Safety Policy and Procedure

Policy Number: 032
Title: Hazardous Substance in Boiler Work

1 Status
1.1 Update of existing policy, effective 12/23/08.

2 Purpose
2.1 To provide guidance for working on industrial boilers and associated systems.

3 Applicability
3.1 This policy applies to all subsidiary companies and departments of the Cianbro Companies.
3.2 All organizations are required to comply with the provisions of this policy and procedure.

4 Definitions
4.1 Hazardous Substance: Any biological agent or other disease causing agent or any chemical present in the workplace that poses a threat to worker health. Typical hazardous substances are toxic, corrosive, ignitable, explosive, or chemically reactive.
4.2 Threshold Limit Values (TLV®): Are guidelines (not standards) prepared by the American Conference of Government Industrial Hygienists, Inc (ACGIH) to assist industrial hygienists in making decisions regarding safe levels of exposure to various hazards found in the workplace. A TLV® reflects the airborne level of exposure that the typical worker can experience without an unreasonable risk of disease or injury. Cianbro uses the lower of the TLV® or OSHA PEL as the allowable safe level for team members.
4.3 Zinc Protoporphyrin: A zinc protoporphyrin (ZPP) test is a blood test that can indicate among other things an adverse metabolic effect of lead on your body. ZPP may rise significantly after an unprotected lead exposure. A significant elevation that persists over time (more than one test) may be the result of lead exposure in the 2-3 months prior to ZPP testing.

5 Policy
5.1 We will protect team members from the hazards associated with work in these environments.

6 Responsibilities
6.1 The Corporate Safety Officer or designee is responsible for providing approval for any deviation from this policy.
6.2 The top Cianbro Manager of the job site is responsible for the implementation of this policy on the project.
6.3 The jobsite team is responsible to ensure required medical surveillance per this policy has been complete prior to the start of the job.
6.4 The corporate safety department is responsible for maintaining this document.
7 Hazardous Substance in Boiler Work

7.1 Planning Program Checklist

The following guidelines require consideration when performing work in and around boilers where the health and environmental dangers of hazardous substances exist.

7.1.1 Before working in and around boilers where boiler ash by-products can be found, an ash (solid) sample must be collected for analyzing. Expect to find:
- Lead, vanadium, and other heavy metals in oil fired boilers
- Lead, arsenic, and other heavy metals in coal fired boilers
- Lead and other heavy metals in trash fired boilers
- Lead and other heavy metals in other fuel fired boilers (Results of samples taken within the previous year by the host may be used after verifying that boiler operating conditions have not changed.)

7.1.2 Sampling and results must be coordinated through the Safety Department for guidance on which substances require special health and safety planning. Refer to Cianbro’s Lead and Other Heavy Metal Safety Policy and Procedure.

7.1.3 Hazardous substance(s) activities must incorporate engineering controls, such as mechanical ventilation, job rotation, worker isolation, and work containment in their activity plans to minimize exposures.

7.1.4 Appropriate medical surveillance must be instituted, with guidance from the Safety Department, through established medical support facilities.

7.1.5 Air monitoring must be done initially and at specific intervals to ensure respirator and PPE (personal protective equipment) is adequate based on results compared to the Permissible Exposure Level (PEL) and Threshold Limit Value (TLV).

7.1.6 Jobsite hygiene must be provided. Remember to match the appropriate hygiene controls and practices to the specific hazardous substance being dealt with. (For example: showers are required if air monitoring results show levels of >50 ug/m³ (PEL) for lead. Refer to Cianbro’s Lead and Other Heavy Metal Safety Policy and Procedure.

7.1.7 Proper respiratory and other PPE must be provided. Again, this will depend on the specific hazardous substance(s) being dealt with, the specific activity being performed (welding, scraping, etc.), and the results of the air monitoring conducted during the initial assessment period. Medical approval, fit testing, and training must be done before wearing a respirator.

7.1.8 All team members must receive Cianbro’s Hazard Communication Training and activity specific hazardous substance(s) training prior to performing work.
7.1.9 Any waste generated must be controlled, stored, labeled, and shipped in accordance with Cianbro's Hazardous Materials and Waste Management Program and any Federal, State or local requirements.

7.1.10 If boiler ash sample results show the presence of lead or other heavy metal (at any level) Cianbro’s Lead and Other Heavy Metal Safety Policy and Procedure must be followed. Almost always lead is present in boiler ash.

7.1.11 A written site specific activity plan covering the hazardous substances team members could be exposed to must be done. Included in the current Activity Plan format, being used at all projects are a project specific lead/silica protection plan page that includes the basic information required by OSHA which must be completed on all lead activities.

7.2 Hazardous Substance(s) Identification

Before any activity begins involving working in and around boilers, project management must take measures to establish what specific hazardous substance(s) are present in the boiler ash and also determine what types of fuel are being used.

7.2.1 If a recent ash sample analysis (current within one year and boiler operating conditions have not changed) is available from the host it can be used. If not, one must be collected and analyzed for hazardous substances.

7.2.2 It is also important to know what types of fuels are being used. Different fuels leave different residuals.

7.2.3 Specific activities must be identified to determine what levels of respiratory; PPE, ventilation, hygiene, etc. will be required during the initial assessment periods of each activity. (Examples of activities are welding, cutting, burning, scraping, grinding, sweeping, vacuuming, needle gunning, etc.)

7.2.4 The Corporate Safety Department should be contacted to discuss development steps prior to drafting a hazardous substance(s) program specific to the project work activities.

7.3 Project Specific Hazardous Substance(s)

7.3.1 Training: A competent person, capable of conducting training, identifying existing and predictable hazardous substance(s) in the work area and who has authority to take prompt corrective measures, must be identified. Prior to starting any activities involving potential hazardous substance(s) exposure, all affected team members must receive initial job specific training in the following areas:

- Activities that could result in exposures to hazardous substances above their assigned action levels.
- Health hazards associated with the specific hazardous substance(s) as specified on Material Safety Data Sheets (MSDS) plus Cianbro's Hazard Communication Program Safety Policy and Procedure.
- Engineering/Environmental/Administrative controls needed (planned for) to minimize substance(s) hazards.
- Proper use, wear, care and maintenance of PPE.
- Site-specific written respirator use plan.
- Complete review of activity plan and sign off by team members.
- Medical surveillance procedure and team member rights concerning medical records.
- Review of applicable contents and appendices of OSHA Standards (i.e. 1926.62 and 9.5 Appendix E of Cianbro's Workplace Lead and Other Heavy Metals Protection Program Safety Policy and Procedure for lead hazards).
- Proper handling/storage/disposal of hazardous wastes.
7.3.2 Environmental Controls:
- Supervisors working with hazardous substances must plan and develop environmental safeguards/containment methods to protect against exposures resulting from outside elements (wind, heat, humidity, etc.). Also, protection of hazardous substances from spreading into other work areas or in the environment through unfiltered ventilation/exhaust or poor work practices needs to be done.

7.3.3 Engineering Controls:
- Engineering control methods must be used to reduce or eliminate exposures to hazardous substances.
- Process/Equipment substitutions should be considered (i.e. by using hydraulic shears instead of a cutting torch or a longer cutting torch instead of the standard short one).
- Isolation may be used as a method of limiting hazardous substance exposure to only those directly involved in the work area by containment and negative pressure to reduce exposure.
- Ventilation or dilution is probably the most important engineering control available to limit airborne concentrations of hazardous substances to acceptable levels. Local exhaust ventilation that includes both portable ventilation systems and shrouded vacuum is generally the preferred method. Remember that HEPA filters must be employed to reduce environmental contamination.
- Negative Air Machines should be used in containment areas. These machines filter the air and help to reduce team member exposure. (Remember to correctly size your machine to your containment area).

7.3.4 Work Practice (Administrative) Controls
involve the way an activity is performed and can be critical to maintaining a safe, healthy work environment.
- The most effective way to reduce exposure to our team members is for the client to thoroughly clean the boiler before we enter. This can include explosive techniques, power wash, and vacuum. It is to our advantage to work with our clients to clean the boiler as effectively as possible and to help them understand why it will benefit them as well as Cianbro (productivity improvements during the outage, less hazard for their team members, etc.).
- A rigorous housekeeping effort is necessary. Regularly cleaning up ash dust and ash containing debris should be accomplished. NO DRY SWEEPING!
- Wet sweep or HEPA vacuum only.
- Initial surface preparation/cleaning must be done before performing planned task. By using a shrouded vacuum needle gun or hand scraper for example to remove any caked on ash before cutting, burning or welding on a surface will reduce/eliminate airborne exposures. Preparation of a surface to a clean state can eliminate or reduce most activities below action levels and/or permissible exposure levels thus eliminating needs for special PPE.
- Vacuuming is usually the most reliable methods to clean up ash dust/debris using a HEPA vacuum filtering system. Pressure wash/vacuum methods, done by a competent professional company, are effective procedures done prior to commencing work.
- Periodic inspection and maintenance of process equipment and control equipment such as ventilation systems is essential to ensure the highest performance is maintained.
- Know the proper way to perform the job task maximizing the effectiveness and minimizing exposures. Wetting of a surface with a water mist before sanding or scraping reduces airborne exposures.
- Good supervision provides needed support for assuring that workers follow proper work practices. Current OSHA standards require frequent and regular inspections of job sites, materials and equipment by a competent person. These should be documented.
- Certain operations should be scheduled at a time when the fewest team members are present who will be subject to hazardous substance exposures.
• Rotate team members in and out of hazardous exposure areas, therefore reducing exposure time for any one individual. **Note:** This cannot be used to reduce exposure to carcinogens.

### 7.3.5 Medical Surveillance

Medical surveillance may be required when team members are exposed to hazardous substances at any amount and/or above permissible exposure levels for a specified amount of time in accordance with OSHA standards. Medical surveillance is required in the following circumstances:

- Team members expected to be exposed to a lead dust or fumes at any level, without regard to the use of respirators, must be protected and follow Cianbro's medical surveillance program for lead. Prior to the job activity involving lead, and at a specific ongoing frequency, team members must have their blood checked for lead (BLL) and Zinc Protoporphyrin (ZPP). (Refer to Cianbro's Workplace Lead and Other Heavy Metals Protection Program Safety Policy and Procedure for medical surveillance test requirements.)
- Team members, who are, or could be, exposed to inorganic arsenic above the action level of 5 ug/m³ (8 hour TWA), without regard to the use of respirators, at least 30 days per year, must follow Cianbro's medical surveillance program. Contact Corporate Safety to coordinate medical surveillance test scheduling.

#### Team members who are or may be exposed to cadmium at or above the action level (2.5 ug/m³) for 30 or more days in twelve consecutive months. All team members who perform the following tasks, operations or jobs 30 or more days in twelve consecutive months would need medical surveillance:

- Electrical grounding with cadmium welding;
- Cutting, brazing, burning, grinding or welding on surfaces that were painted with cadmium-containing paints;
- Electrical work using cadmium-coated conduit;
- Use of cadmium containing paints;
- Cutting and welding cadmium-plated steel;
- Brazing or welding with cadmium alloys;
- Fusing or reinforced steel by cadmium welding;
- Maintaining or retrofitting cadmium-coated equipment;
- Wrecking and demolition where cadmium is present.

**NOTE:** Any team member who is not exposed above the action level of 2.5 micrograms per cubic meter of air (2.5 ug/m³) without regard to the use of respirators, at least 30 days per year does not require medical surveillance. Contact Corporate Safety to coordinate medical surveillance test scheduling.

- Medical Surveillance for Hexavalent chromium must be provided to team members who are:
  - Exposed to Cr(VI) (Hexavalent Chromium) at or above the action level (2.5 ug/m³ Cr(VI) as an 8 hour time-weighted average) for 30 or more days a year;
  - Experiencing signs or symptoms of the adverse health effects associated with Cr(VI) exposure (e.g., blistering lesions, redness or itchiness of the exposed skin, shortness of breath or wheezing that worsens at work, nosebleeds, a whistling sound while inhaling or exhaling); or
  - Exposed in an emergency (i.e., an uncontrolled release of Cr (VI) that results in significant and unexpected exposures.

- Team members, who may be exposed to dust and fumes from vanadium above the permissible exposure level of 50 ug/m³ (8 hr TWA), must wear appropriate respiratory protection for levels determined from air sampling. Remember proper engineering and work practice controls can almost always reduce levels below the PEL eliminating the
need for respiratory protection. Team members exposed to vanadium must follow Cianbro's medical surveillance program. Contact Corporate Safety to coordinate medical surveillance test scheduling. NOTE: When possible, please allow 3-5 days for any medical surveillance test scheduling.

7.4 Airborne Monitoring

7.4.1 Air monitoring must be done at the start of any activity, each time conditions change and when exposure from dust or fumes of hazardous substances is expected while working in or around boilers. A change in conditions could be ventilation flow/volume, scraping to grinding, tooling change, heat/humidity, visible airborne dust from adjacent activities, number of people, etc.

7.4.2 The results from air monitoring must be time weight averaged to the work shift duration in order to determine the effectiveness of engineering/work practice controls and appropriate PPE (respirators). Sample pumps, cassettes and operation instruction can be obtained by calling Corporate Safety in Pittsfield.

7.5 Hygiene Practices and Controls

- Good hygiene practices are essential for all work activities in and around boilers where unclean surfaces/areas exist and exposure is expected because of the specific activity.
- Inhalation and ingestion are the two primary routes of entry into the body creating a health hazard. Skin contact of some substances like arsenic can cause dermatitis with burning, itching, swelling, and skin eruptions.

7.5.1 Minimum requirements include providing for:

- Running water, soap (pump able preferred), clean wipes (towels) and trash containers for waste ensuring that team members wash hands and face prior to eating, drinking, smoking, chewing, and leaving the work area/project site.
- Restrict eating, drinking, smoking and chewing in hazardous work areas. Require team members to leave these items in the clean break area.
- Showers and special other requirements may be necessary if exposure from lead is above the action level or if the possibility of or absorption through the skin exists. (Refer to Cianbro's Workplace Lead Protection Program Safety Policy and Procedure for specific other requirements.)
- Clean change and break areas need to be provided to control the spread of hazardous substance contamination on a person's clothing/footwear.
- Personnel must HEPA vacuum themselves off before exiting work area.

7.6 Respiratory and Personal Protection Equipment

PPE should always be considered as a last resort after best efforts have been made to eliminate/reduce the hazards through effective engineering and work practice controls. Usually, at a minimum, gloves, coveralls or tyvek suits, boots and hard hats should be used. Appropriate respirators need to be selected for the specific type of activity and substance exposure during the initial assessment period and for ongoing work, depending on airborne level results from sampling. A written site-specific respirator plan needs to be in place (Refer to Cianbro's Respiratory Protection Safety Policy and Procedure).
7.7 Recordkeeping

The Safety Specialist and/or Project Superintendent should maintain written documentation as follows:

- Maintain copy of activity plan (active) for ongoing activities and forward copy to the Safety Department.
- Log/record all solid and air monitoring results and calibrations. (Copies to Corporate Safety Department).
- Log/record all medical surveillance completed for team members. (Ensure Safety Department has copies.
- Document training completed.
- Any inspections of the work areas done and results.

7.8 Waste Storage/Disposal

- A designated generator of hazardous waste must be identified. Our contract with the host/client to do the work should clearly state a representative party (i.e. DOT) acceptance of responsibility for hazardous waste collection, storage, shipping and disposal.
- Lead, cadmium, vanadium and arsenic (and other heavy metals) are all considered to be hazardous substances and depending on concentrations must be disposed of as a hazardous waste in accordance with EPA and Cianbro standards. Currently only two waste haulers/disposal companies are approved to handle waste generated by us - (Clean Harbors and Univar) Wastes need to be segregated as much as possible and stored in accordance with Cianbro’s storage procedure in the Hazardous Materials and Waste Management Handbook (Cookbook).

For further information, refer to 9.10 Appendix J Boiler Work Guidelines contained in the Lead and Other Heavy Metals Safety Policy and Procedure.

8 Budget / Approval Process

8.1 It is the responsibility of each jobsite to procure and provide all PPE requirements under this policy and to provide necessary training.

9 Related Documents

9.1 006 Lead and Other Heavy Metals Safety Policy and Procedure