



# **SAFETY MANUAL**

## **Welcome**

Welcome to Innovative Concrete. Here at Innovative we are committed to creating a safe environment for all employees to work.

My top priority is to do all that is necessary to ensure the safety and good health of every employee here at INNOVATIVE CONCRETE, LLC. Through a combination of regulation compliance and partnering with management in the field, it is my goal to eliminate all hazards while maintaining an efficient project. I am not here to only point out discrepancies, but to fully understand the difficulties faced by each man and woman, for each task, in the workplace and to offer practical solutions to a safer job.

Sincerely,

Aaron Bolli

Innovative Concrete, LLC



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# **SECTION ONE**

## **GENERAL SAFETY & OSHA INFORMATION**

### **INTRODUCTION**

It is the belief of Innovative Concrete, LLC. that our employees are our greatest assets. The primary purpose of this handbook is to clarify the risk management controls that all employees must utilize in order to maintain a safe and efficient workplace.

Strict enforcement and compliance with safety and health rules as set forth within this handbook, will aid in eliminating personal injuries, occupational illnesses, damage to equipment and property, and to protect the general public located within, or near, an INNOVATIVE CONCRETE, LLC Project.

The rules and regulations set forth in this handbook apply to any and all personnel (to include but not limited to, all visitors and delivery truck drivers) within an INNOVATIVE CONCRETE, LLC jobsite. It is every employee's responsibility to see that the rules and regulations are enforced.

The design of this program is such that the requirements herein are based upon existing legislative regulations, but are more stringent. In the event that the risk management controls of this program, for any given activity, are deemed safer, and within legislative requirements, than that of other governing bodies, i.e. OSHA, MSHA or CDOT, then the requirements lined out within this program will supersede. It is our goal to do whatever is necessary to ensure the safety and good health of all employees within the workplace to include going above and beyond the minimum requirements.



## **GENERAL DUTY CLAUSE**

### **29 CFR PART 1926 Sec. 5(a)**

Each employer:

(1) Shall furnish to each of his employees employment and a place for employment, which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees.

(2) Shall comply with occupational safety and health standards as promulgated under this Act.

# **GENERAL SAFETY & HEALTH REGULATIONS**

These underlying general safety and health guidelines are not all inclusive but are intended to give the reader a basic understanding of what is expected of him/her regarding the Company Safety expectations. For specific safety requirements, based on each individual task, please refer to section 2 of this handbook.

*(1) All incidents, to include near miss incidents, must be reported to the INNOVATIVE CONCRETE, LLC Safety Director within 4 hours of occurrence. This is to include all incidents regardless of perceived severity or level of injury and/or damage to property.*

*(2) All employees are required and expected to immediately report all hazards, potential hazards, unsafe or unhealthy working conditions whether real or perceived to their supervisors.*

*(3) At no time is an employee of INNOVATIVE CONCRETE, LLC to undertake a task, operate a tool, piece of equipment or vehicle without specific and adequate training. Particular attention will be afforded to all new employees of INNOVATIVE CONCRETE, LLC regardless of supposed experience level.*

*(4) All employees of INNOVATIVE CONCRETE, LLC must familiarize themselves with all potential hazards related to chemicals, biological agents or any hazardous material they may come into contact with on a given work area by use of the MSDS located on the project jobsites and the corporate office.*



- (5) All employees must familiarize themselves with the site specific emergency and evacuation plan in the unlikely event of a major incident or fire.*
- (6) All employees of INNOVATIVE CONCRETE, LLC must know how to do the task in a safe manner, know the related hazards and how to protect one's self, or ask the advice of their respective supervisor if they are unsure.*
- (7) It is essential that all employees actively participate in all safety training meetings and to aggressively support and uphold the requirements within the Company Safety Program. Henceforth it is required that all employees make every effort necessary to familiarize themselves with the requirements set forth within this handbook.*
- (8) At no time is any employee authorized to place speed or efficiency above safety. Safety is, at all times, our highest priority.*
- (9) All warning signs must be understood and heeded by each employee at all times on or off INNOVATIVE CONCRETE, LLC property or an INNOVATIVE CONCRETE, LLC project jobsite.*
- (10) Horseplay, careless and/or reckless actions will NOT be tolerated on an INNOVATIVE CONCRETE, LLC Project jobsite. Immediate disciplinary action will be taken.*
- (11) Firearms, explosives (not in conjunction with blasting or other demolition activities), knives not necessary as a tool, nonprescription drugs and alcohol are strictly forbidden on all INNOVATIVE CONCRETE, LLC property, within INNOVATIVE CONCRETE, LLC vehicles and on an INNOVATIVE CONCRETE, LLC project jobsite.*
- (12) All employees must, at all times, wear their Personal Protective Equipment (PPE) as required by management or dictated by conditions within the field, while conducting work on INNOVATIVE CONCRETE, LLC property or an INNOVATIVE CONCRETE, LLC project jobsite.*
- (13) It is expected of every employee to maintain a clean workspace and to keep all work areas free of unnecessary debris.*
- (14) Safety is the responsibility of all personnel. Employees of INNOVATIVE CONCRETE, LLC are required to not only be mindful of their own safety and health, but also that of their fellow employees.***

*(15) It is the responsibility of all levels of management to ensure that all employees receive specific and adequate training and that these basic guidelines are strictly adhered to.*

*(16) Using common sense is the simplest and best way to prevent accidents and injuries.*

## **OSHA RIGHTS & RESPONSIBILITIES FOR ALL EMPLOYEES**

- You have the right to notify your employer or OSHA about workplace hazards. You may ask OSHA to keep your name confidential.
- You have the right to request an OSHA inspection if you believe that there are unsafe and unhealthful conditions in your workplace. You or your representative may participate in that inspection.
- You can file a complaint with OSHA within 30 days of retaliation or discrimination by your employer for making safety and health complaints or for exercising your rights under the OSH Act.
- You have the right to see OSHA citations issued to your employer. Your employer must post the citations at or near the place of the alleged violations.
- Your employer must correct workplace hazards by the date indicated on the citation and must certify that these hazards have been reduced or eliminated.
- You have the right to copies of your medical records and records of your exposures to toxic and harmful substances or conditions.
- Your employer must post this notice in your workplace.
- You must comply with all occupational safety and health standards issued under the OSHA Act that apply to your own actions and conduct on the job.

# **SECTION TWO**

## **Construction Operations Safety Requirements**

### **PROTECTIVE PERSONAL EQUIPMENT (PPE)**

While OSHA's Personal Protective Equipment standard does not explicitly require a written PPE program, Innovative Concrete, LLC has developed this section to establish our PPE safety plan and specify the protective equipment necessary to protect our employees in instances where the work-related hazards of their jobs cannot be eliminated. Our company believes it is our obligation to provide a hazard free environment to our employees. Any employee encountering hazardous conditions must be protected against the potential hazards. The purpose of protective clothing and equipment (PPE) is to shield or isolate individuals from chemical, physical, biological, or other hazards that may be present in the workplace.

A recent ruling from OSHA states that employers shall provide the required PPE to all employees that may encounter the exposure that warrants the use of PPE. INNOVATIVE CONCRETE, LLC will replace items if it is damaged or excessively worn through the course of normal wear. If the item is lost or damaged intentionally or due to negligence, INNOVATIVE CONCRETE, LLC may require that the employee reimburse the Company for the cost of replacement.

Upon hiring, with the exception of Office personnel, all INNOVATIVE CONCRETE, LLC personnel will receive the following PPE:

- (1) Hard Hat- if determined to be required
- (2) Eye Protection
- (3) Reflective Vest- if determined to be required

#### **General Requirements for PPE**

- It is important that all PPE be kept clean and properly maintained by the employee to whom it is assigned. Cleaning is particularly important for eye and face protection where dirty or fogged lenses could impair vision.





- PPE is to be inspected, cleaned, and maintained by employees at regular intervals as part of their normal job duties so that the PPE provides the requisite protection.
- Personnel working in designated work areas and/or job assignments are required to wear ANSI-approved goggles/face shields to help prevent eye and face injuries, including those resulting from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, or light radiation.
- Personnel working in designated work areas and/or job assignments are required to wear safety shoes to help prevent foot injuries, ankle injuries, slips, and falls. Although INNOVATIVE CONCRETE, LLC will not provide foot wear for employees, it is required that safe, and approved footwear be worn at all times. **Rubber boots will be provided to personnel working in wet concrete.**
- Personnel working in designated work areas and/or assignments are required to wear gloves to help prevent hand injuries, from cuts, burns, cold, and chemical exposures.
- Personnel working in designated work areas and/or job assignments are required to wear ANSI approved hard hats to help prevent head injuries, including those resulting from falling object, bumping the head against a fixed object, or electrical shock.
- Personnel working in designated work areas and/or job assignments are required to wear ANSI approved, Class 2 reflective vests.
- Additional PPE as determined to be required for specific work areas and/or job assignments will be addressed on a per job basis.

## HOUSEKEEPING

Housekeeping, although often considered more of a chore than a safety precaution, is one of the easiest ways to eliminate many hazards on a job-site. Keeping a job-site free of waste and debris along with maintaining materials in an organized manner can prevent slips, trips and falls, unsanitary conditions and many other potentially hazardous conditions. The purpose of this section is to outline some basic requirements for keeping a job-site clean, organized and operating smoothly.

## **General Requirements for Housekeeping**

- Good housekeeping must be maintained at all times in all jobsite work areas.
- Common paths of travel should be established and kept free of an accumulation of materials.
- Keep access to aisles, exits, ladders, stairways, scaffolding, and emergency equipment free from any obstruction.
- Specific areas will be established for the storage of materials, waste and construction debris (i.e. spoil piles).
- Tools, equipment, materials, and supplies shall be stored in an orderly manner.
- As work progresses, scrap and non-essential materials shall be removed from the job-site as quickly as possible.
- Waste shall be disposed of in appropriate waste containers and those containers shall be emptied at regular intervals, contingent upon the size and scope of a project. It is at the Site Superintendents discretion to determine the proper intervals of disposing of waste materials.
- Toilet facilities must be kept clean and sanitary at all times. There is to be one toilet facility for every fifteen (15) people on-site at any given time.

## **HAND AND POWER TOOLS**

In the construction industry, the best tools of any worker are their hands but all workers use many different types of hand tools and power tools. Just as workers wear gloves to protect their hands, all personnel are required to maintain all tools in a safe and working condition. Tools, when used improperly can themselves become dangerous. The purpose of this section is to outline some basic requirements for personnel to protect themselves from exposure to hazards associated with the improper use of tools.



## **General Requirements for Hand & Power Tools**

- The most common mistake that workers make with tools, is to not use the correct tool for the task. Common sense dictates that one does not hammer a nail into a piece of wood with a screwdriver.

### **USE THE RIGHT TOOL FOR THE JOB!**

- Personnel are not authorized to use tools for which they are not trained, or have shown proficient knowledge with.
- All tools shall be inspected prior to use and all damaged tools shall be tagged and removed from service.
- Maintain all tools in a clean and serviceable manner.
- Always use the proper PPE when using tools, a hammer can easily break the head of a nail and the projectile may impact the user's eye or head.
- Do not carry or lower power tools by the cord or hose.
- Portable power tools must be plugged into a GFCI protected energy source at all times to prevent electrical shock.
- All portable power tools must have a three-wire grounded plug and be double insulated. If a tool is found not to meet this requirement, it is not to be used.
- Disconnect all power tools from their energy source when not in use, before servicing or cleaning them, and when changing out accessories (i.e. bits, blades or cutters).
- Safety guards on tools must remain installed while the tools is in use and immediately replaced when damaged, or after service or cleaning of the tool.
- If a cordless tool is connected to a charging device, the power source must conform to the manufacturer's requirements.
- When using a knife or bladed tool, stroke or cut away from the body with smooth, consistent motions. Be careful not to use excessive force that could damage the blade or cause the user to lose control of the tool.



## **PROPER LIFTING PROCEDURES**

In the construction industry, most personnel are required to lift, carry and lower heavy items. Many times, the load is too heavy or awkward for one individual, but that individual may not realize it until it is too late and their back becomes sore due to strained muscles and torn ligaments.

Most, if not all of the injuries caused by lifting heavy or awkward loads can be avoided, if not eliminated completely by implementing simple, but effective lifting techniques.

The purpose of this section is to outline the techniques to be employed by all INNOVATIVE CONCRETE, LLC personnel when lifting heavy and/or awkward loads.

### **General Requirements for Proper Lifting Procedures**

- Lift everything twice, first lift the load mentally then plan every step carefully before you do it physically.
- Size up the load to determine the weight and size.
- Ask for assistance from one or more other workers if the load is too heavy or too awkward.
- If the load is too large and heavy, arrange for mechanical help such as pushcart, hand truck, wheelbarrow, forklift or crane.
- Look for obstacles that might cause you to fall, trip, or slip, also check for adequate lighting, traffic (people and vehicles), and changes in elevation.
- Look for ways to reduce the number of times you have to lift and do not lift and twist in the same motion.
- Keep your back straight; tuck your chin and place your feet apart, one ahead of the other.
- Grip load with palm and fingers, not fingers alone, bring load close to your body by tucking elbows in and then lift with your legs and arms, not your back.
- Always maintain a clear view over the load as you lift, carry and lower.



## **CONCRETE OPERATIONS**

Concrete is the bread and butter of this company and comes with its own set of hazards and risks. As with any discipline within the construction industry, most or the hazards can be mitigated or eliminated by following the requirements set forth in this section.

The purpose of this section is to outline the safety requirements designated for the various concrete operations that INNOVATIVE CONCRETE, LLC personnel may be involved with.

### **General Requirements for Concrete & Masonry Operations**

- Re-bar caps must be used when personnel are working above any protruding reinforcing steel to eliminate the hazard of impalement.
- All employees must wear the necessary protective clothing to ensure that wet concrete never comes into contact with the employees' skin and eyes. When working in wet concrete, employees must wear rubber boots.
- Employees are not permitted to ride in concrete buckets or work under concrete buckets while the buckets are being elevated or lowered into position. Elevated concrete buckets are routed so that no employee or the fewest employees possible are exposed to the hazards associated with falling concrete buckets.
- Employees are not permitted to apply a cement, sand, and water mixture through a pneumatic hose unless they are wearing protective head and face equipment.
- Bulk storage bins, containers, or silos must have conical or tapered bottoms with mechanical or pneumatic means of starting the flow of material.
- Concrete mixers equipped with 1 yard or larger loading skips must be equipped with a mechanical device to clear the skip of material and have guardrails installed on each side of the skip.
- Handles on bull floats that are used where they may contact energized electrical conductors must be constructed of nonconductive material or insulated with a nonconductive sheath whose electrical and mechanical characteristics provide equivalent protection.



- Powered and rotating concrete troweling machines that are manually guided must be equipped with a control switch that automatically shuts off the power when the operator removes his/her hands from the equipment handles.
- Concrete pumping systems using discharge pipes must be equipped with pipe supports designed for 100% overload.
- Concrete buckets equipped with hydraulic or pneumatically operated gates must have positive safety latches or similar safety devices installed to prevent premature or accidental dumping. The buckets must be designed to prevent material from accumulating on the top and sides of the bucket.
- Sections of concrete conveyances must be secured with wire rope (or equivalent material) in addition to the regular couplings or connections.

### **General Requirements for preventing silica exposure while cutting, grinding or jackhammering**

- All employees are required to use proper respirator and utilize either wet cutting or vacuum dust collection systems in order to prevent silica exposure.

## **TRENCHING & EXCAVATIONS**

Along with concrete operations, trenching & excavations are two operations that Innovative Concrete, LLC comes in contact with on an almost daily basis. There are many hazards associated with these activities and they account for nearly one-fifth of work-related injuries through-out the construction industry. Due to the nature of these operations and the intrinsic hazards therein, it is imperative that these requirements become second nature to all INNOVATIVE CONCRETE, LLC personnel. The purpose of this section is to outline the requirements to maintain a safe work environment while working near trenching and excavation operations.

### **General Requirements for Trenching & Excavations**

- Excavations 4 ft. or more in depth must be shored or sloped in a approved manner unless they are made entirely in stable rock.
- Sides of trenches above the 4ft level may be sloped in lieu of shoring, but the slope may be no steeper than a 1H:1V slope in type A soil and type B soils, and 1-1/2H:1V slope in type C soil.

- Excavated or other material must not be stockpiled closer than 2 ft. from the edge of any excavation. Surface encumbrances that create a hazard must be moved or supported as necessary.
- Protection should be provided at the edge or face of excavation to eliminate the possibility of loose rock or soil that could fall or roll into the excavation. Some of the processes that may be used are to scale to excavation to remove excess material or debris, place barricades at the edge, or other equivalent means of protection.
- No employee is permitted under loads handled by lifting or digging equipment. When mobile equipment operates adjacent to or approaches the edge of an excavation, a warning system such as barricades, hand or mechanical signals must be used.
- A competent person must monitor the use of water control and removal equipment.
- Sloping or benching of excavations greater than 20 ft. deep must be approved by a registered professional engineer. The approved design must be kept on site.
- When manufactured support systems are used, the manufacturer's written specifications, recommendations, limitations must be maintained at the jobsite.
- A designated competent person must monitor the construction and maintenance of the recommended protective systems and their use in excavations.
- Safe access and egress should be provided to all excavations and trenches.
- A stairway, ladder, or ramp should be provided for egress from all trenches over 4 ft. in depth.
- Means of egress should be provided so that employees do not have to travel more than 25 ft. laterally to exit the excavation.
- When ladders are used as a means of egress, they should extend 3 ft. above the top of the excavation and be secured at the top.
- All ladders, and/or means of access and egress, must be located within the confines of the shoring or shielding.

*Underground utilities and other obstructions present a very real danger and every effort must be taken to determine that excavation operations are performed safely. Therefore, where excavations are required to be performed when existing utilities*



*or structures may be present, the following probing and exploratory trenching procedures must be followed.*

- The locations of any underground installations such as sewer lines, electric lines, etc., shall be determined before excavation. Utility companies shall be notified of the proposed work to establish the locations of utility installations before the start of an excavation. All such installations must be appropriately identified for the safety of persons working nearby.
- All excavations are performed with extreme caution to prevent injury or damage to underground piping, electrical wiring, etc.
- If there are known underground obstacles, a pre-excavation meeting will be conducted to define appropriate protective measures.
- When excavations occur within 2 ft., vertically or horizontally, of a active direct buried electrical or communication cable, exploratory hand trenching must be done to authenticate the actual location of the cable.
- If any utilities or underground installations are close to, or disturbed by excavation, then each should be protected, supported, or removed prior to the start of the excavation.
- During excavations with a backhoe, there must be an observer at all times to watch the backhoe bucket. This observer should be stationed adjacent to the excavation to avoid the operations of the hoe. The observer is responsible for visually identifying any obstruction while the bucket is excavating, and alerting the operator immediately if any obstructions are observed.
- If the observer leaves the excavation area, excavation efforts must be stopped immediately until the observer returns.
- During hand excavations, if a person's head is below the top of the excavation or if the trench is greater than 4 ft deep, adequate shoring or sloping is required.





## **WORKING AT HEIGHTS**

Over 35% of all occupational injuries within the construction industry occur when personnel fall from heights. Most of those injuries could have been prevented if the use of a fall arrest system had been in use.

The purpose of this section is to outline the basic requirements for INNOVATIVE CONCRETE, LLC personnel when they are required to work at heights.

### **General Safety Requirements for Working At Heights**

- It is the policy of Innovative Concrete, LLC that all personnel working at a height above six (6) feet from the next lower elevation shall utilize one of many authorized fall arrest systems. These systems are:
- Harness & lanyard attached to anchor point rated at 5000 pounds per person using that anchor point.
- An approved guard rail system with a deflection ratio of no more than two (2) inches deflection per ten (10) linear feet of rail. The rail may consist of rigid metal or steel cable.
- When personnel are working on a large raised surface with no more than a pitch ratio of 4 to 12, they are not required to wear a harness or lanyard if they maintain a minimum distance of 6 feet from the edge. At any time should the job require personnel to work closer to the edge than the allotted distance, a fall arrest system must be in use.

### **Roof Tops**

- Personnel conducting work on a roof top with a pitch ratio of more than 4 to 12 are required to utilize the approved fall arrest system at all times.
- Personnel conducting work on a rooftop with a pitch ratio less than 4 to 12 or flat roof are not required to use a fall arrest system but must maintain a minimum distance of 6 feet from all edges.
- Personnel conducting work on a rooftop of any pitch may use a guardrail as specified in the previous section and are not required to use any other fall arrest system.

- Personnel traversing from an aerial lift or other elevator system to a roof top must ensure that the approved fall arrest system is employed at all times prior to stepping on to the roof top, thus ensuring 100% fall protection at all times.

## **Aerial Lifts**

- Only trained and authorized personnel are permitted to operate aerial lifts.
- When conducting work from the basket of an aerial lift, personnel are required to wear a full body harness and attach their lanyard to provided anchor points in the basket at all times.
- Personnel must remain inside the basket at all times and must never climb on the rails to gain access to an elevated working platform.
- Personnel must remain on the floor of the basket at all times and are never permitted to use the rail, planks or ladders to extend the reach of the basket.
- Aerial lifts shall be positioned on flat, level surfaces and the brakes must be set prior to extending the basket. If outriggers are available, they must be employed as well. Wheel chocks are only required if the aerial lift is position on a grade of more the 5 degrees. • At no time are personnel permitted to conduct work in an elevated aerial lift basket when wind speed reaches twenty (20) miles per hour or more.
- At no time is aerial lift to be used for hoisting materials, unless it is small enough to fit easily in the basket itself and does not exceed the weight limit of the lift as designated by the manufacturer.

## **Scaffolding**

- At no time are any personnel authorized to access scaffolding until it has been inspected by an authorized Competent Person for correct erection and serviceability.
- Only access scaffolding by approved means. Scaffold cross bracing is, at no time, an approved means of access or egress.
- All personnel must remain inside the scaffold guardrail system at all times. Leaning over or around the rail system is not permitted. Climbing on top of the rail system is not permitted.

- If using a suspended scaffold system, all personnel are required to use a personal fall arrest system and it must be attached to an approved anchor point not within the scaffolding system. If the scaffold fails and falls, INNOVATIVE CONCRETE, LLC personnel are not permitted to fall with it.
- At no time are personnel permitted to work on a scaffolding system if there is ice, snow or other slippery substance on the working surfaces.
- At no time are personnel permitted to work on a scaffolding system if wind speed reaches twenty (20) miles per hour or more.

## **Ladders**

- A ladder is generally required when a sheer vertical break in elevation of thirty six (36) inches or more exists.
- Ladders must be inspected by an authorized Competent Person each day prior to use. All damaged ladders must be immediately removed from service.
- Ladders must be used only for their intended purpose and loads must never exceed the manufacturers weight limits.
- Only one person is authorized on a ladder at any given time.
- The user must face the ladder while in use and maintain three points of contact at all times.
- At no time are personnel permitted to use both their hands to carry anything up or down a ladder with them. Materials, tools or equipment must be raised or lowered by other approved means if necessary.
- Portable ladders must extend three (3) feet above the landing surface.
- Straight and extension ladders must be positioned at such an angle that the distance between the ladder base to the wall is one fourth the length of the ladder.
- Straight or extension ladders must be tied off or secured to the structure in order to prevent displacement.
- Step ladders must only be used in the open and locked position.



## **HIGHWAY AND ROADWAY WORK ZONES**

There will be a clear demonstration of commitment by Innovative Concrete, LLC management regarding the necessary resources required for the implementation of best practices, accountability, training, and necessary personal protective equipment. It is the responsibility of management to ensure that an effective traffic control plan (TCP) is provided and used whenever vehicle traffic poses a hazard to our employees.

The purpose of the Traffic Control and Work Zone Safety Program is to develop a program that will provide the maximum safety controls for Innovative Concrete, LLC, employees when working in and around live traffic. The program is also intended to ensure the safety of the traveling public. It is also the goal of this program at all times to prevent accidents, minimize and prevent damage to private and public property, minimize claims and litigation, expedite traffic flow and reduce confusion, and insure conformity with all Federal, State, and municipal regulations.

### **General Safety Requirements for Highway Work Zones**

- All certified flagging personnel must complete a flagger certification program before assuming flagging responsibilities for INNOVATIVE CONCRETE, LLC. The classroom training must meet or exceed standards required by UDOT. A successful test score of 80% must be achieved before any employee is issued a flagger certification card. All training and instruction will be provided by a third party.
- It is the policy of Innovative Concrete, LLC, that all Traffic Control Supervisor's or designated Competent Persons ensure that the appropriate personal protective equipment (PPE) have been issued to employees and is being worn by employees.

All of Innovative Concrete employees will be required to wear:

*(1) High visibility Safety vests and apparel. ANSI/SEA 107-1999, Class II, or Class III.*

*(2) Consideration will be made concerning apparel, so that workers do not blend into the background.*

*(3) Inspection of high-visibility clothing to ensure that color has not faded and reflectivity has not been lost.*

*(4) Reflective material may be used on hard hats.*

*(5) Lighting stations or portable hand held lighting units will be used when deemed necessary during nighttime operations as described by the UDOT's specs.*

- Traffic control devices are defined as a sign, signal, markings, barricade, or other devices placed on or adjacent to a street or highway to warn, or guide traffic. Traffic control devices assist motorist with guidance to safely travel any public road. To be effective, a traffic control device should meet five basic requirements:

*(1) Fulfill a need.*

*(2) Command attention.*

*(3) Convey a simple message.*

*(4) Command respect of the road user, and*

*(5) Give adequate time for response.*

- It shall also be noted that all Innovative Concrete traffic control equipment or devices will conform to the NCHRP 350 standards and Best Practices for Cone Setting Operations.

- All Impact Attenuator units will be equipped with a minimum 4x8 foot type C, 25 light Arrow board unit.

- All coning operations during mobile traffic work (short duration) i.e., skip-line, edge-line and tapers will be set with the assistance of an impact attenuator vehicle on high-speed roadways.

- Coning operations will be accomplished from side constructed work platforms. These work platforms will be equipped with handholds and front chain guards.

- Traffic cones used by Innovative Concrete, LLC, will be predominately orange, or fluorescent orange in color and made of material that can be struck without damaging vehicles on impact. They will be used to channel traffic and protect the

traveling public from wet paint material. Consideration will be made to ensure that cones will not be blown over by wind or the traveling motorist. Cones will be doubled when necessary. Also the following requirements will be followed by Innovative Concrete traffic control plans:

*(1) Traffic cones will be maintained in good working condition. Any traffic cone that is found to be defective will be removed from service (i.e.: discolored, large holes or tears, or cannot stand alone).*

*(2) Cones 18 inches in height will only be used in low-volume, low speed traffic control daylight hours.*

*(3) Cones 36 inches and collared will be used in high volume, and high speed traffic control.*

*(4) Collars affixed to 36 inch cones will be at minimum 4 and 6 inches of high reflective material.*

- Devices placed adjacent to the traveled portion of roadway will be spaced so it is apparent a portion of highway is closed to traffic. Consideration to the type and speed of roadway will determine proper cone spacing. Gaps in traffic control devices should be avoided to incorrectly indicate that they have passed the work area.

- Employees will not be allowed to pursue cones that have been dislodged from their original position, exposing them to high vehicle traffic. These cones will be picked up at a later time when traffic and safety conditions allow. Cones that are found in grass median areas will be retrieved only if it does not interfere with the motoring public or endanger employee safety.

- A work area traffic control zone is defined as the portion of street or highway in which all of the traffic control devices are used to warn, regulate or guide motorists and pedestrians past a roadway construction or maintenance operation.

- Sign placement (spacing) will be according to MUTCD minimum standards. If State or municipal standards meet or exceed the MUTCD standards, the more stringent standard will apply.

- All highway or street traffic control work zones will have an advance warning area, a transition area, and a work area. It will also include termination area if possible. The main traffic control devices will include cones, and diamond shaped warning signs (black on orange design) as specified for construction and



maintenance operations. Signage may or may not be required to be of reflective material. The minimum size of INNOVATIVE CONCRETE, LLC signage will be 48 x 48 inch.

- Consideration will be made concerning the placement of signs used in the advance warning area due to various situations. These could include driveways, side streets, site obstructions, vegetation, or parked vehicles.
- Signs will face and be visible to oncoming traffic and be a minimum of 2 feet from the bottom of the sign to the pavement of the roadway. If necessary, signs may require a greater height of 2 feet due to location of placement.
- All signs shall be installed prior to commencement of any work and removed immediately when they are no longer needed.

## **WORKING IN CONFINED SPACES**

The purpose of this section is to outline and define the required measures to be implemented for the protection of authorized INNOVATIVE CONCRETE, LLC personnel that may enter a confined space and may be exposed to hazardous atmospheres, engulfment or entrapment, conditions that may become hazardous due to the nature of a confined space and any other safety or health hazards associated with a given confined space.

### **General Safety Requirements for Working in Confined Spaces**

- An authorized representative of INNOVATIVE CONCRETE, LLC will initially assess all confined spaces on the job-site that personnel would be required to enter in the performance of their duties. Using criteria established by 29 CFR 1910.146, it is the intention of INNOVATIVE CONCRETE, LLC to classify all confined spaces and to determine, on the outset of a project, if a confined space will require a permit.
- Once a space has been designated as a “Permit-Required Confined Space”, all personnel are prohibited from entry until authorized. All personnel working on an INNOVATIVE CONCRETE, LLC Project Job-site that contains a Permit-Required Confined Space will be made aware of the existence, location and known





hazards associated with that space prior to entry onto the job-site. All efforts will be made to prevent unauthorized entry, which may include signage, barricades, security personnel, etc.

- If it becomes necessary for any personnel to enter a designated Permit-Required Confined Space located on an INNOVATIVE CONCRETE, LLC Project Jobsite, the following procedures must be followed.

*(1) The Job-site Superintendent must designate an Entry Supervisor and ensure that the INNOVATIVE CONCRETE, LLC Safety Director has been contacted.*

*(2) The Entry Supervisor must designate all Entry Attendant(s), Entrants and safety personnel. He must also contact the local Fire Department and inform them of the entry.*

*(3) The Entry Supervisor, with concurrence from the Entry Attendant(s), must complete the approved permit, to include all evaluations and testing, and designate the required equipment for the entry.*

*(4) The Entry Supervisor, Entry Attendant(s), Entrants and safety personnel will at this time, conduct an equipment serviceability check as well as a safety briefing, to include rescue & retrieval procedures as designated by the Site Specific Safety Plan, or the confined space permit.*

*(5) Once the Entry Attendant(s) are satisfied that all equipment is serviceable and being used, all entry procedures have been followed, and required hazard control methods are in place as specified by the permit, the authorized Entrant(s) are now permitted to enter the space and conduct the necessary tasks.*

*(6) The Entry Attendant(s) must maintain constant communication with all Entrants either via sight, radio or natural verbal communication. All Entrant(s) are required to update the Entry Attendant as to the conditions of the space at regular intervals. The length of this interval is at the discretion of the Entry Supervisor.*

*(7) If at any time a previously unknown hazard becomes apparent, a failure in equipment occurs or there is a change in atmospheric conditions, all personnel must immediately evacuate the space and the permit is to be cancelled until further evaluation of the space can be conducted and a new permit issued.*

*(8) Upon completion of all tasks within a Permit-Required Confined Space, all Entrant(s) must immediately exit the space and place their initials on the permit in*



*the proper place. Once all personnel are accounted for, the Entry Attendant and Entry Supervisor must make a final visual inspection of the space from outside of the entrance and make a final verbal call for any personnel that may be inside the space to immediately exit. When both the Entry Supervisor and Entry Attendant(s) are satisfied that there are no remaining personnel within the space, the permit is to be cancelled and the space is to be closed.*

*(9) The original permit is to be kept in the corporate office. A copy of the permit is to be kept on the Job-site until the completion of the project.*

## **BASIC ELECTRICAL SAFETY**

Although most people are not electricians, we all use electrical devices several times per day. Improper use, and the failure to understand how electricity works and what it is capable of, poses a serious hazard to all personnel.

The purpose of this section is to illustrate the capabilities of electricity and methods on how to mitigate the risks and hazards of electricity.

### **General Requirements for Basic Electrical Safety**

- Only authorized personnel are permitted to enter high voltage areas.
- At no time are INNOVATIVE CONCRETE, LLC personnel permitted to tamper with electrical wiring unless qualified, and authorized, to do so.
- All electrical wiring and equipment must be considered energized unless lockout/tagout procedures are implemented.
- Inspect all power cords, power tools and electrical equipment to ensure serviceability. Any damaged item must be immediately removed from service.
- All power cords must be equipped with third-wire grounding, be covered or elevated, or otherwise protected from damage when passing through work areas, be protected from pinch points if routed through doorways and never be fastened with staples, hung from nails, or suspended from wire.
- Maintain safe clearance distances between overhead power lines and any electrical conducting material unless the lines have been de-energized, grounded and lockout/tagout procedures have been implemented. Maintain at least fifteen (15) feet from energized power lines for voltages of 50kV or less and an additional ½ inch for every kV over 50kV.



## **HOT WORK**

The purpose of this section is to ensure safe practices when conducting welding, cutting or brazing operations, or more commonly referred to as “Hot Work”. This section applies to all INNOVATIVE CONCRETE, LLC personnel, sub-contractors on all Project Job-Sites.

### **General Safety Requirements for Hot Work**

- Welding, cutting and/or brazing (hot work) will only be performed by certified and authorized personnel only.
- All tools, equipment and required PPE must be inspected for serviceability prior to the start of any hot work operation. All damaged items must not be used and immediately removed from service and replaced.
- All fire prevention and control measures must be employed prior to the start of all hot work operations.
- A hot work permit must be completed and issued prior to the start of all hot work operations. This permit is to be kept on-site at all times for the duration of the operation.
- All lead lines, hoses and power cords traversing passageways must be kept at or above eight (8) feet and secured with plastic zip ties or other approved non-conductive material.
- All hot work must be conducted in well-ventilated areas. Outside areas, areas that contain blowers and/or heavy fans are permissible. If adequate ventilation is not possible, the personnel working within the area must wear the appropriate respiratory protection.

## HOT temperature Stress table

Symptoms & Treatment of Heat Stress				
	Heat Syncope	Heat Rash	Heat Cramps	Heat Exhaustion
Signs and Symptoms	Sluggishness or fainting while standing erect or immobile in heat.	Tiny, raised blister-like vesicles on affected areas, along with prickling sensations during heat exposure.	Painful spasms in muscles.	Fatigue, nausea, headache, skin pale, clammy and moist, rapid pulse, oral temperature normal or low.
Treatment	Remove to cooler area with shade; increase fluid intake; recovery is usually immediate, but observe for 1 hour in case symptoms return or change	Use mild drying lotions and powders, and keep skin clean for drying skin and preventing infection	Remove person to cooler area with shade. Rest lying down. Increase fluid intake. Keep person lying down for 3 hrs and observe symptoms after that.	Remove person to cooler area with shade. Rest person lying down and raise legs above head. Increase fluid intake and contact the Safety Director for further instruction

## COLD temperature Stress table

Symptoms & Treatment of Cold Stress		
	Immersion Foot	Frostbite
Signs & Symptoms	Feet discolored and painful to the touch; severe swelling and possible infection.	Blanched, white, waxy skin, but tissue is resilient; tissue cold and may have large white blisters
Treatment	Wrap feet in warm blanket and seek medical treatment immediately.	Move person to warm place. Warm affected area in warm water (NOT HOT) and have person drink warm water (NOT COFFEE OR ALCOHOL). Do not break blisters and immediately seek medical treatment.

# **Section Three**

## **Supplementary Safety Program including Corrective Action Items**

### **METHODS OF HAZARD IDENTIFICATION**

Hazards in the workplace can be identified in a number of ways. The following methods of hazard identification are hereby implemented into the safety program of Innovative Concrete, LLC.

#### **Workplace Inspections**

Workplace inspections provide a system of recognizing and correcting hazardous conditions. It is the duty of all employees at Innovative Concrete to perform a workplace inspection prior to the start of the workday, and throughout the day as work progresses and hazards change. The following action items will assist in this process.

#### **Job Safety Analysis**

A Job Safety Analysis/Activity Hazard Analysis (JSA/AHA), is a procedure that identifies hazards associated with each step of a job and develops solutions for each hazard that will either eliminate or control the hazard. A JSA/AHA requires the participation of all personnel in a work group. Before commencing the JSA/JSA, it is important to define the scope of the job, including needed personnel, tools, equipment, material, and work area.

A Job Safety Analysis will be performed by the Superintendent or Foreman at the beginning of every new project. A Job Safety Analysis will assist in identifying particular hazards that may occur during performance of a specific job or task. The findings of the superintendent or Foreman will then be communicated to the employees who will be participating on the project during the initial safety meeting held on-site for that particular project. Completed JSAs/AHAs will be submitted to the Safety Manager for review and acceptance prior to the start of work activities.



## **Safety Task Assignment**

STA is the process of identifying and communicating to each employee the task steps to be completed, the hazards and risks associated with the task, and the safe work methods that are to be applied to complete the task in a safe and healthy manner.

Before starting a job task, it is the duty of the Superintendent or Foreman to complete the Safety Task Assignment sheet and communicate to the employees working on the task the findings from the assessment.

## **Experience**

As always, the collective experience of those personnel on the job can help to identify hazards. Again, it is the responsibility of every employee at Innovative Concrete, LLC to create and maintain a safe working environment. If you identify a hazard, it is your express duty to communicate that hazard to the Superintendent or Foreman, and your fellow employees.

## **Statistical Analysis**

Statistical analysis can also help determine the types of hazards most likely to result in an injury. These records are kept at the office and will be communicated as necessary through proper safety meetings.

## **Systems Approach to Managing Hazards and Risks**

It is the policy of Innovative Concrete, LLC that the following process will be implemented by all employees and supervisors to allow for a systematic approach to managing hazards and risks.

**Identification**– The first step in the hazards/risk management process is to identify the hazards in the workplace.

**Assessment**– Once the hazards have been identified, it is necessary to assess what risks they pose to personnel in the workplace. In this way, a measure of the risk can be established and a determination of priority for corrective action can be made.

The level of risk is dependent on the exposure to the risk and the probability and consequences of an event occurring.



**Control**– Control is the process of determining and implementing appropriate measures to control risk. Legislation and codes of practice require that control of factors assessed as posing increased risk be implemented ALARP.

**Evaluation**– Evaluation means checking to see whether the introduced changes reduce the risk previously assessed. It may involve repeating the process of hazard identification, risk assessment, and risk control to confirm that HSE risks from a particular hazard have been controlled as far as is practicable. Where the evaluation of risk control measures reveals some remaining risk, the process continues.

**Monitor**– To maintain the control measures, the measures must be monitored on a regular basis.

## **Reporting Incidents and Resolving Safety Issues**

It is the policy of Innovative Concrete, LLC that all hazards and safety issues must be reported immediately to the relevant supervisor. Should the matter remain unresolved, it should then be reported to the office where it will be forwarded to the appropriate supervisor to be addressed.

## **Safety Meetings**

Meetings will be conducted in accordance with company policy. The meetings will be site-specific containing the most recent items identified as high-risk assessments collected from the database of leading indicators collected by field audits and supervisor recommendations.

## **Toolbox Meetings**

In addition to the above Safety Meetings, Toolbox meetings to discuss workplace Safety issues will be conducted by the immediate supervisor/foreman for his/her individual work groups. Toolbox meetings will be held at least weekly and will be attended by all members of the work group.

The agenda for toolbox meetings are predetermined by a subscription to a toolbox safety meeting provider. The topics have been hand selected and deemed relevant to the industry. In addition, the supervisor can address any or all of the following so that the meeting will be directed toward the activities and tasks associated with the work group's activities.

### Safety topic

- Follow-up items raised at previous toolbox meetings
- Review of accidents/near misses
- Follow-up discussion of inspections/audits
- Items of general Safety importance to the site
- Items of Safety interest to the work group
- Safety initiatives and review of JSAs and/or STAs
- Safety performance
- Environmental aspects
- The immediate supervisor will maintain minutes of toolbox meetings and lists of attendees.

### **Daily Pre-job**

Employees will attend a “prejob” meeting before starting work on any phase of the project. The immediate supervisor will use the applicable JSA/AHA or STA to brief employees on the scope of work, and associated hazards and control measures to be used.

### **Safety Stand-Down Meeting**

As needed to discuss any emergency case or any event/incident.

### **Monthly Supervisors Safety Meeting**

Supervisors and the Safety Manager will meet once per month to discuss site safety and health issues, identify new needs for JSA/AHAs.

## **TRAINING AND EDUCATION**

### **Safety Orientation**

All employees will receive initial safety orientation including a copy of the Safety Manual for Innovative Concrete, LLC at the time of hire. At a minimum the safety orientation will cover the following items:

- Safety Requirements and expectations
- Responsibilities and Duty of Care
- General Known and Potential Hazards
- How to perform Audits and Inspections
- Hazard Analysis Processes
- The proper use of PPE
- How to prevent Silicosis

### **Site Orientation**

Each project employee of Innovative Concrete, LLC will receive a comprehensive safety, health and security briefing by the Site Safety Manager or designee.

Orientations will be developed based on site-specific requirements and conditions to address hazards and corrective measures unique to project environment. Topics include:

- |                                 |                                  |
|---------------------------------|----------------------------------|
| • Site Access                   | • Fall Protection                |
| • Responsibilities              | • Manual Handling                |
| • JSA/STA Processes             | • First Aid and Medical Response |
| • Hazard Communication          | • Injury Management              |
| • How to Report Hazards/Issues  | • Emergency Procedures           |
| • Housekeeping                  | • Fire                           |
| • PPE                           | • Health and Hygiene             |
| • Vehicles and Mobile Equipment | • Fitness for Work               |
| • Audits and Inspections        | • Life Critical Activities       |
|                                 | • Electrical Equipment           |





## **Mandatory Training and Certifications**

Activity-specific training for Innovative Concrete, LLC employees will be specified on the JSA/AHA. Special training or certification will be conducted and/or verified prior to commencement of work, such as crane operators, riggers, powered industrial trucks, aerial lifts and electrical safe work practices.

## **INSPECTIONS/AUDITS**

### **Planned Inspections**

- Project/office management and employee representatives will conduct planned inspections of work areas.
- Leading Indicators for Safety assessments will be completed with Weekly Safety Assessment to be conducted on all project/sites with additional one for every 60 employees.
- Management will participate in at least one Safety Assessment per month.
- Planned inspections will be conducted by observation of the work activities and the actions of people in the workplace.
- Inspections will be reported in writing in accordance with project/site or office procedures.
- Other regular workplace inspections may be required to comply with relevant local legislation and/or regulations.
- Table (4) includes the inspections and audits to be conducted in this project.

TABLE 4

Inspection	Form	Position	frequency
<b>Job Safety Analysis JSA/AHA</b>	Job Safety Analysis Form	Site Superintendent, Safety Manager, Supervisors, all personnel in a work group	Pre each job
<b>Safety Task Assignment STA</b>	Safety Task Assignment	Task's supervisor	Pre each Task
<b>Annual Site Self-Assessment</b>	Safety Site Self-Assessment	Auditor	Annually
<b>Safety Weekly Self-Assessment</b>	Safety Weekly Self-Assessment Program	Site Superintendent, Supervisors, Leads	Weekly
<b>Hazard Inspection</b>	Hazard Inspection Checklist	Site Superintendent, Safety Manager, Supervisors	As needed
<b>Safe Work Observation</b>	Safe Work Observation Report	Any team member	Weekly



## EMPLOYEE ACKNOWLEDGEMENT FORM

### AFTER AN INJURY

If you are injured while on the job, you should get appropriate first aid or emergency medical treatment as soon as possible. **If it is an emergency dial 911 on behalf of yourself or any coworker who has been critically injured.** If it is not an emergency, please contact your supervisor or the office for instructions on where to go to have your injury treated. Injuries should be reported to your supervisor immediately. It is the policy of Innovative Concrete, LLC to do post-accident drug and alcohol testing for all on-the-job accidents. If you are ever in doubt as to the proper protocol, please don't hesitate to contact the office at 435-680-8385.

To report an injury you should:

1. Immediately report the injury or disease to your supervisor and follow up with the office within 3 days to make sure that all of the necessary information for submitting your claim has been collected.
2. Seek immediate medical or first aid treatment. We may require you to obtain initial treatment from a company doctor or designated PPO clinic. We ask that you seek treatment for all non-emergencies at one of our preferred provider organization (PPO) facilities which consist of all WorkMed clinics, any IHC facility or University of Utah Medical Center for Utah. You will be directed to an appropriate facility if you are injured in North Dakota. For life or limb-threatening injuries, please seek initial treatment from the nearest medical facility.
3. Inform your treating physician that you were injured in a work-related accident and ask that he or she file the "Physician's Initial Report of Work Injury or Occupational Disease" (Labor Commission Form 123). Tell the physician your employer is insured with WCF.
4. Seek ongoing treatment at one of our PPO facilities. If you do not use a PPO provider, you may be responsible for any charges in excess of the PPO rates. For a complete listing please contact the office at 435-680-8385. Be sure to give medical providers your claim number.
5. Promptly provide information we request and cooperate with our investigation of your claim. Labor Commission rules allow us to deny your claim if you do not cooperate.
6. Contact your claims adjuster to determine which medical services must be preauthorized by your physician.
7. Keep your claims adjuster and your employer informed of your progress and when you will be able to return to work. Keep them updated on any changes in your employment status, address or telephone number.
8. Be honest in reporting your injuries and capabilities. We work to protect you and your employer against fraud. It is a felony to collect workers compensation benefits through fraudulent pretenses, misrepresentations or omissions.

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Employee Signature

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Date



## EMPLOYEE SAFETY HANDBOOK SIGN-OFF SHEET

Employee Name: \_\_\_\_\_

I have received a copy of the Innovative Concrete Employee Safety Handbook which includes information about silicosis and how to prevent it with safe work practices. I understand that I must read and familiarize myself with the contents of this Handbook and that it provides information for the guidance and reference of all employees.

I understand that the contents of this Handbook may be changed at the company's discretion at any time for any reason. I also understand that this Handbook is confidential company information and that copying in any manner is prohibited. In addition, I understand that this Handbook is company property and must be surrendered upon termination of employment.

\_\_\_\_\_  
Name

\_\_\_\_\_  
Date

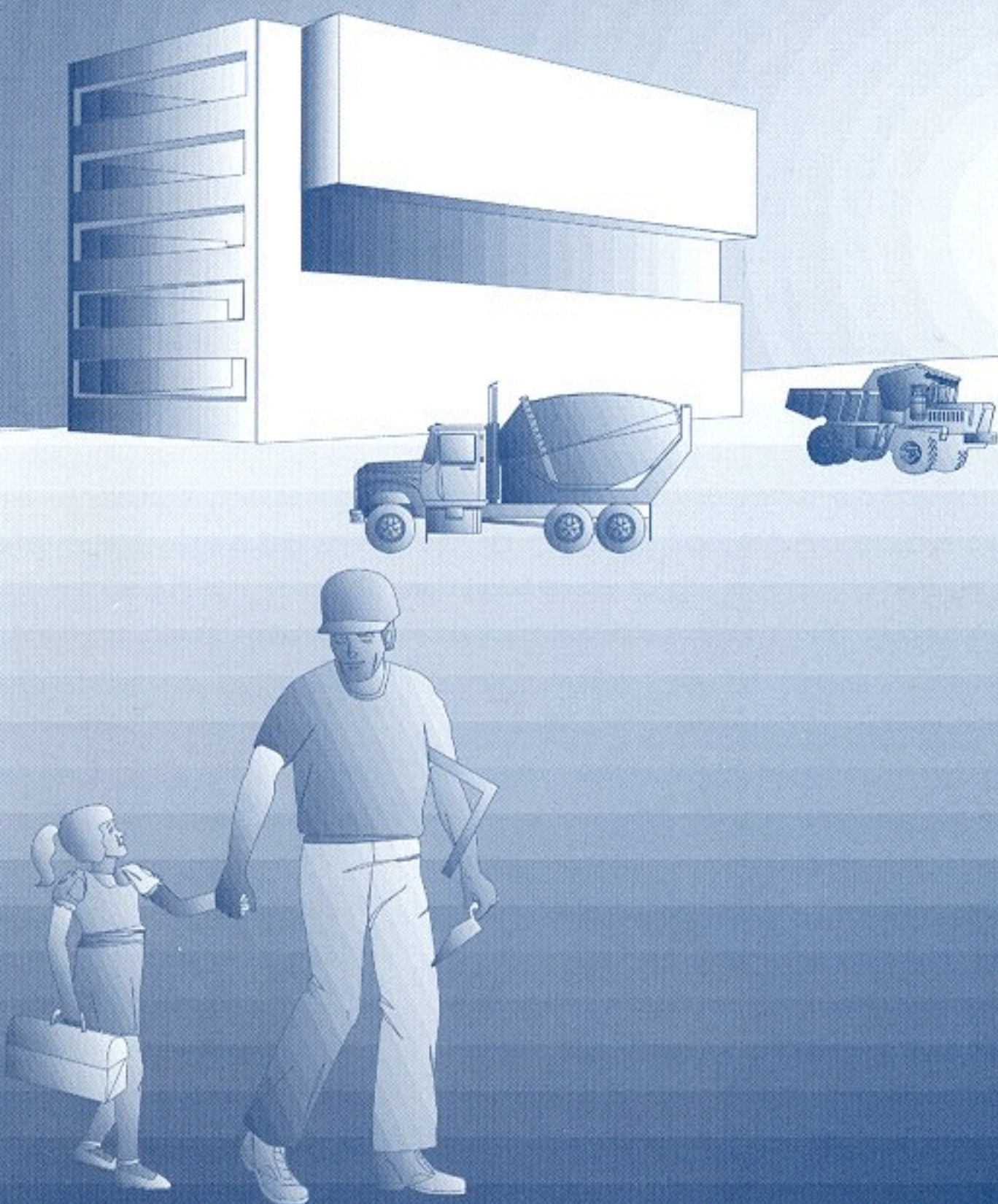


**NIOSH**

# CONSTRUCTION WORKERS: IT'S NOT JUST DUST!

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...PREVENT SILICOSIS



U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES  
Public Health Service  
Centers for Disease Control and Prevention  
National Institute for Occupational Safety and Health

**CDC**  
CENTERS FOR DISEASE CONTROL  
AND PREVENTION





# **SILICOSIS HAS TAKEN A SERIOUS TOLL IN THE UNITED STATES, AFFECTING WORKERS IN MANY SETTINGS. HERE IS A REAL-LIFE STORY...**

**A** West Virginia driller will not see his 10 year old daughter grow up. He will not be there when she gets married. He will not be there when she starts a family of her own. During the fall of 1988 a driller in his late 40s had chest pain. He went to a hospital in Morgantown, West Virginia, where the doctors told him he had silicosis (lung damage). He continued to work and support his family as many workers do. He died from silicosis during the spring of 1994 after 18 years of drilling. After his death his lungs were examined. His lungs were hard because of all the dust in them. It was difficult to cut them even with a scalpel.

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**Thousands of people are exposed to crystalline silica dust at work every day.**

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## **Early Deaths From Dust**

### **Don't Let It Happen To You!**

- 42 year old construction worker in Pennsylvania
- 37 year old construction worker in Ohio
- 49 year old construction laborer in Oklahoma
- 41 year old construction worker in Indiana
- 44 year old construction laborer in North Carolina
- 39 year old construction painter in Ohio



## **WHAT IS SILICOSIS?**

Silicosis is permanent lung damage caused by breathing dust containing extremely fine particles of crystalline silica. Crystalline silica is found in materials such as concrete, masonry and rock. When these materials are made into a fine dust and suspended in the air, breathing in these fine particles can produce lung damage. Silicosis can be totally disabling and may lead to death.

## **SYMPTOMS OF SILICOSIS:**

- Initially there may be no symptoms.
- Later there may be difficulty in breathing and cough may be present.
- Other symptoms may include fever, weight loss, and night sweats.

See a physician if you experience these symptoms and suspect that you are exposed to crystalline silica. All workers breathing crystalline silica dust should have a medical examination.

## **HOW DO CONSTRUCTION WORKERS GET EXPOSED?**

Concrete and masonry products contain silica sand. Since concrete and masonry are primary building materials, there are numerous ways for construction workers to be exposed.

## **SOME ACTIVITIES IN WHICH SILICA DUST MAY BE PRESENT IN THE AIR INCLUDE:**

- Abrasive blasting using silica sand as the abrasive.
- Abrasive blasting of concrete.
- Chipping, hammering, and drilling rock.
- Crushing, loading, hauling, and dumping rock.
- Chipping, hammering, drilling, sawing, and grinding concrete or masonry.
- Demolition of concrete and masonry structures.
- Dry sweeping or pressurized air blowing of concrete or sand dust.



## **HOW IS SILICOSIS PREVENTED?**

The key to silicosis prevention is to prevent dust from being in the air. The Occupational Safety and Health Administration (OSHA) requires dust to be controlled whenever possible. A simple control may work.

**Example:** A water hose to wet dust down at the point of generation. Here are some steps you can take to protect yourself:

- Always use the dust control system and keep it in good maintenance.
- When sawing concrete or masonry use saws that provide water to the blade.
- During rock drilling use water through the drill stem to reduce the amount of dust in the air.
- Use dust collection systems which are available for many types of dust generating equipment. Use local exhaust ventilation to prevent dust from being released into the air.
- Minimize exposures to nearby workers by using good work practices.
- Use abrasives containing less than 1% crystalline silica during abrasive blasting to prevent harmful quartz dust from being released in the air.
- Measure dust levels in the air.

Respirators should only be used until adequate dust controls are in place. Respirators should not be the primary method of protection. If controls cannot keep dust levels below the NIOSH Recommended Exposure Level (REL) then respirators should be used. Select respirators that provide enough protection. Keeping respirators fit for use requires continual maintenance. When respirators are used, OSHA requires employers to establish a comprehensive respiratory protection program. Respiratory protection programs are outlined in the NIOSH *Guide to Industrial Respiratory Protection*.



## **MEDICAL EXAMINATIONS:**

- All workers breathing crystalline silica dust should have a medical examination.
- Chest X-ray (classified according to the 1980 International Labour Office (ILO) International Classification of Radiographs of Pneumoconioses).
- Pulmonary function test.
- Annual evaluation for TB (tuberculosis).

## **WANT MORE INFORMATION?**

### **Three NIOSH Silicosis Alerts available:**

- *Preventing Silicosis and Deaths in Construction Workers*
- *Preventing Silicosis and Deaths from Sandblasting*
- *Preventing Silicosis and Deaths in Rock Drillers*

**For free copies call NIOSH at 1-800-35-NIOSH**

## **Your Comments**

**T**he National Institute for Occupational Safety and Health (NIOSH) requests assistance in controlling exposures of construction workers to respirable crystalline silica. The need is urgent to inform construction workers, coworkers, and construction managers about the respiratory hazards associated with respirable crystalline silica.

Your comments on how best to inform construction workers about this preventable disease are welcomed. Please send your comments to:

Ken Linch  
Industrial Hygienist  
NIOSH  
Division of Respiratory Disease Studies  
1095 Willowdale Road  
Morgantown, West Virginia 26505-2888

**DEPARTMENT OF**

**HEALTH AND HUMAN SERVICES**

Public Health Service

Centers for Disease Control and Prevention

National Institute for

Occupational Safety and Health

1095 Willowdale Road, MS \_\_\_\_\_

Morgantown, West Virginia 26505-2888

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## Controlling Silica Exposures in Construction While Operating Handheld Masonry Saws

Silica is a mineral that is found in stone, soil and sand. It is also found in concrete, brick, mortar and other construction materials. Breathing in silica dust can cause silicosis, a serious lung disease. Using a handheld masonry saw to cut concrete, stone, brick and similar materials can expose workers to hazardous levels of airborne silica. The small particles easily become suspended in the air and, when inhaled, penetrate deep into workers' lungs. This fact sheet describes ways to reduce workers' exposures to silica when using handheld masonry saws to cut masonry products.



Handheld masonry saw without dust controls creates silica dust while cutting cinder blocks. (Photo courtesy of New Jersey Department of Health).



Handheld masonry saw using water for dust control while cutting cinder blocks. (Photo courtesy of New Jersey Department of Health).

### Silica Dust Control Methods

There are two main methods used to control silica dust while operating a handheld saw:

- **Wet cutting**, and
- **Vacuum dust collection systems**.

#### Wet Cutting

Wet cutting is a good way to reduce the amount of silica dust that becomes airborne because it controls the exposure at its source. Water can be supplied to the saws by either a pressurized container or by a constant water source such as a hose connected to a faucet.

Employers are responsible for keeping equipment in good condition to minimize dust and for training workers on how to use the equipment.

- **Check** that hoses are securely connected and are not cracked or broken.
- **Adjust** nozzles so that water goes to the cutting area but still cools the blade.
- **Maintain** saws and dust-control equipment based on the manufacturer's recommendations and maintenance schedule.

### Electrical Safety

Use ground-fault circuit interrupters (GFCIs) and watertight, sealable electrical connectors for electric tools and equipment on construction sites. These features are particularly important in wet or damp areas, such as where water is used to control dust.

### Vacuum Dust Collection Systems

Vacuum dust collection systems (VDCSs) are another good method for reducing silica exposures, but may not reliably keep exposure below OSHA's permissible exposure limit. VDCSs include a dust collector (hood or shroud), vacuum, hose and filter(s).

- Use a vacuum with enough suction to capture dust at the cutting point.
- Use a high-efficiency particulate air (HEPA) filter in the vacuum exhaust and a prefilter or cyclonic separator to improve vacuum efficiency.
- Use a 1½- to 2-inch diameter vacuum exhaust hose or a hose size that is recommended by the tool manufacturer.
- Use a hood or shroud that is recommended by the tool manufacturer.

VDCSs work best when workers are properly trained and use good work practices. For best results:

- **Keep** the vacuum hose clear and free of debris, kinks and tight bends.
- **Turn** the vacuum off and on regularly to reduce dust buildup on the filter, if it is not self-cleaning.
- **Change** vacuum-collection bags as needed.
- **Set up** a regular schedule for filter cleaning and maintenance.
- **Avoid** exposure to dust when changing vacuum bags and cleaning or replacing air filters.

### Compressed Air

Do not use compressed air to clean surfaces, clothing, or filters because it can increase your exposure to silica. Clean only with a HEPA-filtered vacuum or by wet methods.

### Respiratory Protection

When VDCSs and wet cutting are not feasible or do not reduce silica exposures to OSHA's permissible exposure limit, workers need respiratory protection. When respirators are required, employers have to put in place a written respiratory protection program in accord with [OSHA's Respiratory Protection standard](#). It must include the following:

- How to select a respirator;
- Fit testing;
- Directions on proper use, maintenance, cleaning and disinfecting;
- Medical evaluations of workers; and
- Training.

For more information on how to determine proper respiratory protection, visit OSHA's web site at [www.osha.gov](http://www.osha.gov).

For more detailed information on controlling silica exposures when using handheld masonry saws, refer to OSHA Publication 3362, [Controlling Silica Exposures in Construction](#).

**This is one in a series of informational fact sheets highlighting OSHA programs, policies or standards. It does not impose any new compliance requirements. For a comprehensive list of compliance requirements of OSHA standards or regulations, refer to Title 29 of the Code of Federal Regulations. This information will be made available to sensory-impaired individuals upon request. The voice phone is (202) 693-1999; teletypewriter (TTY) number: (877) 889-5627.**

**For assistance, contact us. We can help. It's confidential.**



U.S. Department of Labor  
[www.osha.gov](http://www.osha.gov) (800) 321-OSHA (6742)

## Controlling Silica Exposures in Construction While Operating Hand-Operated Grinders

Silica is a mineral that is found in stone, soil and sand. It is also found in concrete, brick, mortar and other construction materials. Breathing in silica dust can cause silicosis, a serious lung disease. Using a hand-operated grinder on concrete, stone and similar materials can expose workers to hazardous levels of airborne silica. The small particles easily become suspended in the air and, when inhaled, penetrate deep into workers' lungs. Grinder operators' silica exposures are among the highest in the construction industry. This fact sheet describes ways to reduce workers' exposures to silica when using hand-operated grinders.

### Silica Dust Control Methods

There are three main methods used to control silica dust when using hand-operated grinders:

- **Vacuum dust collection systems;**
- **Wet grinding;** and
- **Adjustments in work methods.**

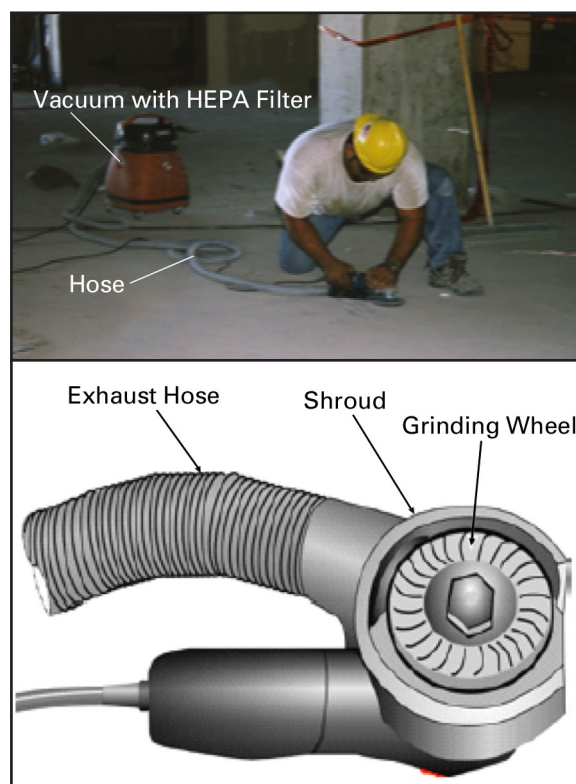
### Vacuum Dust Collection Systems

Vacuum dust collection systems (VDCSs) are available for handheld grinders, often as an add-on unit. The VDCSs should include a shroud which surrounds the grinding wheel, a vacuum, hose and filter(s).

- Use a shroud or hood that is recommended by the tool manufacturer.
- Use a vacuum with enough suction to capture dust at the grinding point.
- Use a high-efficiency particulate air (HEPA) filter in the vacuum exhaust.
- Use a 1½- to 2-inch diameter vacuum exhaust hose or a hose size that is recommended by the tool manufacturer.
- Use a static pressure gauge, where available, to monitor performance.

VDCSs work best when workers are properly trained and use good work practices. For best results:

- **Keep** the vacuum hose clear and free of debris, kinks and tight bends.
- **Turn** the vacuum off and on regularly to reduce dust buildup on the filter, if it is not self-cleaning.
- **Change** vacuum-collection bags as needed.



Grinder with attached VDCS. (Photo courtesy of the University of Washington). Detail of grinder with VDCS attachment. (Courtesy of NIOSH).

- **Set up** a regular schedule for filter cleaning and maintenance.
- **Avoid** exposure to dust when changing vacuum bags and cleaning or replacing air filters.

### **Compressed Air**

Do not use compressed air to clean surfaces, clothing, or filters because it can increase your exposure to silica. Clean only with a HEPA-filtered vacuum or by wet methods.

### **Wet Grinding**

Water-fed control equipment is often used to reduce dust during granite and concrete grinding and polishing, and when concrete and masonry are cut with abrasive wheels. To be effective, a constant supply of water must be applied to the grinding or cutting point. Tools include a nozzle or spout that provides a stream of water to the grinding wheel. A helper also can apply water by hand using a spray nozzle.

### **Electrical Safety**

Use ground-fault circuit interrupters (GFCIs) and watertight, sealable electrical connectors for electric tools and equipment on construction sites. These features are particularly important in wet or damp areas, such as where water is used to control dust.

Water-fed grinders can control dust even on uneven surfaces and near corners and edges, which are problem areas for vacuum dust collection equipment.

### **Adjustments in Work Methods**

Adjusting work practices may also reduce silica exposures:

- **Use** a smaller wheel and use the least aggressive tool that will do the same job whenever possible. Larger wheels and more aggressive wheels (e.g., diamond wheels) result in higher silica exposures.

- **Reduce** the amount of fine grinding required. For example, less dust is created when material is removed by chipping instead of grinding. Use a hammer and chisel or power chipping tool to remove most of the material before using a grinder to smooth the surface.

### **Respiratory Protection**

When wet grinding is not feasible and VDCSS do not reduce silica exposures to OSHA's permissible exposure limit, workers will need respiratory protection. Where respirators are required, employers have to put in place a written respiratory protection program in accord with [OSHA's Respiratory Protection standard](#). It must include the following:

- How to select a respirator;
- Fit testing;
- Directions on proper use, maintenance, cleaning and disinfecting;
- Medical evaluations of workers; and
- Training.

For more information on how to determine proper respiratory protection, visit OSHA's web site at [www.osha.gov](http://www.osha.gov).

For more detailed information on controlling silica exposures when using hand-operated grinders, refer to OSHA Publication 3362, [Controlling Silica Exposures in Construction](#).

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## Controlling Silica Exposures in Construction While Operating Jackhammers

Silica is a mineral that is found in stone, soil and sand. It is a common component of concrete, brick, mortar and other construction materials. Breathing in silica dust can cause silicosis, a serious lung disease. Using a jackhammer to chip or break up concrete, stone, brick and similar materials can expose workers to hazardous levels of airborne silica. The small particles easily become suspended in the air and, when inhaled, penetrate deep into workers' lungs. This fact sheet describes ways to reduce workers' exposures to silica when using jackhammers.

### Silica Dust Control Methods

The best way to control silica dust when using a jackhammer is with wet methods, where water is sprayed constantly to reduce the amount of dust that gets into the air. Wetting the surface with a spray or mist of water at the point where the jackhammer's tip strikes the surface material helps reduce the amount of airborne dust.

#### *Manual Spraying by Helper*

One simple approach to keeping dust under control:

- Use a dedicated helper to direct a constant spray of mist at the impact point while another worker operates the jackhammer.
- Use a spray nozzle similar to those that fit on a garden hose for this job.

Just picking up a hose and spraying the general area every so often is not effective. Simply pre-wetting the concrete or asphalt before the jackhammer breaks the surface is also not effective, because the jackhammer continues to break through dry material that contains silica and is constantly producing dust. To be effective, mist must be applied constantly at the point where the jackhammer hits the surface.

#### **Electrical Safety**

Use ground-fault circuit interrupters (GFCIs) and watertight, sealable electrical connectors for electric tools and equipment on construction sites. These features are particularly important in wet or damp areas, such as where water is used to control dust.



A worker chips concrete with a jackhammer using a water-spray attachment to control dust. (Photo courtesy of NIOSH).

#### **Water-Spray Systems**

Jackhammers retrofitted with a spray nozzle aimed at the tip of the tool can lower silica exposures. Although water-spray controls for jackhammers are not commercially available, it is possible to retrofit most existing equipment. Necessary parts are available at well-stocked hardware stores.

Two organizations have developed designs for a water-spray retrofit system for jackhammers. The National Institute for Occupational Safety and Health (NIOSH) designed, tested and implemented an easy-to-build water-spray attachment for jackhammers. It can be made fairly easily using the parts and instructions described at



[www.cdc.gov/niosh/docs/wp-solutions/2008-127/pdfs/2008-127.pdf](http://www.cdc.gov/niosh/docs/wp-solutions/2008-127/pdfs/2008-127.pdf). The New Jersey Laborers Health and Safety Fund modified the NIOSH spray design and also developed a simple, durable, low-cost water-spray attachment for use on a jackhammer. A detailed description may be found at [www.njlaborers.org/health/pdfs/other/jackhammer.pdf](http://www.njlaborers.org/health/pdfs/other/jackhammer.pdf).

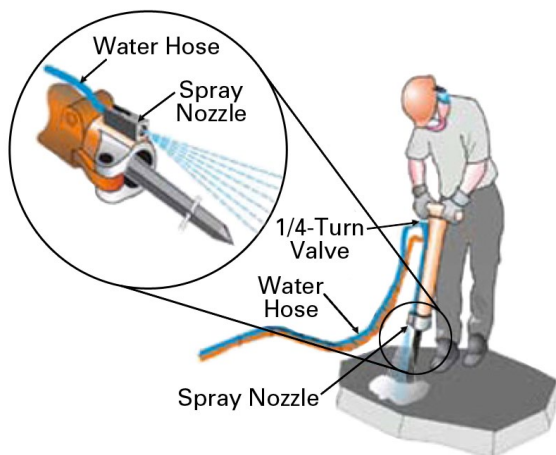


Diagram of water-spray control for jackhammers developed by NIOSH.

Employers need to train workers on the proper use of wet methods to reduce visible dust:

**Dust and debris can clog spray nozzles.** Check the nozzle frequently. If the job starts looking dusty, observe the spray for a few seconds to be sure there is adequate water spray and that it is directed at the tool tip. The nozzle should be cleaned or changed if it is dripping, spitting, or squirting. Keep spare nozzles on hand for quick changes.

**Take steps to provide a consistent water flow.** Make sure there is an adequate supply of water. Prevent kinked hoses, large drops in water pressure and heavy equipment or car traffic running over hoses.

**The spray angle is critical.** Check the water-spray angle frequently. Make sure:

- The spray is focused on the breakpoint;
- The spray is wetting the dust before it can spread away from the tip of the hammer.

### Compressed Air

Do not use compressed air to clean surfaces, clothing or filters, because it can increase your exposure to silica. Cleaning should be performed with a HEPA-filtered vacuum or by wet methods.

### Respiratory Protection

In some cases, such as when water-spray attachments are not available, when work is done in enclosed spaces, or when more than one jackhammer is used in the same work area, silica exposures may exceed OSHA's permissible exposure limit and workers will need respiratory protection. Where respirators are required, employers have to put in place a written respiratory protection program in accord with [OSHA's Respiratory Protection standard](#). It must include the following:

- How to select a respirator;
- Fit testing;
- Directions on proper use, maintenance, cleaning and disinfecting;
- Medical evaluations of workers; and
- Training.

For more information on how to determine proper respiratory protection, visit OSHA's web site at [www.osha.gov](http://www.osha.gov).

For more detailed information on controlling silica exposures when using jackhammers, refer to OSHA Publication 3362, [Controlling Silica Exposures in Construction](#).

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## Controlling Silica Exposures in Construction While Operating Rotary Hammers

Silica is a mineral that is found in stone, soil and sand. It is also found in concrete, brick, mortar and other construction materials. Breathing in silica dust can cause silicosis, a serious lung disease. Using rotary hammers or similar tools to drill small holes in concrete, masonry blocks, or tiles creates dust that can expose workers to hazardous levels of airborne silica. This fact sheet describes ways to reduce workers' exposures to silica when using rotary hammers to drill concrete and other silica-containing materials.

### Silica Dust Control Methods

**Vacuum dust collection systems** are the primary way to control dust when using rotary hammers.

**Wet methods** reduce exposure to silica dust with pneumatic rock drills but are not meant to be used with most electric rotary hammers.



Rotary hammers can produce high levels of silica dust, especially when used directly overhead. (Photo courtesy of New Jersey Department of Health and Senior Services, Silica Surveillance Project).

### Vacuum Dust Collection Systems

Vacuum dust collection systems (VDCSs) are available for many types of handheld drills, usually as add-on systems. The drill bit is surrounded by a shroud that is attached to a vacuum to collect dust and bits of concrete. VDCSs are available in a variety of designs and should include a dust collection device (shroud), vacuum, hose and filter(s).



Rotary hammer with built-in VDCS including HEPA filter. Note the shroud, hose and vacuum. (Photo courtesy of DeWalt. The equipment shown in this picture is for illustrative purposes only and is not intended as an endorsement by OSHA of this company, its products or services).

Remember to:

- Use a shroud sized to fit the hammer's drill bit and compatible with the manufacturer's vacuum system.

- Use a vacuum with enough suction to remove dust at the drilling point.
- Use a high-efficiency particulate air (HEPA) filter in the vacuum exhaust.
- Use a 1½- to 2-inch diameter vacuum exhaust hose or a hose size that is recommended by the tool manufacturer.

VDCSs work best when workers are properly trained and use good work practices. For best results:

- **Keep** the vacuum hose clear and free of debris, kinks and tight bends.
- **Turn** the vacuum off and on regularly to reduce dust buildup on the filter, if it is not self-cleaning.
- **Change** vacuum-collection bags as needed.
- **Set up** a regular schedule for filter cleaning and maintenance.
- **Avoid** exposure to dust when changing vacuum bags and cleaning or replacing air filters.

### Compressed Air

Do not use compressed air to clean surfaces, clothing, or filters because it can increase your exposure to silica. Clean only with a HEPA-filtered vacuum or by wet methods.

### Wet Methods

Wet methods are generally not appropriate for use with electric rotary hammers; however, pneumatic drills can be used for wet drilling and some come equipped with water-feed capability. Wet drilling is commonly used in the tunneling and mining industries to limit dust getting in the air.

To stop dust, keep the water-supply equipment, including pumps, hoses and nozzles, in working order. Make sure that enough water is available for the job.

### Electrical Safety

Use ground-fault circuit interrupters (GFCIs) and watertight, sealable electrical connectors for electric tools and equipment on construction sites. These features are particularly important in wet or damp areas, such as where water is used to control dust.

### Respiratory Protection

When dust controls are used, most rotary hammer drilling should not require respirators. When VDCSs and wet methods are not feasible or do not reduce silica exposures to OSHA's permissible exposure limit, workers need respiratory protection. Where respirators are required, employers have to put in place a written respiratory protection program in accord with [OSHA's Respiratory Protection standard](#). It must include the following:

- How to select a respirator;
- Fit testing;
- Directions on proper use, maintenance, cleaning and disinfecting;
- Medical evaluations of workers; and
- Training.

For more information on how to determine proper respiratory protection, visit OSHA's web site at [www.osha.gov](http://www.osha.gov).

For more detailed information on controlling silica exposures when using rotary hammers, refer to OSHA Publication 3362, [Controlling Silica Exposures in Construction](#).

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## Controlling Silica Exposures in Construction While Operating Stationary Masonry Saws

Silica is a mineral that is found in stone, soil and sand. It is a component of concrete, brick, mortar and other construction materials. Breathing in silica dust can cause silicosis, a serious lung disease. Using a stationary masonry saw to cut bricks, concrete blocks and similar materials can expose workers to hazardous levels of airborne silica. The small particles easily become suspended in the air and, when inhaled, penetrate deep into workers' lungs. This fact sheet describes ways to reduce workers' exposures to silica when using stationary masonry saws.



Stationary saws operated with no dust controls create large amounts of silica dust. (Photo courtesy of the University of Washington).

### Silica Dust Control Methods

There are two main methods used to control silica dust while operating a stationary saw:

- **Wet cutting**, and
- **Vacuum dust collection systems**.

#### Wet Cutting

Wet cutting is the best way to reduce the amount of silica dust that becomes airborne during sawing because it controls exposure at its source. Many stationary saws come with a water basin attached that holds several gallons of water for wet cutting and a pump for recycling the water.

Keep equipment in good working order to minimize dust.

- **Check** that hoses are securely connected and are not cracked or broken.
- **Adjust** nozzles so that water goes to the cutting area but still cools the blade.
- **Rinse or replace** water filters often.
- **Replace** basin water when it gets gritty or begins to silt up with dust.

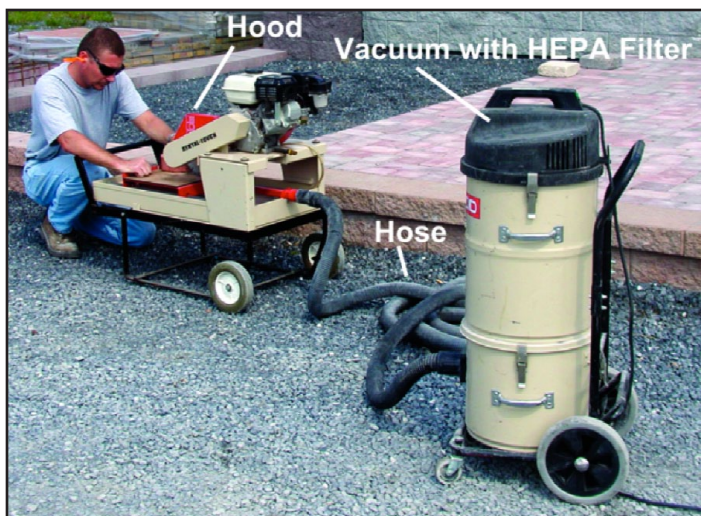
### Electrical Safety

Use ground-fault circuit interrupters (GFCIs) and watertight, sealable electrical connectors for electric tools and equipment on construction sites. These features are particularly important in wet or damp areas, such as where water is used to control dust.

### Vacuum Dust Collection Systems

When wet methods cannot be used, vacuum dust collection systems (VDCSs) are a good, but somewhat less effective choice for reducing exposures. VDCSs should include a dust collection device (hood), vacuum, hose, and filter(s).

- Use a shroud or hood that is the right size for the saw.
- Use a vacuum with enough suction to capture dust at the cutting point.
- Use a high-efficiency particulate air (HEPA) filter in the vacuum exhaust.
- Use a 1½- to 2-inch diameter vacuum exhaust hose or a hose size that is recommended by the tool manufacturer.



An operator cuts a paver with a masonry saw attached to a VDCS. (Photo courtesy of EDCO, Inc. The equipment shown in this picture is for illustrative purposes only and is not intended as an endorsement by OSHA of this company, its products or services).

VDCSs work best when workers are properly trained and use good work practices. For best results:

- **Keep** the vacuum hose clear and free of debris, kinks and tight bends.
- **Turn** the vacuum off and on regularly to reduce dust buildup on the filter, if it is not self-cleaning.
- **Change** vacuum-collection bags as needed.
- **Set up** a regular schedule for filter cleaning and maintenance. For example, clean the filter after each break.
- **Avoid** exposure to dust when changing vacuum bags and cleaning or replacing air filters.

### Compressed Air

Do not use compressed air to clean surfaces, clothing, or filters because it can increase your exposure to silica. Clean only with a HEPA-filtered vacuum or by wet methods.

### Respiratory Protection

Most wet cutting with stationary masonry saws will not require the use of respirators. When VDCSs and wet cutting do not reduce silica exposures to OSHA's permissible exposure limit, workers need respiratory protection. Where respirators are required, employers have to put in place a written respiratory protection program in accord with [OSHA's Respiratory Protection standard](#). It must include the following:

- How to select a respirator;
- Fit testing;
- Directions on proper use, maintenance, cleaning and disinfecting;
- Medical evaluations of workers; and
- Training.

For more information on how to determine proper respiratory protection, visit OSHA's web site at [www.osha.gov](http://www.osha.gov).

For more detailed information on controlling silica exposures when using stationary masonry saws, refer to OSHA Publication 3362, [Controlling Silica Exposures in Construction](#).

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