

1.0 Purpose

To provide guidance for the establishment of a lead program for Washington State Department of Transportation (WSDOT) operations and facilities as required by Washington Administrative Code (WAC) Chapters [296-155-176](#) and [296-62-07521](#).

2.0 Scope and Applicability

This program has been developed for lead work using the referenced WAC chapters as guidance. All lead work activities shall comply with this document to ensure the safety of personnel on all WSDOT work sites. Contractors or Subcontractors performing lead work shall have their own lead work program in place.

3.0 References

- WAC 296-155-176, *Lead (in Construction)*
www.lni.wa.gov/wisha/rules/construction/html/296-155b-1_2.htm#wac296-155-176
- WAC 296-62-07521, *Lead (in General Industry)*
<http://apps.leg.wa.gov/wac/default.aspx?cite=296-62-07521>
- WAC 296-802, *Employee medical and exposure records*
<http://apps.leg.wa.gov/wac/default.aspx?cite=296-802>
- WAC 296-818, *Abrasive blasting*
<http://apps.leg.wa.gov/wac/default.aspx?cite=296-818>
- WAC 296-841, *Airborne Contaminants*
<http://apps.leg.wa.gov/wac/default.aspx?cite=296-841>
- WAC 296-842, *Respirators*
<http://apps.leg.wa.gov/wac/default.aspx?cite=296-842>
- WAC 296-24-71501 through 71507, *Health protection and ventilation (welding)*
<http://apps.leg.wa.gov/wac/default.aspx?cite=296-24-715>
- WAC 296-155-415, *Ventilation and protection in welding, cutting, and heating*
www.lni.wa.gov/wisha/rules/generalsafety/html/24_i-2.htm#wac296-24-715

4.0 Definitions

Action Level – Thirty micrograms of lead per cubic meter of air (30 $\mu\text{g}/\text{m}^3$) over an 8-hour time weighted average (TWA).

Exposure – That concentration of lead in the work place air, as measured in the employee's breathing zone, without regard to the use of respiratory protective equipment.

Lead – Metallic lead, all inorganic lead compounds, and organic lead soaps. Excluded from this definition are all other organic lead compounds.

Lead Change Area – An area immediately adjacent to the lead work area provided for the changing and short-term storage of protective clothing/ equipment and tools.

Lead Storage Area – An area designated for the storage and incidental handling of lead. Airborne concentrations of lead in lead storage areas shall not exceed 30 $\mu\text{g}/\text{m}^3$.

Lead Work Area – Any area in which the airborne concentration of lead has been determined by monitoring to exceed 30 $\mu\text{g}/\text{m}^3$ averaged over an 8-hour period.

Permissible Exposure Limit (PEL) – Fifty micrograms of lead per cubic meter of air (50 $\mu\text{g}/\text{m}^3$) averaged over a 8-hour period. If an employee is exposed to lead for more than 8-hours in any work day, the permissible exposure limit shall be reduced according to the following formula:

Maximum permissible limit (in $\mu\text{g}/\text{m}^3$) = $400 \div$ hours worked in the day.

Qualified Lead Worker – Any employee who has been trained to work in a designated lead work area.

Safety Organization – Headquarters Safety and Health Services Office staff and Region Safety Office staff.

5.0 Organizational Responsibilities

Are as assigned in [Chapter 1](#) of the *Safety Procedures and Guidelines Manual* M 75-01 as well as the items below specific to lead exposure.

5.1 Executive, Senior, and Mid-Level Management

- Ensure the site manager, supervisor and other site personnel should have the required experience to perform these assessments and identify all lead exposure hazards at sites under their control.
- Provide or replace lead exposure control equipment as required to perform work in compliance with this program.

- Perform periodic audits of employee training.
- Review Lead Exposure Control Work Plans to ensure the proper procedures and equipment are utilized.
- Ensure the establishment and maintenance of a lead exposure control program.
- Designate, in writing, Qualified Person(s) for each lead work project. Notify the Region Safety Office of the name of each Qualified Person.
- Ensure that control measures are followed.

5.2 Supervisors

- Assess and identify all lead exposure hazards at sites under their control.
- Develop Lead Exposure Control Work Plans with assistance from Region Safety Office and/or Industrial Hygienist, as needed (see [Appendix 15-A](#)).
- Ensure that all employees entering or working in designated lead work areas wear appropriate protective clothing at all times.
- Ensure coveralls fit properly for employees who are required to wear coveralls for lead work. Coveralls must be worn in a way that affords maximum protection from lead contamination of personal clothing and body.
- Ensure that the appropriate label is properly affixed to each poly bag before leaving the lead change area.
- Ensure that lead workers obtain and use only appropriate gloves for lead work, except as provided elsewhere in this program.
- Ensure that lead workers obtain and use face shields when required by specific operations.
- Ensure that all employees wear and properly use respiratory protective equipment before entering or working in a designated lead work area.
- Ensure that work areas and job sites are cleaned thoroughly at the end of each shift, at the completion of each job, or prior to removing lead work area signs, whichever is sooner, to prevent the spreading of lead scrap or dust.
- Supervisors who perform lead work or who enters a designated lead work area will be qualified in lead work.
- Ensure that employees located immediately outside the lead work area are not exposed to lead.
- Ensure employees are reminded to clean hands and faces prior to eating, drinking, or consuming tobacco products.

- Ensure employees are instructed to obtain clean coveralls, gloves, and respirators whenever necessary to protect skin or clothing from contamination.
- Ensure that employees use appropriate containers for contaminated clothing and lead waste.
- Ensure the Region Safety Office is notified when there has been a production change that may result in new or additional exposure to lead so additional monitoring can be performed.

5.3 Employees

- Wear appropriate protective clothing at all times.
- Comply with lead exposure control measures.
- Wear and properly use respiratory protective equipment before entering or working in a designated lead work area.
- Use appropriate containers for contaminated clothing and lead waste.
- Clean hands and face prior to eating, drinking, or consuming tobacco products.
- Participate in medical surveillance.
- Participate in lead work practice reviews where elevated blood lead levels are discovered.

5.4 Safety Organization

- Assist in developing or securing required lead awareness training.
- Assist in assessment of lead exposure and the understanding of applicable safety standards.
- Ensure that Qualified Persons as identified by managers of major organizations are trained in proper lead work procedures and evaluating hazardous conditions.
- Assist in the development of Pre-activity Safety Plans (PASP) on specific lead work projects under his/her responsibility.
- Ensure all employee exposures to lead are within the appropriate guidelines set forth by this program and [WAC 296-842](#).
- Maintain and calibrate test equipment.
- Approve respiratory equipment.
- Assist in developing or securing training for all employees exposed to lead at or above the action level and where the possibility of eye or skin irritation from lead or ingestion of lead exists.
- Perform or coordinate air monitoring in lead work areas to determine exposures to airborne lead in the employee's breathing zone.

- Inform employees of the airborne lead level in their breathing zone within one week of completion of lab work.
- Maintain a list of qualified persons.
- Coordinate lead work practice reviews when elevated blood lead levels are discovered.

6.0 Lead Activities and Health Hazards

6.1 Lead Activities at WSDOT

Lead emitting activities at WSDOT consist of bridge and road maintenance and inspection projects. Most of these projects are unscheduled maintenance but some are routine scheduled activities. Maintenance crews are usually composed of approximately five or fewer persons. Lead-containing coatings may be disturbed through grinding, welding, heat-straightening, rivet busting, torch cutting, and small scale painting. Freeway expansion joints and automobile exhaust deposits may involve lead impacted work. When feasible, needle guns equipped with high efficiency particulate air filters or similar removal methods are used to remove lead prior to conducting the maintenance work.

Many of the maintenance activities are small scale/short duration projects lasting minutes to hours.

Larger scale bridge painting, including preparatory work, is generally contracted to private companies.

6.2 General Health Hazard Information

Exposure to lead is a potential health hazard, potentially damaging the nervous, blood, and reproductive systems. Lead may cause cancer. Lead exposure may cause lassitude (weakness, exhaustion); insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation; abdominal pain; colic; anemia; gingival lead line; tremor; paralysis of wrist, ankles; decreased hand-grip strength; encephalopathy; kidney disease, gout; eye, skin irritation; decreased hearing acuity; elevated blood pressure; reduced sperm count, impaired sperm motility and abnormal morphology; headache; possible deficits in some neuropsychological performance measures (verbal memory, visuospatial abilities, executive functions); mood changes (irritability, depression); nausea, vomiting; and seizures, coma, death (at extremely high exposures).

Lead dust is introduced into the atmosphere through the grinding and cutting processes of fabrication, heating, or by burning or welding on lead-containing materials. By breathing lead dusts or fumes, employees may develop lead poisoning. Lead poisoning may also occur from eating contaminated foods or handling objects contaminated with lead.

Because lead work poses potential health problems, lead exposures as a minimum must be controlled to levels below the permissible exposure limit (PEL). Effective control requires an awareness of potential health hazards and continued utilization of effective control measures. This program describes these measures in detail. Management must ensure that they are followed.

7.0 Personal Protective Equipment

7.1 General

Coveralls (either disposable or appropriately laundered) are required to minimize contact and contamination of personal clothing by lead fumes and dust. Employees must wear coveralls when entering or working in designated lead work areas.

Coveralls will be stocked and issued as necessary for use by lead workers.

Donning and removal of coveralls shall be done in the lead change area that is located adjacent to the lead work area. The change area will be the only point of entry to or exit from the lead work area.

Coveralls must not be worn outside the lead work or change area. Coveralls shall be vacuumed thoroughly, removed and placed in poly bags and sealed prior to exiting the area.

At the end of the shift or lead work operation, lead-contaminated coveralls shall be placed in a poly bag, sealed and identified with a 3 in x 5 in tag stating the following and stored until properly disposed of or appropriately laundered.

CAUTION
CLOTHING CONTAMINATED WITH LEAD. DO NOT REMOVE DUST BY BLOWING OR SHAKING. DISPOSE OF LEAD CONTAMINATED WASH WATER IN ACCORDANCE WITH APPLICABLE LOCAL, STATE, OR FEDERAL REGULATIONS.

Gloves shall be worn by all employees entering or working in designated lead work and lead storage areas. Lead workers shall obtain and use only gloves for lead work (e.g., non-porous gloves, such as Nitrile) except as provided elsewhere in this program.

Employees shall not wear the gloves outside the designated lead work or lead storage areas. Store the gloves in a properly labeled poly bag when not in use.

All gloves used for lead work shall be disposed of as lead-contaminated waste or appropriately laundered.

Use leather gloves when in hot work operations. Use non-porous gloves, such as Nitrile, under the leather to prevent skin contact.

Use face shields whenever there is danger of facial contact with lead chips. When working overhead, face shields must be worn by employees. Lead workers shall obtain and use face shields when required by specific operations. If the visor becomes impregnated with lead chips, it shall be disposed of as lead-contaminated waste.

7.2 Respiratory Protection Requirements

During operations where engineering controls do not reduce exposures below the PEL, appropriate respirators shall be worn by all employees entering or working in the lead work area. All personnel shall be medically qualified and fit tested prior to utilizing respiratory protection.

Lead Concentration (ug/m3)	Appropriate Respirator
Up to 500	Half-face with P-100 particulate cartridge (color purple/pink – officially called “magenta”)
Up to 1,250	Powered air-purifying respirator with hood or helmet
Up to 2,500	Full-facepiece with P-100 particulate cartridge
Up to 50,000	Full-facepiece air-line respirator operated in continuous flow, pressure-demand, or other positive-pressure mode.

Powered air-purifying respirators (PAPR) will be provided at employee request where a PAPR provides sufficient protection. Contact the Region Safety Office with questions regarding other types of respiratory protection.

8.0 Housekeeping

Lead work supervisors must ensure that work areas and job sites are cleaned thoroughly at the end of each shift, at the completion of each job, or prior to removing lead work area signs, whichever is sooner, to prevent the spreading of lead scrap or dust.

Lead work areas will be cleaned during a shift when considerable amounts of lead scrap or dust have accumulated.

No equipment or material shall leave a lead work area unless it has been:

- Bagged, such as protective clothing.
- Disposed of as lead-contaminated waste.
- Vacuumed thoroughly, such as tools, tool bags, hard hats, and glasses, etc.

When vacuuming is not sufficient to remove lead dust, the surfaces shall be wiped with a wet rag. Dispose of the contaminated rag as lead-contaminated waste.

The cleanup in all lead work areas, change areas, and storage areas will be performed by qualified lead workers.

HEPA filtered-exhaust vacuum cleaners used for lead work will be the primary means for cleanup. Mark all vacuum cleaners used for lead work with “Lead Only.” The type of vacuum cleaner and filter used will be approved by the supervisor prior to initial issue.

Cleaning any lead contaminated surface or material with compressed air or dry-sweeping is prohibited.

9.0 Training

Lead Awareness Training (Course Code BNK)

Lead Exposure Control (Course Code AZS)

Employees and supervisors who perform lead work or who enter a designated lead work area shall be qualified in lead work.

Each employee who works in a designated lead work area where airborne concentrations of lead exceed the action level (30 $\mu\text{g}/\text{m}^3$), shall be a qualified lead worker. In order to obtain and maintain qualifications the following items are required:

- Compliance with [Chapter 8](#), Respiratory Protection Policy, as it applies to assigned respiratory protection.
- Training will include:
 - Specific operations with potential for exposure to lead above the action level.
 - The purpose and description of the Medical Surveillance Program.
 - Engineering controls and work practices associated with lead work.
 - The contents of this chapter, PASPs, or other applicable compliance plans.

- The lead standard(s): [WAC 296-62-07521](#) and/or [296-155-176](#) and appendices.
- Prohibition of chelating agents unless under the direction of a licensed physician.
- Employee right of access to medical and exposure records.

Employee training shall be documented in the Automated Training Management System (ATMS).

Documentation may be stored on a computer as long as it is available to safety and health personnel from the Department of Labor and Industries.

10.0 Lead Work Areas

Each lead work area will be identified by signs and barricade tape located immediately outside the lead work area.

Lead operations requiring ventilation shall use local exhaust equipment to capture the contaminant with the exhaust tube at the point of generation.

All ventilation equipment shall be marked as for lead use only.

Display in a conspicuous manner, signs and barriers that will be used prior to initiating operations involving lead work. Lead work areas in which airborne lead levels exceed the PEL and operations involving direct contact with lead as determined by personal monitoring shall be enclosed by rope and identified with signs as follows:

10 in x 14 in “Warning Lead Work Area” sign.

WARNING
LEAD WORK AREA POISON NO SMOKING OR EATING

Access shall be limited to lead work qualified employees whose job requires them to work in or pass through the lead work area. Unauthorized or unprotected employees are prohibited from crossing any barrier identified by the above signs.

11.0 Air Monitoring in Lead Work Areas

The Region Safety Office will perform or coordinate air monitoring in lead work areas to determine exposures to airborne lead in the employee’s breathing zone.

Employees in work areas that meet or exceed the action level, but do not exceed the PEL, must be monitored for exposure semiannually.

Employees in work areas that exceed the PEL will be monitored for exposure on a quarterly basis.

Supervisors shall inform the Region Safety Office when there has been a production change that may result in new or additional exposure to lead so additional monitoring can be performed.

The Region Safety Office shall inform employees of the airborne lead level in their breathing zone within five business days of receiving results.

12.0 Medical Requirements

WSDOT shall maintain its Medical Surveillance Program for all employees who are or may be exposed above the action level for more than 30 days per year. The medical surveillance program shall comply with all WAC requirements. Regions may implement more protective medical monitoring and removal practices

WSDOT shall assure that lead medical monitoring is performed by or under the supervision of a licensed physician.

In addition to WAC requirements, the Region Safety Office will coordinate a review of lead work practices for any employee in their lead medical monitoring program with blood lead level exceeding 25 µg/dl to assure employees are properly protected from lead hazards.

13.0 Hygiene Facilities

WSDOT shall provide clean change rooms for employees who work in areas where their airborne exposure to lead is above the PEL without regard to the use of respirators. The employer shall assure that change rooms are equipped with separate storage facilities for protective work clothing and equipment and for street clothes which prevent cross-contamination.

Employees who work in areas where their airborne exposure to lead is above the PEL shall shower at the end of the work shift, when feasible, and shall not leave the workplace wearing any clothing or equipment worn during the work shift.

WSDOT shall provide lunchroom facilities for employees who work in areas where their airborne exposure to lead is above the PEL. Lunchrooms shall be temperature controlled, positive pressure, filtered air supply, and are readily accessible to employees.

14.0 Required Contents of Lead Work Plans

- A description of each operation in which lead is emitted; e.g., machinery used, material processed, controls in place, crew size, employee job responsibilities, operating procedures, and maintenance practices.
- A description of the specific means that will be employed to achieve compliance, including engineering plans and studies used to determine methods selected for controlling exposure to lead.
- Air monitoring data which documents the source of lead emissions.
- A work practice program which includes a description of housekeeping practices, hygiene facilities, PPE, and exposure control equipment and its expected efficacy.
- If administrative controls (e.g., limiting exposure through employee rotation) are used, list all affected employees, duration, and exposure levels, as well as any other information demonstrating effectiveness of this control.
- Any other relevant information.


15.0 Appendices

[Appendix 15-A Lead Exposure Control Work Plan](#)

Appendix 15-A

Lead Exposure Control Work Plan

To download a current copy of DOT Form 750-060, go to the Forms Management website:
www.wsdot.wa.gov/fasc/adminservices/forms/formfiles/wsdot_forms



Lead Exposure Control Work Plan

Date Project Location	*Supervisor/Competent Person	No. of People on Crew	
Description of Work (e.g. equipment used, materials involved, special procedures/practices, responsibilities)			
*Supervisor/Competent Person means one who is capable of identifying existing and predictable lead hazards in the surrounding or working conditions and who has authorization to take prompt corrective measures to eliminate them.			
When lead is present if doing these "trigger tasks" (check all that apply)	Treat as if exposed at this level ¹	Use appropriate respiratory protection ² for exposure level (check protection used)	Methods to Reduce/Control Lead Exposure (check all that apply) ³ .
<input type="checkbox"/> Torch burning <input type="checkbox"/> Cutting <input type="checkbox"/> Welding <input type="checkbox"/> Abrasive blasting <input type="checkbox"/> Rivet busting <input type="checkbox"/> Lead burning <input type="checkbox"/> Power tool cleaning without dust collection systems <input type="checkbox"/> Using lead containing mortar <input type="checkbox"/> Abrasive blasting enclosure movement and removal <input type="checkbox"/> Manual demolition of structures <input type="checkbox"/> Manual scraping <input type="checkbox"/> Manual sanding <input type="checkbox"/> Heat gun applications <input type="checkbox"/> Power tools cleaning with dust collection systems <input type="checkbox"/> Spray painting with lead paint. <input type="checkbox"/> Inspections <input type="checkbox"/> Any item not listed	≥2,500 µg/m ³ (50 times the PEL or more)	<input type="checkbox"/> Full-face PAPR (tight fitting) <input type="checkbox"/> Hood or helmet PAPR with manufacturer confirmed APF of 1000 <input type="checkbox"/> Full-face airline respirator in continuous flow or positive pressure mode <input type="checkbox"/> Any of the respirators listed above <input type="checkbox"/> Full-face respirator <input type="checkbox"/> Hood or helmet PAPR <input type="checkbox"/> Half-face airline respirator in continuous flow or positive pressure mode	<input type="checkbox"/> Prior removal with tool equipped with dust control <input type="checkbox"/> Ventilation (mechanical) <input type="checkbox"/> Employee rotation to distribute lead exposed work <input type="checkbox"/> Dust suppression/wet methods <input type="checkbox"/> Prior removal with chemical stripper <input type="checkbox"/> Encapsulation <input type="checkbox"/> Other, describe:
≥500 µg/m ³ (10 times the PEL or more)	≥50 µg/m ³ to 500 µg/m ³	<input type="checkbox"/> Any of the respirators listed above <input type="checkbox"/> Half-face respirator	Contact the safety office prior to job
Contact your safety office for guidance prior to job	Contact your safety office for guidance prior to job	Contact the safety office prior to job	Contact the safety office prior to job

¹ If you have recent air monitoring on a similar job (e.g. tasks, equipment, environmental conditions, paint lead content), you can use that to determine exposure.
² Other appropriate options may be available. Contact your safety office for more information. APF = assigned protection factor (see WAC 296-842-13005)

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3 All feasible control options must be implemented to reduce exposures below the PEL. If respirators are the only method used to reduce exposures, describe in detail why other controls are not feasible.

Requirements for all lead work

All employees trained in lead-safe work practices

Soap, water (drinking water quality), and towels available and used before eating, drinking, smoking, or other "hand to face" activities

on site or at facility no further than three minutes away

Area for lunch and breaks that is free of lead contamination. List location: _____

All employees have been offered/had access to initial blood testing

Other PPE (as applicable) gloves, hardhat, welding gloves, work boots, eye protection/hearing protection

No eating, drinking, smoking, or other hand to face activities conducted in lead work zone

Equipment, tools, work surfaces where lead dust may accumulate are cleaned with HEPA vacuum and/or wet cleaning methods at end of shift project

Job will be routinely inspected by Supervisor/Competent person

Air monitoring has been performed in the last 12 months on similar job or will be treated as "trigger task" exposures levels listed on previous page

All items below are also required if exposures are at or above the PEL (50 micrograms per cubic meter of air) or doing trigger tasks with no monitoring within previous 12 months showing exposures are below the PEL

Coveralls: worn during all lead work, removed or HEPA vacuumed before entering lunch/break area or leaving work site, and removed at end of shift and placed in sealed and labeled bag or other container that will prevent dispersion of dust. Coveralls or other exposed garments must never be taken home.

Respiratory protection used selected based on either:

1. _____ As required by trigger task level

2. _____ Recent air monitoring: divide air monitoring results by assigned protection factor of respirator. (Results/APF=) Answer must be below 50

Employees medically cleared for respirator use and fit tested

All employees on job site must sign the lead control plan

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Supervisor/Competent Person Printed Name	Supervisor/Competent Person Signature	Date Signed
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