NRC FORM 313 **U.S. NUCLEAR REGULATORY COMMISSION**
(09-11-2024)
10 CFR 30, 32, 33, 34, 35, 36, 37, 39, and 40

APPLICATION FOR MATERIALS LICENSE

APPROVED BY OMB: NO. 3150-0120 **EXPIRES: 07/31/2026**

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INSTRUCTIONS: SEE THE CURRENT VOLUMES OF THE NUREG-1556 TECHNICAL REPORT SERIES ("CONSOLIDATED GUIDANCE ABOUT MATERIALS LICENSES") FOR DETAILED INSTRUCTIONS FOR COMPLETING THIS FORM: http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1556/. SEND ONE COPY OF THE COMPLETED APPLICATION TO THE NRC OFFICE SPECIFIED BELOW.

APPLICATION FOR DISTRIBUTION OF EXEMPT PRODUCTS FILE APPLICATIONS WITH:

MATERIALS SAFETY AND TRIBAL LIAISON BRANCH
DIVISION OF MATERIALS SAFETY, SECURITY, STATE AND TRIBAL PROGRAMS
OFFICE OF NUCLEAR MATERIALS SAFETY AND SAFEGUARDS
U.S. NUCLEAR REGULATORY COMMISSION
WASHINGTON, DC 20555-0001

ALL OTHER PERSONS FILE APPLICATIONS AS FOLLOWS:

IF YOU ARE LOCATED IN:

ALABAMA, CONNECTICUT, DELAWARE, DISTRICT OF COLUMBIA, FLORIDA, GEORGIA, KENTUCKY, MAINE, MARYLAND, MASSACHUSETTS, NEW HAMPSHIRE, NEW JERSEY, NEW YORK, NORTH CAROLINA, PENNSYLVANIA, PUERTO RICO, RHODE ISLAND, SOUTH CAROLINA, TENNESSEE, VERMONT, VIRGINIA, VIRGIN ISLANDS, OR WEST VIRGINIA,

SEND APPLICATIONS TO:

LICENSING ASSISTANCE TEAM
DIVISION OF RADIOLOGICAL SAFETY AND SECURITY
U.S. NUCLEAR REGULATORY COMMISSION, REGION I
475 ALLENDALE ROAD, SUITE 102
KING OF PRUSSIA, PA 19406-1415
R1DRSSMail.Resource@nrc.gov
*Note: The preferred method to submit NRC Form 313 is email. Any other document (e.g., financial assurance documents) should be sent via mail.

IF YOU ARE LOCATED IN:

ILLINOIS, INDIANA, IOWA, MICHIGAN, MINNESOTA, MISSOURI, OHIO, OR WISCONSIN, SEND APPLICATIONS TO:

MATERIALS LICENSING BRANCH
DIVISION OF RADIOLOGICAL SAFETY AND SECURITY
U.S. NUCLEAR REGULATORY COMMISSION, REGION III
2056 WESTINGS AVENUE, SUITE 400
NAPERVILLE, IL 60563-2657
R3-DRSSMAIL.Resource@nrc.gov
*Note: The preferred method to submit NRC Form 313 is email. Any other document (e.g., financial assurance documents) should be sent via mail.

IF YOU ARE LOCATED IN:

ALASKA, ARIZONA, ARKANSAS, CALIFORNIA, COLORADO, HAWAII, IDAHO, KANSAS, LOUISIANA, MISSISSIPPI, MONTANA, NEBRASKA, NEVADA, NEW MEXICO, NORTH DAKOTA, OKLAHOMA, OREGON, PACIFIC TRUST TERRITORIES, SOUTH DAKOTA, TEXAS, UTAH, WASHINGTON, OR WYOMING,

SEND APPLICATIONS TO:

MATERIALS LICENSING BRANCH
DIVISION OF RADIOLOGICAL SAFETY AND SECURITY
U.S. NUCLEAR REGULATORY COMMISSION, REGION IV
1600 E. LAMAR BOULEVARD
ARLINGTON, TX 76011-4511
R4licensing@nrc.gov
*Note: The preferred method to submit NRC Form 313 is email. Any other document (e.g., financial assurance documents) should be sent via mail.

PERSONS LOCATED IN AGREEMENT STATES SEND APPLICATIONS TO THE U.S. NUCLEAR REGULATORY COMMISSION ONLY IF THEY WISH TO POSSESS AND USE LICENSED MATERIAL IN STATES SUBJECT TO U.S. NUCLEAR REGULATORY COMMISSION JURISDICTIONS.

1. THIS IS AN APPLICATION FOR *(Check appropriate item)*

- ☐ A. NEW LICENSE
- ☐ B. AMENDMENT TO LICENSE NUMBER
- ☑ C. RENEWAL OF LICENSE NUMBER 47-35235-01

2. NAME AND MAILING ADDRESS OF APPLICANT *(Include zip code)*

The Chemours Company
8480 DuPont Road
Washington, WV 26181

3. LIST ADDRESS AND/OR TEMPORARY JOB SITE (TJS) ADDRESS, WHERE LICENSED MATERIALS WILL BE USED OR POSSESSED

The Chemours Company
8480 DuPont Road
Washington, WV 26181

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

Beth A Burch

BUSINESS TELEPHONE NUMBER	BUSINESS CELLULAR TELEPHONE NUMBER
304-863-4258	N/A

BUSINESS E-MAIL ADDRESS
beth.a.burch@chemours.com

SUBMIT ITEMS 5 THROUGH 11 ON 8-1/2 X 11" PAPER. THE TYPE AND SCOPE OF INFORMATION TO BE PROVIDED IS DESCRIBED IN THE APPLICABLE LICENSING GUIDANCE.

5. RADIOACTIVE MATERIAL
   a. Element and mass number; b. chemical and/or physical form; and c. maximum amount which will be possessed at any one time.

6. PURPOSE(S) FOR WHICH LICENSED MATERIAL WILL BE USED.

7. INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING AND EXPERIENCE.

8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS.

9. FACILITIES AND EQUIPMENT.

10. RADIATION SAFETY PROGRAM.

11. WASTE MANAGEMENT.

12. LICENSE FEES (Fees required only for new applications, with few exceptions*)
(See 10 CFR 170 and Section 170.31)
***Amendments/Renewals that increase the scope of the existing license to a new or higher fee category will require a fee.**

FEE CATEGORY [ ] AMOUNT ENCLOSED $ [ ]

PER THE DEBT COLLECTION IMPROVEMENT ACT OF 1996 (PUBLIC LAW 104-134), YOU ARE REQUIRED TO PROVIDE YOUR TAXPAYER IDENTIFICATION NUMBER. PROVIDE THIS INFORMATION BY COMPLETING NRC FORM 531: https://www.nrc.gov/reading-rm/doc-collections/forms/nrc531info.html. FAX THE COMPLETED NRC FORM 531 TO (301) 415-6725.

13. CERTIFICATION. *(Must be completed by applicant) THE APPLICANT UNDERSTANDS THAT ALL STATEMENTS AND REPRESENTATIONS MADE IN THIS APPLICATION ARE BINDING UPON THE APPLICANT.*

THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATION ON BEHALF OF THE APPLICANT, NAMED IN ITEM 2, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PARTS 30, 32, 33, 34, 35, 36, 37, 39, AND 40, AND THAT ALL INFORMATION CONTAINED HEREIN IS TRUE AND CORRECT TO THE BEST OF THEIR KNOWLEDGE AND BELIEF.
WARNING: 18 U.S.C. SECTION 1001 ACT OF JUNE 25, 1948 62 STAT. 749 MAKES IT A CRIMINAL OFFENSE TO MAKE A WILLFULLY FALSE STATEMENT OR REPRESENTATION TO ANY DEPARTMENT OR AGENCY OF THE UNITED STATES AS TO ANY MATTER WITHIN ITS JURISDICTION.

CERTIFYING OFFICER -- TYPED/PRINTED NAME AND TITLE	SIGNATURE	DATE
James W. HOLLINGSWORTH	James W. Hollingsworth	5/16/2025

FOR NRC USE ONLY

TYPE OF FEE	FEE LOG	FEE CATEGORY	$ AMOUNT RECEIVED	CHECK NUMBER	COMMENTS
APPROVED BY				DATE	

NRC Form 313: 5-11

Section 5: Radioactive Material

a. Element	b. Physical form	c. Maximum amount	6. Authorized use
Nickel-63	Sealed Sources (Eckert & Ziegler Isotope Products Inc./Isotope Products Laboratories, Model NER-004R	15 millicuries per source and 150 millicuries total	For use in Particle Measuring Systems Ion Mobility Spectrometer (IMS) Cell for sample analysis in gas chromatography devices.
Nickel-63	Sealed Sources (Eckert & Ziegler Isotope Products, Model NER-004P; ZSA Global, Model NBCD	15 millicuries per source and 200 millicuries total	For use in Agilent Technologies, Inc. Model G2397A for sample analysis in gas chromatography devices.
Cobalt-60	Sealed Sources (LFE industrial Systems Corporation , Model R-31)	5 millicuries total	Possession and storage only
Celium-137	Sealed Sources (ICN Pharmaceutical, Inc., Model Type 375	200 millicuries total	Possession and storage only
Cesium-137	Sealed Sources (Kay-Ray/Sensall, Inc., Model 7700Y-Series	1.2 Curies Total	For use in Kay-Ray/Sensall, Inc. Models 7063 and 7063P fixed gauging devices to perform level or density measurements
Cesium 137	Sealed Sources (Kay-Ray/Sensall, Inc., Model 7700-Y Series)	1 Curie Total	For use in Kay-Ray/Sensall, Inc. Models 7064 fixed gauging devices to perform level or density measurements
Cesium-137	Sealed Sources (Ohmart, Model A-2100, A-2102 and A-2104)	400 millicuries total	For use in Ohmart Corporation, Model HM8 fixed gauging devices to perform

			level or density measurements.
Cesium-137	Sealed Sources (3M, model 4D6L, 4D6P, 4F6S, or 4F6ST; Gamma Industries, Model VDHP; Isotopes Laboratories, Model 225 or HEG-137; QSA Global, Model CDC. 700, CDC. 711M, CDC.800, CDC.93, CDC.PE2, CKC.P1or CEC.P4)	5 Curies total and no single source to exceed the maximum activity specified in the certificate of registration issued by the US NRC or Agreement State	For use in Ronan Engineering Company, Model SA-1, Fixed gauging devices to perform level or density measurements
Cesium-137	Sealed Sources (AEA Technologies, Model CDC 700; Isotope Product Laboratories, Model PHI series)	90 microcuries per source and 1 millicurie total	For use in Ronan Engineering Company, Model RLL-1 fixed gauging devices to perform level or density measurements.
Cesium-137	Sealed Sources (Thermo Fisher Scientific, Model 57157C)	400 millicuries Total	For use in Thermo Fisher Scientific Model 5034 fixed gauging devices to perform level or density measurements
Americium-241/Beryllium	Sealed Neutron Source (CPN International, Inc., Medel CPN-131)	50 millicuries per source and 100 millicuries total	For use in CPN International, Inc.
Krypton-85	Eckert and Ziegler (Isotope Products Lab) Model KAC.D3, Model 302	Maximum 3 Curies	® Beta Gas Source used to measure thickness and density measurements.

We received a device on 3/10/2025 that we have not installed. It will be in storage until the project is ready in a couple of years. We have added to our inventory and out of abundance of caution would like to add Krypton-85 to our license.

NRC Form 313 Section 6: is in the 4th column of the table above: Purpose for which licensed material will be use.

NRC Form 313 Section 7: is: Beth A. Burch, formally Beth A. Guinn, RSO, email: beth.a.burch@chemours.com; office phone number 304-863-4258 Chemours Company, 8480 Dupont Road, Washington, WV 26181

NRC Form 313 Section 8: Training Records for Beth A. Burch (Attached)

1)Training for Beth Burch-Certificate of Radiological Training

2) Training for Beth Burch -Portable Gauge Training

3) Current Training for DOT Subpart H-Beth Burch

4) Training for non- routine maintenance-Beth Burch

5) Per Letter dated July 28,2021from NRC confirming no ECD repair will be completed by licensee and no foil will be removed (Letter and response attached)

NRC Form 313 Section 9: We will ensure that the location of each fixed gauge meets the Criteria in the section 8.9 "Facilities and Equipment" in NUREG-1556, Vol 4. Revision 1 Consolidated Guidance About Material Licenses: Program specific guidance about gauge licenses.

NRC Form 313 Section 10: Radiation Safety Program: (attached P503) Washington Works EHS Manual Procedure 503 Ionizing, Non-ionizing and X-Ray procedure.

10.1 Radiation Safety Program Audit: To be performed by NRC – N/A

10.2 Radiation Safety Program Equipment: We will use instruments that meet the criteria in Section 8.10.2, "Radiation Monitoring Instruments," in NUREG-1556, Volume 4, Revision 1, "Consolidated Guidance About Materials Licenses: Program-Specific Guidance About Fixed Gauge Licenses" and each radiation survey meter will be calibrated by the manufacturer or other person authorized by the NRC or an Agreement State to perform radiation survey meter calibrations.

10.3 Radiation Safety Program Material Receipt and Accountability: Physical inventories will be conducted every 6 months to account for all sealed sources and devices received and possessed under the license.

10.4 Radiation Safety Program Occupational Dosimetry-We will provide and require the use of individual monitoring devices (dosimetry). All personnel dosimeters that require

processing to determine the radiation dose will be processed and evaluated by an NVLAP-approved processor.

10.5 Radiation Safety Program- Public Dose: N/A

10.6 Radiation Safety Program: Operating, Emergency and Security: Procedure 503 attached Section 9.6 & 9.13. Operating, emergency, and security procedures will be developed, implemented, maintained, and distributed and will meet the criteria in Section 8.10.6, "Operating, Emergency, and Security Procedures," in NUREG-1556, Volume 4, Revision 1.

10.7 Radiation Safety Program: Leak Tests: Leak tests will be performed at intervals of every 6 months. Leak tests will be performed by an organization licensed by the NRC or an Agreement State to provide leak testing services to other licensees; or using a leak test sample collection kit supplied by an organization licensed by the NRC or an Agreement State to provide leak test kits and/or sample analysis services to other licensees and according to the kit supplier's instructions. Records of leak test results will be maintained.

10.8 Radiation Safety Program Maintenance:

ROUTINE MAINTENANCE We will implement and maintain procedures for routine maintenance of our gauges according to each manufacturer or distributor's written recommendations and instructions.

NONROUTINE MAINTENANCE OPERATIONS The gauge manufacturer, distributor, or other person authorized by the NRC or an Agreement State will perform nonroutine operations such as installation, initial radiation survey, repair and maintenance of radiological safety components, relocation, replacement, alignment, removal from service, and disposal of sealed sources.

19.9 Radiation Safety Program-Transportation: N/A

10.10 Radiation Safety Program Fixed gauges at Temporary Job Sites: We will not use fixed gauges at temporary jobsites.

10.11 Radiation Safety Program-Security for Cat 1 and Cat 2 Material - NA

NRC Form 313 Section 11. Waste Management-Gauge Disposal and Transfer: Per Procedure 503 Section 9.10 Disposal: Disposal of radioactive material will be arranged by the RSO, Purchasing and Shipping.

Applied HEALTH PHYSICS, LLC

CERTIFICATE OF RADIOLOGICAL TRAINING

This is to certify that

Beth Guinn

has successfully completed

24 HOUR RADIATION SAFETY OFFICER TRAINING COURSE AND INSTRUCTION AS REQUIRED BY NUREG-1556 VOLUME 1 & VOLUME 4, APPENDIX G AND 49 CFR 172, SUBPART H

presented by Applied Health Physics, LLC
October 15th through October 17th, 2018

Todd Mobley

Todd Y. Mobley, President

October 17, 2018
Date

October 17, 2021
DOT Subpart H Expiration Date

Applied HEALTH PHYSICS, LLC

CERTIFICATE OF RADIOLOGICAL TRAINING

This is to certify that

Beth Burch

has successfully completed the following

8 HOUR RADIATION SAFETY OFFICER REFRESHER TRAINING AND INSTRUCTION AS DESCRIBED IN NUREG-1556 VOLUME 1 and 4, Rev 1 AND 49 CFR 172, SUBPART H

presented by Applied Health Physics, LLC
March 19th, 2024

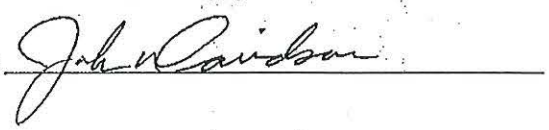
Anthony Hull

Anthony Hull - President
Training Materials Located at:
Applied Health Physics, LLC
2986 Industrial Blvd.
Bethel Park, PA 15102

Date: **March 19, 2024**

Expiration Date: **March 19, 2027**
DOT Subpart H

Beth Guinn Portable Gauge Training

Radiation Theory	What radiation is and how we detect it. Types of radiation. Sources of radiation.
Radiation Safety	How to minimize danger. Biological effects of radiation.
Regulatory requirements	Responsibility of portable gauge licensees. Transportation requirements from 49-CFR Leak Testing Record Keeping Storage Requirements (two locks) Disposal Requirements
Gauge Theory	How the moisture gauge detects and processes information.
Gauge Operation	What the buttons and readout really mean.
Practical Use	Some practical issues for operators, e.g. insulation testing.
Practical demonstration	How to maintain gauge mechanicals.
Review Operating Directions	Operating Manual MCM-2 Hydrotector
Field Use	Review of Chemours Safety Procedures for MCM-2 for field use.
Non-Routine Maintenance	Keeping your gauge in top working order. Monitoring the condition of gauges and return to the factory for Repair.
Calibration	Review calibration procedures
General Discussion	Review of NUREG 1556 vol 1 Using MCM-2 and related equipment.
Trainer	Signature 

The Chemours Company

8480 DuPont Road

Washington, WV 26181

USA

January 14, 2019

Subject: Non-routine Certification

To whom it may concern:,

This is to certify that Beth Guinn is authorized to perform Non-routine work and has met the training requirements of The Chemours Company, NRC license number 47-35235-01, items 11 and 17A.

Installation, Initial radiation surveys, relocation, or removal from service of devices contain sealed sources Item 17. A.	40 Hours hands on

If you have any questions, please contact me.

Sincerely,

Jason Canterbury, Radiation Safety Officer

The Chemours Company
8480 DuPont Road
Washington, WV 26181
(304) 863-4262

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
2100 RENAISSANCE BLVD.
KING OF PRUSSIA, PA 19406-2713

July 28, 2021

Nicole Newell, Plant Manager
The Chemours Company
8480 DuPont Road
Washington, WV 26181

SUBJECT: THE CHEMOURS COMPANY, REQUEST FOR ADDITIONAL INFORMATION, MAIL CONTROL NO. 627325

Dear Ms. Newell:

This is in reference to your letter dated June 2, 2021, requesting to amend NRC License No. 47-35235-01. In order to continue our review, we need the additional information requested below. Please be aware that guidance concerning programs utilizing electron capture detectors (ECD), such as those used in gas chromatographs or chemical agent detection or monitoring instruments, may be found in Appendix C of NUREG-1556, Volume 7, Revision 1, "Consolidated Guidance About Materials Licenses: Program-Specific Guidance About Academic, Research and Development, and Other Licenses of Limited Scope, Including Electron Capture Devices and X-Ray Fluorescence Analyzers". The document may be found at https://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1556/v7/index.html.

1. For awareness only, no response needed - Your license authorizes two models of gas chromatography devices; each model may be possessed under a general license. In accordance with the letters dated June 3, 2015, (ML15189A123) and June 22, 2015, (ML15203A061) your organization requested that these devices be specifically licensed. As such, they have been specifically licensed since the initial issuance of your license issued June 26, 2015 (ML15205A107).

2. As stated in NUREG-1556, Volume 7, Revision 1, if the applicant does not propose ECD repair or maintenance, then no specific training and experience in using and handling radioactive materials is necessary for individuals who will use the device(s) or supervise their use. No special training or experience is needed to perform leak tests using a leak test kit or to clean detector cells used in ECD devices, provided the source or foil is not removed from the detector cell.

   As such, please provide either of the following:

   a. Provide proof of training for the proposed RSO for ECD repair or maintenance and conduct of ECD leak tests; OR

   b. Confirm both of the following:
      i. No ECD repair or maintenance by the licensee is proposed or requested; AND
      ii. The source or foil is not removed from the detector cell, thus no special

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Friday, June 26, 2015 1:25:41 PM

SUNSI Review Complete: DLawyer

Non-Public Designation Category: MD 3.4 Non-Public A.3

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NAME	DLawyer							
DATE	6/26/2015							

OFFICIAL RECORD COPY

Chemours™

July 28, 2021

To: Jonathan B. Pfingsten

Division of Radiological Safety and Security

2100 Renaissance Boulevard, Suite 100

King of Prussia, PA 19406-2713

SUBJECT: Request for additional information regarding ECD devices and training requirements.

Dear Mr. Pfingsten,

This letter is to confirm that No ECD repair or maintenance by the licensee is proposed or requested and the source or foil is not removed from the detector cell.

Nicole Newell, Plant Manager III

The Chemours Company

8480 Dupont Road

Washington, WV 26181

NICOLE.T.NEWELL@CHEMOURS.COM

304-863-4305

Chemours™

Procedure 503
Ionizing, Non-Ionizing, and X-Ray

Table of Contents

1. Purpose

1.1. This procedure provides the rules and practices for radiation safety at Washington Works and includes requirements for:

1.1.1. Ionizing radiation (radioactive material sources)
1.1.2. X-Ray radiation
1.1.3. Non-ionizing radiation (lasers, microwaves, and ultraviolet)

1.2. The purpose of this procedure is to establish a program overseeing the licensing, purchasing, use, and disposal of radiation devices in compliance with government regulation and corporate standards. This procedure describes specific rules and requirements necessary to control all use of radiation sources at WW and ensure that:

1.2.1. Radiation devices are properly designed, always kept in safe operating condition, regularly inspected and tested.
1.2.2. Necessary records are kept.
1.2.3. Ionizing radiation exposures are kept ALARA "As Low as Reasonably Achievable".

1.3. These are minimum requirements for radiation safety. Additional measures may be implemented as necessary.

2. Policy

Radiation sources provide essential process and quality measurements. The applications are complex, and misuse can create personnel hazards and damage equipment or processes. Federal and State regulations and corporate standards set forth requirements which allow radiation to be used safely. It is Washington Works policy to always comply with those regulations and requirements.

3. Medical Rights

All records maintained by the Company concerning an employee's exposure are accessible to them if they request. The employee has the right to examine and copy these records.

4. Compliance

4.1. This procedure is part of the Washington Works Nuclear Regulatory Commission License 47-35235-011.

4.2. Washington Works reserves the right to modify this procedure without amending the NRC License, so long as the modifications comply fully with NRC regulation and do not compromise radiation safety or radioactive material control.

4.3. The policies and practices contained in this document are designed to comply with Nuclear Regulatory Commission regulations 10CFR Parts 2, 19, 20, 21, 30, 31, and 71; OSHA 29CFR 1910.96, DOT 49CFR Parts 100 - 177, West Virginia State Board of Health Chapter 5, Article 3, and Chemours Engineering Standards EP 15-2-4, EP 15-2-11.

5. Definitions

ALARA	An NRC term meaning "AS LOW AS REASONABLY ACHIEVABLE"
Licensee	Holder of the NRC License; in this case, the Washington Works Site
mR/hr	A unit of radiation intensity, milli-Roentgen per hour. This is the normal unit measured by the survey meters used at Washington Works. 1 Roentgen of radiation produces 1 electrostatic unit of charge in 1 cubic centimeter of air.
mrem	A unit of radiation exposure, millirem, which equates the biological effect of several different types of radiation. For gamma radiation, 1 millirem = 1 milliroentgen = 1 milliRad = 0.01 milliSieverts.
Non-ionizing Radiation	Radiation such as laser light or microwaves which does not produce ionized atoms but can damage living tissue.
Radiation Safety Program (RSP)	The rules and practices defined by this procedure allow radiation to be safely used at Washington Works in compliance with government regulation.
West Virginia Department of Health	Regulates the use of X-ray machines.

6. Roles and Responsibilities

6.1. Responsibilities for the Washington Works Radiation Safety Program (RSP) are delegated to the following individuals and groups:

6.1.1. Washington Works Management - Licensee
6.1.2. Radiation Sources Subcommittee
6.1.3. NRC Licensed Individuals
- "Radiation Safety Officer" RSO
- "Responsible Individuals" or Licensed Individuals

6.1.4. Radiation Monitors
6.1.5. LSO Laser Safety Officer

6.2. Washington Works Management

6.2.1. Radiation safety, security, and control of radioactive materials, and compliance with regulations
6.2.2. Completeness and accuracy of radiation safety records and all information provided to the NRC
6.2.3. Knowledge about the contents of the license and application.
6.2.4. Meticulous compliance with current NRC and DOT regulations and Washington Works operating and emergency procedures.
6.2.5. Commitment to provide adequate resources to the radiation protection program.
6.2.6. Selection and assignment of a qualified individual to serve as the Radiation Safety Officer.
6.2.7. Selection and assignment of a qualified individual to serve as the Laser Safety Officer.

6.3. Radiation Sources Sub-Committee (RSS)

6.3.1. The Central Safety, Health, and Environmental Committee established the Radiation Sources Subcommittee (RSS) to assist the plant in the safe handling of all radioactive sources and lasers and implement the Washington Works management responsibilities.

6.4. RSO

6.4.1. Stop unsafe licensed activities
6.4.2. Proper use and routine maintenance
6.4.3. Security and investigation
6.4.4. Material disposal
6.4.5. Interaction with NRC, and other authorities
6.4.6. Records Maintenance
6.4.7. Annual program audit and timely corrective action
6.4.8. Fixed gauge lock - out procedures
6.4.9. Ensure that individuals using licensed material are properly trained
6.4.10. Maintain up-to-date emergency procedures and monitor emergency events

6.5. Licensed Individuals/Authorized Users

6.5.1. Individuals qualified by training and experience who are listed on the NRC license and who are responsible for the RSP. The Radiation Safety Officer (RSO) is the primary contact with the NRC. In Washington Works procedures, the NRC Responsible Individuals are called Licensed Individuals.

6.5.2. The Licensed Individual is an alternate to the RSO and has the same responsibilities. RSO/Licensed Individuals are the only site personnel authorized to supervise the handling or moving of radiation sources.

6.5.2.1. Beth Burch– x4258 Radiation Safety Officer/Authorized user

6.5.2.2. Curt Knowlton – x4068 Licensed Individual X-Ray/Radiography
6.5.2.3. John Davidson – x4675- Site Radiation resource

6.6. Radiation Monitor

6.6.1. The Area Radiation Monitor training shall meet NRC requirements for information to workers receiving occupational doses.
6.6.1.1. Areas which have lockable sources must have a trained monitors on each shift. The training is valid for 3 years.
6.6.1.2. Training will be conducted/documented by the Plant electronic training system Vector and/or a Licensed Individual.
6.6.1.3. The Area Radiation Monitor training shall meet NRC requirements for information to workers receiving occupational doses. Areas which have lockable sources must have a trained monitor on each shift. The training is valid for 3 years. Training will be conducted/documented by the Plant electronic training system and/or a Licensed Individual. A list of trained and qualified Monitors is maintained by the Radiation Safety Officer.
6.6.2. Know how to operate a survey meter.
6.6.3. Perform the area lockout of radiation sources per this procedure and WW S&OH Procedure 508. Only Radiation Monitors or Licensed Individuals are permitted to perform the area lockout of radiation sources.
6.6.4. Establish and check limited access barricades, radiography barricades, and emergency barricades.
6.6.5. Prevent unauthorized or unqualified personnel from entering radiation barricades.

7. Nuclear Radiation Sources

This section contains the RSP requirements for radioactive material sources.

7.1. Information to Employees

NRC Form 3 and any other notification required by the NRC shall be posted at each pedestrian entrance to the Plant. A copy of 42USC 5846 Sec. 206 will be posted with each Form 3.

7.2. Permit

A permit (Radiation Safety Permit-S-191) must be completed by the area where work will be performed and approved by RSO, X-Ray Licensee and the Radiation Resource, before any person (plant, vendor, or Eng. Dept.) brings a source on plant, whatever the use. See Attachment #1 and Radiography, page 25.

7.3. Procurements

7.3.1. Before placing any order, apply to the Radiation Sources Subcommittee concerning all applications/uses/alterations. This includes contracts with vendors, lab use, or any tests on plant.

7.3.2. Any new use of existing or portable Nuclear, X-Ray, & laser sources must be reviewed/approved by the Radiation Sources Sub-Committee.

7.3.3. All Purchase Requisitions must be approved by the RSO and shall specify that upon delivery stores receiving must notify the RSO or Licensed Individual. Do not specify an area delivery point on the Requisition.

7.4. Receiving

7.4.1. Stores Receiving must hold unopened package(s) on loading dock & immediately notify the RSO or a Licensed Individual listed on previous page.
7.4.2. Licensed individual must check security seal as directed in Procedure 517.
7.4.3. Licensed Individual will "survey" the package(s) & determine how it can be safely handled within established radiation limits.
7.4.4. Upon Licensed Individual's clearance, Stores Receiving will proceed with normal functions of receiving the materials.
7.4.5. Licensed Individual will give instructions for delivery/location.

7.5. Shipping Radioactive Material

Radioactive material may be shipped from the plant in a routine manner only after RSO has completed all the following:

7.5.1. Initiated Purchase Requisition for disposal/transfer to another location, or Vendor for disposal
7.5.2. Checked packing for physical integrity and required leak testing
7.5.3. Put on proper NRC/DOT/IATA labels for material type & radiation level
7.5.4. Changed plant radiation records to show the transfer

7.6. Responsibilities of Radioactive Material Source Users

Radioactive material source users will:

7.6.1. Provide safety rules. They must be submitted to the Sub-Committee for approval before ordering radioactive material or putting facilities in service.
7.6.2. Provide such safety equipment/shielding/protection as may be prescribed by the Sub-Committee.
7.6.3. Assign film badges to personnel as required by the RSO.

7.6.4. Notify RSO or other Licensed Individual immediately of any unusual incidents/accidents/fires/spills/etc., where radioactive materials may be involved. Rope off area of incident until necessary survey is completed and area cleared by RSO.

7.6.5. RSO or Licensed Individual must attend all Pre-Startup Safety Reviews involving radiation sources.

8. Radiation Exposure Film Badge Procedures

Washington Works will use film badges to establish that no employee can receive a radiation dose greater than 100 mR/year, which is the NRC public dose limit. Considering past film badge reports it is not realistically possible for any employee to receive a dose more than ten percent of NRC limits (500 mR/year would require monitoring). Therefore, yearly dose reports on NRC form 4 or 5 will not be used.

8.1. Film Badge Procurement

8.1.1. The Radiation Safety Officer will subscribe to a National Voluntary Laboratory Accreditation Program (NVLAP) approved film badge service.

8.1.2. Badges will be obtained to record radiation exposure in all cases recommended by the Radiation Sources Sub-Committee or the RSO.

8.2. Distribution

8.2.1. The Radiation Safety Officer or designate will distribute film badges quarterly.

8.2.2. Film Badges will be used by all persons who will work near radiation sources where film badges have been recommended by the Radiation Sources Sub-Committee or RSO.

8.2.3. Badges should be returned as soon as replacement badges have been issued or as soon as possible before the end of each quarter.

8.3. Film Badge Processing

Film badges must be returned by the end of each quarter to the supplier.

8.4. Film Badge Exposure Record

8.4.1. The RSO will receive the film badge exposure report from the supplier and scan it for any unusual exposure. Those showing more than 150 mR for the quarter will be investigated. NRC occupational dose limits are 5 Rem per year.

8.4.2. All employees issued a badge can request their results at any time. Person(s) will be notified immediately if a report comes back unusual.

9. Handling of Nuclear Radiation Sources

This section describes standards and requirements for permanently installed sources at Washington Works

9.1. Isotopes and Sealed Sources

All sources shall be non-dusting and both chemically and biologically inert. They shall be welded into a capsule designed to withstand fire. Source holders shall be also constructed to withstand fire. With the source holder in the closed condition, shielding shall be such that radiation levels 12" - (30 cm) from the source holder shall not exceed 2 mR/hr. The source holder shall be provided with means for locking it in the closed position or an additional housing shall be provided for locking the source in the closed position. Contact the plant RSO or Radiation Sources Sub-Committee chairman for additional requirements.

9.2. Licensing

The RSO and Licensed Individuals are responsible for ensuring that no radiation sources are received on the plant without proper licensing.

9.3. Marking and Identification

9.3.1. Each source will be identified by a permanent label securely fastened and showing the following: Chemical symbol of radioisotope source, millicurie strength of the source, date of strength measurement or date of purchase, and serial number of the source. It may be fastened directly to the source holder where practical or to a flange or other closure which supports or permits access to the source holder.

9.3.2. Each source installation shall be further identified by posted NRC approved signs 7" X 10" or larger and bearing the radiation symbol and the words "Caution - Radioactive Material." The symbol and wording shall be purple on a yellow background or black on yellow background. Sufficient signs are to be posted so they can be seen by anyone approaching the installation.

9.3.3. Each BTO shall maintain an up-to-date inventory list of its nuclear devices. This list should include the location and plant "J-number for each source. RSO must have an updated list of all Sources with J-number and location of sources in the BTO or storage.

9.4. FPS Area – Washington Works Only

9.4.1. Installation of a radiation source in the FPS area must first be approved by the TFE committee and secondly by the Radiation Sources Sub-Committee.

9.4.2. Permanently installed FPS area radiation sources must be installed so that no TFE or TFE/HCL azeotrope (distillate) process material will be exposed to greater than 10.0

mR/hr. Signs must be posted near lockable source stating: "CAUTION; RADIATION INITIATED TFE POLYMERIZATION HAZARD, NO TFE OR TFE DISTILLATE LINES OR CONTAINERS ARE PERMITTED WITHIN XXX FT OF RADIATION SOURCE XXX" The XXX information will have to be determined for each source, since the distance will vary depending on the source strength.

9.5. Permissible Radiation Intensity Levels

9.5.1. Where practical each installation shall be designed by location and/or shielding such that radiation intensity 12" (30cm) from the outside of the equipment or source location will be 2 mR/hr or less and with an occupancy factor designed to be ALARA. In emergency or in cases where this is not practical, the following must be met:

9.5.1.1. The area will be surveyed by an NRC Licensed Individual to determine the extent and intensity of radiation. Suitable meters shall be maintained by the area for this purpose.

9.5.1.2. The results of this survey will be reviewed with the Radiation Sources Sub-Committee which will decide upon a safe procedure to be followed. Normally this will include one of the following:

9.5.1.3. If the work to be done is of short duration, the area shall be surveyed and those working in the area will be permitted to remain such time that their exposure will not exceed 50 mR. Constant supervision will be provided.

9.5.1.4. If the work to be done is of long duration, and constant supervision is not practical, the area where intensity is 2 mR/hr or more will be clearly marked, will have rules posted regarding occupancy of the area, will be designated a restricted area, and access will be limited.

9.6. Inventory and Security

The RSO will maintain an accurate inventory of all ionizing radiation sources on the W.W. site listing the size, type, manufacturer, material, date of purchase, use, location, and leak test reference. A series of locks having duplicated keys but without a master key will be used to secure radiation sources against unauthorized removal. A key file and record will be maintained by the RSO. The RSO may authorize area personnel to keep one of the keys.

9.7. Leak Testing and Inspection

The RSO will subscribe to an approved leak test service. Area Responsible Individuals/designated individuals will perform the necessary leak testing. "Standard" source holders (i.e., Ohmart SH-FI, SHRH, SHRM, HM8; Kay-Ray 7061, 7063, 7064, 7067, Ronan SA-1 and equivalent) are to be leak tested every three years. Other source holders, in analyzers, gauges, etc., are to be leak tested every six months. Radiation source found to be leaking will be returned to the manufacturer for repair. All source holders, signs, boxes, locks, etc., must be visually inspected at six-month intervals.

9.8. Non-Routine Maintenance

Installation and moving of sources will be done under the direct supervision of an NRC Licensed Individual (see section 6.4). All requirements under Permissible Radiation Intensity Levels - section will apply while sources are being handled. Sources may not be relocated to other units or buildings without approval from the Radiation Sources Sub-Committee.

9.8.1. Barricade the area to a safe distance with the perimeter to be always below 2 mR/hr.
9.8.2. Doses to personnel must remain within regulatory limits and ALARA (e.g., use of shielded containers or shielding).
9.8.3. The source is secured against unauthorized removal or access or under constant surveillance.
9.8.4. Manufacturers or distributor*s instructions and recommendations will be followed.
- Non-manufacturer/non-distributor supplied replacement components or parts, or the use of materials (e.g., lubricants) other than those specified or recommended by the manufacturer will not be used. Any cleaning, maintenance, or repair of the gauges that requires detaching the source or source rod from the gauge, or any internal gauge repair will be performed only by the manufacturer or by other persons specifically licensed by the U.S. Nuclear Regulatory Commission or an Agreement State to perform such services.

9.8.5. Individuals performing non-routine operations on gauges shall wear a film badge.
9.8.6. Obtain a survey instrument that meets the criteria in the section entitled "Radiation Safety Program - Instruments in NUREG-1556, Vol. 4, 'Consolidated Guidance about Materials Licenses: Program-Specific Guidance about Fixed Gauges Licenses, dated October 1998." Each survey meter will be calibrated by a person authorized by the NRC or an Agreement State to perform survey meter calibrations.
9.8.7. Surveys will be conducted during non-routine operations; and will be maintained, for 3 years from the date of the survey, records of the survey (e.g., who performed the survey, date of the survey, instrument used, measured radiation levels correlated to location of those measurements), as required by 10 CFR 20.2103.
9.8.8. Before being returned to routine use, the gauge is tested to verify that it functions as designed and source integrity is not compromised.
9.8.9. All radiation sources, not in use will be locked in the radiation source storage building #349, located north of the Bio Pond. Keys are kept by plant security force and the RSO. During storage, installation, or moving; source shutters will be secured in the shielded position with a padlock, nylon strap, bolt and nut, or other substantial means.

9.9. Alterations

No source capsule or source holder shall be altered by cutting, filing, or changing size or shape by any method. If alterations are required, the source will be returned to the supplier.

9.10. Disposal

Disposal of radioactive material will be arranged by the RSO, Purchasing and plant Shipping.

9.11. Radiation Device Calibration and Checkout

Specific area procedures must be written to cover circumstances where the radiation source must be opened for calibration or check-out.

9.12. Unsealed Isotopes and Source Materials

Currently, there are no plans to use any radiation source in this category and none are anticipated. A suitable procedure will be developed as the need arises.

9.13. Emergencies

Hazards are personnel exposure and/or contamination. Sealed sources are unlikely to release radioactive material unless subjected to extreme fire or explosion. In case of fire, lead shielding could melt out of a source holder thus reducing its shielding ability. In a case of mechanical damage, a source could get shifted so that the radiation beam is no longer shielded by the vessel or equipment. The strategy for dealing with an emergency would be:

9.13.1. Evacuate the immediate area.
9.13.2. Identify and isolate all persons who may have received exposure to radiation and contact medical personnel.
9.13.3. Barricade the area to a safe distance.
9.13.4. Contact the RSO or Licensed Individual.

10. Nuclear Radiation Source Lockout

10.1. The radiation source must be locked out for any work which might expose an individual to the direct radiation beam.

10.2. A dedicated radiation lock must be used. These are locks having no more than 2 keys, and the keys must be under the control of supervision so that access is limited to area Radiation Monitors. These locks are in addition to WW S&OH Procedure 508.

10.3. Radiation locks must be used only by a licensed individual or a trained and qualified Radiation Monitor.

10.4. Radiation Monitor training is valid for three years. A current list is maintained by the plant R.S.O.as indicated on page 6.

10.5. A film badge is not required to lock a source.

10.6. The lockout must be tested with a radiation survey meter to satisfy the try step.

10.7. Specific Steps to Lockout a Source

The following steps are listed for reference and as a basis for writing specific area lockout procedures. Only Licensed Individuals or trained and qualified Radiation Monitors can perform a radiation source lockout.

10.8. Obtain a radiation survey meter and check the calibration sticker on its side to ensure that the meter has been calibrated within the last 12 months. Switch the meter to the battery check position to verify that the batteries are good. Obtain a radiation source lock.

10.9. Visually inspect the source for any damage, or loose mountings, and that the shutter mechanism is operable. If damage or malfunction is noted, rope off the area and contact the RSO.

10.10. Verify that the meter is responding: Set the meter to the most sensitive range (X0.1) and with the source open, check the radiation level in front of the DETECTORS, be very mindful to keep all extremities away from the beam of the source. To verify shutter operation, check the radiation level when the shutter is open, then close the shutter and verify that the level that you were reading drops. Please note that there will always be some level of radiation around the source. The survey meter should detect some level of radiation. If the meter does not respond, contact the plant RSO (WW Ext 304-863-4258) to determine if the meter is malfunctioning.

10.11. Lock and tag the source: Close shutter on source and lock securely with the radiation lock (Radiation Monitor Only). Place an operator danger tag on the lock - signed and dated.

10.12. Try the source lockout: The actual radiation beam is typically very narrow at the front of the source, and with the shutter open is very intense. Do not attempt to measure the radiation level in front of the source. Verify that no radiation is present in front of the DETECTORS with the survey meter set at the most sensitive range, again, keep extremities away from the beam. .

10.13. Complete the lock-out: The source may now be locked with an area lock or system lock. Each person working on systems requiring radiation source lockout will place their personal lock and properly filled out danger tag on the source or lock box.

10.14. Specific area procedures must be written to cover circumstances where the radiation source must be opened for calibration or check-out before the vessel or equipment is completely reassembled.

10.15. Before signing a vessel entry permit: Radiation Monitor must perform the same checks as outlined above and check the radiation level inside the vessel.

10.16. Return the radiation source to service: At the completion of work, any personal locks should be removed then the area Radiation Monitor will remove the radiation lock and open the shutter.

11. X-Ray Machines

11.1. Requirements

11.1.1. Refer to Chemours Engineering Standards EP 15-2-4, EP 15-2-11 and plant RSO for X-Ray equipment requirements.
11.1.2. Each area using X-Ray producing equipment must ensure surveys are performed bi-annually by a radiation monitor.
11.1.3. Any new use/relocation, of existing or portable X-Ray must be reviewed and approved by the Radiation Sources Sub-Committee.
11.1.4. Normal operating procedures shall be written and available to all X-ray equipment workers.
11.1.5. RSO or his delegate must attend all Pre-Startup Safety Reviews.
11.1.6. Yellow signs or labels with the radiation symbol shall be placed on or near X-Ray machines as follows:

11.1.6.1. X-Ray source housing shall be labeled "Caution - High intensity X-Ray Beam".
11.1.6.2. X-Ray rooms or locations shall have a sign stating, "Caution X-Ray equipment".
11.1.6.3. Install a sign inside each X-Ray machine 4" X 8" >> "BYPASS PERMIT REQUIRED TO BYPASS SAFETY SWITCHES - Permit must be signed by the Radiation Safety Officer or NRC Licensed Individual - Refer to S&OH P-503"

11.2. Warning and Safety Devices

The X-Ray machine shall have an easily visible warning light labeled "X-Ray On" near any switch which energizes the X-Ray tube.

11.3. Maintenance and Adjustment

Personnel who service X-Ray machines must be a trained Radiation Monitor (training within past 3 years) and have factory training and/or plant experience servicing X-Ray equipment.

12. Static Eliminators

All applications using radioactive material must be approved by the Radiation Sources Sub-Committee.

13. Laser Radiation

13.1. Permit for Temporary Use

A permit (Laser Safety Permit) - (S-189) must be completed/approved before any person (plant, vendor, or Eng. Dept.) brings a source on plant, whatever the use.

13.2. Approval

Each use, modification, or installation of Laser equipment must be approved by the LSO before it can be ordered, modified, or brought on plant.

13.3. Purchase Requisition

The purchase requisition for any laser equipment must be approved by the Laser Safety Officer or the Committee Chairman before the laser can be ordered.

13.4. Shipping

Lasers can be shipped as standard pieces of equipment. The one exception is if the laser equipment was "manufactured" on this site, then the proper forms must be filed with the Department of Health, Education, and Welfare of the United States before it can be shipped.

13.5. Installation

The Laser Safety Officer or designate must be present for the Pre-Startup Safety Review, Safety & Health procedure 511, and when the equipment is initially energized.

13.6. Training

13.6.1. All personnel qualified to operate or maintain a laser where the exposure level is more than **CLASS II** must have participated in a training program. Contact the Laser Safety Officer to arrange for training. The BTO shall maintain a current list of trained operators and service personnel.

13.6.2. Training on the use of laser pointers and bar code scanners will be done site wide by use of the TLM program and will be documented electronically by each BTO.

13.7. Inventory

Each BTO shall maintain an up-to-date inventory list of its LASERS of class 2 and higher. Information in the list shall include serial number, LASER location, Type, Power, Manufacturer's Name, Class-operating, Class-maintenance, and comments.

13.8. Summary of Laser Requirements and Advisory Guidelines

	Class 1 and 1M	Class 2 and 2M	Class 3 R	Class 3B	Class 4
Training	No	Recommended	Required	Required	Required
Warning label on laser	No	Required	Required	Required	Required
Area posting	No	Recommended	Required	Required	Required
Words on sign/label	NA	Caution	Danger	Danger	Danger
Medical surveillance	No	No	No	Required	Required
Inventory	No	Required	Required	Required	Required
Written SOPs	No	No	Required	Required	Required

13.9. Laser Pointers

Laser Pointers typically contain a Class 2 laser and have the potential to cause damage if the beam is directed into a person's eye. Laser pointers may be exempted from these requirements provided the following are met:

13.9.1. Laser pointers used on site must be Class 2.
13.9.2. Training on the safe use of laser pointers is required.
13.9.3. Laser pointers must be labeled with appropriate yellow Caution warning labels.
13.9.4. Dual function writing and laser pointer pens are not permitted, due to the potential to accidentally activate the laser beam when writing.

13.10. Bar Code Scanners

Bar Code Scanners are increasingly used on site, primarily for inventory tracking. Bar code scanners may be exempted from these requirements provided the following are met:

13.10.1. Bar code scanners used on site must be Class 2.
13.10.2. Training on the safe use of bar code scanners is required.
13.10.3. Bar code scanners must be labeled with appropriate yellow Caution warning labels and the manufacturers' Class 2 label.

13.11. Safety Rules

Laser source users will provide Safety Rules. The Safety Rules must be approved by the Radiation Sub-Committee. The Subcommittee must review any subsequent changes to the safety rules.

13.12. Records

Source users must maintain a record of any personnel exposed to Class IIIB or IV laser equipment and schedule required checkups with Medical for surveillance. All personnel operating Class IIIB or IV laser equipment and those working around these lasers must have an eye exam prior to their initial assignment. An eye exam is required upon any termination of any Class IIIB or IV laser exposure assignment. It is the user's responsibility to:

13.12.1. Arrange required appointments with Medical.
13.12.2. Inform Laser Safety Officer of those qualified to work with Class IIIB or IV lasers and that they have had the required exams.

13.13. Laser Personnel

- Laser Safety Officer –Class 3 R or higher must require Laser Safety Officer, current inventory at Chemours is less than this classification

14. Non-Ionizing Radiation

This section on non-ionizing radiation contains general guidance and minimum program requirements. For further assistance or questions contact the Radiation Sources Sub-Committee.

14.1. Ultraviolet Radiation (UV)

(.100 - .400 MICROMETERS: 3.0 x 1015 - 7.5 X 1014 CYCLES PER SECOND)

14.1.1. UV radiation is an invisible energy produced naturally by the sun and artificially by electrical arcs operating at high temperatures. Artificial sources include germicidal and black light lamps, welding arcs, and some laboratory equipment. Since the eyes and the skin readily absorb UV radiation, there is a potential for injury. The severity depends upon the length of exposure, the intensity, distance, wavelength of the sources and the sensitivity of the individual.

14.1.2. The adverse effects that can occur are "sunburn", corneal lesions, and cataracts. Personal protective measures are important and include wearing special UV goggles or face shield to protect the eyes and face and gloves and long sleeves to cover the hands and arms. Shiny surfaces in the work area will reflect UV radiation so they should be covered or removed. Care should also be taken to shield operations, with potential for exposing nearby employees, with UV impenetrable material, such as black cloth.

14.1.3. Since the Threshold Limit Value (TLV) for occupational exposure to UV radiation is dependent upon the wavelength and the total irradiance, please contact the Radiation Sources Sub Committee for guidance.

14.1.4. Minimum Source Management Requirements

14.1.4.1. Area must maintain a list of UV sources
14.1.4.2. Updated safety rules and operating directions
14.1.4.3. Use adequate eye protection
14.1.4.4. Attach labels and warning signs

14.2. Visible Radiation (VR)

(.40 -.750 MICROMETERS: 3.0 X 1015 - 2.75 X 1014 CYCLES PER SECOND)

14.2.1. Visible radiation, or light, from the sun or artificial sources plays a major role in our daily life. Because few direct effects of light have been documented, it is not considered a major health hazard if the intensity of the light source is "comfortable". However, one of the areas associated with visible radiation is the effect of illumination on job performance. It has been suggested that poor lighting can cause eye strain but does not lead to permanent damage. The consensus on illumination is that, if there is enough light to perform your work reasonably well, there is no reason to believe that there is any hazard to your eyes. If high intensity lighting is to be used, it should be evaluated for retinal effects.

14.3. Infrared Radiation (IR)

(.75 - 1000 MICROMETERS: 2.75 X 1014 - 3 X 1011 CYCLES PER SECOND)

14.3.1. The infrared region extends from the visible red-light region to the microwave region. Exposures to IR radiation can occur from any surface which is at a higher temperature than the receiver. Infrared radiation may be used for any heating application where product surfaces can be arranged for exposure to the heat sources. Typical industrial applications for IR radiation include drying and baking of paints and other protective coatings, dehydration, surface conditioning and heating, and spot heating for any object.

14.3.2. IR is felt as a sensation of warmth on the skin and provides its own warning. The increase in tissue temperature is dependent upon wavelength, length of exposure and total energy delivered to the tissue.

14.3.3. IR radiation in the far wavelength region, 5 to 3000 micrometers, is completely absorbed in the surface layers of the skin. In the near region, .75 to 1.5 micrometers, exposure can cause acute skin burns. This short wavelength region can also cause injuries to the cornea, retina, and lens of the eye. Long term exposure of the eyes to IR radiation from furnaces and other hot bodies has been observed to produce "glassblower's cataract", opacity of the rear surface of the lens of the eye.

14.3.4. Protection for the eyes through special eye wear or face shields is recommended if this exposure is possible.

14.4. Microwave and Radio Frequency Radiation

(3000 MICROMETERS AND LONGER, 3 X 1011, AND LOWER CYCLES PER SECONDS)

14.4.1. The hazards associated with microwave and radio frequency are controversial, and studies continue both in the US and abroad. OSHA and ACGIH recognize only a thermal effect of microwaves and have set standards accordingly. NIOSH and ANSI have proposed intermediate exposure limits for non-thermal effects. DuPont's Acceptable Exposure Limit is frequency dependent and follows closely the NIOSH recommendations. These limits and other precautions are found in DuPont Engineering Standard S-27-T.

14.4.2. Minimum Source Management Requirements

14.4.2.1. For microwave sources, complete requirements in policy 20 and procedure 558.

14.4.2.2. Maintain separate inventory list of food microwave ovens, process microwave sources, and RF sources between 0.03 and 300 MHZ of which are > 1000 watts.

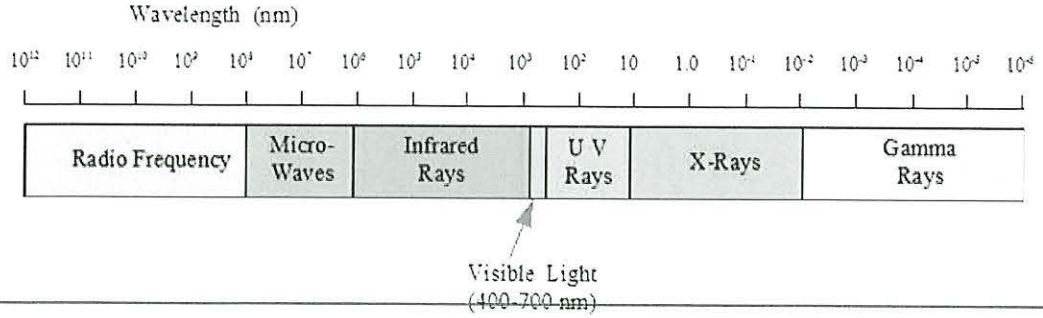
14.4.2.3. Provide adequate safety rules and operating directions for process microwave and process RF sources.

14.4.2.4. Train operators on the use of Process sources.

14.5. Electromagnetic Radiation (ELF & VLF)

(30-300K HERTZ)

14.5.1. Extremely low frequency (ELF) and very low frequency (VLF) electromagnetic radiation from the distribution, transmission, and use of electrical power has been the source of controversy over the past few years. As of now, there are no studies which show a correlation between ELF or VLF and any health problems. However, if questions arise, consult the Radiation Sub Committee, as it has meters to measure ELF and VLF.



15. Radiography

This procedure covers the use of ionizing radiation for weld, pipe, and vessel inspection, or other temporary uses (e.g., distillation column scans or soil compaction). Radiography sources typically emit intense, penetrating radiation, and proper control of these sources is an essential part of the (RSP) radiation safety program. Misuse can result in very high radiation exposures and serious health effects. WW are required by the Nuclear Regulatory Commission (NRC) to keep radiation exposures "As low as Reasonably Achievable" (ALARA).

15.1. Radiation Safety Permits

15.1.1. A Radiation Safety Permit (S-191) must be approved for each job before a Radiation Source is brought on site.

15.1.2. Radiation Work permits can only be approved individuals listed on Page 6.

15.1.3. Curt Knowlton, listed on Page 6 as X-Ray/Radiographer Licensed Individual, must keep his Radiographer training current and is responsible for all safety aspects of Building 123, including signage, warning lighting functions and security of perimeter of building, can perform standard work in said building with entering a work permit into the one note system with his signature as approver in delegate of the RSO. All permits must be uploaded into one note for record keeping.

15.1.4. In the event the RSO is not available any of the Individuals on Page 6 can sign Radiation Permits for work performed at the Quansa Hut, which is an off-site facility with a hard barricade fencing perimeter. All permits must be uploaded into one note for record keeping.

15.2. Vendor Requirements

15.2.1. Any radiography vendor must be licensed by the Nuclear Regulatory Commission. The license must cover the source type, size, and proposed use.

15.2.2. The WW Radiation Safety Officer must have a copy of the vendor's NRC License, and the name and phone number of the vendor's Radiation Safety Officer.

15.2.3. The radiography vendor is responsible to barricade and conduct the radiography in compliance with the NRC regulations.

15.2.4. Radiography source temporary storage shall be the radiographer's vehicle. This vehicle shall be placarded with a standard DOT radiation placard on 3 sides of the vehicle. The placard is for WW emergency response/safety purposes and is required

while on the WW site regardless of DOT regulation. Radiography sources shall be under the direct surveillance of the radiographer at all times or locked in the radiographer's vehicle.

15.3. Radiation Monitors

15.3.1. A Trained and Qualified WW Radiation Monitor must be always present during any radiography conducted in process units.

15.3.2. WW Radiation Monitors are qualified and trained according to P-503. A list of Radiation Monitors is kept by the WW Radiation Safety Officer, Bldg. 168.

15.3.3.

15.3.4. Radiation Monitor responsibilities:

15.3.4.1. Ensure that the radiography operation complies with WW procedures.
15.3.4.2. Verify that the radiography area is properly barricaded.
15.3.4.3. Check that the Radiation Work Permit is properly filled out.
15.3.4.4. Obtain BTO or area management approval for radiography in process units.
15.3.4.5. Ensure that area personnel and radiation sensitive devices are protected.
15.3.4.6. Conduct a safety check for radiography operations (X-Ray yard or process unit).
15.3.4.7. Check that emergency barricades can be readily put in place.

15.3.5. The Radiation Monitor has the authority and responsibility to restrict entry to a radiation barricade.

15.4. Radiography Barricades and Access

Radiation exposure limits are listed in section 9.1.

15.4.1. Restricted Access Barricade

The radiographer vendor is responsible to define and set up a restricted access barricade surrounding the radiography area such that radiation exposure at the perimeter will be less than 2.0 mR in any one hour. Only essential personnel are allowed in the barricaded area. Anyone entering the barricaded area must have permission from the Radiographer and the Radiation Monitor, and they must wear a radiation dosimeter device (film badge).

15.4.2. Emergency Barricade

An emergency barricade must be erected if the radiography equipment malfunctions. The barricade must be set at a distance limiting the radiation intensity to 2.0 mR/hr or less. The barricade position must be determined and barricade rope and signs available before starting the radiography operation.

Iridium 192 source	Emergency Barricade Distance in	Distance to TFE or Distillate in

In Curies	Feet for 2.0 mR/hr	Feet for 10.0 mR/hr
1.0	51	23
2.0	73	33
3.5	96	43
5.0	114	51
7.0	135	61
10.0	162	73
15.0	198	89
30.0	280	125
60.0	395	176
70.0	427	191
80.0	456	204

15.5. Source Restrictions

15.5.1. X-Ray Yard

A radiography testing area has been set aside north of the Bio-waste Treatment Facility at Washington Works and is permanently barricaded at 110 feet radius from the shelter. Ir 192 sources up to 80 Curie may be used in the yard. Sources larger than 60 Ci may require additional precautions.

15.5.2. FPS Area – Washington Works Only

15.5.2.1. The maximum strength of a radiography source used in the Teflon® area is 10 Curie. Larger sources must be approved by the TFE Safety Committee.

15.5.2.2. All TFE or TFE/HCL azeotrope (distillate) must be cleared from lines and vessels within a 10 mR/hr intensity boundary, or the work must be shielded such that TFE/distillate is not exposed to greater than 10.0 mR/hr for any amount of time.

15.5.2.3. Radiography is not allowed on any lines or vessels containing TFE, regardless of diluent or inhibitor.

15.5.2.4. A leak check for TFE is required before radiographing.

15.5.2.5. The use of any sources other than Ir-192 requires Radiation Sources Sub-Committee review.