

FESHM 7050: DEMOLITION & DECOMMISSIONING

Revision History

Author	Description of Change	Date
Jim Niehoff, Raul Cantu & Eric Schlatter	Incorporated FESHM 8070 into Chapter; Changed SSO to DSO; Updated Lead and Asbestos reference chapters; removed Submitting subcontractor performance review link; added GIS reference; Recycling to FESHM 8022, Renamed DP-36 to Facility Reuse Program Policy; Added ES&H into the Engineering Survey process; Removed Center and Added Project; Added Decommission Section; added Technical Appendix on Guidelines to address Environmental Aspects of Enclosure Abandonment. Expanded chapter to include decommissioning	January 2021
Jim Niehoff	Added FESHM Chapter formatting template, revised definitions of competent person and demolition to be consistent with ANSI 10.6. Added definition of qualified person to be consistent with ANSI 10.6. Modified flow chart to include DP-36. Moved Engineering Survey from Appendix to a Form, i.e., 7050-F1.	March 2012
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1.0 INTRODUCTION

Safeguarding our workers, adjacent properties, and utilities is a continuous process that begins in project planning and design phase and runs through end of life. This chapter establishes a process to be followed by all divisions and sections when confronted with managing end of life activities for facilities/real property and experimental equipment. End of life activities for facilities and experimental equipment can include demolition, decommissioning, abandonment, mothballing, dismantlement, cold & dark, or repurposing. This chapter provides guidance for all end of life facility management activities.

This chapter provides actions needed for any demolition activity when operating under FESHM Chapter 7010 ES&H Program for Construction, FESHM Chapter 7020 Subcontractor Safety - Other Than Construction or FESHM Chapter 2060 Hazard Analysis for Fermilab Employees. This chapter is not a primer on how to do demolition safely. Standards to follow when performing demolition can be found in Title 29 Code of Federal Regulations (CFR), Part 1926, Subpart T and 1926.850 titled Demolition. This chapter is divided into two primary categories, decommission and demolition with four sub-categories.

Decommission		Demolition	
Program	Facility	Selective	Complete
Examples: Collider Detector at Fermilab (CDF) & NOvA Near Detector on Surface	Example: CHL	Example: HAB 2 nd & 3 rd Floors	Example: Main Ring Services Building F1 & F2

2.0 DEFINITIONS

- **Abandonment** – A disposition process for property that has no value; does not constitute a danger to the public health or welfare.
- **Authority Having Jurisdiction (AHJ):** An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, equipment installations, or procedures. In the Department of Energy (DOE), the head of field element is the AHJ. At Fermilab, routine AHJ authority for Electrical and Fire Safety has been assigned to the appropriate individuals by the Fermi Site Office.
- **Chief Safety Officer (CSO):** Reports directly to the Director and advises Division/Sections/Projects on ES&H matters. CSO Roles and responsibilities are defined in Fermilab ES&H Manual (FESHM) Chapter 1010 and 10 CFR 851.
- **Competent Person** - The definition of a competent person in 1926.32(f): One who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate the identified hazards. Duties related to ES&H will take precedence over other duties.

- **Construction Coordinator (CC)** - A Fermilab employee responsible for ensuring the work performed conforms to the subcontract technical requirements. The CC is the primary point of contact with the Subcontractor. CC's do not directly supervise subcontractor employees or direct construction work as Task Managers do.
- **Contamination** - The presence of measurable quantities of toxic, hazardous, or radioactive materials either in equipment within a structure and its environs or introduced to the structure itself and its environs as a result of Fermilab activities including both construction and operation. ES&H maintains files on contamination.
- **Decontamination** – The removal or reduction of radioactive and/or other hazardous contamination from facilities, including structural and nonstructural materials and equipment.
- **Decommissioning** – A formal process to remove something from an active status and in a safe-shutdown condition. There are two sub-categories of decommissioning:
 - **Program** – Actions taken at the end of the life of an experiment or program supporting an experiment.
 - **Facility** – Actions taken at the end of the life of a facility to retire or suspend it from service. This is also known as Transitional Facilities, those that have been placed in a safe-shutdown condition and abandoned.
- **Demolition** – Dismantling, razing, destroying, or wrecking any building or structure or any part thereof. 010010 and 013100 found in FESHM Chapter 7010, should be used regardless if demolition is considered “Service”, reference FESHM Chapter 7010, definition of Construction as well. There are two sub-categories of demolition:
 - **Selective** – Actions taken to remove interior or alteration, typically not involving structural load bearing members, to accommodate re-purposing or remodeling a given space or addition. This is a type of selective demolition.
 - **Complete** – Actions taken to remove using heavy equipment such as cranes and excavators equipped with special attachments.
- **Dismantlement** – dismantling of structures.
- **Division Safety Officer (DSO):** An individual who is assigned duties as the principal ES&H advisor for a Fermilab Division, Section, or Project.
- **Engineering Survey** – An evaluation of the conditions on a project site in preparation for the development of plans and procedures.
- **Facility** – A structure including but not limited to, enclosure, shed, trailer, building, concrete slab, any constructed property that served a specific function or service.
- **Integrated Safety Environment Management (ISEM)** – Reference FESHM Chapter 7010.
- **Landlord** - The Division/Section/Project (D/S/P) responsible for the facility or space where work is planned or occurring
- **Qualified Person** – One who, by possession of a recognized degree, certification, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated his/her ability to solve or resolve problems relating to the subject matter, the work, or the project.
- **Service Coordinator (SC)** - The Fermilab field point of contact between the subcontractor and the laboratory for a specific work classified as high hazard activity; responsible for

overseeing the subcontractor's work effort. Requesting organizations provide service coordination when required by Service Managers.

- **Stop Work** – Reference FESHM Chapter 7010 for Stop Work.
- **Task Manager (TM)** - An individual specifically designated by a Division or Section to direct trade-specific activities. The Task Manager assures the development of work hazard assessments as prescribed in Fermilab ES&H Manual Chapter 2060 – *Working Planning and Hazard Analysis*.
- **Transitional** - Transitional facilities are those that have been placed in a safe-shutdown condition and abandoned, or are undergoing decontamination and decommissioning (D&D) work and ultimately demolition or abandonment
- **Time & Materials (T&M) Office** - The office assigned to oversee a set of trade-specific subcontracts from which Fermilab can order supervised labor and other work. The T&M Office Manager is responsible for the overall subcontract compliance effort and operating procedures for specific subcontracts. This individual serves as the focal point for administration of the assigned subcontracts.

3.0 RESPONSIBILITIES

3.1 The Division/Section/Project (D/S/P) Head

- 3.1.1.** Is responsible for ensuring implementation of the requirements of this chapter for those ends of life facility management activities managed by his/her staff. The D/S/P head is also responsible for assigning a qualified CC/TM/SC. Responsible for coordinating an ES&H review for the identification of any hazardous materials, other chemicals, and radioactivity in their facilities that is not removable and communicate the information to the head of the ES&H Section to be incorporated into Decontamination and Decommissioning (D&D) documentation.¹
- 3.1.2.** Ensure that information regarding non-removable radioactivity and chemical hazards is transmitted to the ES&H Section prior to any end of life facility management activity. Means for gathering information will include, but not be limited to the following.
- Environmental Review Forms (FESHM Chapter 8060, National Environmental Policy Act Review Policy)
 - Lists of Facilities Containing Radioactive Materials (Fermilab Radiological Control Manual (FRCM) Chapter 2, Part 4, Release Certification Program for Facilities Containing Radioactive Materials) (RP Form 85 *List of Facilities Containing Radioactive Material*)
 - Engineering Survey Checklists – see Form F1
- 3.1.3.** Examples of chemicals that should be included in reports to ES&H for end of life facility filing are referenced in FESHM Chapter 8021, Chemical and Radioactive

Waste Management. All substances regulated under state or federal regulations shall also be included. Radioactive contamination limits may be found in FRCM Chapter 2, Table 2-2, Summary of Contamination Values. Information concerning known contamination associated with existing facilities is documented in Active Facility Data Collection System summaries and the List of Facilities Containing Radioactive Materials, both maintained and available by the ESH Section. In the event that facility decommission, or demolition is planned, then the Engineering Survey Checklist should be utilized.

3.2 The Construction Coordinator (CC)

- Serving as first line of contact with the subcontractor field organization
- Monitoring and enforcing subcontractor compliance with their ES&H Program (or ISEM plan, if required), the ES&H requirements in subcontract, and the hazard assessments for the scope of work
- Reviewing and accepting the subcontractor hazard analysis, providing input as needed
- Ensuring that no work is performed by the subcontractor or sub-tier contractor until the hazard analysis has been accepted, and reviewed and signed off by each subcontractor and sub-tier contract employee on the job
- Obtaining the required work permits
- Preparing and distributing the Work Permit/Notification form
- Participating in Preconstruction meetings to establish ES&H expectations
- Ensuring that all subcontractor and sub-tier contractor employees attend Fermilab's Subcontractor Orientation and other Fermilab-provided training
- Documenting noncompliance and drafting related memos for the Construction Manager
- Participating in weekly construction progress meetings with subcontractor
- Ensuring that goods and services meet specifications
- Initiating call tree upon subcontractor report of an incident
- Obtaining incident report from the subcontractor
- Preparing independent incident report for the Construction Manager
- Tracking and reporting to ES&H subcontractor and sub-tier contractor work hours by the seventh day of the month following the end of the quarter
- Attending the subcontractor's daily planning meetings, weekly toolbox meetings, and monthly ES&H training
- Participating in subcontractor performance review at end of the subcontract
- Reviewing the condition of mobile cranes used as part of the project, using the guidance found in FESHM 7010 Technical Appendix 3, "Mobile Crane – Safe to Operate Review Items"
- Verifying the training of those involved in high hazard activities with specific training requirements identified in Section 5.7
- Additional training verification may be required based on the phases of work in the HA

3.4 Service Coordinator (SC)

- Prepares a scope of work that clearly describes the typical work, classifies high hazards under the criteria provided in FESHM Chapter 7020 Table 1 – Potential Hazards for HA preparation, and submits with requisition;
- Completes information required in the Exhibit A cover sheet, and appends the Exhibit to the requisition;
- Assures subcontractor employees have received the Fermilab orientation and other task specific training. Reviews the work planning or written hazard analysis submitted by the subcontractor for acceptance, providing input when requested;
- Oversees and assures that the subcontractor work activities are in compliance with the subcontract requirements, including the ES&H requirements. Ensures that as conditions change through the life of the subcontract, or within a specific work activity, the same level of rigor for planning, approval, and oversight is maintained as would have been required for a new subcontract activity;
- Obtains necessary permits and distributes them, including the Work Permit/Notification (WPN) form;
- Reviews incident reports submitted by the subcontractor and forwards copies to the DSO, Procurement Administrator, and Service Manager;
- Coordinates the Site-Specific Meeting. Identifies site-specific hazards and ensures the subcontractor incorporated site specific hazards and associated mitigations on the HA as may be required;
- Notifies the subcontractor in a timely manner of uncorrected deficient or non-compliant work or safety violation using the Subcontractor ES&H Stop Work Order with a copy sent to the Service Manager and Procurement Administrator or designee;
- Notifies the Division Safety Officer (DSO) of any employee injuries;
- When requested, completes the Subcontractor Performance Evaluation Form found at the end of this chapter (Form 7020-F2) and submits to the Procurement.

3.5 The Task Manager (TM)

- Planning and directing all work activities
- Assisting the subcontractor in preparing the HA, and obtaining all required reviews and acceptances (reference FESHM 2060)
- Reviewing HA with subcontractor employees, seeking their input, and making changes as appropriate
- Assuring that all subcontractor employees sign the HA
- Assuring that the subcontractor performs no work until the HA has been accepted, reviewed and signed off by each employee
- Acting as competent person for the job
- Assuring subcontractor employees have received all appropriate training
- Obtaining the required work permits
- Preparing and distributing the Work Permit/Notification (WPN) form
- Conducting pre-job work planning meeting with subcontractor employees to assure they understand the work activity, ES&H hazards, and mitigation measures.

- Notifying the Division Safety Officer (DSO) of any employee injuries
- Coordinates and contributes to subcontractor incident investigations
- Informing the Division Safety Officer (DSO) of ES&H noncompliance issues
- Submitting subcontractor performance review when requested (<http://esh.fnal.gov/xms/FESHM>)
- Reviewing the condition of any mobile crane used as part of the project, using the guidance found in FESHM 7010, Technical Appendix 3.
- Conducting and documenting daily inspections of excavations
- Ensuring completion of an ES&H review of spaces prior to end of life facility management activities

3.6 The D/S Landlord

- Responsible for coordinating ES&H review of end of life facility management activities and conditions including documentation, to determine any contamination and hazardous materials in the structure to be demolished as well as any potential ES&H risks associated with future conditions.
- Initiating the request to manage the end-of-life activity in their space.

3.7 Facilities Engineering Services Section

- Shall be the repository for all civil construction drawings.
- Maintain available archival drawings of all structures and underground enclosures after their removal, modification or abandonment.

3.8 ES&H Section

- Maintain a permanent file designated the "Decontamination and Decommissioning File" (D&D File).
- Provide subject matter expertise for the review of potential ES&H risks associated with end of life facility management activities or end of life facility conditions.

3.9 Security

- Rekeying decommissioned buildings for restricting access.
- Maintain possession of key, authorization required from department head to grant key
- Removal of useable door hardware

4.0 PROGRAM DESCRIPTION

4.1 Decommission (Program/ Experiment)

The decommissioning and dismantlement of an expired experimental area requires ES&H Review to help ensure that all appropriate standards and requirements are effectively met. These reviews, because of specificity or complexity, should be reviewed by Fermilab ES&H Committee (FESHCom) Subcommittees and the original documentation found in accordance with FESHM

2005 ORC. Consequently, ES&H Review panels for experiments will be established. This document defines the procedures for these panels.

- 4.1.1. The CSO or designee, develops the charge to the panel; and names the panel chairs in consultation with Division/Section Heads, and Department Heads, as appropriate.
- 4.1.2. The ES&H Review Panel is normally charged to complete a timely and accurate safety review for decommissioning Experiment Decommission and Dismantlement Safety Review Form F2. The Point of Contact (POC) assigned as lead coordinator, similar to FESHM Chapter 2005 ORC POC, in establishing the principal controls necessary to accomplish the experiment decommissioning, with assistance from ES&H Section, Division/Section/Project engineers, and technicians, as needed. This individual will also serve as the main point of contact during all decommissioning activities.
- 4.1.3. All decommissioning and dismantling activities in a former experimental area involving the creation of new budgetary project codes will be subject to a review. This review will at a minimum follow the guidelines set forth in the included Experiment Decommission and Dismantlement Safety Review Form F2. This form will assist in the creation of the appropriate Hazard Analysis.
- 4.1.4. This is a dynamic document and is designed to establish the minimum safety review criteria for the decommissioning and dismantling of expired experimental areas and equipment. This document serves as a primer for the establishment of specific Hazard Analyses and in no way replaces or supersedes the need for separate job Hazard Analysis. The Review should cover all phases of the work and should be updated as new information is obtained. The POC and ES&H Review Panel members should complete the attached form as completely as possible during the review phase in order to grasp the full extent of the project.

4.2 Decommission (Facility)

- 4.2.1. Decommission or transitional facility planning should consider the impact that such a transition has on fire protection features and activities. Such factors are additionally important if the facility provides a significant mission or value as determined by the Department of Energy program office or if a fire would significantly increase the cost of the transition process. Reference DOE Standard 1066, Appendix F and International Fire Code Section 311.
- 4.2.2. For facility decommissioning, the Engineering Survey Form F-1 must include but is not limited to, all electric, gas, water, steam, sewer, and other services. The service lines shall be shut off, capped, or otherwise controlled, at or outside the building or demolition area before work is started. All workers shall be informed of the location of any existing or relocated utilities. If it is necessary to maintain any power, water, or other utilities during demolition, such lines shall be temporarily relocated as necessary

and/or protected. The location of all overhead power sources shall also be determined, as they can prove especially hazardous during any machine demolition. Contact ES&H Section to assist with the proposed demolition hazards, facility characteristics for completing the Engineering Survey.

- 4.2.3.** When Transitional Facility decommission has been complete, those who request entry must coordinate with Security Operations Center and Facilities Engineering Services Head.

4.3 Demolition (Selective and/or Complete)

- 4.3.1.** Demolition projects can consist of multiple work tasks that can be hazardous in nature. Premature structure collapse, utility location and hazardous materials are some of the most important elements to be considered during the design phase of all proposed work that involves demolition. A demolition project can be as complex as the wrecking of a multiple story building or as straight forward as the remodeling of an office.
- 4.3.2.** Properly planning a demolition activity requires that an engineering survey be performed and documented to provide the persons responsible for the demolition the opportunity to evaluate the entire job. Depending on the project, documentation can range from contract drawings and technical specifications to a job hazard analysis. The scope of the engineering survey will depend on the nature of the demolition project.
- 4.3.3.** The Engineering Survey Form F-1 must include but is not limited to, all electric, gas, water, steam, sewer, and other services. The service lines shall be shut off, capped, or otherwise controlled, at or outside the building or demolition area before work is started. All workers shall be informed of the location of any existing or relocated utilities. If it is necessary to maintain any power, water, or other utilities during demolition, such lines shall be temporarily relocated as necessary and/or protected. The location of all overhead power sources shall also be determined, as they can prove especially hazardous during any machine demolition. Contact ES&H Section to assist with the proposed demolition hazards, facility characteristics for completing the Engineering Survey.
- 4.3.4.** The Engineering Survey can, and should assist in the preparation of procurement documents, and will clearly spell out Fermilab's expectations and requirements regarding demolition activities. Consideration will be given to selection of subcontractors based in part on qualifications to perform the demolition work safely. The 7.0 Technical Appendix A: flow chart should be used as a guide when planning a complete demolition of a facility.

5.0 PROCEDURES

5.1 Division/Section/Project & Real Property

- 5.1.1.** The appropriate D/S/P designee must contact the Facilities Engineering Service Section (FESS) Real Property Department prior to commencement of demolition work, in accordance with Director' Policy Facility Reuse Program. FESS Real Property Department contact information can be found at <http://fess.fnal.gov> or ext. 3304.
- 5.1.2.** Utility location is one of the most important elements of the pre-job planning. All electric, gas, water, steam, sewer, and other services lines should be shut off, capped, or otherwise controlled. Utilities are disconnected or controlled at or outside the building or demolition area prior to start of work. If it is necessary to maintain any power, water, or other utilities during demolition, such lines shall be temporarily relocated as necessary and/or protected. The location of all overhead power sources should also be determined, as they can prove especially hazardous during any machine demolition.
- 5.1.3.** The design team will use all reasonable means of identifying existing utilities:
- Existing utility and GIS maps
 - Previous design and as-built documents
 - Fermi-JULIE locating of utilities
 - On site physical review
 - Corporate knowledge
- 5.1.4.** The design team will incorporate all known utility information into design and construction drawings and the inclusion of Exhibit A found in FESHM 7010.
- 5.1.5.** The responsible party is responsible for coordinating the ES&H review determining whether radiologically contaminated material, asbestos, lead, or any other hazardous materials, chemicals, or gases are present at the site to be demolished or if the end of life facility management activities or conditions pose a current or future risk to the safety and health of people or the environment. The landlord shall review the Decontamination and Decommissioning File (D&D File) of the structure, building or site to identify any known contaminants. When the presence of any such substance is apparent or suspected, testing and removal or purging shall be performed, and the hazard eliminated prior to demolition. It should be noted that decommissioning and abandonment of subsurface enclosures and structures may include environmental impact risks posed from materials not included above (such as metal supports, ladders, etc. that may leach to groundwater once the subsurface structure is allowed to flood). Refer to the attached Technical Appendix A for further guidance.

- 5.1.6. The design team will follow FESHM Chapter 8022 Recycling, Waste Minimization and Pollution Prevention Awareness Program. All end of life facility management waste shall be collected and sent to a recycling vendor to identify any material that can be recycled, reused, or reduced. The design team shall require from the vendor a report on the weight of materials recycled, and total weight.
- 5.1.7. Depending on the nature of the project, subcontract documents may include the following:
- Identify appropriate qualifications for subcontractors on projects regarding end of life facility management activities. These will include past safety performance indicators along with minimal qualifications for the site superintendent as outlined in FESHM 7010.
 - Clearly define the subcontractor's responsibility to protect and/or support adjacent structures and utilities during end of life facility management activities.
 - Preparatory meetings before the start of each new phase of end of life facility management activities.

5.2 NEPA Reviews

- 5.2.1. Fermilab shall conduct necessary NEPA reviews in the initial phase of the activity planning process. Refer to FESHM Chapter 8060.

5.3 Engineering Survey

- 5.3.1. This chapter requires that a qualified person(s) conduct an engineering survey of any structure slated for demolition. The purpose of the survey is to determine the condition of the framing, floors, and walls, so that any necessary measures can be taken to prevent the premature collapse of any portion of the structure. When indicated as advisable, any adjacent structure(s) should be similarly checked. Form 7050-F1 - Engineering Survey Checklist can be used as a guideline when a survey is performed.

5.4 Procurement Phase

- 5.4.1. Depending on the nature of the demolition project, the following may be required:
- A pre-bid meeting including discussion of requirements for demolition.
 - Safety qualifications and qualifications of site superintendent if/as required in Exhibit A will be considered in the subcontractor selection.
 - Pre-construction meetings including discussion of requirements for demolition activities.
 - A demolition plan from the subcontractor including the means and method of demolition, site security from unauthorized access, and an emergency plan addressing fires, cave-ins, and evacuation procedures.

5.5 Demolition Phase

5.5.1. Demolition Activities:

- The TM/CC/SC attends and takes a pro-active role in preparatory meeting with the subcontractor superintendent and competent person prior to the beginning of any demolition activity. Suggested agenda items include:
 - Review permits, HA, LOTO, disablements
 - Review shop drawings, materials on hand
 - Discuss routing of existing utilities / interferences
 - Confirm extent of demolition
 - Establish stop points (inspections)
 - Establish schedule for any further meetings
 - Discussion of ES&H review

- All electric, gas, water, steam, sewer, and other services lines should be shut off, capped, and LOTO procedures implemented at or outside the building before demolition work begins. The subcontractor must verify with the TM/CC that all utilities have been abandoned and or LOTO procedures are in place.
- When utilities and other services in the area of the demolition cannot be de-energized or depressurized, the following procedures apply:
 - A special preparatory meeting must be held to review the known utility information, discuss the means and methods to be utilized, identify associated hazards, and develop an HA. Meeting attendees will include:
 - TM/CC/SC
 - Superintendent
 - Competent Person
 - Subcontractor safety representative
 - ES&H

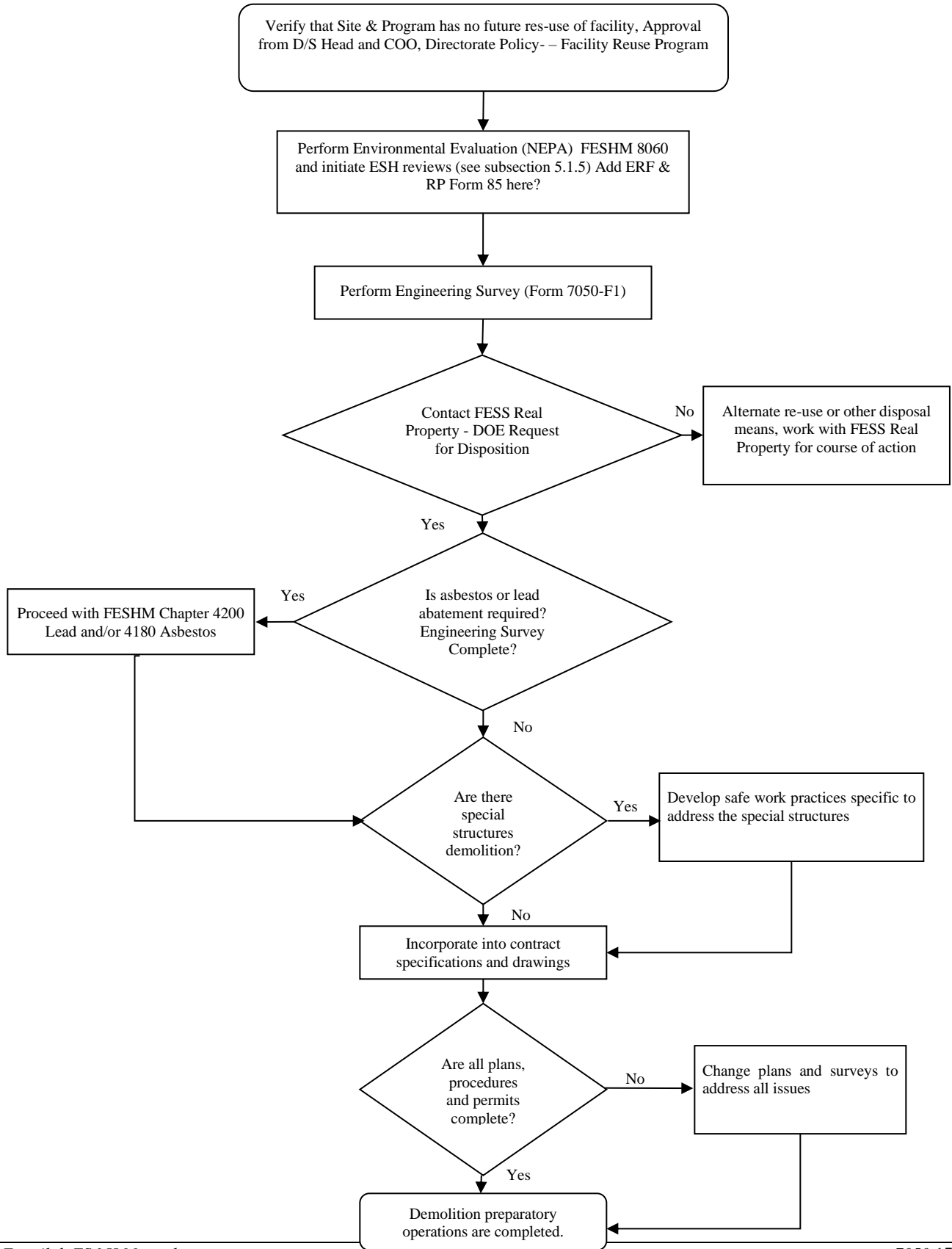
- TM/CC/SC presence is strongly recommended at the demolition site when:
 - Demolition activity first begins or enters a new phase.
 - Demolition activities are near energized electrical cable.
 - Demolition activities are near existing structures.

6.0 REFERENCES

- 29 CFR 1926 – Safety and Health Regulations for Construction
- ANSI/ASSP A10.0, 2017 – Safety & Health Program for Demolition Operations
- Form 7050-F1 – Engineering Survey Check List
- Fermilab ES&H Manual (FESHM)
 - Chapter 7010 – Construction ES&H Program
 - Chapter 7030 – Excavation
 - Chapter 7040 – Concrete Cutting and Coring Activities

- Chapter 8060 – National Environmental Policy Act Review Policy
- Director’s Policy – Facility Reuse Program

7.0 TECHNICAL APPENDIX A: COMPLETE DEMOLITION FLOW CHART APPROVAL PROCESS



8.0 TECHNICAL APPENDIX B: PROCESS GUIDELINES TO ADDRESS ENVIRONMENTAL ASPECTS OF ENCLOSURE ABANDONMENT

The purpose of this document is to provide guidelines for addressing potential environmental impacts resulting from abandonment of subsurface enclosures at Fermilab. It is assumed that dewatering sump(s) will be included in the scope of abandonment. The floor level of all enclosures at Fermilab are deeper than the typical depths to near-surface groundwater (approximately 5 to 10 feet), therefore the abandonment of dewatering sumps will eventually allow the enclosure to partially or completely flood with groundwater. It is the inundation of components within subsurface enclosures that creates potential environmental impacts to surrounding groundwater and nearby surface water. Potential radiation impacts fall under the sitewide monitoring directive for groundwater (DOE 458.1) and the DOE DCS for surface water. Potential impacts from solid waste (metals, etc.) to groundwater fall under RCRA.

An evaluation of the abandonment work must be completed via the NEPA (National Environmental Policy Act) process, the first step of which is completion of the Fermilab ERF (Environmental Review Form). Information on the NEPA process and access to the ERF form can be found at <http://eshq.fnal.gov/atwork/ep/nepa/>. In addition to following the steps to identify and evaluate the components within the enclosure to be abandoned, steps should be taken to limit the flooding (and potential environmental impacts) to the abandoned enclosure so that adjacent enclosure(s) are not affected.

8.1 Process Steps

Following is a summary of process steps applied to enclosure NME-NMH abandonment:

1. Radiation survey
2. Radiation contaminant wipes
3. IH survey and sampling
4. Environmental survey

Results of the radiation and IH surveys and sampling should be taken into consideration when assessing potential environmental impacts. While the IH sampling would be performed after the initial radiation survey, the confined space determination portion of the IH survey would need to be performed before or concurrently with the initial radiation survey.

The radiation evaluation portion should start with a thorough snoop survey, followed by collection of contamination wipes (including the inside of the beam pipe) and photos for documentation and further planning. Components that are removed and not reusable should be taken to the railhead for recycling determination. For items that are not recycled, it is the responsibility of the project/task owner to store (notify area RSO, DSO and building manager) or dispose (Site 40).

The confined space determination made during the initial IH evaluation may be re-assessed if multiple points of entry have been opened during removal of components (e.g., if top slabs are removed from enclosures such as those in the NM line). IH samples should then be collected and the enclosure re-surveyed to confirm non-activation. IH samples are sent offsite for analysis, so the

scheduling of subsequent steps should consider a typical 5-day turnaround to receive analytical results.

During the environmental evaluation, samples should be collected, and additional photographs should be taken to document components with potential impacts due to solid waste. These include:

- Conduit, wiring, control boxes
- Lead (pipes, solder, etc.), magnesium, iron, glycol, etc.
- Asbestos installation
- Transite (asbestos & concrete matrix)
- Radioactive contamination

7.2 Documentation

In order create a reference for future discussions with regulatory agencies, a narrative and tabular documentation of the components removed from and left remaining in abandoned structures should be created and filed. As an example, for the NME-NMG enclosure abandonment work a PDF file with text descriptions, photographs and tables for each enclosure was produced as documentation of the demolition and abandonment work prior to backfilling of the enclosures. Additionally, the component spreadsheets created during the work planning phase served as the platform for documentation of the findings of the radiation, IH and environmental surveys and facilitated the reviews and approvals prior to backfilling.

7.3 Recommendation

To reduce environmental liability and avoid costly groundwater monitoring and mitigation measures that may result from environmental impacts, it is recommended that all enclosure components be removed from abandoned enclosures. Reliance on structural components – such as beamlines that are open to adjacent, non-abandoned enclosures – to maintain partial flooding in the abandoned enclosure requires continued monitoring of the flooded level and may eventually fail, leading to inundation of remaining components originally above the partial flooding level.

ⁱ In July 2000, DOE imposed a suspension on the recycling of metals being removed from radiological areas, as defined by 10 CFR 835, as of that date. Such metals may not be recycled. A Radiation Safety Officer should be consulted concerning special procedures instituted to comply with this suspension