FESHM 4200: SPECIAL TOXIC HAZARDS – LEAD-CONTAINING MATERIALS

Revision History

Author	Description of Change	Revision Date
Jonny Staffa	• Updated hyperlinks to latest documents • Addressed name changes (e.g., ESH&Q, Occupational Medical Office, Division/Sections/Centers) • Change of Signage - Section 4.0 (4.7)	October 2021
Richard Rebstock	• Replace ES&H Divisions/Sections with ESH&Q Industrial Hygiene Group. • Added OSHA's Hazard Communication Standard for General Industry, 29 CFR 1910.1200 in Employee Information and Training section.	October 2016

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1.0 INTRODUCTION

Lead was commonly used in building materials and has a high prevalence of use when shielding radioactivity. Workers and building occupants overexposed to lead could experience gastrointestinal disturbances, fatigue, aches, and conditions that are reversible. Extended exposure may result in nervous system damage, anemia, brain damage, kidney damage and reproductive system damage, conditions that may be permanent.

This chapter establishes responsibilities and requirements for controlling and monitoring lead exposure at Fermilab in accordance with OSHA regulations for lead work in general industry and construction, EPA regulations regarding inventory, reporting, disposal, and specific requirements for disturbance of lead in paint at residential and day care facilities.

General industry operations include research activities, handling of lead shielding, building of experimental equipment, and machining of lead or lead alloys. Construction operations include maintenance, the demolition or remodeling of buildings, new building construction, the removal of lead paint from equipment, tanks, and buildings; and the use of paint that contains lead. EPA Renovation, Repair, and Painting (RRP) activities include the disturbance of paint containing lead in target housing and child-occupied facilities (day care).

This section applies to all Fermilab activities that involve the use of lead, lead compounds, and lead containing materials. It is to provide users of lead in all forms (inorganic compounds, metallic, and organic compounds) with information and requirements for safe handling. General information provided applies to both general industry operations and construction operations.

2.0 DEFINITIONS

Action Level (AL) – an individual's exposure, without regard to the use of a respirator, to an airborne concentration of lead of 30 micrograms of lead per cubic meter of air (30 ug/m^3) averaged over an 8-hr period (exposures at this level trigger exposure monitoring, medical surveillance, education, and training).

Competent Person - One who is capable of identifying Lead hazards in the surroundings or working conditions and who has authorization to take prompt corrective measures to eliminate them.

Composite Dust Wipe Sample - A combination of two or more individual dust wipe samples that are analyzed together to obtain a single result.

Lead – metallic lead, all inorganic lead compounds, and organic lead soaps, other organic forms. Lead-Containing Material - A material that has a detectable quantity of Lead.

Permissible Exposure Limit (PEL) – an individual's exposure, without regard to the use of a respirator, to an airborne concentration of lead of 50 micrograms of lead per cubic meter of air (50 ug/m^3), averaged over an 8-hr period.

3.0 RESPONSIBILITIES

3.1 Division/Section/Project

Division/Section/Project will ensure the requirements of this chapter are fulfilled regarding lead hazards, including notification, sampling, mitigation, training, and disposal.

3.2 Managers and Supervisors

- Notify the ES&H Industrial Hygiene Group if potential Lead-based material is to be modified, disturbed, or removed, in the course of any work task. When properly trained, sample the suspected Lead-based material.
- Ensure that lead and lead compounds are handled using control measures to prevent exposures exceeding regulatory standards. These measures must be reflected in the written Hazard Analysis (FESHM 2060).
- Request that ES&H Industrial Hygiene personnel provide workplace exposure monitoring for lead, as required, to provide initial and periodic exposure evaluations.
- Ensure that required workers are provided information and training about hazards of lead exposure and precautions as specified in the OSHA regulations.
- Ensure that workers exposed to airborne lead levels requiring monitoring are identified to Fermilab Occupational Medical Office for assessment of the need for biological monitoring.
- Ensure that storage, labeling, inventory, reporting, and disposal of lead and lead compounds are conducted in accordance with OSHA and EPA requirements.

3.3 Task Manager/Service Coordinator

- Ensure that the projects involving potential lead exposure are addressed in specifications provided to contractors.
- Ensure that lead and lead compounds are handled using control measures to prevent exposures exceeding regulatory standards. These measures must be reflected in the written Hazard Analysis (FESHM 2060).
- Ensure that proper notification is provided to other workers, residents, and the public in the vicinity of the work area.
- Ensure that subcontractors conduct work according to the applicable OSHA and EPA requirements for handling lead, as well as Fermilab subcontractor requirements in FESHM 7010 and 7020.

3.4 ES&H Industrial Hygiene Group

- Conducts exposure assessments, including workplace monitoring, for areas where lead is used. Report findings of surveys to supervisors.

- Serve as a general support resource to managers and supervisors on safe handling and care of lead and lead compounds.
- Maintain site-wide records of exposure monitoring results.
- Provide guidance to Division/Section/Project on effective lead exposure control methods.
- Communicate to Fermilab Occupational Medical Office the findings of any workplace exposure monitoring for lead.
- Provide access to accredited laboratory services for sample analysis and technical guidance for work involving occupational exposure to Lead.
- Oversee and provide training, as required by OSHA and EPA regulations.

3.5 Fermilab Occupational Medical Office

The Fermilab Occupational Medical Office shall provide a medical surveillance program for employees covered by this chapter (see Medical Surveillance). This includes biological monitoring and individual counseling.

4.0 PROGRAM DESCRIPTION

Lead-containing paints shall not be used. If no other substitute is feasible, exceptions may be granted by written authorization from the Chief Safety Officer.

Materials that may contain Lead must be tested or assumed to contain Lead before any workplace activity is undertaken which could disturb significant quantities of the material. If any level of Lead is detected, then the following procedures must be followed.

1. The ES&H Industrial Hygiene Group shall be contacted and provided with a justification for the disturbance or moving of Lead-containing materials.
2. For subcontracted work, the Task Manager / Service Coordinator shall ensure that the construction or service company complies with the referenced OSHA and EPA standards.
3. The ES&H Industrial Hygiene Group shall recommend proper handling and exposure controls using the following guidelines:

4.1 Exposure Assessment

Exposure above the PEL is assumed for the following tasks unless there is air monitoring data that documents that exposure is below the PEL:

- Where Lead-containing coatings are present, manual demolition of structures, manual scraping, manual sanding, heat gun applications, and power tool cleaning with dust collection systems.
- Spray painting with Lead paint.
- Using Lead-containing mortar, Lead burning.
- Where Lead-containing coatings or paint is present; power tool cleaning without dust collection systems, clean-up activities where dry expendable abrasives are used, and abrasive blasting enclosure movement and removal.
- Abrasive blasting, welding, cutting, and torch burning.

- Moving Lead bricks (more than 10) or shielding elements which are not covered with paint or other barrier coating.

Personal air monitoring representative of each employee's full shift exposure to Lead shall be performed according to the frequencies listed below (or less frequent depending on the occurrence of the work activity).

RESULT	MONITORING FREQUENCY
< 30 $\mu g/m^3$	Need not be repeated for identical operation
> 30 $\mu g/m^3$ **but** <50 $\mu g/m^3$	Every 6 months
>50 $\mu g/m^3$	Every 3 months

Note: See OSHA Standard 1926.62 or 1910.1025 for additional information on monitoring and frequency requirements.

For other tasks, the ES&H Industrial Hygiene Group shall use their judgment to determine if employee exposure may exceed the PEL or AL. If there is reason to believe exposure may exceed the AL, then representative full shift personal air monitoring must be done according to the frequencies listed above.

4.2 Personal Protective Equipment

- Personal protective equipment, including coveralls or similar full-body work clothing, gloves, hats, shoes or disposable shoe coverlets shall be worn when exposure may exceed the PEL.
- Respiratory protection shall be worn when exposure may exceed the AL per the selection requirements outlined in FESHM 4150.
- Contaminated protective clothing and equipment shall be collected in a labeled, closed container.

4.3 Housekeeping

All surfaces shall be maintained as free as practicable of accumulations of Lead. Floors and other surfaces shall be cleaned by vacuuming or other methods that minimize the likelihood of Lead becoming airborne. Where vacuuming methods are used, the vacuums shall be equipped with HEPA filters and used and emptied in a manner, which minimizes the re-entry of Lead into the workplace.

A surface is considered "clean" if the surface concentration is less than 0.05 mg/dm2. Alternatively, in residential buildings where renovation, repair, or painting activities occur that are regulated by the EPA RRP Program, work area cleaning must meet the regulation's standards. This includes wiping and vacuuming surfaces, cleaning verification, and inspections specific to the standard.

4.4 Hygiene Facilities and Practices

Food and/or beverage shall not be stored or consumed and tobacco products are not present or used in areas where employees may be exposed to Lead above the AL.

Employees, who may be exposed above the AL, shall be required to wash their hands and face prior

to eating, drinking, smoking, or applying cosmetics.

Change Rooms - Whenever employee exposure to Lead may exceed the PEL employees shall not leave the workplace wearing any protective clothing or equipment that is required to be worn during the work shift. Employees shall be provided with a clean change area with separate storage facilities for protective work clothing and equipment and for street clothes that prevent cross-contamination.

Showers - Employees shall be provided and required to use shower facilities (were feasible) when their exposure to Lead may be above the PEL. Showers shall be taken at the end of the work shift or job.

Employees exposed to Lead above the PEL shall not leave the area with PPE or equipment unless surface dust has been removed by vacuuming or other cleaning method that limits dispersion of Lead dust.

Work where exposure may exceed the AL must be done by individuals who have received training, are supervised by a competent person, and are enrolled in a medical surveillance program.

4.5 Medical Surveillance

Initial medical surveillance is required for any employee whose exposure to Lead may exceed the AL on any one day. An initial medical surveillance consists of biological monitoring in the form of blood sample and analysis for Lead, and zinc protoporphyrin levels.

A medical surveillance program is required for all employees who may be exposed at or above the AL for more than 30 days in any consecutive 12 months.

Medical surveillance shall be performed per 29 CFR 1926.62 and 29 CFR 1910.1025.

4.6 Employee Information and Training

Employees are to receive information concerning Lead hazards according to the requirements of OSHA's Hazard Communication Standard for the construction industry, 29 CFR 1926.59 and OSHA's Hazard Communication Standard for general industry, 29 CFR 1910.1200, including but not limited to the requirements concerning warning signs and labels, safety data sheets (SDS), and employee information and training.

Employees who handle Lead and have exposures below the action level shall receive Lead Handling Training (Fermilab Course # FN000123). Employees who are subject to Lead exposures at or above the AL on any day shall receive annual Lead Worker Training (Fermilab Course # FN000292).

Employees working in residential buildings where renovation, repair, or painting activities occur that are regulated by the EPA RRP Program, must meet the training requirements of the regulation's standards.

4.8 Signs

Areas where employee exposure to Lead is at or above the PEL shall be posted with a warning sign, which states:

DANGER
LEAD
MAY DAMAGE FERTILITY OR THE UNBORN CHILD
CAUSES DAMAGE TO THE CENTRAL NERVOUS SYSTEM
DO NOT EAT, DRINK OR SMOKE IN THIS AREA

In residential buildings where renovation, repair, or painting activities occur that are regulated by the EPA RRP Program, signs must be posted at each entryway to warn residents to not enter the building; or for exterior work, 20 feet from the edge of the worksite.

4.9 Observation of Monitoring

Affected employees or their designated representative shall be given the opportunity to observe any monitoring of employee exposure to Lead.

Affected employees shall receive a written copy of sampling results within 5 working days after the receipt of results.

4.10 Waste

Every reasonable effort shall be made to limit the release of Lead residues into air, ground, or water. To the extent practical, all Lead-contaminated residues must be contained, collected, and containerized for disposal as regulated chemical waste.

All generated waste shall be disposed of per Fermilab's regulated chemical waste disposal program.

4.11 Clearance Sampling

In areas where lead activities have been completed, surface lead dust levels must be less than 0.5 ug/cm^2 (0.05 mg/dm^2) to enter the area without requirements as prescribed in this Chapter.

Wait a minimum of 1 hour following lead activities for any airborne dust to settle.

Conduct visual examination of the work area:

a. Determine if all required work has been completed and all lead-based hazards have been controlled.
b. Determine sample locations

Collect clearance samples from work area:

a. Separate samples are recommended for different surface materials.
b. Areas sampled should be approximately the same size (100 cm^2).
c. A separate wipe must be used for each area sampled.
d. For characterizing lead dust surface clearance levels wipe sample results may be averaged for

the same surface to determine compliance with the 0.5 ug/cm^2 standard.

e. Areas with a single surface lead result greater than 5.0 ug/cm^2 shall be re-cleaned
f. and retested.

Alternatively, in residential and day care facilities where renovation, repair, or painting activities occur that are regulated by the EPA RRP Program, work area cleaning must meet the regulation's standards. This includes wiping and vacuuming surfaces, cleaning verification, and inspections specific to the standard.

5.0 REFERENCES

29 CFR 1910.1025 OSHA Lead Standard, General Industry 29 CFR 1926.62 OSHA Lead Standard, Construction

40 CFR Part 745 Lead; Renovation, Repair, and Painting Program
IL Administrative Code Title 77: Public Health, part 845 lead Poisoning prevention code, Section 845.30
Fermilab Safety Note 19-Surface Contamination Limit for Removable Inorganic Lead, Tim Miller, August 1988