

Manual Section 7	Issue Date 11/14/07	Revision Date 01/01/24	Policy Number LLCP-054
<b>Abrasive Blasting</b>			

### **Purpose**

This Standard Operating Procedure provides important safety information for abrasive blasting/sandblasting. This Standard does not cover all elements of abrasive blasting/sandblasting and the appropriate regulations and safety personnel shall be consulted for each operation. The job pre-planning based on hazard analysis determines the requirements for each project.

### **Scope**

All LLC Companies including, Blanchard Industrial, LLC, GIS Engineering, LLC, Grand Isle Shipyard, Inc., and GWIS, Mack Steel, NuWave, Sun Industries, Valvemax, Discovery Industries, Inc.; hereafter identified as “Company”.

### **General Description**

Sandblasting requires the use of extremely high pressure. This high pressure will aid in doing a job in weeks that could take years if done by hand. Sandblasting cuts through and removes old paint and rust. As efficient in high pressure cleaning as sand is, it can be dangerous if the work received anything less than you’re full attention. Remember that no safety equipment is to be altered or by-passed at any time. It is essential to use all safety equipment. When sandblasting/pressure washing, the general precautionary measures to follow include, but are not limited to the following:

1. The sandblast nozzle is equipped with a safety device called a “dead man” control. It is designed to require the blaster to have his/her hand on the control and pressing the handle in order to activate it. This is to prevent the unit from blasting if the operator should drop the hose. The “dead man” control shall be equipped with an automatic safety device. Never by-pass this safety device.
2. The 10-15 feet of blasting hose, or the “whip” demands that we safely secure each coupling by wiring the couplings together to prevent them from whipping wildly if they should come loose.
3. The blast nozzle shall be bonded and grounded to prevent the buildup of static charges.
4. The hopper shall be equipped with a pressure relief valve to prevent pressure from rupturing the pot or hopper. The safety valve must be operational to prevent over-pressurizing.
5. Cables should not pass over a sharp edge without being protected from abrasion or chaffing. A split hose over the cable should be used to insulate the cable from the cutting edge of a sharp angle.
6. If working from scaffolding, the boards must be in good shape. They should not be cracked or broken. The boards cannot be rotted and they should be straight with no bows or knots.
7. Scaffolding boards should not only be tied to the structure, but also tied together to prevent them from spreading.
8. If a sandblaster works 6 feet or more above the ground/deck/water level, the individual is required to wear proper fall protection secured to a separate means of adequate support.
9. All employees must wear approved steel-toed boots, hardhat, eye protection, and hearing protection.
10. Sandblasters must wear long-sleeved shirts and leather gloves when blasting. The sandblast hood with the attached skirt must be worn. Inner shields must be worn in conjunction with the outer shields.
11. Compressed air shall not be used for cleaning purposes while working for the Company.

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### Recommendations

NIOSH recommends the following measures to reduce crystalline silica exposures in the workplace and prevent silicosis and silicosis-related deaths:

1. Helpers must wear goggles in the blasting area and particle masks when loading the hopper or working within 50 feet of the blaster.
2. Some of the detergents used in pressure washing can irritate the eyes. Face shields and approved goggles are essential for both the blaster and helper.
3. Pressure washing poses serious slipping hazards when the deck is soapy and wet. Walk slowly and use short deliberate steps until all soap and water can be removed from the deck.
4. Good housekeeping is essential for both pressure washing and sandblasting operations. Keep hoses out of walkways as much as possible.
5. Boards, rags, and buckets must be stored orderly and out of walkways.
6. Good housekeeping is the primary responsibility of the helper and must be continuous until the end of the job.
7. Everyone is responsible for keeping the area clean and orderly to help eliminate tripping hazards.
8. Should grating or decking need to be removed to perform a sandblasting job, that area will be roped off or hand-railed off and properly marked/flagged to prevent someone from falling through the hole. If the hole is larger than 12 inches in diameter, it may be necessary for the blaster to use full fall protection. All grating or covers must be replaced as soon as possible.
9. Avoid jerking on the blasting hose and spraying sand near another employee to get a fellow employees attention.
10. Proper respiratory protection should be worn (see respiratory protection policy).
11. The Company prohibits silica sand (or other substances containing more than 1% crystalline silica) as an abrasive blasting material and substitutes less hazardous materials.
12. Conduct air monitoring to measure worker exposures.
13. Use containment methods such as blast-cleaning machines and cabinets to control the hazard and protect adjacent workers form exposure when necessary.
14. Practice good personal hygiene to avoid unnecessary exposure to silica dust.
15. Wear washable or disposable protective clothes at the worksite.
16. Shower (if possible) and change into clean clothes before leaving the worksite to prevent contamination of cars, homes, and other work areas.
17. Use respiratory protection when source controls cannot keep silica exposures below the NIOSH REL.
18. Provide periodic medical examinations for all workers who may be exposed to crystalline silica.
19. Post signs to warn workers about the hazard and to inform them about required protective equipment.
20. Provide workers with training that includes information about health effects, work practices, and protective equipment for crystalline silica.

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21. The Corporate HSE Department will report all cases of silicosis to State Health departments and to OSHA.

### **Use of Alternative Abrasives**

The risk of silicosis is high in workers exposed to abrasive blasting with silica, and the hazard is difficult to control. NIOSH has therefore recommended since 1974 that silica sand (or other substances containing more than 1% crystalline silica) be prohibited as abrasive blasting material (NIOSH 1974b, NIOSH 1990a). A variety of materials (corundum, glass beads, pumice, sawdust, slags, steel grit and shot, and walnut shells) are available as alternative blasting media (NIOSH 1974c; Mackay et al. 1980; Stettler et al. 1988). However, no comprehensive studies have been conducted to evaluate the health effects of these substitute materials. Until comprehensive data are available, engineering controls and personal protective equipment should be used with any of the alternative abrasives.

In addition to the health hazards of abrasive blasting materials, the finely fractured particles of material being removed (lead paint, for example) may also create health risks for workers (NIOSH 1991a).

### **Air Monitoring**

Whenever hazardous substances such as dusts, fumes, mists, vapors, or gases exist or are produced in the course of construction work, their concentrations shall not exceed the limits specified in the "Threshold Limit Values of Airborne Contaminants - 1970" of the American Conference of Governmental Industrial Hygienists. Air monitoring should be performed to measure worker exposure to airborne crystalline silica and to provide a basis for selecting engineering controls. Air monitoring should be performed as needed to measure the effectiveness of controls. Air samples should be collected and analyzed according to NIOSH Method Nos. 7500 7602 (NIOSH 1984) or their equivalent.

### **Containment Methods**

#### ***Blast-Cleaning Machines and Cabinets***

Whenever possible, blasting should be done in enclosed blast-cleaning machines or cabinets. These devices permit operators to stand outside the cabinet and direct the stream of abrasive material inside with the hands and arms in gloved armholes.

#### ***Abrasive Blasting Rooms***

Abrasive blasting rooms contain the hazard and protect adjacent workers from exposure. However, such rooms may increase the risk for blasters, since they must work inside the enclosure in high concentrations of hazardous blasting material. Blasting rooms must be ventilated to reduce these concentrations and to increase visibility. A supplied-air respirator is required for any blaster working inside a blasting room.

#### ***Portable Blast-Cleaning Equipment***

Portable blast-cleaning equipment presents particularly serious health problems because engineering controls are rarely used. Curtains can be used as temporary containment structures to reduce the hazard to adjacent workers and the general public. However, such temporary structures often leak and may allow large amounts of debris to escape. As with abrasive blasting rooms, these structures should be ventilated to reduce concentrations of hazardous materials and to increase visibility. During work inside the containment, a supplied-air respirator is required for the blaster.

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### ***Ventilation of Containment Structures***

Abrasives and surface coatings on the materials blasted are shattered and pulverized during blasting operations and the dust formed will contain particles of respirable size. The composition and toxicity of the dust from these sources shall be considered in making an evaluation of the potential health hazards. All containment structures should be ventilated to maintain a continuous airflow and prevent any leakage of dust to the outside. Exhaust air should be discharged to the outside through an appropriate dust collector. The dust collector should be set up so that accumulated dust can be removed without contaminating work areas. Detailed requirements are listed in the OSHA ventilation standard (29 CFR 1910.94).

### ***Personal Hygiene***

The following personal hygiene practices are important elements of any program for protecting workers from exposure to crystalline silica and other contaminants such as lead during abrasive blasting operations (NIOSH 1991a).

- All sandblaster should wash their hands and faces before eating, drinking, or smoking.
- Sandblasters should not eat, drink, or use tobacco products in the blasting area.
- Workers should shower before leaving the worksite.
- Workers should park their cars where they will not be contaminated with silica and other substances such as lead.

### ***Protective Clothing***

The following measures should be taken to assure that the blasters' dusty clothes do not contaminate cars, homes, or worksites other than the blasting area:

- Workers should change into disposable or washable work clothes at the worksite.
- Workers should change into clean clothes before leaving the worksite.

### ***Respiratory Protection***

*Respirators should not be used as the only means of preventing or minimizing exposures to airborne contaminants.* Effective source controls such as substitution, automation, containment, local exhaust ventilation, and good work practices should be implemented to minimize worker exposure to silica dust. NIOSH prefers such measures as the primary means of protecting workers. However, when source controls cannot keep exposures below the NIOSH REL, controls should be supplemented with the use of respiratory protection during abrasive blasting.

When respirators are used, the employer must establish a comprehensive respiratory protection program as outlined in the NIOSH Guide to Industrial Respiratory Protection (NIOSH 1987a) and as required in the OSHA respiratory protection standard (29 CFR 1910.134). Important elements of this standard are

- An evaluation of the worker's ability to perform the work while wearing a respirator,
- Regular training of personnel,
- Periodic environmental monitoring,
- Respirator fit testing,
- Maintenance, inspection, cleaning, and storage, and
- Selection of proper NIOSH-approved respirators.

NIOSH recommends that workers wear the type CE abrasive blasting respirator operated in the positive-pressure mode (APF of 2,000) during abrasive blasting operations, Table 1 lists the minimum respiratory equipment required to meet the NIOSH REL for crystalline silica under given conditions.

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Workers should wear the most protective respirator that is feasible and consistent with the tasks to be performed. For additional information about respirator selection, consult the NIOSH Respirator Decision Logic (NIOSH 1987b). Workers should use only those respirators that have been certified by NIOSH and MSHA (NIOSH 1991b).

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**Table 1 –NIOSH-recommended respiratory protection for workers exposed to respirable crystalline silica**

Condition	Minimum respiratory protection * required to meet the Condition NIOSH REL for crystalline silica (50 µg/m³) **
Less than or equal to 500 µg/m³ (10 x REL) ***	Any air-purifying respirator with a high-efficiency particulate filter
Less than or equal to 1,250 µg/m³ (25 x REL)	Any powered, air purifying respirator with a high-efficiency particulate filter, or  Any supplied-air respirator equipped with a hood or helmet and operated in a continuous-flow mode (for example, type CE abrasive blasting respirators operated in the continuous-flow mode)
Less than or equal to 2,500 µg/m³ (50 x REL)	Any air-purifying full-facepiece respirator with a high-efficiency particulate filter, or  Any powered, air-purifying respirator with tight-fitting facepiece and a high-efficiency particulate filter
Less than or equal to 50,000 µg/m³ (1,000 x REL)	Any supplied-air respirator equipped with a half-mask and operated in a pressure-demand or other positive-pressure mode
Less than or equal to 100,000 µg/m³ (2,000 x REL)	Any supplied-air respirator equipped with a full facepiece and operated in a pressure-demand or other positive-pressure mode (for example, a type CE abrasive blasting respirator operated in a positive-pressure mode)
Planned or emergency entry into environments containing unknown concentrations or concentrations less than or equal to 500,00 µg/m³ (10,000 x REL)	Any self-contained breathing apparatus equipped with a full facepiece and operated in a pressure-demand or other positive-pressure mode, **** or  Any supplied-air respirator equipped with a full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in a pressure-demand or other positive-pressure mode ****
CONTINUED:	
Firefighting	Any self-contained breathing apparatus equipped with a full facepiece and operated in a pressure-demand or other positive-pressure mode ****
Escape only	Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter, or  Any appropriate escape-type, self-contained breathing apparatus
<p>* Only NIOSH/MSHA-approved equipment should be used.</p> <p>** These recommendations are intended to protect workers from silicosis; only the most protective respirators are recommended for used with carcinogens.</p> <p>*** Assigned protection factor (APF) times the NIOSH REL. The APF is the minimum anticipated level of protection provided by each type of respirator.</p> <p>**** Most protective respirators.</p>	

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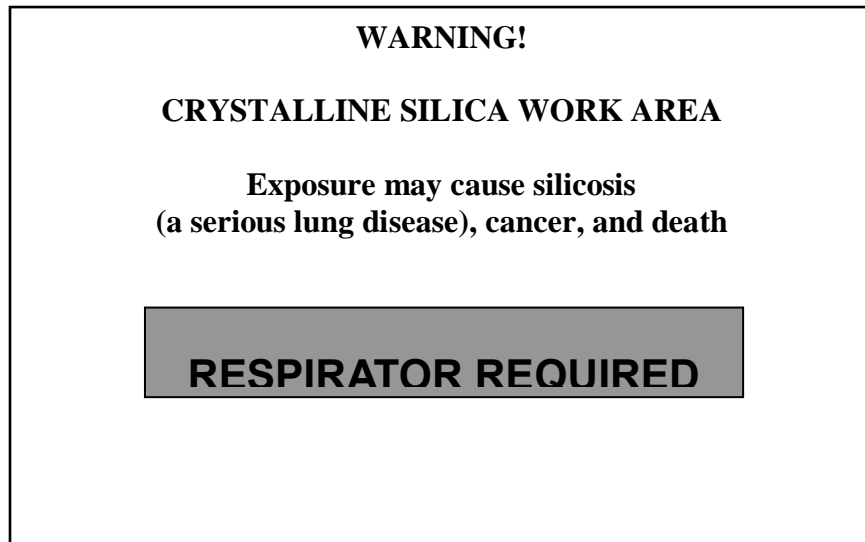
### Medical Monitoring

Medical examinations should be available to all workers who may be exposed to crystalline silica. Such examinations should occur before job placement and at least every 3 years thereafter (NIOSH 1974b). More frequent examinations (for example, annual) may be necessary for workers at risk of acute or accelerated silicosis. Examinations should include at least the following items:

- A medical and occupational history to collect data on worker exposure to crystalline silica and signs and symptoms of respiratory disease
- A chest X-ray classified according to the 1980 International Labor Office (ILO) Classification of Radiographs of the Pneumoconiosis (ILO 1981)
- Pulmonary function testing (spirometry)
- An annual evaluation for tuberculosis (ATS/CDC 1986)

### Warning Signs

Signs should be posted to warn workers about the hazard and specify any protective equipment required (for example, respirators). The sample sign in Figure 2 contains the information needed for a silica work area where respirators are required.



*Figure 2. Sample of warning sign for work areas contaminated with crystalline silica.*

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### **Training**

Workers should receive training (29 CFR 1926.21) that includes the following:

- Information about the potential adverse health effects of silica exposure
- Material safety data sheets for silica, alternative abrasives, or other hazardous materials (29 CFR 1926.59)
- The specific nature of the operation which could result in exposure to abrasive blasting materials.
- Instruction about obeying signs that mark the boundaries of work areas containing crystalline silica
- Information about safe handling, labeling, and storage of toxic materials (30 CFR 56.20012, 56.16004, 57.20012, 77.208)
- Discussion about the importance of engineering controls, personal hygiene, and work practices in reducing crystalline silica exposure
- Instruction about the use and care of appropriate protective equipment (including protective clothing and respiratory protection)

### **Surveillance and Disease Reporting**

NIOSH encourages reporting of all cases of silicosis to the State health departments and to OSHA or MSHA. To enhance the uniformity of reporting, NIOSH has developed reporting guidelines and a surveillance case definition for silicosis. This definition and these guidelines are recommended for surveillance of work-related silicosis by State health departments and regulatory agencies receiving reports of cases from physicians and other health care providers (CDC 1990).