



Department of Environmental Health & Safety

Inorganic Arsenic Program

**for the
Lausche Heating Plant
Facilities Management**

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OHIO University Inorganic Arsenic Program (For the Lausche Heating Plant)

1.0 Scope

- 1.0 This program outlines the procedures, precautions, responsibilities, and methods used by Ohio University (OHIO) to provide for employee safety and health and compliance with the OSHA Inorganic Arsenic Standard.
- 1.1 This program applies only to the employees that enter coal-fired boilers for cleaning purposes at the Lausche Heating Plant.
- 1.2 There are no other known jobs on campus with potential arsenic exposure above the action level.

2.0 Purpose

- 2.0 The purpose of this program is to protect employees from potential exposure to arsenic during cleaning of the interior of the boilers. Arsenic is a toxic dust found as a contaminant of the coal used in the Heating Plant.
- 2.1 The program is also intended to insure compliance with the OSHA Inorganic Arsenic Standard, as a minimum.

3.0 References (OSHA Standards)

- 3.0 29 CFR 1910.1018 – Inorganic Arsenic Standard
- 3.1 29 CFR 1910.146 – Confined Space Entry Standard
- 3.2 29 CFR 1910.134 – Respiratory Protection
- 3.3 29 CFR 1910.1000 – Permissible Exposure Levels (PELs)
- 3.4 29 CFR 1910.132, .133, .135, .138 – Personal Protective Equipment
- 3.5 29 CFR 1910.147 – Hazardous Energy Sources (lock out/tag out)
- 3.6 29 CFR 1910.28 – Scaffolding
- 3.7 29 CFR 1910.251-255 – Welding, cutting, and brazing
- 3.8 29 CFR 1910.95 - Noise

4.0 General

- 4.0 No OHIO employee will enter a boiler without first having complied with and been trained in the requirements of the OSHA Inorganic Arsenic Standard, Confined Space Entry Standard, and OHIO programs.

- 4.1 Coal fired boiler cleaning involves numerous safety considerations. OSHA Standards that must be complied with by OHIO employees and outside contractors, including but not limited to:
 - 4.1.1 Inorganic Arsenic
 - 4.1.2 Permitted Confined Space Entry
 - 4.1.3 Respiratory Protection
 - 4.1.4 Respirable Dust
 - 4.1.5 Personal Protective Equipment
 - 4.1.6 Lock out/ Tag Out
 - 4.1.7 Scaffolding
 - 4.1.8 Welding, cutting, and brazing
 - 4.1.9 Noise
 - 4.1.10 OHIO University Standard Operating Procedures (SOP's)
- 4.2 The Inorganic Arsenic Program is a cooperative program of the Lausche Heating Plant, Facilities Management, and the Department of Environmental Health & Safety. Current program managers are:
 - 4.2.1 Chief Engineer (FM, Heating Plant)
 - 4.2.2 Environmental Safety Coordinator (EHS)
- 4.3 Arsenic is found naturally in the earth. Ohio has naturally high levels of arsenic in the soil in many parts of the state. Arsenic levels vary as a contaminant in coal. Exposure may or may not occur, based on whether specific loads of coal have appreciable arsenic levels in them as contaminants. Over the years, OHIO has monitored and not found measurable arsenic in the air. Most recently, arsenic levels have been over the permissible exposure limit (PEL). At this time, OHIO considers all entrants into the boilers to have potential arsenic exposure without appropriate personal protective equipment and precautions. Compliance with our program is mandatory for coal fired boiler entry.
- 4.4 This program applies only to coal fired boilers, not gas fired boilers. Three (3) Lausche boilers are coal fired at this time. All Ridges Heating Plant boilers and one Lausche boiler are gas.
- 4.5 Boiler cleaning generally only occurs for 1-2 days, 1-3 times per year.

5.0 Permissible Exposure Limits and Monitoring

- 5.0 The permissible exposure limit (PEL) for inorganic arsenic is $10 \mu\text{g}/\text{M}^3$ as an 8 hr. time weighted average (TWA). Sampling has indicated that this level can be exceeded during boiler cleaning operations. Certain requirements of the Standard begin when you exceed the action level of $5 \mu\text{g}/\text{M}^3$.

- 5.1 During boiler cleaning the potential to exceed the PEL can exist therefore, all requirements of the Standard apply to the boiler cleaning operation; full personal protective equipment (PPE), respirators, engineering controls, and trained workers are required. A Confined Space Entry Permit is also required with monitoring.

6.0 Work Site and Engineering Controls

- 6.0 Establish a regulated area and control access.
- 6.1 Follow the Heating Plant Standard Operating Procedure (SOP) for boiler-cleaning operations found in Appendix A.
- 6.2 Open up the boiler wherever possible for ventilation.
- 6.3 Use air filtration devices (AFDs) with HEPA filters to clean the air, maintain negative pressure, and draw fresh air into the space. Exhaust the AFD's outdoors.
- 6.4 All PPE, rags, and other minor waste materials will be left in the boiler to be burned. Do not remove them from the regulated area.
- 6.5 Obtain a Confined Space Permit from an authorized O.U. Confined Space Entry Supervisor before entry and conduct monitoring per the O.U. Confined Space Management Program.

7.0 Air Monitoring

- 7.0 Air monitoring is performed quarterly when the PEL is exceeded and every 6 months when between the AL and the PEL. Since we only clean boilers 1-3 times a year, we will need to do air monitoring each time we clean the boilers. If a combination of work practices and engineering controls bring the levels down to below the PEL, less sampling will be needed.
- 7.1 The Heating Plant Superintendent will notify EHS as soon as a boiler cleaning date has been established, but in no case less than a few days ahead of time, that monitoring will be needed. EHS will conduct the air sampling and report back to the Heating Plant Superintendent.

8.0 Personal Protective Equipment

- 8.0 All coal fire boiler entrants shall wear full disposable protective clothing, gloves, and a full-face air-purifying respirator.
- 8.1 Hardhats or other PPE shall be used as necessary.
- 8.2 All reusable PPE shall be cleaned after use.

9.0 Training

- 9.0 All coal fired boiler entrants shall have taken the OHIO Inorganic Arsenic Program, Confined Space Entry Training and Respiratory Protection Training.
- 9.1 Retraining is required annually thereafter for arsenic and respiratory protection.
- 9.2 All entrants shall be adequately trained in whatever tasks must be done inside the space or when OSHA requires it for specific tasks.

10.0 Signage

- 10.0 The required OSHA Arsenic Warning Sign shall be posted at the entry to the boiler (restricted area).

11.0 Medical Monitoring

- 11.0 Medical monitoring is only required if the employee is exposed to inorganic arsenic above the action level, regardless of respiratory protection, for at least 30 days per year.
- 11.1 Since our employees only clean the boilers a few days per year, a medical program is not required.
- 11.2 If at any time however, an employee feels that they may have symptoms of arsenic related illness or when requested by the OHIO physician at Occupational Health, an employee may have a medical evaluation. Recommendations of the physician shall be followed.

12.0 Hygiene

- 12.0 A plastic drop cloth shall be placed immediately outside the area to the boiler access. All dirty clothing and equipment shall be kept on the drop cloth. Employees shall not exit the drop cloth area without HEPA vacuuming them self and removing disposable clothing.
- 12.1 Employees shall HEPA vacuum their disposable clothing after egress from the space. Air hoses are not allowed for this purpose. Disposable clothing will be removed and thrown in the boiler.
- 12.2 Wash your hands immediately. Remove and clean your respirator.
- 12.3 Shower before leaving work for the day.
- 12.4 No eating, drinking, applying cosmetics, or smoking is allowed without washing your hands first. Both OHIO policy and State of Ohio law prohibit smoking in university vehicles and buildings.

13.0 Contractors working in the coal fired boilers

- 13.0 Appropriate language shall be put in all specifications for outside contractors that must enter boilers for maintenance or repair.

- 13.1 Contractors must comply with OSHA Standards and have an acceptable program for confined space entry into boilers or comply with the OHIO program. If they will create dust inside, they must have an arsenic protection program. Any other standards must be met; such as PPE, welding, scaffolding, etc.
- 13.2 The Heating Plant Superintendent is responsible to review contractor qualifications and restrict access to the space if the requirements are not met. Contact EHS or the Facilities Management Safety Representative for assistance as needed.

Appendix A

Boiler Cleaning – Coal Fired Boilers

1. Contact EHS with the start date ahead of time, to arrange for air monitoring to be done.
2. Secure a written Confined Space Entry Permit from a qualified entry supervisor.
3. Burn all coal from the coalbunker and coal chute as needed.
4. Vent off the steam from the boiler steam drum, once the boiler has dropped steam pressure.
5. All power sources should be locked and tagged out at the main panel.
6. Make sure Confined Space and Inorganic Arsenic Warning Signs are in place as required.
7. Drain out boiler drums and economizer.
8. Lock out and tag the blow down valves.
9. Remove the manhole covers “doors” from the boiler steam drum and mud drum.
10. Engage water feed system, and clean the boiler drums with water and flush.
11. Remove all hand holes from the boiler and economizer.
12. Start the I.D. fan on low speed and vent the furnace over the weekend or as approved by the Plant Superintendent.
13. Raise the stoker gate evenly to 13” and remove the front shoes.
14. Prepare for entry into the boiler space for cleaning.
15. Only personnel with a Confined Space Entry Permit and Training in Confined Space, Respiratory Protection, and Inorganic Arsenic will be permitted to enter the boiler furnace area.

- a. All personnel shall follow the practices and procedures for safe permit entry operations.
- b. The entry supervisor for the space being entered shall write permits.
- c. Air quality testing should be done before entering the permit-required area.
- d. One person shall be the attendant to monitor the permitted space at all times.
- e. All of the proper safety and monitoring equipment shall be checked and set up, including:
 - i. Air monitoring devices, ventilation equipment, personal protective equipment, lighting, barricades and signs, rescue and emergency equipment, and any other equipment necessary for safe entry operations.
- f. Note: Confined Space Permits are good for only one shift, date, and time specified.

16. Personal safety equipment will be worn at all times while cleaning:

- a. Tyvek protective suite, full-face respirators (if half face are allowed, separate eye protection must be used), and gloves.
- b. A HEPA-vac and air filtration device (AFD) as needed.
- c. Proper lighting.

17. Personnel may now enter furnace to begin cleaning. Cleaning is typically done in 30-minute shifts.

18. Erect scaffolding inside the firebox so as to assist in removing slag and clinkers that have collected on the furnace ceiling and walls and then remove from the boiler.
19. Blow down the firebox with high-pressure air, unlock stoker grate only, and run stoker grate to remove residue.
20. Clean the boiler and economizer water tubes, check for refractory failure inside the boiler and the economizer, and repair refractory material as needed.
21. Clean air boxes with HEPA-vacuum.
22. Inspect grates for worn or broken grate bars, replace if required.
23. Replace front shoes.
24. Stop and lock out the I.D. fan/turbine, standing outside the fan, clean the inside of the fan with high-pressure air.
25. Clean the inside of the forced draft fan/turbine with high-pressure air.
26. Change oil/lubricate fan/turbine carrier bearings, oil in the gearbox, and clean gauge glass. Trial run the turbine to recheck the oil level and oil rings.
27. Check packing of the feed water Fisher Valve.
28. Clean the water column gauge glass or replace if needed.
29. Put refractory around the tubes next to the grate at the front of boiler.
30. Externally clean the boiler.
31. Cancel the Confined Space Entry Permit after last entry is made.
32. Re-establish boiler operations