



SECTION 33

BENZENE AWARENESS PROGRAM



1. **REGULATORY STANDARD:** OSHA - 29 CFR 1910.106 and 1926.55
2. **Purpose:** The Benzene Awareness Program is essential to the safety of all Maul Electric, Inc employees and to inform personnel of the dangers of Benzene.
3. **Synonyms:** Benzol, benzole, coal naptha, cyclohexatriene, phene, phenyl hydride, pyrobenzol. (Benzin, petroleum benzin, and Benzine do not contain Benzene)
4. **Scope:** Maul Electric, Inc has chosen to establish a Benzene Awareness Program for emergencies that could arise from exposure to Benzene.
5. **Physical and Chemical Characteristics**
 - 5.1 Benzene is a clear, colorless liquid with a distinctive sweet odor. Its boiling point is 176 degrees F and its flash point is 12 degrees F. The flammable limits in the air are 1.3% for the low end and 7.5% for the high end. Benzene is a flammable liquid. Its vapors can form explosive mixtures. All ignition sources must be controlled when Benzene is used, handled, or stored. Where liquid or vapor may be released, such areas shall be considered as hazardous locations (commonly found in petroleum refining sites, tank gauging, field maintenance, etc..)
 - 5.2 Benzene vapors are heavier than air; thus the vapors may travel along the ground and be ignited by open flames or sparks at locations remote from the site at which Benzene is handled.
 - 5.3 Benzene is classified as a 1 B flammable liquid for the purpose of conforming to the requirements of 29 CFR 1910.106. A concentration exceeding 3,250 ppm is considered a potential fire explosion hazard. Location where Benzene may be present in quantities sufficient to produce explosive or ignitable mixtures are considered Class I Group D for the purpose of conforming to the requirements of 29 CFR 1910.309.
6. **Health Effects**
 - 6.1 Benzene is primarily an inhalation hazard. Systemic absorption may cause depression of the hematopoietic system, pancytopenia, aplastic anemia, and leukemia. Inhalation of high concentrations can affect the central nervous system function. Aspiration of small amounts of liquid Benzene immediately causes pulmonary edema and hemorrhage of pulmonary tissue. There is some absorption through the skin. Absorption may be more rapid in the case of abraded skin, and Benzene may be more readily absorbed if it is present in a mixture or as a contaminant in solvents that are readily absorbed. The defatting action of Benzene may produce primary irritation due to repeated or prolonged contact with the skin. A high concentration is irritating to the eyes and the mucous membranes of the nose, and respiratory tract.



- 6.2** Direct skin contact with Benzene may cause erythema. Repeated or prolonged contact may result in drying, scaling dermatitis, or development of secondary skin infections. In addition, there is Benzene absorption through the skin. Local effects of Benzene vapor or liquid on the eye are slight. Only at very high concentrations is there any smarting sensation in the eye. Inhalation of high concentrations of Benzene may have an initial stimulatory effect on the central nervous system characterized by exhilaration, nervous excitation, and/or giddiness, followed by a period of depression, drowsiness, or fatigue. A sensation of tightness in the chest accompanied by breathlessness may occur and ultimately the victim may lose consciousness. Tremors, convulsions and death may follow from respiratory paralysis or circulatory collapse in a few minutes to several hours following severe exposure.
- 6.3** The detrimental effect on the blood-forming system of prolonged exposure hematopoietic system is the chief target for Benzene's toxic effects that are manifested by alterations in the levels of formed elements in the peripheral blood. These effects have occurred at concentrations of Benzene that may not cause irritation of mucous membranes, or any morbidity is varied, often not readily noticed and non-specific. Subjective complaints of headache, dizziness, and loss of appetite may precede or follow clinical signs. Rapid pulse and low blood pressure, in addition to a physical appearance of anemia, may accompany a subjective complaint of shortness of breath and excessive tiredness. Bleeding from the nose, gums, or mucous membranes, and the development of purpuric spots (small bruises) may occur as the condition progresses. Clinical evidence of leukemia, anemia, and thrombocytopenia, singly or in combination, has been frequently reported among the first signs.
- 6.4** Bone marrow may appear normal, aplastic, or hyperplastic, and may not, in all situations, correlate with peripheral blood forming tissues. Because of variations in the susceptibility to Benzene morbidity. There is no "typical" blood picture. The onset of effects of Benzene exposure may be delayed for many months or years after the actual exposure has ceased and identification or correlation with Benzene exposure must be sought out in the occupational history.
- 7. General Requirements.** Maul Electric, Inc will establish Benzene operational procedures through the use of this document.
- 7.1** Facility Evaluation. This employer shall evaluate our facility(s) to determine if any work area meets the criteria for designation as a Regulated Benzene Hazard Area.
- 7.2** Regulated areas. This employer shall establish a regulated area wherever the airborne concentration of benzene exceeds or can reasonably be expected to exceed the permissible exposure limits, either the 8-hour time weighted average exposure of 1 ppm or the short-term exposure limit of 5 ppm for 15 minutes.
- 7.3** Benzene liquid is highly flammable and vapors may form explosive mixtures in air. Fire extinguishers must be readily available. Smoking is prohibited in areas where benzene is used or stored.



8. **Employee Notification and Signage.** This employer shall post signs at entrances to regulated areas. The signs shall bear the following legend:

DANGER
BENZENE
CANCER HAZARD
FLAMMABLE - NO SMOKING
AUTHORIZED PERSONNEL ONLY
RESPIRATOR REQUIRED

9. **Containers.**

This employer shall ensure that labels or other appropriate forms of warning are provided for containers of benzene within the workplace. There is no requirement to label pipes. The labels shall comply with the requirements of 29 CFR 1910.1200 (Hazard Communication Standard) and in addition shall include the following legend:

DANGER
CONTAINS BENZENE
CANCER HAZARD

10. **Training.**

10.1 Types of training. The company will determine whether training required for specific jobs will be conducted in a classroom or on-the-job. The degree of training provided shall be determined by the complexity of the job and the Benzene exposure hazards associated with the individual job.

10.1.1 Initial Training. Prior to job assignment, this employer shall provide training to ensure that the hazards associated with Benzene are understood by employees and that the knowledge, skills and personal protective equipment required are acquired by employees. The training shall as a minimum include the following:

10.1.1.1 Each authorized employee shall receive training in the recognition of applicable hazards involved with the particular job and job site, as well as the methods and means necessary for safe work.

10.1.1.2 The specific nature of the operation which could result in exposure to Benzene.

10.1.1.3 The purpose, proper selection, fitting, use and limitation of personal protective equipment (PPE).

10.1.1.4 The adverse health effects associated with excessive exposure to Benzene.



10.1.1.5 The engineering controls and work practices associated with the employee's job assignment, including training of employees to follow relevant good work practices.

10.1.1.6 The contents of any compliance plan in effect.

10.1.1.7 The requirements of the Hazard Communication Standard under 29 CFR 1910.1200.

10.1.1.8 The employee's right of access to records under 29 CFR 1910.20.

10.1.1.9 The medical surveillance program in place at this facility used to determine Benzene exposure.

10.1.2 Refresher Training. Scheduled refresher training will be conducted on a(n) _____ basis.

11. Retraining.

11.1 Retraining shall be provided for all affected employees as a minimum whenever:

11.1.1 There is a change in job assignments.

11.1.2 There is a change in personal protective equipment.

11.1.3 There is a change in equipment that presents a new hazard.

11.1.4 There is a change in processes that presents a new hazard.

11.1.5 Their work takes them into hazardous or regulated area.

11.1.6 There is a change in Benzene safety procedures.

11.1.7 Safety procedure fails resulting in a near-miss, illness, or injury.

11.2 Additional retraining. Additional retraining shall also be conducted whenever a periodic inspection reveals, or whenever this employer has reason to believe, that there are deviations from or inadequacies in the employee's knowledge of known hazards, or use of equipment or procedures.

11.3 The retraining shall reestablish employee proficiency and introduce new equipment, or revised control methods and procedures, as necessary.



11.4 Certification. This employer shall certify that employee training has been accomplished and is being kept up to date. The certification shall contain a synopsis of the training conducted, each employee's name, and dates of training.

12. Monitoring and Medical Surveillance. This employer shall monitor our workplace and work operations to determine accurately the airborne concentrations of benzene to which employees may be exposed.

12.1 Initial monitoring. Initial monitoring will be completed within 30 days of the introduction of benzene into the workplace.

12.2 Periodic monitoring and monitoring frequency. If the monitoring reveals employee exposure at or above the action level but at or below the TWA, the monitoring will be repeated each such employee at least every year.

12.3 Exposures above TWA. If the monitoring reveals employee exposure above the TWA, the monitoring will be repeated for each such employee at least every six (6) months.

12.4 Exposures at or below the TWA. The monitoring schedule may be reduced from every six months to annually for any employee for whom two consecutive measurements taken at least 7 days apart indicate that the employee exposure has decreased to the TWA or below, but is at or above the action level.

12.5 Termination of monitoring. If the initial reveals employee exposure to be below the action level, the monitoring may be discontinued for that employee, except as otherwise required.

13. Spill and Leak Procedures. Spills and leaks will be under the supervision of the Supervisor. The following apply:

13.1 Persons not wearing protective equipment and clothing will be restricted from areas of spills or leaks until cleanup has been completed.

13.2 Emergency Containment. Benzene exposure can be hazardous. Only authorized and trained emergency response personnel should attempt containment. If you are not trained in containment of Benzene, evacuate the area in accordance with established procedures. If Benzene is spilled or leaked the following steps as a minimum should be taken.

13.2.1 Remove all ignition sources.

13.2.2 Ventilate the area of the spill or leak to disperse vapors.



13.2.3 If possible, stop flow of liquid, allow to vaporize.

13.2.4 Use containment equipment such as dikes, compatible absorbent materials, etc.

13.2.5 Use non-sparking tools and explosion proof equipment at all times in the spill area.

13.2.6 Employer should be aware of Owners contingency plan provisions. Employees must be informed where benzene is used in host facility and aware of additional plant safety rules

14. Emergency First Aid Procedures. In the event of an emergency, institute first aid procedures and send for first aid or medical assistance in accordance with local procedures. Dial 9-1-1 for emergency response personnel.

14.1 Eye Exposure: Wash immediately with large amounts of water for at least 15 minutes. Lifting the lower and upper lids occasionally, get medical attention as soon as possible.

14.2 Skin Exposure: Immediately flush with copious amounts of water. Remove any clothing contaminated, and flush exposed skin areas, get medical attention as soon as possible.

14.3 Swallowing Exposure: If benzene has been swallowed and the patient is conscious, do not induce vomiting. Call for medical assistance or a doctor immediately.

14.4 Respiratory Exposure: Get the victim to open, fresh air immediately. If breathing has stopped perform CPR. Keep the victim warm and at rest. Get medical attention as soon as possible.

14.5 Rescue Considerations. Don't become a second victim. Move the affected person from the hazardous area. If the exposed person has been overcome, initiate local emergency notification procedures. Never enter any vessel or confined space where the benzene concentration might be high enough to displace air or create an explosive atmosphere without proper training, equipment and procedures. Understand the facility's emergency rescue procedures and know the locations of rescue equipment before the need arises.

15. Protective Clothing and Personal Protective Equipment (PPE). Where engineering controls, administrative controls, and job hazard analyses do not eliminate all job hazards, employees will (where appropriate) wear personal protective equipment (PPE).

15.1 These include items such as caps, hair nets, face shields, safety goggles, glasses, hearing protection, foot guards, gloves, sleeves, aprons,



respirators etc. Supervisors will ensure that equipment selected will meet the following requirements:

15.1.1 It will be appropriate for the particular hazard.

15.1.2 It will be maintained in good condition.

15.1.3 It will be properly stored when not in use, to prevent damage or loss.

15.1.4 It will be kept clean, fully functional and sanitary.

15.2 Hazards associated with wear of protective clothing, PPE, personal clothing and jewelry. Protective clothing and PPE can present additional safety hazards. Supervisors will ensure workers wear appropriate clothing and PPE. These items will be worn so as not create additional hazards.

15.2.1 Personal clothing and jewelry. Personal clothing and jewelry will be monitored by the immediate supervisor. Clothing or jewelry that could become entangled in tools, equipment or machinery or of an excessively flammable nature will be prohibited.

15.3 Respirators. Respirators are required for those operations in which engineering controls or work practice controls are not feasible to reduce exposure to the permissible level. If it can be documented that benzene is present in the workplace less than 30 days a year, respirators may be used in lieu of engineering controls. If you experience difficulty breathing while wearing a respirator, you may request a positive pressure respirator. Contact your supervisor immediately.

15.4 Protective Clothing. You must wear appropriate protective clothing (such as boots, gloves, sleeves, aprons, etc.) over any parts of your body that could be exposed to liquid benzene.

15.5 Eye and Face Protection. You must wear splash-proof safety goggles if it is possible that benzene may get into your eyes. In addition, you must wear a face shield if your face could be splashed with benzene liquid.

15.6 Documentation. PPE requirements will be documented on a "Protective Measures Determination" form and properly filed.

16. Tool Selection, Evaluation and Condition. The greatest hazards posed by tools usually result from misuse and/or improper maintenance. Tool selection sometimes is not considered a priority when arrangements are made to begin work. All employees will consider the following when selecting tools:

16.1 Is the tool correct for the type work to be performed?

16.2 Are grounding methods sufficient when working in wet conditions?



16.3 Does the tool create sparks or heat? Has this been considered when working around flammable substances?

16.4 Are tools stored properly when not being used?

16.5 Have tools been modified beyond the manufacturers specification? If so, have the modifications been approved by a “competent person”?

17. Regulatory Limits:

The permissible exposure limits for Benzene are as follows:

Airborne: The maximum time-weighted average (TWA) exposure limit is 1 part of Benzene vapor per million parts of air (1 ppm) for an 8 hour workday and the maximum short-term exposure limit (STEL) is 5 ppm for any 15 minute period.

An airborne concentration of benzene of 0.5 parts per million (ppm) calculated as an 8-hour time-weighted average.