Waste Handling Facilities

Section V - Chapter 5

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Revision History

Author	Description of Change	Revision No. & Date
David Hockin Jon Ylinen	Initial release of the Waste Handling Facilities Chapter for the Fermi National Accelerator Laboratory Safety Assessment Document (SAD).	Revision 0 May 12, 2015

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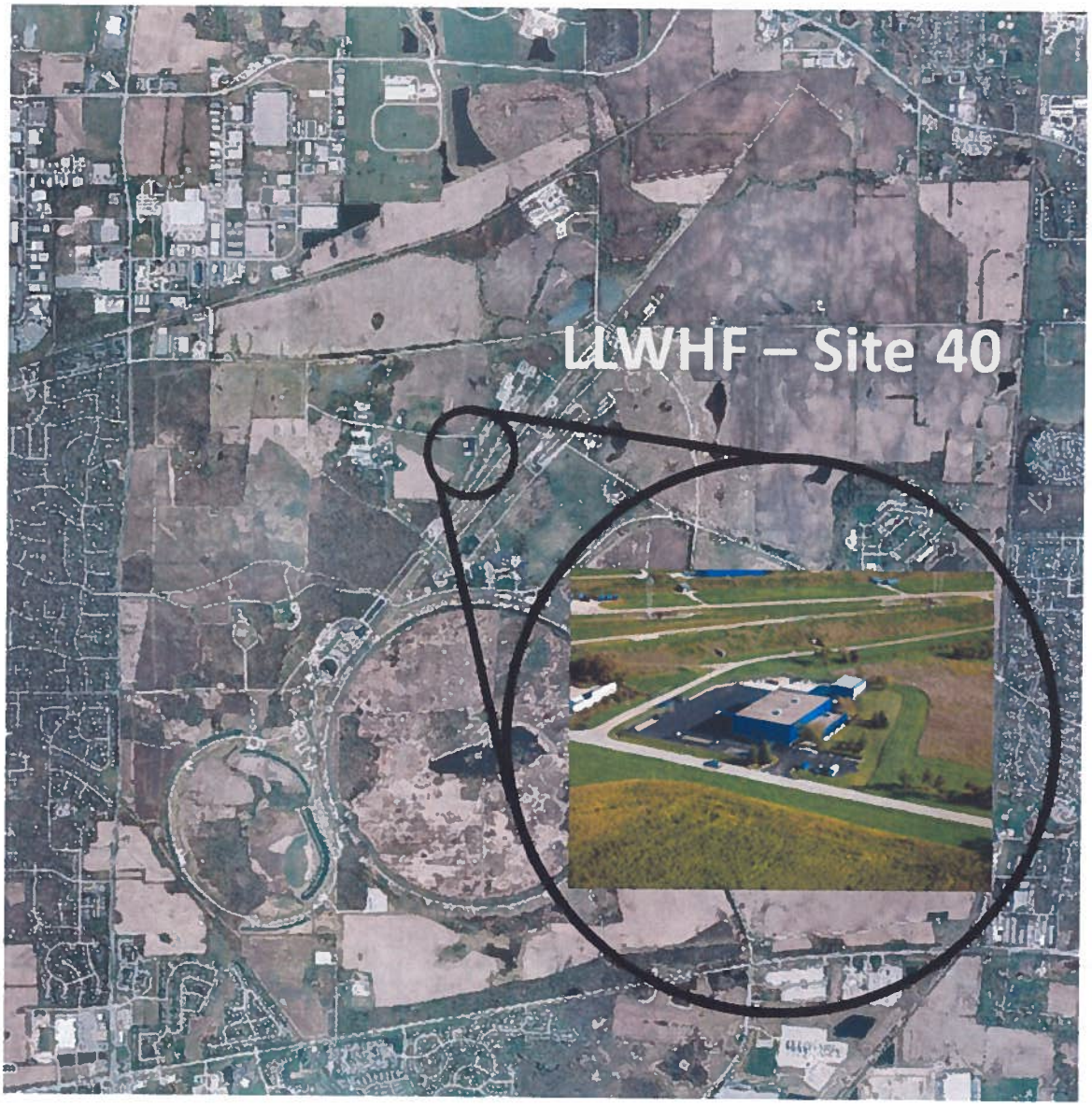
V - 5.1 Waste Handling Facility Locations on Fermi National Accelerator Laboratory (Fermilab) Site

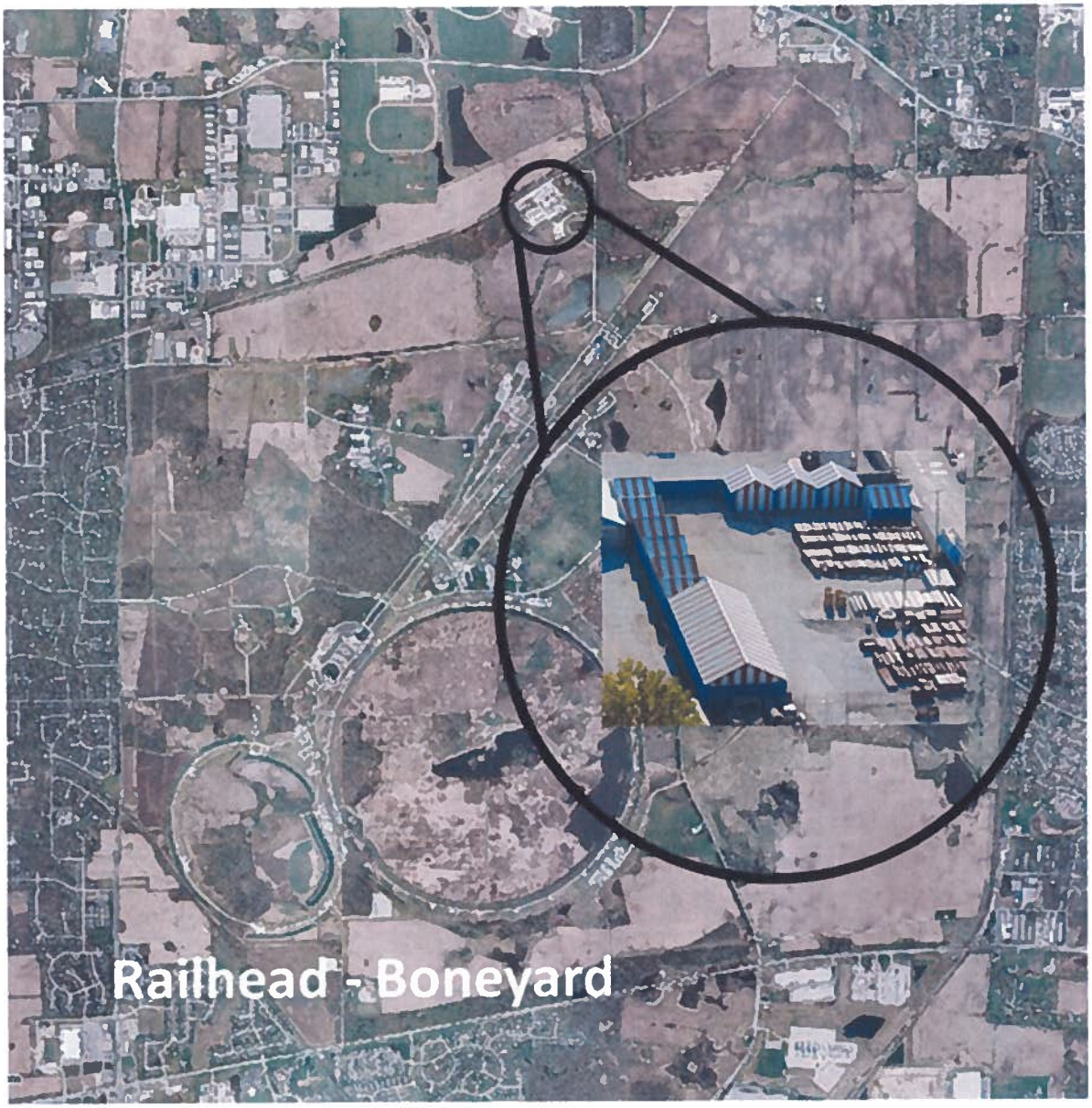
V - 5.1.1 *Low Level Waste Handling Facility (LLWHF) Location on Fermilab Site*

The following aerial photograph shows the location of the LLWHF in relationship to the Fermilab site.



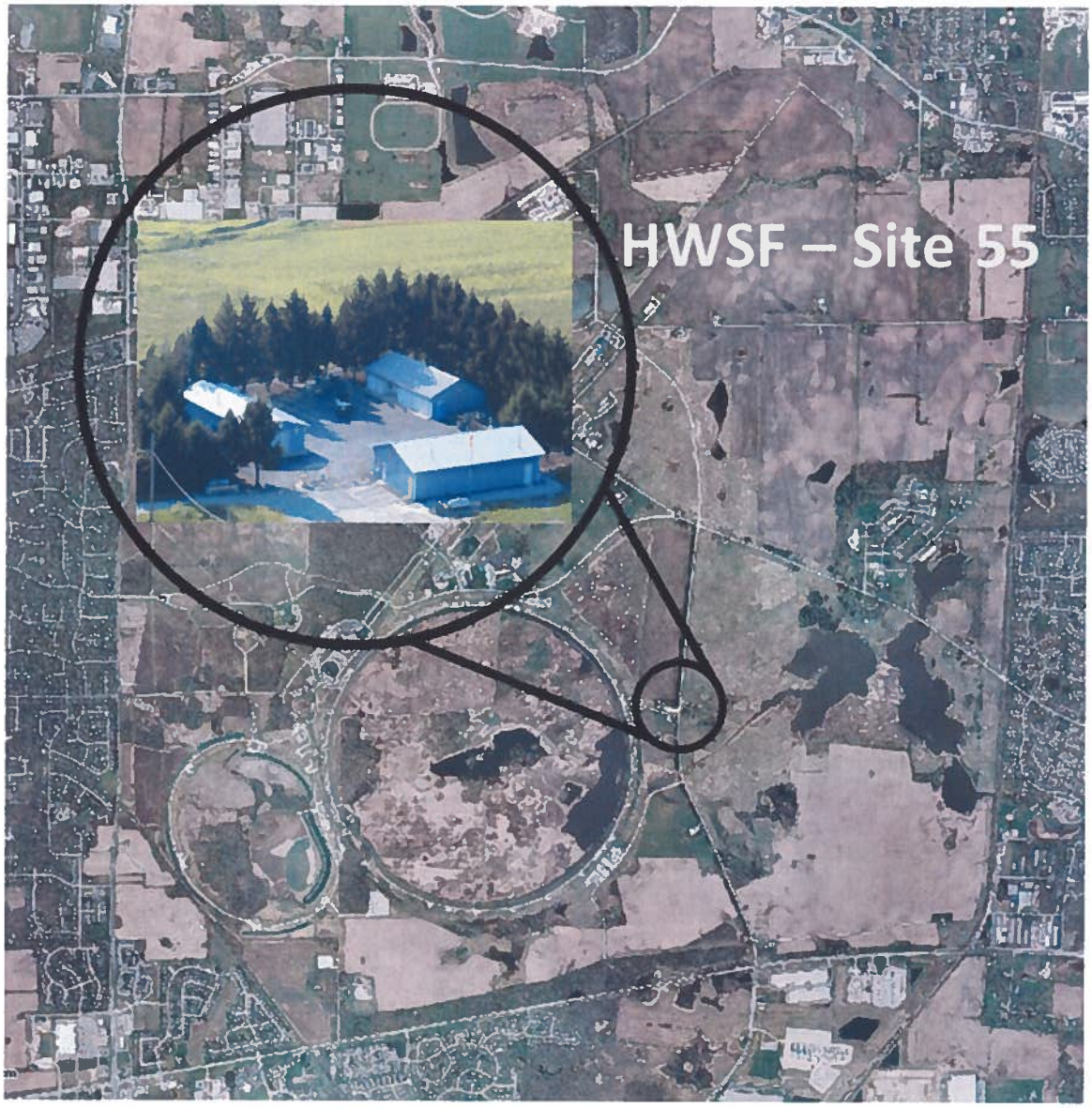
V - 5.1.2 *Railhead - Boneyard (BY) Location on Fermilab Site*

The following aerial photograph shows the location of the BY in relationship to the Fermilab site.



V - 5.1.3 *Hazardous Waste Storage Facility (HWSF) Location on Fermilab Site*

The following aerial photograph shows the location of the HWSF in relationship to the Fermilab site.



V - 5.2 Inventory of Hazards

The following tables list the identified hazards found in the waste handling facilities. All hazards with an asterisk (*) have been addressed in Chapters 1-10 of the Fermilab Safety Assessment Document (SAD) and are not addressed in this section of the SAD.

V - 5.2.1 *LLWHF*

Radiation Residual component activation Radioactive sources	**Kinetic Energy** Industrial equipment * Power tools * Pumps and motors *
Toxic Materials Lead shielding *	**Potential Energy** Compressed gases *
Flammable & Combustible Materials Flammable liquids * Flammable Gas *	**Electrical Energy** Stored energy exposure * High voltage exposure * Low voltage, high current exposure *

V - 5.2.2 *Boneyard*

Radiation Residual component activation Radioactive sources	**Kinetic Energy** None
Toxic Materials Lead shielding *	**Potential Energy** None
Flammable & Combustible Materials Flammable liquids *	**Electrical Energy** Low voltage exposure *

V - 5.2.3 *HWSF*

Radiation Residual component activation Radioactive sources	**Kinetic Energy** Industrial equipment * Power tools * Pumps and motors *
Toxic Materials RCRA Waste * TSCA Waste * Illinois Special Waste * Universal Waste *	**Potential Energy** Compressed gases *
Flammable & Combustible Materials Flammable liquids * Flammable Gas *	**Electrical Energy** Low voltage exposure *
Corrosive Materials Acids * Bases *	

V - 5.3 Introduction

This Section V, Chapter 5 of the Fermi National Accelerator Laboratory (Fermilab) SAD covers the LLRWHF, the BY, and the HWSF. The chapter has been prepared by the staff of the Fermilab Environment, Safety, Health, and Quality (ESH&Q) Section.

V - 5.3.1 *Purpose of the Waste Handling Facilities*

V - 5.3.1.1 LLWHF

The LLWHF handles, packages, stores, and ships radioactive waste. Once waste is received at the location, it is sorted, screened, compacted, absorbed, or solidified and packaged. The packaged waste is stored until there is sufficient amount accumulated to make a shipment as cost effective as possible.[1]

V - 5.3.1.2 BY

The BY is used to "Hold for Decay" (HFD) high dose rate waste items until dose rates are below shipment thresholds. In addition, HFD is also used for short lived isotopes until the waste can be disposed of conventionally. The BY is also used to store large items that are un-shippable due to the size and weight of the items. These items are mostly comprised of low dose rate waste and are HFD until they can be brought to the scrapyard.

V - 5.3.1.3 HWSF

The HWSF is used for the temporary storage of hazardous, non-hazardous, and mixed waste collected from the various Satellite Accumulation Areas (SAA) around the Fermilab site.

V - 5.3.2 *Description of the Waste Handling Facilities*

V - 5.3.2.1 LLWHF

The LLWHF is an office area accommodating up to 9 employees and roughly a 10,000 square foot high bay with a 25 ton bridge crane to assist in handling/loading of radioactive waste. The high bay also has a 32' x 18' x 4" liquid containment with a capacity of 1,373 gallons in the event of a spill.[2] The facilities and equipment used in the processing of radioactive material have been designed and constructed to enable Fermilab to meet the Waste Acceptance Criteria (WAC) of the disposal facility. Some specific aspects of the program where the design and construction has been achieved to meet WAC are:

- *The sorting and screening area utilizes a specially designed table. This table enables the waste processing personnel to accurately separate the solid waste into its various components, i.e., radioactive vs. non-radioactive, compactible vs. non-compactible.*
- *The instrumentation used by processing personnel is calibrated at fixed intervals or as needed by the Radiation Protection Instrument Team at the Laboratory. The sources used in the calibrations are National Institute of Standards and Technology traceable.*
- *The scale used to weigh waste containers is calibrated annually by an off-site contractor. The standards used in calibrating the scale are National Institute of Standards and Technology traceable.*
- *The absorption process for water is documented and only those personnel who have been trained are authorized to perform this task.*
- *The solidification process for oil has been adapted directly from the company who developed it. Fermilab contracts representatives from this company to come to the site, perform the solidification process, and certify their work.*[1]

V - 5.3.2.2 BY

The BY is a gravel hardstand of approximately 32,000 square feet surrounded by a 6' tall chain link fence capped with razor ribbon. The hardstand is used for open storage of large items that have a low dose rate. There are 11 caves of various sizes and one 2,604 square foot storage shed. These structures are used for covered storage of higher dose rate waste, but are subject to ambient temperatures. All structures are located inside the 6' chain link fence.

V - 5.3.2.3 HWSF

The HWSF is an asphalt hardstand of approximately 8,000 square feet surrounded by a 6' tall chain link fence. The hardstand area is used for loading and unloading of waste to and from the waste storage buildings during pick-ups and shipments. There are 3 buildings of various sizes with liquid containments and waste cabinets for the storage of waste. All waste related operations are conducted in accordance with the regulations set forth in CFR Title 40[3] and IPCB Title 35.[4] Building WS-3 at the HWSF is the Resource Conservation and Recovery Act (RCRA) Part B[5] permitted building that has an acid proof containment and a cabinet for storage of mixed waste.

V - 5.4 Safety Assessment

This section analyzes the accelerator specific hazards associated with the waste handling facilities. These hazards include residual activation, sealed sources, and radioactive waste.

V - 5.4.1 *Radiological Hazards*

Radiological hazards have been carefully considered in the design of the waste handling facilities. The facilities are equipped to handle the by-products of residual activation (such as tridiated water), sealed sources, and radioactive waste.

V - 5.4.1.1 Residual Activation

The LLRWF, BY, & the HWSF are not physically connected to the accelerator complex, therefore there is no residual activation produced at these facilities. Activated materials are transported to these facilities as waste and are handled in accordance with approved procedures and/or a current Radiological Work Permit (RWP), and will be discussed further below.

V - 5.4.1.2 Sealed Sources

Radioactive sources at the LLWHF and BY are handled, issued, and stored in accordance with the Fermilab Radiological Control Manual (FRCM) Chapter 4, Article(s) 411 through 415, 423, 431, 432, 433, & 461.[6] There are no sealed sources at the HWSF.

V - 5.4.1.3 Radioactive Waste

Radioactive waste is handled at the LLWHF, BY, and HWSF in accordance with the FRCM Chapter 4 Article(s) 441 through 443. The waste is characterized, stored, and packaged in accordance with the Low Level Waste Certification Program (LLWCP) Chapter(s) 4 through 10. DOE Order 458.1 is followed to protect the public and environment from the hazards of radiation[7], and CFR Title 10 part 835 is used as a guideline for the operations of the facilities when applicable.[8]

V - 5.5 Credited Controls

This section assesses the potential credited controls for the waste handling facilities.

V - 5.5.1 *Passive Controls*

There are no passive credited controls for any of the three facilities that qualify for inclusion in the Accelerator Safety Envelope (ASE). All hazards are managed in accordance with the Fermilab Environment, Safety, and Health Manual (FESHM)[9] including FRCM.

V - 5.5.2 *Active Controls*

There are no active controls for any of the three facilities that qualify inclusion in the ASE. All hazards are managed in accordance with FESHM including FRCM.

V - 5.5.3 *Administrative Controls*

Administrative control of the waste handling facilities begins with keeping the facilities locked when un-occupied. Only a small number of personnel possess keys to the waste handling facilities. All work at the facilities is performed according to HWSF, Radiological Work, and Hazard Control Technology Team (HCTT) procedures, and HCTT guidelines approved by the HCTT Leader, or applicable RWPs for radiological work.

The Fermilab security force performs checks on the facilities once per eight hour shift unless extra patrols are necessary for a specific threat or vulnerability. There are no administrative controls that qualify for inclusion in the ASE. All hazards are managed in accordance with FESHM, including FRCM.

V - 5.6 Summary and Conclusion

Specific hazards associated with the waste handling facility operations are identified and assessed in this chapter of the Fermilab SAD. The designs, controls, and procedures to mitigate these hazards are identified and described. In addition to these specific safety considerations, the facilities are subject to the global and more generic safety requirements, controls and procedures outlined in Section I of the Fermilab SAD.

Within the specific and generic considerations of this assessment, the waste handling facilities can be operated with a level of safety that will protect people and property and is equal to or exceeds those currently prescribed in DOE orders and Fermilab requirements as put forth in the FESHM including FRCM. The HWSF can be operated with a level of safety that will protect people and property and is equal to or exceeding those currently prescribed Federal, State, and Fermilab regulations as put forth in the FESHM, FRCM, CFR Title 40[3], IPCB Title 35[4] and Part B Permit.[5]

V - 5.7 Glossary, Acronyms

ASE	Accelerator Safety Envelope
BY	Boneyard
CFR	Code of Federal Regulations
DOE	Department of Energy
ESH&Q	Environment, Safety, Health and Quality
FESHM	Fermilab Environment, Safety, and Health Manual
FRCM	Fermilab Radiological Control Manual
HCTT	Hazard Control Technology Team
HFD	Hold For Decay
HWSF	Hazardous Waste Storage Facility
IPCB	Illinois Pollution Control Board
LLWCP	Low Level Waste Certification Program
LLWHF	Low Level Waste Handling Facility
RWP	Radiological Work Permit
RCRA	Resource Conservation and Recovery Act
SAD	Safety Assessment Document
TSCA	Toxic Substances Control Act

V - 5.8 References

1 Fermilab Low Level Waste Certification Program

2 HCTT Guideline #05 Spill Control Plan Site 40

3 Title 40 Code of Federal Regulations Applicable Parts of 260-265, 266-299, and 700 to 789

4 Illinois Pollution Control Board Title 35 of the Illinois Administrative Code Subtitle G: Waste Disposal

5 Illinois Environmental Protection Agency Part B Storage Permit

6 Fermilab Radiological Control Manual. - The current web link is: http://esh.fnal.gov/xms/FRCM

7 DOE Order 458.1, Radiation Protection of the Public and the Environment

8 Title 10 Code of Federal Regulations Part 835, Occupational Radiation Protection

9 Fermilab Environment, Safety, and Health Manual. – The current web link is: http://esh.fnal.gov/xms/FESHM