

BENZENE AWARENESS & PROTECTION PROGRAM

PURPOSE / SCOPE

This safety awareness program is intended to provide suitable information to Winger Companies, herein referred to as Winger, employees regarding the potential toxic effects of Benzene so that adequate measures can be taken to limit exposures through controls in the workplace. All Winger employees that perform work activities, where the potential of exposure to benzene may be apparent, will be provided awareness training in this program in order to be familiar with the potential hazards and proper safe work procedures to follow if exposed to this health hazard.

OSHA 29 CFR § 1910.1028 does not apply to “containers and pipelines carrying mixtures with less than 0.1 percent benzene and natural gas processing plants processing gas with less than 0.1 percent benzene”.

SAFE WORK PRACTICES

Winger employees are not permitted to work in areas where there may be a potential for Benzene exposure. It is the responsibility of the Winger Project Manager and the on-site supervisor/foreman to see that any jobsite that may expose employees to Benzene is not manned with personnel until it is proven that it is safe to work within the acceptable OSHA limits without personal protective equipment.

Our projects are typically multi-employer worksites. Locations where potential benzene exposure may be detectable would be areas such as refineries, oil and gas related field operations including maintenance work tasks. Communication must be made with the host facility to ensure our employees are not exposed. This will be performed during pre-job meetings, contractor orientation and at the direction of customer facilities. Employees should be aware of owners' contingency plans and provisions. Employees must be informed where benzene is used in the host facility and aware of additional plant safety rules.

SPECIAL REQUIREMENTS

If it is necessary to perform any work where the exposure to Benzene is above the OSHA acceptable limits, then Winger must implement a comprehensive OSHA mandated special safety policy and procedure that includes elements for exposure monitoring, respiratory protection, formal medical surveillance program, special personal protective equipment, and additional exposure control measures. These work activities will require a specific written safety plan that is pre-approved by the customer and the Winger Safety Director.

DEFINITIONS

ACTION LEVEL (AL) – an airborne concentration of benzene of 0.5 ppm calculated as an 8-hour time-weighted time-weighted average.

BENZENE (C₆H₆) – liquefied or gaseous benzene. It includes benzene contained in liquid mixtures and the benzene vapors released by these liquids. It does not include trace amounts of unreacted benzene contained in solid materials.

EMPLOYEE EXPOSURE – exposure to airborne concentrations of benzene exceed 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.

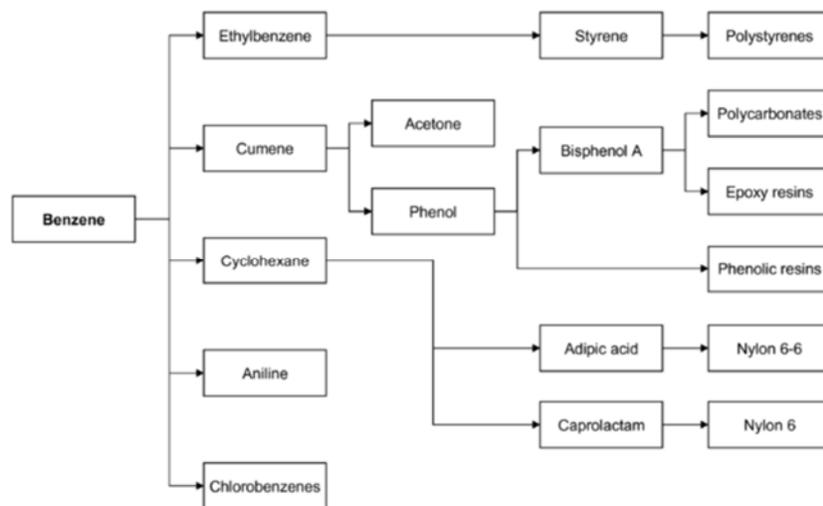
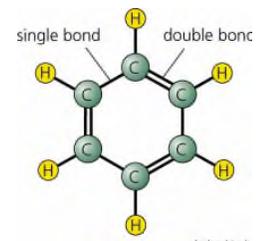
PERMISSIBLE EXPOSURE LIMIT (PEL) – Time weighted average limit (TWA). The employer shall assure that no employee is exposed to an airborne concentration of benzene in excess of one part of benzene per million parts of air (1 ppm) as an 8-hour time-weighted average.

SHORT-TERM EXPOSURE LIMIT (STEL). The employer shall assure that no employee is exposed to an airborne concentration of benzene in excess of five (5) ppm as averaged over any 15-minute period. Some people may begin to smell the sweet odor of benzene at around 5 ppm in the air, but many will not, so they would not know by the sense of smell that they are breathing benzene. In other words, the odor is not a good way of knowing if you are exposed to benzene above the permissible limit.

PERSONAL PROTECTIVE EQUIPMENT (PPE) – Personal protective equipment includes equipment designed to protect individuals from hazards and includes head, face, eye, foot, ear, and respiratory protection.

WHAT IS BENZENE?

- ✚ Benzene is clear liquid solvent made from petroleum.
- ✚ Benzene has a recognizable odor described as “pleasant and sweet”.
- ✚ Benzene vapors are heavier than air and may travel to a source of ignition and flash back. The vapors are readily dispersed by wind movement and/or air currents. It evaporates into the air very quickly and dissolves slightly in water. Benzene is a highly flammable liquid that can accumulate static electricity.
- ✚ Liquid benzene tends to float on water and may travel to a source of ignition and spread fire. Benzene is highly reactive with oxidizing materials.
- ✚ It used to be used as an all-round solvent until it was found to cause cancer. It is now mostly used to make other chemicals. Rarely, it may still be found as an ingredient in some products, usually in small amounts. You can check the product material safety data sheet if you suspect it contains benzene. Another word for benzene sometimes used in Europe is “benzol”. It is sometimes found at hazardous waste sites, especially those where solvents were released into the soil or groundwater. Benzene is also a known ingredient in tobacco smoke.
- ✚ Benzene still ranks in the top 20 chemicals for production volume in the United States. Some industries use benzene to make other chemicals which are used to make plastics, resins, and nylon and synthetic fibers. Benzene is also used to make some types of rubbers, nylon, plastics, resin, lubricants, dyes, detergents, drugs, and pesticides. Natural sources of benzene include volcanoes and forest fires. Benzene is also a natural part of crude oil, gasoline, and cigarette smoke.
- ✚ Gasoline contains 1% to 4% benzene which the reason it is found at refineries. As a gasoline (petrol) additive, benzene increases the octane rating and reduces knocking. As a consequence, gasoline often contained several percent of benzene before the 1950s, when tetraethyl



lead replaced it as the most widely used antiknock additive. With the global phase out of leaded gasoline, benzene has made a comeback as a gasoline additive. The United States Environmental Protection

Agency introduced new regulations in 2011 that lowered the benzene content in gasoline to 0.62%. A greater percentage of benzene is found in crude oil.

- Approximately 240,000 people in the United States are exposed to benzene in the workplace. A recent study suggests that benzene may be present in many commonly used petrochemical products, even though this very toxic chemical may not be listed on a product's Material Safety Data Sheet (MSDS).

- Examples of such products that may contain benzene include:

Commercial hexanes	140 Flash aliphatic solvent
Rubber solvent	Alkyd paint
Petroleum benzine	Toluene
Stoddard solvent	Xylene
Spot remover	Ethyl benzene
Naphtha solvents	Mineral spirits
Varsol products	

- Toluene is now often used as a substitute for benzene. The solvent-properties of the two are similar, but toluene is less toxic and has a wider liquid range.

WHAT ARE THE HEALTH EFFECTS OF BENZENE?

- Of all the hydrocarbons, Benzene poses the most serious long-term threat. Exposure over time, to even low levels of Benzene, can cause leukemia, blood changes and aplastic anemia.

- Benzene is a cancer-causing agent in humans. All contact should be reduced to the lowest possible level. The above exposure limits are for air levels only. Skin contact may also cause overexposure.

- Benzene is one of the most hazardous of all petroleum products because of its adverse health hazards and high flammability.

- Breathing very high levels of benzene can result in death, while high levels can cause drowsiness, dizziness, rapid heart rate, headaches, tremors, confusion, and unconsciousness. Eating or drinking foods containing high levels of benzene can cause vomiting, irritation of the stomach, dizziness, sleepiness, convulsions, rapid heart rate, and death.

- The major effect of benzene from long-term exposure is on the blood. Overexposure to benzene causes harmful effects on the bone marrow and can cause a decrease in red blood cells leading to anemia. It can also cause excessive bleeding and can affect the immune system, increasing the chance for infection. In many cases, stopping your exposure to benzene will result in recovery of the bone marrow increase in red blood cells to normal levels.

- Like most solvents, benzene affects the central nervous system and breathing high levels will make most people feel dizzy, drowsy or high or give them a headache. At extremely high levels, it could actually cause death. However, at lower levels it can affect the bone marrow where red blood cells are made and cause anemia or even leukemia, a type of blood cancer that is often fatal. Benzene is also suspected of causing cancer of the lymph system and of the bladder. Benzene is also extremely flammable and a spill of benzene would be a real fire hazard around open flame or other ignition source. Benzene liquid will also irritate the skin.

- Some women who breathed high levels of benzene for many months had irregular menstrual periods and a decrease in the size of their ovaries. It is not known whether benzene will affect fertility in men.

- Long-term exposure to high levels of benzene in the air can cause leukemia, particularly acute myelogenous leukemia, often referred to as AML. This is a cancer of the blood-forming organs. Benzene is a carcinogen in humans.

- Benzene is quite volatile and a spill would quickly evaporate into the air where it could be inhaled. The main way benzene would enter your body is by inhaling vapors.

- Fortunately, unlike some other solvents, only a small amount of benzene is absorbed through the skin. For that reason and the fact that benzene will remove the natural oil from your hands and eventually cause chapping, rubber gloves are necessary if you handle liquid benzene or a liquid containing benzene.

- ✚ The following adverse health effects are important to remember where there may be a potential exposure to Benzene:
 - **Acute:** At high concentrations (1000 PPM) Benzene has an acute effect on the central nervous systems causing headaches, dizziness, drowsiness, unconsciousness, and possible death. Acute exposure can also cause breathlessness, irritability, and giddiness.
 - **Chronic:** Benzene has the chronic exposure effect on bone marrow (aplastic anemia leukemia). Chronic exposure can also cause convulsions, liver damage, heart damage, blood diseases (aplastic anemia), and cancer (leukemia). These symptoms can take months or years to surface and can develop without physical or visible indications.
 - Repeated skin contact leads to irritant contact dermatitis (rash); as with any petroleum solvent (which Benzene is also classified as); it will leach the natural oils out of the skin. Direct contact with the skin can cause erythema and/or blistering.
 - Benzene is irritating to eyes and mucous membranes.
 - Flammable/dangerous fire risk: benzene has a very low flash point making it dangerous to have any open flame, spark or source of ignition when vapors are present.
 - Explosive limits in air 1.5 to 8% by volume: benzene is highly flammable at low levels of vapor quantity in air.

BASIC GUIDELINES

Following are basic guidelines if an employee has been or is exposed to levels above OSHA permissible limits:

- ✚ Regular jobsite inspections by the Project Manager or competent person.
- ✚ Engineering controls help keep the source emissions low or limit the amount of exposure to the employee. Controls include ventilation systems that capture the contaminant at the source, or process changes to minimize the amount of time the employee spends around exposure sources.
- ✚ “The areas where benzene levels are above the permissible exposure limit of 1 ppm are called “exposure control areas”. These areas may change depending on the type of work that is done and the measured level of benzene in the air.
- ✚ The boundaries of the exposure area must be marked. These are areas where exposures are dangerous without proper protection and training. If you aren’t authorized and trained to use a respirator, you can’t enter these areas.
- ✚ Benzene liquid is highly flammable and vapors may form explosive mixtures in air. Fire extinguishers must be readily available in areas where benzene is used or stored.
- ✚ Remember, you must wear an approved respirator in designated “exposure control areas” – the areas with the warning signs.
- ✚ Wear respirators assigned to you,
- ✚ Wash your hands before eating, drinking or smoking or using the bathroom.
- ✚ Don’t eat, drink or smoke in the work area where you are exposed to benzene. Separate areas will be provided for break and lunch activities.
- ✚ Cover containers when they aren’t in use. The rule points out that this helps prevent unnecessary vapor exposure and helps prevent spills.
- ✚ Rigorous housekeeping is necessary to keep airborne benzene levels below permissible limits.
- ✚ If benzene liquid could splash on your skin or eyes, you’ll need to wear protection. We’ll provide you training on what types of eye protection and chemical gloves to use and how to properly use and care for them.
- ✚ If you will work in these areas, you’ll need to follow our respirator program specifications before you can be issued a respirator. Program specifications require medical evaluations, fit-testing, training, and proper use and care.



- ✚ To prevent inhaling benzene, make sure your respirator fits properly before entering an area where benzene vapors exist.
- ✚ If you think your respirator is leaking, leave the area immediately and have it re-fitted, repaired or replaced.
- ✚ If you know or believe you have inhaled benzene, let your supervisor know immediately.
- ✚ As mentioned earlier, benzene has a pleasant sweet odor which most people detect at a level above the permissible limit. If you can smell it, it probably means you have been overexposed to it. If you smell it while wearing your respirator, then your respirator is leaking and either needs to be fit properly or the reason for the leak determined. If you develop any symptoms commonly associated with benzene exposure, we will make a medical exam available to you.
- ✚ Leave the area immediately.
- ✚ Do not attempt to clean up the spill.
- ✚ Notify your supervisor.
- ✚ If benzene is spilled on you, or if you think you may have inhaled benzene in the incident, we will make a medical exam available to you.
- ✚ Benzene is one of the Lower Explosive Limit (LEL) components detected by our MSA Orion and Altair gas monitors.
- ✚ Employees who fail to comply with this policy will be subject to disciplinary action per company policy.

MEDICAL EVALUATIONS

We will provide initial medical surveillance to employees who are occupationally exposed to airborne benzene levels greater than the action level 30 days a year or above the PEL for greater than 10 days a year. This monitoring consists of visits with the physician to include a detailed occupational history and laboratory analysis per OSHA 29 CFR §1910.1028(i), as required. To ensure appropriate medical surveillance is performed, we will provide to the physician and/or representative:

- ✚ Copies of the Regulation and appendices
- ✚ a description of the employee's duties
- ✚ a list of the personal protective equipment worn by the employee
- ✚ and past exposure assessment data.

In addition to this medical surveillance, if an employee is exposed to benzene in an emergency situation, the employee will be required to provide a urine sample at the end of the employee's shift. All medical examinations, procedures, and blood Benzene level sampling/analysis shall be conducted by licensed healthcare practitioners and/or physicians. Our medical surveillance program shall meet the requirements of OSHA 29 CFR §1910.1028(i).

If abnormalities show up in the blood tests, the doctor may ask for additional tests and temporary removal from the employee's current job. In that case, we will find other work in an area where the employee is not exposed to benzene. Employees who are removed from work will receive all wages, benefits, for a period of 6 months without loss of seniority or promotion opportunities. The company reserves the right to place an employee in a position, of equal responsibility, where the employee will not be occupationally exposed to benzene.

INITIAL DETERMINATION RESULTS

If our initial determination reveals employee exposures to be at the PEL/STEL, we will conduct air monitoring and personal air sampling of 25% of the represented work force. Determinations of employee exposure shall be made from breathing zone air samples that are representative of each employee's average exposure to airborne benzene.

If our initial determination reveals that employee's exposures will be above the PEL, attempts will be made through administrative and engineering controls to reduce exposures below the PEL. If this should fail to reduce the exposure level, employees shall wear the appropriate level of PPE necessary to reduce exposures below the PEL.

If changes in equipment, process, control, personnel or tasks occur after initial determination, we reevaluate to determine if employees are exposed to higher concentrations of benzene. We will conduct periodic air monitoring of the work site to determine if changes occur in the exposure levels.

Exposure, periodic and termination of monitoring will be according to OSHA 29 CFR §1910.1028(e).

OBSERVATION OF MONITORING

Winger shall provide affected employees, or their designated representatives, an opportunity to observe the measuring or monitoring of employee exposure conducted. During this observation, employees will be required to wear personal protective clothing and equipment or respirators as required.

PERSONAL PROTECTIVE EQUIPMENT & RESPIRATORY PROTECTION

If an employee will be occupationally exposed to benzene, additional protective work clothing will be provided at no cost to the employee. This equipment is considered disposable, and is to be disposed of at the job site. Such protective work clothing would be:

- ✚ Saranex coated or Tyvek coveralls with hood,
- ✚ latex gloves with taped interfaces,
- ✚ and safety goggles

Protective Engineering controls and work practices are generally sufficient to reduce exposures to at or below the PEL/STEL without the use of respirators, unless an employee specifically requests a respirator, respiratory protection will not be routinely used on our worksites. Any employee may ask his supervisor for a respirator and one will be provided upon that request in accordance with Winger company respirator policy.

RECORD KEEPING

Winger will maintain accurate biological and environmental monitoring records of employee exposures to potentially toxic materials, including benzene. These records shall be maintained for at least the duration of employment plus 30 years. Employees will have unlimited access to their records and the following exposure monitoring records:

- ✚ Exposure assessment
- ✚ Medical surveillance results
- ✚ Medical removals
- ✚ Objective data for exemption from requirement for initial monitoring
- ✚ Procedures for making records available
- ✚ Procedures for transfer of records

TRAINING DOCUMENTATION

Winger will provide employees with information and training at the time of their initial assignment to a work area where benzene is present. Requisite training will be provided to ensure that our employees acquire an understanding of the specific hazards, kinds of monitoring, testing, and protective measures required by OSHA's benzene regulations. These standards are designed to protect anyone who could be exposed to benzene from suffering serious health consequences.

SOURCE CREDITS:

U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) www.osha.gov
OSHA Benzene Awareness
Washington State Department of Labor & Industries: Benzene
Airgas: Material Safety Data Sheet
Metzger Law Group: Benzene Exposure
Environmental Management Alternatives (EMA) Industrial Safety & Health Programs
Mechanical Contractors Association of America, www.mcaa.org

DOCUMENT CONTROL:

Initial Program October 10, 2012
Revised April 1, 2013
Reviewed April 8, 2015
Revised June 15, 2016
Revised October 19, 2016
Revised September 13, 2017
Revised September 19, 2018