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Brunel Energy, Inc.

Butadiene

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1. Purpose

- 1.1. Brunel Energy, Inc., herein, “the Company,” has established a program in compliance with OSHA 1910.1051, 1,3-Butadiene and 1910.1051(k)(8), Medical surveillance, to provide employees with the general knowledge and guidelines to anticipate, recognize, evaluate, and actively participate in controlling their exposure to Butadiene (BD) found in certain industrial worksites and processing facilities in which the Company may perform work.

2. Applicability

- 2.1. This policy applies to employees, subcontractors and/or visitor(s) of the Company. For the purposes of this policy, an employee shall be considered on the job whenever he/she is:
 - 2.1.1. On or in, any company or client property, including parking areas; or
 - 2.1.2. On company time even if off company premises (including paid lunch, rest periods and periods of being on call).
- 2.2. As a condition of employment, Company employees are required to abide by additional governmental or customer policies and requirements that may be imposed at a worksite in addition to the requirements of these policies and procedures. Nothing set forth in this policy constitutes, construes, or interprets in any way as a contract of employment.

3. Definitions

- 3.1. **Butadiene (BD)** is a colorless gaseous hydrocarbon made by catalytic dehydrogenation of butane and used in the manufacture of synthetic rubber.

4. Responsibilities

- 4.1. Manager(s) and HSE Supervisor(s):
 - 4.1.1. Are responsible for understanding the butadiene awareness policy and enforcing the policy.
 - 4.1.2. Ensure that all employees assigned to at risk areas for butadiene receive training.
 - 4.1.3. Ensure that all employees are aware of the proper work procedures for butadiene.
 - 4.1.4. Ensure that initial training is conducted for all new employees and that retraining is conducted when employee behaviors suggest that retraining is warranted.
 - 4.1.5. Identify and evaluate butadiene hazards and potential exposures during planning and performing work.
 - 4.1.6. Review and approve the task-specific safety analysis.
 - 4.1.7. As necessary, quantitatively determines the presence of butadiene in materials, substrates, and other media. This may involve the collection of samples for analysis by a qualified laboratory or field testing using acceptable test methods.

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- 4.1.8. Provide results of any butadiene survey to management/supervision, along with information regarding hazard potential and control measures. as appropriate, makes recommendations to management/supervision to maintain, modify, upgrade, or downgrade controls accordingly.
- 4.1.9. Take prompt corrective measures (or supports any competent person in this role) to eliminate hazards, such as recommending to management/supervision to implement or modify engineering, administrative, work practice, and personal protection (including respiratory protection) controls.
- 4.1.10. Conducts periodic exposure assessments.
- 4.1.11. As appropriate, assist management/supervision in ensuring that workers have the necessary training and medical surveillance based upon the activity and hazard.
- 4.1.12. Implement site controls isolating employees from butadiene hazards when butadiene is discovered or suspected on a jobsite.
- 4.2. Employee(s):
 - 4.2.1. Shall follow all requirements regarding the safe work procedures for butadiene.
 - 4.2.2. Stop work if butadiene is discovered on a jobsite.
 - 4.2.3. Protect themselves and others from unnecessary butadiene exposure by wearing appropriate PPE.
 - 4.2.4. Following safety rules and guidelines regarding butadiene hazard protection.
 - 4.2.5. Immediately report to a supervisor any changes, deficiency or breaches in site controls established to isolate employees from butadiene hazards on a jobsite.
 - 4.2.6. Participate in JSA and hazard recognition activities and make an effort to identify butadiene hazards during daily JSA's.

5. Requirements

- 5.1. Written Compliance Plan (§ 1910.1051(f)(2))
 - 5.1.1. This program establishes efforts to reduce employee BD exposure to or below the permissible exposure limits (PELs) using primarily engineering and work-practice controls, and then respiratory protection if required or permitted by the OSHA standard.
 - 5.1.2. This plan will be reviewed at least annually and updated as necessary to reflect significant changes in the status of the Company's compliance program. Upon request, the written plan must be provided to OSHA, the National Institute for Occupational Safety and Health (NIOSH), affected employees, and designated employee representatives.
- 5.2. Characteristics of Butadiene

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- 5.2.1. BD is a colorless, noncorrosive, flammable gas with a mild aromatic odor at standard ambient temperatures and pressure. It is produced commercially by three processes: Catalytic dehydrogenation of n-butane and n-butene; oxidative dehydrogenation of n-butene; and recovery as a by-product from the C4 co-product stream during the steam-cracking process used to manufacture ethylene, which is the major product of the petrochemical industry.
- 5.2.2. It is considered an explosive peroxide.
- 5.2.3. Butadiene may also exist as a cryogenic liquid.
- 5.2.4. Butadiene is insoluble in water, stable and reacts with oxidizers.
- 5.2.5. It becomes a fire hazard when exposed to heat, flame, or strong oxidizers and may release toxic gases such as carbon monoxide during a fire.

5.3. Possible Locations of Butadiene

- 5.3.1. Butadiene may be present at refineries and petrochemical plants. 1,3-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. Other uses include copolymer latexes for carpet backing and paper coating, as well as resins and polymers for pipes and automobile and appliance parts. It is also used as an intermediate in the production of such chemicals as fungicides.
- 5.3.2. Butadiene may also be present in 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.
- 5.3.3. Exposure can also occur from automobile exhaust; polluted air and water near chemical, plastic, or rubber facilities; cigarette smoke; and ingestion of foods that are contaminated from plastic or rubber containers.

5.4. Health Hazards

- 5.4.1. Breathing very high levels of butadiene for a short time can cause central nervous system effects, blurred vision, nausea, fatigue, headache, decreased blood pressure and pulse rate, and unconsciousness. There are no recorded cases of accidental exposures at high levels that have caused death in humans, but this could occur. Breathing lower levels of butadiene may cause irritation of the eyes, nose, and throat. Skin contact with liquefied butadiene can cause irritation and frostbite.
- 5.4.2. The health effects caused by exposure to 1,3-butadiene can be split into two categories: acute and chronic. Acute exposures can further be split into low and high doses.
 - 5.4.2.1. Acute low exposures may cause irritation to the eyes, throat, nose, and lungs. Frostbite may also occur with skin exposure.

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- 5.4.2.2. 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.
- 5.4.3. Some studies of workers exposed to BD in the synthetic-rubber industry show an excess cancer mortality from leukemia/lymphoma, raising further concerns that BD is a potential occupational carcinogen.
- 5.5. General Procedure
 - 5.5.1. No employee should be exposed over the 8-hour and 15-minute permissible exposure limits for butadiene.
 - 5.5.2. Smoking is prohibited in areas where butadiene is present or where butadiene may be released.
 - 5.5.3. Employees must be informed where butadiene is used in host facility and aware of additional plant safety rules.
 - 5.5.4. Stop the Work Immediately shall be implemented upon immediate discovery or suspicion of butadiene being present on a jobsite. Employees should proceed to inform their supervisor and/or a Competent individual upon discovery of butadiene.
 - 5.5.5. Employees shall not handle butadiene or products containing butadiene without reviewing SDS information and taking appropriate protective measures.
 - 5.5.6. Employees will not assist in the disposal of Butadiene or products containing Butadiene.
 - 5.5.7. Hazard identification and control all employees assigned to job sites where exposure to Butadiene may be possible shall participate in the identification, evaluation, and control of Butadiene hazards.
 - 5.5.8. All employees shall be familiar with the local Emergency Action Plan and specific contingency plans involving Butadiene.
- 5.6. Goal Program: Exposure-Goal Program (§ 1910.1051(g))
 - 5.6.1. If employees are exposed to BD above the action level, the company will implement a written exposure goal program intended to limit employee exposures to below the action level during normal operations and must be updated as necessary to reflect significant changes in the status of the exposure-goal program.
 - 5.6.2. The program must consist of the following elements:
 - 5.6.2.1. A leak-prevention, -detection, and -repair program.
 - 5.6.2.2. A program for maintaining the effectiveness of local-exhaust ventilation systems.
 - 5.6.2.3. The use of pump exposure-control technology such as, but not limited to, mechanical double-sealed or seal-less pumps.

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- 5.6.2.4. Gauging devices designed to limit employee exposure, such as magnetic gauges on rail cars.
- 5.6.2.5. Unloading devices designed to limit employee exposure, such as a vapor-return system.
- 5.6.2.6. And a program to maintain BD concentration below the action level in control rooms by use of engineering controls.
- 5.6.2.7. Respirator use is not required in the exposure goal program.
- 5.6.3. The Exposure Goal Program written shall be furnished upon request for examination and copying to the Assistant Secretary, the Director, affected employees and designated employee representatives.

6. Procedure

6.1. Exposure Monitoring (§ 1910.1051(d))

- 6.1.1. The Company will perform initial monitoring to determine the extent of BD exposure in their workplace, identify areas of operation that may require additional efforts to reduce employee exposure to BD and determine the need for engineering controls, instituting, or modifying work practices, and selecting appropriate respiratory protection to prevent employees from overexposure to BD. If the initial monitoring shows that BD is at or exceeds the Standard's action level or is above the short-term exposure limit (STEL), then the Company will conduct periodic monitoring.
- 6.1.2. Periodic monitoring would be appropriate because minor changes in processes, materials, or environmental conditions may increase the airborne concentration levels of BD. By using periodic monitoring, the Company can evaluate the effectiveness of selected control methods. In addition, these measurements remind both the Company and employees of the continuing need to protect against the hazards that could result from an employee's overexposure to BD. Finally, periodic monitoring samples inform an examining physician or other licensed health-care professional of the existence and extent of potential sources of occupational diseases.
- 6.1.3. The Company will perform additional monitoring whenever there has been a change in BD production, processes, and controls that may result in new or additional exposure. Also, under certain circumstances such as accidental spills or leaks, ruptures, or other breakdowns, the Company will perform additional monitoring after the incident has been corrected. Such monitoring ensures that the work area is safe or alerts the Company that protection may still be needed.

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- 6.1.4. The Company will notify each employee of the exposure-monitoring results within 5 business days after the receipt of the results. The Company may notify employees either individually by writing, or by posting the monitoring results in an appropriate location that is accessible to affected employees.
- 6.1.5. If the results exceed the 8-hour time weighted average (TWA) or the STEL, the Company will, within 15 business days after receiving these results, provide the affected employees with written information regarding the corrective action the Company will take to ensure that employees are not overexposed to BD.
- 6.2. Medical Surveillance (§ 1910.1051(k))
 - 6.2.1. The Company will provide medical-screening and -surveillance programs for those employees whose duties expose them to BD at concentrations at or above the action level for 30 or more days a year. These programs must be made available to those employees who have, or who may have, exposure to BD at or above the PELs for 10 or more days a year.
 - 6.2.2. Documentation and maintenance of medical examinations provide a continuous record of employee health. Records of medical examinations are used by physicians or other licensed health-care professionals (PLHCPs) who periodically examine employees exposed to BD to determine the extent to which the employees have experienced adverse health effects since their last examination. Further, when symptoms of organic damage appear, the PLHCP often needs information about an employee's previous medical conditions to make an accurate diagnosis of the new condition, its apparent cause, and the course of treatment required. Medical records also ensure that employees can determine whether or not treatment or other interventions are needed for occupational exposures to BD.
- 6.3. Notification of Monitoring Results
 - 6.3.1. The company shall, within 5 business days after the receipt of any monitoring performed, notify the affected employees of these results in writing either individually or by posting of results in an appropriate location that is accessible to affected employees.
 - 6.3.2. The company shall, within 15 business days after receipt of any monitoring performed under this section indicating the 8-hour TWA or STEL has been exceeded, provide the affected employees, in writing, with information on the corrective action being taken by the company to reduce employee exposure to or below the 8-hour TWA or STEL and the schedule for completion of this action.
- 6.4. Exposure-Monitoring and Medical Records

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- 6.4.1. The Company will establish and maintain exposure-monitoring records and employee medical records. Medical and exposure-monitoring records are maintained principally for employee access, but also are designed to provide valuable information to both employees and the Company. The medical and exposure-monitoring records required by this Standard will aid the employee and their physicians or other licensed health-care professionals (PLHCPs) in determining whether or not treatment or other interventions are needed as a result of employee exposure to BD. The information will also enable the Company to better ensure that employees are not being overexposed to BD; such information may alert the Company that steps must be taken to reduce BD exposure.
- 6.4.2. Exposure-monitoring records must be maintained for at least 30 years, and medical records must be kept for the duration of employment plus 30 years. Records must be kept for extended periods because of the long latency associated with the development of BD-related cancers.
- 6.5. Information Provided to Physicians or Other Licensed Health-Care Professionals (§ 1910.1051(k)(6))
 - 6.5.1. The Company shall provide PLHCPs with the following information:
 - 6.5.1.1. A copy of the Standard, including the appendices.
 - 6.5.1.2. A description of the affected employee's duties as they relate to the employee's BD exposure.
 - 6.5.1.3. The employee's actual or representative BD exposure level during employment tenure, including exposure incurred in an emergency situation.
 - 6.5.1.4. A description of personal-protective equipment used or to be used by the employee; and
 - 6.5.1.5. Information from previous employment-related medical evaluations of the affected employee that is not otherwise available to the PLHCP.
 - 6.5.1.6. Making the required information available to the PLHCP will aid in the evaluation of the employee's health and fitness for specific job assignments involving BD exposure. As noted earlier, if symptoms of organic damage appear, the PLHCP often needs information about an employee's previous medical conditions to make an accurate diagnosis of the new condition, its apparent cause, and the course of treatment required. Medical records also ensure that employees can determine whether or not treatment or other interventions are needed for occupational exposures.
- 6.6. Employee Access (§ 1910.1051(m)(5))
 - 6.6.1. Employee medical and exposure-monitoring records will be provided to OSHA and the National Institute for Occupational Safety and Health (NIOSH). Access to these records must be granted in accordance with 29 CFR 1910.1020(e).
- 6.7. Areas that may exceed permissible exposure limits – Regulated Areas

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- 6.7.1. Regulated areas shall be established when exposure to an employee is or is expected to be in excess of the PEL.
- 6.7.2. Regulated areas shall be marked with warning signs to alert employees and access is restricted to authorized persons only.
- 6.7.3. The company shall establish a regulated area wherever occupational exposures to BD exceed or can reasonably exceed the permissible exposure limits, either the 8-hr TWA or STEL.
- 6.7.4. Access to regulated areas shall be limited to authorized persons.
- 6.7.5. Regulated areas shall be demarcated from the rest of the workplace in any manner that minimizes the number of employees exposed to BD within the regulated area.
- 6.7.6. When working at a multi-employer worksite who establishes a regulated area shall communicate the access restrictions and location of these areas to other employers with the work operations at the worksite whose employees may have access to these areas.
- 6.8. Personal Protective Equipment (PPE)
 - 6.8.1. Eye and skin protection should be worn where exposure to liquid butadiene may occur. Contact lenses should not be worn when working butadiene.
 - 6.8.2. Respirators may be required where exposures are above the permissible exposure limit, and emergency respirators may be required where releases could occur. If respirators are required, the Company's established respiratory-protection program in accordance with 29 CFR 1910.134 shall be followed.
 - 6.8.3. Respirators must have a label attached to each respirator filter element to indicate the date and time it is first installed on the respirator. The purpose of this label is to inform employees when to replace a filter element, thereby preventing overexposure to butadiene. If a label is not attached, the respirator shall not be used.
- 6.9. Respirator Fit-Testing Records
 - 6.9.1. The Company shall keep a record of the qualitative and quantitative (QNFT) respirator fit tests administered to employees. This record must contain the following information: The name of the employee; type of respirator; brand and size of respirator; date of the fit test; and, when a QNFT is used, the fit factor, strip-hart recording or other recording of the results of the test.
 - 6.9.2. The Company will maintain the fit-test record until the next fit test is administered. This record enables OSHA to determine if the Company: Complied with the fit-testing requirement; performed the fit test before the employee started using the respirator (and under specific conditions thereafter); accurately determined the protection afforded to the employee; and ensured that the employee is using the correct respirator.
- 6.10. Fire Protection

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6.10.1. Fire extinguishers should be readily available in areas where butadiene is present or where butadiene may be released.

6.11. Emergency-Situation Plan (§ 1910.1051(j))- Spills, Leaks or Ruptures

6.11.1. If butadiene is spilled or leaked, the following emergency situation steps should be taken:

6.11.1.1. Employees shall maximize their PPE to minimize exposure. Persons not wearing protective equipment and clothing should be restricted from areas of spills or leaks until cleanup has been completed.

6.11.1.2. Efforts to eliminate all ignition sources shall be made if safe to do so.

6.11.1.3. The spill, leak or rupture area should be ventilated.

6.11.1.4. If the BD is in liquid form and a small quantity, the area should be allowed to evaporate in a safe manner.

6.11.1.5. Stop or control the leak if this can be done without risk. If the source of leak is a cylinder the leak cannot be stopped in place, remove the leaking cylinder to safe place and repair the leak or allow the cylinder to empty.

6.11.1.6. The disposal of BD is considered hazardous waste and must be disposed of by an authorized third-party company.

6.11.1.7. Monitoring must be performed after spills, leaks, ruptures, or other breakdowns have occurred that may lead to exposure above the 8-hr TWA limit or above the STEL, the Company shall monitor leaks source, such as direct reading instruments, area or personal monitoring, after the cleanup of the spill or repair of the leak, rupture or other breakdown to ensure that exposures have returned to the level that existed prior to the incident.

7. Training

7.1. In Compliance with Employee Information and Training (§ 1910.1051(l)(2)), training will be provided prior to, or at the time of, initial assignment to a job potentially involving exposure to BD at or above the action level or STEL; training must also be provided at least annually thereafter. This training will include:

7.1.1. Hazard Communication Standard (29 CFR 1910.1200)

7.1.2. Butadiene standard

7.1.3. Stop Work Authority

7.1.4. Personal Protective Equipment (PPE) Use, Maintenance and Storage

7.1.5. How to recognize how and where an employee may be occupationally exposed to BD, and

7.1.6. What steps employees can take to limit BD exposure

7.1.7. Information on the location and use of BD,

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7.1.8. Work practices and health hazards associated with BD.

7.2. The Company will ensure employee participation and maintain a written record of the training contents.

8. Reference

8.1. 29 CFR 19.1051 - 1,3-Butadiene.