exposures conducted in compliance with §835.204 and emergency exposures authorized in accordance with §835.1302(d), shall be obtained to demonstrate compliance with §835.202(a).	835.702(d)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, "Occupational radiation protection record-keeping and reporting".
176.	[continued] If complete records documenting previous occupational dose during the year cannot be obtained, a written estimate signed by the individual may be accepted to demonstrate compliance.	835.702(d)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, "Occupational radiation protection record-keeping and reporting".
177.	For radiological workers whose occupational dose is monitored in accordance with §835.402, reasonable efforts shall be made to obtain complete records of prior years' occupational internal and external doses	835.702(e)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, "Occupational radiation protection record-keeping and reporting".
178.	The records specified in this section that are identified with a specific individual shall be readily available to that individual	835.702(f)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, "Occupational radiation protection record-keeping and reporting".
179.	Data necessary to allow future verification or reassessment of the recorded doses shall be recorded.	835.702(g)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, "Occupational radiation protection record-keeping and reporting".
180.	All records required by this section shall be transferred to the DOE upon cessation of activities at the site that could cause exposure to individuals.	835.702(h)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, "Occupational radiation protection record-keeping and reporting".
181.	The following information shall be documented and maintained: (a) Results of monitoring for radiation and radioactive material as required by subparts E and L of this part, except for monitoring required by §835.1102(d);	835.703(a)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, "Occupational radiation protection record-keeping and reporting".
182.	The following information shall be documented and maintained: (b) Results of monitoring used to determine individual occupational dose from external and internal sources.	835.703(b)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, "Occupational radiation protection record-keeping and reporting".
183.	The following information shall be documented and maintained: (c) Results of monitoring for the release and control of material and equipment as required by §835.1101; and	835.703(c)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, "Occupational radiation protection record-keeping and reporting".
184.	The following information shall be documented and maintained: (d) Results of maintenance and calibration performed on instruments and equipment as required by §835.401(b).	835.703(d)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, "Occupational radiation protection record-keeping and reporting".

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185.	Training records shall be maintained, as necessary, to demonstrate compliance with §835.901.	835.704(a)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, "Occupational radiation protection record-keeping and reporting".
186.	Actions taken to maintain occupational exposures as low as reasonably achievable, including the actions required for this purpose by §835.101, as well as facility design and control actions required by §835.1001, §835.1002 and §835.1003, shall be documented.	835.704(b)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, "Occupational radiation protection record-keeping and reporting".
187.	Records shall be maintained to document the results of internal audits and other reviews of program content and implementation.	835.704(c)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, "Occupational radiation protection record-keeping and reporting".
188.	Written declarations of pregnancy, including the estimated date of conception, and revocations of declarations of pregnancy shall be maintained.	835.704(d)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, "Occupational radiation protection record-keeping and reporting".
189.	Changes in equipment, techniques, and procedures used for monitoring shall be documented.	835.704(e)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, "Occupational radiation protection record-keeping and reporting".
190.	Records shall be maintained as necessary to demonstrate compliance with the requirements of §835.1201 and §835.1202 for sealed radioactive source control, inventory, and source leak tests.	835.704(f)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, "Occupational radiation protection record-keeping and reporting".
Subpart I – Reports to Individuals			
191.	801 Reports to individuals. (a) Radiation exposure data for individuals monitored in accordance with §835.402 shall be reported as specified in this section.	835.801(a)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, "Occupational radiation protection record-keeping and reporting".
192.	[Continued] The information shall include the data required under §835.702(c).	835.801(a)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, "Occupational radiation protection record-keeping and reporting".
193.	[Continued] Each notification and report shall be in writing and include: the DOE site or facility name, the name of the individual, and the individual's social security number, employee number, or other unique identification number.	835.801(a)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, "Occupational radiation protection record-keeping and reporting".
194.	801 Reports to individuals. (b) Upon the request from an individual terminating employment, records of exposure shall be provided to that individual as soon as the data are available, but not later than 90 days after termination.	835.801(b)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, "Occupational radiation protection record-keeping and reporting".

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195.	[Continued] A written estimate of the radiation dose received by that employee based on available information shall be provided at the time of termination, if requested.	835.801(b)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, "Occupational radiation protection record-keeping and reporting".
196.	801 Reports to individuals. (c) Each DOE- or DOE-contractor-operated site or facility shall, on an annual basis, provide a radiation dose report to each individual monitored during the year at that site or facility in accordance with §835.402.	835.801(c)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, "Occupational radiation protection record-keeping and reporting".
197.	801 Reports to individuals. (d) Detailed information concerning any individual's exposure shall be made available to the individual upon request of that individual, consistent with the provisions of the Privacy Act (5 U.S.C. 552a).	835.801(d)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, "Occupational radiation protection record-keeping and reporting".
198.	801 Reports to individuals. (e) When a DOE contractor is required to report to the Department, pursuant to Departmental requirements for occurrence reporting and processing, any exposure of an individual to radiation and/or radioactive material, or planned special exposure in accordance with §835.204(e), the contractor shall also provide that individual with a report on his or her exposure data included therein.	835.801(e)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, "Occupational radiation protection record-keeping and reporting".
199.	[Continued] Such report shall be transmitted at a time not later than the transmittal to the Department.	835.801(e)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 12, "Occupational radiation protection record-keeping and reporting".
Subpart J – Radiation Safety Training			
200.	901 Radiation safety training. (a) Each individual shall complete radiation safety training on the topics established at §835.901(c) commensurate with the hazards in the area and the required controls: (1) Before being permitted unescorted access to controlled areas; and (2) Before receiving occupational dose during access to controlled areas at a DOE site or facility.	835.901(a)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological areas, work planning, and work control", and Chapter 11, "Radiation Safety Training".
201.	901 Radiation safety training. (b) Each individual shall demonstrate knowledge of the radiation safety training topics established at §835.901(c), commensurate with the hazards in the area and required controls, by successful completion of an examination and performance demonstrations: (1) Before being permitted unescorted access to radiological areas; and (2) Before performing unescorted assignments as a radiological worker.	835.901(b)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological areas, work planning, and work control", and Chapter 11, "Radiation Safety Training".
202.	901 Radiation safety training. (c) Radiation safety training shall include the following topics, to the extent appropriate to each individual's prior training, work assignments, and	835.901(c)(1)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 11, "Radiation Safety Training".

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	degree of exposure to potential radiological hazards: (1) Risks of exposure to radiation and radioactive materials, including prenatal radiation exposure;		
203.	901 Radiation safety training. (c) Radiation safety training shall include the following topics, to the extent appropriate to each individual's prior training, work assignments, and degree of exposure to potential radiological hazards: (2) Basic radiological fundamentals and radiation protection concepts;	835.901(c)(2)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 11, "Radiation Safety Training".
204.	901 Radiation safety training. (c) Radiation safety training shall include the following topics, to the extent appropriate to each individual's prior training, work assignments, and degree of exposure to potential radiological hazards: (3) Physical design features, administrative controls, limits, policies, procedures, alarms, and other measures implemented at the facility to manage doses and maintain doses ALARA, including both routine and emergency actions;	835.901(c)(3)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological areas, work planning, and work control", and Chapter 11, "Radiation Safety Training".
205.	901 Radiation safety training. (c) Radiation safety training shall include the following topics, to the extent appropriate to each individual's prior training, work assignments, and degree of exposure to potential radiological hazards: (4) Individual rights and responsibilities as related to implementation of the facility radiation protection program;	835.901(c)(4)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 11, "Radiation Safety Training".
206.	901 Radiation safety training. (c) Radiation safety training shall include the following topics, to the extent appropriate to each individual's prior training, work assignments, and degree of exposure to potential radiological hazards: (5) Individual responsibilities for implementing ALARA measures required by §835.101; and	835.901(c)(5)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 11, "Radiation Safety Training".
207.	901 Radiation safety training. (c) Radiation safety training shall include the following topics, to the extent appropriate to each individual's prior training, work assignments, and degree of exposure to potential radiological hazards: (6) Individual exposure reports that may be requested in accordance with §835.801.	835.901(c)(6)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 11, "Radiation Safety Training".
208.	901 Radiation safety training. (d) When an escort is used in lieu of training in accordance with paragraph (a) or (b) of this section, the escort shall: (1) Have completed radiation safety training, examinations, and performance demonstrations required for entry to the area and performance of the work; and	835.901(d)(1)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological areas, work planning, and work control", and Chapter 11, "Radiation Safety Training".

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209.	901 Radiation safety training. (d) When an escort is used in lieu of training in accordance with paragraph (a) or (b) of this section, the escort shall: (2) Ensure that all escorted individuals comply with the documented radiation protection program.	835.901(d)(2)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, "Radiological areas, work planning, and work control", and Chapter 11, "Radiation Safety Training".
210.	901 Radiation safety training. (e) Radiation safety training shall be provided to individuals when there is a significant change to radiation protection policies and procedures that may affect the individual and	835.901(e)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 11, "Radiation Safety Training".
211.	[continued] at intervals not to exceed 24 months.	835.901(e)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 11, "Radiation Safety Training".
212.	[continued] Such training provided for individuals subject to the requirements of §835.901(b)(1) and (b)(2) shall include successful completion of an examination.	835.901(e)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 11, "Radiation Safety Training".
Subpart K – Design and Control			
213.	1001 Design and control. (a) Measures shall be taken to maintain radiation exposure in controlled areas ALARA through engineered and administrative controls.	835.1001(a)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 1, "General requirements", § 1.6, "Design and control".
214.	1001 Design and control. (a) [Continued] The primary methods used shall be physical design features (e.g., confinement, ventilation, remote handling, and shielding).	835.1001(a)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 1, "General requirements", § 1.6, "Design and control".
215.	1001 Design and control. (a) [Continued] Administrative controls shall be employed only as supplemental methods to control radiation exposure.	835.1001(a)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 1, "General requirements", § 1.6, "Design and control".
216.	1001 Design and control. (b) For specific activities where use of engineered controls is demonstrated to be impractical, administrative controls shall be used to maintain radiation exposures ALARA.	835.1001(b)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 1, "General requirements", § 1.6, "Design and control".
217.	1002 Facility design and modifications. During the design of new facilities or modification of existing facilities, the following objectives shall be adopted: (a) Optimization methods shall be used to assure that occupational exposure is maintained ALARA in developing and justifying facility design and physical controls.	835.1002(a)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 1, "General requirements", § 1.6, "Design and control".
218.	Facility design and modifications. During the design of new facilities or modification of existing facilities, the following objectives shall be adopted: (b) The design objective for controlling personnel exposure from external sources of radiation in areas of continuous occupational occupancy (2000 hours per year) shall be to maintain exposure levels below an average of	835.1002(b)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 1, "General requirements", § 1.6, "Design and control".

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	0.5 millirem (5 µSv) per hour and as far below this average as is reasonably achievable.		
219.	1002 Facility design and modifications. During the design of new facilities or modification of existing facilities, the following objectives shall be adopted: (b) [Continuation] The design objectives for exposure rates for potential exposure to a radiological worker where occupancy differs from the above shall be ALARA and shall not exceed 20 percent of the applicable standards in §835.202.	835.1002(b)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 1, "General requirements", § 1.6, "Design and control".
220.	Facility design and modifications. During the design of new facilities or modification of existing facilities, the following objectives shall be adopted: (c) Regarding the control of airborne radioactive material, the design objective shall be, under normal conditions, to avoid releases to the workplace atmosphere and	835.1002(c)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 1, "General requirements", § 1.6, "Design and control".
221.	Facility design and modifications. During the design of new facilities or modification of existing facilities, the following objectives shall be adopted: (c) [Continuation] in any situation, to control the inhalation of such material by workers to levels that are ALARA; confinement and ventilation shall normally be used.	835.1002(c)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 1, "General requirements", § 1.6, "Design and control".
222.	Facility design and modifications. During the design of new facilities or modification of existing facilities, the following objectives shall be adopted: (d) The design or modification of a facility and the selection of materials shall include features that facilitate operations, maintenance, decontamination, and decommissioning.	835.1002(d)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 1, "General requirements", § 1.6, "Design and control".
223.	Workplace Controls. During routine operations, the combination of engineered and administrative controls shall provide that: (a) The anticipated occupational dose to general employees shall not exceed the limits established at §835.202; and	835.1003(a)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 5, "Monitoring of Radiation and Radioactive Contamination", Chapter 6, "Monitoring for Airborne Radioactivity", and Chapter 7, "Radiological Areas, Work Planning, and Work Control".
224.	During routine operations, the combination of engineered and administrative controls shall provide that: (b) The ALARA process is utilized for personnel exposures to ionizing radiation.	835.1003(b)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 5, "Monitoring of Radiation and Radioactive Contamination", Chapter 6, "Monitoring for Airborne Radioactivity", and Chapter 7, "Radiological Areas, Work Planning, and Work Control".

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Subpart L – Radioactive Contamination Control			
225.	Control of material and equipment. (a) Except as provided in paragraphs (b) and (c) of this section, material and equipment in contamination areas, high contamination areas, and airborne radioactivity areas shall not be released to a controlled area if: (1) Removable surface contamination levels on accessible surfaces exceed the removable surface contamination values specified in appendix D of this part; or	835.1101(a)(1)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 5, “Monitoring of Radiation and Radioactive Contamination”.
226.	Control of material and equipment. (a) [continued] Except as provided in paragraphs (b) and (c) of this section, material and equipment in contamination areas, high contamination areas, and airborne radioactivity areas shall not be released to a controlled area if: (2) Prior use suggests that the removable surface contamination levels on inaccessible surfaces are likely to exceed the removable surface contamination values specified in appendix D of this part.	835.1101(a)(2)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 5, “Monitoring of Radiation and Radioactive Contamination”.
227.	Control of material and equipment. (b) Material and equipment exceeding the removable surface contamination values specified in appendix D of this part may be conditionally released for movement on-site from one radiological area for immediate placement in another radiological area only if appropriate monitoring is performed and appropriate controls for the movement are established and exercised.	835.1101(b)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 5, “Monitoring of Radiation and Radioactive Contamination”.
228.	Control of material and equipment. (c) Material and equipment with fixed contamination levels that exceed the total surface contamination values specified in appendix D of this part may be released for use in controlled areas outside of radiological areas only under the following conditions: (1) Removable surface contamination levels are below the removable surface contamination values specified in appendix D of this part; and	835.1101(c)(1)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 5, “Monitoring of Radiation and Radioactive Contamination”.
229.	Control of material and equipment. (c) Material and equipment with fixed contamination levels that exceed the total surface contamination values specified in appendix D of this part may be released for use in controlled areas outside of radiological areas only under the following conditions: (2) The material or equipment is routinely monitored and clearly marked or labeled to alert personnel of the contaminated status.	835.1101(c)(2)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 5, “Monitoring of Radiation and Radioactive Contamination”.
230.	Control of areas. (a) Appropriate controls shall be maintained and verified which prevent the inadvertent transfer of removable contamination to locations outside of radiological areas under normal operating conditions.	835.1102(a)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 5, “Monitoring of radiation and radioactive contamination”, and Chapter 7, “Radiological areas, work planning, and work control”.

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231.	Control of areas. (b) Any area in which contamination levels exceed the values specified in appendix D of this part shall be controlled in a manner commensurate with the physical and chemical characteristics of the contaminant, the radionuclides present, and the fixed and removable surface contamination levels.	835.1102(b)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 5, ““Monitoring of radiation and radioactive contamination”, and Chapter 7, “Radiological areas, work planning, and work control”.
232.	Control of areas. (c) Areas accessible to individuals where the measured total surface contamination levels exceed, but the removable surface contamination levels are less than, corresponding surface contamination values specified in appendix D of this part, shall be controlled as follows when located outside of radiological areas: (1) The area shall be routinely monitored to ensure the removable surface contamination level remains below the removable surface contamination values specified in appendix D of this part; and	835.1102(c)(1)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 5, ““Monitoring of radiation and radioactive contamination”, and Chapter 7, “Radiological areas, work planning, and work control”.
233.	Control of areas. (c) Areas accessible to individuals where the measured total surface contamination levels exceed, but the removable surface contamination levels are less than, corresponding surface contamination values specified in appendix D of this part, shall be controlled as follows when located outside of radiological areas: (2) The area shall be conspicuously marked to warn individuals of the contaminated status.	835.1102(c)(2)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 5, ““Monitoring of radiation and radioactive contamination”, and Chapter 7, “Radiological areas, work planning, and work control”.
234.	Control of areas. (a) Individuals exiting contamination, high contamination, or airborne radioactivity areas shall be monitored, as appropriate, for the presence of surface contamination.	835.1102(d)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 5, “Monitoring of Radiation and Radioactive Contamination”.
235.	Control of areas. (e) Protective clothing shall be required for entry to areas in which removable contamination exists at levels exceeding the removable surface contamination values specified in appendix D of this part.	835.1102(e)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 7, “Radiological areas, work planning, and work control”.
Subpart M – Sealed Radioactive Source Control			
236.	Sealed radioactive source control. Sealed radioactive sources shall be used, handled, and stored in a manner commensurate with the hazards associated with operations involving the sources.	835.1201	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 9, “Radiation Generating Devices and Sealed Radioactive Source Control”.
237.	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;	835.1202(a)(1)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 9, “Radiation Generating Devices and Sealed Radioactive Source Control”.

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238.	Accountable sealed radioactive sources. (a) Each accountable sealed radioactive source shall be inventoried at intervals not to exceed six months. This inventory shall: (2) Verify the presence and adequacy of associated postings and labels; and	835.1202(a)(2)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 9, "Radiation Generating Devices and Sealed Radioactive Source Control".
239.	Accountable sealed radioactive sources. (a) Each accountable sealed radioactive source shall be inventoried at intervals not to exceed six months. This inventory shall: (3) Establish the adequacy of storage locations, containers, and devices.	835.1202(a)(3)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 9, "Radiation Generating Devices and Sealed Radioactive Source Control".
240.	Accountable sealed radioactive sources. (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.	835.1202(b)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 9, "Radiation Generating Devices and Sealed Radioactive Source Control".
241.	Accountable sealed radioactive sources. (b) [continued] Source leak tests shall be capable of detecting radioactive material leakage equal to or exceeding 0.005 μ Ci.	835.1202(b)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 9, "Radiation Generating Devices and Sealed Radioactive Source Control".
242.	Accountable sealed radioactive sources. (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.	835.1202(c)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 9, "Radiation Generating Devices and Sealed Radioactive Source Control".
243.	Accountable sealed radioactive sources. (c) [Continued] 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.	835.1202(c)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 9, "Radiation Generating Devices and Sealed Radioactive Source Control".
244.	Accountable sealed radioactive sources. (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.	835.1202(d)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 9, "Radiation Generating Devices and Sealed Radioactive Source Control".
245.	Accountable sealed radioactive sources. (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.	835.1202(e)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 9, "Radiation Generating Devices and Sealed Radioactive Source Control".
Subpart N – Emergency Exposure Situations			
246.	General provisions. (a) A general employee whose occupational dose has exceeded the numerical value of any of the limits specified in §835.202 as a result of an authorized emergency exposure may be permitted to return to work in radiological areas during the current year providing that all of the following	835.1301(a)(1)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 10, "Incident and Emergency Response".

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	conditions are met: (1) Approval is first obtained from the contractor management and the Head of the responsible DOE field organization;		
247.	General provisions. (a) A general employee whose occupational dose has exceeded the numerical value of any of the limits specified in §835.202 as a result of an authorized emergency exposure may be permitted to return to work in radiological areas during the current year providing that all of the following conditions are met: (2) The individual receives counseling from radiological protection and medical personnel regarding the consequences of receiving additional occupational exposure during the year; and	835.1301(a)(2)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 10, "Incident and Emergency Response".
248.	General provisions. (a) A general employee whose occupational dose has exceeded the numerical value of any of the limits specified in §835.202 as a result of an authorized emergency exposure may be permitted to return to work in radiological areas during the current year providing that all of the following conditions are met: (3) The affected employee agrees to return to radiological work.	835.1301(a)(3)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 10, "Incident and Emergency Response".
249.	General provisions. (b) All doses exceeding the limits specified in §835.202 shall be recorded in the affected individual's occupational dose record.	835.1301(b)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 10, "Incident and Emergency Response".
250.	General provisions. (c) When the conditions under which a dose was received in excess of the limits specified in §835.202, except those doses received in accordance with §835.204, have been eliminated, operating management shall notify the Head of the responsible DOE field organization.	835.1301(c)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 10, "Incident and Emergency Response".
251.	General provisions. (d) Operations which have been suspended as a result of a dose in excess of the limits specified in §835.202, except those received in accordance with §835.204, may be resumed only with the approval of DOE."	835.1301(d)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 10, "Incident and Emergency Response".
252.	Emergency exposure situations. (a) The risk of injury to those individuals involved in rescue and recovery operations shall be minimized.	835.1302(a)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 10, "Incident and Emergency Response".
253.	Emergency exposure situations. (b) Operating management shall weigh actual and potential risks against the benefits to be gained.	835.1302(b)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 10, "Incident and Emergency Response".
254.	Emergency exposure situations. (c) No individual shall be required to perform rescue action that might involve substantial personal risk.	835.1302(c)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 10, "Incident and Emergency Response".

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255.	Emergency exposure situations. (d) Each individual authorized to perform emergency actions likely to result in occupational doses exceeding the values of the limits provided at §835.202(a) shall be trained in accordance with §835.901(b) and briefed beforehand on the known or anticipated hazards to which the individual will be subjected.	835.1302(d)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 10, "Incident and Emergency Response".
256.	Nuclear accident dosimetry. (a) Installations possessing sufficient quantities of fissile material to potentially constitute a critical mass, such that the excessive exposure of individuals to radiation from a nuclear accident is possible, shall provide nuclear accident dosimetry for those individuals.	835.1304(a)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 4, "External Dosimetry program".
257.	Nuclear accident dosimetry. (b) Nuclear accident dosimetry shall include the following: (1) A method to conduct initial screening of individuals involved in a nuclear accident to determine whether significant exposures to radiation occurred;	835.1304(b)(1)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 4, "External Dosimetry program".
258.	Nuclear accident dosimetry. (b) Nuclear accident dosimetry shall include the following: (2) Methods and equipment for analysis of biological materials;	835.1304(b)(2)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 4, "External Dosimetry program".
259.	Nuclear accident dosimetry. b) Nuclear accident dosimetry shall include the following: (3) A system of fixed nuclear accident dosimeter units; and	835.1304(b)(3)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 4, "External Dosimetry program".
260.	Nuclear accident dosimetry. (b) Nuclear accident dosimetry shall include the following: (4) Personal nuclear accident dosimeters.	835.1304(b)(4)	The description of how this requirement is implemented can be found in the Ames Laboratory RSPD, Chapter 4, "External Dosimetry program".
261.	The data presented in appendix A are to be used for controlling individual internal doses in accordance with §835.209, identifying the need for air monitoring in accordance with §835.403, and identifying the need for posting airborne radioactivity areas in accordance with §835.603(d).	Appendix A.1	The values from Appendix A are not reproduced in this RPP; however, Ames Laboratory uses them in its programs for airborne radioactivity monitoring, internal dosimetry, and radiological posting, described in Chapters 6, 3, and 7, respectively, of the Ames Laboratory RSPD.
262.	The DAC values are given for individual radionuclides. For known mixtures of radionuclides, determine the sum of the ratio of the observed concentration of a particular radionuclide and its corresponding DAC for all radionuclides in the mixture. If this sum exceeds unity (1), then the DAC has been exceeded. For unknown radionuclides, the most restrictive DAC (lowest value) for those isotopes not known to be absent shall be used. For any single radionuclide not listed in appendix A with decay mode other than alpha emission or spontaneous fission and with radioactive half-life greater than two hours, the DAC value shall be $4 \text{ E-}11 \text{ } \mu\text{Ci/mL}$ (1 Bq/m^3). For any single radionuclide not listed in appendix A that decays by alpha emission or spontaneous fission the DAC value shall be $2 \text{ E-}13 \text{ } \mu\text{Ci/mL}$ ($8 \text{ E-}03 \text{ Bq/m}^3$).	Appendix A.2	The values from Appendix A are not reproduced in this RPP; however, Ames Laboratory uses them in its programs for airborne radioactivity monitoring, internal dosimetry, and radiological posting, described in Chapters 6, 3, and 7, respectively, of the Ames Laboratory RSPD.

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	<p>The DACs for limiting radiation exposures through inhalation of radionuclides by workers are listed in this appendix. The values are based on either a stochastic (committed effective dose) dose limit of 5 rems (0.05 Sv) or a deterministic (organ or tissue) dose limit of 50 rems (0.5 Sv) per year, whichever is more limiting.</p> <p>Note: the 15 rems [0.15 Sv] dose limit for the lens of the eye does not appear as a critical organ dose limit.</p> <p>The columns in this appendix contain the following information: (1) Radionuclide; (2) inhaled air DAC for type F (fast), type M (moderate), and type S (slow) materials in units of $\mu\text{Ci/mL}$; (3) inhaled air DAC for type F (fast), type M (moderate), and type S (slow) materials in units of Bq/m^3; (4) an indication of whether or not the DAC for each class is controlled by the stochastic (effective dose) or deterministic (organ or tissue) dose. The absorption types (F, M, and S) have been established to describe the absorption type of the materials from the respiratory tract into the blood. The range of half-times for the absorption types correspond to: Type F, 100% at 10 minutes; Type M, 10% at 10 minutes and 90% at 140 days; and Type S 0.1% at 10 minutes and 99.9% at 7000 days.</p> <p>The DACs are listed by radionuclide, in order of increasing atomic mass, and are based on the assumption that the particle size distribution of 5 micrometers AMAD is used. For situations where the particle size distribution is known to differ significantly from 5 micrometers AMAD, appropriate corrections may be made to both the estimated dose to workers and the DACs.</p>		
263.	Footnote 1: A determination of whether the DACs are controlled by stochastic (St) or deterministic (organ or tissue) dose, or if they both give the same result (E), for each absorption type, is given in this column. The key to the organ notation for deterministic dose is: BS = Bone surface, ET = Extra thoracic, K = Kidney, L = Liver, and T =Thyroid. A blank indicates that no calculations were performed for the absorption type shown.	Appendix A.3-1	The values from Appendix A are not reproduced in this RPP; however, Ames Laboratory uses them in its programs for airborne radioactivity monitoring, internal dosimetry, and radiological posting, described in Chapters 6, 3, and 7, respectively, of the Ames Laboratory RSPD.
264.	Footnote 2: The ICRP identifies these materials as soluble or reactive gases and vapors or highly soluble or reactive gases and vapors. For tritiated water, the inhalation DAC values allow for an additional 50% absorption through the skin, as described in ICRP Publication No. 68, Dose Coefficients for Intakes of Radionuclides by Workers. For elemental tritium, the DAC values include a factor that irradiation from gas within the lungs might increase the dose by 20%.	Appendix A.3-2	The values from Appendix A are not reproduced in this RPP; however, Ames Laboratory uses them in its programs for airborne radioactivity monitoring, internal dosimetry, and radiological posting, described in Chapters 6, 3, and 7, respectively, of the Ames Laboratory RSPD.
265.	Footnote 3: A dash indicates no values given for this data category.	Appendix A.3-3	The values from Appendix A are not reproduced in this RPP; however, Ames Laboratory uses them in its programs for airborne radioactivity monitoring, internal dosimetry, and radiological posting, described in Chapters 6, 3, and 7, respectively, of the Ames

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266.	Footnote 4: DAC values derived using hafnium tritide particle and are based on "observed activity" (i.e, only radiation emitted from the particle is considered). DAC values derived using methodology found in Radiological Control Programs for Special Tritium Compounds, DOE-HDBK-1184-2004.	Appendix A.3-4	Laboratory RSPD. The values from Appendix A are not reproduced in this RPP; however, Ames Laboratory uses them in its programs for airborne radioactivity monitoring, internal dosimetry, and radiological posting, described in Chapters 6, 3, and 7, respectively, of the Ames Laboratory RSPD.
267.	Note 5: These values are appropriate for protection from radon combined with its short-lived decay products and are based on information given in ICRP Publication 65: Protection Against Radon-222 at Home and at Work and in DOE-STD-1121-98: Internal Dosimetry. The values given are for 100% equilibrium concentration conditions of the short-lived radon decay products with the parent. To allow for an actual measured equilibrium concentration or a demonstrated equilibrium concentration, the values given in this table should be multiplied by the ratio (100%/actual %) or (100%/demonstrated %), respectively. Alternatively, the DAC values for Rn-220 and Rn-222 may be replaced by 2.5 working level (WL) and 0.83 WL, respectively, for appropriate limiting of decay product concentrations. A WL is any combination of short-lived radon decay products, in one liter of air without regard to the degree of equilibrium, that will result in the ultimate emission of 1.3 E+05 MeV of alpha energy.	Appendix A.3-5	The values from Appendix A are not reproduced in this RPP; however, Ames Laboratory uses them in its programs for airborne radioactivity monitoring, internal dosimetry, and radiological posting, described in Chapters 6, 3, and 7, respectively, of the Ames Laboratory RSPD.
268.	Derived Air Concentration (DAC) for Workers From External Exposure During Immersion in a Cloud of Airborne Radioactive Material	Appendix C	The values from Appendix C are not reproduced in this RPP; however, Ames Laboratory uses them in its programs for airborne radioactivity monitoring, internal dosimetry, and radiological posting, described in Chapters 6, 3, and 7, respectively, of the Ames Laboratory RSPD.
269.	The data presented in appendix C are to be used for controlling occupational exposures in accordance with §835.209, identifying the need for air monitoring in accordance with §835.403 and identifying the need for posting of airborne radioactivity areas in accordance with §835.603(d).	Appendix C.1	The values from Appendix C are not reproduced in this RPP; however, Ames Laboratory uses them in its programs for airborne radioactivity monitoring, internal dosimetry, and radiological posting, described in Chapters 6, 3, and 7, respectively, of the Ames Laboratory RSPD.
270.	The air immersion DAC values shown in this appendix are based on a stochastic dose limit of 5 rems (0.05 Sv) per year. Four columns of information are presented: (1) radionuclide; (2) half-life in units of seconds (s), minutes (min), hours (h), days (d), or years (yr); (3) air immersion DAC in units of µCi/ml; and (4) air immersion DAC in units of Bq/m ³ . The data are listed by radionuclide in order of increasing atomic mass. The	Appendix C.2	The values from Appendix C are not reproduced in this RPP; however, Ames Laboratory uses them in its programs for airborne radioactivity monitoring, internal dosimetry, and radiological posting, described in Chapters 6, 3, and 7, respectively, of the Ames Laboratory RSPD.

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	air immersion DACs were calculated for a continuous, nonshielded exposure via immersion in a semi-infinite cloud of airborne radioactive material. The DACs listed in this appendix may be modified to allow for submersion in a cloud of finite dimensions.		
271.	The DAC values are given for individual radionuclides. For known mixtures of radionuclides, determine the sum of the ratio of the observed concentration of a particular radionuclide and its corresponding DAC for all radionuclides in the mixture. If this sum exceeds unity (1), then the DAC has been exceeded. For unknown radionuclides, the most restrictive DAC (lowest value) for those isotopes not known to be absent shall be used. For any single radionuclide not listed above with decay mode other than alpha emission or spontaneous fission and with radioactive half-life less than two hours, the DAC values shall be $6 \text{ E-}06 \text{ } \mu\text{Ci/mL}$ ($2 \text{ E+}04 \text{ Bq/m}^3$).	Appendix C.3	The values from Appendix C are not reproduced in this RPP; however, Ames Laboratory uses them in its programs for airborne radioactivity monitoring, internal dosimetry, and radiological posting, described in Chapters 6, 3, and 7, respectively, of the Ames Laboratory RSPD.
272.	The data presented in appendix D are to be used in identifying the need for posting of contamination and high contamination areas in accordance with §835.603(e) and (f) and identifying the need for surface contamination monitoring and control in accordance with §835.1101 and §835.1102.	Appendix D.1	The values from Appendix D are not reproduced in this RPP; however Ames Laboratory uses them in its programs for control of radioactive material as described in the Ames Laboratory RSPD, Chapter 5, "Monitoring of Radiation and Radiation Contamination".
273.	Note 1: The values in this appendix, with the exception noted in footnote 6 apply to radioactive contamination deposited on, but not incorporated into the interior or matrix of, the contaminated item. Where surface contamination by both alpha- and beta-gamma-emitting nuclides exists, the limits established for alpha- and beta gamma emitting nuclides apply independently	Appendix D-1	The values from Appendix D are not reproduced in this RPP; however Ames Laboratory uses them in its programs for control of radioactive material as described in the Ames Laboratory RSPD, Chapter 5, "Monitoring of Radiation and Radiation Contamination".
274.	Note 2: As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.	Appendix D-2	The values from Appendix D are not reproduced in this RPP; however Ames Laboratory uses them in its programs for control of radioactive material as described in the Ames Laboratory RSPD, Chapter 5, "Monitoring of Radiation and Radiation Contamination".
275.	Note 3: The levels may be averaged over one square meter provided the maximum surface activity in any area of 100 cm^2 is less than three times the value specified. For purposes of averaging, any square meter of surface shall be considered to be above the surface contamination value if: (1) from measurements of a representative number of sections it is determined that the average contamination level exceeds the applicable value; or (2) it is determined that the sum of the activity of all isolated spots or particles in any 100 cm^2 area exceeds three times the applicable value.	Appendix D-3	The values from Appendix D are not reproduced in this RPP; however Ames Laboratory uses them in its programs for control of radioactive material as described in the Ames Laboratory RSPD, Chapter 5, "Monitoring of Radiation and Radiation Contamination".
276.	Note 4: The amount of removable radioactive material per 100 cm^2 of surface area should be determined by swiping the area with dry filter or soft absorbent paper, applying moderate pressure, and then assessing the amount of radioactive material on the swipe with an appropriate instrument of known efficiency. (Note - The use of dry material may not be appropriate for	Appendix D-4	The values from Appendix D are not reproduced in this RPP; however Ames Laboratory uses them in its programs for control of radioactive material as described in the Ames Laboratory RSPD, Chapter 5, "Monitoring of Radiation and Radiation Contamination".

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	tritium.) When removable contamination on objects of surface area less than 100 cm ² is determined, the activity per unit area shall be based on the actual area and the entire surface shall be wiped. It is not necessary to use swiping techniques to measure removable contamination levels if direct scan surveys indicate that the total residual surface contamination levels are within the limits for removable contamination.		
277.	Note 5: This category of radionuclides includes mixed fission products, including the Sr-90 which is present in them. It does not apply to Sr-90 which has been separated from the other fission products or mixtures where the Sr-90 has been enriched.	Appendix D-5	The values from Appendix D are not reproduced in this RPP; however Ames Laboratory uses them in its programs for control of radioactive material as described in the Ames Laboratory RSPD, Chapter 5, "Monitoring of Radiation and Radiation Contamination".
278.	Note 6: Tritium contamination may diffuse into the volume or matrix of materials. Evaluation of surface contamination shall consider the extent to which such contamination may migrate to the surface in order to ensure the surface contamination value provided in this appendix is not exceeded. Once this contamination migrates to the surface, it may be removable, not fixed; therefore, a "Total" value does not apply. In certain cases, a "Total" value of 10,000 dpm/100 cm ² may be applicable either to metals, of the types which form insoluble special tritium compounds that have been exposed to tritium; or to bulk materials to which particles of insoluble special tritium compound are fixed to a surface.	Appendix D-6	The values from Appendix D are not reproduced in this RPP; however Ames Laboratory uses them in its programs for control of radioactive material as described in the Ames Laboratory RSPD, Chapter 5, "Monitoring of Radiation and Radiation Contamination".
279.	Note 7: These limits only apply to the alpha emitters within the respective decay series.	Appendix D-7	The values from Appendix D are not reproduced in this RPP; however Ames Laboratory uses them in its programs for control of radioactive material as described in the Ames Laboratory RSPD, Chapter 5, "Monitoring of Radiation and Radiation Contamination".
280.	The data presented in appendix E are to be used for identifying accountable sealed radioactive sources and radioactive material areas as those terms are defined at §835.2(a), establishing the need for radioactive material area posting in accordance with §835.603(g), and establishing the need for radioactive material labeling in accordance with §835.605.	Appendix E.1	The values from Appendix E are not reproduced in this RPP; however Ames Laboratory uses them in its program for control of sealed radioactive sources as described in the Ames Laboratory RSPD, Chapter 9, "Radiation generating devices and sealed radioactive source control".
281.	Any alpha emitting radionuclide not listed in appendix E and mixtures of alpha emitters of unknown composition have a value of 10 µCi.	Appendix E NOTE 1	The values from Appendix E are not reproduced in this RPP; however Ames Laboratory uses them in its program for control of sealed radioactive sources as described in the Ames Laboratory RSPD, Chapter 9, "Radiation generating devices and sealed radioactive source control".
282.	With the exception that any type of STC has a value of 10 Ci, any radionuclide other than alpha emitting radionuclides not listed in appendix E and mixtures of beta emitters of unknown composition have a value of 100 µCi.	Appendix E.3	The values from Appendix E are not reproduced in this RPP; however Ames Laboratory uses them in its program for control of sealed radioactive sources as described in the Ames Laboratory RSPD, Chapter 9,

Contact Person	Michael McGuigan	Revision	10
Document	Plan 10202.004	Effective Date	04/01/16

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			"Radiation generating devices and sealed radioactive source control".
283.	Note: Where there is involved a mixture of radionuclides in known amounts, derive the value for the mixture as follows: determine, for each radionuclide in the mixture, the ratio between the quantity present in the mixture and the value otherwise established for the specific radionuclide when not in the mixture. If the sum of such ratios for all radionuclides in the mixture exceeds unity (1), then the accountability criterion has been exceeded.	Appendix E Note	The values from Appendix E are not reproduced in this RPP; however Ames Laboratory uses them in its program for control of sealed radioactive sources as described in the Ames Laboratory RSPD, Chapter 9, "Radiation generating devices and sealed radioactive source control".

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