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OF THE AIR FORCE**

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Safety

**AIR FORCE NUCLEAR WEAPONS
INTRINSIC RADIATION AND 91(B)
RADIOACTIVE MATERIAL SAFETY
PROGRAM**

COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

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This Instruction implements AFPD 91-1, *Nuclear Weapons and Systems Surety*. This publication is consistent with AFPD 13-5, *Nuclear Enterprise*. This Instruction is consistent with the policy in AFPD 90-8, *Environment, Safety, and Occupational Health*, AFPD 90-9 *Operational Risk Management*, AFPD 91-2, *Safety Programs*; and AFPD 91-3, *Occupational Safety and Health*. It contains guidance needed to carry out Intrinsic Radiation (INRAD) Safety Program requirements and to ensure that exposure of personnel to INRAD is “as low as reasonably achievable” (ALARA) and does not exceed the maximum permissible dose. It provides guidance on the management of both 91(b) radioactive material (RAM) associated with current nuclear weapons maintenance operations and residual 91(b) RAM from Continental United States (CONUS) legacy maintenance, nuclear weapon accident/incidents, and AF 91(b) reactors. The term “91(b)”

refers to RAM covered under Section 91(b) of the Atomic Energy Act (AEA) of 1954. It applies to Air Force, Air Force Reserve, and Air National Guard units with a nuclear mission and personnel engaged in the maintenance, upload, download, transport, or storage of nuclear weapons, associated RAM, or components, as well as organizations that possess residual 91(b) RAM, excluding material covered under AFI 91-110, *Nuclear Safety Review and Launch Approval for Space or Missile Use of Radioactive Material and Nuclear Systems*. Refer recommended changes and questions about this publication to the OPR using the AF Form 847, *Recommendation for Change of Publication*; route AF Form 847s from the field through the appropriate functional’s chain of command. Ensure that all records created as a result of processes prescribed in this publication are maintained in accordance with AFMAN 33-363, *Management of Records*, and disposed of in accordance with Air Force Records Disposition Schedule (RDS) located at <https://www.my.af.mil/gcss-af61a/afirms/afirms/>. Before publishing, send major command (MAJCOM) supplements to Instruction to AFSC/SEW, 9700 Avenue G, Kirtland AFB NM 87117-5670) for coordination and AF/SE, 1400 Air Force Pentagon, Washington DC 20330-1400, for review.

(USAFE) AFI91-108, 21 September 2010, is supplemented as follows: This supplement applies to United States Air Forces in Europe (USAFE) nuclear-capable units and to all personnel concerned with maintenance, security, on-load, off-load, transport or storage of nuclear weapons and associated nuclear material and components. It applies to Air Force Reserve Command (AFRC) or Air National Guard (ANG) units or members when performing nuclear missions within USAFE. Ensure that all records created as a result of processes prescribed in this publication are maintained in accordance with Air Force Manual AFMAN 33-363, *Management of Records*, and disposed of in accordance with the Air Force Records Disposition Schedule (RDS) located in the Air Force Records Information Management System (AFRIMS) on the AF Portal: <https://www.my.af.mil/gcss-af61a/afirms/afirms//rims.cfm>. Refer recommended changes and questions about this publication to the OPR using the AF Form 847, *Recommendation for Change of Publication*; route AF Form 847 from the field through the appropriate functional chain of command.

SUMMARY OF CHANGES

This interim change (IC) adds new language in the introductory paragraph, specifically the second sentence, to make this publication consistent with AFPD 13-5, *Nuclear Enterprise*. This IC also adds AFPD 13-5 in the reference section of Attachment 1.

(USAFE) This document is substantially revised and must be completely reviewed. Extensive changes in policies and procedures required a complete revision of this publication.

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Chapter 1

PROGRAM DESCRIPTION

Section 1A—Program Applicability and Objectives

1.1. Purpose:

1.1.1. This Instruction provides specific guidance for operations involving RAM covered by the Atomic Energy Act of 1954, 42 U.S.C. § 2011 et seq., commonly termed Section 91(b). RAM under the 91(b) designation within the scope of this Instruction are: current nuclear weapons material, legacy nuclear weapons maintenance wastes, residuals from nuclear weapons accidents, residuals from aircraft washdown operations from atmospheric testing of nuclear weapons, and residuals from nuclear reactor operations.

1.1.2. This Instruction does not apply to RAM covered under AFI 40-201, *Managing Radioactive Materials in the US Air Force*, or 91(b) RAM covered under AFI 91-110, *Nuclear Safety Review and Launch Approval for Space or Missile Use of Radioactive Material and Nuclear Systems*. Note: this Instruction references AFI 40-201 as some processes from that Instruction may be applicable to INRAD safety.

1.2. Program Applicability:

1.2.1. Implementation of the INRAD safety program and the ALARA concept must consider weapons safety, security, reliability, and operational mission requirements. The ALARA concept is further defined and explained in AFI 48-148, *Ionizing Radiation Protection*. Note: most Technical Order (T.O.) procedures have inherent ALARA principles that reduce the potential for exposure.

1.2.1.1. Units with a contingency or limited nuclear mission must comply with the ALARA concept.

1.2.1.2. Host installations that support nuclear-capable tenants or geographically separated units (GSUs) must comply with this Instruction.

1.2.1.3. Use the following as primary methods to achieve ALARA:

1.2.1.3.1. Minimize the time individuals spend in the vicinity of weapon systems.

1.2.1.3.2. Maximize distance between the source(s) of ionizing radiation and working area.

1.2.1.3.3. Use shielding techniques, when appropriate.

1.2.1.3.4. Implement a combination of these actions.

1.2.2. Units that generate radioactive waste and/or mixed (i.e., chemical and radioactive) waste from nuclear weapons maintenance procedures must comply with this Instruction.

1.2.3. CONUS installations that possess residual 91(b) RAM-contaminated buildings, burial sites, etc. from past (legacy) nuclear weapons accidents, incidents and maintenance, or dismantled/decommissioned 91(b) nuclear reactors (still under AF possession), or other residual 91(b) RAM must comply with this Instruction.

1.3. Program Objectives:

1.3.1. Limit the risk of radiation-induced effects to a reasonable level in relation to the requirements of the USAF mission, other societal or military risks, benefits gained and economic factors.

1.3.2. Manage 91(b) RAM associated with current nuclear weapons maintenance operations and residual 91(b) RAM from CONUS legacy maintenance, nuclear weapon accident/incidents, and AF 91(b) reactors.

Section 1B—General Responsibilities

1.4. Assistant Secretary of the Air Force for Acquisition (SAF/AQ):

1.4.1. Monitors research and development issues pertaining to the biological effects of INRAD and applies the results to the development cycle of new or modified nuclear weapon systems.

1.4.2. Ensures the Research, Development, Test, and Evaluation (RDT&E) and other life-cycle activities properly address INRAD exposure and control techniques addressed in DODD 3150.1, *Joint DoD-DOE Nuclear Weapon Life-Cycle Activities*, DODI 5030.55, *DOD Procedures for Joint DOD-DOE Nuclear Weapons Life-Cycle Activities*, MIL-STD-882D, *Department of Defense Standard Practice for System Safety*, AFI 90-901, *Operational Risk Management*, AFI 91-102, *Nuclear Weapon System Safety Studies*, *Operational Safety Reviews*, and *Safety Rules*, AFI 91-103, *AF Nuclear Safety Design Certification Program*, AFI 91-107, *Design, Evaluation, Troubleshooting, and Maintenance Criteria for Nuclear Weapon Systems*, AFMAN 91-118, *Safety Design and Evaluation Criteria for Nuclear Weapons Systems*, AFI 91-202, *The US Air Force Mishap Prevention Program*, AFI 63-103, *Joint Air Force-National Nuclear Security Administration (AF-NNSA) Nuclear Weapon Life Cycle Management*, AFI 63-125, *Nuclear Certification Program*, AFPD 63-1/AFP 20-1, *Acquisition and Sustainment Life Cycle Management*, and AFI 63-1201, *Acquisition and Sustainment Life Cycle Management*.

1.4.3. Informs AFSC as early as possible of the development of new weapon systems or weapon arrays which may involve INRAD sources (and of any INRAD measurement data taken during the RDT&E cycle).

1.5. Air Force Chief of Safety (AF/SE): Provides guidance for operations involving INRAD and/or 91(b) RAM.

1.6. Air Force Safety Center, Weapons Safety Division (AFSC/SEW):

1.6.1. Regulates 91(b) RAM (acquired from DOE for DOD use in weapons, power production, and other military-unique applications per 42 U.S.C. Ch. 23, Div. A, Subchapter VIII, *Military Application of Atomic Energy*), not contained in current nuclear weapon system components.

1.6.2. Issues permits to CONUS installations for the possession, use, characterization, and remediation of residual 91(b) RAM from past nuclear weapon accidents, incidents and maintenance activities, dismantled/decommissioned reactor 91(b) RAM still under AF possession. RAM associated with current stockpiled nuclear weapons and current

maintenance residuals are not subjected to permitting, as these operations are covered under AF Instructions.

1.6.3. Coordinate with AFIA/SG on inspection criteria and compliance requirements for 91(b) permits.

1.6.4. Coordinates with the AF/SG and the AF Medical Support Agency (AFMSA) on all radiation safety policy issues related to INRAD.

1.6.5. Coordinates with AF/SG and the Air Force Nuclear Weapons Center (AFNWC) on occupational safety and health issues related to INRAD exposures and on 91(b) RAM wastes generated from current nuclear weapon operations.

1.6.6. Establishes additional INRAD measurements or calculations, in addition to the requirements in AFMAN 48-125, *Personnel Ionizing Radiation Dosimetry*, and AFI 48-148 requirements.

1.6.7. Provides guidance for safety programs, specifically addressing the INRAD hazards associated with nuclear weapons.

1.6.8. Compiles INRAD exposure information for USAF weapons systems and associated USAF career fields.

1.6.9. Coordinates with the Defense Threat Reduction Agency (DTRA) for inclusion of relevant INRAD measurement information in T.O. 11N-20-7.

1.6.10. Coordinates with the United States Air Force School of Aerospace Medicine, Radiation Health Branch (USAFSAM/OEHH), field units and any other appropriate organizations for monitoring and evaluating potential hazards associated with weapon systems, weapon arrays, special operations, operational weapon systems not yet measured and listed in T.O. 11N-20-7, or other operational situations.

1.6.11. Coordinates with USAFSAM/OEHH, AF/A7CVR, field units, and any other associated organizations on issues relating to 91(a) [i.e., Section 91(a) of the AEA of 1954, Department of Energy-possessed] RAM and AF 91(b) RAM.

1.6.12. Reviews and approves work plans for characterization, remedial actions, and final status surveys on sites containing permitted residual 91(b) RAM. Recommends remedial endpoints and radiation safety criteria consistent, as practical, with those applied to AF non-91(b) sites (i.e., 10 CFR 20, *Standards for Protection Against Radiation*, and AFI 40-201, and other industry-accepted standards or recommendations).

1.6.13. Determines, in coordination with AF/SG, 91(b) regulatory status of RAM in AF possession.

1.6.14. Determines Permit Radiation Safety Officer (RSO) qualifications for 91(b) permits.

1.7. Air Force Surgeon General (AF/SG):

1.7.1. Establishes force health protection and medical surveillance to policy for SECAF approval to ensure compliance with relevant Federal policy, Air Force policy and accepted scientific practice.

1.7.2. Ensures INRAD safety program is incorporated into the installation radiation safety program.

1.7.3. Assists AFSC/SEW in clearly defining regulatory authority status for NRC-regulated RAM and 91(b) RAM, under the AEA of 1954.

1.7.4. Executes AF radiation dosimetry program.

1.8. Air Force Inspection Agency, Medical Operations Directorate (AFIA/SG).

1.8.1. Maintains a staff qualified health physicist (Bioenvironmental Engineering (BE) subspecialty), with appropriate security clearance, to conduct 91(b) RAM Permit inspections.

1.8.2. Conducts unannounced inspections to assess permittee compliance with the terms and conditions of their 91(b) Permit, applicable AFIs, and applicable federal regulations. Inspections shall be conducted in a similar manner to those conducted under the authority of AFI 40-201.

1.8.3. Distributes inspection reports and information affecting 91(b) RAM Permit compliance to the permittee, installation commander, AFSC/SEW, and AF/SG according to AFI 90-201, *Inspector General Activities*.

1.9. Air Force Civil Engineer (AF/A7C):

1.9.1. Has overall responsibility for the execution of the environmental restoration program and oversees implementation of policy and guidance, develops budgets, and advocates for resources IAW AFI 32-7020, *The Environmental Restoration Program*.

1.9.2. Maintains a USAF Radioactive Waste Site Registry IAW AFI 40-201, including those sites with potential for containing residual 91(b) RAM from past nuclear weapons accident, incidents, maintenance, and dismantled/decommissioned 91(b) nuclear reactors still in AF possession.

1.10. MAJCOMs: Conduct activities in a manner consistent with the spirit and intent of this Instruction.

1.10.1. Chief of Safety (SE):

1.10.1.1. Ensures command actions relating to nuclear weapons and associated components comply with this Instruction.

1.10.1.2. Ensures installation-level programs support the objectives of the INRAD safety program.

1.10.1.3. Sends installation-level requests for INRAD measurements of new weapon systems, new weapon arrays, special nuclear weapons operations, operational weapon systems not yet measured and listed in T.O. 11N-20-7, or other operational situations to AFSC.

1.10.1.4. Reports INRAD or 91(b) RAM-related incidents or mishaps to AF/SE or AFSC/SEW.

1.10.1.5. Ensures installation legacy sites possessing residual 91(b) RAM and the potential for co-mingled explosives residuals are properly managed according to AFMAN 91-201, *Explosives Safety Standards*.

1.10.2. Command Surgeon (SG): Ensures installation-level radiation safety programs support the objectives of the INRAD safety program.

1.10.2.1. **(Added-USAFE)** Headquarters, United States Air Forces in Europe, Aerospace Medicine Division (HQ USAFE/SGP), USAFE.SGP@RAMSTEIN.AF.MIL, will conduct reviews of Intrinsic Radiation (INRAD) safety programs at USAFE main operating bases (MOB) and Munitions Support Squadrons (MUNSS) during HQ USAFE-sponsored Nuclear Surety Staff Assistance Visits (NSSAV).

1.10.2.2. **(Added-USAFE)** Advise base bioenvironmental engineering service and environmental health service in establishing and conducting an effective INRAD safety program for MUNSS at geographically separated units.

1.10.3. Inspector General (IG): Inspect INRAD safety program in accordance with AFI 90-201.

1.10.4. Air Force Materiel Command:

1.10.4.1. Through AFMC Command Surgeon, ensures USAFSAM/OE:

1.10.4.1.1. Plans, programs, budgets and sustains capability to:

1.10.4.1.1.1. Provide subject matter expert guidance on the control of INRAD exposures.

1.10.4.1.1.2. Measure weapon INRAD, including personnel dosimetry.

1.10.4.1.1.3. Provide on-site surveys and consultation, as requested, to determine whether operating procedures or equipment is effective in keeping personnel exposures ALARA.

1.10.4.1.1.4. Provide health risk assessments on radiologically-impacted sites.

1.10.4.1.2. Coordinates with AFSC/SEW to obtain pertinent INRAD data acquired during the RDT&E cycle for weapon systems.

1.10.4.1.3. Works with AFSC/SEW and AF/SG to develop comprehensive USAF Installation RSO training.

1.10.4.2. Air Force Radioactive Recycling and Disposal (AFRRAD) Office, 88 ABW/CEV, Wright-Patterson AFB, OH oversees all 91B radioactive and mixed waste disposition activities. This office shall:

1.10.4.2.1. Plan/program for, budgets and sustains resources for radioactive waste management/disposal from current nuclear weapons maintenance operations.

1.10.4.2.2. Coordinate the disposal of 91(b) RAM among installation RSOs, the DOD Executive Agent, disposal contractors, and disposal site operators consistent, as practical, with requirements in AFI 40-201.

1.10.4.2.3. Provide technical oversight of 91(b) radioactive waste activities to include decommissioning of radiological waste burial sites or contaminated facilities.

1.11. **(Added-USAFE) Wings**

1.11.1. **(Added-USAFE)** Wing Weapon Safety Manager (WSM) will conduct a review of the installation, unit and MUNSS INRAD safety programs as part of their annual nuclear

surety inspections conducted according to AFI 91-101, Air Force Nuclear Weapons Surety Program.

1.11.2. **(Added-USAFE)** WSMs will forward requests for INRAD measurements for items listed in paragraph 1.10.1.3 to Headquarters, United States Air Forces in Europe, Weapons Safety Division (HQ USAFE/SEW) and Aerospace Medicine Division (HQ USAFE/SGP). HQ USAFE/SEW will review for validity and forward through official channels to Headquarters, Air Force Safety Center, Weapons Safety Division (HQ AFSC/SEW) HQ AFSCSEW@kirtland.af.mil.

1.11.3. **(Added-USAFE)** Report 91(b) mishaps, IAW AFI 40-201 *Managing Radioactive Materials in the US Air Force* and AFMAN 91-221, *Weapons Safety Investigations and Reports*.

1.11.4. **(Added-USAFE)** Wing and installation support medical treatment facilities will provide bioenvironmental engineering and public health support to units and MUNSS when it is beyond the capability of assigned Independent Duty Medical Technicians (IDMT).

Chapter 2

INSTALLATIONS AND UNITS

Section 2A—General

2.1. Installation Programs: This section applies to wings, groups, tenant organizations, and GSUs that support a nuclear weapon mission as well as organizations that possess residual 91(b) RAM.

2.2. Commander or Director Requirements:

2.2.1. Wing or Installation Commander or Director, as appropriate, will appoint, in writing, a qualified installation RSO consistent with AFI 48-148. For most installations, this is a bioenvironmental engineer from the Bioenvironmental Engineering Flight or Element. At small installations without a bioenvironmental engineer assigned, an individual at the bioenvironmental engineering office assigned to provide support to the installation will perform the duties assigned to the installation RSO in this document. In this case, it is especially important for the unit RSO to maintain contact with the installation RSO.

2.2.2. The GSU commander designates a qualified unit RSO to work with the installation RSO at the parent installation in managing the GSU's INRAD safety program.

2.2.3. Commanders of wings, groups, tenant organizations, and GSUs are responsible for keeping exposures to personnel and members of the public below limits specified in AFI 48-148, and ALARA. This shall be accomplished by receiving, reviewing, and endorsing by signature, an annual INRAD safety review from the installation RSO.

2.3. Installation RSO Requirements:

2.3.1. Installation RSO's shall meet the training requirements specified in AFI 48-148.

2.3.2. Evaluate personnel and members of the public for radiation exposure limits specified in AFI 48-148, and ensure exposure is ALARA. [Note: Generally, INRAD measurements will not be conducted by installation personnel. Evaluations generally consist of evaluating exposure times, distances to weapons, and use of accepted exposures rates published in T.O. 11N-20-7].

2.3.3. Conduct the radiation dosimetry program per this Instruction and AFMAN 48-125, including: assessing dosimetry monitoring requirements per AFI 48-148, monitoring for adverse trends, evaluating and reporting abnormal or suspected overexposures, and providing dosimetry training.

2.3.3.1. Issue whole body and neutron radiation dosimeters to all members of the 2W2, Nuclear Weapons Specialist, career field assigned to a nuclear capable units. Exception: 2W2 assigned to duties that do not have the potential for INRAD exposure (i.e., administrative positions).

2.3.3.2. Issue radiation dosimeters to all other nuclear weapons personnel who have the potential to exceed the general public dose limit of 100 millirem in a year as demonstrated by INRAD measurements or calculations conducted by AFSC/SEW or USAFSAM/OEH. The process of evaluating potential exposure should be done jointly

with the unit RSO. The evaluation should take into consideration known or calculated dose rates, expected length of exposure, and any comparable dosimetry results.

2.3.3.3. IAW AFI 48-148, determine when to issue radiation dosimeters to visitors.

2.3.3.4. Evaluate declared pregnant workers for exposure limits specified in AFI 48-148, and recommend through Public Health any duty limitations required to keep exposures below applicable limits. Assess the requirement for dosimetry and provide dosimetry to declared pregnant females in accordance with the guidance in AFMAN 48-125. See note in paragraph 2.3.2.

2.3.4. Coordinates with base civil engineer to ensure installation hazardous materials emergency response plans include provisions for the theft, loss, sabotage, or release of 91(b) RAM consistent with Air Force Manual 32-4013, *Hazardous Material Emergency Planning and Response Guide*. The installation RSO shall be included in the development and exercise of all installation plans.

2.3.5. Provide an annual INRAD safety program review to the installation commander. Note: this can be accomplished as part of Environment, Safety, and Occupational Health Council (ESOHC) briefing.

2.4. Supervisor Requirements:

2.4.1. Comply with Workplace Supervisors Requirements as delineated in AFI 48-148 and AFI 48-145, *Occupational and Environmental Health Program*.

2.4.2. Coordinate with the unit and/or installation RSO on workers receiving initial (within 90 days of assignment, but prior to INRAD exposures) and refresher (at least every 15 months) INRAD safety training. Document the training in unit and individual records, and ensure documentation is retained in accordance with AFI 91-101 for nuclear surety training.

2.4.3. Promptly refer declared pregnant females to their Primary Care Manager for establishment of a Pregnancy Profile exposure evaluation, and installation RSO for exposure and dosimetry requirement evaluations.

2.4.4. Restrict pregnant females from duties requiring contact with or occupancy in rooms where tritium is present. If operation requirements of the unit make it necessary for pregnant females to work in areas where tritium is present, then the unit commander shall review the exposure potential. The unit commander should consult AFSC/SEWN, the installation RSO, and/or the worker's Primary Care Manager to discuss the potential for exposure and risk associated with such exposure.

2.5. Individual Requirements:

2.5.1. Comply with requirements for Individuals (Occupationally Exposed USAF Military, Civilians, and In-house Contractors) as delineated in AFI 48-148.

2.5.2. Female military members: on becoming aware of becoming pregnant, will notify workplace supervisor, Medical Group Public Health, and primary care manager.

2.5.3. Non-military females: on becoming aware of becoming pregnant, should notify their workplace supervisor and Primary Care Manager. Note: a civilian woman's decision to declare her pregnancy to her supervisor (and employer) is entirely voluntary.

Section 2B—Current Nuclear Mission-Related 91(b) RAM**2.6. Nuclear Capable Unit Commanders:**

2.6.1. After coordination with the installation RSO, designate, in writing, a unit RSO for units that possess nuclear weapons or support a nuclear weapon mission. Rationale: based on the sensitive nature of special weapons and INRAD exposure, each unit should have at least one individual to serve as a point of contact for radiation safety issues, procedures, and actions to take in the event of reported overexposure.

2.6.2. Will establish procedures to:

2.6.2.1. Notify the installation RSO and SEW of any new weapon systems, new weapon arrays, special operations, T.O. changes, or proposed facility modifications where weapon systems will be located, so that AFSC with the assistance of USAFSAM and DTRA can evaluate potential personnel exposure. Send requests for evaluations to AFSC through the MAJCOM.

2.6.2.1.1. (Added-USAFE) Forward requests for INRAD evaluations to Headquarters, United States Air Forces in Europe, Aerospace Medicine Division (HQ USAFE/SGP), USAFE.SGP@RAMSTEIN.AF.MIL and HQ USAFE/SEW.

2.6.2.2. Inform the Chief of Safety, MAJCOM/SEW and installation RSO of any INRAD or 91(b) RAM-related mishaps per AFI 91-204, *Safety Investigations and Reports*.

2.6.2.3. Ensure the unit RSO, in conjunction with the unit safety office, informs AFSC/SEW through Air Force Safety Automated System (<https://sas.kirtland.af.mil/>) of any *abnormal exposures and/or suspected overexposures* to personnel or the public from a mishap involving INRAD or 91(b) RAM.

2.6.2.4. Report 91(b) RAM-related incidents or mishaps in accordance with AFI 91-204.

2.6.2.4. (USAFE) The RSO will assist weapon safety staff in reporting mishaps and incidents of this nature according to AFMAN 91-221, *Weapons Safety Investigations and Reports*. Ensure HQ USAFE/SEW and HQ USAFE/SGP are information addressees for all nuclear mishap reports.

2.6.2.5. Ensure maintenance-related radiological and mixed waste materials are properly segregated, stored, and disposed in coordination with the installation hazardous waste program manager (Civil Engineering), installation RSO, the AFRRAD Office, and requirements in AFI 21-204, *Nuclear Weapons Maintenance Procedures*.

2.6.3. Confirm with the unit RSO that radiation exposure related to INRAD processes are below limits specified in AFI 48-148, and ensure exposure is ALARA.

2.7. Installation RSO Requirements (in addition to section 2. 3):

2.7.1. Coordinate with installation SEW to ensure integration of the INRAD safety program into the overall installation weapons safety program and radiation protection program.

2.7.2. Review unit operating instructions for the control of INRAD exposure and make appropriate work practice and control method recommendations to unit radiation safety officers, supervisors and workers to ensure exposures are ALARA.

2.7.2.1. **(Added-USAFE)** Periodic reviews of operations will be conducted as indicated by AFI 48-148, *Ionizing Radiation Protection*.

2.7.3. Conduct joint annual review with the unit RSO of the INRAD safety program to ensure program requirements are met. At a minimum, shall include evaluation of the program against elements NSI checklist.

2.7.4. Know the INRAD hazards associated with the local weapon systems and identify those hazards to the unit RSO.

2.7.4.1. **(Added-USAFE)** Radiation data for a weapon system associated with USAFE locations can be found in Air Force Technical Order (T.O.) 11N-20-7, *Nuclear Safety Criteria*.

2.7.5. Validate the unit-specific INRAD safety training program, if applicable.

2.7.6. Provide, or designate someone to provide, initial and refresher radiation safety training (commonly referred to as ALARA training) to workers that have the potential for combined occupational ionizing radiation exposures in excess of the general public exposure limit specified in AFI 48-148.

2.7.7. Maintain copies of MAJCOM NSI INRAD safety-related inspection reports for a minimum of three years.

2.7.8. Review the qualifications of the unit commander's nominee for unit RSO, and verify the individual satisfies the requirements specified in this Instruction.

2.8. Unit RSO Requirements:

2.8.1. Be knowledgeable of INRAD safety program requirements, engage with routine maintenance operations from a supervisory role or as an individual performing maintenance, and hold a rank of at least E-5 with a seven skill level.

2.8.1.1. **(Added-USAFE)** Weapon safety staff assigned to MUNSS will perform the requirements of the Unit RSO and will manage the INRAD safety program with the assistance of the IDMT assigned to the MUNSS.

2.8.1.2. **(Added-USAFE)** . Will provide support to the wing weapon safety staff and Installation RSO at the parent base.

2.8.2. Know the INRAD hazards associated with applicable unit weapon systems and be knowledgeable of applicable Air Force Instructions and Manuals.

2.8.2.1. **(Added-USAFE)** Radiation data for a weapon system associated with USAFE locations can be found in Air Force Technical Order (T.O.) 11N-20-7, *Nuclear Safety Criteria*.

2.8.3. Coordinate with supervisors of INRAD workers, the installation RSO, and the installation hazardous waste manager on radiation safety and waste management issues.

2.8.4. Coordinate all workplace changes affecting radiation exposure with the Installation RSO.

2.8.5. Evaluate personnel and members of the public for radiation exposure limits specified in AFI 48-148, and ensure exposure is ALARA.

2.8.5.1. (Added-USAFE) AFMAN 48-125, *Personnel Ionizing Radiation Dosimetry*, provides guidance to evaluate any suspected abnormal exposure or overexposure to INRAD or inhaled radioactive substances.

2.8.6. Adhere to procedures established by unit commander as required by para. 2.6.2 of this Instruction.

2.9. Supervisor Requirements (in addition to section 2. 4):

2.9.1. Know the INRAD hazards associated with applicable unit weapon systems and be knowledgeable of applicable Air Force Instructions and Manuals. Review INRAD exposure hazards with workers and ancillary personnel.

2.9.2. Implement installation RSO's recommendations to keep INRAD exposures below applicable limits and ALARA.

2.9.3. Ensure all workers are trained on ALARA. If not, refer them to the installation RSO or someone designated by the installation RSO.

2.10. Individual Requirements (in addition to section 2. 5):

2.10.1. Know the INRAD hazards associated with applicable unit weapon systems.

2.10.2. Follow recommendations of installation RSO, unit RSO, and/or supervisor on how to keep INRAD exposures below applicable limits and ALARA.

2.11. Base Civil Engineer:

2.11.1. Provide environmental related consultation to generating units, the installation RSO, and the AFRRAD office on the RCRA hazardous waste (HW) requirements of 91(b) mixed wastes as related to the proper identification, handling, segregation, and storage of such wastes.

2.11.2. Oversee compliance with installation RCRA permits (if applicable) and/or RCRA requirements for storage, treatment, and disposal of mixed waste per federal, state, and local requirements and AFI 32-7042, *Waste Management*, and in coordination with the installation RSO and the AFRRAD office.

Section 2C—Residual 91(b) RAM Not Associated with Current Nuclear Missions

2.12. Installation Commanders: Ensure sites identified by AFSC/SEW and AF/A7C with legacy residual 91(b) RAM from nuclear weapons accidents, incidents and maintenance, or dismantled/decommissioned 91(b) nuclear reactors (still under AF possession), or other residual 91(b) RAM are permitted by AFSC, unless previously cleared for unrestricted use or deemed not impacted by AFSC. AFSC/SEW provides guidance for permit application. These sites are normally managed under the Installation Restoration Program, per AFI 32-7020, and permit management is typically accomplished by Civil Engineering.

2.13. Permittees (Primary Responsible Party) for Permitted 91(b) RAM:

2.13.1. Ensure adherence to permit conditions.

2.13.2. Ensure a qualified permit RSO is assigned to each permit. Permit RSO qualifications are site dependent. For most sites, a fully qualified Bioenvironmental Engineer, 43E3 is

sufficient. AFSC/SEW provides guidance to permittees on appropriate qualifications for permit RSOs.

2.13.3. Ensure adequate security controls are implemented to preclude unintentional access to 91(b) RAM hazards and unwarranted 91(b) RAM removal.

2.14. Permit RSO Requirements:

2.14.1. Coordinate with the installation RSO on 91(b) RAM sites, and storage and use areas. For most 91(b) permits, the permit RSO is also the installation RSO.

2.14.2. Ensure conditions of the permit are met.

2.14.3. Evaluate personnel and members of the public for radiation exposure limits specified in AFI 48-148, and ensure exposure is ALARA.

2.14.4. Conduct the radiation dosimetry program, including: assessing dosimetry monitoring requirements per AFMAN 48-125, monitoring for adverse trends, evaluating and reporting abnormal or suspected overexposures, and providing dosimetry training in accordance with AFMAN 48-125.

2.14.5. Evaluate declared pregnant female workers for exposure limits specified in AFI 48-148, and recommend through Public Health any duty limitations required to keep exposures below applicable limits. Assess the requirement for dosimetry and provide dosimetry to declared pregnant females workers in accordance with the guidance in AFMAN 48-125.

2.14.6. Request amendments/modification to permit when changes to RAM or operating conditions change.

2.14.7. Ensure that radioactive and mixed waste generated during characterization sampling and remediation have disposal coordinated through the AFRRAD Office.

FREDERICK F. ROGGERO, Major General,
USAF
Chief of Safety

(USAFE)

KENNETH D. MADURA, Colonel, USAF
Director of Safety

Attachment 1**GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION*****References***

- AFI 21-204, *Nuclear Weapons Maintenance Procedures*, November 30, 2009
- AFI 32-7020, *The Environmental Restoration Program*, February 7, 2001
- AFI 32-7042, *Waste Management*, April 15, 2009
- AFI 40-201, *Managing Radioactive Materials in the US Air Force*, April 13, 2007
- AFI 48-145, *Occupational and Environmental Health Program*, March 5, 2008
- AFI 48-148, *Ionizing Radiation Protection*, October 12, 2001
- AFI 63-103, *Joint Air Force-National Nuclear Security Administration (AF-NNSA) Nuclear Weapon Life Cycle Management*, September 12, 2008
- AFI 63-125, *Nuclear Certification Program*, March 15, 2004
- AFI 90-201, *Inspector General Activities*, June 17, 2009
- AFI 90-901, *Operational Risk Management*, April 1, 2000
- AFI 91-101, *Air Force Nuclear Weapons Surety Program*, 19 Dec 05 & C, February 3, 2010
- AFI 91-102, *Nuclear Weapon System Safety Studies, Operational Safety Reviews, and Safety Rules*, July 28, 2004
- AFI 91-103, *AF Nuclear Safety Design Certification Program*, September 16, 2005
- AFI 91-107, *Design, Evaluation, Troubleshooting, and Maintenance Criteria for Nuclear Weapon Systems*, April 6, 1994
- AFI 91-110, *Nuclear Safety Review and Launch Approval for Space or Missile Use of Radioactive Material and Nuclear Systems*, June 28, 2002
- AFI 91-202, *The US Air Force Mishap Prevention Program*, August 1, 1998
- AFI 91-204, *Safety Investigations and Reports*, September 24, 2008
- AFPD 32-70, *Environmental Quality*, July 20, 1994
- AFPD 63-1/AFPD 20-1, *Acquisition and Sustainment Life Cycle Management*, April 3, 2009
- AFPD 90-8, *Environment, Safety and Occupational Health*, September 1, 2004
- AFPD 90-9, *Operational Risk Management*, April 1, 2000
- AFPD 91-1, *Nuclear Weapons and System Surety*, February 13, 2007
- AFPD 91-2, *Safety Programs*, September 28, 1993
- AFPD 91-3, *Occupational Safety and Health*, September 27, 1993
- AFMAN 32-4013, *Hazardous Material Emergency Planning and Response Guide*, August 1, 1997
- AFMAN 33-363, *Management of Record*, March 1, 2008

AFMAN 48-125, *Personnel Ionizing Radiation Dosimetry*, August 7, 2006

AFMAN 91-118, *Safety Design and Evaluation Criteria for Nuclear Weapons Systems*, January 18, 1994

AFMAN 91-201, *Explosives Safety Standards*, November 17, 2008 & C, October 19, 2009

AFPAM 90-902, *Operational Risk Management Guidelines and Tools*, December 14, 2000

Atomic Energy Act (AEA) of 1954, as amended

DODD 3150.1, *Joint DoD-DOE Nuclear Weapon Life-Cycle Activities*, August 27, 2002

DODI 5030.55, *DOD Procedures for Joint DOD-DOE Nuclear Weapons Life-Cycle Activities*, January 25, 2001

MIL-STD-882D, *Department of Defense Standard Practice for System Safety*, February 10, 2000

Resource Conservation and Recovery Act (RCRA) 1976 & 1984 amendments

T.O. 11N-20-7, *Nuclear Safety Criteria*

Abbreviations and Acronyms

AEA—Atomic Energy Act

AFMSA/SG3PB—Air Force Medical Support Agency – Bioenvironmental Engineering Division

AFRRAD—Air Force Radioactive Recycling and Disposal

ALARA—As Low As Reasonably Achievable

BE—Bioenvironmental Engineering

CERCLA—Comprehensive Environmental Response, Compensation, and Liability Act

CFR—Code of Federal Regulations

DOD—Department of Defense

DOE—Department of Energy

INRAD—Intrinsic Radiation

LLRW—Low Level Radioactive Waste

NRC—Nuclear Regulatory Commission

PRSO—Permit Radiation Safety Officer

RAM—Radioactive Material

RCRA—Resource Conservation and Recovery Act

RSO—Radiation Safety Officer

T.O.—Technical Order

U.S.C.—United States Code

USAFSAM—United States Air Force School of Aerospace Medicine

Terms

91(a) Material—Radioactive material exempted from NRC licensing controls under Section 91(a) of the AEA of 1954, as amended, in the interest of national defense, under the possession of the DOE.

91(b) Material—Radioactive material exempted from NRC licensing controls under Section 91(b) of the AEA of 1954, as amended, in the interest of national defense, under the possession of the DOD. These include materials in nuclear weapons.

Annual—Recurring, done, or performed every year (i.e. every 12 months).

As Low As Reasonably Achievable (ALARA)—The concept that personnel exposures must be maintained as low as possible consistent with existing technology, cost, and operational requirements.

Low—Level Radioactive Waste (LLRW)—LLRW is any radioactive waste that is not high-level radioactive waste, uranium tailings, or transuranic waste.

Legacy RAM Sites—Sites contaminated from historical nuclear weapons maintenance, accidents, or reactor residuals. This covers maintenance on unsealed weapons and accidents that occurred during the 1950s and 1960s.

Mixed Waste—Waste that contains hazardous waste and source, special nuclear, or byproduct material subject to the AEA of 1954 (i.e., material regulated by the Nuclear Regulatory Commission).

Mishap—For purposes of this Instruction, a mishap is defined in AFI 91-202. It is an event involving human acts of omission or commission involving a nuclear reactor, radioisotope power system, or radioactive material resulting in a loss of control of radioactive material that presents a hazard to life, health, or property. This includes loss of control that may result in any person in an unrestricted area exceeding the limits for exposure to ionizing radiation as stated in AFI 48-148.

Nuclear Reactor—A facility using fissile materials in a self-supporting chain reaction (nuclear fission) to produce heat or radiation for both practical application and research and development.

91(b) Permit— Written authorization from the Air Force Safety Center for Air Force organizations to receive, possess, use, store, transport, transfer and dispose of some radioactive materials defined under Section 91(b) of the AEA of 1954. Permits are similar, in function, to USAF Radioactive Materials Permits issued by the USAF Radioisotope Committee, as defined under AFI 40-201.

Permit Radiation Safety Officer—In the context of a 91(b) permit, an individual with specific education, military training, and professional experience in radiation protection practice assigned to ensure radiation safety conditions are met for RAM under a specified permit.

Permittee—In the context of a 91(b) permit, the primary responsible party that has the resource and funding authority to ensure that conditions of the permit can be met.

Radiation Safety Officer—An individual with specific education, military training, and professional experience in radiation protection practice. The term "Radiation Safety Officer" is a functional title and does not denote a commissioned status or specialty code.

Radioactive Material—Materials with unstable nuclei decay by nuclear transformation. Transformations can emit ionizing radiations: alpha or beta particles, gamma radiation or x-radiation, and/or neutrons.

Attachment 1 (USAFE)**GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION*****References***

AFI 44-103, The Air Force Independent Duty Medical Technician Program, 1 May 2005

AFMAN 48-125, Personnel Ionizing Radiation Dosimetry, 7 August 2006

AFMAN 91-221, Weapons Safety Investigations and Reports, 18 June 2004

TO 11N-20-7, Nuclear Safety Criteria

AFI 91-121, Nuclear Surety Staff Assistance Visit (NSSAV), 8 November 2010

Abbreviations and Acronyms

IDMT —Independent Duty Medical Technician

MUNSS —Munitions Support Squadrons

NSSAV —Nuclear Surety Staff Assistance Visit

USAFE —United States Air Forces in Europe

Attachment 2

AFI 91-108 INRAD SAFETY SELF-INSPECTION GUIDE

Table A2.1. INRAD SAFETY SELF-INSPECTION GUIDE.

ITEM #	ITEM	REFERENCE(S)
1.	Installation Commander Requirements	
1.1.	Has the installation commander designated, in writing, an individual who meets the requirements to serve as the installation Radiation Safety Officer (RSO)?	<i>AFI 91-108, para. 2.2.1</i> <i>AFI 91-108, para. 2.3.1</i> <i>AFI 48-148, para. 2.10.1</i>
1.2.	Has the installation commander confirmed with the installation RSO that radiation exposures related to INRAD processes are ALARA and that subsequent radiation doses for workers and ancillary personnel were below the maximum permissible dose limits?	<i>AFI 91-108, para. 2.2.3.</i> <i>AFI 48-148, table A4.1.</i>
1.3.	Did the installation commander receive and endorse by signature an annual INRAD safety review from the installation RSO?	<i>AFI 91-108, para. 2.2.3</i>
2.	Installation Radiation Safety Officer (RSO) Requirements	
2.1.	Did the installation RSO review the qualifications of the unit commander(s) nominee(s) for unit RSO, and verify the individual(s) satisfy the requirements specified in AFI 91-108, para. 2.8.1?	<i>AFI 91-108, para. 2.7.8.</i> <i>AFI 91-108, para. 2.8.1</i>
2.2.	Did the installation RSO verify that radiation exposures related to INRAD processes are ALARA and that subsequent radiation doses for workers and ancillary personnel were below the maximum permissible dose limits?	<i>AFI 91-108, para. 2.3.2.</i> <i>AFI 91-108, para. 2.3.3.</i> <i>AFI 48-148, para. 2.15.4.</i> <i>AFI 48-148, table A4.1.</i>
2.2.1.	Did the installation RSO verify exposures received by declared pregnant workers were below the specified limits (i.e., less than 500 mrem within a 10 month period and less than 50 mrem per month)?	<i>AFI 91-108, para. 2.3.3.4.</i> <i>AFMAN 48-125, 6.</i>
2.2.2.	Has the unit RSO reported any abnormal or suspected over-exposures to the installation RSO and were they evaluated for root cause and corrective action?	<i>AFI 91-108, para. 2.3.3.</i> <i>AFI 91-108, para. 2.8.6.</i> <i>AFMAN 48-125, para. 8, 9</i>
2.2.3.	Did the installation RSO provide personnel not assigned at the installation an INRAD safety brief and dosimetry prior to their entry into the weapons storage or maintenance areas, according to requirements in AFI 91-108?	<i>AFI 91-108, 2.3.3.3.</i> <i>AFI 48-148, 5.2</i>

2.3.	Did the installation RSO provide an annual INRAD safety review to the installation commander?	<i>AFI 91-108, 2.3.5. AFI 48-148, para. 2.15.1.</i>
2.4.	Did the installation RSO jointly conduct a unit-specific annual review of the INRAD safety program with the unit RSO?	<i>AFI 91-108, para. 2.7.3.</i>
ITEM #	ITEM	REFERENCE(S)
2.4.1.	Did the installation RSO validate the unit-specific INRAD safety training program, if applicable?	<i>AFI 91-108, para. 2.7.5.</i>
2.4.2.	Did the installation RSO verify INRAD work practices and radiation control methods were ALARA?	<i>AFI 91-108, para. 2.7.2.</i>
2.4.3.	Did the installation RSO identify unit-specific INRAD safety hazards to the unit RSO?	<i>AFI 91-108, para. 2.7.4.</i>
2.5.	Has the installation RSO made a determination (quantitative or directive) if workers and ancillary personnel of INRAD processes are to be included in the installation dosimetry program?	<i>AFI 91-108, section. 2.3.3. AFI 48-148, para. 2.15.4. AFI 48-148, para. 2.15.6. AFMAN 48-125, para. 4.</i>
2.6.	Has the installation RSO reviewed, for adequacy, the installation plans regarding the theft, loss, sabotage, or release of nuclear materials where INRAD is of concern?	<i>AFI 91-108, para. 2.3.4.</i>
2.7.	Are copies of INRAD safety- related inspection reports, performed by the MAJCOM, unit, etc., retained for a period of three years?	<i>AFI 91-108, 2.7.7.</i>
3.	Unit Commander Requirements	
3.1.	Did the unit commander, after coordination with the installation RSO, designate in writing an individual who meets the requirements to serve as the unit RSO?	<i>AFI 91-108, para. 2.2.2. AFI 91-108, para. 2.6.1. AFI 48-148, para. 2.16.</i>
3.2.	Has the unit commander confirmed with the unit RSO that radiation exposures related to INRAD processes are ALARA and that subsequent radiation doses for workers and ancillary personnel were below the maximum permissible dose limits?	<i>AFI 91-108, para. 2.2.3. AFI 91-108, para. 2.6.3. AFI 48-148, table A4.1.</i>
3.3.	Did the unit RSO promptly inform the installation RSO, Chief of Safety, and MAJCOM/SEW of any mishap(s) as required by AFI 91-204, para. 1.6.?	<i>AFI 91-108, para. 2.6.2.2. AFI 91-204, para. 1.6.</i>
3.4.	Did the unit commander implement procedures requiring the unit RSO to inform the installation RSO, Chief of Safety, MAJCOM/SE, and AFSC of INRAD operational, weapon system, and facility modifications that could potentially alter personnel radiation exposures?	<i>AFI 91-108, para. 2.6.2.1.</i>
4.	Unit Radiation Safety Officer Requirements	
4.1.	Has the unit RSO validated that radiation exposures related to INRAD processes are ALARA and that subsequent	<i>AFI 91-108, para. 2.2.3. AFI 91-108, para. 2.8.5.</i>

	radiation doses for workers and ancillary personnel were below the maximum permissible dose limits?	<i>AFI 48-148, para. 2.16.2.</i> <i>AFI 48-148, table A4.1.</i>
4.2.	Did the unit RSO identify INRAD exposure hazards with the workplace supervisor?	<i>AFI 91-108, para. 2.8.3.</i> <i>AFI 48-148, para. 2.16.2.</i>
ITEM #	ITEM	REFERENCE(S)
4.3.	Did the unit RSO identify or validate any publication, weapon system, and/or facility modification that could potentially alter radiation exposures to workers and ancillary personnel radiation, and were the unit's reporting procedures followed?	<i>AFI 91-108, para. 2.8.6.</i> <i>AFI 48-148, para. 2.16.2.</i>
5.	Supervisor Requirements	
5.1.	Is the workplace supervisor properly executing "workplace supervisors" responsibilities listed in AFI 48-148, para. 2.18 and AFI 48-145 para 3.19?	<i>AFI 91-108, para. 2.4.1.</i> <i>AFI 48-145 para 3.19</i>
5.2.	Did the workplace supervisor validate that all workers of INRAD processes received initial and refresher INRAD safety training, including ALARA, within 90 days of assignment and every 15 months thereafter, and such record retention is consistent with AFI 91-101 for nuclear surety training?	<i>AFI 91-108, para. 2.4.2.</i> <i>AFI 91-108, para. 2.9.3.</i> <i>AFI 48-148, para. 2.18.3.</i> <i>AFI 48-148, para. 2.18.4.</i> <i>AFI 91-101, para. 2.16.1</i>
5.3.	Did the workplace supervisor implement installation and unit RSO directives to keep INRAD procedures ALARA and exposures below applicable limits?	<i>AFI 91-108, para. 2.9.2.</i> <i>AFI 91-108, para. 2.9.3.</i> <i>AFI 48-148, para. 2.18.1.</i> <i>AFI 48-148, para. 2.18.4.</i> <i>AFI 48-148, para. 2.18.6.</i>
5.4.	Did the workplace supervisor review the INRAD exposure hazards with the workers and ancillary personnel?	<i>AFI 91-108, para. 2.9.1.</i> <i>AFI 48-148, para. 2.18.3.</i>
5.5.	Did the workplace supervisor ensure all potentially pregnant female workers were referred to their Primary Care Manager for evaluation, and if declared pregnant, to the installation and unit RSO for enrollment in the radiation dosimetry program?	<i>AFI 91-108, para. 2.4.3.</i> <i>AFI 91-108, para. 2.9.3.</i> <i>AFI 48-148, para. 2.18.5.</i> <i>AFMAN 48-125, para. 6.</i>
6.	Individual Requirements	
6.1.	Have workers of INRAD processes successfully completed a safety training program that includes the "individual's responsibilities" outlined in AFI 48-148, para. 2.19?	<i>AFI 91-108, para. 2.5.1.</i> <i>AFI 48-148, para. 2.19.</i>
6.2.	Can workers describe the INRAD exposure hazards specific to the unit, as identified by the unit RSO or the workplace supervisor?	<i>AFI 91-108, para. 2.10.1.</i>
6.3.	Can workers describe radiation protection practices and procedures on how to keep exposures related to INRAD processes ALARA and occupational exposures below the applicable limits, as identified by the unit RSO or workplace supervisor?	<i>AFI 91-108, para. 2.10.2.</i> <i>AFI 48-148, para. 2.19.4.</i> <i>AFI 48-148, para. 2.19.5.</i> <i>AFI 48-148, para. 2.19.7.</i> <i>AFI 48-148, table A4.1.</i>

