

1.0 PURPOSE

- 1.1 To protect employees from the hazards associated with benzene and maintain benzene exposures below the regulatory limits.

2.0 SCOPE

- 2.1 This program applies to all locations at UIC that use benzene or benzene-containing solutions.
- 2.2 It does not apply to the storage, dispensing, sale or use of gasoline, motor fuels or other fuels containing benzene.

3.0 AUTHORITY

- 3.1 Occupational Health and Safety Administration 29 CFR 1920.1028
- 3.2 The General Rules Concerning University Organization and Procedures, Article V, Section 1 (a) (U of I)

4.0 DEFINITIONS

- 4.1 **Action Level** - is 0.5 part benzene per million parts of air (0.5 ppm), calculated as an 8-hour time-weighted average. If employees are exposed at or above this concentration for more than 30 days per year, OSHA mandates that employers initiate certain required activities such as annual exposure monitoring and medical surveillance.
- 4.2 **Permissible exposure limit (PELs)** – 1 ppm, calculated as an 8-hour time-weighted average. If employees are exposed at or above this limit, OSHA mandates that employers are required to provide protective equipment such as respirators, must study and install engineering controls, if feasible, establish regulated areas, and perform all other OSHA-required procedures and duties.
- 4.3 **Short Term Exposure Limit (STEL)** - 5ppm averaged over any 15-minute period. Any exceedance of this limit also triggers all the OSHA requirements prescribed for exceedances of the PEL.
- 4.4 **Regulated area** – any area where airborne concentrations of benzene exceed or can reasonably be expected to exceed, the PELs.

5.0 PROCEDURES

- 5.1 Employee Exposure Assessments
 - 5.1.1 To assess airborne exposure to benzene, personal air samples must be collected representative of each potentially exposed work group in each work area.
 - 5.1.2 If 8-hr sample results are greater than the action level, but less than the PEL, annual monitoring is conducted.

- 5.1.3 If 8-hr sample results are greater than the PEL and 15-min sample results are greater than the STEL, monitoring is conducted every six months.
- 5.1.4 Monitoring may be discontinued if two consecutive sample results collected at least seven days apart are less than the action level.
- 5.1.5 Employees must be notified within 15 working days by EHSO if the personal sample results exceed the exposure limits. The notification must also include corrective actions to minimize employee exposure.
- 5.1.6 Air monitoring will be repeated in an area each time there is a change in equipment, processes or controls which may result in additional exposure to benzene.

5.2 Exposure Control

- 5.2.1 Substitution - When possible, substitution of a less hazardous chemical or process will be used to reduce or eliminate benzene exposures.
- 5.2.2 Engineering Controls - Chemical fume hoods and/or local exhaust ventilation will be used to reduce exposures to benzene. Local exhaust is used to capture and exhaust benzene vapors from the worksite, thereby preventing the accumulation of high exposure levels in the employee's breathing zone.
- 5.2.3 Administrative Controls - If engineering controls cannot be implemented, alteration of work practices will be used to reduce exposures to benzene. This could include limiting the amount of time employees spend working in high exposure areas by rotating personnel.
- 5.2.4 Personal Protective Equipment (PPE) - Contact with the eyes or skin with liquids containing benzene will be prevented by the use of protective garments and equipment which are impervious to benzene.
- 5.2.5 Respirators. If employee exposures are found to exceed the PEL or STEL, respirators will be provided until feasible engineering or administrative controls can be implemented.

5.3 Signage And Labeling

- 5.3.1 Regulated Areas - Access to these areas will be limited to persons trained to recognize the hazards of benzene. All entrances and access ways will be posted with signs bearing the following information:

DANGER
Benzene
Cancer Hazard
Flammable-No Smoking
Authorized Personnel Only
Respirator May Be Required

5.3.2 Container Labels - If a chemical product containing benzene is transferred into a container other than the original, the labels shall comply with the requirements of 29 CFR 1910.1200(f) and with the following information:

DANGER
Contains Benzene
Cancer Hazard

5.4 Standard Operating Procedures (SOP)

5.4.1 Working with benzene requires a written Standard Operating Procedure that addresses the following:

- the hazards of benzene;
- what containment devices (i.e., chemical fume hoods, glove boxes) will be used when working with benzene;
- what Personal Protective Equipment is required;
- designated storage and use areas;
- how to dispose of waste benzene solutions; and
- decontamination and spill clean-up procedures.

5.5 Employee Information And Training

▪ Every employee working with benzene must receive training on its hazards. If exposures are above the AL in a particular work area, the employees in that area must be trained annually. This information contains the following:

- requirements of the OSHA Standard-29 CFR 1910.1028;
- explanation of UIC's Benzene Safety program;
- contents of the Material Safety Data Sheet;
- description of the medical surveillance program;
- description of the health hazards associated with exposure;
- signs and symptoms of exposure;
- instructions to report any signs or symptoms that may be attributable to benzene exposure;
- description of the operations in the work area where benzene is present;
- work practices to reduce exposure, including engineering and administrative controls and Personal Protective Equipment required; and
- instructions for handling spills and emergency procedures.

5.5.1 All training must be documented by the individual presenting the training session and a copy of the training records submitted to EHSO.

5.6 Medical Surveillance

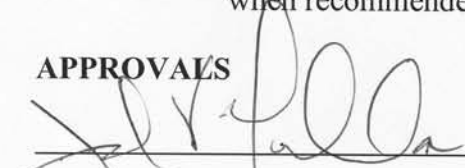
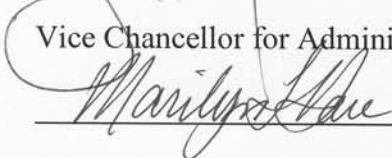
- 5.6.1 Employees found to have benzene exposures that exceed the benzene action level for 30 or more days per year or above the PEL and/or the STEL for ten or more days per year, will be included in a medical surveillance program conducted by the University Health Services.
- Employees exposed to benzene must receive medical attention under the following circumstances:
 - whenever an employee has developed signs or symptoms associated with exposure to benzene; and/or
 - whenever an employee is involved in a spill, leak or other occurrence resulting in a possible overexposure to benzene.
 - Medical Removal. If University Health Services determines that there has been a possible overexposure, EHSO will evaluate the work area to determine if further control measures are necessary.

6.0 RESPONSIBILITIES

- 6.1 The Environmental Health and Safety Office (EHSO) is responsible for:
- 6.1.1 developing and implementing a University-wide program;
 - 6.1.2 monitoring compliance with the OSHA Standard-29 CFR 1910.1028;
 - 6.1.3 providing general Benzene Safety training;
 - 6.1.4 conducting exposure assessments and evaluating exposure control measures as necessary;
 - 6.1.5 investigating accidents; and
 - 6.1.6 maintaining employee exposure records.
- 6.2 Deans, Directors and Department Heads are responsible for: ensuring departmental compliance with all the procedures outlined in this program.
- 6.3 Principal Investigators'/Supervisors' responsibilities include:
- 6.3.1 ensuring compliance with this program in their work areas;
 - 6.3.2 developing Standard Operating Procedures that address specific safety measures to be implemented when using benzene;
 - 6.3.3 coordinating the provision of medical examinations, monitoring exposure, and recordkeeping, as required;
 - 6.3.4 ensuring employees with potential exposure to benzene receive the appropriate training prior to working with the substance;
 - 6.3.5 arranging for immediate emergency response, if necessary, for chemical spills, injuries and overexposures;
 - 6.3.6 maintaining a MSDS for the benzene products used and all other hazardous chemicals in the work area; and
 - 6.3.7 notifying EHSO when there is a change in equipment, processes or controls which may result in additional exposure to benzene.

- 6.4 Laboratory personnel are required to:
- 6.4.1 know the provisions of the Benzene Safety Program;
 - 6.4.2 report accidents, possible overexposures or unsafe conditions to their supervisor;
 - 6.4.3 wear Personal Protective Equipment and use engineering controls when recommended and provided.

7.0 APPROVALS

 _____	<u>1/10/08</u>
Vice Chancellor for Administrative Services	Date
 _____	<u>1/9/08</u>
Director of Environmental Health & Safety	Date

Appendix A

HAZARD DATA: Benzene exposure has been associated with aplastic anemia and blood cancer. Benzene can affect the human body through inhalation, skin/eye contact or accidental ingestion. Benzene has a pleasant, sweet odor, but the odor does not provide adequate warning of its hazard. The dose, or amount of exposure, determines the type and degree of beneficial or adverse health effects.

Acute Health Effects

Inhalation. Exposure to high concentrations of benzene may cause breathlessness, irritability, euphoria, headache, dizziness, nausea, intoxication or giddiness. It may cause severe irritation of the eyes, nose and respiratory tract. Severe exposures can lead to convulsions and loss of consciousness. Aspiration of small amounts of liquid benzene into the lungs immediately causes pulmonary edema and hemorrhage of pulmonary tissue.

Skin Absorption/Eye Contact. Contact with benzene may cause severe irritation of the skin and eyes. Benzene can be absorbed into the skin and cause dermatitis and erythema. Direct eye contact may result in temporary corneal damage.

Ingestion. Benzene ingestion may cause nausea, vomiting, headache, dizziness and gastrointestinal irritation.

Chronic Health Effects

Chronic effects are various blood disorders, ranging from aplastic anemia to leukemia (blood cancer) that may appear over a relatively long periods of time, usually after repeated and prolonged exposure to benzene above the OSHA permissible exposure limit (PEL). Benzene has been cancer in humans such as myeloid leukemia, acute lymphocytic and/or myelogenous leukemia, hairy cell leukemia, myelodysplastic syndrome, Hodgkin's disease and lymphomas. The hematopoietic (blood forming) system is the chief target for benzene's chronic toxic effects which are manifested by alteration in the levels of formed elements in the peripheral blood.

Physical Hazards

Benzene poses a serious fire and explosion hazard when exposed to heat or flame (flash point of 12°F). Benzene vapor is heavier than air and may collect in low areas. Vapors can also travel for some distance and may come into contact with ignition sources. The flame may then be propagated along the vapor trail back to the source and cause an explosion.