

DuPont Polymer Products USA, LLC
Washington Works
P.O. Box 2600
Washington, WV 26181-2600

November 18, 2022

SUBMITTED BY EMAIL

Betsy Ullrich
Mail Control No. 633416
USNRC, Region I
Division of Radiological Safety and Security
475 Allendale Road – Suite 102
King of Prussia, PA 19406

Subject: DUPONT POLYMER PRODUCTS, LLC, REQUEST FOR ADDITIONAL INFORMATION FOR NEW LICENSE APPLICATION, LICENSE NO. 47-01876-02, MAIL CONTROL 633416

Dear Ms. Ullrich:

This response is in reference to your letter dated November 9, 2022, requesting follow up information to a change in control of part of our licensed activities authorized by NRC License No. 47-01876-01. Please find below the following information in response to your questions:

1. We are confirming that any future license amendments will be signed by a Management Representative rather than the Radiation Safety Officer as to demonstrate that Management has reviewed the application and concurs in the statements and representations contained within.
2. We confirm that in all correspondence, our name should be written as DuPont. We apologize for the confusion that the lower case "p" may have caused.
3. The physical address of this facility now has four businesses within one industrial site. This license (02) will manage the sources within the newly purchased DuPont M&M business by Celanese (Dupont Polymer Products, USA LLC) which is headquartered in Dallas, Texas. The remaining business not included in the sale, DuPont Delrin (DuPont Specialty Products USA, LLC) will remain with the parent DuPont company based out of Wilmington, Delaware. Two separate management and oversight committees have been established, one for the existing DuPont license and one for the newly applied for license.
4. Casey Green's RSO Training certificate states: NUREG_1556 Volume 4, appendix D & J and 49 CFR 172. It is our understanding that this allows him to perform non-routine maintenance. If additional documentation or credentials are required, please advise.
5. We confirm that all other persons including area monitors are working under the supervision of the RSO.
6. Site S&OH Procedure 503 Nuclear, X-Ray, and Laser (revised copy attached to the email response), Section 9.5 Inventory and Security has been revised to read, "In addition, the location of the gauge is compatible with the "Conditions of Normal Use" and "Limitations and/or Other Considerations of Use" on the SSD registration certificate."
7. Site S&OH Procedure 503 Nuclear, X-Ray, and Laser, Section 9.5 Inventory and Security has been revised to read, "Physical inventory shall be completed every 6 months per NRC License Requirements".
8. Site S&OH Procedure 503 Nuclear, X-Ray, and Laser, Section 8.1 Personnel Dosimeters Procurement, was revised to read:

"Personnel dosimeters Shall meet the requirements for monitoring in NRC 10 CFR Part 20.

The Radiation Safety Officer will subscribe to a National Voluntary Laboratory Accreditation Program (NVLAP) approved personnel dosimeters service. Personnel dosimeters will be obtained to record radiation exposure in all cases recommended by the Radiation Sources Sub-Committee or the RSO."

9. a. Site S&OH Procedure 503 Nuclear, X-Ray, and Laser, Appendix A has been created to address this.
- b. Site S&OH Procedure 503 Nuclear, X-Ray, and Laser, Section 9.7 Non-Routine Maintenance was revised to state: "Device to be surveyed prior to the task. Ensuring potential exposure is less than a maximum of 10 mrem with emphasis on ALARA practices. If potential exposure is likely over 10 mrem Personal dosimeters shall be worn. NRC maximum is 5000 mrem."

We thank you for your attention to this matter. If you have any questions or need additional information, please do not hesitate to contact Herbert Whitlatch at (304) 863-2906.

Best Regards,



Ryan A. Birge
EH&S Manager
Washington Works, DuPont Polymer Products USA, LLC.

ATTACHMENT

CC: Herbert Whitlatch, RSO for DuPont Polymer Products, USA, LLC
John Kovalski, Washington Works Plant Manager, DuPont Polymer Products, USA, LLC

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Procedure 503 Nuclear, X-Ray, and Laser

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1. Purpose

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

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

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:

- Radiation devices are properly designed, kept in safe operating condition at all times, regularly inspected and tested.
- Necessary records are kept.
- Ionizing radiation exposures are kept ALARA "As Low as Reasonably Achievable".

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 DuPont standards set forth requirements which allow radiation to be used safely. It is Washington Works policy to strictly comply with those regulations and requirements at all times.

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

This procedure is part of the Washington Works Nuclear Regulatory Commission License 47-01876-02.

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.

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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,

5. Definitions

ALARA	A NRC term meaning "AS LOW AS REASONABLY ACHIEVABLE"
Licensee	Holder of the NRC License; in this case, the Washington Works Celanese 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

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

- Washington Works Management - Licensee
- Radiation Sources Subcommittee
- NRC Licensed Individuals
 - "Radiation Safety Officer" RSO
 - "Responsible Individuals" or Licensed Individuals
- Radiation Monitors
- LSO Laser Safety Officer

6.1 Washington Works Management

- Radiation safety, security, and control of radioactive materials, and compliance with regulations

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- Completeness and accuracy of radiation safety records and all information provided to the NRC
- Knowledge about the contents of the license and application.
- Meticulous compliance with current NRC and DOT regulations and Washington Works operating and emergency procedures.
- Commitment to provide adequate resources to the radiation protection program.
- Selection and assignment of a qualified individual to serve as the Radiation Safety Officer.
- Selection and assignment of a qualified individual to serve as the Laser Safety Officer.

6.2 Radiation Sources Sub-Committee (RSS)

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.

Refer to Safety Resource R-3, Central Safety, Health, and Environmental Committee & Subcommittees, for the RSS responsibilities and members.

6.3 RSO

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

6.4 Licensed Individuals/Authorized Users

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.

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.

- H.A. Whitlatch – x2906 Radiation Safety Officer/Laser Safety Officer

6.5 Radiation Monitor

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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 computer-based training. A list of trained and qualified Monitors can be found at \\Wwcs4\shared11\Common Global\Information\Radiation Training.doc

- Know how to operate a survey meter.
- 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.
- Establish and check limited access barricades, radiography barricades, and emergency barricades.
- 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-RSP503) must be completed by the area where work will be performed and approved by RSO or Licensee, 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

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.

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

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

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- Stores Receiving must hold unopened package(s) on loading dock & immediately notify the RSO or a Licensed Individual listed on previous page.
- Licensed individual must check security seal as directed in Procedure 517.
- Licensed Individual will “survey” the package(s) & determine how it can be safely handled within established radiation limits.
- Upon Licensed Individual’s clearance, Stores Receiving will proceed with normal functions of receiving the materials.
- 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:

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

7.6 Responsibilities of Radioactive Material Source Users

Radioactive material source users will:

- Provide safety rules. They must be submitted to the Sub-Committee for approval before ordering radioactive material or putting facilities in service.
- Provide such safety equipment/shielding/protection as may be prescribed by the Sub-Committee.
- Assign Personnel dosimeters to personnel as required by the RSO.
- 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.
- RSO or Licensed Individual must attend all Pre-Startup Safety Reviews involving radiation sources.

8. Radiation Exposure Personnel dosimeters Procedures

Washington Works will use Personnel dosimeters to establish that no employee can receive a radiation dose greater than 100 mR/year, which is the NRC public dose limit. Taking into account past personnel dosimeters reports it is not realistically possible for any employee to receive a dose in excess of 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 Personnel dosimeters Procurement

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Personnel dosimeters Shall meet the requirements for monitoring in NRC 10 CFR Part 20.

The Radiation Safety Officer will subscribe to a National Voluntary Laboratory Accreditation Program (NVLAP) approved personnel dosimeters service.

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

8.2 Distribution

The Administrative Assistant will distribute Personnel dosimeters quarterly. Each group of Personnel dosimeters will be accompanied by an assignment form.

Personnel dosimeters will be used by all persons who will work near radiation sources where dosimetry have been recommended by the Radiation Sources Sub-Committee or RSO. Each plant area will complete the assignment form for each Personnel dosimeters. Personnel dosimeters should be returned as soon as replacement badges have been issued or as soon as possible before the end of each quarter.

8.3 Personnel dosimeters Processing

Personnel dosimeters must be returned by the end of each quarter to the supplier.

8.4 Personnel dosimeters Exposure Record

The RSO will receive the personnel dosimeters 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.

All employees who receives in excess of 100 mrem shall be reported to the individual annually.

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

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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

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.

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.

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.

9.4 Permissible Radiation Intensity Levels

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:

- 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.
- 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:
- 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.
- 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.

9.5 Inventory and Security

Physical Inventory Shall be completed every 6 Months Per NRC License requirements.

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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 will be used to secure radiation sources against unauthorized removal. The RSO may authorize area personnel to keep one of the keys.

In addition, the location of the gauge is compatible with the "Conditions of Normal Use" and "Limitations and/or Other Considerations of Use" on the SSD registration certificate.

9.6 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.

9.7 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.

- Barricade the area to a safe distance with the perimeter to be below 2 mR/hr at all times.
- Doses to personnel must remain within regulatory limits and ALARA (e.g., use of shielded containers or shielding).
- The source is secured against unauthorized removal or access or under constant surveillance.
- Manufacturer's 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.
- " Device to be surveyed prior to the task. Ensuring potential exposure is less than a maximum of 10 mrem with emphasis on ALARA practices. If potential exposure is

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likely over 10 mrem Personal dosimeters shall be worn. NRC maximum is 5000 mrem.”

- 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 July 2016.” Each survey meter will be calibrated by a person authorized by the NRC or an Agreement State to perform survey meter calibrations.
- 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.
- Before being returned to routine use, the gauge is tested to verify that it functions as designed and source integrity is not compromised.
- 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.
- See appendix A for Non-Routine Maintenance

9.8 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.

9.9 Disposal

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

9.10 Radiation Device Calibration and Checkout

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

9.11 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.

9.12 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

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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:

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

10. Nuclear Radiation Source Lockout

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

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.

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

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

A personnel dosimeter is not required to lock a source.

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

10.1 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.

- 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.
- 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.
- 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. The survey meter should detect some level of radiation. If the meter does not respond, contact the plant RSO (WW Ext 863-2906) to determine if the meter is malfunctioning.
- 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.
- 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

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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.

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

Refer to S-24-T and plant RSO for X-Ray equipment requirements.

Each area using X-Ray producing equipment must ensure surveys are performed bi-annually by a radiation monitor.

Any new use/relocation, of existing or portable X-Ray must be reviewed and approved by the Radiation Sources Sub-Committee.

Normal operating procedures shall be written and available to all X-ray equipment workers.

RSO or his delegate must attend all Pre-Startup Safety Reviews.

Yellow signs or labels with the radiation symbol shall be placed on or near X-Ray machines as follows:

- X-Ray source housing shall be labeled "Caution - High Intensity X-Ray Beam".
- X-Ray rooms or locations shall have a sign stating, "Caution X-Ray equipment".
- 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

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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

Reference DuPont Standard S-26-T (Does not include consumer laser printers or CD drives)

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

All personnel qualified to operate or maintain a laser where the exposure level is in excess of **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.

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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 contains 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:

- Laser pointers used on site must be Class 2.
- Training on the safe use of laser pointers is required.
- Laser pointers must be labeled with appropriate yellow Caution warning labels.
- 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:

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- Bar code scanners used on site must be Class 2.
- Training on the safe use of bar code scanners is required.
- 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:

- Arrange required appointments with Medical.
- 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

Herb Whitlatch, Laser Safety Officer – B-280 – x2906.

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: 3.0×10^{15} - 7.5×10^{14} CYCLES PER SECOND)

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.

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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.

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.

14.1.1 Minimum Source Management Requirements

- Area must maintain a list of UV sources
- Updated safety rules and operating directions
- Use adequate eye protection
- Attach labels and warning signs

14.2 Visible Radiation (VR)

(.40 - .750 MICROMETERS: 3.0×10^{15} - 2.75×10^{14} CYCLES PER SECOND)

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 as long as 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: 2.75×10^{14} - 3×10^{11} CYCLES PER SECOND)

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.

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.

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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.

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)

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.

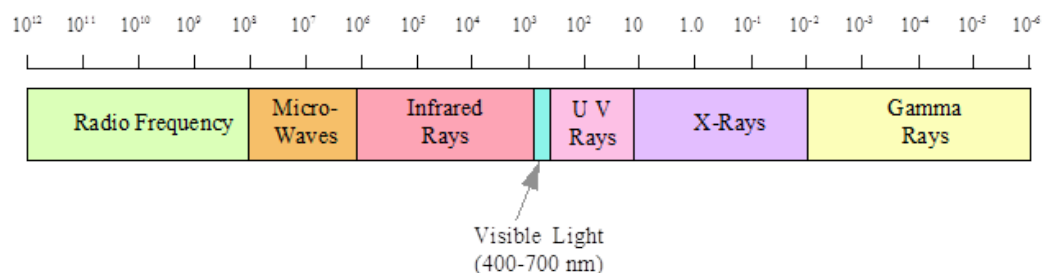
14.4.1 Minimum Source Management Requirements

- For microwave sources, complete requirements in policy 20 and procedure 558.
- 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.
- Provide adequate safety rules and operating directions for process microwave and process RF sources.
- Train operators on the use of Process sources.

14.5 Electromagnetic Radiation (ELF & VLF)

(30-300K HERTZ)

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.



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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

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

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

15.2 Vendor Requirements

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

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.

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

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

A Trained and Qualified WW Radiation Monitor must be present at all times during any radiography conducted in process units.

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. 280.

Radiation Monitor responsibilities:

- Ensure that the radiography operation complies with WW procedures.
- Verify that the radiography area is properly barricaded.
- Check that the Radiation Work Permit is properly filled out.

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- Obtain BTO or area management approval for radiography in process units.
- Ensure that area personnel and radiation sensitive devices are protected.
- Conduct a safety check for radiography operations (X-Ray yard or process unit).
- Check that emergency barricades can be readily put in place.

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 In Curies	Emergency Barricade Distance in Feet for 2.0 mR/hr	Distance to TFE or Distillate in 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

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Appendix: A Non-Routine Maintenance REMOVAL AND INSTALLATION OF NUCLEAR GAUGING DEVICES

Purpose

This procedure provides instruction for the removal from service and the installation of nuclear gauging devices.

Scope

This procedure is applicable only to removal and the installation of nuclear gauging devices from service for the following reasons:

- Placement of device(s) in service or storage.
- Shipment of device(s) for disposal, transfer and/or return to manufacturer.

Limitations

Only devices registered with the USNRC, Agreement States or cognizant jurisdiction are authorized for removal or installation under this procedure.

Prerequisites

1. All individuals involved in the removal and installation of nuclear gauging devices must possess the following training qualifications and demonstrate proficiency in the assigned tasks:
 - Radiation Safety Training course, with emphasis on ALARA practices
 - Knowledge of proper use of radiation survey meters
 - Familiarization with this procedure
2. Prior to removal of a nuclear gauging device, a specified location must be identified to securely store the device or stage prior to transfer. In the event that the device is to be stored, a chosen storage location will meet the following requirements:
 - The storage location will be located in an area of the facility with low personnel traffic patterns.
 - Access will be restricted to unauthorized personnel through the use of locked doors or chained to building steal. Only the Radiation Safety Officer or responsible individual will maintain the key(s).
 - Storage Location will be labeled with a "Caution, Radioactive Materials" sign with contact phone numbers for the Radiation Safety Officer or responsible individual.

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Precautions and Limitations

All work will be performed by Licensed individual.

Nuclear gauging devices will be removed from service under the following conditions:

- Devices with an operable shutter whereby the shutter mechanism may be placed in a closed position and secured prior to removal from its mounting.
- Devices have a valid leak test performed prior to removal.
- Device to be surveyed prior to the task. Ensuring potential exposure is less than a maximum of 10 mrem with emphasis on ALARA practices. If potential exposure is likely over 10 mrem Personal dosimeters shall be worn. NRC maximum is 5000 mrem a year.

Nuclear gauging devices will be removed from storage and reinstalled under the following conditions:

- Devices are operational and possess a valid leak test.
- Devices that have an operable shutter whereby the shutter mechanism has been secured in a closed position.

Equipment

Calibrated survey instrumentation capable of detecting the type and strength of radiation emitted.

Removal Instructions

1. Perform radiological monitoring and inspection of device, including valid leak test results.
2. Lock-out/Tag-out of shutter mechanism.
3. Complete survey to ensure maximum exposure of 10 mrem during task with emphasis on ALARA practices
4. Remove nuclear gauge from service and transfer gauge to specified storage location.
5. Perform radiological monitoring, posting and inspection of storage area.

Installation Instructions

1. Perform radiological monitoring and inspection of device.
2. Verify Lock-out/Tag-out of shutter mechanism and valid leak test results.
3. Complete survey to ensure maximum exposure of 10 mrem during task with emphasis on ALARA practices.
4. Transfer nuclear gauge to specified location and install in accordance with manufacturer instructions.
5. Perform and document radiological monitoring, including survey results in all accessible areas **with shutter in the open position.**

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9/24/18	Kim Flanery	Updated header and footer to meet quality standard ISO 9001:2015
9/24/18	Herb Whitlatch	Review with no changes.
10/15/20	John Tedesco	Updated RSO/LSO information. Changed TLM to computer-based training.
10/15/20	Herb Whitlatch	Reviewed. I checked the document for content.