## Butadiene

1. **Purpose**

To establish butadiene safety requirements for facilities where butadiene is present or potentially present.

1. **Responsibilities**

The Field Foreman shall:

* Review the butadiene plan with affected personnel.
* Review and ensure employees are aware of host facility’s contingency, evacuation, and emergency plans.
* Inform employee where butadiene is used in the host facility.
* Inform employee of additional plant safety rules.
* Conduct exposure monitoring and notify impacted employees of monitoring results.

The Environmental, Safety, and Health Department shall:

* Assist in the development of a site-specific contingency plan.
* Provide butadiene safety training and training materials.
* Review the butadiene plan at least annually.
* Ensure fire extinguishers are readily available in areas where butadiene may be present.

1. **Characteristics of Butadiene**

Butadiene is a flammable, colorless gas with a mild, aromatic odor at room temperature and pressure. Butadiene may also exist as a cryogenic liquid. Butadiene is insoluble in water, stable, and reacts with oxidizers.

1. **Exposure**

Butadiene is produced through the processing of petroleum and is mainly used in the production of synthetic rubber but is also found in smaller amounts in plastics and fuel.

Butadiene may be present at refineries and petrochemical plants.

Butadiene mainly occurs in the workplace, including the following industries: synthetic elastomer (rubber and latex) production, petroleum refining, secondary lead smelting, water treatment, agricultural fungicides, production of raw material for nylon, and the use of fossil fuels. Exposure can also occur from automobile exhaust, polluted air and water near chemical, plastic or rubber facilities, carpet backing, paper coating, cigarette smoke, resins and polymers for pipes and automobiles, and ingestion of foods that are contaminated from plastic or rubber containers.

1. **Health Effects**

Acute low exposure to butadiene may cause irritation to the eyes, throat, nose, and lungs. Skin contact with liquified butadiene may cause irritation and frostbite. Acute high exposures may cause damage to the central nervous system or cause symptoms such as distorted blurred vision, vertigo, general tiredness, decreased blood pressure, headache, nausea, decreased pulse rate, and fainting.

Several human epidemiological studies have shown an increase in cardiovascular diseases and cancer in longer term, chronic exposure to butadiene. However, due to the small numbers of cancers and confounding factors such as smoking, and simultaneous exposure to benzene and styrene, a true causal relationship cannot be established.

Butadiene is a suspected human carcinogen.

1. **Engineering and Work Practice Controls**

The preferred approach to reduce, eliminate, or maintain exposure levels below the permissible exposure limits to butadiene is to utilize engineering controls such as ventilation and process modification. If these controls are not sufficient other controls may be implemented including requiring respirator protection where ventilation is not feasible, requiring workers to shower and change into street clothes before leaving the plant, and issuing workers PPE.

1. **Respirators and Respiratory Protection**

Respirators shall be selected according to the air concentrations of butadiene measured in the workplace. The respirator shall be provided at no cost to the employees and shall be NIOSH approved. NIOSH approved air purifying respirators shall have organic vapor cartridges or cartridges approved for use with butadiene. Respirator shall be worn at least during:

* Periods necessary to install or implement feasible engineering and work-practice controls.
* Non-routine work operations that are performed infrequently and for which employee exposures are limited in duration.
* Work operations for which feasible engineering and work-practice controls are not yet sufficient to reduce employee exposures to or below the PELs.
* Emergencies

1. **Personal Protective Equipment (PPE)**

Protective clothing, face shield, safety glass, and gloves shall be provided at no cost to the employee and shall be worn by employees exposed to butadiene concentrations that exceed the permissible exposure level. Employees shall not wear contact lenses when working near butadiene. Employees are required to shower and change into street clothes before leaving the facility.

Contaminated clothing will be laundered to prevent the release butadiene in excess of the PELs. Any person who gives contaminated clothing to another person for laundering will inform that person of this requirement.

1. **General**

* Smoking is prohibited in areas where butadiene is located or where it may be released.
* Fire extinguishers shall be readily available in areas where butadiene may be present.
* All field locations, production facilities, and platforms that present potential butadiene exposures shall be so designated at their access points with danger signs that warn personnel of potential butadiene exposures.
* Butadiene exposure area shall be outlined from the rest of the workplace to limit the number of employees exposed.
* Access to butadiene exposure areas shall be limited to authorized employees only.
* All personnel shall be required to comply with the butadiene safety requirements in this safety program.
* All employees shall be aware of the company's emergency plan and they shall be aware of any host facility’s site-specific evacuation, emergency, or contingency plans.

1. **Exposure Monitoring**

* No person shall be exposed over the permissible exposure limit (PEL) of 1 part per million (PPM) butadiene measured as an 8-hour time weighted average and 5 PPM as determined over a sampling period of 15 minutes.
* Initial exposure monitoring must be conducted for butadiene. If the initial monitoring indicates exposures are above the 8-hour permissible exposure limit, monitoring will be conducted every three months. If above the 15 minute short term exposure limit, monitoring will be conducted every three months. If the initial monitoring indicates exposures are above the action level but below the 8-hour permissible limit, monitoring will be conducted annually.
* Exposure monitoring shall be conducted after any spills, leaks, or releases to ensure exposure levels have returned to the level prior to the incident.
* All employees shall be notified within 15 days after the receipt of monitoring results in writing or by posting the monitoring results in an accessible location.

If exposure levels to butadiene are above the permissible levels, a written plan to reduce the employee exposure level below the PEL shall be established and implemented. The plan shall be reviewed at least annually.

An exposure goal program must be in place if butadiene exposures are above the action level. The goal program should include a leak prevention, detection, and repair program a ventilation repair and maintenance program the use of pump exposure control technology use of gauging devices and unloading devices.

1. **Medical Surveillance**

A medical screen and surveillance program shall be established whenever personnel have the potential for exposure to butadiene levels at or above the action level for more than 30 days in a year. The following guidelines shall be followed for medical surveillance:

* All medical examinations and procedures will be performed by or under the supervision of a licensed physician and are to be provided without cost to personnel at a reasonable time and place.
* The health questionnaire, physical examination, and blood sampling shall be conducted every annually until two consecutive blood samples & analysis are acceptable.
* Following an emergency situation, medical screening shall be conducted as quickly as possible, but not later than 48 hours after the exposure.
* Medical screening for employees exposed to butadiene in an emergency situation shall focus on the acute effects of BD exposure and at a minimum include: A CBC within 48 hours of the exposure and then monthly for three months; and a physical examination if the employee reports irritation of the eyes, nose throat, lungs, or skin, blurred vision, coughing, drowsiness, nausea, or headache. Continued employee participation in the medical screening and surveillance program, beyond these minimum requirements, shall be at the discretion of the physician or other licensed health care professional.
* For each medical evaluation, the employer shall ensure that the physician or other licensed health care professional produces a written opinion and provides a copy to the employer and the employee within 15 business days of the evaluation.
* The company shall continue to provide medical screening and surveillance for employees, even after transfer to a non-butadiene exposed job and regardless of when the employee is transferred.

1. **Training**

Safety training shall be provided for all personnel who may be required to work in a known or suspected butadiene environment above permissible exposure limit (PEL). This classroom and instructor led training shall be provided at the time of initial assignment and at least annually thereafter.

The following areas shall be covered in the training program:

* Characteristics and properties of butadiene.
* The quantity, location, manner of use, release, and storage of butadiene and the specific operations that could result in exposure to butadiene.
* General requirements of working in or near a butadiene environment.
* How to protect yourself from exposure to butadiene.
* Health effects and symptoms of exposure to butadiene.
* Personal protective equipment and its proper use.
* Use and limitations of respiratory protection equipment.
* Company respiratory protection program and medical evaluations, fit testing, and selected respirator training.
* Our policy and procedures related to butadiene.
* On site specific emergency actions plans and evacuation procedures.
* The engineering controls and work practices associated with job assignments.
* The purpose and description of the medical screening and medical surveillance program.
* All personnel who work in or may be required to work in a butadiene area shall complete a refresher course annually.
* All training shall be documented.
* Contractors shall document and provide verification of such training of their employees upon request.

1. **Emergencies**

* Personnel responsibilities during a butadiene release emergency shall be established in writing by each operating location. These responsibilities shall include personnel accounting, securing the area, isolating the leak, etc.
* Personnel will not respond to a butadiene leak or release alone. The buddy system must always be used in response to alarm situations.
* In the event of the butadiene leak or release, all impacted employees shall don respirators and/or evacuate the area.
* All personnel shall be trained in their responsibilities regarding butadiene emergencies.
  + Training shall be documented.
  + This training may coincide with annual butadiene training.