CSUDH | ENVIRONMENTAL HEALTH & SAFETY

SILICA DUST EXPOSURE CONTROL PLAN

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INTRODUCTION

California State University, Dominguez Hills (CSUDH) began construction in 1960. Over the past 65 years, the 350-acre campus has had miles of sidewalks and other concrete areas installed. Concrete repairs have become increasingly common due to the age of underground pipes, tree root damage, and general wear and tear. For smaller jobs, handheld power saws and jackhammers are frequently used for breaking up existing concrete.

All concrete contains varying levels of silica; the dust created by cutting into concrete generates *respirable crystalline silica* (RCS). When high levels of the small particles are inhaled, they can cause irreversible damage to the lungs. The dust can be inhaled not only by workers, but by others near the area, including students and visitors.

Although the most serious workplace exposure to RCS comes from the manufacture of artificial stone, protocols must be in place in the event that exposures occur from campus workplace activities with concrete. Because the concrete at CSUDH was installed over time, and by a number of outside contractors, it may not be assumed that quantities of RCS in concrete dust is insignificant.

This policy shall also apply to the interiors of many of the newer buildings on campus which have engineered concrete flooring. Laboratories and other areas on university property may have natural or engineered stone countertops. These surfaces are at a higher risk for respirable crystalline silica and special precautions must be followed when grinding, cutting, or jackhammering. CSUDH employees shall not conduct any of these high-risk tasks.

The policy shall outline measures designed to control the generation of concrete, masonry dust including engineering controls, administrative controls, and personal protective equipment (PPE). The policy shall comply with all applicable sections of the California Code of Regulations (CCR), Title 8, section 5204 *Occupational Exposure to Respirable Crystalline Silica* *https://www.dir.ca.gov/title8/5204.html* . Sections of the plan regarding respiratory protection must comply with 8 CCR, 5144, *Respiratory Protection* *https://www.dir.ca.gov/title8/5144.html* and 8 CCR 3204 Access to Employee Exposure and Medical Records.

This plan is accessible electronically on the CSUDH Environmental Health and Safety (EHS) webpage at https://www.csudh.edu/ehs/. Paper copies are available at the EHS office to workers or their representatives upon request.

Inclusions:

All general grinding, jackhammering, or saw work performed on concrete, masonry, artificial stone, and any hard surfaces that can reasonably expected to contain silica.

Exclusions:

Large construction or demolition projects conducted by outside contractors in which the area is under complete control of the construction company (i.e. fenced off with restricted access) where CSUDH employees are not considered a subcontractor and therefore will not be part of these multi-employer worksites.

CSUDH shall not conduct work on any natural or engineered stone surfaces. Any project that requires cutting, sanding, installing, or demolition of these surfaces shall be contracted with an approved contractor.

Any academic department using silica products within their programs must develop their own respirable silica policy. The policy must be approved by the Environmental Health and Safety Director and reviewed annually. It shall be made available to students and other participants working with or potentially exposed to respirable silica dust.

Tenants of CSUDH are not included in this program. However, before any dust-causing concrete work may be performed by these tenants, the work must be reviewed and approved by the EHS Director.
These include but are not limited to:

- Loker Student Union
- California Academy of Math and Science

DEFINITIONS

Concrete or Masonry Material: A hard stone-like building material made of clay or made by mixing cement or a combination of cement, sand, and gravel

Artificial stone: any reconstituted, artificial, synthetic, composite, or engineered stone, porcelain or quartz. It is commonly made by binding crushed or pulverized stone with adhesives, polymers, epoxies, resins, or other binding material to form a slab

Respirable Crystalline Silica: means quartz, cristobalite, and/or tridymite contained in airborne particles that are determined to be respirable by a sampling device designed to meet the characteristics for respirable-particle-size-selective samplers specified in the International Organization for Standardization (ISO) 7708:1995: Air Quality -- Particle Size Fraction Definitions for Health-Related Sampling.

Action level: means a concentration of airborne respirable crystalline silica of 25 micrograms, calculated as an 8-hour time weighted average. This is the lowest amount of airborne RCS that can cause respiratory illness.

Permissible Exposure Limit (PEL): is the maximum amount of a chemical or physical agent that a worker can be exposed to without experiencing adverse health effects. No employee may exposed to an airborne concentration of respirable crystalline silica in excess of 50 micrograms, calculated as an 8-hour TWA.

Wet methods: mean to apply sufficient water directly onto the surface of the work object. Water flow rates must equal or exceed manufacturer recommendations for the equipment used. Other wet methods include submersing the work object underwater or water jet cutting

High-Efficiency Particulate Air (HEPA) Filter method: use of a filter that is at least 99.97 percent efficient in removing mono-dispersed particles of 0.3 micrometers in diameter

Regulated area: a demarcated area where an employee's exposure to airborne concentrations of respirable crystalline silica exceeds, or can reasonably be expected to exceed, the permissible exposure limit of 50 micrograms.

High Exposure Trigger Tasks: means machining, crushing, cutting, drilling, abrading, abrasive blasting, grinding, chiseling, carving, gouging, polishing, buffing, fracturing, intentional breaking, or intentional chipping of artificial stone that contains more than 0.1 percent by weight crystalline silica, or natural stone that contains more than 10 percent by weight crystalline silica. High-exposure trigger tasks also include clean-up, disturbing, or handling of wastes, dusts, residues, debris, or other materials created during the above-listed tasks.

RESPONSIBILITIES

The Director of Environmental Health and Safety shall be the plan administrator. This person is responsible to review the program for effectiveness and to make revisions when necessary.

Environmental Health and Safety

- Evaluate new equipment and Create a Job Hazard Analysis (JSA) for equipment used to cut, grind, or chisel concrete and include hazards for RCS exposure
- Provide training to all potentially impacted employees and their supervisors on the risks of RSC and measures to control exposures
- Conduct (or arrange for an authorized subcontractor to conduct) an exposure assessment when needed
- Review the plan annually to determine the plan's effectiveness
- Maintain training records
- Maintain records of exposure assessments

Trades and Housing Trades Managers

- Obtain approval from the EHS Director before purchasing equipment designed or used for cutting, grinding or chiseling concrete
- Inform the EHS Director whenever concrete work is conducted
- Identify employees or groups of employees who require RSC training
- Train employees to recognize and reduce risks of RSC

Employees

- Follow the procedures outlined in this policy
- Attend safety training for RSC
- Follow JSA instructions found on the EHS website as well as the QR code on the equipment
- Report any misuse of equipment or procedures to your manager
- Do not participate in any concrete cutting, grinding, or jackhammering operations without proper training
- Participate in *Respiratory Protection Program* and wear PPE when required
- Notify supervisor if there are any changes to health that may prevent respiratory protector's effectiveness
- Report any exposure accident or injury to their supervisor

HAZARD COMMUNICATION

Communication of the hazards associated with respirable crystalline silica will comply with CSUDH's Hazard Communication Program and 8 CCR 5194 Hazard Communication.

EXPOSURE ASSESSMENT

The concrete poured at CSUDH was completed over an extended period of time with a variety of contractors and specific formulations. Unless testing is conducted each time concrete is cut, it cannot be determined whether action levels for

RCS are attained. Cal/OSHA has published a list of typical equipment and tasks involved in disturbing crystalline silica-containing materials (See Table 1 Equipment Procedures for Reducing Respirable Crystalline Silica Dust Exposures). Exposure assessments and monitoring will not be required if all exposure control methods listed in Table 1 are implemented.

CSUDH employees shall not engage in tasks not listed in Table 1, or where the university is unable to fully and properly implement the engineering control, work practices, and respiratory protection described in Table 1.

The university will reassess exposures whenever a change in the production, process, control equipment, personnel, or work practices will reasonably be expected to result in new or additional exposures at or above the action level. If that occurs, EHS shall require the university to seek outside contractors to perform the work.

These tasks shall require exposure assessments to be performed for those employees who are or may be reasonably expected to be exposed to respirable crystalline silica at or above the action level. The respirable silica regulation requires one of the following:

- *Performance Option* - Assessing the 8-hour TWA exposure for each employee on the basis of any combination of air monitoring data or objective data sufficient to accurately characterize employee exposures to respirable crystalline silica.

- *Scheduled Monitoring Option* - Performing exposure monitoring, on a predefined schedule, for each employee or group of employees (if jobs duties are similar) with personal breathing zone air samples to determine exposure to respirable crystalline silica.

CSUDH employees shall not perform any task involving respirable silica that would require medical monitoring (e.g. exposures above the permissible exposure limit (PEL). Whenever an exposure assessment indicates that employee exposure is above the PEL, the university will provide written notification describing the corrective action being taken to reduce exposure to or below the PEL.

EXPOSURE CONTROL MEASURES

The most effective way to ensure that employees are not at risk for RCS is to provide engineering controls for **all** concrete jackhammer, grinding and sawing operations on campus. The two methods approved by CSUDH EHS to control concrete dust are the wet method and the HEPA filter method. This plan only discusses activities that take place at CSUDH. For a full list of tasks, reference the regulatory standard at https://www.dir.ca.gov/title8/5204.html. For each task identified in Table 1 below, the exposure control methods specified for that task must be fully and properly implemented.

When an employee performs more than one task listed in Table 1 during the course of a shift, and the total duration of all tasks combines is more than four hours, the required respiratory protection for each task is the respiratory protection specified for more than four hours per shift. If the total duration of all tasks on Table 1 combined is less than four hours, the required respiratory protection for each task is the respiratory protection specified for less than four hours per shift.

If it is found an employee or group of employees are exposed to respirable crystalline silica above the PEL, engineering and work practice controls will be utilized to reduce and maintain employee exposure to respirable crystalline silica to or

below the PEL. Wherever engineering and work practice controls are not feasible or when they cannot lower employee exposure to or below the PEL, the university will provide appropriate respirators to supplement the engineering and work practice controls. When respiratory protection is required to be worn, all requirements of Title 8, Section 5144 and the CSUDH Respiratory Protection Program must be adhered to.

The University will reassess exposures whenever a change in the production, process, control equipment, personnel, or work practices will reasonably be expected to result in new or additional exposures at or above the action level.

Table one includes the required engineering and work practice control methods along with the respiratory protection requirements for the state of California. Supervisors must ensure that the time limitations for each task is followed and that employees have the proper equipment and PPE to perform the task.

Two items on the Cal/OSHA table are not applicable. CSUDH employees shall not participate in the following construction tasks or equipment operations:

7. Handheld grinders for mortar removal
9. Walk-behind milling machines and floor grinders

On rare occasions, *6b Jackhammers and handheld powered chipping tools when used indoors or enclosed space* may be required for plumbing operations. In those cases, all participating employees shall receive training and appropriate respiratory protection. A medical evaluation and fit test shall be provided before respiratory protection is issued or used.

Table 1 Equipment Procedures for Reducing Respirable Crystalline Silica Dust Exposures

	Construction Task or Equipment Operation	Engineering and Work Practice Control Methods	Required Respiratory Protection	
			≤ 4 hours/shift	**>4 hours/shift**
1	Stationary masonry saws	• Use saw equipped with integrated water delivery system that continuously feeds water to the blade. • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	None
2a	Handheld power saws (any blade diameter) when used outdoors	• Use saw equipped with integrated water delivery system that continuously feeds water to the blade. • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask
2b	Handheld power saws (any blade diameter) when used indoors or in an enclosed area	• Use saw equipped with integrated water delivery system that continuously feeds water to the blade. • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask
3	Handheld power saws for cutting fiber-cement board (with blade diameter of 8 inches or less) for tasks	• Use saw equipped with commercially available dust collection system. • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	None

	performed outdoors only	• Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency.		
4a	Walk-behind saws when used outdoors	• Use saw equipped with integrated water delivery system that continuously feeds water to the blade. • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	None
4b	Walk-behind saws when used indoors or in an enclosed area	• Use saw equipped with integrated water delivery system that continuously feeds water to the blade. • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask
5	Handheld and stand-mounted drills (including impact and rotary hammer drills)	• Use drill equipped with commercially available shroud or cowling with dust collection system. • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. • Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism. • Use a HEPA-filtered vacuum when cleaning holes.	None	None
	Construction Task or Equipment Operation	**Engineering and Work Practice Control Methods**	**Required Respiratory Protection**	
			≤ 4 hours/shift	**>** 4 hours/shift
6a	Jackhammers and handheld powered chipping tools when used outdoors	• Use tool with water delivery system that supplies a continuous stream or spray of water at the point of impact. OR: • Use tool equipped with commercially available shroud and dust collection system. • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. • Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism.	None	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask
6b	Jackhammers and handheld powered chipping tools when used indoors or in an enclosed area	• Use tool with water delivery system that supplies a continuous stream or spray of water at the point of impact. OR: • Use tool equipped with commercially available shroud and dust collection system. • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. • Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism.	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask

7	Handheld grinders for mortar removal (i.e., tuck-pointing)	• Use grinder equipped with commercially available shroud and dust collection system. • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. • Dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism.	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask	Powered Air-Purifying Respirator (PAPR) with P100 Filters
8a	Handheld grinders for uses other than mortar removal for tasks performed outdoors only	• Use grinder equipped with integrated water delivery system that continuously feeds water to the grinding surface. • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. OR: • Use grinder equipped with commercially available shroud and dust collection system. • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. • Dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism.	None	None

Construction Task or Equipment Operation		**Engineering and Work Practice Control Methods**	**Required Respiratory Protection**	
			≤ 4 hours/shift	**>** 4 hours/shift
8b	Handheld grinders for uses other than mortar removal when used indoors or in an enclosed area	• Use grinder equipped with commercially available shroud and dust collection system. • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. • Dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism.	None	N95 (or Greater Efficiency) Filtering Facepiece or Half Mask
9	Walk-behind milling machines and floor grinders	• Use machine equipped with integrated water delivery system that continuously feeds water to the cutting surface. • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. OR: • Use machine equipped with dust collection system recommended by the manufacturer. • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. • Dust collector must provide the air flow recommended by the manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism. • When used indoors or in an enclosed area, use a HEPA-filtered vacuum to remove loose dust in between passes.	None	None
10	Heavy equipment and utility vehicles for tasks such as grading and excavating but not	• Apply water and/or dust suppressants as necessary to minimize dust emissions.	None	None

including demolishing, abrading, or fracturing silica-containing materials	OR: • When the equipment operator is the only employee engaged in the task, operate equipment from within an enclosed cab.

Depending upon the hazard, tool, and location, either the wet or dry method shall be used to control dust:

Wet Method

Outdoors

When water is used to control dust, electrical safety must be ensured. Check electrical cords for wear and tear. Make sure the cord and the outlet used is grounded. Before work, employees must don the PPE listed in each Job Safety Analysis for equipment used. The wet method requires at least two employees – one to operate the equipment, and one to wet the cutting surface. Water must be applied continuously to the saw blade or workpiece without interfering with the action or guard. Water from a standard utility hose is preferred, however, when water is not readily available, a pressurized water container may be used. The water must cover the entire surface of the work object where a tool, equipment, or machine contacts the work object.

Indoors (or enclosed areas)

Wet cutting indoors or in enclosed areas may not reliably keep silica exposures low, so extra ventilation or a means of exhaust may be needed to reduce visible airborne dust. Extra ventilation can be supplied by using: exhaust trunks, portable exhaust fans, air ducts, or other means of mechanical ventilation. Ventilation shall be positioned to move contaminated air away from the workers' breathing zones.

Indoor wet cutting must be accompanied by respiratory protection with a minimum Assigned Protection Factor (APF) of 10 is required on Table 1 of 8 CCR 5144 when wet cutting with handheld masonry saws indoors or in an enclosed area, or used outdoors for more than four hours per shift. When respiratory protection is required, the terms of CSUDH's *Respiratory Protection Program* shall be followed. A copy of the program can be found on the EHS web page at https://www.csudh.edu/ehs/.

Clean-up Process for Wet Method

- Clean up any slurry produced to prevent it from drying and releasing silica dust into the air
- Clean slurry by using a shovel or a wet vacuum equipped with a HEPA filter
- Slurries may not be washed down drains, sewers, or storm drains
- Wastes must be placed in leak-proof bags and disposed of at the end of the work shift or more frequently to ensure that there is no visible build up in the area
- The bag should be disposed of using the dumpster in the facilities yard that is designated for construction materials. The bag should not be disposed of in any other trash receptacle.

Dust Collecting Method

When the wet method is not practical, cutting, grinding or chiseling operations may be done with a dry dust collection method. Dust collection must be done with a HEPA filter that is specifically designed for the equipment used.

Clean-up Process for Dry Method

During both the physical work and the clean up process, workers should be careful not to walk or to move equipment or tools on or through the dry dust, debris, residue or any other material that may contain crystalline silica.

- Do not dry sweep or brush dusts
- Do not use compressed air to clean clothing or surfaces
- Do not use an unapproved, non-filtered vacuum
- Use only a designated HEPA filtered vacuum for the cleanup of concrete dusts. Household vacuums with HEPA filters may not be used
- Employees must wear an N95v respirator when emptying the vacuum bag full of silica dust. Once the respirator is on, employees must carefully open the vacuum and tie the bag using a zip-tie. The bag should be disposed of using the dumpster in the facilities yard that is designated for construction materials. The bag should not be disposed of in any other trash receptacle.

Housekeeping

Any success in reducing exposures with engineering controls can easily be reversed with poor work practices. The following good housekeeping practices shall be followed during both the physical work and clean up process.

Do not carry equipment, walk through, drag hoses, or disturb waste products, dust, or any other materials that may contain crystalline silica.

General restrictions apply to the use of compressed air:

- Do not use compressed air on waste, dust, or debris that may contain crystalline silica
- Do not use compressed air to clean dust off of clothing or skin
- Do not use compressed air to back flush, backwash, or clean water, air, or other types of filters that may contain crystalline silica

Personal Protective Equipment

In addition to engineering controls, CSUDH also provides Personal Protective Equipment (PPE) to employees to reduce the risk of exposure. The California Occupational Safety and Health Administration (Cal/OSHA) has published a list specifically for the construction industry of typical equipment and tasks involved in disturbing crystalline silica-containing materials. See 8 CCR 1532.3 Occupational Exposures to Respirable Crystalline Silica. Although CSUDH employees are not required to follow construction industry standards, this list shall be referenced when selecting best practices for exposure control methods. The plan only covers activities that are performed by CSUDH employees. After work is completed, PPE must be doffed in a manner that does not cause residual dusts left on clothing to be carried home or to become airborne.

Respiratory Protection

Respiratory Protection is required under the following circumstances:

- Exposures exceed the PEL for certain tasks in which engineering controls are not feasible
- The PEL is exceeded when setting up engineering controls
- Engineering controls are insufficient to reduce exposures below the PEL
- When the employee is in a regulated area

For high-exposure trigger tasks, or when work is inside a regulated area, respirators are required to be full-face, tight-fitting power-air purifying respirator (APF 1000) or greater. An exception can be made if monitoring is continual, but a half-face respirator must be used. No CSUDH employee shall engage in any high-exposure trigger tasks or work that is inside a regulated area.

MEDICAL SURVELLIANCE AND EXPOSURE REPORTING

Medical surveillance is required if an employee uses a respirator for 30 or more days per year. Currently, no work is conducted at CSUDH that meets this criteria. The need for medical surveillance and the work activities that potentially expose employees to RCS shall be reviewed annually along with this program. If medical surveillance becomes necessary, CSUDH shall comply with all requirements of https://www.dir.ca.gov/title8/5204.html.

TRAINING

Training will be provided prior to assignment and every three (3) years thereafter. The training will consist of, at a minimum, the following information:

- The health hazards associated with exposure to respirable crystalline silica
- Symptoms related to exposure to respirable crystalline silica
- The increased risk of latent tuberculosis infection becoming active that results from the effects of respirable crystalline silica exposure
- The increased risk of death that results from the combined effects of smoking and respirable crystalline silica exposure
- Specific tasks in the workplace that could result in exposure to respirable crystalline silica
- Specific measures the employer has implemented to protect employees from exposure to respirable crystalline silica including engineering controls, work practices, PPE, and respirators to be used
- How to properly use and implement engineering controls, work practices, and respiratory protection to prevent employee exposure to respirable crystalline silica
- Specific housekeeping procedures and the importance of handwashing
- The contents of this program
- The purpose and description of medical surveillance programs

RECORD KEEPING

Training Records
Training records shall be kept for a minimum of three years.

Exposure Assessments
The University will maintain all exposure measurements (air monitoring) taken, or objective data used, to assess employee exposure to respirable crystalline silica in accordance with 8 CCR 3204 Access to Employee Exposure and Medical Records.

Medical Evaluations

Medical evaluations will be maintained by the University's contracted physician or licensed health care professional in accordance with 8 CCR 3204 Access to Employee Exposure and Medical Records