Purpose

This program covers E&B's policy related to Benzene hazards in occupational settings. E&B recognizes Benzene as a very serious health hazard. The intent of this program is to provide E&B employees with general knowledge and guidelines enabling employees to anticipate, recognize, evaluate, and better participate in controlling their exposure to Benzene found in certain industrial worksite soils and / or due to spills or release incidents occurring within petrochemical refining and processing facilities in which E&B may work.

Scope

This Benzene Hazard Awareness Program and Policy is intended for support of and use by company operations both in business units and project operations. This is a hazard recognition and education focused program and does not imply that any training associated with this program certifies or qualifies any E&B employee to analyze worksites for Benzene, measure Benzene levels or determine safe exposure levels.

Regulatory References

This Benzene Hazard Awareness Program is primarily intended to satisfy the following regulatory requirements:

Policy

29 CFR 1910.1028

Stop the Work Immediately - Upon discovery or suspicion of benzene being present on a jobsite, E&B employees are to stop the work immediately and inform their supervisor.

Do Not Handle Benzene Products - It is E&B policy that employees shall not knowingly handle benzene or products containing benzene without reviewing SDS information and taking appropriate protective measures.

Do Not Dispose of Benzene - It is E&B policy that employees shall not participate in the disposal of benzene or products containing benzene.

Contact a Competent Individual - It is E&B policy to contact a competent individual upon discovery of benzene being present.

Avoid Exposure – It is E&B policy to train employees with general knowledge and guidelines enabling them to protect themselves and others from unnecessary benzene exposure.

Hazard Identification & Control – All employees assigned to jobsites where exposure to Benzene may be possible shall participate in the identification, evaluation, and control of Benzene hazards. All employees shall be familiar with the local Emergency Action Plan and specific contingency plans involving benzene.

Exposure Limits – 29 CFR 1910.1028 indicates the permissible exposure limit (PEL) for Benzene is one part per million in air. The short-term exposure limit (STEL) (for 15 minutes) is five parts per million in air. The long-term exposure action level is 0.5 parts per million in air, and triggers use of personal protective equipment, employee monitoring, medical surveillance, hazard communication, regulated work areas, and record-keeping.

Exposure Monitoring – Medical surveillance will be available to all employees who are or may be exposed to Benzene at or above the action level.

Responsibilities

Management – E&B Management is responsible for the following:
Ensure that the HSE Management System includes a benzene policy and that the policy is reviewed annually and revised as necessary to reflect the most recent exposure monitoring data.
Provide Benzene Hazard Awareness Training for all employees assigned to at-risk areas.
Provide leadership and support for employees in communicating their responsibility to stop the work when benzene hazards are discovered or suspected.
Provide resources to address and correct any benzene related events that arise.
Determine when medical surveillance is required.
Ensure that confirmed employee exposures are adequately documented.

Supervision – E&B Supervision is responsible for the following:
Understand and enforce the E&B Benzene Policy

Implement site controls isolating employees from benzene hazards when benzene is discovered or suspected on a jobsite.
Immediately inform management of any benzene exposures on a jobsite.
Provide immediate on-the-spot training in recognition and control of Benzene hazards for all employees assigned to at-risk locations, enabling employees to protect themselves and others from unnecessary benzene exposure.
Contact a competent individual when benzene is discovered on a jobsite.
Enforce Air Testing and PPE requirements and enforce discipline as necessary for PPE or any hazard control violation.

Employees – E&B Employees are responsible for the following:
Upon discovery of benzene being present on a jobsite, E&B employees are to stop the work and immediately inform their supervisor.
Protect themselves and others from unnecessary benzene exposure by wearing appropriate PPE and following safety rules and guidelines regarding Benzene hazard protection.

Immediately report to a supervisor any changes, deficiency or breaches in site controls established to isolate employees from benzene hazards on a jobsite.

Participate in and understand Benzene Awareness training.
Participate in JSA and hazard recognition activities. Make every effort to identify Benzene hazards during daily JSA's.

What is Benzene?

Benzene is a clear, colorless liquid with a characteristic, aromatic hydrocarbon odor. It is EXTREMELY FLAMMABLE in both its liquid and vapor states. Benzene can accumulate static charge by flow or agitation. Since benzene's vapor is heavier than air and may spread long distances, distant ignition and flashback are possible. Liquid can float on water and may travel to distant locations and/or spread fire. All ignition sources must be kept at a safe distance from benzene.

It is harmful if inhaled or swallowed and is a central nervous system depressant. The vapor may cause headache, nausea, dizziness, drowsiness and confusion. Benzene may cause blood and bone marrow effects. It can cause skin and eye irritation. It is also an aspiration hazard because swallowing or vomiting of the liquid may result in aspiration into the lungs. Benzene is considered a CANCER HAZARD - can cause cancer and may cause genetic damage. Odor is not reliable as a hazard warning because the recognition threshold is above safe limits.

Where do you find benzene?

Benzene is produced from petroleum and coal sources. Benzene is also known as benzol, carbon oil, coal naphtha, cyclohexatriene, and phenyl hydride. It is used mainly in the manufacture of ethyl benzene (55%), cumene (24%), cyclohexane (12%), nitrobenzene (5%), detergent alkylate, chlorobenzenes and maleic anhydride. Benzene is a very minor component of gasoline. Its commercial use as a solvent has practically been eliminated because of its toxicity. However, it continues to be used as a solvent and reactant in laboratories.

Industrial Hygiene Hazards Associated with Benzene

Inhalation - Short-term exposure causes depression of the central nervous system (CNS), marked by drowsiness, dizziness, headache, nausea, loss of coordination, confusion, and unconsciousness. No effects are expected at 25 ppm. Exposure to 50 to 150 ppm produces headache, and tiredness. Nose and throat irritation have also been reported following short-term exposure. Exposure to approximately 20,000 ppm for 5 to 10 minutes may result in death.

Absorption - Benzene is moderately irritating. Human studies have demonstrated that absorption of liquid benzene or its vapors occurs only to a small extent but can contribute to overall exposure.

Benzene vapor can be irritating to the eyes. Splashes of benzene in the eyes will be moderately irritating but will not cause permanent injury if flushed immediately.

Ingestion - Benzene is readily absorbed following ingestion producing central nervous system depression with symptoms marked by drowsiness, dizziness, headache, nausea, loss of coordination, confusion, and unconsciousness.

Long term health effects of exposure to benzene

Skin- Prolonged or repeated contact causes redness, dryness, cracking (dermatitis) due to the defatting action of this solvent.

Blood and blood-forming organs - Benzene causes a serious condition where the numbers of circulating red, white, and clotting cells are reduced. At this stage, effects are thought to be readily reversible. However, continued exposure can result in aplastic anemia or leukemia. Benzene also damages the bone marrow, where new blood cells are produced, resulting in aplastic anemia, which can lead to leukemia.

Immune system - Studies of workers have found changes in the immune system, which are at least partially related to the changes in the blood system discussed above.

Nervous system - Studies suggest that benzene may cause effects on the peripheral nerves and/or spinal cord. Symptoms included an increased incidence of headaches, fatigue, and difficulty sleeping and memory loss among workers with significant exposures.

Cancer - There are so many case reports and epidemiologic studies of exposed workers, that a causal relationship between benzene exposure and leukemia has been clearly established. Benzene exposure has also been associated with cancer of the lymph system (lymphoma), lung cancer and bladder (urothelial) cancer.
Hazard Recognition
Benzene is a colorless, highly flammable liquid chemical with a sweet odor. Because of the distinctive smell of benzene (and related compounds), the benzene family is classified as "aromatic"; thus, the name, aromatic hydrocarbon. Benzene has an odor threshold of 12 ppm.

Recognition

Factors and Sites Favorable for Benzene Exposure
Disturbed Soils within Hydrocarbon Processing Facilities - Disturbed soil within hydrocarbon processing facilities where hydrocarbons or Benzenes may have been spilled or which have long periods of exposure to low level Benzene.
Vessels or Tanks – Confined spaces with Benzene residue.
Spills, Pipe or Equipment Failure – Containment or process equipment failures resulting in Benzene gas being released into the atmosphere.
Factors and Sites LESS Favorable for the Benzene Exposure
Open, Un-congested Hydrocarbon Process Areas with Good Ventilation or Air Movement and Properly Working Containment
– Open Areas where little undisturbed soil exists.

Controls – Protection

Benzene is EXTREMELY FLAMMABLE and VERY TOXIC (CANCER HAZARD). Smoking is prohibited, and fire extinguishers shall be readily available in all areas where benzene is used or stored. Before handling, it is extremely important that engineering controls are operating, and protective equipment requirements and personal hygiene measures are being followed. Only authorized personnel should have access to this material. They should be properly trained regarding its hazards and its safe use. Maintenance and emergency personnel should be advised of potential hazards. At high concentration, ignition sources must be eliminated with 150 feet

Control – The use of Engineering control methods to reduce hazardous exposures are preferred. Methods include mechanical ventilation (dilution and local exhaust), isolation by enclosing the process or personnel, control of process conditions, and process modification (e.g., substitution of a less hazardous material). Whenever possible, closed handling systems for processes involving this material should be used. Use a non-sparking, grounded ventilation system, separate from other exhaust ventilation systems. Exhaust directly to the outside. Supply sufficient replacement air to make up for air removed by exhaust systems.

Controlling the release of Benzene gas is the primary method of protection against exposure.

Follow confined space gas monitoring and entry procedures when entering a vessel or tank in which Benzene residue may be present
Avoid unnecessary digging in hydrocarbon processing facilities
Use regulated areas – If Benzene concentration exceed or are expected to exceed permissible exposure limits, either the 8-hour limit of one ppm or the 15-minute limit of 5 ppm, establish a regulated area limiting access to authorized personnel only.

Respiratory protection - If engineering controls cannot be implemented employ respiratory protection.

Protection - Because of the high potential hazard associated with this substance, stringent PPE control measures are necessary. All required or necessary protective clothing and equipment will be provided at no cost to the employees. Protective clothing and equipment must prevent eye contact and limit dermal exposure.

Inhalation PPE - Respiratory protection shall be selected according to airborne concentrations. Respiratory protection recommendations for benzene concentration in air Recommended Exposure Limit (REL):
Positive pressure, full-face piece Self-Contained Breathing Apparatus (SCBA); or
Positive pressure, full-face piece Supplied-Air Respirator (SAR) with an auxiliary positive pressure SCBA.
Escape: Gas mask with organic vapor canister; or escape- type SCBA.

The NIOSH has classified this material as a potential occupational carcinogen, according to specific NIOSH criteria. This classification is reflected in these recommendations for respiratory protection, which specify that only the most reliable and protective respirators be worn at any detectable concentration.

Absorption PPE – PPE clothing should be made of materials suitable for the hazard. Remove contaminated clothing promptly. Keep contaminated clothing in closed containers. Discard or launder before re-wearing. Inform laundry personnel of contaminant's hazards. Have a safety shower/eye-wash fountain readily available in the immediate work area.
Chemical safety goggles - A face shield may also be necessary.
Chemical resistant gloves, coveralls, boots, and/or other resistant protective clothing.
A chemical resistant full-body encapsulating suit and respiratory protection may be required in some operations.

Recommended Materials - Polyvinyl alcohol, Barricade™, Responder™, 4H™ (polyethylene/ethylene vinyl alcohol), CPF 3™, Tychem 10000™ and Teflon™
Non-Recommended Materials - PVC, nitrile rubber, Sanranex™, butyl rubber, natural rubber, neoprene, polyethylene.

First Aid & Exposure Response

Provide general supportive measures (comfort, warmth, rest). Consult a physician and/or the nearest Poison Control Centre for all exposures except very minor instances of inhalation or skin contact.

Absorption - If someone becomes ill from breathing benzene - Take proper precautions to ensure your own safety before attempting rescue. Wear appropriate protective equipment. Remove source of contamination or move victim to fresh air. If breathing has stopped, trained personnel should begin artificial respiration or, if the heart has stopped, cardiopulmonary resuscitation (CPR) immediately. Obtain medical attention immediately.

Absorption - If someone gets benzene on their skin - Avoid direct contact. Wear chemical protective clothing, if necessary. As quickly as possible, flush with lukewarm, gently flowing water for at least 20 minutes. Under running water, remove contaminated clothing, shoes and leather goods (e.g., watchbands, belts). Obtain medical attention immediately.

Discard contaminated clothing, shoes and leather goods (e.g., watchbands and belts). If someone gets benzene in their eyes - Avoid direct contact. Wear chemical resistant gloves, if necessary. Immediately flush the contaminated eye(s) with lukewarm, gently flowing water for 20 minutes, or until the chemical is removed while holding the eyelid(s) open. Take care not to rinse contaminated water into the non-affected eye. Obtain medical attention immediately.

Ingestion - If someone swallows benzene - Never give anything by mouth if victim is rapidly losing consciousness or is unconscious or convulsing. Have victim rinse mouth thoroughly with water. DO NOT INDUCE VOMITING. Have victim drink 8 to 10 oz of water to dilute material in stomach. If vomiting occurs naturally, have victim lean forward to reduce risk of aspiration. Repeat drinking of water. Quickly transport victim to an emergency care facility.

Training

E&B will provide benzene hazard awareness training for all employees.
Training Content - Training will cover the following topics:
Benzene Hazard Awareness Training
E&B Benzene Policy
Responsibilities
Hazard Recognition & Control
Protection & First Aid

Personnel Training – E&B personnel shall receive the following training:
10.2.1 All employees shall receive Benzene Hazard Awareness training and have access to the written plans.
Training Frequency - Training and re-training frequency shall be as follows:
10.3.1 Initial Benzene Hazard Awareness Training shall take place when employees mobilize to jobsites with known benzene hazards. Benzene awareness training shall be refreshed annually as part of the Toolbox Safety Meeting Program, Industrial Hygiene & Hazard Communication agenda.

Reporting and Recordkeeping
Reports – All benzene related events shall be reported.

Incident Report - All benzene exposure shall be record as Incidents on an E&B Incident Report.

Near Miss Reports - Failures in containment, control methods, isolation, etc., not resulting in employee exposure shall be record as near miss events on an E&B Near Miss Report.
Control & Retention – Records associated with this program shall be handled in the following manner. Incidents shall be handled per the Incident Reporting and Record Keeping Program. Records shall be retained for a minimum of the employee's duration of employment plus