Abrasive Blasting	S.O.P. 7A		Page 1 of 7
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	Approved By:		
STANDARD OPERATING PROCEDURE			

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I. SCOPE AND PURPOSE

A. The purpose of this policy is to provide safe guidelines for the operation and maintenance of abrasive blasting equipment and their related components.
B. This policy applies to personnel involved in abrasive blasting jobs performed by the Company.

II. RELATED PROCEDURES AND RESOURCES

A. S.O.P. 3G, Personal Protective Equipment
B. S.O.P. 3O, Fall Hazard Management
C. S.O.P. 4A, Aerial Work Platforms
D. S.O.P. 5D, Industrial Noise and Hearing Conservation
E. S.O.P. 5F, Respiratory Protection
F. S.O.P. 8A, Asbestos Abatement
G. S.O.P. 8C, Lead Abatement
H. Attachment Form 7A.1a, Abrasive Blasting Checklist
I. Personal Protective Equipment Field Training Module
J. Respiratory Protection Field Training Module
K. Asbestos and Lead Awareness Field Training Module

III. PERSONNEL RESPONSIBILITY

A. Responsibility
   1. Supervisor
      a. Must be aware of potentially hazardous conditions that may arise during the blasting process, such as lead and other heavy metals, asbestos, and flammable atmospheres, prior to starting any blasting job, and must, take measures to protect employees.
      b. Must instruct all blast operators, prior to the start of a job, on the form, fit and functions of the machines to be used.

c. Supervisors must ensure that all employees are trained on related safety topics.
d. Must understand the importance of regularly scheduled maintenance for continued safe operation of blast equipment.
e. Must ensure that all employees comply with this policy and all other related policies.
f. Must complete form 7A.1a,Abrasive Blasting Checklist on at least daily.

2. Employee
   a. Blasters must be familiar with the safe operating functions of blasting equipment to be used on a job.
   b. Blast operators must comply with all company procedures.
   c. Employees must have knowledge of hazards associated with respirable silica.

IV. EQUIPMENT SAFETY

A. Equipment Handling
   1. Follow these guidelines when moving blasting equipment to prevent back strains and crushing injuries:
      a. Use a forklift, crane or other type of lifting device for transporting a blast machine; always use a lifting device when the machine contains abrasive.
      b. Never manually move a blast machine where abrasive has been spilled on hard surfaces or on a wet or slippery surface.
      c. Never attempt to manually move a blast machine containing abrasive.
      d. Always disconnect hoses from machines to avoid interference during movement.
      e. When an empty two-wheeled machine must be manually moved, use two physically capable workers and ensure that the surface is smooth, level and uncluttered by hose, debris or other obstacles that prevent smooth rolling.
      f. On job sites requiring continual manual machine handling, use a four-wheeled blast machine or towing attachment on a two-wheeled machine.

B. Air Compressors
   1. Air compressors must be located in a well-ventilated area. It must be able to obtain large volumes of clean, toxicant-free air. This means the compressor must be placed “upwind from the blasting” operation and out of the range of dust and flying abrasives.
   2. Due to the high pressure that air compressors create, precautions must be taken to prevent unleashing of strong forces that can cause serious bodily injury.
   3. Air compressors must be inspected daily, prior to use, by a competent person. Inspection must include, but are not limited to the following:
      a. Look for broken airlines.
      b. Look for damaged air fittings.

c. Ensure the filters are clean.

4. Never adjust the pressure setting on a compressor above the blast equipment maximum working pressure rating. The maximum working pressure rating is indicated on the manufacturer's metal identification plate.

C. Blast Pot

1. Position blast pots and/or compressors on level ground. Machines operate best when they sit on level surfaces. Oils and other lubricants work more effectively when the parts are not sitting at an unnatural tilt.
   a. If a level site is impossible, the operator should use wheel blocks or construct a temporary base for the equipment.
2. For communication purposes place blast pot between the compressor and the surface to be blasted. This will enable the "pot tender" and operator to make visual contact.
3. All couplings and pipefitting on the blast pot, compressor, and hoses must be airtight.
4. Blast Pots must be inspected daily, prior to use, by a competent person.

D. Hoses and Connectors

1. Wooden ramps must be placed over blasting hoses to protect hoses that stretch across roadways.
2. Couplings must have safety wires in place and be secure as required by federal safety regulations. The operator shall be responsible to ensure that each coupling has safety wires (tie wire) in place. Outside couplings, such as quarter-turn and "crow's foot" type couplings, can be accidentally disconnected when hoses are dragged over rough ground.
3. Whip checks must be installed at bull hose connections.
4. Pot attendant must carefully check for leaks immediately after the hoses have been pressurized and immediately correct them. The pot attendant shall also replace rubber gaskets in hose couplings and tighten pipe fittings. In addition the pot attendant shall ensure there is an ample supply of gaskets available on each jobsite.
5. The operator should hold onto the blast hose until the air pressure from the nozzle drops off to zero.
6. Do not use hose with soft spots. Soft spots pose danger of unexpected blowouts that may cause serious injury if struck by high-velocity abrasive. Cutting out the, worn section and installing couplings to join the good pieces together may repair hoses with one or two soft spots. When repairing hose, ensure that the ends are cut square and smooth, and fit firmly against the coupling shoulders.
7. Never use tape to repair a blown-out hose.
8. Immediately replace a hose if a blowout or leak occurs.
9. Hose ends must come into contact with coupling gaskets to prevent leaks and to maintain static electricity conductivity.
10. When all air is exhausted, the hose shou1d be carefully laid down. Hoses should never be dropped or thrown down because such actions may damage nozzles and the remote control handle assemblies.

E. Nozzles and Remote Controls

1. All blast machines must be equipped with remote control systems to start and stop the blasting process. Remote controls consists of either an Electric Remote Control Switch or an Air Actuated Remote Lever. On the Electric Remote Control the trigger mechanisms is encased to prevent accidental start-up of blasting.
2. Never tape, strap, or tie down an air actuated remote control lever or choke electric remote control switch. If the lever cannot freely open, the safety feature of remote controls is completely circumvented. Without remote controls, when an operator loses control of a pressurized blast hose, it will wildly whip around blowing high-velocity abrasive in every direction. Emergency depressurization of the hose is vital.
3. If there is the slightest delay in reaction time of the handle lever or lever lock to open, check for, dust and dirt build-up around pivot pins before resuming blasting. Also, test the tension on the lever springs, and replace them immediately if they do not respond rapidly.
4. Remote control systems must be well maintained by only designated personnel. Dirty, worn-out parts may interfere with the controls ability to shut-off, culminating in potentially serious injuries to blast operators and bystanders.
5. Increasing depressurization time signals the need to replace the muffler filter element.
6. Substituting component pieces with other manufacturer's parts is not allowed..
7. Inspect blast nozzles for wear and cracks on the inner liner. When a nozzle orifice is worn 1/16" larger than its original size, it should be replaced. Continuing to use a nozzle, beyond the maximum wear point may result in eroding away the liner to the point where abrasive will blow-out through the side of the nozzle.
8. Check nozzles and nozzle holders for deterioration of thread form. Threads on nozzles and their companion holders must not be cross-threaded, worn or distorted.
9. Hoses that are being tied and lifted to blasting operations being conducted above grade, i.e., scaffolds, shall be depressurized to prevent accidental start-up.

F. Operator Signals

1. On the job site, voice communication is often impossible. Even shouts cannot be heard over the noise of compressors and blasting. In addition, the operator's head will be enclosed in the helmet, which blocks out sound and limits vision. For these reasons, an industry wide standard set of hand and sound signals has been developed.
2. Signals may be visual hand movements, flashing light, pulls on a rope or sounds made by banging a hammer or using a horn or electric buzzer.

3. Every operator should become familiar with the signals to be used on the jobsite.

V. ENVIRONMENTAL CONTROLS

A. Electrical Safety
   1. The work area must be inspected for exterior electrical power lines that may endanger operators.
   2. Blasters should use care to avoid directly blasting power lines and insulators.
   3. Indoor work areas should be inspected for electrical wiring, which should be protected from blasting.
      a. Electrical power should be shut off and not restored until the wiring is inspected for damage and determined to be safe.
   4. Electrical wiring used for equipment on the job site should be constructed of heavy-duty casings and equipped with dust-tight, moisture-resistant connectors.
   5. Inspect wiring to ensure that it is in good condition and properly grounded.
   6. Electrical control panels and terminal boxes should be UL-approved, dust tight and moisture-free enclosures.
   7. Use Dust-tight, moisture-free connectors on all electrical fittings.
   8. Keep electrical cords and fittings away from water and other liquids.
   9. For prevention of electrical shock with electrically operated remote controls, transformers must be used to reduce incoming high voltage to no more than 12 to 24 volts at the operator's control handle.

B. Fire Protection
   1. Always consult with client safety representative for specific instructions when the work environment may be flammable.
   2. If possible do not blast in atmospheres that contain flammable fumes.
   3. On applications where flammable gas is present and cannot be avoided, install additional grounding wires on blast machines and nozzles, and use ventilation systems to reduce the fume concentrations to an acceptable level.

C. Walking and Working Surfaces
   1. Take precautions at the work site to eliminate hazardous surface obstacles that may interfere with worker mobility.
   2. Prior to working from scaffolds ensure that a competent person has inspected them.
   3. Check means of access to areas where blasting will occur. Ladders must extend three feet beyond working surface. Portal must be large enough for workers and hoses to pass so not to cause hazards.
   4. Surfaces where platforms, scaffolding, scissor lifts or personnel lifts are used must be level, dry, free of obstructions and holes and in compliance with other conditions recommended by manufacturers and safety

specialists.

5. Spent abrasive and debris must be removed from walking and working surfaces as soon as possible and not allowed accumulate.
6. Spent abrasive and debris removed from surfaces must be disposed of in accordance with the Federal and State regulations on solid and hazardous waste.

D. Enclosures and Containment
   1. Adequate ventilation must be provided for employees working within enclosures. Referred too as "engineering controls" the ventilation equipment needed for job site containment of abrasive blasting must comply with OSHA regulations. These regulations are the same for field-installed enclosures as for stationary blast room facilities (refer to29 CFR 1910.94).
   2. Consult with client representative and safety personnel prior to job start-up to plan for ventilation while working in enclosures.

E. Temperature Extremes
   1. Never operate compressor if hoses are frozen. When winter temperatures drop below freezing, check them for ice prior to pressurizing hoses. The moisture within the hoses may have frozen over night, resulting in loss of control over the guillotine.
   2. Provide adequate drinking water, especially during summer.

VI. PERSONAL PROTECTION EQUIPMENT

A. Fall Protection
   1. Secure blast hoses by tying them to scaffolding or personnel platforms, when working from elevations, to prevent injury from hoses falling on other personnel working below or near blasting area.
   2. Workers must be certified to operate lift equipment, if blasting is to be performed from aerial work platforms.
   3. Harnesses and lanyards must be worn when required as per S.O.P. 3O, Fall Hazard Management.

B. Respiratory Protection
   1. Inhaling dust in a blasting operation is dangerous, and can result in severe lung diseases or death.
   2. Before using any blasting abrasive, check the Material Safety Data Sheets (MSDS) to find out the chemical composition of the abrasive material.
   3. Investigate the chemical and physical composition of the materials that are to be removed from the surface. Some protective coatings consist of lead, cadmium, chromium, titanium or other metals which when pulverized to respirable dust particles can cause harm to respiratory system.
   4. All personnel within an abrasive blasting zone must wear goggles and proper respiratory protection. The blasting zone is an area where any personnel may be subjected to unacceptable levels of respirable dust. The type of protection is dependant on the hazardous dust generated from pulverized abrasive and surface materials.

5. Breathing air quality must comply with S.O.P. 5F, Respiratory Protection.
6. Ventilation systems and dust collectors may be necessary in enclosed conditions.
7. Workers must wear proper approved respirators during clean up and until the work site atmosphere has been found safe to breathe without the need of respirators.
8. Spent abrasive and debris removed from surfaces must be disposed of in accordance with the Federal and State regulations on solid and hazardous waste.
9. Helmet air filters must meet OSHA's breathing air filter criteria with properly functioning pressure regulator, gauge and pressure relief valve.
10. Check air filter cartridge for cleanliness as described in the owner's manual.
11. Carbon monoxide monitor and alarm systems should include field calibration kit.
12. Never attach breathing air hose to plant or stationary fittings.

C. Hearing Protection
1. Noise from abrasive blast nozzles can be loud enough to damage the hearing of blasters and others on the work site. The noise level depends on nozzle size and pressure and noise generated in the surrounding area.
2. In accordance with OSHA regulations, workers must not be exposed to noise levels exceeding 80 decibels as an eight-hour time-weighted average (80 dBA TWA), therefore all blasters shall wear earplugs.
3. Other workers are required to wear earplugs as per S.O.P. 5D, Industrial Noise and Hearing Conservation.
4. Length of exposure to noise, noise level readings, and distance from the noise source are factors used in determining level of hearing protection required.

D. Protective Clothing
1. Blaster must wear heavy-duty gloves.
2. Employees must wear steel toe boots as described in S.O.P. 3G.
3. Helmet lenses should be changed as soon as pitting or frosting takes place.
4. Use only the original respirator manufacturer's replacement lenses. Substituting lenses violates the respirator's NIOSH approval in addition to voiding the respirator manufacturer's warranty.