

FESHM 7010: CONSTRUCTION ES&H PROGRAM

Revision History

Author	Description of Change	Revision Date
Angela Aparicio & Jim Niehoff	Modified Section 6, Trainings Requirements for CC/TM and added another category, Low and High Voltage tasks. Tweaked document throughout from ESH&Q to ES&H. Clarified 6-ft fall rule for scaffolding and steel erection. Added a paragraph in Section 5.4, Subcontractor's training records and Fermilab's right to verify.	August 2022
Jim Niehoff	Revised ISMS to ISEMS to be consistent with 01300; added reference to 1926, Subpart AA under Section 7.5	January 2019
Jim Niehoff	Renamed Beneficial Occupancy to Authorization of Use and Possession. Replaced FESS Procedure with FESHM 7005.	June 2018
Mike Bonkalski, Raul Cantu, & Jim Niehoff	Addressed the Enterprise Assessment report recommendations: <ul style="list-style-type: none"> • Formatted as an ES&H Construction Manual in line with the new 013100 <i>ES&H Requirements for Subcontractors</i>; • Clarified safety expectations and documentation required on T&M and Fixed Price Construction projects. • Added definition of Field Superintendent; • Changed 30-Hour OSHA training from Competent Person to Field Superintendent; • Updated requirements for Environmental Protection; • Added QA/Safety Risk Form for all fixed price work; • Correlated Procurement roles & responsibilities to match Procurement policies; • Added the approved D/S Task Manager sheet. 	July 2017
Jim Niehoff	Modified ES&H Roles and Responsibilities pertaining to review and acceptance of Subcontractor's ES&H program, removed LOTO II and NFPA 70E training requirements from General Construction Table 1 Qualifications Criteria, & removed acceptance/review form.	July 2011
Kent Collins	Combined 7010 and 7011 into one chapter, added Center & Exhibit A thereby canceling FESHM, Chapter 7011.	November 2010
Russ Alber	Minor modification, categorized price limits related to construction cost	May 2007
E. McCluskey	Added TM/CC Qualifications as outlined in Table 1	March 2006
Jolie Macier	Clarified Construction Coordinator roles and responsibilities.	June 2003
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TABLE OF CONTENTS

1.0	INTRODUCTION.....	4
2.0	DEFINITIONS	4
3.0	CONSTRUCTION DOCUMENTS	8
3.1	General	8
3.2	Fixed Price Construction.....	8
3.3	Time & Material Construction Documents	9
3.4	Submittal & Working Drawings.....	9
4.0	FERMILAB ES&H DOCUMENTS	10
4.1	ES&H Documents	10
4.2	Code of Federal Regulations (CFR) Documents.....	11
4.3	National Codes and Standards.....	11
5.0	SUBCONTRACTOR’S ES&H DOCUMENTS	12
5.1	Subcontractor’s Safety Performance	12
5.2	Subcontractor’s Environment Safety & Health Program	12
5.3	Subcontractor’s Construction (site-specific) ES&H Certification (CESHC).....	13
5.4	Subcontractor’s Training Records.....	13
5.5	Hazard Analysis (HA).....	13
5.6	Work Planning.....	15
6.0	TRAINING REQUIREMENTS.....	15
6.1	Fermilab Personnel.....	15
6.2	Fermilab Task Manager/Construction Coordinator Qualification Criteria	15
6.3	Fermilab Task Manager/Construction Coordinator Qualification List	16
6.4	Subcontractor Personnel.....	17
6.5	Delivery Personnel	18
6.6	Competent Person.....	18
6.7	Subcontractor Safety Officer/Representative	18
6.8	Field Superintendent.....	18
6.9	Qualified Person	18
7.0	CONSTRUCTION ES&H CONTROLS	19
7.1	Hazard Communication.....	19
7.2	Hazardous Material	19
7.3	Excavation	19
7.4	Concrete Finishing, Cutting, and Coring Activities	20
7.5	Confined Workspaces.....	20
7.6	Fall Protection	20
7.7	Ladders and Scaffolds	21
7.8	Fire Protection	21
7.9	Electrical & Power Distribution	23
7.10	Lockout and Tagout.....	23
7.11	Pressurized Gas and Process Piping.....	24
7.12	Blasting.....	25
7.13	Housekeeping, Health, and Sanitation	25
7.14	Environment Protection.....	25
7.15	Radioactive Materials.....	26

7.16	ES&H Inspections & Audits	26
7.17	Visitors to Construction Sites.....	27
7.18	Loaning of Fermilab Tools.....	27
7.19	Material Handling and Storage.....	27
7.20	Safety Bulletin Boards.....	28
8.0	CONSTRUCTION EQUIPMENT	28
8.1	Motor Vehicles	28
8.2	Cranes	28
8.3	Earth Moving and Other Heavy Equipment.....	29
8.4	Portable and Hand Tools	29
9.0	CONSTRUCTION PERSONNEL PROTECTION	30
9.1	Physical and Medical Qualifications	30
9.2	Drug and Alcohol Free Work Place	30
9.3	Personal Protective Equipment and Protective Clothing	30
9.4	Industrial Hygiene	31
9.5	Radiation Monitoring Badges	32
10.0	WORK PROCEDURES.....	32
10.1	General	32
10.2	Pre-Construction Meeting	32
10.3	Notice to Proceed, Work Permits, and Construction Start	32
10.4	On-going Construction (QA/QC) Inspections.....	33
10.5	Jobsite ES&H Meetings	34
10.6	Authorization of Use & Possession (AUP) and Final Acceptance	34
10.7	Work Completion and Clean-Up.....	34
10.8	Subcontractor’s Evaluation	34
11.0	EMERGENCY PROCEDURES	35
11.1	Stop Work.....	35
11.2	Restart Work.....	35
11.3	Spills of Toxic or Hazardous Materials.....	35
11.4	Personnel Injuries/Medical Services	36
11.5	Fire Control	36
11.6	Accident Investigation.....	36

1.0 INTRODUCTION

This chapter outlines the relationships and responsibilities of Fermilab, the Construction Subcontractor and sub-subcontractors (AKA sub-tier contractors). This chapter is intended to provide guidance for Fermilab employees as a Construction Environment, Safety, and Health (ES&H) Manual, and mirrors and clarifies the 013100 contractual ES&H requirements for Subcontractors and sub-subcontractors involved with construction projects on the Fermilab site. It also applies to activities in leased spaces with the understanding that site-specific actions (i.e., fire response, waste management, spill response, industrial hygiene monitoring, confined space entry support, etc.) will be provided by local resources.

2.0 DEFINITIONS

- **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 delegated to the ES&H Section by the Fermi Site Office. Reference DOE Order 420.1C Facility Safety and DOE Standard 1066, Fire Protection, for further information.
- **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 hazardous. Duties related to ES&H will take precedence over other duties.
- **Construction:** The combination of erection, installation, assembly, demolition, or fabrication activities involved to create a new facility or to alter, add to, rehabilitate, dismantle, or remove an existing facility. Construction also includes the alteration and repair (including dredging, excavating, and painting) of buildings, structures, or other real property, as well as any construction, demolition, and excavation activities conducted as part of environmental restoration or remediation efforts.
- **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.
- **Construction Environmental Safety & Health Certification (CESHC):** An official, binding document prepared by the subcontractor and bearing the signature of a responsible manager of the subcontracting company defining the safety and health practices and responsibilities necessary to conduct operations at Fermilab or leased spaces in a safe manner.

- **Construction Manager (CM):** An individual or firm responsible to Fermilab, for supervising and administrating a construction project to ensure that the construction subcontractor complies with the construction subcontract requirements.
- **Construction Management Office (CMO):** An office comprised of a Construction Manager, Design Coordinator, Construction Coordinator, Procurement Administrator, and ES&H Safety Coordinator. This office is responsible for supervising and administrating the construction project to ensure the subcontractor's compliance with technical specifications and ES&H requirements. An office member will serve as the primary liaison between the Subcontractor and Fermilab. A CMO is typically related to General Plant Projects (GPP) and projects designed and built under DOE Order 413.3B, *Program and Project Management for the Acquisition of Capital Assets*.
- **Construction Worksite:** The physical area within the defined limits necessary to perform the work described in the Subcontract.
- **Davis-Bacon Act:** The Davis-Bacon and Related Acts, apply to subcontractors and sub-tier contractors performing on federally funded or assisted contracts in excess of \$2,000 for the construction, alteration, or repair (including painting and decorating) of public buildings or public works. Reference U.S. Department of Labor, Wage and Hour Division for additional information.
- **Design Coordinator:** A Fermilab person assigned to the project who works with the CM and CC to assist in the technical coordination of the project.
- **Division Safety Officer (DSO):** An individual who is assigned duties as the principal ES&H advisor for a Fermilab Division, Section, or Project.
- **ES&H Coordinator:** A Fermilab employee responsible for ES&H guidance, periodic construction site visits, supporting the Construction Coordinator, and providing oversight of the Subcontractor's safety program. The ES&H Coordinator reviews the Hazard Analyses and training documentation for on-going work activities and brings any noted deficiencies to the attention of the Fermilab CC for follow up with the Subcontractor. The ES&H Coordinator has authority to stop work activities for imminent danger, fatality, or major environmental release, but does not have authority to direct changes in the work scope of the project or to the Subcontractor's means and methods of construction.
- **ES&H Construction Oversight:** Activities of ES&H personnel aimed at assessing a project to verify compliance with laws and regulations, Fermilab policies and procedures, subcontract requirements, and the accepted Subcontractor's ES&H Program. Oversight includes audits, inspections, and the activities of all line management in support of Fermilab ES&H efforts.
- **ES&H Inspection:** An on-site review of construction work activities using the established subcontractor's ES&H Program, Construction ES&H Site Specific Certification, Hazard Analyses, and/or Fermilab ES&H Manual Chapters.
- **ES&H Section:** Fermilab Environment, Safety, and Health (ES&H) Section is headed by the Chief Safety Officer. Roles and responsibilities can be found in Fermilab ES&H Manual Chapter 1010.

- **Excavation:** Any man-made cut, cavity, trench, or depression in the earth's surface formed by earth removal, where employee exposure can be reasonably anticipated and employee entry into the excavation is a requirement of the work activity.
- **Fermi Site Office (FSO):** The United States Department of Energy local site office.
- **Hazard Analysis (HA):** The process of identifying and formally documenting hazards and controls for all anticipated phases of work.
- **Field Superintendent:** 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 hazardous. Their role is to manage the day-to-day construction operations, to control the short-term construction schedule, and to coordinate quality control activities with sub-tier contractors and vendors. ES&H will always take precedence over other duties.
- **Imminent Danger:** A hazard which, if allowed to persist, is quite likely to cause an accident that will result in death, serious injury, significant property damage, or environmental impairment.
- **Integrated Safety Environment Management (ISEM):** The system for performing work safely and in an environmentally responsible manner. ES&H management systems are normal and natural elements of accomplishing work. The intent is to combine ES&H considerations with managing other primary elements of construction: quality, cost, and schedule. Fermilab subscribes to the philosophy of ISEM and requires subcontractors and sub-tier subcontractors to implement ISEM in order to achieve the mission while protecting the public, workers, and environment.
- **Landlord:** The Division, Section or Project responsible for the facility or space where work is planned or occurring.
- **Mobile Crane:** A crane consisting of a rotating superstructure, operating machinery, and operator's station and boom; mounted on a crane carrier equipped with axles and rubber-tired wheels or crawler type cranes for travel and have a power source(s). Having either a single station or two separate stations for operating and driving. Its function is to lift, lower and swing loads with boom raising and lowering capabilities and it has a superstructure that can rotate 360 degrees.
- **Personal Protective Equipment (PPE):** Refers to protective clothing, helmets, goggles, and other garments or equipment designed to protect the wearer's body from injury or infection. The hazards addressed by protective equipment include physical, electrical, heat, noise, chemicals, biohazards, and airborne particulate matter.
- **Procurement Administrator (PA):** A Fermilab employee specifically assigned to the project, who is responsible for negotiating and administering the subcontract terms and conditions. All modifications to the subcontract will come from the Procurement Administrator or designee, in writing. The Procurement Administrator or designee is the sole entity that can modify the subcontract or initiate change orders.
- **Project ES&H Support:** Individual(s) designated to provide ES&H support to the Project Manager and Integrated Project Team. Responsibilities fall to the ES&H Section if no Project ES&H support is assigned in the Project Execution Plan.

- **Project Execution Plan (PEP):** A document created by the Project Manager that identifies the roles and responsibilities for the Integrated Project Team.
- **Project Manager (PM):** The Fermilab individual directly involved with and accountable for overall project control and the application of specific control measures to ensure successful completion of project objectives.
- **Quality Assurance (QA):** A program that focuses on developing a systematic approach to activities that will help us avoid problems and deliver an end product that meets the expectations of our customers. There is a continuing evaluation of factors that affect the design or specification for intended applications as well as verification, audits, and inspection.
- **Quality Control (QC):** Activities focused on monitoring a process or eliminating causes of unsatisfactory performance to verify the quality of our deliverables and control outputs by performing inspections, tests and validations to determine if design specifications have been met.
- **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.
- **Requisitioner:** The person or organization responsible for developing the written scope of work and submitting it to the Procurement Department.
- **Revision:** A change to the subcontract occurring after the subcontract has been awarded and executed. Revisions are typically issued during the construction period.
- **Subcontractor's ES&H Program:** Subcontractor's company policies and procedures to ensure operations comply with applicable safety and occupational health laws and regulations, and protect the safety and health of employees and members of the public.
- **Subcontractor Safety Officer/Representative:** An individual from the Subcontractor assigned as the designated Safety Representative. They will have completed the OSHA 30-hour construction safety course and have a minimum of 10 years of construction experience consistent with the type of activities included in the scope of work.
- **Stop-Work Authority:** The responsibility and duty of all personnel to stop work when an unsafe condition or act is observed that could affect the safety of personnel and/or environment.
- **Stop Work:** There are several variations of Stop Work related to the severity of the conditions and on-going operations. Specifically, they are:
 - Stop Work and Remedy Immediately in the field (SWRI): This type of stop work condition promptly corrects hazard conditions. For example, two extension cords daisy chained together. Whoever stopped and corrected the condition will notify the Construction Coordinator/Task Manager (TM/CC). The issue should be documented by the ES&H Coordinator.
 - Stop Work and Remedy the Activity (SWRA): This type of stop work involves a hazardous activity that cannot be promptly mitigated. Whoever stopped the work activity will notify the TM/CC. The TM/CC is the only one who can restart the work activity. If the hazard can be abated in a timely manner, then

no formal notification is required. However, the issue should be documented by the ES&H Coordinator.

- Stop Work and Require a Written Corrective Action response (SWRCA): This type of stop work involves systemic issues with multiple work activities or is an immediate danger to life, health or environment. Examples would be lack or improper use of fall protection, excavation collapsing while workers are present, serious NFPA 70E violation, etc.
- **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*.
- **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 CONSTRUCTION DOCUMENTS

3.1 General

Although documents vary widely for the many types of construction on the Fermilab site, all such documents will convey Fermilab commitment for strict compliance to ES&H goals. Both text and drawings will clearly detail the general and project specific information to fulfill ES&H requirements. Fermilab uses two (2) types of subcontractors to accomplish construction work covered by the Davis-Bacon Act: 1) Fixed Price Construction and 2) Time and Materials Construction. The descriptions below emphasize the ES&H aspect of documents associated with these types of construction.

3.2 Fixed Price Construction

- 3.2.1. Schedule, Terms, and Conditions: This document provides project specific information including “Job Conditions” and “Interferences Affecting the Work” which pertain to the project site and work required for completion by the subcontractor. It delineates specific safety requirements for fire protection, welding, ground fault protection, temporary lighting, ventilation, material handling and safety equipment for the planned work, and indicates other general documents that are included in the construction subcontract by reference.
- 3.2.2. Technical specifications: The project technical specifications provide information about the materials, fabrication and installation methods to be used to complete the subcontract work. These specifications can detail specific ES&H considerations that are required by either the material manufacturer or by Fermilab. For certain materials and equipment, Fermilab may require a submittal for review, detailing manufacture’s information, samples, Safety Data Sheet (SDS), and/or drawing. This review process

may result in additional ES&H requirements related to installing or using any material or equipment provided to complete the subcontract work.

- 3.2.3. Constructability Review: A constructability review, including ES&H issues, will be conducted at no later than 60% design completion. The review will identify problems in constructing the project as designed. Recommendations are provided to the designer on changes that will facilitate construction while retaining design intent. Other actions taken in conjunction with the review of drawings and specifications are a check of items and quantities, development of a schedule, sequence of work, and a review of utility issues.
- 3.2.4. Subcontract General: The Subcontract General contains text that applies to all construction subcontracts and is not project specific. It is reviewed periodically by the Fermilab legal counsel and generally is changed only when procurement laws or regulations for construction work are altered.

3.3 Time & Material Construction Documents

T&M Construction documents fall into two categories. The Fermilab T&M Construction Subcontract with each individual outside subcontractor in each of the specific work disciplines and the T&M Task Order Requisition which initiates an individual task.

- 3.3.1 The T&M Construction Subcontracts follow the same general format as the Fixed Price Subcontract with certain exceptions. They do not contain Technical Specifications and they do not contain formal working drawings. These subcontracts procure services which can then be used for individual task orders. The T&M Construction Subcontract contains the same General Requirements, ES&H Requirements, and Terms and Conditions.
- 3.3.2 The T&M Task Order Requisition is the instrument that initiates work under any of the standing T&M Construction Subcontracts. The requisition form includes a description of the planned work and identifies the Task Manager responsible for overseeing the work. The task description of the work may be general and undefined in cases where there is variable work scope and content. Drawings or sketches should accompany the requisition when they are available; however, the main responsibility for directing the construction labor team rests with the Task Manager. The TM will define any task specific ES&H requirement with input from ES&H Section.

3.4 Submittal & Working Drawings

- 3.4.1. Submittals in construction are shop drawings, material data, samples, and product data. These may include catalog cut sheets, manufacturer's standard drawings and details, fabricators' detailing, equipment performance characteristics, working drawings, and calculations.
- 3.4.2. Submittals may be required on a given project to verify correct products and quantities will be installed. Subcontractor submittals can also assist with coordination with other

trades and indicate means and methods of construction, such as crane lift, concrete forms, or scaffolding. This documentation may be subject to review and acceptance by the ES&H Section.

3.4.3. The submittal procedure can be found in Specification Section 13300 and in the individual technical division or section of the specifications.

4.0 FERMILAB ES&H DOCUMENTS

4.1 ES&H Documents

Portions of the following Fermilab documents having direct application to the required construction will be included in the appropriate subcontract documents:

- 4.1.1. Fermilab Environmental, Safety, and Health Manual (FESHM). Some of the specific chapter related to construction activities include:
- FESHM Chapter 1010, *Laboratory Environment, Safety, and Health Management System and Its Implementation*
 - FESHM Chapter 2001, *Environment, Safety, & Health for Projects*
 - FESHM Chapter 2020, *Work Permit and Notification Form*
 - FESHM Chapter 2060, *Work Planning and Hazard Analysis*
 - FESHM Chapter 3020, *Incident Investigation and Analysis*
 - FESHM Chapter 4230, *Confined Spaces*
 - FESHM Chapter 4195, *Silica*
 - FESHM Chapter 5031, *Pressure Vessels*
 - FESHM Chapter 5031.1, *Piping Systems*
 - FESHM Chapter 5032.3, *Transporting Gases in Building Elevators*
 - FESHM Chapter 6020.2, *Welding, Burning, and Spark Producing Operations*
 - FESHM Chapter 6030, *Disablement of Fire Protection Systems and Other Related Safety Systems*
 - FESHM Chapter 7005, *Facility Construction, Modifications & Inspection*
 - FESHM Chapter 7020, *ESH&H Program for Subcontractor Safety Other Than Construction*
 - FESHM Chapter 7030, *Excavation*
 - FESHM Chapter 7040, *Concrete Cutting and Coring Activities*
 - FESHM Chapter 7050, *Rules for Demolition*
 - FESHM Chapter 7060, *Fall Protection*
 - FESHM Chapter 7070, *Ladder & Scaffold Safety*
 - FESHM Chapter 7080, *Concrete Anchor Devices*
 - FESHM Chapter 8025, *Wastewater Discharge to Sanitary Sewers*
 - FESHM Chapter 8050, *Domestic Water Protection*
 - FESHM Chapter 8060, *National Environmental Policy Act Review Policy*
 - FESHM Chapter 9120, *AC Electrical Power Distribution Safety*

- FESHM Chapter 10100, *Overhead Cranes and Hoists*
- FESHM Chapter 10110, *Below the Hook Lifting Devices*
- FESHM Chapter 10140, *Mobile Cranes*
- FESHM Chapter 10190, *Crane Personnel Lifting Platforms*
- FESHM Chapter 10200, *Lift Plans*

4.1.2. Fermilab Quality Assurance Manual (QAM)

4.1.3. Fermilab Radiological Control Manual (FRCM)

4.2 Code of Federal Regulations (CFR) Documents

These have direct application to construction performed on the Fermilab site and at leased spaces with regard to ES&H issues. All work performed at Fermilab and leased spaces will comply with all applicable provisions of these documents where applicable:

- 10 CFR 851, *Department of Energy Worker Safety and Health Program*
- 10 CFR 820, *Procedural Rules for DOE Nuclear Activities*
- 10 CFR 835, *Occupational Radiation Protection*
- 10 CFR 860, *Trespass to Land Owned & Leased by the US Government*
- 29 CFR 1904, *Record Keeping Guidelines for Occupational Injuries and Illnesses*
- 29 CFR, 1910, *Occupational Safety and Health General Industry Standards*
- 29 CFR 1926, *Occupational Safety and Health Standards for Construction*
- 40 CFR *Protection of the Environment* (USA EPA)
- 49 CFR *Transportation*
- 35 IAC *Illinois Environmental Protection* (Illinois EPA)

4.3 National Codes and Standards

The National Codes and Standards in total or in part have requirements which address specific ES&H issues related to construction. All work performed on the site will comply with all applicable provisions of these documents. It should be noted that this is not necessarily a comprehensive list.

- 4.3.1. American Conference of Governmental Industrial Hygienists, *Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices*
- 4.3.2. American Society of Mechanical Engineers (ASME)
 - ASME B30 Series, Crane Safety
 - ASME B31 Standards of Pressure Piping
- 4.3.3. American National Standards Institute (ANSI)
 - ANSI A10, Construction Package
 - ANSI Z136.1 Safe Use of Ladders

4.3.4. International Building Code (IBC)

4.3.5. National Fire Protection Association (NFPA)

- NFPA 70, National Electrical Code
- NFPA 70E, Standard for Electrical Safety in the Workspace

5.0 SUBCONTRACTOR'S ES&H DOCUMENTS

5.1 Subcontractor's Safety Performance

The subcontractor will have their past safety performance evaluated and accepted before any construction subcontract can be awarded. The subcontract documents will prescribe which submittals are required.

5.1.1. The Fermilab ES&H Section will evaluate the subcontractor's past safety performance including the following criteria when the information is available:

- Information provided by the subcontractor on the Fermilab Subcontractor Safety Information Questionnaire form, and/or;
- Subcontractor experience modification rate (EMR), and/or;
- On-site safety performance as documented, if available. See the "Subcontractors Evaluation" procedure in this document.

5.1.2. For a Fixed Price subcontractor, the PA will forward the completed form (Fermilab Subcontractor Safety Information Questionnaire Form 7010-F1) and supporting documents to the ES&H Section for review. The ES&H Section will review and provide comments and rejection/acceptance to the PA within three (3) working days.

5.1.3. For a T&M subcontractor, the PA will forward the completed for (Fermilab Subcontractor Safety Information Questionnaire Form 7010-F1) and supporting documents to the ES&H Section for review. The ES&H Section will review and provide comments and rejection/acceptance to the PA within three (3) working days.

5.1.4. To be acceptable, the subcontractor must have an Experience Modification Rate (EMR) of less than one (1) **and** a three-year safety record equal to or less than 85% of the most current U. S. Bureau of Labor Statistics General Construction statistics for Total Recordable Case Rate (TRC) and Days Away, Restricted, or Transferred (DART) Case Rate as reported in the BLS Occupational Injury and Illness Data.

5.1.5. The subcontractor's previous on-site performance, as documented in formal evaluations provided to the Fermilab Procurement Office, also will be considered.

5.2 Subcontractor's Environment Safety & Health Program

The Subcontractor will have an effective ES&H program incorporating the ISEM philosophy.

- 5.2.1. On all subcontracts that require performance bonding, the Subcontractor will have an ES&H Program commensurate with the nature and complexity of the work. This Program will describe the Subcontractor's overall commitment to safety and specific safety measures for this project work scope and site. Additional information can be found in 013100.
- 5.2.2. Once submitted, the ES&H Section will review and provide comments and rejection/acceptance to the PA within five (5) working days.
- 5.2.3. Changes and Updates: The ES&H Program is a living program. Updates that reflect changes to processes and plans will be submitted as changes are made. Fermilab may require changes to the program and acceptance prior to subcontract award. Once accepted by Fermilab, the Subcontractor will be required to comply with the requirements identified in their program.
- 5.2.4. All sub-tier subcontractors employed by the Subcontractor must agree in writing to follow the Subcontractor's ES&H Program. If not, the Sub-tier subcontractors will submit for review/acceptance their ES&H Program and provide their own CESHCA acknowledging the requirements of 10 CFR 851, as referenced in 013100.

5.3 Subcontractor's Construction (site-specific) ES&H Certification (CESHC)

All projects with new subcontracts, will require Construction ES&H site specific certification prior to commencing any work activities on site. Subcontractors will sign the acknowledgment of 10 CFR 851 as delineated in 013100. The ES&H Section will review and provide comments and rejection/acceptance to the PA within five (5) working days.

5.4 Subcontractor's Training Records

For all work activities where specific training is mandated by regulations (e.g. OSHA), the subcontractor must maintain records at the work site providing proof of current training records for any qualified individuals. Designated "Competent Persons" are expected to have a higher level of experience, training and qualification.

Fermilab may verify the subcontractor's 30 Hour OSHA training, Competent Person Training for Fall Protection, Scaffolding, Excavation and Confined Space Entry Training. Subcontractor must have training and experience in crane inspections and lift plan development and approval including critical lifts on the Fermilab site.

5.5 Hazard Analysis (HA)

A written HA is required for all construction work, regardless of who performs the work. The HA document will identify all hazards associated with each phase of work and the work processes to be employed to eliminate or reduce those hazards. Each identifiable feature within a project requires a written hazard analysis. Work will not proceed on that feature until the Task Manager/Construction Coordinator has assured an HA has been prepared, reviewed, accepted, and people involved in the work have acknowledged the HA.

- 5.5.1. New or unanticipated hazards encountered with each project phase or change in specific operations within that phase must be addressed and added to the HA as the project develops.
- 5.5.2. The Construction Coordinator assigned for Fixed Price Construction projects is responsible for ensuring that the HA addresses the work supervision and management as conducted by the Subcontractor's Field Superintendent and that the work process, hazards, and controls are well communicated to the workers.
- 5.5.3. It is not uncommon to have multiple HA's for a construction project reflecting the individual discipline or task specific trade working on a specific activity. The preparation of the HA's, regardless if Fixed Price or T&M, should be by the subcontractor and/or individual sub-tier subcontractors with input from the workers.
- 5.5.4. The CC and/or T&M Office must assure that the Subcontractor understands the HA process and is able to perform a thorough hazard assessment and prepare a task specific job Hazard Analysis.
- 5.5.5. HA's submitted by the subcontractor and/or sub-tier subcontractors (via the Subcontractor) will be reviewed and accepted by the Task Manager or Construction Coordinator and ES&H Section. Once received by the Construction Coordinator, will submit to ES&H for review and input prior to acceptance.
- 5.5.6. For Fixed Price Construction projects, the Procurement Administrator will not issue the Notice to Proceed (NTP) or Purchase Order until the CC sends notification that the hazard analysis has been accepted. The initial HA can be in the form of a visitor's HA. For larger projects, only the Subcontractor's ES&H Program is required to be accepted prior to NTP.
- 5.5.7. Change orders have the potential to introduce new hazards. Change orders should be reviewed and if new hazards are present due to new work activity, the HA will be revised and reviewed with the subcontract personnel if additional risks are introduced.
- 5.5.8. If there will be two (2) or more groups (subcontractors and/or employees) working in the same area, and yet operating under different HAs, the TM/CC must coordinate activities with the other TM/CC/supervisor. Any conflicts between the two HAs will be resolved before work begins. Both working groups will review and sign each other's HA.
- 5.5.9. For projects involving only electrical work less than 600 volts, the Electrical Hazard Analysis/Work Permit form found in Fermilab ES&H Manual Chapter 9120 is sufficient as long as all hazards including electrical hazards are identified and dealt with.
- 5.5.10. The completed HA form with the signature page must be posted at the jobsite. This can be accomplished through a variety of means, including use of the subcontractor's

bulletin board or a clipboard. If posting is not feasible, due to the location of the work, the HA should be located in a place so that it is easily available to all affected employees (subcontractors, Sub-tier subcontractor's employees, Fermilab employees). If the jobsite conditions are such that the HA could get destroyed, the original should be saved off work site and a copy posted and replaced as needed.

5.5.11. The ES&H Section will review the HA and provide comments and acceptance to the TM/CC within three (3) working days.

5.5.12. HA records created by the subcontractor are to be retained with the subcontract file, readily accessible, for a minimum of one (1) year. HAs must be stored for five (5) years after the year in which the work took place, reference Fermilab ES&H Manual Chapter 2060.

5.6 Work Planning

Daily and task (trade) specific hazard analysis found in the Technical Specification 013100.

6.0 TRAINING REQUIREMENTS

6.1 Fermilab Personnel

The TM/CC is the primary contact in the field, as well as the quality control and field technical representative to the laboratory.

6.1.1. Before assignment as a TM/CC, an employee must, at a minimum, complete training as follows:

- OS000009/CR OSHA Construction Safety 30 Hour (mandatory)
- FN000303- Construction Management & Safety (mandatory)
- Excavation Competent Person (mandatory if an excavation is part of the construction activities).
- Training required for the areas where the work will be performed and/or the nature of the activity (e.g. Radiation Worker, ODH, Controlled Access).
- Scaffolding Competent Person (mandatory if a scaffold erection is part of the construction activities).

6.1.2. For additional information on availability of courses contact the ES&H Section.

6.2 Fermilab Task Manager/Construction Coordinator Qualification Criteria

Table 1 below compiles the qualification criteria and maintenance of qualifications requirements for employees involved in construction management under the construction specialties.

6.3 Fermilab Task Manager/Construction Coordinator Qualification List

Division/Sections shall maintain a TM/CC qualified list using Form F-7. This list shall be updated annually and submitted to ES&H Section.

Category	Education/Experience	Training	Mentoring	Step 1. Continuing Education
General Construction	- 2 yr. Degree in construction related field; Or, - 3 yrs. Experience in construction related trade	- OSHA 30-Hour - Modified Construction Management & Safety - Scaffolding – Competent Person? - Fall Protection	Yes, mentor discretion on length	- 8 hours per year (Seminars, class or trade shows), and/or; - Quarterly updates
Excavation	Manage one (1) or more excavations per year	- OSHA 30-Hour - Modified Construction Management & Safety - OSHA excavation hazards course	Yes (mentor discretion on length)	- 8 hours per year (Seminars, class or trade shows), and/or; - Quarterly updates
Rigging	BS Engineering Or 5+ years of experience	- OSHA 30-Hour - Modified Construction Management & Safety - Rigging & Crane courses	Yes (mentor discretion on length)	- 8 hours per year (Seminars, class or trade shows), and/or; - Quarterly updates
Piping	BSME, BSCE Or 5-years' experience	- OSHA 30-Hour - Modified Construction Management & Safety - Pressure vessel orientation	Yes (mentor discretion on length)	- 8 hours per year (Seminars, class or trade shows), and/or; - Quarterly updates
HVAC	BSME Or, 5-years' experience	- OSHA 30-Hour - Modified Construction Management & Safety - LOTO II (See ITNA) & NFPA 70E (See ITNA)	Yes (mentor discretion on length)	- 8 hours per year (Seminars, class or trade shows), and/or, - Quarterly updates
Electrical – Low Voltage ≤480V	BSEE or 5-years exp.	- OSHA 30-Hour - Modified Construction Management & Safety - LOTO II (See ITNA) & NFPA-70E (See ITNA)	Yes (mentor discretion on length)	- 8 hours per year (Seminars, class or trade shows), and/or; - Quarterly updates

Electrical – High Voltage >480V	BSEE or 5-years exp.	- OSHA 30-Hour - Modified Construction Management & Safety - LOTO II (See ITNA) & NFPA-70E (See ITNA)	Yes (mentor discretion on length)	- 8 hours per year (Seminars, class or trade shows), and/or; - Quarterly updates
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6.4 Subcontractor Personnel

All subcontractor employees who will not be escorted by a trained Fermilab employee must attend a safety orientation and includes General Employee Radiological Training (GERT) before start of work.

- 6.4.1. The ES&H Section will provide this orientation daily at 0730 AM. The training will be documented with an attendance sheet and a card that the subcontractor employee must carry at all times while working at Fermilab. If the subcontractor employee is unable to produce the card, the employee will be required to stop work until the card can be produced or until the subcontractor employee attends the orientation again. The orientation expires two (2) years from the date of attendance.
- 6.4.2. The subcontractor will be responsible to assure that employees (including Sub-tier subcontractor employees) are able to understand Fermilab’s ES&H requirements. The ES&H Section has the ability to provide the class in Spanish if needed. It is the responsibility of the TM/CC to arrange for this specialized training.
- 6.4.3. All subcontractors and Sub-tier subcontractors performing work at Fermilab will provide safety training, medical surveillance, and safety equipment, including personal protective equipment (PPE) for their employees. Exceptions involve training that is unique to Fermilab. This includes oxygen deficiency hazard (ODH) medical surveillance, training, and equipment for ODH areas, radiological training and equipment. Additional training, surveillance and equipment will be provided as stipulated in the subcontract documents.
- 6.4.4. All subcontracts will contain a statement formally notifying the subcontractor and all Sub-tier subcontractors that they are required to maintain records of training completed by all personnel working on the Fermilab site. Training needs will be based upon statutory requirements, Fermilab requirements, the nature and complexity of the work, and/or the associated hazards. These training and associated medical records will be subject to audit and verification by Fermilab. Training records for certain high hazard activities will be inspected prior to exposing employees to the respective hazard. The activities that require verification of training prior to execution of work are, but not necessarily limited to:
 - Entry into a permit-required confined space or ODH classified facility/area.
 - Entry into a radioactive or controlled work area.
 - Work involving exposure to lead, asbestos, or beryllium.

- Use of respiratory protection when potential exposure levels will be above established limits (medical clearance, fit testing, and training).
- Fall Protection
- Lockout/Tagout
- Electrical activities that require compliance with NFPA 70E
- Scaffolding
- Excavation
- Crane Operator & Rigging
- Aerial (Boom) & Scissor Lifts
- Forklift, including construction type

6.5 Delivery Personnel

Delivery personnel coming to construction sites are required to use PPE applicable to their own activities and are exempt from the Subcontractor Orientation class. When outside their vehicle, they must wear PPE as specified in the HA within the construction designated area. Subcontractors are responsible for notifying delivery personnel of PPE requirements or providing delivery personnel with the personal protective equipment required by the hazard analysis.

6.6 Competent Person

A person having the necessary training, field experience to identify and eliminate the hazards associated with the work activity. Examples include, but not necessarily limited to: Fall protection, Rigging and Material Handling, Welding and Cutting. For certain areas requiring specific expertise, such as excavation or scaffolding erection, additional specialty training and certification is required.

6.7 Subcontractor Safety Officer/Representative

Unless specified otherwise in 010010 and 01300 ES&H Requirements, the Field Superintendent will act as the Subcontractor Safety Officer. Determination of a required Subcontractor Safety Representative for Fixed Price Construction Projects is dependent on the completion of the Safety QC/QA Risk Assessment Form 7010-F6 or <https://fess-app.fnal.gov/app/SubcontractorSafetyForm>.

6.8 Field Superintendent

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 hazardous. The superintendent's role is to manage the day-to-day operations and control schedule. In addition, the superintendent includes quality control and coordination responsibilities with sub-tier contractor/vendors. Fermilab requires the Subcontractor Field Superintendent to have completed an OSHA 30-hour construction safety course.

6.9 Qualified Person

The definition of a qualified person is found in 1926.32(I) and NFPA 70E, Article 100. Qualified person has the technical or engineering knowledge related to supporting/equipment systems. For example, a qualified person who has been trained in NFPA 70E, is the only individual who can exercise LOTO on an electrical distribution system.

7.0 CONSTRUCTION ES&H CONTROLS

7.1 Hazard Communication

- 7.1.1. All Subcontractors will have a hazard communication program which complies with the requirements in OSHA 29 CFR 1926.59.
- 7.1.2. Subcontractors will maintain and have available on site Safety Data Sheets (SDS) for each hazardous chemical being used on the construction site.
- 7.1.3. The Subcontractor will maintain all SDS for all hazardous chemicals used by sub-subcontractors employed as part of the subcontract.

7.2 Hazardous Material

Any substance which by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritating, or otherwise harmful, is likely to cause death or injury will be considered a hazardous material and its use in construction activities will be subject to the following standards.

- OSHA 29 CFR 1910, Subpart H – Hazardous Materials
- OSHA 29 CFR 1910, Subpart Z – Toxic and Hazardous Substances
- OSHA 29 CFR 1926, Subpart D – Occupational Health and Environmental Controls
- Fermilab ES&H Manual Chapter 4110 Hazard Communications

7.3 Excavation

No excavation work will commence until the Construction Coordinator or Task Manager obtains an Excavation Permit. All excavation work will be performed in strict accordance with OSHA 29 CFR 1926, Subpart P – Excavations.

- 7.3.1. The Subcontractor will designate an “Excavation Competent Person” as defined in Section 1926.650(b) prior to the commencement of any excavation activities.
 - Access and egress will be established for excavations including trenches equal or greater than 4 feet deep.
 - The Subcontractor will have a qualified person (licensed engineer) prepare an excavation plan when excavations are equal to or greater than 20 feet deep. This excavation plan will be submitted, reviewed, and accepted by Fermilab prior to the start of excavation activities.
 - The Subcontractor will protect edges of all unattended open trenches with barricades, etc.

- 7.3.2. Existing underground utilities will be located by Fermilab prior to the start of excavation activities, reference FESHM Chapter 7030 for further information.

7.4 Concrete Finishing, Cutting, and Coring Activities

- 7.4.1. Existing embedded utilities in concrete walls, floors, ceiling (deck) will be located by Fermilab in advance, reference FESHM Chapter 7040 for further information.
- 7.4.2. Silica exposure and monitoring requirements are found in FESHM Chapter 4195.

7.5 Confined Workspaces

- 7.5.1. All confined workspace either existing within or to be constructed under the scope of work, will be identified.
- 7.5.2. Work within confined spaces will be in accordance the subcontractor's own program which will meet the requirements of the following:
- ANSI Z117.1, Safety Requirements for Confined Spaces
 - OSHA 29 CFR 1910.146, 1926.21 (b) (6), and 1926.352 (g); 353 (b) and 1926 Subpart AA
- 7.5.3. Subcontractor will have required documentation on site, including specifically:
- Copy of Confined Space Entry Program;
 - Training records;
 - Names of individuals who will perform specific functions for confined space entry including the authorized entrant(s) and attendant(s) and responder(s);
 - Calibration log of air monitoring equipment; and
 - A listing of personal protective equipment to be used on the confined space including lifelines, harnesses, respirators, tripods, and ventilators.
- 7.5.4. All potentially hazardous energy sources within the confined space will be secured, relieved, disconnected, and/or restrained in accordance with the Subcontractor's Lockout/Tagout Program and in some T&M instances, Fermilab's LOTO program.
- 7.5.5. Prior to entry of the confined space, the Construction Coordinator or Task Manager will make notification to the Fermilab Fire Department. Notification of the Fermilab Fire Department is required at the completion of the confined space as well.

7.6 Fall Protection

- 7.6.1. All fall hazards equal to or greater than six (6) feet will have 100% fall protection for all Subcontractor's and/or Sub-tier subcontractor's employees. This includes steel erection work and scaffolding work except for reinforcing steel walls. Fall protection is not required when climbing vertically on reinforcing steel walls; however, when

traversing horizontally or performing work on reinforced steel walls, then 100% fall protection is required.

- 7.6.2. A fall protection plan will be instituted for leading edge work or precast concrete erection work that make conventional fall protection systems infeasible or create a greater hazard. This equivalency analysis will be documented as part of the HA for this work activity.
- 7.6.3. The Subcontractor will maintain on site individual employee training records. For example, training records should include recognition of fall hazards and proper procedures for the fall protection systems.
- 7.6.4. All workers using fall arrest harness must be specifically trained in their use.

7.7 Ladders and Scaffolds

- 7.7.1. Walking and working surfaces including temporary flooring, scaffolds, platforms, roof surfaces, shoring, formwork, ladders, and stairs, will comply with the following:
 - OSHA 29 CFR 1926, Subpart L – Scaffolding Note: 6-foot fall protection rule applies to Scaffolding.
 - OSHA 29 CFR 1926, Subpart M – Floor and Wall Openings
 - OSHA 29 CFR 1926, Subpart Q – Concrete and Masonry Construction, Section 1926.703 (a), (b), and (c)
 - OSHA 29 CFR 1926, Subpart R – Steel Erection, Section 1926.750 in it's entirety. Note: 6-foot fall protection rule applies to Steel Erection.
 - OSHA 29 CFR 1926, Subpart X – Stairways and Ladders
 - ACI 347 – Recommended Practices for Concrete Framework
 - ANSI A10.1 - Safety Requirements for Concrete and Masonry Work
 - Fermilab ES&H Manual Chapter 7070
- 7.7.2. The Subcontractor will assign a competent person for scaffolding erection, dismantling, and inspection.

7.8 Fire Protection

- 7.8.1. Fire Protection and prevention at construction sites will be in accordance with the following standards except where more stringent requirements are contained in the subcontract documents.
 - OSHA 29 CFR 1926, Subpart F – Fire Protection and Prevention
 - OSHA 29 CFR 1926, Subpart J – Welding and Cutting, section 1926.352 and 1926.354
 - NFPA 10, Standard for Portable Fire Extinguisher
 - International Fire Code, Chapter 33, Fire Safety During Construction and Demolition
 - Fermilab ES&H Manual Chapter 6010

- 7.8.2. Fire Department may make periodic fire inspections of construction sites.
- 7.8.3. All fires and emergencies will be reported immediately by dialing Fermilab Phone extension: **3131** or Subcontractor phone: **1 (630) 840-3131**
- 7.8.4. All (Hot Work) welding, burning, brazing, flame cutting, and/or spark producing operations will comply with:
- OSHA 29 CFR 1910, Subpart O – Welding, Cutting, and Brazing
 - OSHA 29 CFR 1926, Subpart J Welding and Cutting
 - American Welding Society (AWS) Standard: Safety in Welding and Cutting, and Allied Process, ANSI/ASC Z49.1
 - NFPA 51B, Standard for Fire Prevention During Welding Cutting and Other Hot Work
 - Fermilab ES&H Manual Chapter 6020.2
- 7.8.5. Prior to commencing any welding cutting or brazing operations, Subcontractor will request from the Construction Coordinator or Task Manager a (Hot Work) Burn Permit issued by the Fermilab Fire Department.
- 7.8.6. Disabling or shielding of a fire detection system to avoid accidental alarms activated by welding, burning, or brazing activities, will be in accordance with FESHM 6030.
- 7.8.7. Approved portable fire extinguishers will be furnished and maintained by the Subcontractor on all welding, flame cutting, cad welding activities, cranes and other heavy equipment such as construction fork lifts, earth moving and other heavy mechanical equipment, and trucks, in accordance OSHA 1926.550.
- Only multi-purpose Class A, B, C dry chemical fire extinguishers, ten (10) pound minimum capacity with a pressure gauge are acceptable for use on Fermilab construction sites unless otherwise approved by the Fermilab Fire Department.
- 7.8.8. Stationary, above ground fuel storage tanks for construction vehicles are not permissible on the Fermilab site. Fuel tanks mounted on vehicles are permissible as long as vehicle and fuel tank conform to the requirements of the Illinois State Fire Marshal's Office and will be removed from the Fermilab site at the end of each work day. Refueling equipment while the equipment motor is running is prohibited.
- 7.8.9. Open burning, fire barrels, coal or kerosene type salamanders, or open flame heating devices with exposed fuel below the flames are prohibited. Spark arrestors will be provided on all stack or burning devices having forced drafts. Only UL or FM Approved temporary heating devices, vented to the outside are permissible in any enclosed building room or structure.

- 7.8.10. Temporary closures, dust partitions, or solid barriers constructed of combustible materials will conform to the requirements of Fermilab ES&H Manual Chapter 6040.1 unless otherwise approved by the Fermilab Fire Department.
- 7.8.11. Subcontractor storage, handling, and fire protection for flammable and combustible liquids will comply with OSHA 1926.152
- 7.8.12. Smoking including electronic cigarettes are prohibited in locations where flammable and or combustible materials are stored. “No Smoking” signs will be posted by the Subcontractor, if necessary. Smoking including electronic cigarettes is prohibited in all Fermilab buildings and enclosures.

7.9 Electrical & Power Distribution

- 7.9.1. All temporary electrical distribution provided and installed on the construction site by the Subcontractor will comply with applicable sections of:
- OSHA 29 CFR 1910, Subpart S – Electrical
 - OSHA 29 CFR 1926, Subpart K – Electrical
 - National Electrical Code (NFPA 70)
- 7.9.2. All lock-out and tagout procedures will be used on ALL electrical systems to insure personnel safety in accordance with NFPA 70E.
- 7.9.3. Any work on existing Fermilab electrical distribution systems will comply with Fermilab ES&H Manual Chapters 9110 Electrical Utilization Equipment Safety and 9120, AC Electrical Power Distribution Safety.
- 7.9.4. Flexible cords are to be rated for the hazard or extra hazard usage, in accordance with National Electrical Code, Table 400.5(A). Marking on such cords would be S, ST, SO, and STO. Appropriate markings for hard service are SJ, SJO, SJT, and SJTO.
- 7.9.5. Relocatable Power Taps (RPTs), also referred to as power strips, are prohibited in construction areas.
- 7.9.6. Ground Fault Circuit Interrupters (GFCIs) are the only accepted method to protect construction workers from an electrocution hazard when using hand held power tools. Subcontractors and their Sub-tier subcontractors will supply portable GFCIs for their workers to use if protected circuits are not available.

7.10 Lockout and Tagout

Controlling hazardous energy sources for personnel safety in construction activities is commonly termed “lockout and tagout”. A lockout-tagout procedure covers potential hazards associated with electrical circuits, pneumatic or hydraulic systems, presses, capacitors, batteries, mechanical movement levers, pump shafts, fan blades, and pressurized liquids or gases. All actions required to

control hazardous energy sources through a lockout-tagout procedure will comply with the applicable portions of the following standards:

- OSHA 29 CFR 1910.147 – The Control of Hazardous Energy (Lockout-Tagout)
- OSHA 29 CFR 1910 Subpart S – Electrical, Sections 1910.301 through 1910.399
- OSHA 29 CFR 1926.417 – Construction Industry (Lockout-Tagout)
- NFPA 70E, Electrical Safety in the Workplace, 2009 Edition
- FESHM Chapter 2100 Fermilab Energy Control Program (Lockout-Tagout)

7.11 Pressurized Gas and Process Piping

The following procedure will be followed to minimize risk and prevent accidents when performing work on pressurized or process piping systems. The most common piping systems at Fermilab include Industrial Cooling Water, (ICW) Domestic Water System (DWS), Storm Sewer (SS), Heating Water (HW), Low Conductivity Water System (LCW), Chilled Water System (CHW), and Natural Gas (GAS). Other piping systems, such as Nitrogen, Helium, Argon and pressurized air, are subject to specialized ES&H procedures and specifications tailored to those systems, typically found in Engineering Notes. For further information related to these systems, reference the FESHM 5000 Series entitled “Pressured/Vacuum Vessels and Piping.”

- Follow explicitly the materials jointing and workmanship specifications defined in the drawings and technical specifications. Handle requests for substitution or deviations through established change request and change order procedures.
- Obtain approval and coordination of the system outage with the Construction Coordinator or Task Manager prior to working on existing in-service piping systems. Make requests for such outages at least 48 hours in advance of the scheduled work.
- Work on existing pressurized, in-service piping systems generally is not permissible. “Hot Tap” connections are not permissible unless 1) the job specifies the need and 2) the Subcontractor has submitted specific procedures and received Fermilab approval.
- Relieve pressure on the entire piping system before opening it up and starting work. The Subcontractor will use Lock and Tag procedures defined in Section 7.10 for all valves, blank-offs and relief lines.
- Observe all related ES&H procedures for excavations, combustible gases, confined spaces and oxygen deficiency concurrently with the planned piping work.
- The Subcontractor will test new piping systems or additions in accordance with the drawings and technical specifications for the project. The Subcontractor will review testing procedures with the Construction Coordinator or Task Manager prior to the testing. Proper piping anchorage and support (e.g., thrust blocks, tie rods, retainers, and hangers) will be in place before the system test.
- Upon test completion, the Subcontractor will follow the specified pipe cleaning procedures. The Subcontractor will also dispose of solvents and wash solutions in accordance with the specifications and related Fermilab ES&H Manual Chapters.
- The piping system will be returned to service by reversing the above procedures of notification, inspection, system fill, and lock and tag.

7.12 Blasting

Blasting is not permissible on any construction project on site without prior written approval of Fermilab.

7.13 Housekeeping, Health, and Sanitation

- 7.13.1. The Subcontractor will maintain housekeeping daily. The Subcontractor will plan, organize, layout and maintain the construction site in a manner to insure an environmentally healthful working area. The subcontractor will be responsible for the work areas of the Sub-tier subcontractors and will enforce similar conditions on them.
- 7.13.2. Keep all areas of the construction site clear of debris, rubbish, and other materials that could cause tripping or falling conditions. Construction materials will be piled in orderly stacks, with safe heights and slopes, reference OSHA 29 CFR 1926.25.
- 7.13.3. The Subcontractor will maintain access and egress to excavations, structures and other areas for efficient use by personnel and equipment paying special attention to routing of emergency equipment that may be needed at the work area.
- 7.13.4. The Subcontractor will maintain adequate portable toilet facilities for the crews at the site. These facilities must be anchored properly, reference OSHA 29 CFR 1926.151.
- 7.13.5. The Subcontractor will execute cleaning and sweeping in a manner, which minimizes the contamination of the air with dust or particulate matter and addresses the requirements detailed in the silica guidance table. The Subcontractor will also maintain building entrances and openings to prevent or minimize the entry of vermin.

7.14 Environment Protection

- 7.14.1. Construction work on site will comply with Fermilab Environmental Management System, all applicable environmental Executive Orders, laws, and regulations. An approved Environmental Review Form is required for all construction work and can be found at: <http://fess-ogfp.fnal.gov:8095/EnvironmentalReview/faces/searchReviewForms.xhtml>. All subcontractors and sub-subcontractors will plan and perform construction activities in an environmentally sound manner that limits the risks to the environment and protects the public health.
- 7.14.2. The Subcontractor will implement preventive and protective measures on all construction activities to ensure ES&H environmental compliance objectives are being met.
 - Erosion controls will be in place where needed, prior to the start of earthwork. Storm water diversions and erosion/sediment controls (including lined ditches, silt fences, and erosion matting) shall be installed per technical specifications and/or drawings.

- Excavation at or adjacent to streams, tributaries, and other drainage outfalls may be done only after prior notification to the Fermilab Construction Coordinator. The Subcontractor will ensure that erosion control features are in compliance with wetland/waterbody permits before excavating.
- The Subcontractor will mitigate immediately any latent field conditions that result in unexpected environmental impacts on the construction site.
- The Subcontractor will plan and sequence construction activities in conjunction with daily weather forecasts for the site. Excavation operations will not proceed beyond erosion control measures by more than 24 hours when severe and inclement weather is predicted.
- The Subcontractor will properly grade and maintain all maintenance and fueling areas to prevent any adverse effect on the environment.
- Flammable and/or combustible liquids, fuels, and oils will not be stockpiled on the site beyond one-day usage unless approved by the TM/CC after consultation with the Fermilab Fire Department.

7.14.3. At close of every workday, the Subcontractor's Field Superintendent will inspect the complete construction site to ensure that all erosion controls drainage patterns, excavations and staging areas are in environmentally sound condition for the weather conditions anticipated until the next work day. This inspection will include the work of the subcontractor as well as all the Sub-tier subcontractors. Any required correction will be immediate.

7.15 Radioactive Materials

7.15.1. This section applies to construction near radiation areas or radioactive materials. The Subcontractor will diligently follow all special procedures described in the drawings and technical specifications relative to construction work in radioactive soil or at existing structures. All workers will receive Fermilab training in accordance with the Fermilab Radiological Control Manual (FRCM) and will wear dosimetry monitoring badges or other devices as required.

- Fermilab will monitor excavations in areas suspected of radioactive soil conditions. The Subcontractor will allow access and time for these measurements. The Subcontractor will follow the prescribed procedures for material handling and segregation of designated material exactly as specified.
- Workers will wear protective clothing when specified by the Fermilab TM/CC. Fermilab will furnish and collect this clothing.
- The Fermilab Construction Coordinator or Task Manager will guide and instruct the Subcontractor on procedures to wash-down and cleanup of the Subcontractor's equipment. The Subcontractor will not remove equipment from site without prior inspection and approval by the ES&H Section.

7.16 ES&H Inspections & Audits

The ES&H Section will conduct regular ES&H inspections and audits of a Subcontractor's ES&H Program.

7.16.1. An ES&H audit should occur at six (6) month intervals when projects are scheduled to last more than 12 months. ES&H Section will coordinate these audits with the CC and the Subcontractor Safety Representative

7.16.2. **ES&H Inspection Documentation** – The ES&H Section will document each construction project inspection and any observations, as per ES&H procedures.

7.17 Visitors to Construction Sites

All visitors, including Fermilab personnel who are not directly involved with the project, entering a construction site must notify the TM/CC and review and sign the HA. All persons entering a construction site must wear the PPE identified in the HA.

7.18 Loaning of Fermilab Tools

Fermilab does not normally loan tools and equipment unless the subcontract specifically authorizes the loan. Excluded from this policy are non-powered handheld tools and LOTO locks and tags.

Conditions may arise where a TM/CC finds it absolutely necessary to loan power tools or a piece of equipment. In these instances, the tool or equipment may be loaned but under very strict conditions. To loan a tool or equipment:

- There must be a compelling reason that benefits Fermilab;
- The subcontractor and the TM/CC must inspect the loaned item;
- The subcontractor superintendent whose employee will be using the tool or equipment must certify in writing that the employee has current training in the use of the tool or equipment;
- The subcontractor superintendent releases Fermilab in writing of any liability if an injury occurs to the subcontractor employee while using the tool or equipment owned by Fermilab; and
- The subcontractor superintendent accepts the tool for the intended use.

The Construction Coordinator or Task Manager will use Form 7010-F8. The TM/CC will send the original to the PA after the tool is returned to Fermilab's control.

7.19 Material Handling and Storage

7.19.1. All material handling and storage at the construction site will be subject to the following regulations:

- OSHA 29 CFR 1926 Subpart H – Materials Handling, Storage Use, and Disposal, Section 1926.250 through 252.

7.19.2. The Subcontractor's use of custom fabrications (cylinder tank stand, material handling devices, lifting fixtures) requires certification by a licensed engineer prior to use.

Certification and backup documentation will be submitted to Fermilab for review and approval prior to use.

7.20 Safety Bulletin Boards

7.20.1. The Subcontractor is responsible for installing and maintaining a safety bulletin board(s) at the location where the majority of the workers report and for advising workers of the nearest bulletin board locations. Workers are responsible for reviewing the bulletin board to keep informed of safety-related information.

7.20.2. The safety bulletin board will display at a minimum:

- The DOE Occupation Safety and Health Poster (Your Rights as a Worker) including the Fermi Site Office contact information for filing a complaint; reference 013100 for further information;
- Citations and notices as appropriate; and
- The Storm Water Pollution Protection Program, if applicable.

8.0 CONSTRUCTION EQUIPMENT

8.1 Motor Vehicles

8.1.1. All motor vehicles used to perform construction work (excluding cranes, earth moving equipment, and material handling equipment which are addressed below) will be subject to all provisions of the Illinois Vehicle Code and Illinois Rules of the Road while operating on site. All motor vehicles operators must have a valid driver's license and an insurance card in their possession at all times.

8.1.2. All roads shall remain open to emergency traffic at all times. All equipment and vehicles shall be confined to operating along defined construction roads and approved access routes. Posted speed limit signs will be enforced.

8.1.3. Interruption of normal traffic patterns or temporary road closings for movement of equipment or deliveries, requires advance notice, appropriate barricades, and flagging by the Subcontractor. Contact the TM/CC to arrange for temporary road closures.

8.1.4. Fuel tanks mounted on pick-up trucks or other subcontractor vehicles used for refueling other construction equipment will conform to all requirements of the Office of the Illinois State Fire Marshall. These fueling vehicles will be removed from the Fermilab site by the end of each day.

8.1.5. The Construction Coordinator or Task Manager will designate parking area for motor vehicles used to perform subcontract work. Subcontractor personnel will use only those roadways normally open to public traffic unless specifically directed otherwise.

8.2 Cranes

- 8.2.1. The ANSI standards, which are part of the Laboratory's codes and standards, FESHM Chapter 1071, cover the maintenance and operation of heavy equipment such as mobile cranes. The Subcontractor must inspect this heavy equipment before use on Fermilab site.
- 8.2.2. All cranes, derricks, hoists, elevators, forklifts, moveable platforms or conveyors used in the performance of civil construction work on Fermilab site, are subject to the following specific rules and regulations:
- OSHA 29 CFR 1926, Subpart H – Materials Handling, Storage, Use and Disposal, Section 1926.251;
 - OSHA 29 CFR 1926, Subpart N – Helicopters, Hoists, Elevators, and Conveyors, Section 1926.551 and 1926.552 through 1926.556;
 - OSHA 29 CFR 1926.751, Subpart R – Steel Erection. This regulation defines critical lift as a lift that (1) exceeds 75 percent of the rated capacity of the crane or derrick, or (2) requires the use of more than one crane or derrick. If any of these conditions apply, the Subcontractor will submit a lift plan to the TM/CC and to ES&H for review and acceptance prior to executing the lift;
 - OSHA 29 CFR 1926, Subpart CC - Cranes and Derricks in Construction 1926.1400 through 1926.1443;
 - OSHA 29 CFR 1910, Subpart N – Materials Handling and Storage; Sections 1910.180 through 1910.182, 1910.184, 1910.189, and 1910.190;
 - OSHA 29 CFR 1910, Subpart S – Electrical, Section 1910.306;
 - FESHM Series 10000 entitled Material Handling and Transportation; and
 - ANSI B30 Series, Crane Safety.

8.3 Earth Moving and Other Heavy Equipment

- 8.3.1. All earth moving and other heavy equipment used in the performance of construction work on site will be subject to the following regulations:
- OSHA 29 CFR 1926.600 – 1926.604 and 1926.606 – Motor Vehicles, Mechanized Equipment, and Marine Operations.
 - All earth moving and other heavy equipment must have a back-up alarm.
- 8.3.2. Traffic on paved roads shall be restricted to rubber tired vehicles. Where crawler mounted equipment is required to cross paved roads or areas, the pavement shall be suitable protected from damage to the satisfaction of the TM/CC.
- 8.3.3. Dust, debris mud, and litter on any Fermilab roads caused by the Subcontractor's operations shall be removed by the Subcontractor in a manner as directed by the TM/CC.

8.4 Portable and Hand Tools

- 8.4.1. Tool inspections of subcontractor owned tools are the responsibility of the subcontractor. The Construction Coordinator or Task Manager and ES&H Section may perform random inspections to verify compliance.
- 8.4.2. All portable and hand tools used in the performance of the construction work on site, are subject to following regulations:
- OSHA 29 CFR 1926, Subpart I – Tools, Hand and Power;
 - OSHA 29 CFR 1926, Subpart K - Electrical, Section 1926.404, 1926, 405, and 1926.449; and
 - OSHA 29 CFR 1910, Subpart P – Hand and Portable Powered Tools and Other Hand-Held Equipment, All Sections.

9.0 CONSTRUCTION PERSONNEL PROTECTION

9.1 Physical and Medical Qualifications

The Subcontractor should ensure that workers comply with 10 CFR 851, OSHA, and 013100 requirements for physically fit and medically qualified personnel.

9.2 Drug and Alcohol Free Work Place

- 9.2.1. All personal of subcontractor and Sub-tier subcontractors are prohibited from engaging in the unlawful manufacture, distribution, dispensing, possession, or use of controlled and restricted substances. All subcontractors and sub-subcontractor's personnel will adhere to the Federal Controlled Substances Act (12 USC 8120 and requirements defined in 29 CFR 1308.11-1308.15) and as stated in the subcontract documents.
- 9.2.2. A Subcontractor or sub-subcontractor's employee involved in any damage to property or release to the environment is subject to a drug test. Test results will be submitted to the PA who will determine the appropriate distribution of results. Tests will be conducted in accordance with the Subcontractor's Drug Testing program. Test results will be handled as Personally Identifiable Information (PII) and will only be provided to those who have a need to know. If test results are positive, the individual will no longer be allowed to work on the site.

9.3 Personal Protective Equipment and Protective Clothing

- 9.3.1. All subcontractors and Sub-tier subcontractors will furnish and require their personnel to wear appropriate PPE in all operations where there is an exposure to hazardous conditions and/or where there is a need for using such equipment to reduce the hazards to their employees. Clothing suitable for the work and weather conditions should be provided by the subcontractor as required. Personal protective equipment will be in accordance with OSHA and ANSI requirements pertaining to the subcontract activities. Such equipment, may be necessary to protect body parts such as eye, face, head, hands,

respiratory, skin, ears, and feet. In addition, protective clothing and other protective devices may be required for hazards such as welding, falls, traffic, and confined space.

- 9.3.2. Subcontractors working outside in the field should wear reflective high visibility garments. Personnel working on construction activities or in the field shall also wear hard hats, brim facing forward or full brim style hard hats.
- 9.3.3. Minimum PPE requirements for workers include:
- Sturdy work type shoes or boots with toe protection and that cover the ankle;
 - Long trousers;
 - ¼ length sleeve shirts which covers the ball of the shoulder;
 - Safety glasses;
 - ANSI compliant hard hat.
- 9.3.4. Minimum PPE requirements for visitors/non-workers include:
- Closed toed shoes without heels (tennis or canvas shoes and sandals are not allowed to be worn on the construction site);
 - Long trousers;
 - ¼ length sleeve shirt which covers the ball of the shoulder;
 - Safety glasses;
 - ANSI compliant hard hat.
- 9.3.5. Additional PPE may be required by the Hazard Analysis (HA).
- 9.3.6. Construction personnel who perform welding and cutting, operate rotating machinery, or who are exposed to chemicals, fire or other such hazards, must contain their hair to a point where there is no danger of their hair catching fire, dipping into toxic chemicals or acids, or being caught in rotating machinery.
- 9.3.7. The Subcontractor will perform monitoring as necessary to document employee exposures to chemical and industrial hygiene hazards, and to meet regulatory requirements. Negative exposure assessments are encouraged even when not specifically required by a substance-specific standard. The Subcontractor will notify workers of monitoring results within the applicable OSHA-specified timeframe.
- 9.3.8. The Subcontractor will incorporate a provision to prevent heat stress and cold stress into the project Hazard Analysis when hot or cold conditions may be expected. The Subcontractor will follow the Thermal Stress Threshold Value Limits the American Conference of Governmental Industrial Hygienists (ACGIH).

9.4 Industrial Hygiene

- 9.4.1. All subcontractors and sub-subcontractors will maintain an effective Industrial Hygiene program covering health hazards associated with the subcontract activity. The industrial hygiene program should address identification, protection, monitoring, and control of any potential health hazards. Such hazards may include physical and

chemical hazards. Physical hazards may include temperature extremes, physical exertion, and noise. Chemical hazards may include exposure to toxic chemical agents which may be inhaled, ingested, or absorbed through the skin.

- 9.4.2. The ES&H Section will verify controls to prevent overexposure. Reference the FESHM 4000 Series, titled “Industrial Hygiene” for additional guidance or contact the ES&H Industrial Hygiene group.

9.5 Radiation Monitoring Badges

Fermilab Radiation Procedures will be followed by all personnel that may be exposed to radiation. Each Division Safety Officer is responsible for assessing the need for radiation training and the issuance of personnel dosimetry monitoring badges in accordance with the Fermilab Radiological Control Manual. The D/S/P for which the work will be accomplished is responsible for assuring that the requirements of the FRCM are met. All subcontractors will follow the requirements of the Fermilab Radiation Procedures as set forth in the subcontract documents.

10.0 WORK PROCEDURES

10.1 General

The following generally pertains to all types of construction work (including Fixed Price and Time & Material, Labor Hours, etc.). Task Managers are expected to fill out Work Permit Notifications and have the T&M Subcontractor perform a daily work planning meeting.

10.2 Pre-Construction Meeting

- 10.2.1. The Procurement Administrator, in accordance with the Procurement Policy, will convene a Pre-Construction Meeting prior to the subcontract award and prior to issuing Notice to Proceed. The Subcontractor’s field supervisory personnel will attend. Fermilab attendees will include field coordination personnel, representatives of ES&H Section, technical project personnel and a representative from the D/S in which the work will occur.

- 10.2.2. The Subcontractor will present detailed examples of their contractually required ES&H program at the Pre-Construction Meeting. If the Subcontractor has already submitted a copy of the ES&H program, the program should be documented in ES&H Section files.

10.3 Notice to Proceed, Work Permits, and Construction Start

- 10.3.1. The Subcontractor, in accordance with the terms and conditions of the Request for Proposal will submit its ES&H Program and Construction ES&H Certification as delineated in 013100 ES&H Requirements. No construction work will start until these documents have been reviewed and approved.

- 10.3.2. The Procurement Administrator will issue the Notice to Proceed when all contractual submission requirements have been met. The TM/CC will initiate a Work Permit Notification form in accordance with FESHM Chapter 2020. Once the Subcontractor receives all approvals, the construction work may start.
- 10.3.3. All construction subcontractor and sub-subcontractor personnel will receive Subcontractor's Orientation Training before starting the work. The ES&H Section will provide specialized training needed for the construction personnel, as specified in the subcontract documents. The Subcontractor will provide the general ES&H training required for each craft activity. Subcontractor Orientation Training is good for two years from the date received.

10.4 On-going Construction (QA/QC) Inspections

- 10.4.1. Fermilab will conduct a daily QA/QC audit and track on the form found in Specification Section 010010. If the subcontract documents require the subcontractor to submit QA/QC Plan, then the CMO is responsible for verifying and implementing the QA/QC Plan.
- 10.4.2. If the subcontract documents do not require the subcontractor to submit QA/QC Plan, it is still the expectation that the specifications/drawings requirements will be met by the subcontractor and in-process verifications can take place by the Construction Coordinator to provide assurance
- 10.4.3. When a subcontractor performs a construction job, the responsibility of the performance of the subcontract lies with the Construction Coordinator or Task Manager. The subcontractor on Fixed Price projects is responsible for monitoring and documenting daily activities and any QA/QC related testes and activities. Weekly written reports will be given to the Construction Coordinator.
- 10.4.4. The TM/CC will observe the subcontractor's work and ensure the subcontractor is implementing their approved construction quality control plan. If there are obvious or possible discrepancies between the product and the specification, the TM/CC will notify the subcontractor and request an inspection/consultation from the ES&H AHJs and/or the designers/engineers.
- 10.4.5. The TM/CC will document any nonconformance issues and distribute appropriately to the Construction Manager and Procurement Administrator.
- 10.4.6. If any Suspect/Counterfeit Items or Non-conforming items are discovered during QA/QC inspections, the requirements in the Fermilab Quality Assurance Manual Chapter 12020, *Suspect/Counterfeit Item (S/CI) Program* will be followed. At a minimum, material will be segregated and tagged to prevent inadvertent use until a final determination is made. Immediate notification should include the TM/CC, the Procurement Administrator, and the Fermilab Quality Assurance Manager.

10.5 Jobsite ES&H Meetings

- 10.5.1. The Subcontractor's Field Superintendent will convene daily work planning and hazards meetings with workers at the job site which include all the craft/trade personnel. The purpose is to review special job conditions, safe operating procedures, required personnel protective equipment, and other relevant safety topics. It is anticipated that this meeting will last approximately 10 minutes.
- 10.5.2. The Subcontractor's Field Superintendent will convene weekly Toolbox Meetings of approximately 5 minutes' duration and include all the craft/trade personnel. The Weekly Toolbox meetings will emphasize the current construction operations and provide an opportunity for inspection of tools and personal protective equipment.
- 10.5.3. The Subcontractor will invite the Fermilab Construction Coordinator and ES&H Representative to both the Daily and Weekly meetings. The Subcontractor must submit meeting documentation to the Construction Coordinator.

10.6 Authorization of Use & Possession (AUP) and Final Acceptance

- 10.6.1. Fermilab will review the ES&H Program of the Subcontractor as a part of the Fermilab's Walk-Throughs for AUP and Final Acceptance. The Subcontractor Field Superintendent will accompany the Fermilab team on these Walk-Throughs.
- 10.6.2. The process and the forms used to Transfer for AUP prior to completion and the final acceptance can be found in FESHM 7005.

10.7 Work Completion and Clean-Up

The Subcontractor will complete all construction work and all Clean-Up operations in compliance with the approved ES&H Program. Documentation for all aspects of the ES&H Program will be complete and in place before subcontract closeout. All excess materials, equipment, waste material, and rubbish will be disposed of properly.

10.8 Subcontractor's Evaluation

- 10.8.1. A Fermilab Procurement team will review each completed project in accordance with Procurement Policy for quality of work, adherence to the schedule and cost, and the effectiveness of the subcontractor's ES&H program. Fermilab will use this overall assessment as part of a basis for future solicitations and awards. Fermilab will inform Subcontractors at the pre-construction meeting that they are responsible for safety performance and that an evaluation will be performed at the completion of the subcontracted work. For those projects under \$250,000.00, TM/CC can elect to provide feedback through <https://fess-app.fnal.gov/app/SubcontractorEvaluation/faces/evaluationForm.xhtml>

10.8.2. Procurement Administrator will chair the meeting and bring all interested parties together to complete the evaluation. As a minimum, invited personnel will include the CM, PM, CC, D/S representative, and the ES&H Section. Subcontractor Performance Evaluation Form 7010-F4 for construction will be used for this purpose. Completed evaluations forms will be retained by Procurement and a copy sent to ES&H Section.

10.8.3. Projects less than \$250,000 may be evaluated at the discretion of the interested parties using form 7010-F5 or <https://esh-docdb.fnal.gov/cgi-bin/sso/ShowDocument?docid=3279>The Procurement Administrator may issue an interim Subcontractor Evaluation any time performance is determined to be less than satisfactory.

11.0 EMERGENCY PROCEDURES

11.1 Stop Work

11.1.1. If an imminently hazardous situation is identified on any construction site (including Fixed-Price or T&M Subcontracts) appropriate corrective measures will be taken immediately by the Subcontractor. If the hazard cannot be abated in a timely manner, the work activity will be stopped.

11.1.2. Fermilab employees have the authority and responsibility to stop any construction activity temporarily that is observed to be an imminent hazard and must contact the Construction Coordinator or Task Manager immediately for resolution.

11.1.3. After the TM/CC has been notified, the TM/CC will notify, in writing, the CMO, PM, ES&H Section, and Procurement Administrator. This level of Stop Work also requires a complete work stoppage on the entire construction site. Procedure for Stopping and Restarting Activities is found in FESHM 1010, Technical Appendix 2.

11.1.4. The Construction Coordinator or Task Manager can stop the immediate construction work; however, the STOP WORK ORDER Form 7010-F3 found in this chapter must be issued to the Procurement Administrator. The Procurement Administrator is the only individual who has the authority to stop work on the entire construction site.

11.2 Restart Work

11.2.1. FESHM Chapter 1010, Technical Appendix 2 contains the procedure for stopping and restarting activities. The activity may resume after the Subcontractor has abated the hazard.

11.3 Spills of Toxic or Hazardous Materials

In the event of a spill of potentially toxic or hazardous material on any construction site, the first person to become aware of the spill immediately will call (630) 840-3131 or on a Fermilab phone, extension 3131, which will institute the Fermilab Fire Department response. Efforts to stop the spill

and/or minimize the spread of spilled material should only be attempted if it does not endanger the health or safety of personnel at the scene.

11.4 Personnel Injuries/Medical Services

- 11.4.1. In the event of a serious injury, or if there is any doubt as to the extent of the injury, the first person to become aware of the injury will immediately call (630) 840-3131 or on a Fermilab phone extension 3131.
- 11.4.2. All Subcontractors engaged in construction activities on the Fermilab site are subject to OSHA 29 CFR Subpart D – Occupational Health and Environment Controls, Section 1926.50 regarding medical services and first aid for employees.
- 11.4.3. All Subcontractors at Fermilab for more than 30 days are subject to 10 CFR 851 and must identify an Occupational Medical Facility in their Construction ES&H Certification found in Specification 013100.

11.5 Fire Control

- 11.5.1. All Subcontractor personnel will evacuate to a prearranged safe location as designated by the Construction Coordinator or Task Manager.
- 11.5.2. All fires will be reported immediately by calling (630) 840-3131 or on a Fermilab phone extension 3131.

11.6 Accident Investigation

- 11.6.1. The Subcontractor will report immediately all incidents and near misses to the Construction Coordinator or Task Manager who will in turn notify the CM, PM, Project ES&H Support personnel, the ES&H Section, and PA.
- 11.6.2. All incident and near miss written reports will be sent to ES&H Section within six (6) calendar days of generation of the report, in accordance with FESHM Chapter 3020. For recording near misses, a Human Performance Improvement Investigation will be conducted and will be led by the ES&H Section.
- 11.6.3. Subcontractors will perform an investigation and submit the initial report within twenty-four (24) hours of the occurrence or near miss to both the TM/CC and the PA. The subcontractor will use their internal accident/incident report forms found in their approved ES&H Program. The subcontractor will identify root causes, corrective actions, and preventive actions in the report. The finalized report will be completed and submitted within seventy-two (72) hours.
- 11.6.4. All Subcontractors engaged in construction activities on the Fermilab site will report and maintain an accurate record of all accidents occurring on the site, in accordance

with both Fixed Price and T&M subcontracts requirements. OSHA Form 300, CFR 1904, will be used for this record.

- 11.6.5. The CM/TM/CC will submit the incident report to the project ES&H support personnel and ES&H Section for potential entry into CAIRS within six (6) calendar days of report of the incident. All incidents entered into the CAIRS database, must have lessons learned documentation. Information needed for CAIRS needs to duplicate Illinois Form 45 for Worker's Compensation found <https://www2.illinois.gov/sites/iwcc/Documents/ic45FORM.pdf>.