



**U.S. AIR FORCE**

**RADIATION PROTECTION PROGRAM  
FOR THE  
M43A1/M8A1 CHEMICAL AGENT ALARM (CAA),  
CHEMICAL AGENT MONITOR (CAM),  
IMPROVED CHEMICAL AGENT MONITOR (ICAM)  
AND  
GID-3 AUTOMATIC CHEMICAL AGENT  
DETECTOR/ALARM (ACADA)**

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(Revision 2)

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## A. MANAGEMENT

The management recognizes their involvement is vital for an effective radiation safety program. Management commitments and responsibly include:

- ❑ Radiation safety, security and control of radioactive material, and compliance with regulations;
- ❑ Completeness and accuracy of the radiation safety records and all information provided to the Nuclear Regulatory Commission (NRC) and/or Air Force Inspector General;
- ❑ Knowledge about the contents of the permit;
- ❑ Committing adequate resources (including space, equipment, personnel, time, and, if needed, contractors) to the radiation protection program to ensure that public and worker safety is protected from radiation hazards an compliance with regulations is maintained; and
- ❑ Selecting and assigning a qualified individual to serve as the Permit Radiation Safety Officer for permitted activities as specified in AFI 40-201.

## B. ALARA

The management is committed to ensure that the dose to occupationally exposed individuals and to members of the public is as low as is reasonably achievable (ALARA) consistent with the purpose for which the permitted activity is undertaken. The state of technology, the economics of improvements in relation to benefits to the public health and safety and other societal and socioeconomic considerations should also be taken into account.

The development and implementation of the radiation program includes provisions for keeping dose equivalents ALARA. The radiation protection program includes examination and verification of program features and of records by management, or their designee, and administrative controls specifying investigation levels below the limits. Records shall be maintained showing the examination and verification of program features and records, and actions taken by management, or its designee, adequate to demonstrate compliance with the requirements of the NRC and USAF maintaining doses ALARA and to demonstrate implementation of the ALARA program.

One requirement to implement the ALARA program is specified in 10 CFR 20.1101(d). This refers to a constraint on air emissions to the environment such that an individual of the public likely to receive the highest dose will not be expected to receive a total effective dose equivalent in excess of 10 mrem a year. The NRC published Regulatory Guide 4.20, *Constraint on Releases of Airborne Radioactive Materials to the Environment for Licensees Other Than Power Reactors* (December 1996), as guidance on methods acceptable to the NRC for compliance with the constraint on air emissions to the environment. Acceptable methods include the use of worksheets in EPA 520/1-89-002, *A Guide for Determining Compliance with the Clean Air Act Standards for Radionuclide Emissions from NRC-Licensed and Non-DOE Federal Facilities* (Revision 2). The sources used are sealed/foiled sources exclusively, have not leaked, and are excluded by the specified document.

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## C. APPLICABLE REGULATIONS/TECHNICAL ORDERS

The following listing is not all-inclusive but does represent the most common documents concerning the permitted material's possession and use.

### Nuclear Regulatory Commission

- 10 CFR Part 19 *Notices, Instructions and Reports to Workers: Inspection and Investigations*
- 10 CFR Part 20 *Standards for Protection Against Radiation*
- 10 CFR Part 21 *Report of Defects and Noncompliance*
- 10 CFR Part 30 *Rules of General Applicability to Domestic Licensing of Byproduct Material*
- 10 CFR Part 71 *Packaging and Transportation of Radioactive Material*
- NUREG-1556 Vol. 1, *Consolidated Guidance About Materials Licenses – Specific Guidance About Portable Gauge*

### U.S. Air Force Instructions

- AFI 40-201 *Managing Radioactive Material In the USAF*
- AFI 91-204 *Investigating and Reporting Mishaps*
- AFI 24-201 *Cargo Movement*

### U.S. Air Force Technical Orders

- T.O. 11H2-20-1, *Operator's Manual For Chemical Agent Monitor (CAM)*
- T.O. 11H2-17-1, *Operator's and Unit Maintenance Manual for M8A1 Automatic Chemical Agent Alarm (CAA)*
- T.O. 11H2-17-2, *Direct Support Maintenance Manual for M8A1 Automatic Chemical Agent Alarm*
- T.O. 11H2-23-1, *Operator's and Unit Maintenance Manual -- Alarm, Chemical Agent Detection, Automatic, XM22, PN 0614-2000C (Graseby Dynamics, LTD)*

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## D. RESPONSIBILITIES AND DUTIES

The specific responsibilities of the Permit Radiation Safety Officer and Base Radiation Safety Officer are stated within AFI 40-201. In addition, NRC publishes their perspective of the duties and responsibilities of Radiation Safety Officers:

### *AFI 40-201 – Permit Radiation Safety Officer*

- Check the receipt, storage, distribution, use, transfer, and disposal of radioactive materials for compliance with, approved rules, specific conditions of the permit, and directives listed in AFI 40-201.
- Tell the responsible commander and supervisors when procedures don't comply and recommend corrective action.
- Help the permittee determine, report, promptly investigate, and correct:
  - The causes, severity, and results of accidents or incidents.
  - Noncompliance or other deviation from approved radiation safety rules.
- Set up, in one binder or file, the permittee's written policy and rules for:
  - Authorizing the purchase of radioactive material.
  - Receiving and opening packages of radioactive materials.
  - Storing radioactive materials.
  - Keeping an inventory record of radioactive materials.
  - Emergency response to a loss of control of radioactive material.
  - Using radioactive material safely.
  - Doing periodic radiation surveys.
  - Calibrations and checks of survey instruments and other safety equipment.
  - Disposing of radioactive material.
  - Training personnel who work in, or frequent, radioactive material use and storage areas.
- Keep a copy of all records and reports required by the NRC and Air Force regulations that apply to each permit, including:
  - The permit and permit application.
  - Amendments.
  - All correspondence related to the permit.
- Annually, brief the organization commander responsible for the permit on the permit radiation safety program and any problem areas.
- Establish investigation action levels for personnel exposure at which the RSO must promptly investigate to find and address the cause. Set these action levels below allowable regulatory limits.
- Work with the base RSO on actions that may affect the base, such as changes in source use locations and method of disposal, etc.

### ***NRC Published Duties and Responsibilities***

- Possession, use, storage, and maintenance of sources and gauges are consistent with the limitations in the license, the Sealed Source and Device Registration sheet(s), and manufacturer's recommendations and instructions.
- Individuals using gauges are properly trained.
- When necessary, personnel monitoring devices are used and exchanged at the proper intervals; records of the results of such monitoring are maintained.
- Gauges are properly secured.
- Proper authorities are notified in case of accident, damage to gauges, fire, or theft.
- Unusual occurrences involving the gauge (e.g., accident, damage) are investigated, cause(s) and appropriate corrective action are identified, and corrective action is taken.
- Audits are performed at least annually and documented, and corrective actions taken.
- Licensed material is transported in accordance with all applicable U.S. Department of Transportation requirements.
- Licensed material is disposed of properly.
- Appropriate records are maintained.
- Up-to-date license is maintained and amendment and renewal requests submitted in a timely manner.

### ***AFI 40-201 – Base Radiation Safety Officer***

- Sets up overall installation radiation safety program.
- Provides information on radiation safety issues.
- Provides information on effectiveness of measures to control radiation hazards.
- May also serve as Permit RSO.
- Assists in within instructions and getting approval for non-Air Force organizations to use radioactive materiel (RAM) on the base.
- Checks all users to ensure safe handling of RAM.
- Briefs AFOSH Council on new permits or major amendments.
- Works with Permit RSO, Environmental Coordinator, Bioenvironmental Engineers, and Fire Chief of research storage and disposal needs and develop methods, locations, and rules for handling and storing radioactive material.
- Annually reviews permit radiation safety programs to ensure leak tests, inventories, and training programs are implemented in accordance with AFI 40-201.

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## **E. RECEIVING AND TRANSFERRING RADIOACTIVE MATERIAL**

### Receiving

1. The Permit Radiation Safety Officer should ensure that permitted radioactive material requested or ordered is authorized by the permit by radionuclide, form, manufacturer, model, and quantities.
2. Each package received shall be visually inspected for any signs of shipping damage such as crushed or punctured containers. Any obvious damage must be reported to the Radiation Safety Officer.
3. Monitor the external surfaces of the package for conformance to the method of shipping (e.g., if instruments and articles, radiation level should not be greater than 0.5 mrem/hr). If a labeled package (White I, Yellow II, or Yellow III), perform the monitoring as soon as practical but within three hours of receipt.
4. Open the package and verify the contents agree with packing slip.
5. Maintain a record of receipt and the package survey. An example is in the Appendices.

### Transferring

1. Transfer permitted radioactive material only to an organization or person authorized to receive the material under the terms of an USAF or USN permit or Nuclear Regulatory Commission or Agreement State license.
2. Assure the recipient has authority to receive the materials before making the transfer by:
  - i. Obtaining a copy of the recipient's permit or license, as appropriate, authorizing the radioactive materials to be transferred.
  - ii. Obtaining a written certification from the recipient stating he is authorized to receive the type, form, and quantity of radioactive material to be transferred, specify the permit or license number, issuing agency and expiration date.
3. Package the material in accordance with the applicable regulations of the Department of Transportation if the recipient is off base and/or the material must be transported over public highway.
4. Prepare a record of the transfer stating the recipient, material transferred, date of transfer, and permit or license number. An example is in the appendices.
5. Obtain verification from the recipient of receipt.

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## F. STORAGE, POSTING, AND LABELING

### Storage

1. The device(s) shall be stored in a locked cabinet, room, or other configuration such that the device(s) is assured of unauthorized removal or access.
2. Storage of device(s) outside of their designated storage area must be stored in a secured area or properly packaged for transport.
3. When not in storage, the device(s) shall be in constant surveillance of an authorized user.
4. Consideration should be given to other items that may be present (i.e., chemicals, explosives, heat sources, etc.) in selection of storage locations.

### Posting

1. Each storage area or room in which radioactive material is stored shall be posted with a conspicuous sign or signs bear the radiation symbol and the words "CAUTION, RADIOACTIVE MATERIAL." See the attachments for an example and description of the sign.
  - a. An exception is granted by 10 CFR 20.1903 stating that a room or area is not required to be posted with a caution sign because of the presence of a sealed source provided the radiation level at 30 centimeters from the surface of the source container or housing does not exceed 0.005 rem/hr. However, it has been the practice within the USAF to post the storage location.
  - b. DO NOT post a caution sign with the words "CAUTION – RADIATION AREA". This sign is only used for areas in which radiation levels could result in an individual receiving a dose equivalent in excess of 0.005 rem in 1 hour at 30 centimeters. The CAM/CAA would meet this exception, however, within the USAF this exception is typically not applied.
2. NRC Form 3, *Notice to Employees*, shall be prominently posted. This may be posted on the storage cabinet or within the area the devices are stored. The latest copy may be obtained at <http://www.nrc.gov/NRC/FORMS/form3.html>.
3. A supplemental notice (see appendices) shall be posted. This posting fulfills the requirement of posting in lieu of posting the following items.
  - a. The regulations in 10 CFR Part 19, 20, and 21.
  - b. The license/permit, license/permit conditions, or document incorporated into a license/permit by reference, and amendments thereto; and
  - c. Operating procedures applicable to licensed/permit activities.
  - d. Section 206 of the Energy Reorganization Act of 1974

### Labeling

Each device shall be labeled in accordance with 10 CFR 20.1904. Each container of permitted material shall bear a durable, clearly visible label bearing the radiation symbol and the words "CAUTION, RADIOACTIVE MATERIAL." The label should also bear sufficient information (such as radionuclide, activity, date of activity) to permit individuals handling or using the containers to minimize exposure. The CAM has been exempted from the label color requirements.

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## G. RADIOLOGICAL SURVEYS

Radiological surveys (an evaluation or measurement) shall be performed to assess radiological dose and/or the magnitude of radiation levels and assure compliance with applicable regulations. The two primary surveys are:

1. Ensure the radiation dose received by individual members of the public does not exceed 100 millirem in one calendar year resulting from the possession and/or use of permitted material.
2. The radiation dose in unrestricted areas does not exceed 2 mrem in any one hour.

Members of the public include persons who live, work, or may be near location where radioactive material is used or stored and employees who's assigned duties do not include the use of radioactive material but may work in the vicinity where such materials are used or stored.

Typical unrestricted areas may include offices, shops, areas outside buildings, property, and storage areas.

### EVALUATIONS

Compliance with the above is determined by measurement or calculation to assure that the Total Effective Dose Equivalent (TEDE) to the individual likely to receive the highest dose at the boundary of the unrestricted area does not exceed 100 mrem in a year.

#### CAM, ICAM and ACADA

The NRC Sealed Source/Device Registry for these devices indicates there is no detectable radiation level on any accessible surface of the device. Based on this data, radiation levels in an unrestricted area are below the 2 millirem in any one hour and an individual could not receive a dose exceeding 100 millirem in a year.

#### M8A1

The NRC Sealed Source/Device Registry for these devices states the maximum radiation dose rate at 6 inches is 0.06 mR/hr. Worst-case assumption of proportional increase radiation level with the number of devices (negates any self attenuation) and the devices are stored six inches from an unrestricted area, the maximum dose from storing 4 devices would be 0.24 mR/hr. Assuming 100 percent occupancy, the total annual dose would be 2097 mrem/year. Using an occupancy factor of 1/16 (assuming storage of devices are in unoccupied storage rooms), the annual dose would be 131 millirem. Since this exceeds 100 mrem in a year, additional action is necessary. The devices can be stored seven inches from an unrestricted area. At this distance, the calculated exposure rate is approximately 0.044 mR/hr. With the same assumptions of 100 percent occupancy, the unrestricted area dose from 4 devices would be 1540 mrem/year. Using the same occupancy factor, the annual dose would be 96.3 mrem. This is below the limit.

The devices shall be stored seven inches from an unrestricted area and if greater number than 4 devices are stored, then a re-evaluation would be needed.

Acceptability of the use of 1/16 as the occupancy is obtained from NUREG-1556, Vol. 7, Appendix O.

**H. OCCUPATIONAL DOSE AND PERSONNEL MONITORING**

1. No person shall be permitted to receive a radiation dose in one calendar year in excess of the limits specified in 10 CFR Part 20.1201. In general the specified limits are:

Body Part	Rem
Head, trunk, arms below elbow, legs above the knee, or gonads	5
Lens of eye	15
Skin or extremities	50

2. Under ordinary conditions of handling, storage, and use of the device, the radioactive material contained in the device will not be released or inadvertently removed from the source housing. The NRC has concluded (see device registry in appendices) the devices would be expected to maintain their containment integrity. Therefore, it is unlikely that any person will receive in any one year a dose in excess of 10 percent of the limits specified above, thus personnel monitoring will not be worn and is not required.

3. In keeping with the ALARA program, the following levels have been established, which if expected to be exceeded, will initiate review of investigation by the Permit Radiation Safety Officer and/or Base Radiation Safety Office.

Body Part	Investigative Levels (millirem/calendar quarter)	
	Level I	Level II
Head, trunk, arms below elbow, legs above the knee, or gonads	125	375
Lens of eye	375	1500
Skin or extremities	1250	5000

4. The Permit Radiation Safety Officer will review exposures exceeding Level I but less than Level II. The investigation may consist of comparison with those of others performing similar tasks, individual work habits, and condition of the devices. Exposures equal to or exceeding Level II shall be investigated by the Permit Radiation Safety Officer. The investigation shall include comparisons with those of others performing similar tasks, individual work habits, incidents, equipment condition, physical surveys, etc. Each investigation shall be documented including corrective actions, if any.

## I. ACCOUNTABILITY AND INVENTORY

### Accountable

1. 10 CFR 30.35 specifies that a decommissioning funding plan be submitted for possession of byproduct in excess of the amounts specified in 10 CFR 30.35(d). For sealed sources or plated sources, the limit is specified as the quantity greater than  $10^{10}$  times the applicable quantities of appendix B to Part 30. The unity rule does apply for combination of isotopes.

Radionuclide	Appendix B quantity ( $\mu\text{Ci}$ )	$10^{10}$ x Appendix B (Ci)
Nickel 63	10	100,000
Americium 241	0.01	100

For unity, the total activity of the respective radionuclide quantity shall be substituted.

$$1 \leq \frac{Ni - 63}{100,000Ci} + \frac{Am - 241}{100Ci}$$

The total possession shall be limited as stated above.

An example where 50 CAM (Ni-63 of 15 millicuries each) and 50 CAA (Am-241 of 250 microcuries each) are in possession.

$$1 \leq \frac{(50)(0.015)}{100,000Ci} + \frac{(50)(0.000250)}{100Ci}$$

$$1 \leq 0.0001325$$

This example demonstrates that greater than 50 devices of each type can be possessed and any single time and not exceed the limits specified in 10 CFR 30.35.

### Inventory

1. A physical inventory shall be performed every 6 months to account for all sources received and possessed under the authority of the USAF Radioactive Material Permit.
2. The inventory shall be recorded and shall include:
  - a. Inventory date;
  - b. Model and serial number of device or source;
  - c. Radionuclide and activity;
  - d. Device or source location; and
  - e. Signature of the Permit Radiation Safety Officer certifying the inventory accuracy.
3. The record of the inventories shall be maintained for 3 years from the date of the inventory for inspection.

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## J. LEAK TESTING

1. Each sealed source containing permitted material shall be tested for leakage and/or contamination at intervals not to exceed 12 months in accordance with the respective Technical Order. Any source received from another person that is not accompanied by a certificate indicating that a test has been performed within 12 months before the transfer shall not be put into use until tested.
2. Notwithstanding the leak test interval stated, the ACADA shall be tested at the following intervals:
  - i. After any removal and reinstallation of the same source module, a leak test will be performed taking a sample from the outer surface of the module at a point that is the most directly accessible to the nickel-63 source
  - ii. After replacement with a new source module, a leak test will be performed on the new source module taking a sample from the outer surface of the module at a point that is the most directly accessible to the nickel-63 source.
3. Notwithstanding the periodic leak test required, any permitted sealed source is exempt from such leak tests when the source contains 100 microcuries or less of beta and/or gamma emitting material or 10 microcuries or less of alpha emitting material.
4. Any source in storage and not being used need not be tested. When the source is removed from storage for use (actual, exercise, or training) or transfer to another person, it shall be tested and a report of results obtained before use or transfer.
5. Test samples shall be collected by the permittee and forwarded to the Radioanalytical Branch of the Air Force Institute for Operational Health (AFIOH/SDR, 2350 Gillingham Drive, Brooks City-Base TX 78235-5103) for evaluation or any individual authorized by the USNRC or Agreement State license or USAF or USN permit to evaluate leak tests for others.
6. The test shall be capable of detecting the presence of 0.005 microcurie of radioactive material on the test sample. If the test reveals the presence of 0.005 microcurie or more of removable contamination, the source shall be removed from service and decontaminated, repaired, or disposed of in accordance with NRC regulations and Air Force directives. A report shall be filed within 5 days of the date the leak test result is known with the USAF Radioisotope Committee Secretariat (AFMOA/SGOR, 110 Luke Ave Room 405, Bolling AFB DC 20332-7050). The report shall specify the source involved, the test results, and corrective action taken. Records of leak test results shall be kept in units of microcuries and shall be maintained for inspection by the NRC, the USAF Radioisotope Committee Secretariat, or the Medical Directorate of the Air Force Inspection Agency.

Specific procedures for conducting the leak test are specified in the appendices.

## **K. SURVEY INSTRUMENTATION**

1. Surveys necessary to verify the presence or absence of beta/gamma emitting contaminants shall be made with ADM-300 detectors or equivalent. All surveys necessary to verify the presence or absence of alpha emitting contaminants shall be made with the ADM-300 with alpha probe or equivalent.
2. Survey instruments used for exposure rate measurements shall be calibrated at least annually and following repair. Certificates of calibrations shall be maintained on file for 3 years following the calibration.
3. Survey instrument calibrations shall be performed by persons licensed by the USNRC or an Agreement State or permitted by the USAF or USN.
4. A radiation survey meter used to determine compliance with 10 CFR shall have a dedicated (always available at time of calibration and use) check source. The check source shall be used by persons performing each meter calibration to establish a baseline response representing proper operation of the meter. The baseline reading must be annotated on the meter. The check source must be read at the beginning of each day of use of the meter and at any time that damage to the meter is suspected. A record of this check source measurement does not have to be maintained.
5. Procedures for routine use are in the appendices.

## **L. TRAINING OF PERSONNEL**

1. The Permit Radiation Safety Officer or Base Radiation Safety office shall provide instruction to radiation workers (engaged in activities permitted and controlled by the permittee). Instruction shall include, but is not limited to:
  - a. General radioactive materials safety rules.
  - b. Personnel monitoring program (e.g. use, exchange, storage, records and reports).
  - c. Radiation and contamination survey program.
  - d. Accident, incident, and emergency procedures.
  - e. Radioactive materials work procedures.
  - f. Risks associated with radiation exposure.
  - g. Applicable USNRC and USAF rules and regulations and permit conditions.
  
2. The Permit Radiation Safety Officer or Base Radiation Safety Officer shall provide instruction to ancillary personnel, such as clerical, janitorial, and security personnel, whose duties may require them to work in the vicinity of radioactive material. The instruction shall include, but not be limited to:
  - a. All terms of the license pertinent to radiation safety.
  - b. Identification of areas where radioactive material is used or stored.
  - c. Potential hazards associated with radioactive material.
  - d. Radiological safety procedures appropriate to their respective duties.
  - e. Pertinent state and federal regulations.
  - f. Rules and procedures of the license.
  - g. Obligation to report unsafe conditions.
  - h. Appropriate response to emergencies or unsafe conditions.
  - i. Right to be informed of their radiation exposure and bioassay results.
  - j. Locations where the permittee has posted or made available notices, copies of pertinent regulations, and copies of pertinent permit and permit conditions (including applications and applicable correspondence).

The Permit Radiation Safety Officer shall verify that personnel will be properly instructed before assuming duties with, or in the vicinity of, radioactive materials, during annual refresher training, and whenever there is a significant change in duties, regulations, or the terms of the permit.

Specific radiation safety training guides are in the appendices.

## **M. TRANSPORTATION**

1. All radioactive material shall be transported in accordance with U.S. Department of Transportation regulations (49 CFR).
2. Transporting occurs whenever the device is transported on a public highway or prepared to be transferred to another person.
3. Each individual that prepares a package for transport shall be trained in accordance with 49 CFR 172.700.
4. A quality control checklist found at WPAFB Radiation Safety website (<http://www.abwem.wpafb.af.mil/em/>) should be used to assist in preparing shipments.

## **N. EMERGENCY PROCEDURES**

If the source fails to be placed in the shielded position (e.g., as a result of being damaged, source becomes stuck) or if any other emergency or unusual situation arises:

### Authorized User

1. Immediately secure the area and keep people away from the device until the situation is assessed and radiation levels are known. However, perform first aid for any injured individual and remove them from the area only when medically safe to do so.
2. Users and other potentially contaminated individuals should not leave the scene until emergency assistance arrives.
3. Notify the Permit Radiation Safety Officer. If unavailable, notify the Base Radiation Safety Officer.
4. Follow the directions provided by the person contacted.

### Radiation Safety Officer

1. Arrange for a radiation survey to be conducted as soon as possible by a knowledgeable person using appropriate radiation detection instrumentation, if not performed by the user.
2. Make necessary notifications to the USAF Radioisotope Committee and others as deemed appropriate. Specific reporting requirements may be found in 10 CFR 20.2201-2203, 10 CFR 30.50 and AFI 40-201.

## **O. AUDITS**

1. The Radiation Protection Program content and implementation shall be reviewed annually in accordance with 10 CFR 20.1101.
2. The audit may include, as appropriate, but not limited to, verifications and checks of the following:
  - a. Area and contamination surveys.
  - b. Survey instrument calibrations.
  - c. Leak testing of sealed sources.
  - d. Accountability and inventory.
  - c. Personal monitoring.
  - d. Receipt, transfer, and disposal.
  - e. Posting requirements.
  - f. Record keeping.
3. A written record of the audit shall be made and maintained on file. The record shall include findings, corrective actions, and recommendations for consideration, if any.

A sample audit checklist is included in the appendices.

## **P. RECORDS MANAGEMENT**

Documentation of activities to demonstrate compliance with applicable regulations may be kept in two six-tab folders as indicated below:

### VOLUME 1

TAB 1 – Permit

TAB 2 – Formal Radiation Program

Correspondence with USAF Radioisotope Committee regarding Permit

TAB 3 – Annual Management Briefings

TAB 4 – Inspections (NRC, USAF IG, etc.)

TAB 5 – Designation of Authorized Users

Training of Authorized Users

Radiation Safety Officer Appointment Letter

TAB 6 – Miscellaneous (i.e., technical orders)

### VOLUME 2

TAB 1 – Transmittal letters received from Base RSO (if letter has reports attached, separate report from transmittal letter and file in the appropriate tab)

TAB 2 – Survey Reports

TAB 3 – Receipt, Transfer, and Inventory Records

TAB 4 – Leak Test Certificates

TAB 5 – Audit/Program Reviews

TAB 6 – Miscellaneous

**APPENDICES:**

1. Example USAF Radioactive Material Permit
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Appendix 1.

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**RADIOACTIVE MATERIAL PERMIT**  
**USAF RADIOISOTOPE COMMITTEE**

Pursuant to the authority stated in AFI 40-201, Managing Radioactive Materials in the USAF, and in reliance on statements made by the applicant, permission is hereby granted to receive, possess, transfer, and store radioactive materials listed below, and to use this material for the purpose and at the places listed below. This document is not a valid permit unless it is signed by the Permittee and endorsed by a representative to the USAF Radioisotope Committee

<b>1. ORGANIZATION (Name and Address)</b>		<b>2. PERMIT NO.</b>	<b>3. AMENDMENT NO</b>
		<b>4. EXPIRATION DATE</b>	
		<b>5. DOCKET NO.</b>	
<b>6. PERMIT RSO:</b>		<b>7. ALTERNATE PERMIT RSO:</b>	
<b>8. RADIOACTIVE MATERIAL</b> (Element and Mass Numbers)	<b>9. CHEMICAL/PHYSICAL FORM</b> (NSN or Model Number)(*denotes sealed sources)	<b>10. MAXIMUM QUANTITY AUTHORIZED</b>	
A. Americium 241	*A. Plated foil source (SS&DR NR-1129-D-0102-S, Model No. M43A1 or NRD Model A-001)	A. 4 devices; 1 source per device, not to exceed 300 microcuries per source	
B. Nickel 63	* B. Plated foils (Du Pont Merck Model No. NER004R or AEA Technology QSA, Inc. Model NBCD)(SS&DR No. NR-0155-D-0119-S)	B. 15 devices; 1 source per device, not to exceed 15 millicuries per source	
C. Nickel 63	* C. Plated foils (Du Pont Merck Model No. NER004R or Amersham Model NBCD) (SS&DR No. NR-0155-D-0119-S)	C. 15 devices; 1 source per device, not to exceed 15 millicuries per source	
D. Nickel 63	* D. Plated foils (AEA Technology QSA, Inc. Model NBC or NBCD)(SS&DR No. NR-1129-D-0101-S)	D. 14 devices; 2 sources per device, not to exceed 15 millicuries per source	
<b>11. AUTHORIZED USE</b>			
A. To be used in Model M43A1 Chemical Agent Detector (CAD) for detection of aerosols and gases.			
B. For use in Chemical Agent Monitor (CAM), NSN 6665-01-199-4153.			
C. For use in Improved Chemical Agent Monitor (ICAM), NSN 6665-01-357-8502.			
D. For use in the Automatic Chemical Agent Detector/Alarm (ACADA)			
<b>12.</b> The authority for this permit is US Nuclear Regulatory Commission (NRC) Master Material License No. 42-23539-01AF issued to the USAF Radioisotope Committee and AFI 40-201, <i>Managing Radioactive Materials in the USAF</i> .			
<b>13.</b> The permittee shall comply with the provisions of Title 10, Chapter 1, Code of Federal Regulations, Part 19, "Notices, Instructions and Reports to Workers; Inspections," Part 20, "Standards for Protection Against Radiation," and Part 30, "Rules of General Applicability to Domestic Licensing of Byproduct Material," except that all reports required by those parts must be made to the USAF Radioisotope Committee Secretariat. In addition, the permittee shall comply with AFI 40-201, all applicable Air Force Regulations, and all instructions and directives of the USAF Radioisotope Committee necessary to insure compliance.			
<b>14.</b> The permitted material may be stored and used at the permittee's facilities, and at temporary sites where the Air Force maintains jurisdiction for regulating use of the permitted material subject to any host nation restrictions under Status of Forces Agreements. The permitted material must be stored in			

a secured area when not under the direct supervision of an authorized user or RSO, or properly packaged for transport.

15. A. The permitted material in Items 8.A., 8.B., and 8.C. shall be used only as part of intact M43A1 Detector Units, intact CAMs and ICAMs, respectively, and only by personnel trained in proper operations of the units and familiar with radioactive source safety and accountability requirements of end item user AFTO 11H2-17-1, AFTO 11H2-20-1, or Army TM 3-6665-343-10.

B. The permitted material in Item 8.D. shall only be used as part of intact GID-3 ACADAs and only by individual trained in proper operation of the unit and familiar with radioactive source safety and accountability requirements of AFTO 11H2-23-1 or Army TM 3-6665-321-12&P.

16. The Permit and Alternate Permit Radiation Safety Officers shall be those individuals whose training and experience are approved by the USAF Radioisotope Committee Secretariat and are appointed in writing by the head of the permittee's organization. \*A copy of the appointment memo must be provided to the USAF Radioisotope Committee Secretariat (AFMSA/SGPR, 110 Luke Ave Room 405, Bolling AFB DC 20032-7050).

\*NOTE: For Template Permits, As of 1 October 2001 statement signed by the Commander on page 2 of the Request for Template Permit Action form satisfies this requirement and appointment is not required in separate memo. Non Template permit RSO changes are still required on standard memo.

17. A. (1) Each sealed source containing permitted material in Item 8.A. shall be tested for leakage and/or contamination at intervals not to exceed 12 months in accordance with AFTO 11H2-17-2. Any source received from another person which is not accompanied by a certificate indicating that a test has been performed within 12 months before the transfer shall not be put into use until tested.

(2) Each sealed source containing permitted material in Item 8.B. and C. shall be tested for leakage and/or contamination at intervals not to exceed 12 months (6 months for Airborne Vapor [AVM]) in accordance with AFTO 11H2-20-1 and Army TM-3-6665-343-10 and Air Force supplements thereto. Any source received from another person which is not accompanied by a certificate indicating that a test has been performed within 12 months (AVM – 6 months) before the transfer shall not be put into use until tested.

(3) Periodic leak tests for material in Item 8.d. (ACADAs) are not required at base level.

B. Sealed sources need not be tested if they are in storage, and are not being used. However, when they are removed from storage for use or transferred to another person, and have not been tested within the required test interval, they shall be tested before use or transfer. No sealed source shall be stored for a period of more than 10 years without being tested for leakage and/or contamination.

C. Test samples shall be collected by the permittee and forwarded to the Radioanalytical Branch of the Air Force Institute for Operational Health (AFIOH/SDR, 2350 Gillingham Drive Brooks City-Base TX 78235-5103) or any individual authorized by USNRC or Agreement State license or USAF or USN permit to evaluate leak tests for others.

D. The test shall be capable of detecting the presence of 0.005 microcurie of radioactive material on the test sample. If the test reveals the presence of 0.005 microcurie or more of removable contamination, the source shall be removed from service and decontaminated, repaired, or disposed of in accordance with NRC regulations and Air Force directives. A report shall be filed within 5 days of the date the leak test result is known with the USAF Radioisotope Committee Secretariat (AFMSA/SGPR, 110 Luke Ave Room 405, Bolling AFB DC 20032-7050). The report shall specify the source involved, the test results, and corrective action taken. Records of leak test results shall be kept in units of microcuries and shall be maintained for inspection by the NRC, the USAF

Radioisotope Committee Secretariat, or the Medical Directorate of the Air Force Inspection Agency.

18. Sealed sources containing permitted material shall not be opened or removed from the devices by the permittee. This permit does not authorize maintenance, disassembly, or handling of the M43A1 or detector module beyond that given in AFTO 11H2-17-1 and the leak test given in paragraph 2-6 of AFTO 11H2-17-2. This permit does not authorized maintenance or disassembly of the CAM or ICAM. This permit does not authorized maintenance, disassemble, or handling of the GID-3 ACADAs beyond that given in AFTO 11H-23-1.
19. All surveys necessary to verify the presence or absence of beta/gamma emitting contaminants shall be made with the ADM-300 internal detectors or equivalent. All surveys necessary to verify the presence or absence of alpha emitting contaminants shall be made with the ADM-300 with alpha probe or equivalent.
20. The permittee shall conduct a physical inventory every 6 months to account for all sources received and possessed under this permit. The records of the inventories shall be maintained for 3 years from the date of the inventory for inspection by the NRC, the USAF Radioisotope Committee Secretariat, or the Medical Directorate of the Air Force Inspection Agency and shall include: a) inventory date, b) model and serial number of device or source, c) radionuclide and activity, d) device or source location, and e) signature of the Permit RSO certifying the inventory accuracy.
21. The permittee may transport permitted material in accordance with the provisions of 10 CFR 71, "Packaging of Radioactive Material for Transport" and 49 CFR 170 through 189, "Transportation" subject to any host nation restrictions under Status of Forces Agreements.
22. Transfer of permitted material may only be to a USAF or USN Radioactive Material Permittee or to an NRC or Agreement State Licensee holding a valid authorization to receive the sources. The permitted materials must be disposed of in accordance with AFI 40-201.
23. Except as specifically provided otherwise by this Permit, the possession and use of radioactive material described in Item 8 of this Permit shall be in accordance with statements, representation, and procedures contained in:

Document Reference	Subject	Date
(Application w/ Atch)	Request for Template Permit Action	

The Nuclear Regulatory Commission's regulations and United States Air Force directives shall govern the permittee's statements in applications or letters, unless the statements are more restrictive than the regulations and directives.

Date: \_\_\_\_\_

FOR THE USAF RADIOISOTOPE COMMITTEE

By \_\_\_\_\_

Health Physicist  
Radiation Protection Division and  
USAF Radioisotope Committee Secretariat  
Air Force Medical Support Agency  
Office of the Surgeon General

Appendix 2.

**RADIOACTIVE MATERIAL RECEIVING REPORT**  
(10 CFR 20.1906)

June 1994

**I. RECEIPT OF SHIPMENT:** Shipment Identification: \_\_\_\_\_

Received by: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

Packing Slip and Contents Agree:

	Yes	No	Comments
Radionuclide:	<input type="checkbox"/>	<input type="checkbox"/>	_____
Amount:	<input type="checkbox"/>	<input type="checkbox"/>	_____
Form:	<input type="checkbox"/>	<input type="checkbox"/>	_____

**II. RADIOACTIVE MATERIAL INFORMATION:**

Radionuclide: \_\_\_\_\_ Activity: \_\_\_\_\_  
Manufacturer: \_\_\_\_\_ Model/Lot: \_\_\_\_\_  
Serial Number: \_\_\_\_\_ Form: \_\_\_\_\_

**III. Package Information**

Label: White I  Yellow II  Yellow III  N/A   
Transport Index (\_\_\_\_\_) \_\_\_\_\_  
Excepted: Limited Quantity  Instruments or Articles   
Condition of Container: Undamaged  Damaged  Wet   
Activity Exceeds Type A Quantity Limits: Yes  No

**IV. Package Survey:**

*(External package monitoring required if package is labeled or has evidence of potential contamination. Internal monitoring performed on all packages.)*

Surveyed by: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

Instrument: Manufacturer \_\_\_\_\_ Model \_\_\_\_\_  
Serial Number \_\_\_\_\_ Calibration Date: \_\_\_\_\_

Radiation Levels: Background \_\_\_\_\_ mrem/hr Package Surface \_\_\_\_\_  
mrem/hr  
One Meter from Package Surface \_\_\_\_\_ mrem/hr

Contamination Levels:

External Surface of Package: \_\_ cpm \_\_\_\_\_ dpm  
Swipe of final source container free of contamination Yes  No   
Packing material free of contamination Yes  No

**Signature:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**If monitoring reveals contamination or radiation levels exceed limits, immediately notify the Permit Radiation Safety Officer.**

*Appendix 3.*

MEMORANDUM FOR THE RECORD

DATE:

SUBJECT: Transfer and Receipt of Radioactive Material

On <DATE>, the following radioactive material was transferred from <INSERT PERMITTEE ORGANIZATION and OFFICE SYMBOL>, USAF Radioactive Material Number <INSERT PERMIT NUMBER> to <INSERT RECIPIENT'S ORGANIZATION and OFFICE SYMBOL (or company)>, USAF Radioactive Material Permit Number <INSERT RECIPIENT'S PERMIT NUMBER>.

Nickel 63, 15 millicuries on 25 February 1998, Chemical Agent Alarm (NSN 6665-01-199-4153), serial number 345.

The recipient's USAF Radioactive Material Permit (or written certification statement) authorizing the above material is attached.

PERMIT RADIATION SAFETY OFFICER

Attachment:  
USAF Radioactive Material Permit <INSERT NUMBER>

I hereby certify the receipt of the above named radioactive material on <DATE>.

RECIPIENT'S SIGNATURE

*Appendix 4.*

**DESCRIPTION OF CAUTION SIGN**

1. The cross-hatched area is to be magenta, or purple, or black.
2. The background is to be yellow.
3. There is not a prescribed size requirement.



Appendix 5.

## SUPPLEMENTARY NOTICE TO NRC FORM 3

1. This notice is posted to comply with the requirements of U.S. Nuclear Regulatory Commission and Air Force regulations specified in 10 CFR Part 19, 10 CFR Part 21 and AFI 40-201.

2 US Air Force Radioactive Material Permit No. \_\_\_\_\_<sup>1</sup> issued under the Air Force's Nuclear Regulatory Commission Master Materials License No. 42-23539-01AFP authorizes use of radioactive materials at this location. Contact \_\_\_\_\_<sup>2</sup> to see a copy of the permit, amendments and supporting documents including Title 10 Code of Federal Regulations Parts 19, 20 and 21, AFI 40-201, and all operating procedures applicable to permitted activities. The Air Force Master Materials License, amendments, and supporting application is maintained by the USAF Radioisotope Committee Secretariat at Bolling Air Force Base, Washington, D.C. These documents are available for viewing at the USAF Radioisotope Committee Secretariat office. The USAF Radioisotope Committee Secretariat may be contacted by writing to AFMSA/SGPR, 110 Luke Ave Suite 405, Bolling AFB, DC 20332-7050, DSN 297-4313, Commercial (703) 767-4313.

### SECTION 206 of the Energy Reorganization Act of 1974

#### § 5846. Compliance with safety regulations

##### (a) Notification to Commission of noncompliance

Any individual director, or responsible officer of a firm constructing, owning, operating, or supplying the components of any facility or activity which is licensed or otherwise regulated pursuant to the Atomic Energy Act of 1954 as amended [42 U.S.C.A. § 2011 et seq.], or pursuant to this chapter, who obtains information reasonably indicating that such facility or activity or basic components supplied to such facility or activity--

(1) fails to comply with Atomic Energy Act of 1954, as amended, or any applicable rule, regulation, order, or license of the Commission relating to substantial safety hazards, or

(2) contains a defect which could create a substantial safety hazard, as defined by regulations which the Commission shall promulgate, shall immediately notify the Commission of such failure to comply, or of such defect, unless such person has actual knowledge that the Commission has been adequately informed of such defect or failure to comply.

##### (b) Penalty for failure to notify

Any person who knowingly and consciously fails to provide the notice required by subsection (a) of this section shall be subject to a civil penalty in an amount equal to the amount provided by section 234 of the Atomic Energy Act of 1954, as amended [42 U.S.C.A. § 2282].

##### (c) Posting of requirements

The requirements of this section shall be prominently posted on the premises of any facility licensed otherwise regulated pursuant to the Atomic Energy Act of 1954, as amended [42 U.S.C.A. § 2011 et seq.].

##### (d) Inspection and enforcement

The Commission is authorized to conduct such reasonable inspections and other enforcement activities as needed to insure compliance with the provisions of this section.

(Pub.L. 93-438, Title II, § 206, Oct 11, 1974, 88 Stat. 1246.)

<sup>1</sup> Enter the applicable permit number or numbers

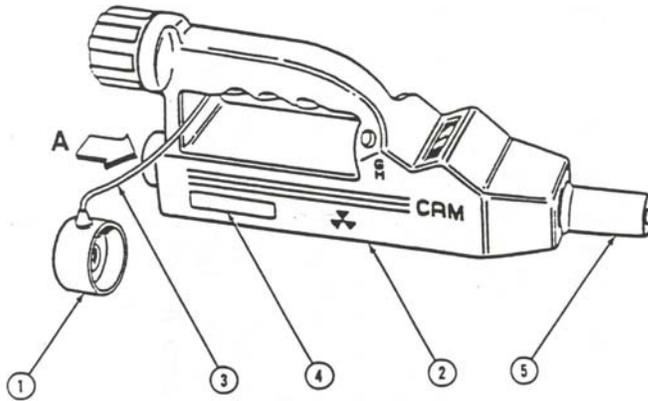
<sup>2</sup> Enter the individual, organizational office symbol, address, and telephone extension

Appendix 6.

**LEAK TEST PROCEDURES FOR CAM/CAA/ACADA**

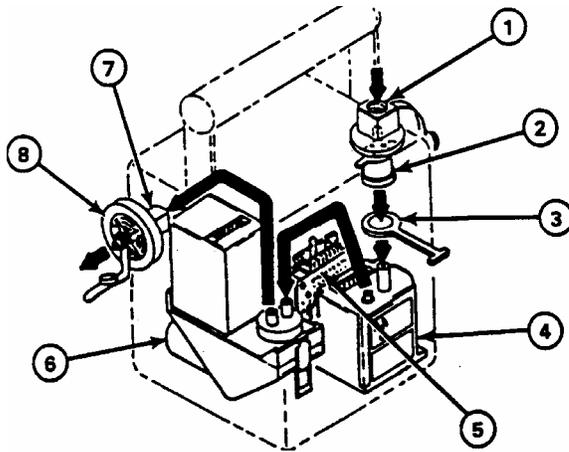
- |   | CHECK                    |
|---|--------------------------|
| 1. The following items are needed:  | √                        |
| i. AF Form 495 (one swipe envelope for each device)   | <input type="checkbox"/> |
| ii. Swipe paper (NSN 6640-00-836-6870)  | <input type="checkbox"/> |
| iii. Disposable gloves  | <input type="checkbox"/> |
| iv. ADM 300 with AP100 and/or BP100   | <input type="checkbox"/> |
| v. Ziplock bag  | <input type="checkbox"/> |
| 2. Record appropriate information on AF Form 495. See the following instructions for completion of AF Form 495.   | <input type="checkbox"/> |
| 3. Turn on the ADM 300 and place in close vicinity in a manner to monitor the swipe without having to touch the monitoring instrument.  | <input type="checkbox"/> |
| 4. Don gloves.  | <input type="checkbox"/> |
| 5. Remove devices from the storage location.  | <input type="checkbox"/> |
| 6. Mark the side of wipe with an "x" that will touch the detector. Wipe the appropriate locations (see diagrams) on the device. One swipe may be used for each device. Apply moderate pressure. | <input type="checkbox"/> |
| 7. Monitor the swipe. This is to assess gross contamination. If the swipe is two times background or more, special attention is required.   | <input type="checkbox"/> |
| 8. Place the swipe in AF Form 495.  | <input type="checkbox"/> |
| 9. Remove the gloves and place in ziplock bag for storage as potential radioactive waste. (The gloves may be disposed in ordinary trash after acceptable test results received.)                | <input type="checkbox"/> |
| 10. Seal the envelope with tape. <b>Do not lick.</b>  | <input type="checkbox"/> |
| 11. Monitor the envelope and your hands. The exterior of the envelope shall not exceed 0.5 mrem/hr to be acceptable in U.S. Mail system.  | <input type="checkbox"/> |
| 12. Return the devices to storage location.   | <input type="checkbox"/> |
| 13. Place AF Form 495(s) in a larger envelope and mail to:<br>AFIOH/SDR<br>2350 Gillingham Drive<br>Brooks City-Base TX 78235-5103  | <input type="checkbox"/> |

**Chemical Agent Monitor (CAM)**  
**Improved Chemical Agent Monitor (ICAM)**



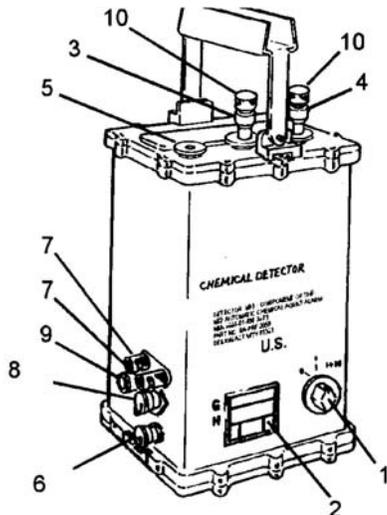
1. Environmental cap
2. Instrument exterior surface (**swipe location**)
3. Environmental cap tether
4. CAM serial number
5. Protective cap assembly (**swipe location**)

**Chemical Agent Alarm (CAA)**



1. Air Inlet
2. Air Inlet heater
3. Air Filter
4. Cell Model (contains Am-241 source) – **swipe exterior**
5. Electronics module
6. Pump module
7. Air outlet – **swipe outlet**
8. Outlet Filter

**Automatic Chemical Agent/Detector/ Alarm (ACADA)**  
 (not required at base level)



1. Selector Switch
2. Display
3. Inlet – **swipe location**
4. Exhaust – **swipe location**
5. Breather Test Point
6. Power Connector
7. Remote Alarm Connectors
8. COMMS Connector
9. Vent
10. Protective Caps

**Instructions for Completion of AF Form 495.**

Identification information

- a. **NAME AND ADDRESS OF SUBMITTING ACTIVITY** – Enter the organization and office symbol of the owning organization. This is where the analysis report will be mailed.
- b. **NAME AND TELEPHONE NUMBER OF PERSON PERFORMING TEST** – Self explanatory
- c. **RADIONUCLIDE OR TYPE OF RADIATION** – Enter the radionuclide appropriate to the instrument swiped (i.e., Nickel 63 for CAM or Americium 241 for CAA)
- d. **BASE SAMPLE NUMBER** – This is an eight-digit number starting with “WW” (represents swipes) followed by two-digit calendar year, and last four digits identify the locally assigned sequential number. The sequential number starts over each new calendar year.

SWIPE CONTAINER		
NAME AND ADDRESS OF SUBMITTING ACTIVITY		DATE SUBMITTED
		RADIAC READING
NAME AND TELEPHONE NUMBER OF PERSON PERFORMING TEST		AREA SWIPED (SQ(M))
RADIONUCLIDE OR TYPE OF RADIATION		SOURCE CODE
BASE SAMPLE NUMBER		SERIAL NUMBER OF SOURCE
DATE RECEIVED	BASE CODE	USAF OEHL NUMBER
SEND TO: USAF OEHL/RZA Brooks Air Force Base, Texas 78235-5501		
AF Form 495, JUL 87 PREVIOUS EDITION WILL BE USED.		

- e. **DATE SUBMITTED** - Self explanatory
- f. **RADIAC READING** – Record the actual reading with units (i.e., mr/hr).
- g. **AREA SWIPED** – leave blank
- h. **SOURCE CODE** – leave blank
- i. **SERIAL NUMBER OF SOURCE** – Enter the serial number of the device swiped.
- j. **BASE CODE** – This is the code assigned by IERA. If you are unsure of this number, contact IERA.

Note: The address on AF Form 495 is not correct. Do not use for mailing.

*Appendix 7.*

**SURVEY INSTRUMENT USAGE**

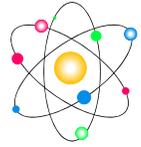
1. Ensure the calibration certificate is available and the calibration is within 12 months. Each instrument shall be calibrated at 12-month intervals or after any repair/maintenance.
2. Check the battery condition. Refer to instrument manual for replacement, if necessary. Replacement of battery does not constitute repair/maintenance; therefore, calibration is not required after battery replacement.
3. Perform a constancy check on the instrument.
  - i. Place the instrument in the same geometry used for source check.
  - ii. Compare the reading to the recorded source check measurement.
  - iii. If the reading is within  $\pm 20\%$  of the check source reading, the instrument is ready for use. If the reading is not within this range, notify the Permit Radiation Safety Officer and attach a tag indicating the instrument needs repair/calibration.

Appendix 8.



U.S. AIR FORCE

*RADIATION SAFETY BRIEFINGS  
For Chemical Agent Devices*



REASON: Initial and/or Annual Refresher      AUDIENCE: \_\_\_\_\_  
 SPEAKER: \_\_\_\_\_      LOCATION: \_\_\_\_\_  
 DATE: \_\_\_\_\_      TIME: \_\_\_\_\_

**TOPICS COVERED**

Nuclear Regulatory Commission (10 CFR 19.12)

1. Kept informed of the storage, transfer, or use of radiation and/or radioactive material
2. Instructed in the health protection problems associated with exposure to radiation and/or radioactive material, in precautions or procedures to minimize exposure and in the purposes and functions of protective devices employed
3. Instructed in, and required to observe, to the extent within the workers control, the applicable provisions of Commission regulations and licenses for the protection of personnel from exposure to radiation and/or radioactive material
4. Instructed of their responsibility to report promptly to the licensee any condition which may lead to or cause a violation of Commission regulations and licenses or unnecessary exposure to radiation and/or radioactive material
5. Instructed in the appropriate response to warnings made in the event of any unusual occurrence or malfunction that may involve exposure to radiation and/or radioactive material
6. Advised as to the radiation exposure reports which workers may request

General Operation Procedures and Information

- |   |  |
|---|--|
| 1. General radioactive materials safety rules   | 5. Radiation and contamination survey program                          |
| 2. Radioactive materials work procedures        | 6. Applicable USNRC and USAF rules and regulations                     |
| 3. Risks associated with radiation exposure     | 7. Personnel monitoring program (e.g. use, exchange, storage, records) |
| 4. Accident, incident, and emergency procedures |  |

PERSONNEL IN ATTENDANCE

Name Printed	Signature	Organization	Office Symbol	Telephone

---

<b>SPECIFIC RADIATION SAFETY TRAINING GUIDE FOR THE CAM and ICAM</b>
--

1. **Source:** The radioactive source contained in the CAM/ICAM is a sealed ring source composed of nickel-63 (Ni-63). The maximum activity for each source contained in a CAM is 15 millicuries. This is a beta-emitting source.
2. **External Radiation Levels:** The following are measured exposure rates submitted by the Department of the Army for the foil source at various distances.

**Source:** On contact with surface: 25 rad/hr, beta.  
5 cm from surface: 10 rad/hr.  
30 cm from surface: background.

**Instrument:** No detectable levels any accessible surface

3. **Authorized User:** An authorized user is an individual trained in proper operations of the device and familiar with radioactive source safety and accountability requirements of end item user AFTO 11H2-20-1.
4. **Use:** The permitted material may be stored and used at the licensee's facilities and at temporary sites where the Air Force maintains jurisdiction for regulating use of the permitted material subject to host nation restrictions under Status of Forces Agreements. The permitted material must be secured location (i.e., locked room, cabinet or vehicle) when not under direct supervision of an authorized user or the RSO. When in use, the permitted material must be under the direct supervision of an authorized user or the RSO. The permitted material must have a current leak test or survey (within the past 12 months) accompanied by test results before it can be used (actual or exercise) or transferred.
5. **Leak Testing and Surveys:** Leak testing for the CAM/ICAM will be conducted at intervals not to exceed 12 months in accordance with AFTO 11H2-20-1. The test shall be capable of detecting the presence of 0.005 microcurie of removable radioactive material on the test sample. Surveys shall be made with the ADM-300 with beta probe or equivalent to verify the presence or absence beta emitting contaminants.
6. **Maintenance and Disassembly:** The Radioactive Material Permit does not authorize maintenance, disassembly, or handling of the CAM/ICAM or detector beyond that given in AFTO 11H2-20-1.
7. **Removal of Source:** Sealed sources containing permitted material shall not be opened or removed from the devices by the permittee.
8. **Transfer:** Transfer of permitted material may only be to a USAF or USN Radioactive Material Permittee or to an NRC or Agreement State Licensee holding a valid authorization to receive the sources.
9. **Disposal:** Permitted material may be disposed of in accordance with AFI 40-201.

**SPECIFIC RADIATION SAFETY TRAINING GUIDE  
FOR THE  
COMPONENT OF M43A1 DETECTOR UNIT OF THE  
M8A1 AUTOMATIC CHEMICAL ALARM**

1. **Source:** The radioactive source contained in the M43A1 is a sealed foil source composed of americium-241 (Am-241). The maximum activity for each source contained in the M43A1/M8A1 is 300 microcuries. This is predominately an alpha emitting source. The source also emits a low energy x-ray.
2. **External Radiation Levels:** The following are maximum measured exposure rates directly in front of the foil face. In other directions the levels are insignificant.

**Cell Module:**           Surface - 1.4 mR/hr.  
                              Six inches - 0.7 mR/hr.  
                              36 inches - 0.06 mR/hr.

**Detector:**             Surface – 0.6 mR/hr  
                              Six inches – 0.04 mR/hr  
                              36 inches – 0.005 mR/hr

3. **Authorized User:** An authorized user is an individual trained in proper operations of the device and familiar with radioactive source safety and accountability requirements of end item user AFTO 11H2-17-1.
4. **Use:** The permitted material may be stored and used at the licensee's facilities and at temporary sites where the Air Force maintains jurisdiction for regulating use of the permitted material subject to host nation restrictions under Status of Forces Agreements. The permitted material must be secured location (i.e., locked room, cabinet or vehicle) when not under direct supervision of an authorized user or the RSO. When in use, the permitted material must be under the direct supervision of an authorized user or the RSO. The permitted material must have a current leak test or survey (within the past 12 months) accompanied by test results before it can be used (actual or exercise) or transferred.
5. **Leak Testing and Surveys:** Leak testing for the M43A1 will be conducted at intervals not to exceed 12 months in accordance with paragraph 2-6 of AFTO 11H2-17-2 by surveying the cell and outlet ports. The test shall be capable of detecting the presence of 0.005 microcurie of removable radioactive material on the test sample. Surveys shall be made with the ADM-300 internal detectors with alpha probe or equivalent to verify the presence or absence alpha emitting contaminants.
6. **Maintenance and Disassembly:** The Radioactive Material Permit **does not** authorize maintenance, disassembly, or handling of the M43A1 or detector beyond that given in AFTO 11H2-17-1. Removal of outer case to perform a leak test is permitted by trained individual.
7. **Removal of Source:** Sealed sources containing permitted material **shall not be opened or removed** from the devices by the permittee.
8. **Transfer:** Transfer of permitted material may only be to a USAF or USN Radioactive Material Permittee or to an NRC or Agreement State Licensee holding a valid authorization to receive the sources.

**Disposal:** Permitted material may be disposed of in accordance with AFI40-201 and directions contained in the Excess Radioactive Materials Management guide (AFRMWO, Brooks AFB).

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<b>SPECIFIC RADIATION SAFETY TRAINING GUIDE FOR THE ACADA (M22)</b>
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1. **Source:** The radioactive source contained in the ACADA is two sealed ring source composed of nickel-63 (Ni-63). The maximum activity for each source contained in a CAM is 15 millicuries (30 millicuries in the device). This is a beta-emitting source.
2. **External Radiation Levels:** The following are measured exposure rates submitted by the Department of the Army for the foil source at various distances.  
  
**Instrument:** No detectable levels any accessible surface
3. **Authorized User:** An authorized user is an individual trained in proper operations of the device and familiar with radioactive source safety and accountability requirements of end item user AFTO 11H2-23-1
4. **Use:** The permitted material may be stored and used at the licensee's facilities and at temporary sites where the Air Force maintains jurisdiction for regulating use of the permitted material subject to host nation restrictions under Status of Forces Agreements. The permitted material must be secured location (i.e., locked room, cabinet or vehicle) when not under direct supervision of an authorized user or the RSO. When in use, the permitted material must be under the direct supervision of an authorized user or the RSO. The permitted material must have a current leak test or survey (within the past 12 months) accompanied by test results before it can be used (actual or exercise) or transferred.
5. **Leak Testing and Surveys:** Leak testing for the ACADA is not required at routine intervals. Leak tests are required after source module removal. If leak test is required, the test shall be capable of detecting the presence of 0.005 microcurie of removable radioactive material on the test sample. Surveys shall be made with the ADM-300 with beta probe or equivalent to verify the presence or absence beta emitting contaminants.
6. **Maintenance and Disassembly:** The Radioactive Material Permit does not authorize maintenance, disassembly, or handling of the ACADA or detector beyond that given in AFTO 11H2-23-1.
7. **Removal of Source:** Sealed sources containing permitted material shall not be opened or removed from the devices by the permittee.
8. **Transfer:** Transfer of permitted material may only be to a USAF or USN Radioactive Material Permittee or to an NRC or Agreement State Licensee holding a valid authorization to receive the sources.
9. **Disposal:** Permitted material may be disposed of in accordance with AFI 40-201.

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# **M43A1/M8A1 Radioactive Material Americium-241**

---

- Primarily an ALPHA emitter (5.5 MeV)
- Also emits 0.06 and 0.1 Mev gamma
- ALPHA particle radiation cannot penetrate the top layer of skin
- Intake through inhalation/ingestion is main concern from a leaking source
- ALPHA particles are an internal hazard

---

# **CAM, ICAM and ACADA Radioactive Material Nickel-63**

---

- Primarily a BETA emitter (0.067 MeV)
- Emits no gamma
- Low energy BETA particle radiation can only penetrate the first few layers of skin
- Intake through inhalation/ingestion is main concern from leaking source
- BETA radiation can be a hazard to eyes, skin, and internal organs (depends on energy)

# M43A1/M8A1 Permit Requirements

---

- No more than 4 sources – Refer to the Permit
- 300  $\mu\text{Ci}$ /source – Refer to the Permit
- Leak test required every 12 months
- Inventory taken every 6 months
- Ship in accordance with US. DOT
- Can only ship to others authorized to receive by permit

## **CAM, ICAM and ACADA Permit Requirements**

---

- No more than 15 sources or as specified in permit
- Maximum 15 mCi/source (ACADA has 2 sources/device)
- Leak test required every 12 months (except ACADA)
- Inventory taken every 6 months
- Ship in accordance with U.S. DOT
- Can only ship to others authorized to receive by permit

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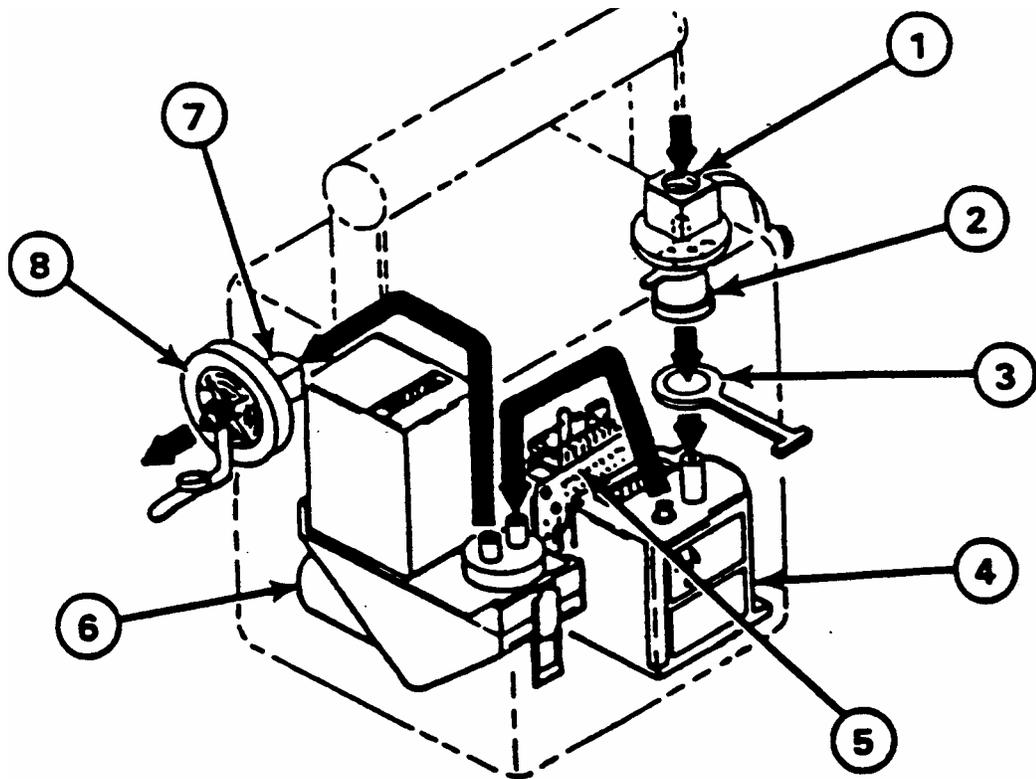
# M43A1/M8A1, CAM, and ICAM Leak Tests

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- Be sure to document leak tests
- Not needed when stored, but must be done before use
- Must have results from AFIOH before using
- Leak tests cannot be used as contamination surveys required by 49 CFR 173.424(f)

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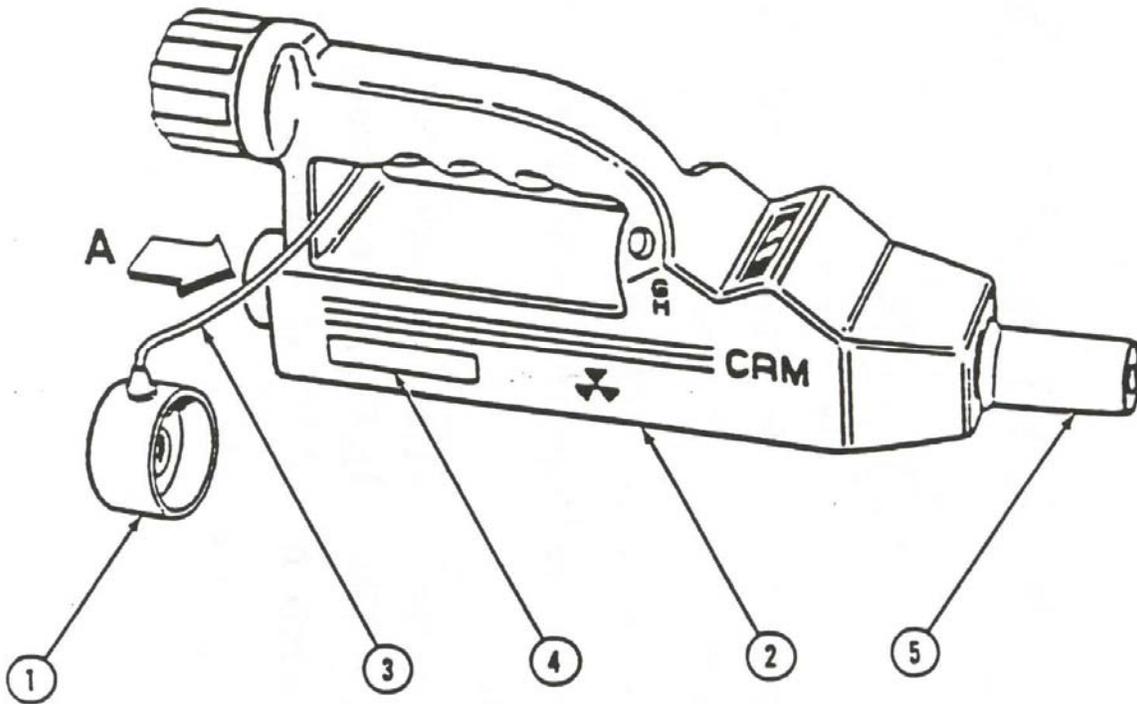
**M43A1/M8A1 AUTOMATIC CHEMICAL AGENT  
ALARM/DETECTOR**



- 1) Air Inlet
- 2) Air Inlet heater
- 3) Air Filter
- 4) Cell Model (contains Am-241 source) – wipe exterior
- 5) Electronics module
- 6) Pump module
- 7) Air outlet – wipe outlet
- 8) Outlet Filter

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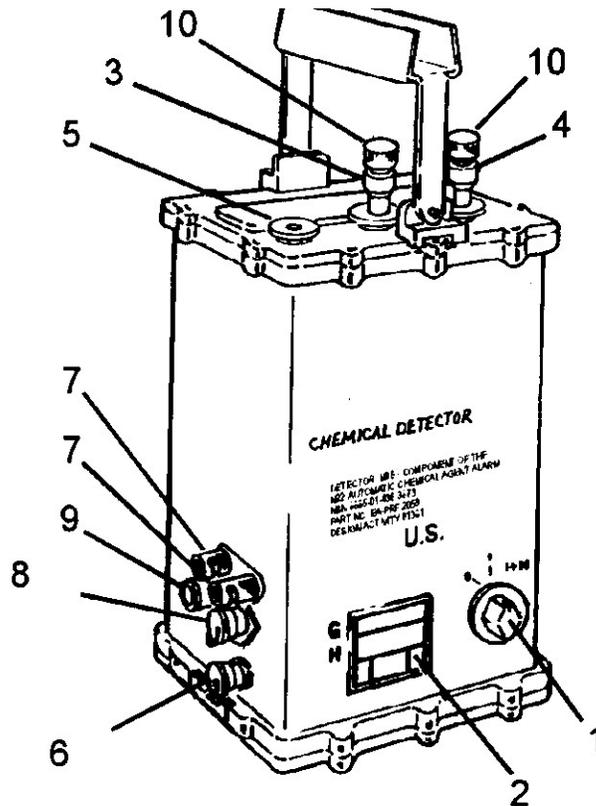
## CHEMICAL AGENT MONITOR (CAM and ICAM))



- (1) Environmental cap
- (2) Instrument exterior surface – wipe exterior surface
- (3) Environmental cap tether
- (4) CAM serial number
- (5) CAM detector (protective cap assembly) – wipe exterior surface of cap assembly

## AUTOMATIC CHEMICAL AGENT DETECTOR/ALARM (ACADA)

Not required at base level



1. Selector Switch
2. Display
3. Inlet – swipe location
4. Exhaust – swipe location
5. Breather Test Point
6. Power Connector
7. Remote Alarm Connectors
8. COMMS Connector
9. Vent
10. Protective Caps

---

# **M43A1/M8A1, CAM, ICAM and ACADA Shipping**

---

- Shipping procedures may be found in the Radiation Protection Program
- Get permit copy from receiving organization
- Ship as Radioactive Material Excepted Package, Limited Quantity, UN2910 or Instruments or Articles, UN 2911, and according to procedures
- Keep a copy of shipping documents
- Obtain confirmation of receipt from gaining organization

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# **M43A1/M8A1, CAM , ICAM and ACADA Other Items**

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- Permit expiration date – see Permit Section 1
- Submit permit renewals at least 90 days ahead of time
- All amendments and requests go through the RIC
- “CAUTION RADIOACTIVE MATERIAL” sign recommended on storage area
- Labeling required on equipment/container if not already marked

Appendix 9.



U.S. Department  
of Transportation  
Research and  
Special Programs  
Administration

400 Seventh St., S.W.  
Washington, D.C. 20590

IAEA CERTIFICATE OF COMPETENT AUTHORITY  
SPECIAL FORM RADIOACTIVE MATERIALS  
CERTIFICATE NUMBER USA/0036/S, REVISION 7

This certifies that the source described has been demonstrated to meet the regulatory requirements for special form radioactive material as prescribed in the regulations of the International Atomic Energy Agency<sup>1</sup> and the United States of America<sup>2</sup> for the transport of radioactive materials.

1. Source Identification - NRD Model A-001.
2. Source Description - This Special Form material is a laminated metallic foil of silver, gold, and americium dioxide, as shown on NRD Inc. Drawing No. 92A071 (attached). The foil may be single or double. The single foil consists of successive layers of plating, gold, Am-241 and gold, gold, silver, and flash plating for identification. In the double foil the flash plating is replaced by gold, Am-241 and gold, gold, and plating. The plating is yellow gold, white gold, or palladium. During transport the material may be in the form of free foils or secured in a variety of holders or mounts.
3. Radioactive Contents - Americium-241 as an oxide with the activity per foil ranging from less than 0.037 MBq (1uCi) to 2.035 GBq (55 mCi). Activity per unit area does not exceed 0.086 MBq per square millimeter (1800 uCi per square inch).
4. Quality Assurance - Records of Quality Assurance activities required by Paragraph 810 of the IAEA regulations<sup>1</sup> shall be maintained and made available to the authorized officials for at least three years after the last shipment authorized by this certificate. Consignors and consignees in the United States exporting or importing shipments under this certificate shall satisfy the requirements of Subpart H of 10 CFR 71.
5. Expiration Date - This certificate expires August 31, 2007.

1 "Regulations for the Safe Transport of Radioactive Material, 1998 Edition (Revised), No. TS-R-1 (ST-1, Revised)," published by the International Atomic Energy Agency (IAEA), Vienna, Austria.

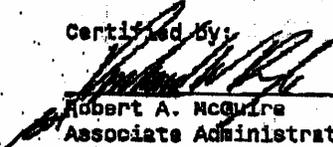
2 Title 49, Code of Federal Regulations, Parts 100 - 199, United States of

( - 2 - )

**CERTIFICATE USA/0036/S, REVISION 7**

This certificate is issued in accordance with paragraph 804 of the IAEA Regulations and Section 178.478 of Title 49 of the Code of Federal Regulations, in response to the petition and information dated January 31, 2002 submitted by NRD LLO, Grand Island, NY, and in consideration of other information on file in this Office.

Certified by:

  
\_\_\_\_\_  
Robert A. McGuire  
Associate Administrator for  
Hazardous Materials Safety

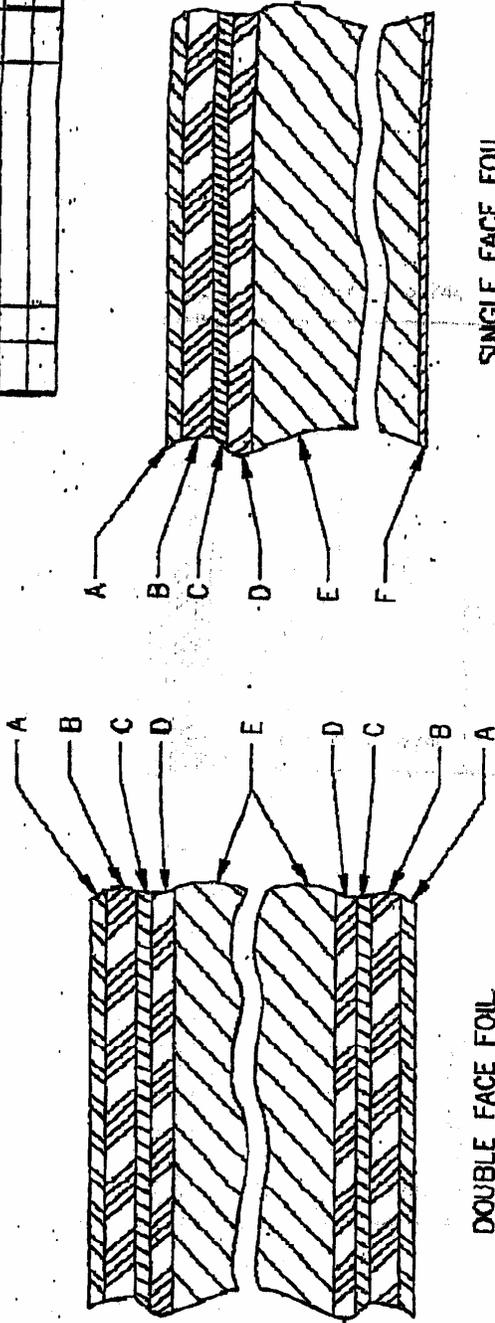
**JUL 17 2002**

\_\_\_\_\_  
(DATE)

Revision 7 - Issued to reference the 1998 IAEA regulations and to extend the expiration date.

DATE	REASON RECORD	AUTHN INK CK

17:41 RSPA/RAHHS



DOUBLE FACE FOIL  
CROSS SECTION

SINGLE FACE FOIL  
CROSS SECTION

- A. \* PLATING 0.00002
- B. GOLD 0.00004
- C. AMERICIUM 241 & GOLD 0.00002
- D. GOLD 0.00003
- E. SILVER 0.004 TO 0.009
- F. FLASH PLATING FOR IDENTIFICATION

**NOTES:**

1. \* PLATING CAN BE YELLOW GOLD, WHITE GOLD, OR PALLADIUM.
2. ACTIVITY RANGE:
  - A. FROM LESS THAN 1 MICROCURIE UP TO 55 MILLICURIES PER FOIL.
  - B. NOT TO EXCEED 2.33 MICROCURIES PER SQUARE MILLIMETER. (OR 1500 MICRO-CURIES PER SQUARE INCH)
3. DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.

<b>NRD INC.</b>		A SUBSIDIARY OF MARK IV INDUSTRIES, INC.	
2587 ALT BOULEVARD GRAND ISLAND, NEW YORK 14072		A-001 FOIL	
GENERAL & PARTS		GENERAL COMPOSITION	
SCALE NONE		DRAWN BY C. DUNN	
SEE NOTES		DATE 10JUL92	
10JUL92		92A071	



REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF DEVICE  
(AMENDED IN ENTIRETY)

NO: NR-1129-D-103-S      DATE: June 06, 2002      PAGE: 2 OF 6  
(supercedes NR-0155-D-119-S)

DEVICE TYPE: Chemical Agent Monitor

DESCRIPTION:

The chemical agent monitor (CAM) and the improved chemical agent monitor (ICAM) are used by Department of Defense (DOD) personnel to detect concentrations of hazardous elements in laboratory and field environments. Each unit measures approximately 5.75" (14.61 cm) high by 15.5" (39.37 cm) long by 3.2" (8.13 cm) wide and uses ion mobility spectroscopy (IMS) technology to selectively monitor agent vapors (typically nerve and mustard) of interest. Air is drawn into the inlet nozzle by a pump and past a membrane. Air molecules permeate the membrane into the detector cell where they are ionized by the Ni-63 source. Detection of specific agents is based on molecular ion drift within the detector cell assembly and at the collector electrode.

Each model contains a IMS cell, a sieve pack, a pump, electronics for interpreting the data from the collector electrode, a lighted display, and an aluminum cases. In the model CAM, the IMS cell, sieve pack and pump assemblies are combined into a single, replaceable unit. In the model ICAM, the IMS cell is separate from the sieve pack and pump assemblies. This allows the sieve pack to be replaced without the need to replace the IMS cell and contained Ni-63 source.

The Ni-63 source is contained within the IMS cell. A model NER-004R or NBCD foil ring source is plated onto a brass ring. The plated brass ring is inserted into a source holder (called a "screen") assembly which is inserted into the IMS cell assembly. In the model CAM, the IMS cell, sieve pack, and pump assembly are housed within an aluminum-alloy cylinder. In the model ICAM, the IMS cell is separately housed in an aluminum-alloy cylinder. This allows for replacement of the sieve pack without the need to gain access or replace the IMS cell which might require disposal of the contained Ni-63 source. Both the CAM and ICAM contain the IMS cell, sieve pack, and electronics in an outer aluminum-alloy case.

Previous models contained a tritium light source to back-light the monitor display. However, the Department of the Army indicates that units containing tritium sources have not been distributed since 1985.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF DEVICE  
(AMENDED IN ENTIRETY)

NO: NR-1129-D-103-S      DATE: June 06, 2002      PAGE: 3 OF 6  
(supercedes NR-0155-D-119-S)

DEVICE TYPE: Chemical Agent Monitor

LABELING:

The device is labeled in accordance with 10 CFR 20.1904. The label has been exempted from the color requirements of Section 20.1901(a). Each model contains labeling on the IMS cell and on the outer case that includes the isotope, activity, a radiation trefoil, and the words "CAUTION" or "CAUTION RADIOACTIVE MATERIAL."

DIAGRAMS:

See Attachments 1, 2 and 3.

CONDITIONS OF NORMAL USE:

The device will be used in ambient environments throughout the world and, as such, may be subjected to temperature and humidity extremes that may be encountered during military operations. The device is portable and will be used by individuals for the detection of chemical agents in the air or on fixed locations.

PROTOTYPE TESTING:

The distributor reports that the devices were extensively field tested by the Department of Defense. The devices were also subjected to the testing requirements of the Ministry of Defense by the manufacturer. Furthermore, the model CAM has been in use since prior to 1984 and has demonstrated an acceptable survival rate for military conditions of use. The design and construction of the model ICAM is essentially the same as the CAM as relates to source shielding, security and containment and will be used in identical environments. Therefore, the model ICAM is expected to perform similarly to the model CAM.

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REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF DEVICE  
(AMENDED IN ENTIRETY)

NO: NR-1129-D-103-S      DATE: June 06, 2002      PAGE: 4 OF 6  
(supercedes NR-0155-D-119-S)

DEVICE TYPE:    Chemical Agent Monitor

EXTERNAL RADIATION LEVELS:

The distributor reported that there is no detectable radiation at any accessible surface of either device.

QUALITY ASSURANCE AND CONTROL:

The devices are to be manufactured by a company under contract to the U.S. Department of the Army (DOA). The contract specifies what the acceptable specifications of the device will be. The DOA checks incoming products prior to release for use by the custom user.

LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE:

- The device shall be distributed by the Department of the Army, U.S. Army Soldier and Biological Chemical Command (SBCCOM), ATTN: AMSSB-RIM(N), Commander, Kansas Street, Natick, MA 01760-5000 for use by any U.S. Federal Government agency anywhere authorized by the applicable specific license.
- Custom users other than Department of Defense are limited to perform only external maintenance on the detector, with the exception of the modular sieve pack. For all internal maintenance and repair, with the exception of the modular sieve replacement, the detector will be returned to the Army for repair either by the manufacturer or by trained Department of Defense personnel/contractors.
- Reviewer Note: The areas where the sources modules and molecular membrane filters are repaired or stored should be tested for removable contamination at a time interval to be determined by the Department of the Army, Radiation Safety Staff.
- Handling, storage, use, transfer, and disposal shall be determined by the licensing authority.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF DEVICE  
(AMENDED IN ENTIRETY)

NO: NR-1129-D-103-S      DATE: June 06, 2002      PAGE: 5 OF 6  
(supercedes NR-0155-D-119-S)

DEVICE TYPE:    Chemical Agent Monitor

LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE (cont.):

- Reviewer Note: Department of Defense (DOD) licensees must ensure that only trained maintenance personnel will have access to internal mechanisms of the Model CAM to effect necessary repairs of the device and that operators of the device are permitted to only provide maintenance on components on the exterior of the device. None of the repair activities **should** require non-DOD users to open the source housing cells nor have any direct contact with the radioactive sources.
- The model CAM and ICAM devices shall be tested for leakage at intervals not to exceed 12 months using techniques capable of detecting 0.005 microcurie (185 Bq) of removable contamination.
- This registration sheet and the information contained within the references shall not be changed without the written consent of the NRC.

SAFETY ANALYSIS SUMMARY:

The models CAM and ICAM are chemical agent monitors designed to measure concentrations of specific gases and to warn of concentrations that are hazardous to humans.

Based on our review of the information and test data cited in the references, and that the device will be used by persons trained in its use, we continue to conclude that the models CAM and ICAM are acceptable for custom licensing purposes.

Furthermore, we continue to conclude that the devices would be expected to maintain their containment integrity of the source for the uses specified in this certificate. We conclude that the Department of the Army has provided sufficient information to provide reasonable assurance that, the devices can be safely operated, in accordance with the limitations set forth in this registration certificate and in the references listed below, by the custom users listed on this registration certificate specifically licensed by the NRC.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF DEVICE  
(AMENDED IN ENTIRETY)

NO: NR-1129-D-103-S      DATE: June 06, 2002      PAGE: 6 OF 6  
(supercedes NR-0155-D-119-S)

DEVICE TYPE: Chemical Agent Monitor

REFERENCES:

The following supporting documents for the model Chemical Agent Detector (CAM) and Improved Chemical Agent Detector (ICAM) designs are hereby incorporated by reference and are made a part of this registry document:

- Department of the Army applications dated November 29, 1984, and April 28, 1995, with enclosures thereto.
- Department of the Army letters dated February 5, 1985, March 20, 1995, April 28, 1995, October 5, 1995, December 4, 1996, June 10, 1997, July 1, 1997, February 25, 2000, December 8, 2000 (re: M43A1 and CAM/ICAM), January 19, 2001, and February 2, 2001, with enclosures thereto.
- Department of the Army facsimiles dated September 27, 1996, and May 20, 1997.
- Department of the Army electronic mail received July 7, 1997, January 8, 2001, and April 4, 2002.

ISSUING AGENCY:

U.S. Nuclear Regulatory Commission

Date: June 6, 2002 Reviewer: \_\_\_\_\_

*Ujagar S. Bhachu*

Ujagar S. Bhachu

Date: June 6, 2002 Concurrence: \_\_\_\_\_

*John P. Jankovich*

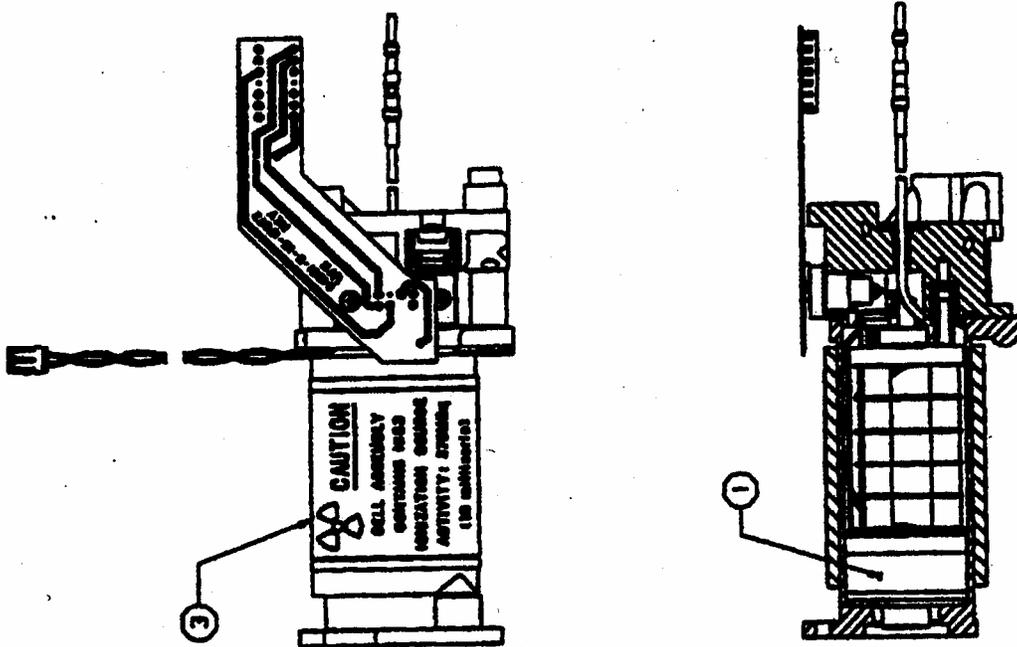
John P. Jankovich



REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF DEVICE  
(AMENDED IN ITS ENTIRETY)

NO: NR-1129-D-103-S      DATE: June 6, 2002  
(supercedes NR-0155-D-119-S)

ATTACHMENT 2



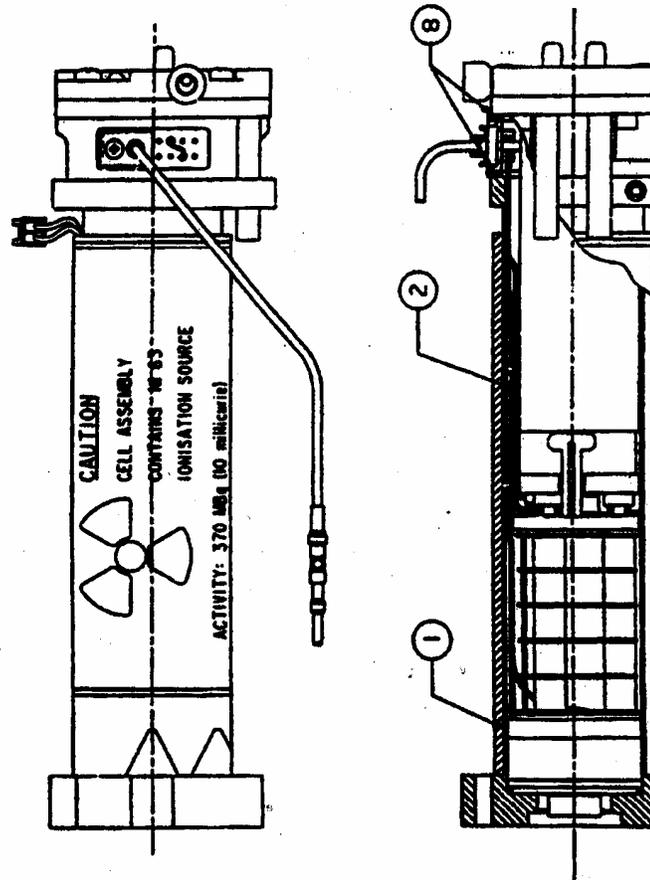
IMS Cell Assembly for the ICAM Model (Sieve Pack Separate)

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF DEVICE  
(AMENDED IN ITS ENTIRETY)

NO: NR-1129-D-103-S  
(supercedes NR-0155-D-119-S)

DATE: June 6, 2002

ATTACHMENT 3



Combined IMS Cell and Sieve Pack Assembly for the CAM Model



REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF DEVICE  
(AMENDED IN ITS ENTIRETY)

NO: NR-1129-D-102-S      DATE: June 06, 2002      PAGE: 2 OF 6  
(supercedes NR-0155-D-118-S)

DEVICE TYPE: Chemical Agent Detector

DESCRIPTION:

The Model M43A1 chemical agent detector is made up of three major components: (1) the electronics package, (2) the air pump assembly, and (3) the detector cell assembly which contains the Americium source. These three components are secured in a high impact plastic case. The use of these components allows rapid non-technical repair of a unit in the field. The device also has an optional battery pack that can be secured to the bottom of the device or it can be powered by a 24-volt supply line. The device can be a portable unit or one that is mounted at a fixed location, depending on the situation. The unit has been constructed using materials that provide for its use in a wide range of environments. In January 2001, the reference to the AEA Technology QSA, Inc. (formerly Amersham Corporation) foil source model AMM1001, was removed. The distributor verifies that the source has never been used in the devices.

LABELING:

The source housing is labeled with the trefoil symbol, isotope, activity, date of assay, the words "Caution-Radioactive Material", and the words "Radiation Exposure Can Occur When Cell Module Is Opened, Cell Module Should Not Be Disassembled." Additionally, the outside of the case is labeled with the isotope, activity, trefoil symbol, the words "Caution-Radioactive Material", the words "Control Disposal Required", and the words "If Found, Return To Nearest Military Activity".

DIAGRAM:

See Attachment 1.

CONDITIONS OF NORMAL USE:

The device will be used in ambient environmental conditions throughout the world as an automatic chemical agent alarm.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF DEVICE  
(AMENDED IN ITS ENTIRETY)

NO: NR-1129-D-102-S      DATE: June 06, 2002      PAGE: 3 OF 6  
(supercedes NR-0155-D-118-S)

DEVICE TYPE: Chemical Agent Detector

PROTOTYPE TESTING:

The foil source design used in the device has been deemed acceptable for licensing purposes by the NRC. The Radiochemical Center in England (Amersham) subjected the foil source to the following tests:

- specified form per requirements of IAEA transportation
- isotope testing in accordance with 1968 requirements
- exposure to sulphur dioxide, ammonia, hydrogen sulfide, hydrochloric acid, salt spray, and ozone
- immersion in simulated body fluid
- abrasion tests
- elevated temperature tests up to 1200°C (2192.0°F)
- vibration tests
- exposure to cleaning fluids, ethel, acetone, trichloroethylene

The manufacturer reported no leakage above 0.005 microcurie (185 Bq) for any of the foil sources tested.

The entire device was subjected to environmental testing as required by Military Standard 810C. The device was subjected to tests that simulated the worst conditions that may arise during field use. Devices were smear tested after each test. No leakage in excess of 0.005 microcurie (185 Bq) was reported.

EXTERNAL RADIATION LEVELS:

The Department of the Army reports that, for a 300 microcurie (11.1 MBq) source:

- The maximum radiation dose rates from the detector is 0.9 mR/hr (9.0 microSv/hr) at the surface, 0.06 mR/hr (0.6 microSv/hr) at 6 inches (15.2 cm), and 0.0075 mR/hr (0.075 microSv/hr) at 36 inches (91.4 cm).
- The maximum radiation dose rates from the cell module (source housing) is 2.1 mR/hr (21 microSv/hr) at the surface, 1.05 mR/hr (10.5 microSv/hr) at 6 inches (15.2 cm), and 0.09 mR/hr (0.9 microSv/hr) at 36 inches (91.4 cm).

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF DEVICE  
(AMENDED IN ITS ENTIRETY)

NO: NR-1129-D-102-S      DATE: June 06, 2002      PAGE: 4 OF 6  
(supercedes NR-0155-D-118-S)

DEVICE TYPE:    Chemical Agent Detector

EXTERNAL RADIATION LEVELS (cont'd.):

Actual readings were taken directly in front of the foil face. Nominal foil activity is 250 microcuries (9.25 MBq), with loading tolerance of +/- 20%. The actual foil activity was not measured so was conservatively assumed to be for the lowest possible activity source, 200 microcuries (7.4 MBq). The values listed were adjusted up by 50% to correspond to 300 microcuries (11.1 MBq). In other directions, the levels are insignificant.

QUALITY ASSURANCE AND CONTROL:

The devices are to be manufactured by a company under contract to the U.S. Department of the Army. The contract clearly specifies what are to be acceptable specifications of the device. Also, devices are periodically tested by the Army to ensure that they meet these specifications. Any device that does not meet the specifications is deemed not acceptable for use until the problem can be corrected by the manufacturer.

LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE:

- The device shall be distributed by the Department of the Army, U.S. Army Soldier and Biological Chemical Command (SBCCOM), ATTN: AMSSB-RIM(N), Commander, Kansas Street, Natick, MA 01760-5000 for use by any U.S. Federal Government agency anywhere authorized by the applicable specific license.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF DEVICE  
(AMENDED IN ITS ENTIRETY)

NO: NR-1129-D-102-S      DATE: June 06, 2002      PAGE: 5 OF 6  
(supercedes NR-0155-D-118-S)

DEVICE TYPE: Chemical Agent Detector

LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE (cont'd.):

- Custom users other than Department of Defense are limited to perform only external maintenance on the detector. For all internal maintenance and repair, the detector will be returned to the Army for repair either by the manufacturer or by trained Department of Defense personnel/contractors.
- The areas where the cell modules are repaired or stored should be tested for removable contamination at a time interval to be determined by the Department of the Army, Radiation Safety Staff.
- Handling, storage, use, transfer, and disposal shall be determined by the licensing authority.
- Reviewer Note: Department of Defense (DOD) licensees must ensure that only trained maintenance personnel will have access to internal mechanisms of the Model M43A1 to effect necessary repairs of the device and that operators of the device are permitted to only provide maintenance on components on the exterior of the device. None of the repair activities should require non-DOD users to open the source housing cells nor have any direct contact with the Am-241 sources.
- The device shall be leak tested at intervals not to exceed 12 months using techniques capable of detecting 0.005 microcurie (185 Bq) of removable contamination, and using procedures as described in the licensees application dated March 29, 1982.
- This registration sheet and the information contained within the references shall not be changed without the written consent of the NRC.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF DEVICE  
(AMENDED IN ITS ENTIRETY)

NO: NR-1129-D-102-S      DATE: **June 06, 2002**      PAGE: 6 OF 6  
(supercedes NR-0155-D-118-S)

DEVICE TYPE: Chemical Agent Detector

SAFETY ANALYSIS SUMMARY:

The Model M43A1 chemical agent detector has been designed to give fast, accurate readings of the concentration of specified gases and to warn of concentration that may be hazardous to the persons deployed in that area.

Based on our review of the information and test data cited in the references, and that the device will be used by persons trained in its use, we continue to conclude that the M43A1 chemical agent detector design is acceptable for licensing purposes. We conclude that the Department of the Army has provided sufficient information to provide reasonable assurance that, the devices can be safely operated, in accordance with the limitations set forth in this registration certificate and in the references listed below, by the custom users listed on this registration certificate specifically licensed by the NRC.

REFERENCES:

The following supporting documents for the Model M43A1 chemical agent detector are hereby incorporated by reference and are made a part of this registry document:

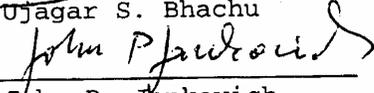
- Department of the Army letters dated February 5, 2001, February 2, 2001, January 19, 2001, December 21, 2000, December 8, 2000 (re: M43A1 and CAM/ICAM), December 6, 2000, August 18, 2000, February 25, 2000, March 20, 1995, October 29, 1997, May 15, 1984, June 3, 1983, and March 29, 1982, with enclosures thereto.
- Department of the Army electronic mail received January 8, 2001, March 28, 2001, and **April 4, 2002.**

ISSUING AGENCY:

U.S. Nuclear Regulatory Commission

Date: June 06, 2002 Reviewer: 

Ujagar S. Bhachu

Date: June 06, 2002 Concurrence: 

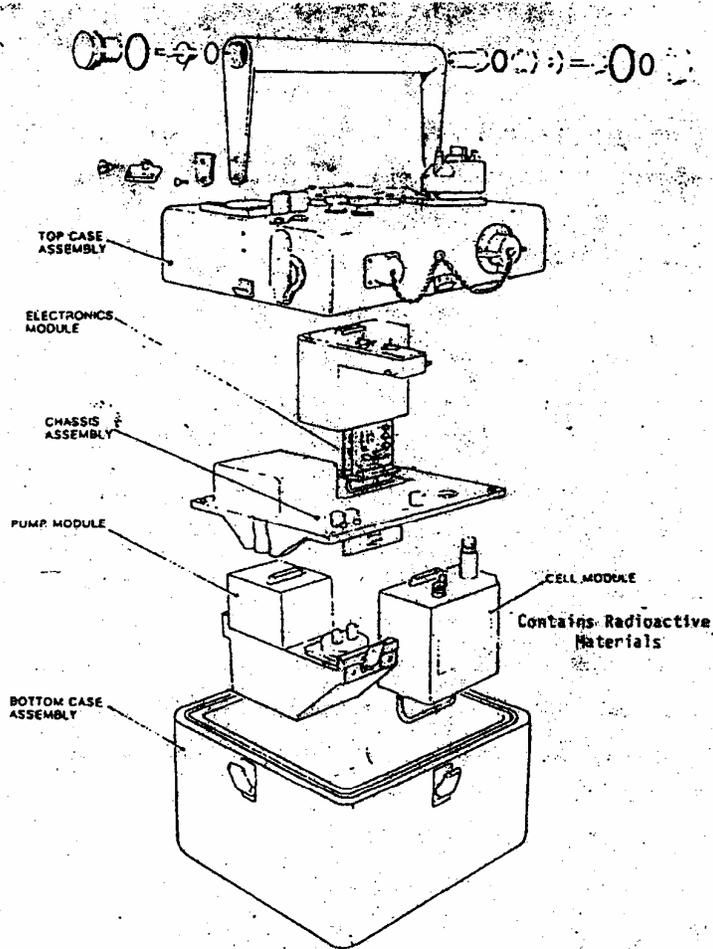
John P. Jankovich

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF DEVICE  
**(AMENDMENT IN ITS ENTIRETY)**

NO: NR-1129-D-102-S  
(supercedes NR-0155-D-118-S)

DATE: June 06, 2002

ATTACHMENT 1



Isometric Sketch of the M43A1 Detector Unit



REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF DEVICE  
(AMENDED IN ITS ENTIRETY)

NO: NR-1129-D-101-S      DATE: June 6, 2002      PAGE: 2 OF 8  
(supercedes NR-0155-D-125-S)

DEVICE TYPE:    Chemical Agent Detector

DESCRIPTION:

The Graseby Ionics Detector-3 (GID-3), also known as the M22 Automatic Chemical Agent Alarm, is a portable gas detector used by military personnel to detect concentrations of hazardous chemicals. The GID-3 contains two ion mobility spectrometry (IMS) cells, each containing a Ni-63 plated source of up to 15 mCi (0.56 GBq). The device is designed to be either operated on the ground or mounted for use on military vehicles. The GID-3 has dimensions of 5.0 x 6.0 x 9.0 inches (12.7 x 15.2 x 22.9 cm) and weighs 10.63 pounds (4.8 kg). When the device has all of its accessories attached, it weighs 23.65 pounds (10.6 kg).

Each IMS cell consists of two parts: the cell assembly and drift tube assembly. The cell assembly contains the Ni-63 source. The source is held in place by a cylindrical source screen made of stainless steel with three equally spaced internal tabs. The cylindrical source and the screen are housed in a polymeric insulator with a cover within the cell assembly. Each IMS cell is inserted into a bore of a machined block of aluminum alloy that has been nickel plated. There are two bores, one for each cell, adjacent to each other in the block of aluminum material. One end of the drift tube assembly is fastened to the air inlet manifold by four screws which have thread locking sealant applied to them at assembly. The opposite end of the assembly is attached to a manifold assembly by four screws. This arrangement closes off the radioactive source with the exception of the sampling air passages which are a nominal 0.06 inches (1.5 mm) in diameter.

Access to the IMS cells and the internal mechanisms of the device, such as the pump assemblies, is made through the top and bottom plates of the device's case. These plates are held in place by screws requiring special tools to remove.

As of May 1999, the eight screws which attach the manifolds to each end of the drift tube body are button head style tamper resistant screws.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF DEVICE  
(AMENDED IN ITS ENTIRETY)

NO: NR-1129-D-101-S      DATE: June 6, 2002      PAGE: 3 OF 8  
(supercedes NR-0155-D-125-S)

DEVICE TYPE: Chemical Agent Detector

DESCRIPTION (cont.):

In December 1999, this certificate was amended to remove the New England Nuclear Model NER-004R source as a source approved for use in the device. The device distributor states that there have been no devices manufactured or distributed that have contained the NER-004R source.

LABELING:

The device is labeled in accordance with 10 CFR 20.1901 and 1904. In addition to the labeling on the outside of the device, each IMS cell is labeled with the following wording: "Ionising source, Ni63, and 560 MBq," and the standard radiation trefoil. The module assembly containing the two IMS cells is labeled with a serial number. Prior to July 2001, the cells were labeled with the nominal 10 mCi (370 MBq). As of July 31, 2001, the cells are labeled with the maximum activity of 15 mCi (560 MBq). During the period of January 25, 2001, to July 30, 2001, cells labeled with the nominal activity can continue to be distributed to Department of Defense licensees.

DIAGRAM:

See Attachments 1 and 2.

CONDITIONS OF NORMAL USE:

The device will be used in ambient environments throughout the world, both outdoors and indoors. The device will be used for the detection of military chemical agents. The device may be stored in temperatures in the range of  $-62 \pm 3^{\circ}\text{C}$  to  $71 \pm 3^{\circ}\text{C}$  ( $-80 \pm 3^{\circ}\text{F}$  to  $160 \pm 3^{\circ}\text{F}$ ) and used in temperatures in the range of  $-30 \pm 3^{\circ}\text{C}$  to  $52 \pm 3^{\circ}\text{C}$  ( $-22 \pm 3^{\circ}\text{F}$  to  $126 \pm 3^{\circ}\text{F}$ ) and relative humidity in the range of 5 to 100%. The device is also expected to withstand the vibration experienced during use in vehicles, both on the move and stationary. The expected useful life of the device is 15 years, based upon previous military devices of a similar nature and purpose, technology advancement, physical wear, DOD affordability, and threat.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF DEVICE  
(AMENDED IN ITS ENTIRETY)

NO: NR-1129-D-101-S      DATE: June 6, 2002      PAGE: 4 OF 8  
(supercedes NR-0155-D-125-S)

DEVICE TYPE: Chemical Agent Detector

PROTOTYPE TESTING:

The Department of the Army reports that the device was extensively field tested by the Department of Defense. The range of environmental and physical tests that the GID-3 was put through are found in Military Standard 810E, "Environmental Test Methods and Engineering Guidelines." This standard provides direction on how to conduct the tests, number of cycles, and all physical conditions. The specific tests are developed in accordance with this standard and incorporate the environmental and physical conditions in which the devices will be subjected. These tests are described in the ACADA System Performance Specification document. Among others, the device was prototype tested by performing drop tests from two different heights, several different vibration tests simulating shocks and different types of vehicles, and temperature and humidity extremes.

EXTERNAL RADIATION LEVELS:

The Department of the Army reported there is no detectable radiation on any accessible surface of the device. The device contains two Ni-63 sources which emit low energy beta radiation. The sources are completely surrounded by aluminum with a wall thickness sufficient to absorb all of the radiation emitted by the sources. Therefore, radiation levels on the detector's surface will be indistinguishable from background. The Department of the Army demonstrated this by placing a thermoluminescent dosimeter facing the IMS cell modules as close as possible for over 27 hours. The results showed that there is no measurable dose (less than 0.0005 rem [5 uSv]) over this time period.

QUALITY ASSURANCE AND CONTROL:

The devices are to be manufactured by a company under contract to the Department of the Army. Under this contract, the company must follow an approved Quality Program Plan and Configuration Management Plan. Prior to a change being made in either program, the Department of the Army must give its approval. In addition, the Defense logistics Agency Defense Contracts Management Command (DCMC) provides oversight of the manufacturer to ensure

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF DEVICE  
(AMENDED IN ITS ENTIRETY)

NO: NR-1129-D-101-S      DATE: June 6, 2002      PAGE: 5 OF 8  
(supercedes NR-0155-D-125-S)

DEVICE TYPE: Chemical Agent Detector

QUALITY ASSURANCE AND CONTROL (cont'd.):

conformance to the Quality Program Plan and Configuration Management Plan. DCMC provides direct feedback to the GID-3 program office regarding potential areas of concern and recommended corrective actions.

LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE:

- The device shall be distributed by the Department of the Army, U.S. Army Soldier and Biological Chemical Command (SBCCOM), ATTN: AMSSB-RIM(N), Commander, Kansas Street, Natick, MA 01760-5000 for use by any U.S. Federal Government agency anywhere authorized by the applicable specific license.
- Custom users other than Department of Defense are limited to perform only external maintenance on the detector, with the exception of the modular sieve pack. For all internal maintenance and repair, with the exception of the modular sieve replacement, the detector will be returned to the Army for repair either by the manufacturer or by trained Department of Defense personnel/contractors.
- The areas where the cell modules are repaired or stored should be tested for removable contamination at a time interval to be determined by the Department of the Army, Radiation Safety Staff.
- Handling, storage, use, transfer, and disposal shall be determined by the licensing authority.
- Reviewer Note: Department of Defense (DOD) licensees must ensure that only trained maintenance personnel will have access to internal mechanisms of the Model GID-3 to effect necessary repairs of the device and that operators of the device are permitted to only provide maintenance on components on the exterior of the device. None of the repair activities **should** require non-DOD users to open the source housing cells nor have any direct contact with the Ni-63 sources.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF DEVICE  
(AMENDED IN ITS ENTIRETY)

NO: NR-1129-D-101-S      DATE: June 6, 2002      PAGE: 6 OF 8  
(supercedes NR-0155-D-125-S)

DEVICE TYPE: Chemical Agent Detector

LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE (cont'd):

- The device shall be leak tested using techniques capable of detecting 0.005 microcurie (185 Bq) of removable contamination, using procedures as described in the licensee's application dated March 29, 1982, and at the following intervals:  
  
After any removal and reinstallation of the same source module, a leak test will be performed taking a sample from the outer surface of the module at a point that is the most directly accessible to the nickel-63 source.  
  
After replacement with a new source module, a leak test will be performed on the new source module taking a sample from the outer surface of the module at a point that is the most directly accessible to the nickel-63 source.
- In addition to a leak test, the module membrane will be inspected after repair involving disassembly of the source module: (a) a visual inspection of the module membrane will be performed to detect any signs of damage or deterioration, and if any such signs are detected, the source module shall not be put back into service until the membrane has been replaced or repaired by a person authorized by an NRC or an Agreement State license to perform this activity; and (b) in any event, a leak test will be performed prior to the source module being sealed, taking a sample from the most directly accessible point available to the nickel-63 source, with due care not to damage the source or the membrane.
- Prior to July 2001, the cells were labeled with the nominal 10 mCi (370 MBq). As of July 31, 2001, the cells are labeled with the maximum activity of 15 mCi (560 MBq). During the period of January 25, 2001, to July 30, 2001, cells labeled with the nominal activity can continue to be distributed to Department of Defense licensees.
- This registration sheet and the information contained within the references shall not be changed without the written consent of the NRC.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF DEVICE  
(AMENDED IN ITS ENTIRETY)

NO: NR-1129-D-101-S      DATE: June 6, 2002      PAGE: 7 OF 8  
(supercedes NR-0155-D-125-S)

DEVICE TYPE:    Chemical Agent Detector

SAFETY ANALYSIS SUMMARY:

Based on our review of the information contained in the references cited below, and that the device will be used by persons trained in its use, we continue to conclude that the Department of the Army has provided sufficient information to provide reasonable, assurance that:

1. The device can be safely operated, in accordance with the limitations set forth in this registration certificate and in the references listed below, by the custom users listed on this registration certificate specifically licensed by the NRC; and
2. Under ordinary conditions of handling, storage, and use of the device, the radioactive material contained in the device will not be released or inadvertently removed from the device and it is unlikely that an operator will receive in 1 year an occupational dose in excess of the annual limits specified in 10 CFR 20.1201(a).

Based on review of the Model GID-3, and the information and test data cited herein, we continue to conclude that the device is acceptable for custom licensing purposes.

Furthermore, we continue to conclude that the device would be expected to maintain its containment integrity for normal conditions of use and accidental conditions which might occur during uses specified in this certificate.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF DEVICE  
(AMENDED IN ITS ENTIRETY)

NO: NR-1129-D-101-S      DATE: **June 6, 2002**      PAGE: 8 OF 8  
(supercedes NR-0155-D-125-S)

DEVICE TYPE: Chemical Agent Detector

REFERENCES:

The following supporting documents for the GID-3 design are hereby incorporated by reference and are made a part of this registry document:

- Department of the Army application dated October 3, 1996, letters dated February 18, 1997, February 24, 1997, and April 24, 1997, with enclosures thereto.
- Department of the Army facsimiles dated January 17, 1997, and August 5, 1997.
- Department of the Army e-mails dated February 7, 1997, February 25, 1997, April 9, 1997, April 10, 1997, April 28, 1997, and May 1, 1997.
- Department of the Army materials hand delivered on May 15, 1997.
- Department of the Army letters dated October 21, 1999, October 22, 1999, December 9, 1999, December 29, 1999, February 25, 2000, April 14, 2000, August 17, 2000, December 6, 2000, December 8, 2000 (re: GID-3), December 8, 2000 (re: M43A1 and CAM/ICAM), January 16, 2001, and February 2, 2001, with enclosures thereto.
- Department of the Army electronic mail received January 8, 2001.
- AEA Technologies (US) letter dated December 6, 2000.
- **Department of the Army electronic mail received April 4, 2002.**

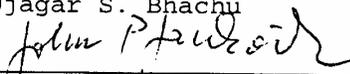
ISSUING AGENCY:

U.S. Nuclear Regulatory Commission

Date: June 6, 2002 Reviewer: \_\_\_\_\_

  
Ujagar S. Bhachu

Date: June 6, 2002 Concurrence: \_\_\_\_\_

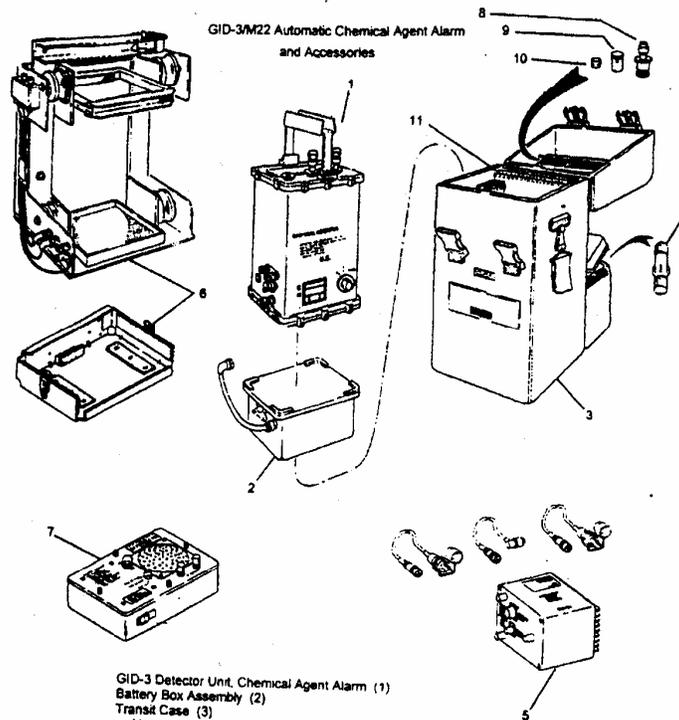
  
John P. Jankovich

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF DEVICE  
(AMENDED IN ITS ENTIRETY)

NO: NR-1129-D-101-S      DATE: June 6, 2002      ATTACHMENT 1  
(supercedes NR-0155-D-125-S)

DEVICE TYPE: Chemical Agent Detector

GID-3 and Accessories



- GID-3 Detector Unit, Chemical Agent Alarm (1)  
Battery Box Assembly (2)  
Transit Case (3)  
Also contained in the Transit Case are:-  
Confidence Sample (4)  
Spare Sealed Inlet (8)  
Rain Caps (9)  
Protective Caps (10)  
Technical Manual, Operator's And Unit Maintenance Manual (11)
- Auxiliary Equipment:  
Power Supply Assembly (5) (including Power Cable Link, a 110 VAC Power Cable  
and 220 VAC Power Cable)  
Vehicle Mounting Kit (6) (including the mounting bracket for the M42 Remote Alarm)  
Alarm Unit, Chemical Agent, Automatic Alarm: M42 (7)

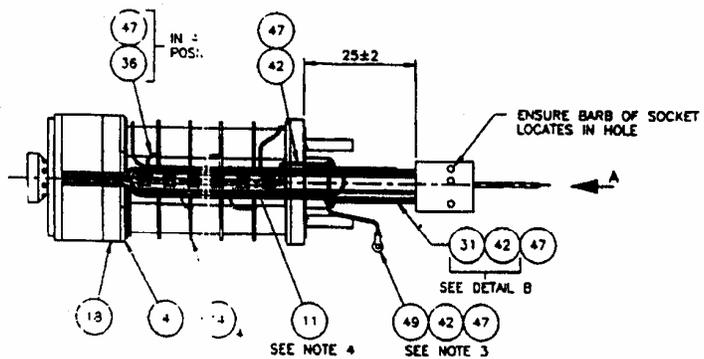
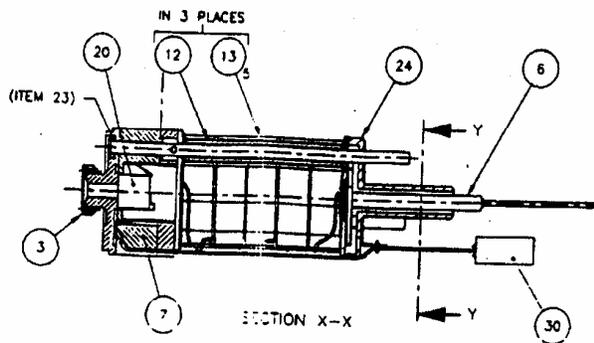
REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
 SAFETY EVALUATION OF DEVICE  
 (AMENDED IN ITS ENTIRETY)

NO: NR-1129-D-101-S      DATE: June 6, 2002      ATTACHMENT 2  
 (supercedes NR-0155-D-125-S)

DEVICE TYPE:      Chemical Agent Detector

Cell Assembly

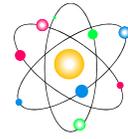
Part Number	Description
3	Sensor Assembly
7	Source Screen Assembly
20	Ni-63 Source



Appendix 13.



***RADIATION PROTECTION PROGRAM***  
***AUDIT REPORT***



**PERMITTEE:** \_\_\_\_\_

**USAF PERMIT NO.:** \_\_\_\_\_

**EXPIRATION DATE:** \_\_\_\_\_

**PERMIT RADIATION  
SAFETY OFFICER:** \_\_\_\_\_

**DATE OF AUDIT:** \_\_\_\_\_

**AUDIT PERFORMED BY:** \_\_\_\_\_

**SUMMARY:**

\_\_\_\_\_ The permit was found to be in compliance with rules and regulations of the Nuclear Regulatory Commission and U.S. Air Force.

\_\_\_\_\_ The permit was found to be in violation but corrective action was taken at the time of the audit. The following item(s) were corrected:

\_\_\_\_\_ The permit was found to be in violation and the following item(s) need correction:

**COMMENTS/RECOMMENDATIONS:**



U.S. AIR FORCE

# Radiation Protection Program Audit

Permittee: \_\_\_\_\_

USAF Permit No.: \_\_\_\_\_

Criteria	Yes	No	N/A	References
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## 1. MANAGEMENT and PROGRAM

a. same as in permit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10 CFR 20.1101
b. formal radiation protection program	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10 CFR 20.2102
c. ALARA program				10 CFR 30.34
- written documentation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	AFI 40-201
- annual review conducted _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
d. permit documentation available including referenced documents	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
e. incident certification letters signed by permittee and RSO	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
f. briefed annually by RSO _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
g. records maintained	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

comments

## 2. FACILITIES and STORAGE

a. facilities as described	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10 CFR 20.1801
b. radiation/storage areas secured	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10 CFR 20.1802
c. constant surveillance in unrestricted area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	T.O. 00-110N-3

comments

## 3. EQUIPMENT

a. equipment appropriate to material on hand	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10 CFR 20.1501
b. adequate number of monitoring equipment available	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
c. survey instrument calibrated at _____ intervals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
d. calibrated by authorized persons	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
e. equipment functions properly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
f. records maintained	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

comments





U.S. AIR FORCE

# Radiation Protection Program Audit

Permittee: \_\_\_\_\_

USAF Permit No.: \_\_\_\_\_

Criteria	Yes	No	N/A	References
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## 6. MATERIALS

a. RAM authorized on permit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10 CFR 20.1904
b. accounted for by inventory	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10 CFR 30.34
c. inventory conducted semiannually previous inventory _____ last inventory _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10 CFR 30.51
d. containers properly labeled	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
e. records maintained	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

comments

## 7. RECEIPT OF RADIOACTIVE MATERIAL

a. written procedures of receipt and opening packages	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10 CFR 20.1904
b. records of receipt available	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10 CFR 20.1906
c. package survey performed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10 CFR 30.51
d. radiation labels obliterated	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
f. records maintained	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

comments

## 8. TRANSFER AND SHIPPING

a. RAM properly packaged, marked, and labeled	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	49 CFR 173
b. RAM transferred to authorized recipient	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10 CFR 30.41
c. copy of recipient's license or other authorization	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10 CFR 30.51
d. Confirmation of receipt by gaining organization	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10 CFR 71
d. records maintained	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	AFI 40-201

comments



U.S. AIR FORCE

# Radiation Protection Program Audit

Permittee: \_\_\_\_\_

USAF Permit No.: \_\_\_\_\_

Criteria	Yes	No	N/A	References
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## 9. LEAK TESTS

a. sealed sources tested for leakage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10 CFR 30.34
b. test are at 6 month intervals or other approved interval previous testing _____ last testing _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
c. results in microcuries	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
d. results less than 0.005 $\mu$ Ci	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
e. proper notification was made if leaking source	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
f. records maintained	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

comments

## 10. SURVEY PROGRAM

a. unrestricted area surveys conducted	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10 CFR 20.1301
- areas < 2 mrem in any one hour	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10 CFR 20.1302
- areas < 100 mrem in a year	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10 CFR 20.1501
b. storage areas surveyed annually	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10 CFR 20.2103
c. contamination surveys performed at required intervals _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10 CFR 20.2107
d. restricted area surveys conducted required intervals _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
e. records maintained	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

comments

## 11. GENERAL WORK PROCEDURES

a. no evidence of smoking, eating, drinking or application of cosmetics in radiation areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	AFI 40-201
b. no personal items stored in designated restricted areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

comments



U.S. AIR FORCE

# Radiation Protection Program Audit

Permittee: \_\_\_\_\_

USAF Permit No.: \_\_\_\_\_

Criteria	Yes	No	N/A	References
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## 12. POSTING

a. NRC Form 3 (Rev 8-99 or later)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10 CFR 19.11
b. notice of availability of permit/ license/regulations/procedures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10 CFR 20.1902 AFI 40-201
c. Part 21	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
d. "Caution - Radioactive Material" signs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
e. "Caution - Radiation Area" signs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

comments

## 13. DISPOSAL

a. waste properly stored				10 CFR 20.2001
- approved storage location	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10 CFR 20.2108
- packages properly labeled	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10 CFR 30.301
- segregated from biological and chemical wastes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10 CFR 30.51
- liquid packaged with 2X absorbent	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
b. authorized methods used	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
c. coordinated with Base RSO	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
d. records maintained	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

comments

## 14. INCIDENTS/ACCIDENTS

a. immediate notification made of loss or theft	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10 CFR 20.2201
b. proper notification of incidents	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10 CFR 20.2202
c. report of overexposure or excessive levels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10 CFR 20.2203 10 CFR 30.50 AFI 91-204

comments



U.S. AIR FORCE

**Radiation Protection Program Audit**

Permittee: \_\_\_\_\_

USAF Permit No.: \_\_\_\_\_

Criteria	Yes	No	N/A	References
----------	-----	----	-----	------------

**15. AUDIT of PROGRAM CONTENT and IMPLEMENTATION**

- |  |                          |                          |                          |                                  |
|--|--------------------------|--------------------------|--------------------------|----------------------------------|
| a. performed at least annually<br>previous audit _____<br>last audit _____ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 10 CFR 20.1101<br>10 CFR 20.2102 |
| b. identifies problem areas  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |                                  |
| c. items corrected   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |                                  |
| d. records maintained  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |                                  |

comments

**16. RECORDS MAINTENANCE and FORM**

- |   |                          |                          |                          |                |
|---|--------------------------|--------------------------|--------------------------|----------------|
| a. original or reproduced copy  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 10 CFR 20.2101 |
| b. includes pertinent information such as<br>stamps, initials, and signatures | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |                |
| c. adequate safeguards against tampering and loss                             | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |                |
| d. units used are curie, rad, and rem   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |                |

comments

**17. OTHER (specify)**

- |          |                          |                          |                          |
|----------|--------------------------|--------------------------|--------------------------|
| a. _____ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b. _____ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

comments