User Guide: Lead Exposure Control Plan

Purpose

Regulations governing occupational exposure to inorganic lead fall under the responsibility of the Occupational Safety and Health Administration (OSHA). PCB Piezotronics (PCB) Lead Compliance Program, specified in 29 CFR 1910.1025, was established to control exposure to inorganic lead, train all employees about the hazards and risks of lead exposure, and ensure that no employees are exposed to lead at concentrations greater than 50 µg/m3 over an 8-hour period. The company program covering exposure to inorganic lead is administered through the Vice President of Manufacturing Services and Human Resources. PCB shall review and/or update this program every 12 months or when there is a significant change to a lead process to ensure that the information is accurate and current.

Scope

PCB's Lead Compliance Program controls occupational exposures to inorganic lead through engineering controls and Standard Operating Procedures (SOP) which are designed to minimize employee exposure. Respiratory protection shall be used when engineering controls are not feasible, during the interim while engineering controls are being installed, or during non-routine tasks. PCB's policy requires that all affected employees be instructed about the possible hazards of inorganic lead.

Definitions

Action Level- An OSHA occupational exposure limit for airborne contaminants. For lead it is 30 micrograms per cubic meter of air (30 µg/M^3) for an 8-hour Time-Weighted Average (TWA). Employees whose exposure is above the Action Level for more than 30 days per year are required to be in a medical surveillance program.

Affected Employee- Any employee whose exposure is at risk of being at or above the Action Level (e.g., Crystals Technician).

HEPA- A High Efficiency Particulate Air Filter capable of filtering 0.3 micron particles with 99.97 percent efficiency.

Lead- Metallic lead, all inorganic lead compounds (e.g., laboratory reagents, solder).

Medical Surveillance - Consists of medical examinations as well as blood sampling for lead and zinc protoporphyrin (ZPP), if applicable. Performed by or under the supervision of a physician.

Permissible Exposure Limit (PEL)- An OSHA occupational exposure limit for airborne contaminants. For lead it is 50 micrograms per cubic meter of air (50 µg/m^3) for an 8-hour Time-Weighted Average (TWA).

PPE- Personal Protective Equipment. Safety equipment worn by employees; may include safety glasses, gloves, smocks, shoe covers, etc.

Hazards of Lead

Lead can be absorbed into the body by inhalation (breathing) and ingestion (eating). Lead (except for some organic compounds not covered by this program) is not absorbed through the skin. Inhalation of lead is

considered the most important source of occupational exposure. When lead is scattered in the air as a dust or fume particle, it can be inhaled and absorbed into the blood stream through the lungs and upper respiratory tract. Lead can also enter via the digestive system if it enters the mouth and is swallowed. As an example, lead can be ingested by handling cigarettes, food, etc., with lead contaminated hands. Short term (acute) overexposure in large doses of lead may cause seizures, coma, and death from cardio-respiratory arrest. Short term occupational exposures leading to these effects are unusual but possible. Long-term (chronic) overexposure may result in damage to the blood-forming, nervous, urinary, and reproductive systems. Some common symptoms of long-term overexposure include loss of appetite, metallic taste in the mouth, anxiety, constipation, nausea, pallor, insomnia, headache, nervous irritability, muscle and joint pain, and tremors.

When lead gets into the body it is only partly eliminated. The majority of the lead is stored in the bones and other tissues. As exposure to lead continues, the amount stored in the body increases if more lead is absorbed than is excreted. Consequently, continuous exposure to low levels of lead can, over time, cause lead to accumulate in the body and lead poisoning may result.

Examples of Possible Sources of Lead Exposure in non work related activities

- Lead-Containing Paint: Sanding, scraping, burning, welding, ingestion.
- Drinking Water: Some water sources, lead solder in pipes
- Metallic Lead: Casting lead or brass, soldering, sawing, cutting, etc.
- Soil: Automobile exhaust, paint chips, fumes downwind of a smelter
- Miscellaneous: Pottery glazes, leaded crystal decanters, "folk" medicine, tin cans (banned in USA), indoor shooting ranges, hobbies (stained glass, fishing sinkers)

Responsibilities

A. Employees

1. Follow lead safety procedures.

2. If you notice a problem or defect with the provided PPE, notify your supervisor.

B. Supervisors

1. Ensure that affected employees receive appropriate training both initially and annually.

2. Ensure that affected employees follow established safety procedures and that engineering controls are properly functioning.

3. Notify Human Resources and the Vice President of Manufacturing Services of employees who may have a potential exposure to lead, as well as operations or changes that may produce or increase lead exposure to employees.

C. PCB Piezotronics, Inc

1. Conducts initial exposure assessments and workplace monitoring to determine an employee's potential exposure to lead.

2. Recommends appropriate engineering and administrative controls to ensure that lead levels do not exceed the OSHA Action Level.

3. Recommends appropriate personal protective equipment (PPE).

4. Notifies employees of personal lead air monitoring results within 15 business days of their receipt.

5. Conducts training for employees who perform any tasks in which there is a potential exposure to lead.

6. Performs quarterly checks of HEPA ventilation systems/vacuums used for the control of airborne lead.

7. Manages and updates the Lead Exposure Control Plan as needed.

8. Identifies employees who should be considered for the Medical Surveillance Program.

9. Ensure that employees who perform work that may have a potential to exceed the Action Level are in a medical surveillance program and have had a base-line blood lead sample prior to starting work.

10. Personal and area air sampling results collected by subcontractors shall be submitted to the Vice President of Manufacturing Services and Human Resources for collection, retention, and distribution.

11. The Human Resources department will assist in overseeing the Lead Exposure Control Plan, distribute exposure reports to affected employees, and maintain records (program, airborne survey results, employee exposure monitoring results, copies of the exposure reports, medical surveillance records, etc.).

D. Healthworks (or other designated medical provider)

1. Maintains a medical surveillance program as described in 29 CFR 1910.1025.

2. Maintains biological monitoring and medical removal records, as well as making them available to affected employees and/or their authorized representatives.

Exposure Monitoring

PCB has conducted personal exposure monitoring to determine the lead exposure levels for employees who perform tasks that involve working with lead or its compounds. This is an ongoing program and new tasks involving working with lead will be monitored as they occur.

1. Employee Notification - Within 15 business days after the receipt of monitoring results, employees are notified of the results of any personal or area air samples for lead. Monitoring results are communicated verbally to employees during a team meeting, and the results are posted on a company bulletin board in a central location of the work area. Based on the results, any corrective action required is included in the employee communication. In addition, employees who wore a personal air sample monitor are provided with a written notification of the results of their individual monitoring sample during a meeting with Human Resources and the Vice President of Manufacturing Services, during which any questions or concerns they may have can be addressed. A copy of the results dated and signed by both the employee and Vice President of Manufacturing Services is retained by Human Resources.

Monitoring of airborne lead is required for any operation which shows the possibility of any employee exposure at or above the action level. Employee exposure is the exposure the employee would receive if not using a respirator.

When monitoring reveals employee exposure to be at or above the action level (30 µg/m^3) but below the PEL (50 µg/m^3), monitoring shall be repeated every 6 months.

When monitoring reveals that employee exposure is above the PEL (50 µg/m^3), monitoring shall be repeated every 3 months.

Monitoring at PCB has been conducted in the following areas:

Operation	Above Action Level (AL)	Above Permissiable Exposure Level (PEL)
V-Blending	YES	NO
Powder Sifting (Manual)	YES	NO
Pressing	NO	NO
Firing	NO	NO
Core Drilling (CNC)	NO	NO
Lapping	NO	NO

Respiratory Protection

All employees that work in areas or operations at or above the Action Level are required by the company to wear respirators. Required respirators are either loose-fitting Powered Air Purifying Respirators (PAPR) with P100 HEPA Filters, or N100 disposable facemasks. For further information on this policy please refer to PCB's Respiratory Protection Program. Respiratory protection is available to all employees even if monitoring results are below the OSHA PEL for a specific work area.

Personal Protective Equipment and Clothing

It is important to avoid the contamination of personal clothing, and to ensure that lead contaminated materials do not leave the work area unless they are in a sealed container. Appropriate PPE shall be used whenever it is possible to contaminate personal clothing during lead work.

To see the personal protective equipment requirements for specific areas and operations refer to PCB's Personal Protective Equipment Program.

PCB provides the following Personal Protective Equipment to employees who work with inorganic lead powder(s) or whom have a high potential of coming into contact with lead contaminated materials.

Tyvek Suit	Smock	Chemical resistant gloves
Oven mitts	Safety glasses	Face shields
N100 Respirator	PAPR	Safety Shoes & Coverlets

Employees working in select areas are required to wear safety shoes and/or disposable shoe coverlets. PCB provides safety shoes compliant with ANSI-Z41-1991 per the Manufacturing Employee Safety Manual. Safety shoes worn in these areas must be worn at work only and left on the premises at the end of the work shift.

Employees that have accumulated lead powder on work clothing or shoes are to vacuum their clothing and shoes to remove lead powder prior to leaving the work area.

Housekeeping

All surfaces must be kept as free as possible from accumulation of lead dust. If "wet wiping" is warranted, specific cleaning solutions that are designed to remove lead and/or heavy metals should be used. It is the responsibility of the operators to maintain the overall cleanliness of their own work areas. The acceptable method of cleaning lead-bearing powder from the floor is vacuuming with HEPA vacuum. Sweeping or blowing of lead powders in the facility is strictly forbidden! Wet mopping or a wet scrubber is also used to clean lead powders that may accumulate on the floors from normal work practices.

Hygiene Practices and Facilities

Eating is strictly prohibited in production areas, restrooms and/or locker rooms. Hand washing is mandatory before smoking and eating, and appropriate signs are posted in the washrooms. Shower facilities are provided on-site, and employees working in areas at or above the PEL are required to shower at the conclusion of their work shift. In the event that a work area tests above the PEL, employees working in that area will be notified of the requirement to shower at the end of their shift.

All restrooms and locker rooms are stocked with specific hand soap designed to remove lead and/or heavy metals from human skin. All employees working in areas with potential lead exposure are to wash their hands with this soap.

Lead Medical Surveillance

PCB's Human Resources department orders and maintains blood-lead and ZPP monitoring for employees exposed to inorganic lead. For the complete blood lead and ZPP monitoring requirements refer to PCB's Lead Medical Surveillance and Removal Program for Employees Exposed to Inorganic Lead.

Employee Information and Training

Lead training is given to all affected employees on an annual basis per PE01. Employees are instructed to direct

any questions they may have regarding hazards on the job to their immediate supervisor, a member of the PCB Safety Committee, or the Human Resources Department.

Training includes:

- In depth discussion of OSHA's Lead rule and Appendices A and B of 29 CFR 1910.1025
- Awareness of the areas and operations that may result in exposure to lead, along with the engineering controls and work practices associated with them.
- A description of PCB's Lead Medical Surveillance and Removal Program for Employees Exposed To Inorganic Lead

Sign Requirements

Warning signs are posted in work areas where the potential exists to exceed the Action Level.

Waste Disposal

PCB contracts with licensed third party hazardous waste transporters to determine whether lead containing wastes should be classified as "hazardous waste". They will also provide guidance for packaging and disposal, as well as approve all hazardous waste manifests before waste leaves PCB.

Lead and its compounds are considered hazardous waste if the Soluble Threshold Limit Concentration (STLC) exceeds 5.0 milligrams per liter (mg/l) or the Total Threshold Limit Concentration (TTLC) exceeds 1,000 milligrams per kilogram (mg/kg).

Table of Listed Hazardous Waste Containing Lead

Waste Name	Operation(s) Generated	EPA Waste Code(s)	Proper Shipping Name
Lead-contaminated solids, PPE, filters, HEPA vacuum waste, etc.	Batching, Pressing, Firing, filtration materials	D008	Lead Debris
Used Lapping Compounds	Crystal Lapping	D008	Lead Contaminated Lapping Sludge
Machining Coolant	Crystal Machining	D008	Coolant with Lead
Micro 90	Cleaning after Lapping	D008	Micro 90 with Lead
Powder Equipment Washdown Water	Cleaning after wet mixing, drying pans, ball milling,	D008	Hazardous Ceramic Rinse Water

	spray drying, floor cleaning		

Engineering Controls

Engineering controls are the primary method to reduce lead exposure within PCB's facility. Each area or operation that has a potential to release inorganic lead dust/powder into the work area has been equipped with a form of engineering control. All engineering controls are tested for performance based on manufacturers' recommendations.

All engineering controls are tested quarterly and records are maintained in the Preventative Maintenance System and on the R-drive at R/Crystals/EHS.