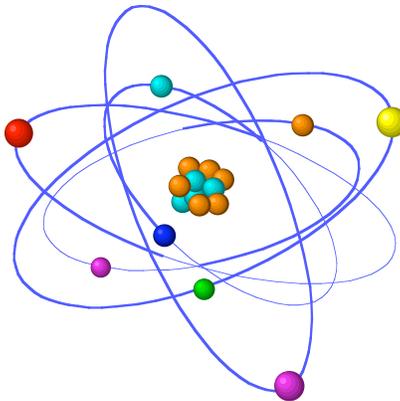




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Langley Research Center

IONIZING RADIATION



National Aeronautics and Space Administration

Responsible Office: Office of Safety and Mission Assurance

PREFACE

These procedural requirements, a part of the Langley Research Center (LaRC) Safety Manual, prescribe the Nuclear Regulatory Commission (NRC) regulations by assigning responsibilities and authorities at LaRC. Ionizing radiation sources not covered by NRC regulations are included in these procedural requirements.

The standards and regulations contained herein do not in any way relieve supervisors, employees, or contractors of their responsibilities for the conduct of safe operations.

LAPG 1710.5, dated September 21, 2001, is rescinded and should be destroyed.

Delma C. Freeman, Jr.
Deputy Director

DISTRIBUTION:

SDL 040, SDL 043, SDL 410, SDL 411, and SDL 412
429/Office of Safety and Facility Assurance, OSMA (200 copies)

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AUTHORITY

Department of Labor, OSHA, Title 29, Code of Federal Regulations (CFR), Part 1910.1096 (29 CFR 1910.1096).

NRC License Applications (NRC Form 313).

U.S. Nuclear Regulatory Commission (NRC), Title 10, Code of Federal Regulations (CFR), Parts 0 to 50.

U.S. NRC 10 CFR 20, Standards for Protection Against Radiation.

U.S. NRC 10 CFR 19, Notices, Instructions and Reports to Workers: Inspection and Investigations.

U.S. NRC Form No. 3, "Notice to Employees."

The below documents are available from the Radiation Safety Officer:

CODE OF FEDERAL REGULATIONS (CFR)

Title 10 - Atomic Energy

- Part 19 Notices, Instructions and Reports to Workers; Inspection
- Part 20 Standards for Protection Against Radiation
- Part 30 Licensing of Byproduct Material
- Part 31 General Licenses for Certain Quantities of Byproduct Material and Byproduct Material Contained in Certain Items
- Part 33 Special Licenses of Broad Scope for Byproduct Material
- Part 35 Human Uses of Byproduct Material
- Part 36 Export and Import of Byproduct Material
- Part 40 Licensing of Source Material
- Part 70 Special Nuclear Material
- Part 71 Packaging of Radioactive Material for Transport

Title 29 - Occupational Safety and Health Administration

- Part 1910.1096 Ionizing Radiation

PROVISIONS OF SPECIFIC NUCLEAR REGULATORY COMMISSION (NRC) LICENSES

Title 14 – Aeronautics and Space, Chapter 1 – Federal Aviation Administration, Department of Transportation (parts 1-199).

Title 39 – Postal Service Regulations, Chapter 1, United States Postal Service, Subchapter K – Special Requirements.

Title 46 – Shipping, Chapter 1 – Coast Guard, Department of Transportation, Subchapter N – Dangerous Cargoes

Title 49 - U.S. Department of Transportation
Parts 171 178 Rules and Regulations

POSTAL GUIDE

Part I, Article 37, Chapter IV, Radioactive Materials

REFERENCES

LAPD 1150.2, "Boards, Panels, Committees, Councils and Teams."

LAPD 1700.2, "Safety Program."

LPR 1046.1, "NASA Langley Research Center Emergency Plan."

LPR 1740.6, "Personnel Safety Certification."

NASA Langley Form 38, "Safety Permit Request - Radioactive Material."

NASA Langley Form 44A, "Radiation Hazard Form."

NASA Langley Form 48, "Safety Permit Request - Radiation Machine."

NASA Langley Form 66, "Worker Appointment and Certification Form."

NASA Langley Form 125, "Purchase Request/Purchase Order (PR/PO)."

NASA Langley Form 145, "Maintenance Shipping Form."

NASA Langley Form 492, "Radiation Worker's Certification Card. "

NASA Langley Form 498, "Safety Permit."

Chapter 1

1. INTRODUCTION

1.1 PURPOSE

It is LaRC policy to comply with NASA regulations and Federal Laws as prescribed in Appendices A and B of these procedural requirements and to:

- exercise centralized control over operations involving use of radioactive materials and radiation producing equipment.
- assure that exposure of personnel to ionizing radiation from radioactive materials or radiation-producing equipment is kept to a minimum.
- assure that compliance with Federal, state, and local regulations is maintained.

The responsibility for implementation of these safety policies with respect to a particular radiation device is given to the responsible Organizational Facility Safety Head (OFSH) (line management). OFSH's shall establish normal and emergency operating procedures and ensure all personnel operating devices within their facility are trained. The NASA Langley Form 498, "Safety Permit," review system is established to ensure that the procedures are in compliance with the protection standards adopted herein.

1.2 SCOPE

These procedural requirements define the requirements for procurement, use, handling, storage, shipment, and disposal of sources of ionizing radiation, as well as personnel monitoring and emergency procedures. They also indicate sources from which more detailed information may be obtained when necessary.

1.3 APPLICABILITY

The procedures and radiation protection practices as set forth in these procedural requirements apply to all organizational elements of LaRC and to all contractors working in facilities under the administrative control of LaRC. It should be noted that referenced regulations are Federal statutes imposed on NASA under terms of licenses with the Nuclear Regulatory Commission (NRC), and applicable regulations promulgated by the Occupational Safety and Health Administration (OSHA), the Food and Drug Administration (FDA), and the Department of Transportation (DOT). Questions concerning details of current regulations or the applicability of regulations should be referred to the Radiation Safety Officer (RSO), Health Physicist, Office of Safety and Facility Assurance (OSFA), Office of Safety and Mission Assurance (OSMA).

It is the responsibility of Contractors to provide and implement their own ionizing radiation program for facilities solely operated by the Contractor. As a minimum, this

program shall be in accordance with the LaRC program as described in these procedural requirements.

1.4 ISSUANCE AND CONTROL OF PROCEDURAL REQUIREMENTS REVISIONS

It is the OSFA's responsibility to issue, distribute, and control these procedural requirements. Revisions to these procedural requirements shall be developed by the LaRC Ionizing Radiation Committee (IRC) (Ref. Langley Policy Directive [LAPD] 1150.2, "Boards, Panels, Committees, Councils and Teams.").

1.5 DEFINITIONS AND TERMINOLOGY

Appendix A contains definitions and terminology used in these procedural requirements.

1.6 RECORDS

Ionizing radiation inventory records
Current list of employees who are required to be certified as radiation workers.
Incident and over-exposure reports
Receipts and shipments of ionizing radiation sources.
Records of trained and safety certified radiation workers.
Records of personnel monitoring.
Records of calibration of monitoring instrumentation.
Personnel dosimetry reports.
Records of all radioactive waste disposals.

The following forms were completed when implementing requirements:
NASA Langley Form 38, "Safety Permit Request - Radioactive Material."
NASA Langley Form 44A, "Radiation Hazard Form."
NASA Langley Form 48, "Safety Permit Request - Radiation Machine."
NASA Langley Form 66, "Worker Appointment and Certification Form."
NASA Langley Form 125, "Purchase Request/Purchase Order (PR/PO)."
NASA Langley Form 145, "Maintenance Shipping Form."
NASA Langley Form 492, "Radiation Worker's Certification Card. "

Chapter 2

2. IONIZING RADIATION COMMITTEE (IRC)

2.1 AUTHORITY

The IRC is established under the authority of LAPD 1700.1, "Safety Program," and LAPD 1150.2, "Boards, Panels, Committees, Councils and Teams." Its establishment is necessary in the public interest and to:

- ensure compliance with licensing requirements for radioactive material under the rules and regulations of the U.S. Nuclear Regulatory Commission, Title 10, Code of Federal Regulations, (CFR), Parts 0 to 50.
- ensure compliance with the U.S. Department of Labor, OSHA, Title 29, Code of Federal Regulations (CFR), Part 1910.1096 (29 CFR 1910.1096).

Any member of this committee is authorized to investigate any questionable radiation source, equipment, system, and so forth; and is authorized to act in the name of the LaRC Director to stop work; to prevent the use of equipment which is considered unsafe; and, to start action to eliminate the unsafe condition. This action shall be documented within 24 hours by formal memorandum to the Safety Manager with a copy to the Chairperson, IRC. Work can be resumed after the corrective action has been taken. If line management is not in agreement with the corrective action recommended by the official who stopped the work, however, the line manager is to submit the reasons for disagreement to the Chairperson, Executive Safety Board, who shall make an appropriate review. In these cases, work shall not resume without the approval of the Chairperson, Executive Safety Board.

Due to the need for the IRC to maintain an overview of ionizing radiation activities at LaRC, a review system is established for major radiation facilities. This review system is described in Chapter 4, "Routine Procedures and Requirements."

2.2 STRUCTURE AND ORGANIZATION

The IRC functions as a subcommittee of the Executive Safety Board. Its position in the organization for radiation safety is shown in Figure 2.1, LaRC Organization for Radiation Safety.

The IRC consists of a Chairperson, Vice-Chairperson, Secretary and ten additional members. Committee members (including Chairperson and Vice Chairperson) are appointed by the Vice-Chairperson, Executive Safety Board, by virtue of their technical and/or educational expertise in the field of ionizing radiation. Members serve for a two-year term with the exception of the Safety Manager, the RSO, and a representative from the Office of Environmental Management (OEM) who are committee members and serve as long as the committee continues to function.

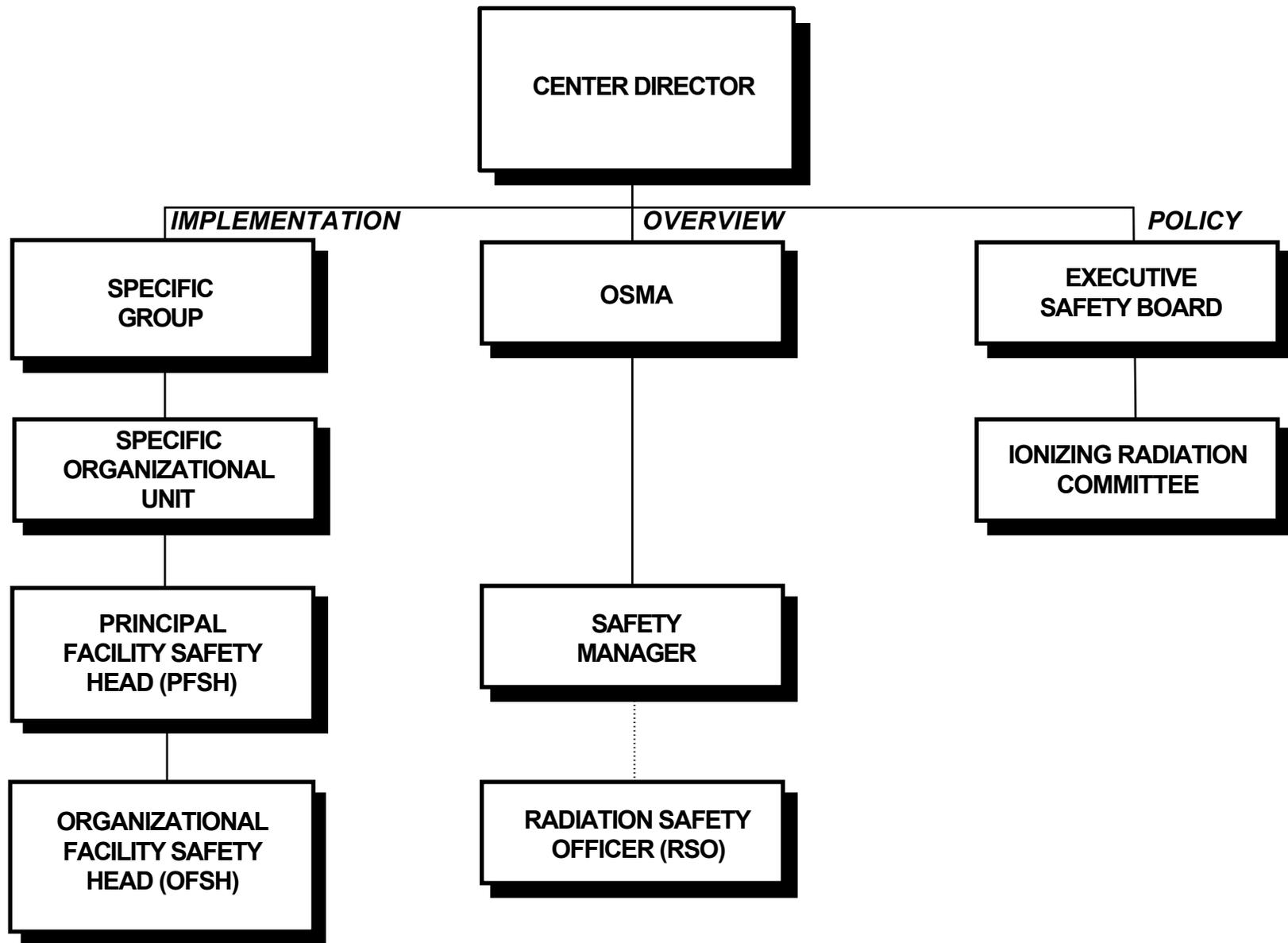


Figure 2.1, LaRC Organization for Ionizing Radiation Safety

During the first meeting of a new calendar year, the committee shall elect a committee secretary from its full membership. The committee secretary shall be responsible for preparing and distributing committee minutes in addition to other responsibilities.

2.3 DUTIES AND RESPONSIBILITIES

2.3.1 General

The general duties and responsibilities of the IRC are to:

- ensure compliance with Federal regulatory statutes.
- exercise a centralized control over sources of ionizing radiation at LaRC. This control is accomplished by a review and approval of all procurement, handling, use, storage, and disposal of radioactive materials and radiation producing machines (Chapter 4).
- ensure that an audit is conducted annually of each facility's possession and use of sources of ionizing radiation (Chapter 5).
- develop and coordinate material incorporated in these procedural requirements as needed.

2.3.2 Specific

The specific duties of the officials and members of the IRC are described herein.

2.3.2.1 Chairperson

The chairperson shall:

- prepare an agenda and call meetings as required, at least quarterly.
- act as the presiding officer at committee meetings.
- act as the signature authority for actions approved by the committee (safety permits, and so forth).
- be cognizant of all matters pertaining to ionizing radiation at LaRC.

2.3.2.2 Vice Chairperson

The vice-chairperson shall:

- assist the Chairperson whenever necessary.
- serve as the Chairperson when the Chairperson is absent.

2.3.2.3 Secretary

The secretary shall:

- prepare and distribute minutes of committee meetings which, are to contain, as a minimum, a record of persons present and a description of matters discussed and conclusions reached, including the opinions of dissenting members.

- distribute minutes to all members; the affected FSH's; the Chairperson, Executive Safety Board; and the Director, OSMA.
- process official correspondence for the committee as needed.

2.3.2.4 Members

Other members of the IRC shall:

- be cognizant of all matters pertaining to radiation safety at LaRC. This is chiefly, but not entirely, achieved by attending the committee meetings and participating in the decisions made by the committee.
- serve on ad hoc committees appointed by the Chairperson, when necessary.

Chapter 3**3. SAFETY AND HEALTH FUNCTIONS****3.1 GENERAL**

The responsibility for implementing these procedural requirements shall be divided among five safety and health functions. The interface requirements of these functions and their duties and responsibilities are presented in this chapter.

3.2 ORGANIZATIONAL FACILITY SAFETY HEAD (OFSH)

The Principal Facility Safety Head (PFSH) of each facility where ionizing radiation operations are performed shall appoint an OFSH for each operation, which is functionally or generically distinct. The OFSH shall, in each case, be a representative of line management who is thoroughly familiar with the operation and its hazards. In some cases, the OFSH may also be the prime user of the source(s) of ionizing radiation.

3.2.1 Interfaces

The OFSH is the first point of contact for the individual who has a requirement for the procurement, use, or disposal of sources of ionizing radiation. The first point of contact for the OFSH is the RSO.

3.2.2 Responsibilities

Responsibilities of the OFSH with an operation involving sources of ionizing radiation are to:

- supervise and coordinate, in a safe manner, the procurement, use, and disposal of sources of ionizing radiation.
- maintain a continual inventory of all radioactive sources and all radiation-producing machines used in operations. The inventory is to include locations of use, type of radiation emitted and maximum radiation intensities produced by these sources and machines.
- maintain an inventory of radiation-monitoring instruments in operation, which are required for the purpose of monitoring personnel exposure to ionizing radiation (Chapter 5, "Special Procedures and Requirements"). The instrument inventory shall include the manufacturer, model number, serial number, and the date of calibration for each instrument required.
- furnish inventory records to the RSO.
- secure film badge service from the RSO for all personnel in the operation who are likely to receive ionizing radiation exposure in excess of 25 percent of the limits specified in Chapter 5.
- maintain a current list of employees in the operation who are required to be certified as radiation workers. Chapter 5 presents the certification requirements.

3.3 RADIATION SAFETY OFFICER (RSO)

The position of the RSO has been designated within a contractor team of full-time professional health physicists. The RSO is located in the Office of Safety and Facility Assurance, OSMA.

3.3.1 Interfaces

The RSO is responsible for reporting information to OSMA and the Safety Manager. The RSO is a member of the IRC. Recommendations to the committee for approval or disapproval of new uses of ionizing radiation shall be made by the RSO following pre-operational surveys and review of safety procedures. The RSO assists the radiation user as primary contact on a day-to-day basis for matters relating to radiation safety, other than procurement.

3.3.2 Responsibilities

In general the RSO provides administrative and technical guidance to LaRC personnel in the safe use of ionizing radiation. Specific duties of the RSO include:

- assume control and initiate corrective action in radiation emergencies.
- coordinate with NRC on matters concerning licensing and other regulatory functions through the Safety Manager.
- prepare incident and over-exposure reports required by the NRC and other agencies.
- perform pre-operational surveys and radiation hazard analyses of all proposed uses of facilities for radioactive material and radiation machines to assure conformity with applicable regulations, standards, and good practice. Recommend to the IRC approval or disapproval of these facilities.
- perform annual audits of ionizing radiation activity in each organizational unit.
- maintain a program of personnel dosimetry (film badges, pocket chambers, and so forth). Interpret reports and maintain permanent dosimetry records.
- perform periodic radiation protection surveys and radiation safety evaluations including leak tests required by the NRC license.
- assist line management in implementing radiation safety rules and procedures as promulgated by the IRC and/or Federal regulatory authorities.
- assure that the disposal of radioactive waste is safe and complies with Federal, state, local, and LaRC requirements.
- maintain OSFH's provided inventories, and forward updates to the LaRC Fire Chief for incorporation into the Emergency Alarm Response System (EARS).
- provide training and indoctrination of personnel in radiation safety.
- review all purchase requests for ionizing radiation sources for compatibility with approved programs and licensing requirements.
- sign NASA Langley Form 498, and forward to Safety Manager.
- inspect and maintain records of all receipts and shipments of ionizing radiation sources.
- periodically inform the IRC of new developments in the field of ionizing radiation, as they are applicable to activities at LaRC.

3.4 SAFETY MANAGER (HEAD, OFFICE OF SAFETY AND FACILITY ASSURANCE, OSMA)

3.4.1 Interfaces

The Safety Manager's interfaces include:

- responsibility for the technical management of contractual health physics services at LaRC.
- serving as a member of the IRC (or assign a designee).
- acting as the primary contact for LaRC management on matters relating to radiation safety.
- representing the government as the liaison between the RSO and Federal regulatory authorities (NRC, OSHA, and so forth).

3.4.2 Responsibilities

The Safety Manager's responsibilities include:

- exercising general surveillance over all uses of ionizing radiation at LaRC, including on-site contractor activities to assure radiation use is in conformance with safe practice, pertinent regulations, and with provisions approved by the IRC for specific radiation use authorizations (that is, NASA Langley Form 498's).
- deciding whether or not to have the RSO perform the above function.
- serving as the final reviewing and/or certifying authority on the following documents:
 - NRC License Applications (NRC Form 313).
 - NASA Langley Form 66, "Worker Appointment and Certification Form."
 - NASA Langley Form 44A, "Radiation Hazard Form."

3.5 OCCUPATIONAL HEALTH OFFICER (OHO), OFFICE OF HUMAN RESOURCES (OHR)

3.5.1 Interfaces

The OHO interfaces as the:

- Contracting Officer's Technical Representative (COTR) for medical support services at LaRC (specifically, the Occupational Medical Center (OMC), 10 West Taylor Street, Facility 1149).
- Center's prime contact for matters relating to occupational illnesses or injuries.

3.5.2 Responsibilities

The OHO is required to:

- determine the adequacy of physical examination requirements for ionizing radiation workers at LaRC.

- review new developments in the area of medical surveillance for ionizing radiation workers.
- serve as a qualifying official for ionizing radiation worker appointment and certification on NASA Langley Form 66.

3.6 RADIATION WORKERS

The OFSH having direct involvement with sources of ionizing radiation shall forward recommendations for appointment of radiation workers as described in Chapter 4, "Routine Procedures and Requirements." Radiation workers are the only persons permitted to handle radioactive materials or to approach sources of radiation closely enough to receive a dose in excess of 5 rem in a year or a dose rate in excess of 2 mR per hour.

3.6.1 Interfaces

Radiation workers interfaces include:

- working under the direct authority of the OFSH.
- exercising authority over all personnel in connection with the safe operation of the device to which the radiation worker is assigned.

3.6.2 Responsibilities

Radiation workers are required to:

- be cognizant of and comply with the LaRC regulations pertaining to ionizing radiation safety.
- adhere to the limitations stated in the "Description of Duties" section of the appointment form, and notify the OFSH when:
 - a change in the definition of the limitations is needed.
 - the need to work in restricted areas has ended.
- ensure that persons, other than qualified radiation workers, are not exposed to radiation levels, which produce a dose in excess of 0.1 rem (external) and/or 0.05 rem (internal) in a year.

Chapter 4**4. ROUTINE PROCEDURES AND REQUIREMENTS****4.1 GENERAL**

This chapter sets forth procedures and requirements for processing documents and materials related to ionizing radiation. Questions concerning these procedures and requirements shall be directed to the RSO.

4.2 PROCUREMENT AND RECEIPT

Prior to the procurement and receipt of any source of ionizing radiation, the user or operator of the source shall complete NASA Langley Form 44A, and route to the RSO as the final repository. If an OFSH has not been appointed, the user shall submit NASA Langley Form 44A to the PFSH who then appoints an OFSH for the organization procuring the source of ionizing radiation.

4.2.1 Organizational Facility Safety Head (OFSH)

The OFSH is to:

- review and approve NASA Langley Form 44A for system compatibility with research objectives.
- forward approved NASA Langley Form 44A to the RSO.

4.2.2 Radiation Safety Officer (RSO)

The RSO is required to:

- schedule a pre-operational survey with the OFSH upon receipt of NASA Langley Form 44A. The purpose of this survey is to provide the OFSH with guidance and assistance in the following areas:
 - applicability of NASA Langley Form 498 requirements.
 - preparation of NRC license (if applicable).
 - preparation of safety procedures.
 - preparation of authorizing documents specified in this chapter.
- sign NASA Langley Form 44A after the survey and forward to the Safety Manager, Mail Stop 429.

4.2.3 Safety Manager

The Safety Manager is required to:

- on receipt of NASA Langley Form 44A, review the RSO's survey and approve or disapprove the purchase of the source of ionizing radiation.
- if disapproved, return NASA Langley Form 44A to the OFSH with a written explanation of disapproval attached. The OFSH may appeal disapproval(s) through his/her Organizational Unit Manager to the Executive Safety Board.
- if approved, sign the form, detach copy 2, and notify the OFSH by telephone of its approval. The OFSH may request that the Safety Manager forward the approved NASA Langley Form 44A and NASA Langley Form 125, "Purchase Request/Purchase Order PR/PO," to the appropriate purchasing office or may elect to have these documents returned.

4.2.4 Purchasing Officer, Office of Procurement

Upon receipt of an **approved** NASA Langley Form 44A, complete the information indicated in the upper right hand corner of the form. If a contract is let for purchase of the material, detach Copy 3 of NASA Langley Form 44A and forward Copy 4 to the Office of Logistics Management Office (OLM).

4.2.5 Receiving (OLM)

Upon receipt of any incoming source of ionizing radiation authorized by NASA Langley Form 44A, immediately notify the RSO of its arrival at LaRC. The material shall not be released until the RSO has surveyed the package to document radiation intensities and/or contamination.

4.3 AUTHORIZATION OF USE (SAFETY PERMIT)

Some sources of ionizing radiation require the completion of a NASA Langley Form 38, "Safety Permit Request - Radioactive Material" or NASA Langley Form 48, "Safety Permit Request - Radiation Machine," and subsequent approval and issuance of NASA Langley Form 498, before the source can be used or operated at any LaRC facility. The RSO is responsible for the determination of NASA Langley Form 498 requirements during the processing of NASA Langley Form 44A. The pertinent determining factors which require a NASA Langley Form 498 include: duration of exposure, source quantity (mass, volume, etc.), potential exposure configuration, number of handlers, and commercial certifications. The IRC reviews the need for NASA Langley Form 498 based on these factors during its quarterly meetings for final dispensation rendering.

The NASA Langley Form 498 is a written designation that the particular research experiment, rig, or operation has been reviewed by technically qualified members of the LaRC staff and that all reasonable safety precautions and environmental requirements have been considered and subsequently implemented. The NASA Langley Form 48 for radiation machines or NASA Langley Form 38 for radioactive

materials shall be used as appropriate. The NASA Langley Form 38 or NASA Langley Form 48 shall describe the maximum potentially hazardous operating parameters (that is, maximum source strength, kilovoltage, amperage, and so forth) expected during the life of the experiment or operation. Changes in the operational configuration which do not exceed the authorized maximum parameters or change the authorized safety features will not require the processing of a modified NASA Langley Form 498. Other changes require additional review and approval by the IRC. The NASA Langley Form 498's are valid for a period of one year from date of issuance.

4.3.1 Organizational Facility Safety Head (OFSH)

The OFSH responsibilities include:

- preparing NASA Langley Form 38 or NASA Langley Form 48 and attaching pertinent drawings, sketches, and supporting information. If safety procedures and precautions cannot be adequately described in Block 2 of the form, an attachment may be used.
- preparing, and attaching to NASA Langley Form 38 or NASA Langley Form 48, NASA Langley Form 66 (NASA employees) or a similar form (for contractor employees) for each radiation worker.
- forwarding NASA Langley Form 38 or NASA Langley Form 48 and attachments to the RSO.
- posting the approved NASA Langley Form 498 (and a copy of the NASA Langley Form 38 or NASA Langley Form 48) in a conspicuous place at the specified site, or if more practical, in the applicable control center for the site.
- submitting a memorandum to the Safety Manager requesting renewal of NASA Langley Form 498 at least 30 days prior to the expiration date or submitting a new NASA Langley Form 38 or NASA Langley Form 48 through channels anytime a change is required in the authorized maximum operating parameters.

4.3.2 Radiation Safety Officer (RSO)

The RSO is required to:

- perform a radiation hazard analysis of the proposed operation upon receipt of NASA Langley Form 38 or NASA Langley Form 48 and attachments. Work closely with the OFSH during this analysis to provide guidance and assistance in the preparation and acquisition of safety procedures, protective equipment, medical surveillance, and NRC licensing (if required).
- forward NASA Langley Form 38 or NASA Langley Form 48, attachments, and the hazard analysis (with appropriate recommendations) to the IRC for their review and approval.

4.3.3 Ionizing Radiation Committee

The IRC is required to review NASA Langley Form 38 or NASA Langley Form 48 to determine that all reasonable precautions have been taken and the proposed operations can be carried out with an acceptable level of risk to personnel and

equipment. Based on this review the IRC shall recommend issuance of NASA Langley Form 498 by the committee Chairperson if sufficiently satisfied upon completion of review or return NASA Langley Form 38 or NASA Langley Form 48 to the requester if problem areas are evident.

4.3.4 Committee Chairperson

The IRC Chairperson is to:

- complete NASA Langley Form 498 and specify, when appropriate, any special conditions on which approval is based.
- forward NASA Langley Form 38 or NASA Langley Form 48, attachments, and approved NASA Langley Form 498 to the Safety Manager, Mail Stop 429.

4.3.5 Safety Manager

The Safety Manager is required to:

- review existing NASA Langley Form 498 as part of the annual audit to ensure that they are valid (either not expired or have been reviewed before expiration date).
- notify the requester when a review will be completed.
- review NASA Langley Form 38 or NASA Langley Form 48 for impact on the environment or creation of safety hazards outside the scope of radiological health. Based on this review:
 - sign NASA Langley Form 498 and return all attached documentation to the requester.
 - return NASA Langley Form 38 or NASA Langley Form 48 and all attached documentation to the requester if problem areas are evident.

Chapter 5**5. SPECIAL PROCEDURES AND REQUIREMENTS****5.1 SPECIAL REQUIREMENTS FOR OFF-SITE RADIATION USE AUTHORIZATION**

Prior to approving a NASA Langley Form 498 for an organizational element of LaRC in which LaRC-owned radiation-producing material or equipment will be used at a temporary job site (a facility not under the administrative control of LaRC), the following requirements shall be satisfied:

- Written authorization shall be obtained from the administration of the facility. If the facility or institution holds a byproduct license from the NRC or an agreement (Appendix A), then the use of byproduct materials should be concurred by that Center's RSO and/or its IRC.
- To assure minimal radiation exposure to individuals and confirm no residual radioactive contamination remains in the off-site facilities, an individual with adequate training and experience in radiological health activities shall be named to select suitable instrumentation and perform monitoring tasks as determined necessary by the LaRC IRC.
- Procedures and arrangements for disposal, to handle radioactive waste generated at the temporary job site, shall be formally specified and approved by the LaRC IRC. The preferred waste disposal method shall be by direct transfer to NRC or agreement state licensee authorized to perform collection and/or disposal of radioactive waste.

All records of radiation surveys, personnel monitoring, and radioactive material transfers shall be maintained by the use supervisor and submitted to the RSO at the completion of the authorized use. Any incidents involving individuals overexposed, lost sources, or contamination problems shall be reported immediately to the RSO.

5.2 INTERIM APPROVALS**5.2.1 RSO/IRC Chairperson**

When an immediate use of ionizing radiation is determined necessary, the RSO, with verbal concurrence from the Chairperson, IRC, may temporarily:

- Extend an expiration date of a NASA Langley Form 498 for a period not to exceed 60 days.
- Add specific users to a NASA Langley Form 498 provided they have met the standards of training and experience established by the IRC.
- Add to the sources of ionizing radiation named on an approved authorization provided the sources added will not change the kinds of radiation emissions previously authorized.

The IRC shall evaluate these temporary modifications and, if satisfied that the RSO's action was proper, shall ratify the actions at the next committee meeting. Approvals may be withdrawn at any time if safety violations occur or use of a regulated source is found not to be in compliance with conditions of the approved authorization.

Chapter 6**6. IONIZING RADIATION PROGRAM REQUIREMENTS**

The LaRC ionizing radiation program requirements include: audits, training and certification, medical surveillance, receipt, shipping, area designations, radiation dose limits, airborne concentration limits, personnel monitoring, posting and labeling, leak testing, radioactive waste disposal, contract radiography, and in-house mobile radiography.

6.1 AUDITS

The RSO shall be responsible for conducting no less than annually an audit of each facility possessing sources of ionizing radiation. The annual audit shall be comprised of four segments, with approximately one fourth of this Center's activity involving ionizing radiation being audited each quarter. The results of those audits shall be presented to the IRC during their quarterly meetings.

OFSH's shall be notified by memorandum one week in advance of the exact day(s) their audit will be conducted. Typical items covered during an audit are:

- inventories of:
 - all radioactive material.
 - radiation producing machines.
 - monitoring instrumentation.

- records of:
 - trained and safety certified radiation workers.
 - personnel monitoring.
 - calibration of monitoring instrumentation.

- compliance with terms of NASA Langley Form 498.
- conduct of routine radiation protection surveys.

6.2 TRAINING AND CERTIFICATION

All personnel (including contractors) who operate, manipulate, or who have any other type of physical control over the use of radiation-producing equipment or material specifically authorized by a NASA Langley Form 498, are required to be properly trained and safety certified as radiation workers. Additionally, any person who is likely to receive a radiation dose in excess of 10 percent of the limits as specified in this chapter, as a result of LaRC operations, is to be trained and certified as a radiation worker. It is the responsibility of each OFSH to see that personnel within the facility are properly trained and certified. Questions concerning this requirement shall be directed to the RSO.

6.2.1 Qualifications

As a minimum, and prior to working with ionizing radiation, individuals shall have had either radiation experience and/or training on specific topics. NASA Langley Form 66, is used for Government personnel to determine and certify that the qualifications for worker training and safety certification described above and in accordance with LPR 1740.6, "Personnel Safety Certification." Contractor personnel shall use a form, which supplies the equivalent information contained in NASA Langley Form 66.

6.2.2 Safety Permits

NASA Langley Form 66 for individuals working on a new or existing operation or experiment involving ionizing radiation shall be processed as an attachment NASA Langley Form 38 or NASA Langley Form 48 as presented in Chapter 4. NASA Langley Form 66 shall be processed by the RSO to add individuals as authorized users to an existing NASA Langley Form 498 as described in this Chapter.

6.2.3 Certification Card

Based on the satisfactory completion of NASA Langley Form 66 the RSO and/or qualifying status of the worker, the RSO shall issue, revalidate, or terminate a NASA Langley Form 492, "Radiation Worker's Certification Card." The certification card shall be annotated with the number(s) of the Safety Permit NASA Langley 498(s) with which the work is associated. The worker shall have the card on-hand or readily accessible, as proof of his/her certification, while performing applicable tasks.

6.2.4 Recertification

Ionizing Radiation workers are required to be recertified every 2 years. Recertification involves attending refresher training and revalidation of the Certification Card by the RSO. Refresher training can be scheduled by contacting the RSO.

6.3 MEDICAL SURVEILLANCE

Personnel requiring safety certification as radiation workers shall be given a complete initial, annual, and termination physical examinations at the OMC, prior to a NASA Langley Form 492, being issued, revalidated, or terminated in accordance with LPR 1740.6. These examinations are normally accomplished through routine processing of NASA Langley Form 66 and in accordance with established LaRC Occupational Medicine Examination Protocol. The RSO shall be responsible for notification of the physical examinations through the LaRC OHO. Safety-certified radiation workers are required to participate in this examination protocol. Medical records of these workers shall be specifically identified so that the examining physician can be alerted to symptoms relating to radiation exposure. If the worker's radiation exposure is required to be monitored by a film badge presented in this chapter, the worker shall be asked to review the exposure history for the preceding 12-month period.

6.4 RECEIPT

The RSO shall be notified of all arrivals of sources of radiation at LaRC for documentation and inspection. Leak testing is performed, if applicable. The OLM shall furnish the RSO with a copy of the receiving document. All radioactive material shall be delivered by the RSO to the custodian.

6.5 SHIPPING

Sources of radiation, once documented by the RSO and located in a particular facility, shall not be transferred to the accountability of another organization, or transferred from one location to another within LaRC, without prior notification of the RSO. The RSO notification is in addition to action required for property control procedures.

Off-site shipments (both commercial and by NASA vehicle) require documentation and completion of a NASA Langley Form 56, "Radioactive Material Transfer," which is to be included with other relevant shipping documents. Each shipment is to be made in accordance with the applicable Federal, State, and local transportation regulations. These regulations are referenced in Appendix A. All commercial shipments of radioactive material shall be under the cognizance of OLM when the shipment is sponsored by or shipped in connection with a LaRC sponsored project.

6.6 AREA DESIGNATIONS

There are several area designations, which apply to radiation control at LaRC.

6.6.1 Controlled Area

Any area to which access is controlled for purposes of protection of individuals from exposure to radiation and radioactive material. The term "controlled" is meant to be synonymous with the term "restricted" as used in the NRC Regulations.

6.6.2 Radiation Area

Any area, accessible to individuals, in which radiation levels could result in an individual receiving a dose equivalent in excess of .005 rem (0.05 msv) in one hour at 30 centimeters from the radiation source or from any surface that the radiation penetrates.

6.6.3 High Radiation Area

Any area, accessible to individuals, in which radiation levels could result in an individual receiving a dose equivalent in excess of 0.1 rem (1 msv) in one hour at 30 centimeters from the radiation source or from any surface that the radiation penetrates.

6.6.4 Very High Radiation Area

Any area, accessible to individuals, in which radiation levels could result in an individual receiving an absorbed dose in excess of 500 rads (5 grays) in one hour at one meter from a radiation source or from any surface that the radiation penetrates.

6.6.5 Airborne Radioactivity Area

An airborne radioactive area is a room, enclosure, or area in which airborne radioactive materials composed wholly or partly of licensed material exist in concentrations:

- in excess of the derived air concentrations (DAC's) specified in Appendix A to Department of Energy (NRC) 10 CFR 20.1001-20.2401, or
- to such a degree that an individual present in the area without respiratory protective equipment could exceed, during the hours an individual is present in a week, an intake of 0.6 percent of the annual limit on intake (ALI) or 12 DAC-hours.

6.6.6 Uncontrolled Area

Any area to which access is not controlled for purposes of protection of individuals from exposure to radiation and radioactive materials. The term "uncontrolled" is meant to be synonymous with the term "unrestricted" as used in the NRC Regulations.

6.7 RADIATION DOSE LIMITS

Radiation dose limits at LaRC are based upon limits specified by the NRC in NRC 10 CFR 20, and by OSHA in 29 CFR 1910.1096. It should be recognized that the LaRC limits are established as maximum values and, in all cases, personnel exposure should be maintained as far below the limits specified in this part as practical.

6.7.1 Dose Limits in Controlled Areas

Radiation workers shall not be exposed routinely to radiation or radioactive material in a manner that the following limits are exceeded:

Exposed Body Area	Rem/Year
Whole body (head, trunk, active blood forming organs, and internal organs)	5 rems total effective dose equivalent or 50 rems total dose to any single organ or tissue, whichever is the more limiting (effective dose equivalent being the sum of the deep dose equivalent (external dose) and the committed effective dose equivalent (internal dose))
Skin or extremities (hands, forearms, leg below the knee, feet and ankles)	50 rem
Lens of the eye	15 rem
Embryo/fetus (declared pregnancy and estimated time of conception)	0.5 rem during entire gestation period

NOTE: In exceptional cases, an individual may be permitted a planned special exposure separate from, and in addition to, the annual dose limits.

6.7.2 Dose Limits for Minors

An individual under the age of 18 years shall not be permitted to enter or be employed in controlled areas if the individual will receive doses of radiation in amounts exceeding 10 percent of the specified dose limits for controlled areas (i.e., 0.5 rem for whole body).

6.7.3 Annual Dose to the Public

Annual dose to the public shall not exceed 100 mrem excluding medical and other exposures not related to working in the environs of radiation.

6.7.4 Dose Limits in Uncontrolled Areas

Individuals in uncontrolled areas shall not receive a radiation dose to the whole body in excess of 0.1 rem in any calendar year. Furthermore, individuals who are continuously present in the area shall not receive a radiation dose in excess of 100 millirem in any seven days.

6.7.5 Dose Limits for Pregnant Workers

Federal regulations provide for a reduced radiation dose limit for declared pregnant radiation workers of 500 mrem for the duration of the gestational period. In order for this dose limit to be implemented the worker must formally declare herself to be pregnant to the RSO. The RSO will perform an evaluation of the work area to determine if any work restriction or alteration will be necessary to minimize exposure.

The worker is provided protection of seniority, time in grade and promotion potential. The declaration is voluntary and may be withdrawn at any time with no stated reason.

Radiation workers who are pregnant or believe that they may be pregnant are urged to contact the RSO for counseling and further details about declaring pregnancy. All discussions and pregnancy declarations will be kept confidential if requested by the employee.

6.8 AIRBORNE CONCENTRATION LIMITS

Airborne concentrations of radioactive materials to which personnel at LaRC may be exposed are also based upon limits specified by the NRC in NRC 10 CFR 20. Again, the LaRC limits are established as maximum values, and in all cases airborne concentrations shall be maintained at the lowest practical level.

6.8.1 Controlled Areas

Without allowance made for protective clothing or equipment, personnel shall not be exposed to airborne radioactive material in average concentrations in excess of the limits specified in NRC 10 CFR 20. These limits are based upon an exposure to

these concentrations for 40 hours in any period of seven consecutive days. For exposure times other than 40 hours, the airborne concentration limits may be increased or decreased proportionately.

6.8.2 Minors

An individual under the age of 18 years shall not be exposed to airborne radioactive material in an average concentration in excess of the limits specified in NRC 10 CFR 20. Concentrations may be averaged over a period not greater than one week.

6.8.3 Uncontrolled Areas

Personnel in uncontrolled areas shall not be exposed to airborne radioactive material in concentration in excess of the limits specified in NRC 10 CFR 20. Concentrations may be averaged over a period not greater than one year.

6.9 PERSONNEL MONITORING

Personnel monitoring requirements include:

- Personnel monitoring shall be required in any area where there is a probability that an individual may receive a radiation dose in excess of 10 percent of the specified radiation dose limits described in this chapter.
- The details of the monitoring procedure shall be determined in each case by the RSO in consultation with the OFSH and with consideration of the LaRC dose limits.
- Personnel monitoring procedures shall include, as a minimum, the wearing of film badges and/or pocket dosimeters. In addition, an audible warning device shall be worn by all operators and monitoring personnel engaged in the work of radiography. Personnel monitoring devices are available from the RSO with the exception of audible warning devices which are to be procured from the Systems Engineering Competency.
- The RSO shall maintain a permanent record of all personnel dosimetry reports. If a report indicates an overexposure, an investigation shall be initiated to determine the cause and to suggest remedial action. The overexposure shall be reported to the NRC in compliance with NRC 10 CFR 19.
- Individuals determined to require radiation monitoring shall be advised annually of their exposure to radiation or radioactive material during their required annual physical examination.

6.10 POSTING AND LABELING

The posting and labeling requirements for LaRC are based on the regulations in NRC 10 CFR 19, NRC 10 CFR 20, and 29 CFR 1910.1096. The radiation symbols prescribed by this Chapter shall be the conventional magenta or purple three bladed design on a yellow background. Any additional information that may minimize exposure to radiation or to radioactive material shall be on or near signs and labels. Posting and labeling requirements are stated below.

6.10.1 Radiation Area

Each radiation area shall be conspicuously posted with a sign or signs bearing the radiation symbol and the words:



6.10.2 High Radiation Area

Each high radiation area shall be conspicuously posted with a sign or signs bearing the radiation symbol and the words:



All high radiation areas established for a period of 31 days or more, shall be equipped with a control device which will cause the level of radiation to be reduced below that at which an individual might receive a dose of 100 millirem in one hour upon entry into the area or will energize a conspicuous, visible, or audible alarm signal to ensure that the individual entering and the supervisor of the operation are made aware of the entry.

6.10.3 Airborne Radioactivity Area

Each airborne radioactivity area shall be conspicuously posted with a sign or signs bearing the radiation symbol and the words:



6.10.4 Storage Area

In addition to the above, each area in which radioactive material is used or stored and which contains any radioactive material, other than natural uranium or thorium, in an amount exceeding ten times the quantity of such material specified in NRC 10 CFR 20, or which contains natural uranium or thorium in an amount exceeding 100 times the quantity specified in NRC 10 CFR 20, shall be conspicuously posted with a sign or signs bearing the radiation symbol and the words:



6.10.5 Operating Procedures and General Information

Areas in which individuals are employed in activities covered by these procedural requirements shall be posted with the following to ensure that they are seen by individuals on their way to or from their place of employment, or kept in a suitable place so that they are available for examination upon request:

- a current copy of NRC 10 CFR 19.
- a current copy of NRC 10 CFR 20.
- a current copy of 29 CFR 1910.1096.
- a copy of the NRC license and its reference documents.
- a copy of these procedural requirements (LPR 1710.5).

- a notice of cited violations of appropriate Federal regulations and the resulting LaRC actions.

In addition to the above, NRC Form No. 3, "Notice to Employees," shall be posted to ensure that it is seen in areas utilizing radioactive materials.

6.10.6 Containers

Each container of radioactive material shall bear a durable, clearly visible label identifying the radioactive contents as to radionuclide, quantity, and date of assay. The label shall bear the radiation symbol and the words:

CAUTION RADIOACTIVE MATERIAL(S)



6.10.7 Radiation-Producing Machines or Equipment

All x-ray machines, x-ray diffraction units, electron microscopes, and other similar equipment shall bear a durable, clearly visible label bearing the radiation caution symbol and the words:



6.10.8 Exemptions to Posting and Labeling Requirements

Exemptions to posting and labeling requirements at LaRC shall be approved by the RSO and limited to the following:

- An area is not required to be posted with a sign because of the presence of a sealed source provided the radiation level 12 inches from the surface of the source container or housing does not exceed five millirem per hour.
- Areas are not required to be posted with signs because of the presence of radioactive materials packaged and labeled in accordance with applicable transportation regulations.

- Containers that do not contain materials in quantities greater than amounts specified in NRC 10 CFR 20.
- Containers of only natural uranium or thorium in quantities no greater than ten times amounts specified in NRC 10 CFR 20.
- Containers that do not contain licensed materials in concentrations greater than amounts specified in NRC 10 CFR 20.
- Containers which are attended by an individual who will take precautions necessary to prevent the radiation exposure to any individual in excess of the LaRC limits.
- Containers which are in transport and packaged and labeled in accordance with applicable transportation regulations.

6.11 LEAK TESTS

Tests for leakage and/or contamination shall be performed by the health physics staff as authorized by the NRC to perform such services. Leak tests requirements include the following:

- Each sealed source containing byproduct material, other than Hydrogen 3 and Kr-85, with a half-life greater than 30 days and in any form other than gas shall be tested for leakage and/or contamination at intervals not to exceed six months. In the absence of a certificate from a transferor indicating that a test has been made within six months prior to the transfer, the sealed source shall not be put into use until tested.
- All alpha sources greater than 10 microcuries shall be wipe-tested on a three month interval.
- Notwithstanding the periodic leak test required by the above paragraph, any licensed sealed source containing byproduct material is exempted from periodic leak tests provided the quantity of byproduct material contained in the source does not exceed 100 microcuries of beta and/or gamma emitting material or 10 microcuries of alpha emitting material.
- All other sealed sources in storage are excepted from this test. However, all sources shall be tested for leakage prior to any use or transfer to another person unless they have been leak tested within six months notwithstanding the three months for alpha emitting sources prior to the date of use or transfer.
- The test shall be capable of detecting the presence of 0.005 microcurie of radioactive material on the test sample. The test sample shall be taken from the sealed source or from the surfaces of the device in which the sealed source is permanently mounted or stored on which one might expect contamination to accumulate. Records of leak test results shall be kept in units of microcuries and maintained for inspection by the NRC.
- If the test reveals the presence of 0.005 microcurie or more of removable contamination, the RSO shall immediately withdraw the sealed source from use and shall cause it to be decontaminated and repaired or to be disposed of in accordance with NRC regulations. A report shall be filed within five days of the test with the office that is charged with Byproduct Material Licensing, Nuclear Regulatory Commission, Washington, DC 20555, describing the

equipment involved, the test results, and the corrective action taken. The report shall also be sent to the Regional Administrator, Region II, Office of Inspection and Enforcement, NRC.

6.11.1 Requirement

Source(s) of ionizing radiation which require an approved NASA Langley Form 498 for authorized use or operation shall have assigned to that facility a working and calibrated radiation survey meter. The survey meter shall be appropriate for measuring the specific type of radiation emanating from the source (that is, alpha, beta, gamma, neutron, x ray, and so forth).

6.11.2 Responsibilities

Specific personnel are responsible for the issuance, maintenance, and calibration of leak detection survey meters.

6.11.2.1 Issuance

The RSO, in consultation with the requester of the NASA Langley Form 498, shall designate the appropriate type of survey meter for each application and shall make arrangements for its issuance.

6.11.2.2 Maintenance

The OFSH shall be responsible for assuring that survey meters are kept in good working order and calibrated every six months while in use, and after any repair. For each survey meter needing repair and/or calibration the requester shall complete NASA Langley Form 145, "Maintenance Shipping Form," and submit it with the instrument to the organization responsible for calibration.

6.11.2.3 Calibration

Radiation instruments calibrated in 6.11.2.2 above shall require exposure to known radiation fields with at least two points in each range checked. Generally, the calibration checks shall be made in the regions of 10 - 30 percent and 70 - 90 percent of full scale. In the event it is not possible to obtain a calibration check for a particular range, the instrument shall be considered not calibrated for that range and shall be marked accordingly. Should all calibration check readings fall within ± 10 percent, no change shall be made in instrument settings. When the calibration check shows the instrument response to exceed the above tolerance, a calibration adjustment shall be made according to the manufacturer's specific procedures. If the instrument's

response exceeds ± 20 percent either because of rate or energy dependence and cannot be corrected by adjustment, suitable correction factor graphs or charts shall be prepared and attached to the instrument.

6.12 RADIOACTIVE WASTE DISPOSAL

Disposal of radioactive wastes require the following:

- Special waste receptacles shall be provided by the OEM, OSEM for the disposal of low-level radioactive waste. These receptacles shall be conspicuously marked with the radiation symbol and the words:



Separate receptacles shall be provided for low-level waste, and these wastes shall be strictly segregated. Concentrated stock solutions of radioactive materials, sealed sources, and other high-level materials shall not be disposed of in low-level waste containers. The health physics staff, upon request by the OFSH, shall be responsible for disposal or removal and storage of such high-level material.

- The contents of the radioactive waste receptacles shall be collected by the health physics staff periodically. The arrangements for ultimate disposal of all radioactive waste resulting from LaRC operations shall be the responsibility of OEM, OSEM in conjunction with OLM. Radioactive waste shall be handled as hazardous waste. Disposal of high-level material is limited to an appropriate licensee of the NRC or one of its agreement states who shall conduct final disposal operations.
- Records of all radioactive waste disposals shall be maintained by the RSO.

6.13 CONTRACT RADIOGRAPHY

The Systems Engineering Competency often requires the use of contract radiography operations for the nondestructive testing of welds, castings, new construction, and so forth. While the sporadic and uncertain nature of these operations prohibits the effective use of the NASA Langley Form 498 system, the following procedural and safety criteria shall be observed for all contract radiography performed at LaRC.

6.13.1 NASA LaRC Inspector Responsibilities

The NASA LaRC Inspector responsibilities include:

- at least four hours prior to initiating contract radiography operations, notify the personnel listed below, by telephone, of the location, starting time, and expected duration of the operation:
 - the RSO.
 - NASA LaRC Security.
 - the Duty Officer at the West Heating Plant, 14 West Taylor Street (Facility 1215).
 - the Facility Coordinator for the facility where the operation is to be performed.
 - the NASA LaRC Fire Department.
- be present for the entire duration of the radiographic operation.
- as a trained “radiation monitor,” ensure that the contractor:
 - establishes a “controlled area” as defined in this Chapter. This shall include the use of physical barriers, as defined in these procedural requirements, and clearly visible signs to prevent unauthorized entry into the controlled radiation area.
 - complies with this chapter.
 - attempts to further minimize exposure by the use of shielding devices and beam collimators when available.
- notify the personnel listed below when contract radiography operations have been completed:
 - NASA LaRC Security.
 - the Duty Officer at the West Heating Plant, 14 West Taylor Street (Facility 1215).
 - the NASA LaRC Fire Department.

6.13.2 Scheduling of Operations

Due to the difficulty encountered in the control of personnel, contract radiography shall not normally be allowed to start until 5:00 p.m. or later on weekdays. Exceptions shall have the prior written approval of the Chairperson, IRC.

6.14 IN-HOUSE MOBILE RADIOGRAPHY (NASA)

When performing mobile radiography operations outside of an approved x-ray laboratory facility, the OFSH shall follow the procedures as presented above. The OFSH shall not be required to submit a NASA Langley Form 38 or NASA Langley Form 48 for the mobile operation if the equipment and personnel involved have been authorized by an approved NASA Langley Form 498 for a permanent x-ray laboratory facility.

6.15 STORAGE OF RADIOACTIVE MATERIAL

Radioactive materials shall be stored in approved locations only. Radioactive materials shall not be stored alongside other items that may cause unintentional releases, such as corrosive chemicals. Radioactive materials shall be kept locked up when they are not in use or in the presence of authorized users. This requirement may be satisfied by either locking the material up in a cabinet or locker or by locking up the work area. In either case, only authorized users may be allowed to have a key to access the material. Radioactive material installed in a piece of equipment that requires disassembly to access the material is exempt from this requirement.

Chapter 7**7. EMERGENCY PROCEDURES****7.1 GENERAL**

Contamination is easily spread during an emergency situation such as a fire, explosion, accidental breakage of a container, or spill. The air currents set up by a fire can spread radioactive materials very rapidly and easily. They may also find their way into an air conditioning system, or, if spilled on the floor, personnel may track them around. This contamination is undetectable except by the use of special radiation detecting devices, such as the Geiger counter. Since it is extremely difficult to set up adequate detection controls in an emergency, preplanned emergency procedures are included in these procedural requirements. Personnel whose work involves the use of radioactive materials shall familiarize themselves with these procedures. Should there be a catastrophic radioactive release, response procedures shall be in accordance with LPR 1046.1, "NASA Langley Research Center Emergency Plan."

7.2 PROCEDURES AFTER SPILLAGE OF RADIOACTIVE MATERIAL**7.2.1 General Responsibilities**

Immediately after the occurrence of a spill, the involved person shall:

- vacate all affected personnel to a safe area.
- notify the RSO by telephone or the most rapid method of communication.
- follow the instructions given by the RSO or an authorized representative.

7.2.2 Specific Precautions

Unless instructions given by the RSO are different, the person involved in the spillage shall:

- prevent all nonemergency personnel from approaching the contaminated area, or from attempting to deal with the spillage.
- close all windows and other openings such as ventilating grills.
- close and lock all doors.
- seal all doors and other openings after closing if the spillage involves powdered or gaseous radioactive material. Suitable sealing materials usually available are wide masking tape, adhesive tape, or heavy wrapping paper, clipped or pasted to the frames.

7.2.3 Rules Affecting Conduct of All Personnel

Personnel shall conduct themselves by the following rules:

- No person shall enter an affected area until the health physics staff has conducted a contamination survey and has pronounced the area safe to resume work.
- Unauthorized personnel shall not attempt to make a survey, or to clean up the spillage.
- Decontamination procedures shall ALWAYS be conducted under the supervision of the RSO or an authorized qualified representative.
- Personnel shall be instructed to keep their movements in the contaminated area to a minimum to avoid spreading the contaminant by tracking.

7.3 FIRES IN RADIATION AREAS

Fires in radiation areas shall be handled as described herein.

- In case of fire in areas where radioactive materials are in use, every practical effort shall be made by the user to replace the material in its shielded container. If this is not possible, it shall be the responsibility of the user to promptly notify the NASA LaRC Fire Department and the RSO or alternate.
- NASA LaRC Fire Department personnel shall be knowledgeable of radiation hazards, and are encouraged to contact the health physics staff for periodic instruction. The RSO shall periodically notify the NASA LaRC Fire Department in writing of all locations of radioactive materials in amounts that may prove hazardous to NASA LaRC Fire Department personnel either externally or internally or that may present a serious contamination problem. When calling one of these locations, the NASA LaRC Fire Chief, in consultation with the RSO, shall ensure that proper procedures are implemented to minimize radiation exposure to personnel and prevent the spread of contamination.

7.4 LOST, MISPLACED, OR STOLEN SOURCES OF RADIATION

Lost, misplaced, or stolen sources of radiation shall be reported immediately to the RSO. The RSO shall promptly prepare all reports required by the NRC after a theft or loss of licensed material. These reports shall then be transmitted by the Safety Manager.

7.5 NOTIFICATION OF ACCIDENTS

Accident notification shall be in accordance with the following procedures:

- A user or operator shall immediately report to the RSO any incident or accident-involving radiation sources, or malfunction of radiation producing equipment. The RSO shall promptly investigate any report and advise NASA LaRC management of the findings. The OFSH and Chairperson, IRC, shall be informed periodically of the progress of the investigation.

- The RSO shall assure that the NRC is notified immediately following an accident as described in NRC 10 CFR 20, Paragraph 20.403.
- The RSO shall submit a written report, for transmission by the Safety Manager, to NRC within 30 days following an overexposure to radiation levels and concentrations of radioactive material as described in NRC 10 CFR 20, Paragraph 20.405.

Chapter 8

8. VISITOR CONTROL

Visitors will be allowed to enter radiation areas at LaRC only with approval of the cognizant OFSH and subsequent notification to the RSO. Visitors shall be required to submit their full name, date of birth, social security number, and a statement of previous exposure history so that they can be issued a film badge prior to entry into a radiation area. Visitors within a radiation area shall be accompanied by a certified radiation worker at all times.