

# Other Radioactive Material Storage Areas

## Section V - Chapter 2

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## V- 2 Other Radioactive Material Storage Areas

### V - 2.1 Location on Fermi National Accelerator (Fermilab) Site

Other radioactive material storage areas encompass all areas on the Fermilab site that have not been addressed in the Fermi National Accelerator Laboratory Safety Assessment Document Sections I through V that may, from time to time, contain radioactive materials. These areas comprise many different locations on the Fermilab site including accelerator areas, beam line areas, Wilson Hall, and the Village.



## **V - 2.2                    Inventory of Hazards**

The following table lists radiation and nuclear material hazards found in other radioactive material storage areas that have not been addressed in other chapters of this document.

<b>Radiation</b>	<b>Nuclear Material</b>
Radioactivated Material Sealed Radioactive Sources Radioactive and Hazardous Waste	Depleted Uranium Other Nuclear Material

## **V - 2.3                    Introduction**

This Section V, Chapter 2 of the Fermi National Accelerator Laboratory (Fermilab) Safety Assessment Document (SAD) covers other radioactive material storage areas that are not covered in other sections and chapters of this document. Section V, Chapters V-1, V-3, V-4, V-5, V-6, and V-7 address the Railhead, Radiation Physics Calibration Facility, Radionuclide Analysis Laboratory, Waste Handling Facilities, Technical Division Facilities, and Shipping and Receiving Operations, respectively. This chapter addresses radioactive material storage areas such as experimental areas where sealed radioactive sources are used and stored, nuclear material in storage, and division/section/center designated radioactive material storage areas.

## **V - 2.4                    Safety Assessment**

Only radiological hazards and nuclear material hazards located in radioactive material storage areas that have not been addressed in other chapters of the Fermilab SAD will be addressed in this chapter. All other hazards have been discussed in Section I, Chapters I-1 through I-10 of this document and are covered no further in this chapter.

### ***V - 2.4.1                Radiological Hazards***

A number of different types of materials located on the Fermilab site may present radiological hazards. Fermilab implements management controls that govern radiological material use, storage, transportation, and disposal. This section identifies the types of radiological



materials, radioactivated material, sealed radioactive sources, radioactive and hazardous waste, and nuclear material, and their respective safety controls.

Safety controls at Fermilab are in the form of prescribed procedures and protective measures detailed in the following guidance documents: Fermilab Environment, Safety, and Health Manual<sup>1</sup> (FESHM), Fermilab Radiological Control Manual<sup>2</sup> (FRCM), Fermilab Sealed Source Control and Accountability Program<sup>3</sup>, Fermilab Nuclear Materials Control and Accountability (MC&A) Plan<sup>4</sup>, Fermilab Site Security Plan<sup>5</sup>, and Low-Level Waste Certification Program<sup>6</sup>.

#### V - 2.4.1.1 Radioactivated Material

Radioactivated material located in storage areas is managed in accordance with the requirements set forth in the FRCM Chapter 4, *Radioactive Materials, Part 1, Radioactive Material Identification, Storage, and Control*, that implement Title 10 of the Code of Federal Regulations Part 835, *Occupational Radiation Protection* (10 CFR 835). All areas where radioactive material is stored shall be approved by the division/section/center Radiation Safety Officer. Each area where radioactive material is stored must be appropriately posted as set forth in FRCM Chapter 2, *Radiological Standards, Part 3, Posting*. Radioactive material in long-term storage must be located in areas specifically designated for storage of such materials. Outdoor storage of radioactive material is discouraged. Radioactive material shall not be stored in Fermilab on-site housing, established eating and drinking areas, or in Wilson Hall unless the requirements set forth in FRCM Chapter 9, *Special Circumstances, Part 1, Control of Radioactive Materials in Wilson Hall*, are followed.

Unlike many other buildings on the Fermilab site, Wilson Hall is open to the public. In order to minimize exposure of radiation to the public and to minimize the potential for loss or theft of radioactive material, more restrictive requirements for use and storage of radioactive material are applied to Wilson Hall than to other buildings at Fermilab. FRCM requirements are established to minimize use and storage of these materials in Wilson Hall to the extent possible. Special requirements and controls for use and storage of radioactive material located in Wilson Hall are set forth in FRCM Chapter 9, *Special Circumstances, Part 1, Control of Radioactive Materials in Wilson Hall*.

Specific locations at the Railhead are designated for general storage of radioactive material. Limited indoor storage is available in Lundy barn. Section V, Chapter V-1 of this document addresses the Railhead.

Access controls for radioactivated material in storage are managed in accordance with requirements set forth in FRCM Chapter 4, *Radioactive Materials*.

#### V - 2.4.1.2 Sealed Radioactive Sources

Various types of sealed radioactive sources are used and stored in many locations on the Fermilab site. Sealed radioactive sources are stored and used in accordance with requirements set forth in FRCM Chapter 4, *Radioactive Materials*, Part 3, *Radioactive Source Controls*, and the Fermilab Sealed Source Control and Accountability Program requirements.

Sealed radioactive sources in use in experimental areas are stored in designated storage boxes that are locked. The Environment, Safety, Health, and Quality (ESH&Q) Section source physicist issues source box keys to a designated group of individuals for each source box. These individuals are designated as source monitors. Source monitors are responsible to control access to the source storage box, retrieve/return radioactive sources from/to the box, verify training of source users requesting to use a radioactive source, and also to complete the radioactive source access log.

Because of the nature of activities in Wilson Hall, use and storage of sealed radioactive sources is restricted. Special limits for common radionuclides such as Americium-241, Cesium-137, and Iron-55 are listed in FRCM Chapter 9, *Special Circumstances*, Table 9-1, *Wilson Hall Limits for Common Radionuclides*.

Access controls for sealed radioactive sources used and stored at Fermilab are described in Sealed Source Control and Accountability Program requirements.

#### V - 2.4.1.3 Radioactive and Hazardous Waste

Radioactive and hazardous waste handling and management are conducted in accordance with FESHM Chapter 8000, *Environmental Protection*, and requirements set forth in FRCM Chapter 4, *Radioactive Materials*, Part 4, *Radioactive Waste Management*. All radioactive material that is no longer needed presently or in the probable future should be disposed of as radioactive waste. Specific procedures for management of radioactive waste is addressed in the Low-Level Waste Certification Program and division/section/center radioactive and hazardous waste handling procedures.

The ESH&Q Section is responsible for ordering, maintaining, and issuing hazardous and radioactive waste containers. The ESH&Q Section Hazard Control Technology Team picks up radioactive and hazardous waste and prepares waste shipments for disposal at licensed disposal facilities off-site.

**V - 2.4.1.4 Nuclear Material**

Depleted uranium and other nuclear material located in specifically approved areas on the Fermilab site are stored and used in accordance with requirements set forth in FRCM Chapter 4, *Radioactive Materials*, and the Fermilab Nuclear Materials Control and Accountability Plan requirements. The ESH&Q Section Nuclear Materials Representative (NMR) is responsible for control and accountability of nuclear material at Fermilab. The NMR maintains a list of Fermilab areas approved for use and storage of nuclear material.

Fermilab has a graded program for controlling personnel access to nuclear material in storage. Fermilab has implemented material access controls to ensure that only authorized personnel gain access to nuclear material. Locked buildings, fences, gates, and padlocks prevent unauthorized access to nuclear material.

Sealed neutron sources containing nuclear material are stored in a concrete cave located inside Cave 1 of the Radiation Physics Calibration Facility (RPCF). Keys to the outside door of the RPCF are issued only to select members of the ESH&Q Section Radiation Protection Group and are retrieved upon termination or transfer out of the ESH&Q Section. Access to the neutron storage cave is controlled by a 4 digit combination lock. An intrusion alarm system is installed on the doors to RPCF, which upon unauthorized entry, sets off a Fire Incident Reporting and Utility System alarm at the Communication Center. Access controls for nuclear material are described in the Fermilab Nuclear MC&A Plan and the Fermilab Site Security Plan.

**V - 2.5 Assessment of Potential Credited Controls****V - 2.5.1 *Passive Controls***

All hazards are managed in accordance with FESHM and FRCM requirements. There are no passive controls that qualify for inclusion in the Accelerator Safety Envelope (ASE).

**V - 2.5.2 *Active Controls***

All hazards are managed in accordance with FESHM and FRCM requirements. There are no active controls that qualify for inclusion in the ASE.

**V - 2.5.3 *Administrative Controls***

All hazards are managed in accordance with FESHM and FRCM requirements. There are no administrative controls that qualify for inclusion in the ASE.

**V - 2.6****Summary & Conclusion**

Specific hazards associated with radioactive material storage areas not addressed in other sections and chapters of this SAD are identified in this chapter of the Fermilab SAD. In addition to these safety considerations, these areas are subject to the global and more generic safety requirements, controls, and procedures outlined in Section I of this Fermilab SAD.

Within the specific and generic considerations of this assessment, radioactive material storage areas on Fermilab site can be operated with a level of safety that will protect people and property and is equal to or exceeding that currently prescribed by Department of Energy orders and Fermilab requirements as set forth in the FESHM and the FRCM.



**V - 2.7****Glossary, Acronyms**

ASE	Accelerator Safety Envelope
DOE	Department of Energy
ESH&Q	Environment, Safety, Health and Quality
FESHM	Fermilab Environment, Safety, and Health Manual
FIRUS	Fire Incident Reporting and Utility System
FRCM	Fermilab Radiological Control Manual
MC&A	Materials Control and Accountability
NMR	Nuclear Materials Representative
RPCF	Radiation Physics Calibration Facility
SAD	Safety Assessment Document

## V - 2.8                      References

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<sup>1</sup>Fermilab Environment, Safety, and Health Manual, March, 2015. ESHQ DocBD link:  
<http://esh.fnal.gov/xms/FESHM>

<sup>2</sup>Fermilab Radiological Control Manual, March, 2015. ESHQ DocBD link:  
<http://esh.fnal.gov/xms/FRCM>

<sup>3</sup>Fermilab Sealed Source Control and Accountability Program, February, 2013. ESHQ DocBD link: <https://esh-docdb.fnal.gov:440/cgi-bin/ShowDocument?docid=156>

<sup>4</sup>Fermilab Nuclear Materials Control and Accountability Plan, February, 2015. ESHQ DocBD link: <https://esh-docdb.fnal.gov:440/cgi-bin/ShowDocument?docid=2024>

<sup>5</sup>Fermilab Site Security Plan, July, 2014. ESHQ DocBD link:  
<https://esh-docdb.fnal.gov:440/cgi-bin/ShowDocument?docid=2761>

<sup>6</sup>Low-Level Waste Certification Program, June, 2008 (under revision, March, 2015)