Brieser CONSTRUCTION

Section 36
Safety Health and Environmental Manual

2025

Benzene Exposure

Benzene Exposure

PURPOSE

This standard will outline the protective measures needed when working around excavations that are impacted with hydrocarbons typically found in oil refineries, which could contain benzene, toluene, ethylbenzene, or xylene. This is the only exposure task that Brieser employees should encounter due to the nature of our work and activities performed at these refineries. All protective procedures will be driven with personal monitoring techniques as well as monitoring the area around an excavation. Section 26 of the Brieser SH&E Manual will detail the procedures for assessing risk for health issues such as benzene exposure.

SCOPE

To define the requirements, responsibilities, and procedures necessary to reduce the risk of our employees to Benzene exposure.

RESPONSIBILITIES

The Program Administrator: Brieser Safety Manager

This person is responsible for:

- Issuing and administering this program and making sure that it satisfies all applicable federal, state, and local requirements.
- Ensuring that employees have available to them initial and refresher training on the use of this policy.
- Maintaining training records for all employees included in the training sessions.

Project Managers, Superintendents and Foremen

These people are responsible for:

- Ensuring that any potential excavation that is reported or expected to be contaminated with benzene either by way of smell, visual, or through the use of air monitoring equipment is fully evaluated and the contents of this policy are followed before any employee is allowed to work in or around that excavation.
- Providing training in the signs and symptoms of benzene exposure to workers on site
- Ensure employees are fitted with the correct respirator and have been medically cleared to wear it.

Project Managers, Superintendents and Foremen continued.

- Ensure all testing equipment is functioning properly, calibrated and assigned a competent user.
- Ensure that all excavations suspected of benzene contamination are monitored using a PID (Photo ionizing detector) currently the Ultra Rae 3000 equipped with a benzene filter.
- Ensure that all supervision is trained in emergency procedures when an employee exhibits symptoms consistent with possible heat illness.

Employees

- Understanding common signs and symptoms of benzene exposure
- Review the Benzene Safety Data Sheet before work commences.
- Understand the routes of entry and exposure to benzene.
- Report all “funny” smells while excavating.
- If a “funny” smell is detected while excavating, evacuate the area and call your supervisor.

GENERAL

Benzene is an organic chemical compound with the molecular formula C6H6. Its molecule is composed of 6 carbon atoms joined in a ring, with 1 hydrogen atom attached to each carbon atom. Because its molecules contain only carbon and hydrogen atoms, benzene is classed as a hydrocarbon.

Benzene is a natural constituent of crude oil and is one of the most basic petrochemicals. Benzene is a colorless and highly flammable liquid with a sweet smell. Vapors may form explosive mixtures in air. Fire extinguishers must be readily available in areas where benzene is used or stored. Because it has a high-octane number, this is an important component of gasoline, composing a few percent of its mass. Benzene is not soluble in water therefore it will float on top.

Brieser construction will employ the American Conference of Governmental Industrial Hygienists (ACGIH) values. The permissible exposure over an 8-hour workday is defined as the TLV TWA or Threshold Limit Value Time Weighted Average. The TLV TWA for Benzene is .5 ppm. The STEL or Short-Term Exposure Limit is defined as a 15-minute exposure. The STEL for Benzene is 2.5 ppm. If either the TLV TWA or the STEL are expected to be met or exceeded, additional monitoring requirements, medical surveillance, and annual employee training will be needed. In addition, when employee exposures exceed either the TLV TWA or STEL, the regulation requires the establishment of a regulated area and a written compliance program using engineering and work practice controls where feasible to reduce employee exposure levels, augmented by an effective respiratory protection program.

PROCEDURES IF BELOW TLV TWA OR STEL

The Brieser supervision shall monitor the excavation with an issued PID monitor. The supervision will alert the customer to monitor the excavation using their monitoring equipment. A side-by-side comparison shall be evaluated between the Brieser and Customer's monitor. If readings are greater than or equal to .5 ppm the excavation will be barricaded off and left to dissipate into the atmosphere. Whenever it is determined that Brieser employees will work in an excavation that contains benzene the Brieser employee that has been trained in the use, care and maintenance of our PID monitor will take readings of the area in concentric circles, starting at what the employee thinks is a safe distance every minute until a STEL of 15 minutes is established. To establish a STEL, average the one-minute readings taken with the PID monitor. If that STEL is below 2.5 ppm, the employee may be closer to the excavation repeating the process until they are at the area where employees will be working from.

All data shall be collected on the Brieser IH (Industrial Hygiene) Sample Form and turned into the Safety Department for recordkeeping. See Appendix A

At times, the Brieser Safety Department may perform periodic personal exposure monitoring to ensure our employees are below the TLV TWA of .5 ppm.

PROCEDURES IF CONCENTRATIONS OF BENZENE ARE EXPECTED TO BE AT OR ABOVE THE TLV TWA OR STEL

1. Brieser Safety Department must be contacted.
2. The Safety Department will conduct personal sampling monitoring on no less than 25% of the workforce that is expected to be exposed.
3. A regulated area must be established.
4. A written plan must be developed that outlines how employee exposures will be reduced through hazard control methods.

EXPOSURE LIMITS

TLV TWA: .5 ppm
STEL: 2.5 ppm

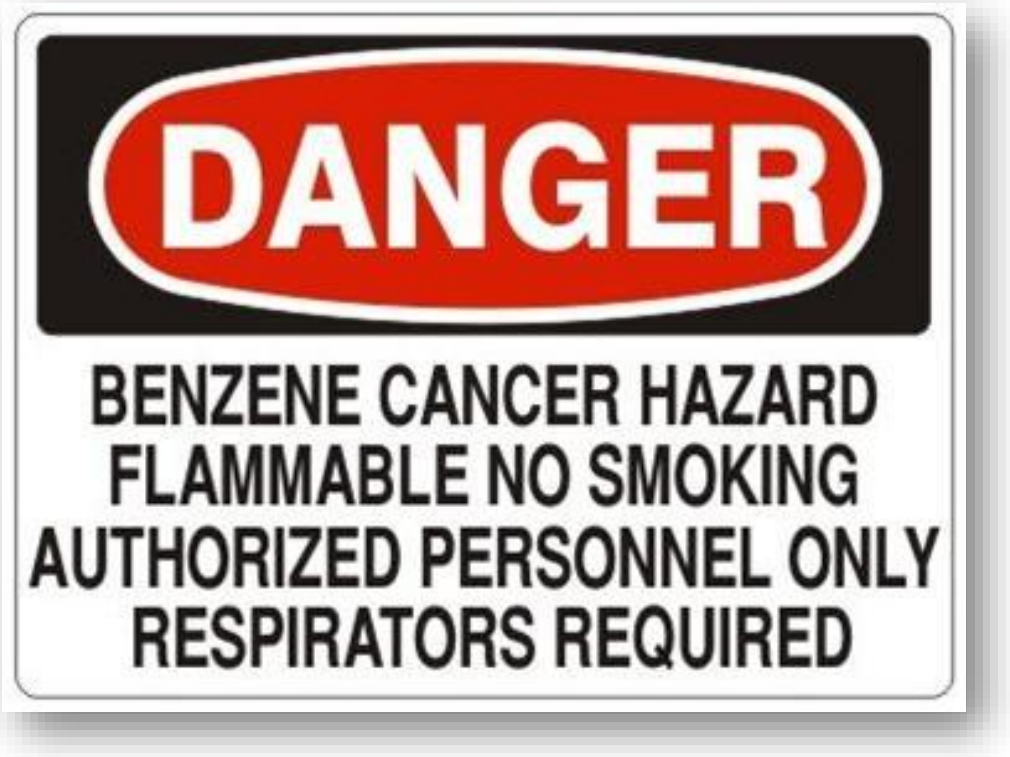
PERIODIC MONITORING

The Brieser Safety Department will periodically monitor employee exposures to benzene at least every 6 months if conditions permit using a passive badge monitor in addition to a direct reading PID monitor. The Brieser Safety Department will periodically review and revise this procedure to reflect the most recent exposure monitoring data.

REGULATED AREA

A regulated area must be established wherever the airborne concentration of benzene exceeds, or can reasonably be expected to exceed, either the TLV TWA of .5 ppm or the STEL of 2.5 ppm. The area must be demarcated from the rest of the work site by physical means or signs that limit access to only authorized, properly equipped personnel in order to minimize the exposure to benzene.

Signs with the following legend shall be posted at entrance to the regulated work areas:



Smoking is prohibited in areas where benzene is used or stored.

METHODS OF COMPLIANCE

Where feasible, benzene exposure must be controlled through engineering controls and work practices in preference to respiratory protection. Respirators can and should be used to control exposures that are intermittent or caused by emergency conditions and while awaiting engineering controls.

In cases of exposure levels above the limit, a written plan to reduce that exposure will be prepared. This plan will be explained in the monitoring results letter sent to the exposed employee. The area superintendent will receive a copy of this notice and will be responsible for the prompt implementation of this plan.
In the case of a customer "in-plant or host" release of Benzene all Brieser personnel shall be trained and follow our customers Emergency procedures and contingency plan. All Brieser employees are required to sign the host facilities permit to work in an area where Benzene is used.

RESPIRATORY PROTECTION

Respirators shall be provided at Company expense and used by the employee in the following circumstances:

1. During the time necessary to install and/or implement feasible engineering controls
2. Where feasible engineering controls and work practices by themselves are not sufficient to reduce employee exposure to or below the PEL.
3. During intermittent or limited duration work operations where engineering controls and work practices are not feasible or required
4. In emergencies.

The Brieser Safety Health and Environmental Manual Section 7 Respiratory Protection shall be referenced if the use of respirators will be used to control benzene exposure on the jobsite.

Generally, for exposures in atmospheres between 1 and 5 ppm, the appropriate respirator will be a negative pressure respirator with organic vapor cartridges. Filter elements must be changed at the end of the service life or at the beginning of each shift, whichever comes first.

Employees exposed to benzene shall be given adequate time to wash their face and respirator to prevent skin irritation and to change filter elements. Protective clothing should be provided as necessary to limit exposure to the eyes or skin.

RESPIRATORY PROTECTION continued

The job supervisor is responsible to ensure the proper respirators are worn in the approved manner, and that all hygiene considerations (wash-up time, filter element changes and protective clothing) are followed.

Before an employee can use a negative pressure respirator for benzene exposure, that employee must be fit tested properly on an annual basis. This fit test must follow the protocol for fit testing to be done at the appropriate intervals and the Safety Department will assist operating and maintenance areas in determining which employees are to be included in this program. A current listing of respiratory fit tested employees will be maintained by the Safety Department as part of its Industrial Hygiene requirements as part of this written program. Employees without a current fit test shall not be assigned to jobs with known benzene exposures above the action level.

MEDICAL SURVEILLANCE

A medical surveillance program must be made available to those employees who are or may be exposed to benzene:

- At or above the TLV TWA for 10 or more days per year

HAZARD COMMUNICATION/TRAINING

Employees must receive training and information on benzene prior to initial assignment. If exposures are above the TLV TWA, training must be repeated annually. A standard Safety Data Sheet SDS shall be used for training content for levels below the TLV TWA limit. Otherwise, a written plan will be used for training purposes if warranted by this policy.

PERSONAL PROTECTIVE EQUIPMENT

Appropriate personal protective equipment (PPE) is to be worn by all personnel handling or potentially encountering liquids containing greater than 0.1% benzene. PPE should include protection of eyes/face, protective clothing for skin and gloves for hand protection.
Nitrile glove material is superior to PVC glove material for protection against hydrocarbons.

HEALTH EFFECTS

- Exposure routes include:
  - Inhalation, Skin Absorption, Ingestion, Skin and/or Eye Contact
- Target Organs
  - Eyes, Skin, Respiratory System, Blood, Central Nervous System, Bone Marrow
- Short term effects of overexposure may include irritation of eyes, nose and skin, breathlessness, irritability, euphoria, headache, dizziness, or nausea.
- Long term effects may result in blood disorders such as leukemia and anemia.

PERSONAL HYGIENE

- Wash hands, arms, and face thoroughly with soap and water. Rinse thoroughly and dry. Before eating, drinking or after you have left the contaminated area.

IH SAMPLING FORM

Brieser OSHA - VPP

Sample Description	
(Project Code-Yr/Mth/Day-Sample Description-Sample # (start with 001))	
Sample Type	(Personal) (Area) (Blank) (Bulk) (Grab) (Source)
Person Sampled (Employee Last name, First Name)	
EHS Job (Job Description)	(Carpenter) (Finisher) (Iron Worker) (Laborer) (Operator) (Tech Eng) (Teamster)
Collected By (Last name, First Name)	
Sample Period	(8 hour shift) (10 hour shift) (12 hour shift); (STEL)
Calculation Method	(Zero) (Same)
Sample Template	(Asbestos) (Benzene-Direct Reading) (BTX Full Shift) (BTEX- STEL) (Resp Silica) (Noise) (Welding)
Media Type	(3M 3500 OVM)(Dosimeter)(3M 3720 Formaldehyde) (Mercury SKC 520 or Assay Badge)(CT:Charcoal Tube) (Direct Reading Instrument) (GammaRaeII) (Vrae) (3M eg5 Noise Dosimeter)
Media Number	
Activity Description	

	Date	Time	Minutes
Sample Start			
Stop			

HS Equipment	(dose Badge) (Draeger Pump) (SKC Pump)(Sirius PID) (RAE Benzene PID)(Sound Level Meter) (3M eg5 Noise Dosimeter)
HS Equipment Serial Number	
Calibrator	5) (RAE PID Cal gas) (MSA Sirius Galaxy)(Quest QC-10)
Calibrator Serial Number	

	Initial	Final	Total Strokes
Calibration			

Unit Of Measure	(PPM) (MG/M3) (L/min) (cc/min) (dBA)
Laboratory	(Galson Labs)
Exchange Rate	3dBA (only with noise, leave blank if not noise)
Direct Reading Results	(Non Detect)

TABS-

Tasks	Controls
	Admin Controls
Brazing	Isolation of Worker
Chipping - Bushhammering	Work Practice Contols
Chipping - Hand Held	Worker Rotation
Chipping - Hequip. Attmt.	**Eng. Solutions**
Chipping - Jack Hammer	Air Conditioning
Compacting	Barrier - Noise
Cutting/Sawing	Damping - Noise
C/S - Circular Saw	Enclosure
C/S - Miter Saw	Gen Dilution Vent.
C/S - Partner Saw	Local Exhaust (LEV)
C/S - Torch Cutting	Misting Dust Control
C/S - Table Saw	Portable LEV
C/S - Walk Behind	**Eye Protection**
C/S - Walk Behind Soft Cut	Chemical Goggles
Concrete Vibrating	Safety Glasses
Grinding	Welding Shaded Lenses
Grinding - Hand Held	**Foot Protection**
Power Finishing	Boot Chemical Prot
Pouring/Setting	Safety-toe Shoe
Welding	**Gloves**
Welding - FCAW	Butyl Alcohol
Welding - MIG	Butyl Rubber
Welding - SAW	Kevlar
Welding - TIG	Leather Gauntlet
	Latex
Full Body Protection	Nitrile
Chemical Protective Suit	Neoprene
Flame Reistant	PVC
Tyvek Suit	
Respirators	
(N95) (Supplied Air) (SAR) 1/2Mask APR)	
(FF Multi Gas) (FF-OV) (1/2 Mask OV)	

BRIESER CONSTRUCTION
SAFETY & HEALTH MANUAL
SECTION 36
BENZENE EXPOSURE
SUB-SECTION TRAINING

Personal Protective Learning Exercise
Brieser Construction

Score: _____ %

Employees Name:		**Date:**	
Company:		**Instructor:**	
Employee #:		**Job Title:**	

Answer the following questions "True" or "False" by circling the appropriate letter.

T **F** 1. Benzene is extremely flammable?

T **F** 2. Exposure to benzene does not cause cancer?

T **F** 3. Routes of entry to benzene exposure are: inhalation, ingestion, skin contact and eye contact?

T **F** 4. Symptoms of overexposure may include the following:

- Dizziness,
- Excitation,
- Pallor, followed by
- Flushing
- Weakness
- Headache
- Breathlessness
- Chest constriction
- Irritation of eyes, skin, nose, respiratory system.
- Nausea
- Staggered gait
- And fatigue?

T **F** 5. If benzene contaminated liquid got into your eyes, you should flush with water for 5 minutes?

T **F** 6. Benzene is flammable. I should have the proper fire extinguisher at the jobsite?

T **F** 7. The ACGIH TLV TWA for Benzene is 1 ppm?

T **F** 8. The Vapor Density of Benzene is 2.7 when compared to air at 1.0 this information found on the Safety Data Sheet tells me that vapors from benzene in an excavation are likely to settle at the bottom?

T **F** 9. The Specific Gravity of Benzene is .88 when compared to water at 1.0 this information found on the Safety Data Sheet tells me that benzene liquid will float on top of water?

T **F** 10. Nitrile glove material is superior to PVC glove material when I am trying to protect my hands from benzene exposure?

Personal Protective Learning Exercise
Brieser Construction
Answers

T	F	1. Benzene is extremely flammable?
T	**F**	2. Exposure to benzene does not cause cancer?
T	F	3. Routes of entry to benzene exposure are: inhalation, ingestion, skin contact and eye contact?
T	F	4. Symptoms of overexposure may include the following: Dizziness, excitation, pallor, followed by flushing, weakness, headache, breathlessness, chest constriction. Irritation of eyes, skin, nose, respiratory system. Nausea, staggered gait, fatigue?
T	**F**	5. If benzene contaminated liquid got into your eyes, you should flush with water for 5 minutes? ***You will flush for a minimum of 15 minutes***
T	F	6. Benzene is flammable. I should have the proper fire extinguisher at the jobsite?
T	**F**	7. The ACGIH TLV TWA for Benzene is 1 ppm? ***It is .5 ppm pg. 3***
T	F	8. The Vapor Density of Benzene is 2.7 when compared to air at 1.0 this information found on the Safety Data Sheet tells me that vapors from benzene in an excavation are likely to settle at the bottom?
T	F	9. The Specific Gravity of Benzene is .88 when compared to water at 1.0 this information found on the Safety Data Sheet tells me that benzene liquid will float on top of water?
T	F	10. Nitrile glove material is superior to PVC glove material when I am trying to protect my hands from benzene exposure?