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Brunel Energy, Inc.

Silica Exposure Control

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1. Purpose

- 1.1. Brunel Energy, Inc., hereinafter referred to as, the “Company,” has established a program compliant with OSHA’ Toxic and Hazardous Substances standard, Title 29 Code of Federal Regulations 1910.1000 and other OSHA rules as needed to reduce employee exposure to airborne crystalline silica to below the OSHA Permissible Exposure Limit (PEL) by means of substitution, engineering controls, work methods and administrative controls.
- 1.2. The Company shall ensure that no employee is exposed to an airborne concentration of respirable crystalline silica in excess of 50 ug/m³, calculated as an 8-hour TWA. Employees, subcontractors, and the public will be protected from the hazards associated with crystalline silica.

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. **Action Level** means a concentration of airborne respirable crystalline silica of 25 micrograms per cubic meter of air (µg/m³) or 0.025 milligrams per cubic meter of air (mg/m³).
- 3.2. **Carcinogen** is a substance that causes the development of cancerous growths in living tissue. One of the groups that rates cancer risk is the International Agency for Research on Cancer (IARC). The IARC lists materials as:
 - 3.2.1. Group 1 – known carcinogenic to humans.
 - 3.2.2. Group 2A – probably carcinogenic to humans.
 - 3.2.3. Group 2B – possibly carcinogenic to humans.
- 3.3. **Crystalline Silica** is a form of silicon dioxide (SiO₂). Quartz is the most common form. Cristobalite and Tridymite are two other crystalline forms that might be encountered. These crystalline forms are the dangerous ones.
- 3.4. **Permissible Exposure Limit (PEL)** is the OSHA allowable concentration limit in air that an employee can be exposed to for an eight-hour day.

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3.5. **Pulmonary Function Test (PFT)** is a Pulmonary function test. This test is designed to determine how well your lungs are working. There are several pieces that can be part of the PFT:

- 3.5.1. FVC – forced vital capacity.
- 3.5.2. FEV1 – forced expiratory volume in one second,
- 3.5.3. DLCO – diffusion capacity for carbon monoxide, radiographic
- 3.5.4. TLC – total lung capacity.

3.6. **Respirable** refers to particles small enough to be drawn deep into the lungs and that are below 10 microns in size (too small to be seen by the naked eye).

3.7. **Silicosis** is a progressive disease of the lungs that reduces the ability of the lungs to extract oxygen from the air. It is caused by exposure to respirable crystalline silica dust particles. The damage cannot be reversed.

4. Responsibilities

4.1. Manager(s) and HSE Supervisor(s):

- 4.1.1. Managers and Supervisors shall implement, support, and enforce this policy.
- 4.1.2. Shall ensure employees receive silica awareness training in coordination with lead awareness.

4.2. Employee(s):

- 4.2.1. Employees will comply with the silica awareness requirements.
- 4.2.2. Employees performing work that has the potential for crystalline silica exposure to non-employees shall, prior to beginning the activity, notify all potentially affected parties of the expected exposure, health hazards of crystalline silica, and the methods they can use to protect themselves against overexposure.

4.3. Subcontractor(s):

- 4.3.1. Employees performing work that has the potential for crystalline silica exposure to non-employees shall, prior to beginning the activity, notify all potentially affected parties of the expected exposure, health hazards of crystalline silica, and the methods they can use to protect themselves against overexposure.

5. Requirements

5.1. Competent Person

- 5.1.1. The company shall identify a competent person to inspect and oversee all activities with potential airborne silica exposure. The competent person must have training in the inspection of work areas and equipment and in the determination of safe working conditions. This person shall have a working knowledge of OSHA 1926.1153 standards, shall be capable of.

- 5.1.1.1. Identifying airborne silica hazards.

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- 5.1.1.2. Determine the need for initial and additional exposure monitoring.
- 5.1.1.3. Recommend and implement engineering and work practice controls.
- 5.1.1.4. Establish levels of PPE.
- 5.1.1.5. Have the authority to take action to eliminate hazards and correct incidences of noncompliance.

6. Procedure

6.1. Identification of Hazards

6.1.1. Crystalline silica is a natural constituent of the earth's crust and is a basic component of sand, concrete, brick, asphalt, granite, some blasting grit, and wall spackling materials. Employees may be exposed to crystalline silica hazards when around activities like:

- 6.1.1.1. Abrasive blasting
- 6.1.1.2. Jack hammering
- 6.1.1.3. Concrete crushing
- 6.1.1.4. Hoe ramming
- 6.1.1.5. Rock drilling
- 6.1.1.6. Mixing of concrete or grout
- 6.1.1.7. Concrete drilling
- 6.1.1.8. Sawing concrete, concrete blocks, or bricks
- 6.1.1.9. Chipping or scarifying concrete
- 6.1.1.10. Rock crushing
- 6.1.1.11. Moving or dumping piles of concrete, rock, or sand
- 6.1.1.12. Housekeeping activities (shoveling, sweeping, vacuuming, etc.)
- 6.1.1.13. Demolition involving any of these materials
- 6.1.1.14. Using coatings containing crystalline silica
- 6.1.1.15. Removing coatings containing silica

6.1.2. Silica exposure should be minimized by substituting silica materials with non-silica containing materials. Where such control is not feasible, alternative methods to reduce exposure should be identified for applicability.

6.1.3. Engineering and work practice controls, including administrative controls, shall be implemented to reduce and maintain employee exposure to silica at or below the PEL, to the extent that such controls are feasible.

6.1.4. Where all possible engineering and work practice controls that can be instituted are not sufficient to reduce employee exposure to or below the PEL, such controls shall be

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used, nonetheless, to reduce employee exposure to the lowest feasible level (and in conjunction with respiratory protection).

- 6.1.5. If administrative controls are used to limit exposure, establish, and implement a job rotation schedule that includes employee identification as well as the duration and exposure levels at each job or workstation where each affected employee is located.
 - 6.1.6. A written compliance program shall be established and implemented prior to the start of operations within the scope of this Written Compliance Plan. The written program shall outline the plans for maintaining employee exposure below the PEL.
 - 6.1.7. Surfaces shall be maintained as free as possible from accumulations of silica. Select methods for cleaning surfaces and floors that minimize the likelihood of silica becoming airborne (such as using a HEPA vacuum).
 - 6.1.8. When using mechanical ventilation to control exposure, regularly evaluate the system's ability to effectively control exposure. Never use compressed air to remove silica from any surface unless it is used in conjunction with a ventilation system designed to capture the airborne dust created while using the compressed air.
 - 6.1.9. If vacuuming is the method selected, specialized vacuums with HEPA filtration are required. Methods to use and empty vacuums in a manner that minimizes the reentry of silica into the workplace shall be described and used. Use of household vacuums with HEPA filters are not allowed at any time for the collection of dust or debris that contains silica.
 - 6.1.10. Do not allow employees to leave the workplace wearing any protective clothing or equipment that is required to be worn during their work shift without HEPA vacuum removal of dust.
 - 6.1.11. Where feasible, install shower facilities and require employees who work in regulated areas to shower at the end of their work shift. Also provide an adequate supply of cleaning agents and clean towels.
 - 6.1.12. Provide hand washing facilities for use by employees working in regulated areas. Furthermore, require employees to wash their hands and face at the end of the work shift and prior to eating or entering eating facilities, drinking, smoking, or applying cosmetics.
 - 6.1.13. Employees shall not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in regulated areas and/or any area where exposure to silica is above the PEL.
 - 6.1.14. Eating facilities or areas shall be provided for employees working in regulated areas. These facilities shall be maintained free of silica contamination and shall be readily accessible to those employees.
 - 6.1.15. An annual assessment of this written program effectiveness will be performed.
- 6.2. Initial Exposure Assessment & Exposure Monitoring

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- 6.2.1. Exposure assessments must be conducted for those employees who are expected to be exposed to respirable crystalline silica at or above the action level.
- 6.2.2. When exposure to silica cannot be eliminated through the use of feasible engineering or administrative controls, activity with the potential for silica exposure exists or a change in equipment, process, controls, or personnel occurs, or a new task has been initiated, an initial exposure assessment is also required.
- 6.2.3. Project personnel will conduct a conduct an initial written exposure assessment in accordance with 29 CFR 1926.1153(d)(2) to determine the extent of employee exposure and identify the appropriate exposure controls. The assessment shall consist of the collection of personal air samples representative of a full shift including at least one sample for each job classification in each work area, either for each shift, or for the shift with the highest exposure level. A copy of the written exposure plan is available to all employees.
- 6.2.4. During the initial determination, until such time that actual airborne concentrations are determined, personnel shall be protected by respiratory protection based on task-specific anticipated airborne concentrations of silica as illustrated in Table 2. The Company will provide respiratory protection, protective clothing and equipment, hygiene facilities and training.
- 6.2.5. When an assessment determines that exposure has occurred above the action level but below the PEL, additional monitoring shall be required at least every 6 months. Additional monitoring shall continue until such time that the monitoring results fall below the action level on two separate occasions at least 7 days apart.
- 6.2.6. When monitoring yields results above the PEL, then quarterly monitoring is required. In addition, the quarterly monitoring may be suspended when additional monitoring results fall below the action level on two separate occasions at least 7 days apart.
- 6.2.7. Where the competent person can clearly demonstrate, in the absence of air monitoring data, that a work activity will not create airborne silica concentrations in excess of the action level, then air monitoring may be unwarranted. Where a negative initial determination is reached without air monitoring, the competent person must develop a written explanation as to why exposures are not expected to exceed the action level.
- 6.2.8. The Company will either implement all controls required by 1926.1153 Table 1-Exposure Control Methods for Selected Construction Operations or address it in a job specific activity plan that focuses on eliminating or minimizing silica exposure through substitution, engineering controls, work practices and methods, air monitoring, effective hygiene practices, PPE, training, environmental controls, and waste disposal.
- 6.3. Medical Surveillance
 - 6.3.1. The company shall institute medical surveillance for any employees whose exposure is equal to or exceeds the action level or is required by this program to wear a respirator thirty (30) or more days per year.

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- 6.3.2. Employees with potential exposure to crystalline silica must be current with the Company's respirator medical surveillance.
 - 6.3.2.1. They must have had the pre-placement physical including the respirator questionnaire (with the silicosis portion) and a baseline PFT.
 - 6.3.2.2. The respirator and silicosis questionnaires must be completed annually.
 - 6.3.2.3. The standard PFT must be performed every three years (FVC, FEV1, and FEV1 / FVC).
- 6.3.3. Follow-up examinations are ordered by the Company's Medical Director after review of the above information and may be triggered by the following signs and symptoms of silicosis not explained by a non-silica related, currently existing medical condition and/or clinically significant PFT results:
 - 6.3.3.1. FVC < 70% of predicted.
 - 6.3.3.2. FEV1/FVC and FVC < 70% of predicted.
 - 6.3.3.3. Other change deemed clinically significant by medical review.
- 6.3.4. The initial follow up will consist of a silica medical exam and a specialized PFT (DLCO, and /or radiographic TLC). It may include a chest x-ray if clinically indicated and not done as part of specific respiratory function testing.
- 6.3.5. In the event that silica induced pulmonary disease is suspected, the employee must be removed from potential exposure to silica containing dusts until a final medical determination is made.
- 6.3.6. All employees will be provided with access to a copy of 29 CFR 1910.1153.
- 6.4. Personal Protective Equipment (PPE)
 - 6.4.1. Employees shall be provided, at no cost, protective work clothing and equipment including cotton coveralls or similar full-body clothing, gloves, hats, shoes or disposable shoe coverlets, face shields, vented goggles, or other appropriate PPE. Respirators will be provided to employees who are exposed to respirable crystalline silica.
 - 6.4.2. When the level of employee exposure to crystalline silica is known to be below the PEL if the use of feasible engineering and work practice controls is not sufficient to reduce the exposure to below the PEL or during the following conditions.
 - 6.4.3. During periods when employee exposure to airborne silica exceeds the PEL.
 - 6.4.4. For work operations where engineering and work-practice controls are not sufficient to reduce employee exposure to or below the PEL.
 - 6.4.5. During periods when an employee requests a respirator (Powered air-purifying respirators (PAPR) shall be provided to employees who request such a respirator to use where it will provide adequate protection.)
 - 6.4.6. During periods when respirators are required to provide interim protection while conducting initial exposure assessments.

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6.4.7. If a potential of silica dust exposure exists, the employee shall wear the following Personal Protective Equipment (PPE):

- 6.4.7.1. Disposable or reusable work clothing to keep from spreading the dust or bringing the dust home.
- 6.4.7.2. Leather gloves.
- 6.4.7.3. Safety glasses (goggles maybe appropriate).
- 6.4.7.4. Face shield
- 6.4.7.5. Respiratory protection
- 6.4.7.6. Boot covers or way to remove silica dust from boots (water hose for rubber boots, HEPA vac for leather boots).

6.4.8. Respiratory protection shall be selected based on guidance in 1926.1153 Table 1 or based on a Certified Industrial Hygienist's or competent person's assessment of the potential airborne exposure that may be created by the means and methods of work (high energy operations with high airborne dust generation or low energy operations with low dust generation).

6.5. Communication of Hazards

6.5.1. Owners, contractors, and other personnel working in the areas producing dust containing or suspected of containing crystalline silica, will be verbally notified. Each employee will have access to labels on containers of crystalline silica and safety data sheets and be provided information on the health hazards of silica including cancer, lung effects, immune system effects, and kidney effects.

6.5.2. Affected areas shall be clearly taped or blocked off.

6.5.3. Signs must be posted near all access points. Depending on location and type of work, containment with ventilation and HEPA exhaust may be required.

6.5.4. Employees who have not completed training as specified in Section 6 Training, or personnel without proper PPE are not allowed in the regulated area. The size of the area should be determined by the competent person based on visible emissions, wind direction, and available sampling data.

6.5.5. A written compliance program shall be made available to all affected employees.

6.6. Housekeeping

6.6.1. Areas shall be kept as free from accumulated dust as possible. Use methods that do not reintroduce dust into the air (wet methods, heap vacs, etc.).

6.6.2. Areas shall not be dry swept or brushed where activity could contribute to exposure to crystalline silica.

6.7. Waste Storage and Disposal

6.7.1. By itself, dust containing crystalline silica is not regulated as a hazardous waste unless it is mixed with or contains something else that makes it a hazardous waste. The

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employee shall not create an additional airborne crystalline silica hazard when collecting, emptying, or disposing of the material.

7. Training

- 7.1. Employees whom the Company anticipates may work on projects where they could be exposed to airborne silica will be provided training compliant with the 29 CFR 1910.1200, 1910.1053(j)(3) and 1926.1153(i)(2) to include:
 - 7.1.1. Review of 29 CFR 1926.1153
 - 7.1.2. Information about the potential health effects and symptoms of exposure to respirable crystalline silica.
 - 7.1.3. Material safety data sheets for silica, quartz, and applicable products containing silica.
 - 7.1.4. Purpose and set up of regulated areas marking the boundaries of work areas containing silica dust.
 - 7.1.5. Discussion of the importance of substitution, engineering controls, work practices, good housekeeping, and personal hygiene in reducing crystalline silica exposure.
 - 7.1.6. Use and care of appropriate PPE including respirators.
 - 7.1.7. Expected exposures, controls in place to minimize exposure, and how to set up, use, maintain, etc. the controls to be used.
 - 7.1.8. The contents of this safety policy and procedure.
 - 7.1.9. The identification of the competent person for silica exposure identification and determination of control requirements.
 - 7.1.10. Hygiene and Housekeeping
 - 7.1.11. Availability of written exposure assessment, air monitoring and medical surveillance results.

8. Recordkeeping

- 8.1. In accordance with 29 CFR 1910.20, medical records shall be maintained for at least thirty years after an employee's termination of employment.
- 8.2. All exposure monitoring (air sampling, etc.) results shall be kept for thirty years. The results of exposure monitoring shall be reported in writing to the affect employees it represents or posted in a location available to view. If the results are above the PEL, include the actions that will be taken to reduce the exposure.
- 8.3. All exposure monitoring worksheets, results, and other pertinent information will be accurately maintained and shall be kept on site.

9. Appendix

- 9.1. Table 1 Respiratory Protection Task Assessment

10. Reference

- 10.1. OSHA 1910.1000

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Table 1 Respiratory Protection Assessment Guide

Respirator	Protection Factor	Typical Silica Activity
Half face with HEPA filters Full face with HEPA filters PAPR with HEPA filters Supplied air respirator SCBA	Up to 0.5 mg/m ³ for quartz cristobalite or tridymite	Housekeeping (wet method) Saw cutting (wet method) Drilling concrete (wet method) Power tools with dust collection Equipment operating (open cab) Other activities not creating visible dust
Full face (quantitatively fit) PAPR with HEPA filters Supplied air respirator SCBA	Up to 2.5 mg/m ³ for quartz cristobalite or tridymite	Chipping concrete Jack hammering
PAPR with HEPA filters Supplied air respirator SCBA	Up to 5 mg/m ³ quartz cristobalite or tridymite	Power tools without dust collection Mixing grout (bulk) Vacuum abrasive blasting
Supplied air respirator SCBA Abrasive blasting hood respirator	Over 5 mg/m ³ quartz cristobalite or tridymite	Abrasive blasting