 Fermilab		ES&H Section Procedures	
Procedure Number/Name ESH-RPO-POST-01 – Radiological Posting		Effective Date: 11/2/2020	
Written by: Kathy Graden	Reviewed and Updated By: Kathy Graden/Maddie Schoell	Revision: 1	

Radiological Posting

Approvals

Written By: _____ Date: _____

Kathy Graden, Radiation Safety Officer

Approved By: _____ Date: _____

Madelyn Schoell, Radiation Physics Operations (RPO) Department Head

Approved By: _____ Date: _____

Matthew Quinn, Senior Radiation Safety Officer

Revision History

Author	Description of Change	Revision Number	Revision Date
Kathy Graden	Initial Issue	0	10/14/2020
Kathy Graden	Addition of information for sign inserts (8.2.8)	1	11/2/2020

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Procedure

1.0 Purpose

The purpose of this procedure is to describe radiological posting at Fermilab for specific cases that are not already prescribed in Title 10 Code of Federal Regulations (CFR) Part 835, Occupational Radiation Protection, the Fermilab Radiological Control Manual (FRCM), or the Fermilab Environment, Safety, and Health Manual (FESHM).

2.0 Scope

The scope of this procedure DOES NOT include the radiological posting requirements as specified in 10 CFR Part 835, Subpart G, Posting and Labeling, Fermilab Radiological Control Manual (FRCM) Chapter 2, Radiological Standards, Part 3, Posting. This procedure DOES NOT include radioactive material labeling as described in FRCM Chapter 4, Radioactive Materials, Part 1, Radioactive Material Identification, Storage, and Control.

Posting of all areas controlled for radiological purposes must be in compliance with the above regulatory and Fermilab requirements.

3.0 Summary

This procedure provides guidance on proper use of the radiation warning trefoil symbol, placement of radiological postings on outdoor boundaries and indoor areas, posting Contamination Areas in beamline enclosures, and deposing and release certification of areas controlled for radiological purposes.

4.0 Definitions

See FRCM glossary of terms for radiological area posting definitions.

5.0 Responsibilities

Fermilab radiological control organization (RCO) personnel are responsible to follow posting requirements as stated in 10 CFR Part 835, the FRCM, and FESHM. The Fermilab Senior Radiation Safety Officer (SRSO) and RPO Department Head are responsible to ensure the requirements of this procedure are followed.

- 5.1 Assigned RSOs are responsible for ensuring areas are posted accurately in accordance with 10 CFR Part 835, FRCM Chapter 2, Part 3, and this procedure.
- 5.2 Radiological Control Technicians (RCTs) are responsible for posting and deposing all areas controlled for radiological purposes in accordance with 10 CFR Part 835, FRCM Chapter 2, Part 3, and this procedure.
- 5.3 The RPO Department is responsible for maintenance of radiological signs, ropes, chains, stanchions, and other radiological posting materials.

6.0 Health and Safety Warnings

As stated in Posting and Labeling for Radiological Control Guide, DOE G 441.1-10, 10 CFR Part 835 establishes specific requirements for posting of controlled areas, radioactive material areas (RMAs), and radiological areas. Controlled areas are established to warn individuals that they are entering areas that, because of the presence of radiological areas and/or RMAs, are controlled for radiation protection

purposes. RMAs and radiological areas are established within the controlled area to provide warning of specific hazards that may require individual protective action for safe entry and exit.

Personnel may encounter radiological hazards such as radiation exposure, radioactive contamination, or airborne radioactivity while fulfilling responsibilities related to posting and deposing areas controlled for radiological purposes. Personnel must comply with radiological work permit (RWP) requirements such as dosimetry, personal protective equipment (PPE), and respiratory protection to monitor and mitigate radiological hazards.

7.0 Material, Equipment & Training Needed

7.1 Material & Equipment Required

- Various types of radiological signs and other materials for each type of radiological area and other radiological postings as required by 10 CFR Part 835 or as approved by the SRSO

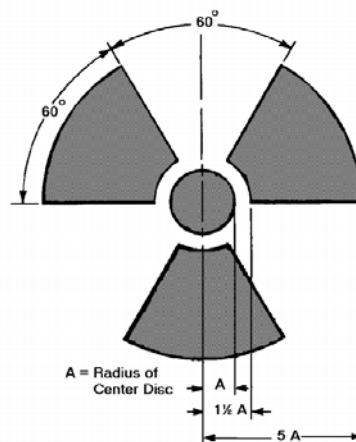
7.2 Training Required

- 7.2.1 Radiological Worker Training (FN000470 and FN000471) or DOE Core Academics for RCTs (FN000277) and RCT Continuing Training and Requalification (FN000300).
- 7.2.2 Radiological Postings and Radioactive Material Training (FN000366).
- 7.2.3 Other training as required by RWP or other entry requirements.

8.0 Procedural Steps

8.1 Proper Use of Radiation Warning Trefoil Symbol

- 8.1.1 Radiological signs must be designed in accordance with Posting and Labeling for Radiological Control Guide, DOE G 441.1-10. The standard radiation warning trefoil should be proportioned as shown below:



- 8.1.2 The radiation warning trefoil used to identify radiological hazards should only be used in areas that are controlled for radiological purposes. Radiological postings should not be used in areas where no radiation exists. Likewise, use of the radiation warning trefoil

should only be placed on items that are radioactive. The radiation warning trefoil should only be used when and where radioactivity exists.

- 8.1.3 Non-radioactive items should NOT be labeled using the radiation warning trefoil. For example, the trefoil should not be used on non-radioactive shielding or other non-radiological postings or labels used to warn personnel of non-radiological hazards such as electrical, cryogenic, confined space, critical devices, or other critical safety systems (credited controls).
- 8.1.4 Lettering should not be superimposed on the radiation warning trefoil. The size of lettering used on the sign should not detract from the clarity of the radiation warning trefoil.

8.2 Placement of Radiological Postings on Outdoor Boundaries and Indoor Areas

- 8.2.1 Per 10 CFR Part 835, Subpart G, each entrance or access point to areas controlled for radiological purposes shall be posted.
- 8.2.2 Radiological postings should be completed before work begins and updated periodically when changes in radiological conditions occur or are expected.
- 8.2.3 Outdoor boundaries and physical barriers should be clearly visible from all directions and various elevations to prevent inadvertent access to areas. Signs required by 10 CFR Part 835 shall be clearly and conspicuously posted on outdoor boundaries and physical barriers.
- 8.2.4 Although not specifically addressed in this procedure, each item or container of radioactive material that requires labeling shall bear a clearly visible label that includes the radiation warning trefoil.
- 8.2.5 The effect upon visibility of opening of doors or other changes in configuration should be considered when posting radiological hazard warning signs. At least one sign should be on each side of an area's boundary, and a sign should be visible from any normal avenue of approach. Posting at eye level is recommended.
- 8.2.6 Appropriate radiological signs should be placed intermittently along outdoor boundaries (fences, barricades, ropes, tapes, etc.). A distance of 50 feet between signs along outdoor boundaries of an area controlled for radiological purposes is recommended.
- 8.2.7 Areas designated for eating and drinking should not be co-mingled with radiological areas or RMAs.
- 8.2.8 In some circumstances, inserts are used in addition to radiological postings to provide added instructions. Additional/supplemental instructions may be added at the discretion of the RSO. Examples may include, but are not limited to keep out, no carts, additional layer of PPE, authorized personnel only, contact RSO for access/work, etc.

8.3 Posting Contamination Areas

- 8.3.1 10 CFR 835 establishes requirements for Contamination Areas, High Contamination Areas, and Airborne Radioactivity Areas. These areas must be posted to provide warning

of the presence of radioactive contamination and airborne radioactivity. The need to post Contamination Areas and high Contamination areas is contingent upon two factors:

- Area accessibility
- Presence of removable surface contamination at levels exceeding the specified removable surface contamination values (1x the values provided in Appendix D of 10 CFR Part 835 for contamination areas, 100 x these values for high contamination areas)

- 8.3.2 The Appendix D values of 10 CFR 835 establish the thresholds above which an area containing accessible levels of removable radioactivity shall be posted as a Contamination Area. For tritiated water, Radiation Physics Note 165, Evaluation of the Radiological Hazards from Use of Industrial Cooling Water (ICW) in the Fermilab Fire Suppression Sprinkler Systems, Appendix 1, Analysis of Possible Puddle Heights H , states that a surface contamination level of 10,000 disintegrations per minute (dpm) per 100 cm² corresponds to 4,505 picoCuries (pCi) per 100 cm². Pertaining to the situation of water in the liquid state on solid horizontal surfaces, calculations of water on various surfaces were computed.
- 8.3.3 Based on the calculations described above, Fermilab uses a value of 100 pCi/ml as the threshold for posting Contamination Areas resulting from tritiated water puddles in beamline enclosures and other areas.
- 8.3.4 While containment or decontamination is preferable, roping off and posting an area has been proven to be successful in minimizing exposures and preventing the spread of contamination because it limits personnel walking through the area. Physical solid barriers are not always possible in beamline enclosures. However, particulate radioactivity within the boundary has been shown to not readily migrate beyond the posted area.
- 8.3.5 Within beamline enclosures, Contamination Area postings should be as localized as possible (i.e., next to the beamline elements), where practical. Additionally, redundant Contamination Area postings may be placed across the aisle, in conjunction with or just outside of the local Contamination Area postings, until contamination wipe surveys of the aisle are performed to confirm no contamination in the area. Once confirmatory surveys are performed, the postings across the aisle may be removed, so long as the localized postings remain.

8.4 Deposting and Release Certification of Areas Controlled for Radiological Purposes

- 8.4.1 Radiological postings should be removed as soon as is practicable when no longer required.
- 8.4.2 The process for deposting areas controlled for radiological purposes requires certification that the area is no longer a facility containing radioactive materials. Areas and buildings that no longer have radioactive materials or are otherwise no longer controlled for radiological purposes must be certified for release from the Fermilab List of Facilities Containing Radioactive Materials (R.P. form # 85). Release certification involves several steps:

- Completion of area dose rate surveys
 - Completion of wipe surveys (as applicable)
 - Removal of source box (as applicable)
 - Removal of all radiological postings on outdoor boundaries and indoor areas
- 8.4.3 Release certification of areas controlled for radiological purposes is documented via a memo from the assigned RSO to the SRSO. In this memo, the assigned RSO should describe actions taken to ensure all radioactive materials and sources of radiation have been removed from the area. The assigned RSO should include documentation such as area surveys and wipe surveys (as applicable).
- 8.4.4 After the SRSO signs the release certification memo to approve the release of the area, the assigned RSO/RPO Department Head should change the status of the area/building on R.P. Form #85 from “R” which stands for Facility Containing Radioactive Materials to “C” which stands for Certified as No Longer a Facility Containing Radioactive Materials.
- 8.4.5 The assigned RSO should complete other forms of documentation related to deposing and certifying release of an area such as updating the Configuration Control Log (as applicable).
- 8.4.6 The assigned RSO should post the signed release certification memo on DocDB.

9.0 Data and Records Management

N/A

10.0 Quality Assurance/Quality Control

This procedure is subject to a review/update frequency requirement of five years and is due 10/2025.

11.0 References (Right click to open hyperlinks)

Fermilab Radiological Control Manual Chapter 2, Radiological Standards, <https://esh-docdb.fnal.gov/cgi-bin/ShowDocument?docid=444>

Fermilab Radiological Control Manual Chapter 4, Radioactive Materials, <https://esh-docdb.fnal.gov/cgi-bin/ShowDocument?docid=446>

Title 10 Code of Federal Regulations Part 835 Occupational Radiation Protection, Subpart G, Posting and Labeling, <https://www.ecfr.gov/cgi-bin/text-idx?SID=a069c156722da73e316046707c604ee2&mc=true&node=pt10.4.835&rgn=div5#sp10.4.835.g>

Posting and Labeling for Radiological Control Guide, DOE G 441.1-10, dated 05-24-99, <https://www.directives.doe.gov/directives-documents/400-series/0441.1-EGuide-01c-admchg1>

Radiation Physics Note 165, Evaluation of the Radiological Hazards from Use of Industrial Cooling Water in the Fermilab Fire Suppression Sprinkler Systems, J.D. Cossairt and M. Quinn, May 2019, <https://esh-docdb.fnal.gov/cgi-bin/sso/RetrieveFile?docid=3290&filename=RP%20Note%20No%20165%20Rev%201.pdf&version=7>

ESH RPO-CONTAM-01, Control of Contamination Areas and Program Management, S. McGimpsey, K. Graden, October 2020, <https://esh-docdb.fnal.gov/cgi-bin/sso/ShowDocument?docid=6132>

12.0 SOP Signature Sheet

N/A - Procedure review and training specified in section 7.2 is tracked in TRAIN.

13.0 Procedure Specific Training Checklist

N/A - Procedure review and training specified in section 7.2 is tracked in TRAIN.

14.0 Attachments

See example templates below for non-radiological signs. Please note that these are only examples and other non-radiological signs may be used with assigned RSO/SRSO approval.

