Western Michigan University
Radiation Safety

Administrative Controls Program

Purpose

A. Provide the criteria for retaining the Radiation Safety Program records.

B. Establish a table of events that require notification of Federal and State Agencies.

C. Establish the criteria and process for becoming an Authorized User (AU) of licensed material.

D. Establish the criteria and process for authorizing the use of licensed material.

E. Establish the criteria and process for authorizing a room or area to use or store licensed material or operate a radiation-producing machine.

F. Provide guidelines for writing and distributing procedures.

G. To ensure that procedure steps critical to compliance are not deleted in future revisions.

Table of Contents

I. Responsibilities

A. Executive Manager

1. Make the required notifications to regulatory agencies if the RSO is unavailable or incapacitated.
2. Document when and why a regulatory agency was notified.

B. Radiation Safety Officer (RSO)

1. Make the required notifications to regulatory agencies.
2. Document when and why a regulatory agency was notified.
3. Approve/Disapprove applications for Users, Uses, and Rooms.
4. Write, amend, and distribute the Radiation Safety procedures and policies.
5. Provide storage for the records covered by this program.

C. Authorized User (AUs)

1. Inform the RSO of any personnel changes under their supervision.
2. Provide documentation of training and experience using radioactive material of the type and quantity requested on a new use or room application.
3. Provide an endorsement for any RW assigned to them that has submitted an application to become an Authorized User.
4. Submit completed records to the RSO for storage in accordance with the retention schedule.

D. Radiation Workers (RWs)

1. Notify their AU of termination or change in status of using radioactive material.
2. Provide input and suggestions for procedure changes or improvements.

II. Definitions - See Appendix E of this program.

III. Documentation and Retention

A. All documents and records made in support or implementation of the Radiation Safety Policy must be: **[10CFR20.2101 and 2102 / 10CFR30.51 / 49CFR72.201]**

1. Legible and in English
2. Capable of remaining legible until the license is terminated or the record is no longer required to be stored.
3. Must be in US units.
    a. Curie, dpm, rad, REM, etc. and their subdivisions, i.e., uCi, mR, mREM, etc.
    b. Exception is when specified to be in SI units such as 10CFR20.2006 or 49CFR172.203.

B. Training Program

Retention	Document	Reference
3 years	Rosters	10CFR20.2102
Life	Test Bank	10CFR20.2102

C. Radiological Controls Program

Retention	Document	Reference
Life	List of all rooms and areas that have had licensed material used in them. (See Administrative Controls Program - Areas Important to Decommissioning	10CFR30.35
Life	Surveys, used to determine dose, the release of licensed material to the environment, or individual intakes of licensed material.	10CFR20.2103 R333.5079
3 years	Surveys, Routine	10CFR20.2103 R333.5079
Item's return	Conditional Release forms	
3 years	Investigations of exposure levels exceeding WMU limits	10CFR20.2102
Life	Planned Special Exposures	10CFR20.2105

D Source Inventory and Control Program

Retention	Document	Reference
3 years	Receipt inspection and surveys; including the Radionuclide Order Form and the Vendor documentation that arrives with the package.	10CFR30.51 10CFR20.2103
Life	Campus RAM Inventory Log	10CFR30.51
3 years	Semi-annual inventories.	10CFR33.14 License
3 years	RAM Activity Log	License
3 years	Leak test results / On-Off tests of the mechanisms and indications.	10CFR31.5
3 years	Radiation machine registrations	R333.5031
3 years	Radiation producing machine initial run surveys.	R333.5079

E. Administrative Program

Retention	Document	Reference
Life	Authorized User, use, and room applications	10CFR20.2102
Life	List of Authorized Users	10CFR20.2102
Life	Notice of Violations and WMU responses.	10CFR20.2102 R333.5086-5088
Life	Telephone Reports to regulating agencies	10CFR20.2102 R333.5086-5088
Life	Written Reports to regulating agencies.	10CFR20.2102 R333.5086-5088
Life	Procedure revision records	10CFR20.2102
Life	Radiation Safety Committee Meeting Minutes	10CFR20.2102

F. Quality Control Program

Retention	Document	Reference
3 years	Incident Reports	10CFR20.2102
3 years	Internal audit reports.	10CFR20.2102
3 years	Audits conducted by federal and state agencies.	10CFR20.2102

G. Instrumentation and Dosimetry Program

Retention	Document	Reference
3 years	Calibration records	10CFR20.2103 R333.5079
3 years	Investigations of use for calibration failures.	10CFR20.2103 R333.5079
Perpetual	List of instruments	10CFR20.2102
Life	NRC Form 4 / MIOSHA-RSS-101	10CFR20.2104 R333.5080
3 years	Records used to complete the NRC Form 4 / MIOSHA-RSS-101	10CFR20.2104 R333.5080
Life	NRC Form 5 / MIOSHA-RSS-102	10CFR20.2106 R33.5081

H. Transportation of Radioactive Material/Waste Program

Retention	Document	Reference
3 years	All shipping paperwork for Radioactive Material; Bill of Lading, Emergency contacts, Manifests, Container Certificate of Compliance, etc.	10CFR30.51
Life	All shipping paperwork for Radioactive Waste; Bill of Lading, Emergency contacts, Manifests, Container Certificate of Compliance, etc.	10CFR30.51
3 years	Notifications to governors of intent to shipment radioactive material through their state.	10CFR20.2102
3 years	Disposal records – material and machines	10CFR30.51

V. Final Conditions

A. Records are retained in accordance with the procedures and regulations.

B. Notifications to regulatory agencies are made in the required time and in a professional way to minimize miscommunications.

C. Users, uses, and rooms are reviewed and approved.

D. Procedures are developed in a consistent manner.

Appendix A
Notification of the Nuclear Regulatory Commission

NOTE: The following people are responsible for making the NRC required notifications, in order of preference: Radiation Safety Officer, Executive Manager, Division of Environmental, Health, and Safety (EHS) Manager, or EHS 24-Hour Responder.

I. Telephone Notifications [10CFR20.2102]

A. Fill out the Regulatory Telephone Notification Form before placing the call.
   1. Caller's name and call back number.
   2. Description of the event, include date and time of occurrence.
   3. Exact location of the event.
   4. Isotopes, quantities, and chemical/physical form of the material involved.
   5. Available radiation exposure data, without names.

II. Written Notifications [10CFR20.2102]

A. Fill out the Regulatory Written Notification Cover Sheet.
   1. Point of Contact, Title, and call back number.
   2. Description of the event, include date and time of occurrence.
   3. Exact location of the event.
   4. Isotopes, quantities, and chemical/physical form of the material involved.
   5. Corrective actions taken or planned to prevent recurrence.

B. Attach an in depth report of the incident, including a minimum:
   1. Results of any evaluations or assessments.
   2. Extent of exposure of individuals without identifying them by name.
   3. Radiation and contamination levels involved in the event.
   4. The cause of the elevated exposure or contamination levels.
   5. Identify the individuals overexposed.
      a. Separate and detachable part of the report.
      b. Name
      c. Social Security Number
      d. Date of Birth
      e. Exposure

C. Submit the Written Notification.
   1. The original notifications: **[10 CFR 20.2202 and 2203 / 10CFR21.21]**

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington D.C., 20555-0001

2. Follow on notifications: **[10 CFR 20.2201]**

USNRC, Region III
2443 Warrenville Road, Suite 210
Lisle, IL, 60532-4352

III. Table of Events Requiring NRC Notification

Nuclear Regulatory Required Notifications are made to:	**NRC Operations Center (301) 816-5100**		
Event	**Telephone Notification**	**Written Report**	**Reference**
Event that prevents immediate protective actions necessary to avoid exposure to radioactive materials that could exceed regulatory limits or releases	Immediate	30 days	10CFR30.50
Defect in equipment that could create a substantial safety hazard	2 days	30 days	10CFR21.21
Theft/Loss			
Theft or loss of material > 1000 times Appendix C to 10 CFR 20 quantities	Immediate	30 days	10CFR20.2201
Theft or loss of material > 10 times Appendix C to 10 CFR 20 quantities that is still missing at 30 day mark	30 days	30 days	10CFR20.2201
Exposure			
Exposure > 5 times the federal limits.	Immediate	30 days	10CFR20.2202
Exposure in 24 Hours > the federal limits	24 hours	30 days	10CFR20.2202
Equipment that is disabled or fails to function as designed when required to prevent radiation exposure in excess of regulatory limits	24 hours	30 days	10CFR30.50
Exposure > federal limits.	None	30 days	10CFR20.2203
Exposure to an individual member of the public > 100 mREM	None	30 days	10CFR20.2203
A restricted area in access of applicable limits in the license.	None	30 days	10CFR20.2203
An unrestricted area in access of 10 times any applicable limit in the license.	None	30 days	10CFR20.2203
All Planned Special Exposures	None	30 days	10CFR20.2204

Contamination/Release of Materials:			
Release of material that if an individual was present for 24 hours would have received 5 times Annual Limit on Intake	Immediate	30 days	10CFR20.2202
An event that required unplanned medical treatment at a medical facility of a person with loose contamination on their person or clothing	24 hours	30 days	10CFR30.50
Unplanned Contamination event that : 1. Restricts worker entry > 24 hrs or access for reasons other than to allow the decay of isotopes with half-lives < 24 hrs prior to decontamination. 2. Involves material > 5 times lowest Annual Limit on Intake	24 hours	30 days	10CFR30.50
Release of material that if an individual was present for 24 hours would exceed Annual Limit on Intake	24 hours	30 days	10CFR20.2202
Unplanned fire or explosion damaging any licensed material or device, container, or equipment containing licensed material when: 1. The quantity involved was > 5 times the lowest Annual Limit on Intake, and 2. The damage affects the integrity of the container	24 hours	30 days	10CFR30.50
Transportation:			
Radioactive labeled packages that exceed: 200 mR/hr on contact / 10 mR/hr at 1 m / 2,200 dpm/100 cm2	Immediate	30 days	10CFR20.1906

Appendix B
Notification of the State Regulatory Agencies

NOTE: The following people are responsible for making the State required notifications, in order of preference: Radiation Safety Officer, Executive Manager, Division of Environmental, Health, and Safety (EHS) Manager, or EHS 24-Hour Responder.

I. Telephone Notifications [R333.5086-5088]

A. Fill out the Regulatory Telephone Notification Form before placing the call.
   1. Caller's name and call back number.
   2. Description of the event, include date and time of occurrence.
   3. Exact location of the event.
   4. Isotopes, quantities, and chemical/physical form of the material involved.
   5. Available radiation exposure data, without names.

II. Written Notifications [R333.5086-5088]

A. Fill out the Regulatory Written Notification Cover Sheet.
   1. Point of Contact, Title, and call back number.
   2. Description of the event, include date and time of occurrence.
   3. Exact location of the event.
   4. Isotopes, quantities, and chemical/physical form of the material involved.
   5. Corrective actions taken or planned to prevent recurrence.

B. Attach an in depth report of the incident, including a minimum:
   1. Results of any evaluations or assessments.
   2. Extent of exposure of individuals without identifying them by name.
   3. Radiation and contamination levels involved in the event.
   4. The cause of the elevated exposure or contamination levels.
   5. Identify the individuals overexposed.
      a. Separate and detachable part of the report.
      b. Name, Social Security Number, Date of Birth, Exposure

C. Submit the Written Notification.
   1. Reports concerning State of Michigan regulation are submitted to the:

MIOSHA/Radiation Safety Section
Michigan Department of Licensing and Regulatory Affairs
525 W. Allegan Street
P.O. Box 30643
Lansing, Michigan 48933

III. Table of Events Requiring State Notification

State Required Notifications are made to:	**Radiation Safety Section (517) 763-0131**		
Event	**Telephone Notification**	**Written Report**	**Reference**
Theft			
Theft or loss of any source of radiation	10 days	30 days	R333.5086
Exposure			
Whole Body > 25 REM Lens of the eye > 75 REM Skin & Extremity > 250 REM	Immediate	24 hours & 30 days	R333.5087 R333.5088
If received or could have received in a 24 hour period: Whole Body > 5 REM Lens of the eye > 75 REM Skin & Extremity > 30 REM	24 hours	24 hours & 30 days	R333.5087 R333.5088
Whole Body > legal limits (R333.5057-5060) or applicable registration limits	None	30 days	R333.5088
Restricted area dose rates exceeding applicable limits	None	30 days	R333.5088
Radiation levels in an unrestricted area > 10x applicable limits	None	30 days	R333.5088

Appendix C
Process for Approval of
Authorized Users, Uses, and Rooms

I. Responsibilities

A. Radiation Safety Officer

1. Approve or disapprove applications. **[10CFR33.14 / License]**
2. Receive the applications.
3. Review the applications.
4. Evaluate the applicant's training.
5. Validate/confirm the information provided in the application is correct.
6. Address the radiological concerns associated with the application.
7. Document the resolution of all application concerns.
8. Inform the applicant of the actions taken on their application.
9. Maintain and update the Authorized Users and area/rooms lists.
10. Conduct Authorized User training.

B. Authorized User

1. Provide documentation of training and experience using radioactive material of the type and quantity requested on the application.
2. Provide an endorsement for any RW assigned to them that has submitted an application to become an Authorized User.

C. Applicant

1. Complete and submit the application.
2. Provide verifiable documentation of training and experience using radioactive material of the type and quantity requested on the application.
3. Provide documentation of acceptability of the area(s) to ensure adequate controls and measures are in place to maintain exposure ALARA.
4. Respond to any inquiries made during the review process.

II. Process

A. Application Process for Authorized Users, Authorized Uses, and Authorized Areas/Rooms.

1. Determine the need to use radioactive material.
2. Review the applicable criteria for approving an application to become:
    a. Authorized User – III of this appendix.
    b. Authorized Use – IV of this appendix.
    c. Authorized Area/ Room – V of this appendix.
3. Gather the required documentation.
4. Complete the application and submit it with all supporting documentation to the RSO.
5. The RSO reviews the submitted application.
    a. Request any additional information or clarification from the applicant.

b. Document the resolution of any concerns.
c. Verify information to be correct.

6. The RSO will apply the applicable criteria and approve or disapprove the application.

III. Criteria and information required for approving an Authorized User **[License]**

A. Minimum Requirements for Authorized User Approval:

1. One year of applied experience for the type and quantity of material to be used.
2. 40 hours of training for the type and quantity of material to be used.
3. Satisfactorily complete Western Michigan University's Authorized User training, or equivalent as determined by the Radiation Safety Officer (RSO).

NOTE: Section B provides the criteria and means to substantiate the minimum requirements for an applicant coming from another facility or institute.

B. Training at a Facility or Institute other than WMU.

1. Training, covering the following topics:
   a. Characteristics and biological effects of ionizing radiation (appropriate to the types and forms of material they are to be using);
   b. Units of radiation dose and quantities,
   c. Radiation protection principles, (ALARA, exposure control, contamination control)
   d. Radiation detection and instrumentation,
   e. Regulatory requirements, and
   f. Hands-on lab training,
2. A course certificate or other documentation supporting III.B.1. from the person or institute conducting the radiation safety training.

C. Experience at a facility or institute other than WMU.

1. One year of applied experience:
   a. Must have been using the requested material or similar material.
   b. Must have been in a similar isotopic form.
   c. Must have been in similar or greater quantities.
2. Supporting documentation will be from the person or institute where material was being used and needs to include:
   a. Dates or time periods
   b. Location or facility
   c. Type, quantity, and application of material

NOTE: Section D provides the criteria and means to substantiate the minimum requirements for an applicant that has been employed at Western Michigan University.

D. Training and Experience at WMU.

1. Must be a Radiation Worker.

2. Satisfactorily complete Western Michigan University's Authorized User training, or equivalent as determined by the RSO.

3. One year of experience at WMU under an Authorized User for the type and quantity of material to be used AND the AU's endorsement.

IV. Criteria and information required for approving the use or an area/room for use of Licensed Material **[License]**

NOTE: We do not allow for the use of Unbound Iodine or Volatile Radioisotopes. Requests for use of such material will be held subject to the establishment of the controls necessary to maintain exposure to staff, students, and public ALARA and approval of the NRC via a license amendment.

A. Minimum Requirements for approval of the use:

1. The AU responsible for the use of the requested material has been clearly identified.
2. A detailed description of how the material is to be used has been submitted.
3. All known or postulated hazards associated with the use of the material have been identified.
4. All special procedures and controls that would be associated with the use of the material or area/room have been identified or developed.
5. The area is clearly identified in which the material is to be used or requesting to be authorized for use.

B. The detailed description should include:

1. Materials to be used in the area/room:
    a. Radioisotope: chemical form, toxicity, and hazards.
    b. What the use of the material will provide.
    c. When the material will be applied.
    d. How the material will be applied.
    e. The quantity of material used per application.
2. Known or postulated hazards associated with the type, form, and use of the material:
    a. Identified with mitigating factors to minimize the hazard.
    b. Special procedures that would be associated with the use of this material.
    c. All areas that have a potential to be contaminated AND would require special means to decontaminate have been identified, i.e., the drain in a sink.
    d. Controls in place to prevent the spread of contamination and to maintain exposure ALARA.
        1. Radiation detection instruments
        2. Shielding type and layout
        3. Fume hood
        4. Work area spill protection
        5. Other controls

3. A survey map has been developed and indicates:
    a. The level of control appropriate for the described material.
    b. The primary work area(s) are clearly marked on the survey map.
    c. Routine wipe test locations have been identified.
    d. The engineering controls in place or projected to be put in place.

Appendix D
Procedure Writing and Distribution Guidelines

I. Format

A. Type
1. Calibri (body)
2. Font 10, 12, or 14 pts
3. Procedure title and section titles are bolded and 14 pt
4. Regulatory references are bolded and 10 pt
5. All other text is 12 pt

B. Layout in outline fashion.
1. Sections (I., II., III., etc.) aligned with the left margin and two spaces after the period.
2. Paragraphs (A., B., C., etc.) aligned with the left margin and two spaces after the period.
3. Subparagraphs (1., 2., 3., etc.) tabbed ¼ inch (two dots) and one space after the period.
4. Line (a., b., c., etc.) tabbed ½ inch (four dots) and one space after the period.
5. Sub-line (1., 2., 3., etc.) tabbed ¾ inch (six dots) and one space after the period.
6. Associate line (a., b., c., etc.) tabbed 1 inch (eight dots) and one space after the period.
7. Example:

Margin **I. Section**
A. Paragraph
¼ inch 1. Subparagraph **[Regulation reference]**
½ inch a. Line
¾ inch 1. Sub-line
1 inch a. Associate line

8. Header
a. First line: the procedure title justified to the right margin
b. Second line: the revision date shown as Rev. YYMMDD justified to the right margin
c. Font is 10 pt Calibri
d. Example: Administrative Controls Program Right margin
Rev. 170601

9. Footer
a. Title/Purpose page does not have a footer or page number.
b. Table of content:
1. Has a lower case i., ii., etc.
2. Centered in Calibri 10 pt.
3. Example: i.
c. Body:
1. Page numbers shown as Page 1 of #, followed by Page 2 of #, etc.
2. Justified to the right margin in Calibri 10 pt.
3. Example: Page 1 of 8 Right margin
d. Appendixes are the same as the body with first page starting at 1 again. If only a single page, it will not have a page number.

C. Content and preferred order

1. Title page with purpose(s)
2. Table of Contents
3. Section I. Responsibilities list specific responsibilities for the subprogram.
4. Section II. Definitions list specific definitions pertaining to the subprogram for ease of use.
5. Section III. Requirements list the regulated activities and outcomes for maintaining exposure As Low As Reasonably Achievable (ALARA). **[10CFR20.1101]**
6. Section IV. Could be additional requirements and progress if needed.
7. Section IV or next consecutive number is the Final Conditions.
8. Appendixes follow in alphabetical order and are used to specify guidance for performing a task or process to care out the requirements.
9. Steps / lines
    a. Provide information or actions
    b. Should be short concise sentences to clearly communicate the information or action.
    c. Should NOT explain why the step is necessary.
    d. Action lines/steps should start with a verb to immediately direct the action.
    e. Preferred is one line/step per action, but limited to a maximum of two related actions per line/step.
10. Additions or clarifying injects.
    a. Notes are:
        1. Enclosed in a box with
        2. The word NOTE is the lead word and bolded in Calibri 12 pt.
        3. The body of the note should by un-highlighted Calibri 12 pt.
        4. The note should precede the step or steps it is providing additional guidance or warning.
        5. Example:

NOTE: Warning about the following paragraph.

    b. Regulatory, license, or response commitment references
        1. Follow the paragraph or line
        2. Must be looked at prior to making any changes to the procedure.
        3. Enclosed with brackets
        4. Bolded in Calibri 10 pt.
        5. Example: **[10CFR20.XXXX]**
    c. Abbreviations
        1. If listed in the Common Terms, Appendix e of this procedure, no action required.
        2. If not listed,
            a. Define in the definitions section, or
            b. Spell out the word(s) the first time it is used and place the abbreviation in parentheses immediately following the word(s), i.e., Transport Index (TI).

II. Distribution of the Radiation Safety Procedures

A. Radiation Safety procedures are maintained on the WMU webpage under Research and Compliance.

B. Revisions information will be given to the Authorized Users (AU) and RWs.

C. The RSO will maintain up to date procedures and ensure the webpage accurately reflects current revisions.

III. Revising a Procedure That Does Not Effect a NRC Commitment, Regulatory, Or License Requirement.

A. The following steps are to be performed by AUs and RWs:

1. Determine the necessary change(s).
2. Submit the change to the RSO.
    a. Provide the change wording.
    b. Provide a brief explanation of why the change is necessary.

B. The following steps are to be performed by the RSO:

1. Review the change.
    a. Discuss the change with the author, if necessary.
    b. Determine if the change will require additional changes.
    c. Verify that the change will not affect a NRC commitment, regulatory, or license requirement.
2. Generate a draft copy of the procedure with the change.
3. Perform a trial use of the draft procedure.
4. Seek additional reviews if necessary.
5. Make the change in the procedure and indicate the change by a side bar in the right hand margin to indicate that it has been revised.
6. Send the information to the AUs and RWs.
7. Have the webpage updated.
8. File the procedures.

IV. Final Conditions

A. Steps critical to compliance are marked to prevent them from being deleted in future revisions.

B. Procedures are developed with consistency to aid the end users.

C. Procedures and changes are up to date and posted to the webpage.

Appendix E
List of Common Terms

A1	The maximum activity of special form radioactivity permitted in a Type-A package. **[49CFR173.435]**
A2	The maximum activity of other than special form radioactivity (normal form), LSA, or Surface Contaminated Objects (SCO) permitted in a Type-A package. **[49CFR173.435]**
ALARA	An acronym for 'As Low As Reasonably Achievable'
Anti-Cs	An abbreviation for anti-contamination clothing. Anti-Cs are the items worn by personnel using unsealed radioactive material to prevent them from getting radioactive material on their person.
'As Found' Data	The readings taken when the instrument is exposed to a known dose rate prior to calibration adjustments.
AU	An acronym for Authorized User. An authorized User is an individual that has been approved by the RSO and listed on the license to use and supervise the use of radioactive material.
Audit	A formal examination of the radiation safety program or a specific area of the program.
Calibration	The determination of variation from a standard, or accuracy, of a measuring instrument to ascertain necessary correction factors.
Carrier	A person engaged in the transportation of property in a common, contract, or private vehicle.
ccpm	An acronym for corrected counts per minute. It is derived by subtracting the background reading from the sample or survey reading when determining loose or fixed contamination levels.
Cherenkov Radiation	Blue light emitted when a charged particle moves in a transparent medium with a speed greater than that of light in the same medium.
Conditional Release	The release of radioactive material for use outside a restricted area under strict controls and conditions.
Contact Readings	Dose rate readings taken within 1/4 -1/2 inch from the surface of an object.
Contamination	The disposition of radioactive material in an undesired area, particularly where its presence may be harmful.
Contamination, Fixed	Contamination that is trapped in the pores or in some way bonded to the surface of a material and cannot be easily removed.
Contamination, Loose	Contamination that can be easily removed from the surface of a material.
Control Levels	Designated criteria which govern the depth of control and oversight required during the use of radioactive material.

Controlled Area	An area, outside of a restricted area but inside the site boundary, access to which can be limited by the licensee for any reason. **[10CFR20.1003]**
Controlled Surface Contaminated Area (CSCA)	An accessible area with loose surface contamination levels $\geq$ 1000 dpm/ 100 cm^2 β–γ or $\geq$ 20 dpm/ 100 cm^2 α that is posted and requires additional controls for entry and performance of activities. **[10 CFR 835 Appendix D]**
Conversion rule	Mathematical formula based on calibration data that converts the instrument readings from cpm to dose rate readings in mR/hr.
Curie (Ci)	The quantity of radioactive material which decays at a rate of: 3.7 x 10^{10} disintegrations per second (dps), or 2.22 x 10^{7} disintegrations per minute (dpm), or 3.7 x 10^{10} Becquerel (Bq)
Declared pregnant women	A woman that has voluntarily informed the licensee, in writing, of her pregnancy and estimated date of conception.
Decontamination	The transfer of contamination from one medium to another for the purpose of reducing or eliminating contamination from the original medium.
Decontamination, Special	Aggressive decontamination methods that may cause damage to the item in which the contamination is present, e.g., high-pressure washing, grinding the surface, etc.
Dose	A general term that refers to absorbed energy or equivalent.
Dose rate	A general term that refers to the absorbed energy or equivalent per unit time.
Dosimeter	See personnel monitoring devises.
Engineering Controls	The installed equipment such as glove bags, fume hoods, other ventilators, etc. used to control the concentration of radioactive material in the air to reduce the dose and exposure.
Excepted	To leave out or omit.
Exclusive Use	The sole use of a conveyance by a single shipper in which all initial, intermediate, and final loading and unloading are carried out in accordance with the direction of the shipper or receiver.
Executive Manager	The authority with the means to make prompt decisions without having to consult with higher management, particularly in case of an emergency concerning radiation exposures. The Executive Manager of WMU's Radiation Safety Program is the Associate Vice President for Research.
Exempted	To release from a requirement to which others are subjected.
Exposure	The act of being exposed to ionizing radiation or radioactive material.
Extremities	The parts of the arms from the elbow to the fingertips and the legs from the knees to the toes.
Findings	Points of interest that support the evaluation of a program. Findings are examples, positive or negative, of the practices, work conditions, postings, or anything related to the control of radiation (exposure, contamination, material, and waste) observed during an audit.

Free Release	The change in status of an area or equipment from restricted to unrestricted after verification that the radiation and contamination levels comply with the stringent criteria for uncontrolled areas.
Frequencies	Time requirements for complying with the rules and regulations governing the use of radioactive material.
Immediate	As soon as possible, but within less than four (4) hours. **[10CFR30.50]**
Daily	The 24-hour period that starts at 12:00 AM and concludes at 11:59 PM.
Weekly	A seven-day period, running Monday through Sunday.
Biweekly or Semi-monthly	A fourteen day period, running Monday through the second Sunday, including a grace period of +/- 2 working days.
Monthly	A 30 day period that includes a grace period of + / - 5 working days.
Calendar Quarter	A three month period beginning with the first day of the month and ending the last day of the third month. The 1st calendar quarter of each year shall begin on January 1 and ending on March 31.
Quarterly	A period in time not less than 12 consecutive weeks not more than 14. Commonly referred to as 3 months.
Semi-annual	A six month period, that includes a grace period of + / - 30 calendar days.
Annual	The period of time that is bounded by the beginning and ending of the year, i.e. January 1st through December 31st.
Biannual	The period of time that is bounded by the beginning of one year and ending of the next year, i.e. January 1, 1999 through December 31, 2000.
General Area Readings	Dose rate readings taken greater than 30 cm from any object.
Grace Period	The additional time allowed to fulfill routine commitment requirements due to special circumstances. Entry into a grace period does not adjust the tasks next scheduled due date.
Half-life	The time required for the activity of a radioactive substance to decay by a 50%. Each radionuclide has a unique half-life.
Half-value layer	The amount of a specified material that attenuates radiation beams to an extent that the exposure rate is 1/2 of its original value.
Hazardous Material (HAZMAT)	A material that has been determined by the Secretary of Transportation capable of posing an unreasonable risk to the health, safety, and property when transported in commerce. Radioactive material and waste would be considered HAZMAT if the specific activity is > 70 Bq/g.

Hazardous Substance	A material, including mixtures and solutions, that : (1) is listed in the Appendix to 49CFR172.101, or (2) is in a quantity, in one package, which equals or exceeds the reportable quantity (RQ) listed in the Appendix to 49CFR172.101. Radioactive material and waste can be hazardous substances.
Hazardous Waste	Any material that is subject to the hazardous waste manifest requirements of the Environmental Protection Agency, 40CFR262. Radioactive Material and Waste ARE NOT hazardous waste, unless mixed with a hazardous waste.
High Radiation Area	An area, accessible to individuals, in which they could receive in any 1 hour an excess of 100 mREM at 30 cm from the source or surface of the source. WMU posts High Radiation Areas at $\geq$ 90 mR/hr.
Incident Reports	Formal reports of events, conditions, actions, etc. that have or may have an adverse effect on the safety of the general public and WMU AUs/RWs due to radiation exposure.
Independent Auditor	An auditor that has no affiliation to WMU who is contracted for the sole purpose of performing an in-depth audit of the Radiation Safety Program. The Independent Auditor must have the experience and knowledge of a Radiation Safety Program for a Research facility.
Ion Pair	Two particles of opposite charge resulting from the interaction of ionizing radiation with neutral atoms or molecules.
Ionization	The process by which a neutral atom or molecule acquires a positive or negative charge.
Ionizing radiation	Any electromagnetic or particulate radiation capable of producing ions, directly or indirectly, in its passage through matter.
Labels	4" x 4" diamond shape stickers affixed to packages prior to shipping or moving to make individuals aware of potential radiation exposures and to minimize exposures.
Leak test	A wipe survey performed on non-gaseous sealed sources to ensure that there is no leakage of radioactive material. Devices containing only Kr-85 or H-3 are exempt from leak testing. Also, devices that contain $\leq$ 100 μCi of β or γ emitting material are exempt.
License	Official authorization to possess and use radioactive material. The license also stipulates additional parameters by which we must abide while using radioactive material.
Licensee	Western Michigan University
Low Specific Activity (LSA)	Refers to a radioactive material with a specific activity governed by a set criteria in 49CFR173.427
Marking	Information placed conspicuously on items to make individuals aware of potential radiation exposures and to minimize exposures.
Monitoring	Periodic or continuous determination of the amount of ionizing radiation or radioactive contamination present in an occupied region.

Multi-purpose instruments	These instruments are built with a meter face that can be read in cpm or mR/hr. The multi-purpose instruments are calibrated in the count rate mode (cpm) on the x 0.1 scale and in the dose rate mode (mR/hr) for the other scales.
Nonstochastic effect	The health effects, the severity of which varies with the dose and for which a threshold is believed to exist. Radiation-induced cataract formation is an example of a nonstochastic effect (also called a deterministic effect).
Occupational exposure	Exposure received in the course of employment in which duties involve exposure to ionizing radiation.
Package	The packaging together with its radioactive contents as presented for transport.
Packaging	The container or receptacle that makes up the containment system for radioactive transport. This includes any absorbent materials, shielding, etc.
Radiation Workers (RWs)	The direct handlers of radioactive material and radiation producing devices that have been trained and approved by the RSO.
Personal monitoring device	A device designed to be worn or carried by the individual for estimating exposure received.
Placards	10.8" x 10.8" diamond shape stickers or plaques affixed to transport vehicles to indicate the hazards associated with the different package contents aboard the vehicle.
Posting	A warning sign placed conspicuously to make individuals aware of potential radiation exposures and to minimize exposures.
Practical Application	The performance or simulation of a task in a lab or controlled setting.
Pre-operational checks	A series of instrument checks that verify that the instrument can reproduce accurate results from use to use.
Quality Factor (QF)	The linear-energy-transfer dependent factors by which absorbed doses are multiplied to express on a common scale the effectiveness of the absorbed dose. The numerical values are based partly on the biological effects and partly on judgement.
Rad	The unit of absorbed dose in any material by any type of radiation. A rad is equal to 100 ergs per gram of material.
Radiation	Excess energy emitted by an atom in the form of electromagnetic waves or particles.
Radiation Area	An area, accessible to individuals, in which they could receive in any 1 hour an excess of 5 mREM at 30 cm from the source or in any 5 days a dose in excess of 100 mREM. WMU will post Radiation Areas at $\geq$ 2 mR/hr.
Radiation Producing Machines	Devices designed to emit a controlled beam of radiation when energized. Machines that produce radiation from radioactive material contained in their design are not considered radiation producing machines.

Radiation Symbols	Alpha = α Beta = β Gamma = γ Neutron = η
Radioactive / Licensed Material (RAM)	Source material, special nuclear material, or by-product material received, possessed, used, transferred, or disposed of under a license issued by the NRC.
Radioactive Material Area	A room in which licensed material above a specific amount may be used or stored. **[10CFR20.1902]**
Radioactivity	The spontaneous emission of elementary particles by some atoms when their unstable nuclei disintegrate.
REM	The unit of measure of the equivalent absorbed dose in a human. REM = Rad x Quality Factor
Restricted Area	An area, access to which is limited by the licensee for the purpose of protecting individuals against undue risks from exposure to radiation and radioactive materials. **[10CFR20.1003]**
RSO	Radiation Safety Officer
Shall	Indicates a requirement to comply with the statement, rule or regulation.
Shielding	An engineering control used to reduce the exposure to individuals working around or with licensed material or waste.
Shipping Papers	The documentation required by the Department of Transportation to identify and manifest a shipment.
Should	Indicates a recommendation to perform the step, rule, or regulation whenever practicable to meet optimum safety standards.
Special Form	A radioactive material that would present a direct radiation hazard, but little internal hazard or contamination if released from its package; a solid piece or sealed encapsulated item with no single dimension < 5 mm.
Specific Activity	The total radioactivity of a given nuclide per gram of substance.
Specification Communication	Specific information placed in or on a package or vehicle required by the Department of Transportation in order to communicate the hazard associated with the materials transported. The specification communications include Markings, Labels, Placards, and Shipping papers. Each item must comply with set standards as to size, shape, color, and placement.
Standard	A sample of radioactive material, usually with a long half-life, in which the number and type of radioactive atoms at a definite reference time is known. It is used in performing calibrations.
Stochastic effects	The health effects that occur randomly and for which the probability of the effect occurring, rather than its severity, is assumed to be a linear function of dose without threshold. Hereditary effects and cancer incidence are examples of stochastic effects.

Subprograms	The nine programs that comprise the Radiation Safety Program in order to fulfill the purpose of the Radiation Safety Policy. They are: 1) Training, 2) Radiological Controls, 3) Quality Control Program, 4) Source Inventory and Control, 5) Instrumentation and Dosimetry Program, 6) Radioactive Waste Program, 7) Transportation of Radioactive Material/Waste Program, 8) Administrative Controls, 9) Emergency Plan
Survey	An evaluation of the radiological conditions and potential hazards incident to the use, transfer, release, disposal, or presence of radioactive material or other sources of radiation.
Transport Index (TI)	A dimensionless number placed on the label of a package to designate the degree of control to be exercised by the carrier during transportation. (Dose rate (in mR/hr) at one meter from the external surface of the package and rounded up to the first decimal place is the TI.)
Waste	An unwanted by-product of a process or product.
Whole Body	For the purposes of external exposure determinations, include the head, trunk, gonads, legs above the knees, and arms above the elbows.
X-Ray Hazard Area	A posting used on the entrances to areas with radiation producing machines to make individuals aware of potential radiation exposures.