Introduction

The purpose of this document is to provide Respirable Crystalline Silica (RCS) work procedures for Eastern Washington University (EWU) that establish safe work practices and protection for employees working in applicable industry with hazards requiring protections from exposure to RCS. Updates for Washington Department of Occupational Safety and Health (DOSH) revisions are established for effective changes in Construction Industry work activities to begin effective October 1st, 2018; and July 1st, 2019 for General Industry workplaces on EWU campuses.

Scope of Silica Operations

This procedure applies to all buildings, equipment operated, land holdings, machinery, and structures to which is occupied, operated, and owned by Eastern Washington University at all campuses and remote locals. Adherence to methods of compliance is required within the State of Washington. This procedure, shall be a collaborative work effort shared amongst respective department employees, supervisors, and the EWU Environmental Health and Safety (EH&S) department for: exposure assessments, employee notifications, identification of exposures, regulated work practices, housekeeping, medical monitoring, and recordkeeping. Any variance from guidelines set forth in this document for work procedures must be addressed by competent person(s); and a respective department supervisor for approval for the affected employee; and process review by EWU's EH&S department.

Crystalline silica is the primary component of many building materials such as: aggregate fills, concrete, granite, sandstone, concrete, concrete masonry unit (block), cement, mortar, etc. Respirable silica has also been found as a filler material in acoustical tile, fireproofing, insulations, leveling compounds, and composite construction materials. Exposures to airborne silica occur as RCS building materials are disturbed or actively turned to powdered form by:

- Abrasive blasting (if the abrasive contains silica and/or if the materials being blasted contain silica)
- Chipping, hammering, and drilling of natural rock
- Crushing, loading, hauling, and dumping of rock
- Sawing, hammering, drilling, grinding, and chipping, and/or tuck-pointing of concrete, masonry structures, or tile
- Demolition of concrete and masonry structures
- Dry sweeping, motorized sweeping, or pressurized air blowing of concrete, rocks, or sand dusts
- Road construction
- Sweeping, cleaning, and dismantling equipment in service of silica work activities
- Tunneling, excavation, and/or earth moving of soils with high silica content

All EWU employees in the act of disturbing crystalline silica containing building materials for the release of respirable dusts; must comply with the designated Washington Administrative Code (WAC) 296-840, Respirable Crystalline Silica.

Responsible persons

Supervisors/Qualified Persons/Leads:

- Define, document, and employ appropriate controls and measures by implementing these procedures in collaboration with the EH&S staff and Facilities management
- Safeguard EWU's workforce and student population by completion of silica workplace exposure assessments and scheduled monitoring
- Guarantee that employees authorized to conduct work activities disturbing RCS, receive appropriate training in adherent work procedures

- Obligate employee resources for personal protective equipment (PPE), identify changes in working conditions, and provide training required for job compliance in silica work activities
- Verify that contractors are notified of any designated building substances to have potential for high silica content release
- Optimize equipment and tools available for silica work activities for control of airborne hazards

Employees/Competent Persons:

- Identify work conditions where silica procedures are required
- Review and implement silica work procedures where needed
- Follow safety procedures for administrative, engineering controls and/or PPE as required to complete work
- Participate in workplace exposure assessments
- Notify designated supervisor or leads of changes in work conditions that may have adverse effect for the safety of the work environment, in regards to RCS

Contractors/Project Managers:

- Consult with Facilities Management and EH&S department for identification of situations where silica procedures are required for mitigation
- Collaborate with institutional partners for identifying work locations and building materials with installation or removal of high silica content building materials
- Ensure that contractors hired to perform any silica work are afforded copy of EWU's Respirable Crystalline Silica Work Program for compliance on, or in EWU facilities and/or property if requested

General Operations

It is assumed that certain work activities and job procedures undoubtedly produce significant quantities of respirable crystalline silica. Ultimately, removal of silica from the workplace as a respirable hazard is foremost in importance. If RCS is present in the work to be performed, its' release should be limited as to prevent or limit workers from respirable dust inhalation.

To implement hazard reduction in workplace exposures for silica, defined engineering, administrative controls, and functional implementation of worker PPE, unless exposure assessment can determine respirable silica below required action levels.

Table 1 – Specified Control Methods

Construction tasks or work activities that are indistinguishable from a construction task listed in Table 1 of this section; cannot be performed without adherence to the guidelines set forth for each categorical activity task defined in the table below:

Specified Exposure Control Methods When Working With Materials Containing Crystalline Silica, WAC 296-840-110 – Table 1

Equipment/Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours/shift	> 4 hours/shift
(i) 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
(ii) Hand-held power saws (any blade diameter)	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. - When used outdoors. - When used indoors or in an enclosed area.	None APF 10	APF 10 APF 10
(iii) Hand-held power saws for cutting fiber-cement board (with blade diameter of 8 inches or less)	For tasks performed outdoors only: Use saw equipped with commercially available 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.	None	None
(iv) Walk-behind 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. -When used outdoors. -When used indoors or in an enclosed area.	None APF 10	None APF 10
(v) Drivable saws	For tasks performed outdoors only: 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
(vi) Rig-mounted core saws or drills	Use tool equipped with integrated water delivery system that supplies water to cutting surface. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	None
(vii) Hand-held 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
(viii) Dowel drilling rigs for concrete	For tasks performed outdoors only: Use shroud around drill bit with a dust collection system. Dust collector must have a filter with 99% or greater efficiency and a filter-cleaning mechanism. Use a HEPA-filtered vacuum when cleaning holes	APF 10	APF 10
(ix) Vehicle-mounted drilling rigs for rock and concrete	Use dust collection system with close capture hood or shroud around drill bit with a low-flow water spray or wet the dust at the discharge point from the dust collector.	None	None

	OR Operate from within an enclosed cab and use water for dust suppression on drill bit.	None	None
(x) Jackhammers and hand-held powered chipping tools	Use tool with water delivery system that supplies a continuous stream or spray of water at the point of impact. - When used outdoors - When used indoors or in an enclosed area. 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. - When used outdoors. - When used indoors or in an enclosed area.	 None APF 10 None APF 10	 APF 10 APF 10 APF 10 APF 10
(xi) Hand-held grinders for mortar removal (i.e., tuckpointing)	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 cyclonic preseparator or filter-cleaning mechanism.	APF 10	APF 25
(xii) Hand-held 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 preseparator or filter-cleaning mechanism. - When used outdoors. - When used indoors or in an enclosed area.	None None None	None None APF 10
(xiii) 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 HEP-filtered vacuum to remove loose dust in between passes.	None None	None None

(xiv) Small drivable milling machines (less than half-lane)	Use machine equipped with supplemental water sprays designed to suppress dust. Water must be combined with a surfactant.	None	None
(xv) Large drivable milling machines (half-lane and larger)	For cuts of any depth on asphalt only: Use machine equipped with exhaust ventilation on drum enclosure and supplemental water sprays designed to suppress dust. Operate and maintain machine to minimize dust emissions. For cuts of four inches in depth or less on any substrate: Use machine equipped with exhaust ventilation on drum enclosure and supplemental water sprays designed to suppress dust. Operate and maintain machine to minimize dust emissions. OR Use a machine equipped with supplemental water spray designed to suppress dust. Water must be combined with a surfactant. Operate and maintain machine to minimize dust emissions.	None None	None None
(xvi) Crushing machines	Use equipment designed to deliver water spray or mist for dust suppression at crusher and other points where dust is generated (e.g., hoppers, conveyers, sieves/sizing or vibrating components, and discharge points). Operate and maintain machine in accordance with manufacturer's instructions to minimize dust emissions. Use a ventilated booth that provides fresh, climate-controlled air to the operator, or a remote-control station.	None	None
(xvii) Heavy equipment and utility vehicles used to abrade or fracture silica-containing materials (e.g., hoe-ramming, rock ripping) or used during demolition activities involving silica-containing materials	Operate equipment from within an enclosed cab. When employees outside of the cab are engaged in the task, apply water and/or dust suppressants as necessary to minimize dust emissions.	None None	None None
(xviii) Heavy equipment and utility vehicles for tasks such as grading and excavating but not including: Demolishing, abrading or fracturing silica-containing materials	Apply water and/or dust suppressants as necessary to minimize dust emissions. OR When the equipment operator is the only employee engaged in the task, operate equipment from within an enclosed cab.	None None	None None

General Work Procedures

Work not defined by Table 1, may present an equal risk for exposure to workers if not properly controlled. EWU employee and supervisor recognition of silica-laden work materials is required prior to start of work activities. Review of building material(s) application, handling, and maintenance may require a review of the product's Material Safety Data Sheet (MSDS) or Safety Data Sheet (SDS) for instruction about unique or specialized use and/or work practices. If guidance is not provided by the product manufacturer, general precautions for worker safety should be observed where continuous and visible dusts are present in the workplace:

- Employee recognition of damaged silica-containing materials or work activities creating silica dusts
- Required reporting of other hazards not identified in the work assignment to their respective supervisor or work order administration as soon as possible

- Preparation of silica-work areas for containment, shall be require notification of EWU's Environmental Health and Safety department and associated departmental notifications through Facilities Operations
- Work areas where prolonged and visible dusts will occur, must be demarcated with signage and restricted access:

- Loose silica aggregates or building materials require water-misting applications prior to disturbance when feasible
- Do not dry-sweep or use compressed air to clean the localized work area when confined indoors
- Accumulated silica dusts on protective clothing and equipment require a damp wiping, water wash, or HEPA vacuuming for removal of respirable powders
- Non-excavation silica debris and wastes require polyethylene double bagging, with twisted and taped enclosures for disposal

Engineering Controls

Employing alternate methods for design or modification of equipment, damping of building materials, ventilation systems, and/or change in processes for a reduction in airborne silica releases, will constitute an engineering control.

Compliance to maintenance schedules and operative condition of equipment should be managed so that enclosures, seals, mechanisms, and efficiencies control visible silica dusts. Any tooling in use of wet methods, must supply adequate flow rates to quell release of visible dust particulate. Care for work tailings will require removal from the work areas while damp or wet to limit potential of future silica dusts.

Enclosed environments such as equipment cabs and booths should be maintained free of dusts by operation of continuous supplied air under positive pressures. Supplied air provided must meet requirements for ninety-five percent (95%) efficiency in particulate arrestment of 0.3-10.0-micron size dusts. An equivalent MERV rating of sixteen (16) or better must be applied to the cab filtration unit(s), with both heating and cooling capabilities present.

Alternatives for substitution of silica containing materials may be in consideration as part of work processes or project planning. Selection of alternatives for use as a binding medium, blasting media, traction additive, and/or resistive function in building products or materials may be introduced into the work environment as a process control for silica safety.

Administrative Controls

Observation of limiting employee work exposures through alternative labor practices, observation of housekeeping processes, rotation of shifts and/or job duties, and intermittent completion of work provide protection from silica hazards.

Employee break rooms, changing areas, meeting facilities, and restrooms should be maintained free of silica dust accumulations. Designated facility locations should be available for employees to wash or shower at the end of shift where silica has excessively accumulated onto worker clothing, hair, or hands. Dry sweeping or use of compressed air to clean-up or remove silica dusts is prohibited as a cleaning practice. Finally, commonly used surfaces that have become contaminated with RCS, should be preserved by washing/wiping down with wet methods, or vacuuming with a high efficiency particulate arrestment (HEPA) filtration device where approved.

Personal Protective Equipment

In the event that, removal of RCS cannot meet safe working levels; or engineering and administrative controls are ineffective for protecting the employee; then use of PPE should be implemented for worker safety.

Respiratory protection:

- Where situations arise within the workplace that engineering and administrative practices cannot minimize RCS below safe working levels, respirator use will be employed to protect employees. Where respirators are required for work protections, EWU employees must participate and have enrollment into EWU's Respiratory Protection Program as part of the EWU Accident Prevention Program.

As a reminder, all employees designated for work exposures requiring respirator use, will be enrolled in the EWU medical monitoring program and are subject to evaluation by EWU's licensed healthcare provider for validation of proper respirator use. All EWU respirator participants, are required to qualify for respirator use through EH&S fit testing.

- Qualifying respirators for use in respirable crystalline silica environments are:
  - ✓ APF 10 Half-face, respirators with magenta or N/P 100 rating; or stacked combinations thereof
  - ✓ APF 25 Powered air purifying respirators (PAPR) with a magenta or N/P 100 rating; or stacked combinations
  - ✓ APF 50 Full-face, respirators with magenta or N/P 100 rating; or stacked combination thereof
  - ✓ APF 1000 Full-face respirators with supplied air systems

  Paper dust masks, half-faced masks, respirators with an N/P 95 or lesser rating, and/or a respirator not qualified for use by EH&S during annualized fit testing, will not meet worker safety requirements when working in RCS environments.

Protective Clothing:

- Avoiding contamination of personal attire and clothing items may necessitate additional protective barriers for silica dust prevention. Transportation and wearing articles of protective clothing to the employee's home should be avoided to limit exposure to respirable silica hazards. Protective clothing items can include coveralls, flame-resistant attire, gloves, headwear, and work coats or jackets.

Training

Annual evaluation and review of the respirable crystalline silica program requires necessary updates for maintaining effective worker safety. Integral to this process, feedback from the competent workforce is required for establishing proper work activities, conditions, or tasks; inspection of job sites, materials and equipment. All of which exhibit potential for respirable silica release for review of future employee training.

Defining established work tasks associated with silica exposure, will incorporate housekeeping function and worker awareness to silica hazards at EWU. Descriptions of work equipment, job tasks, materials, and worksites

will be regular and frequent to update safe work procedures. Resultant of this, identified engineering controls, work practices, worksite restrictions, and respiratory protection requirements for related RCS tasks will amend worker training.

Training components for EWU's annual Silica Awareness training will incorporate the following:

- Awareness training and similar exposures
  - for associated health hazards
  - specific tasks resulting in exposure to RCS
  - reference to WAC Health and Safety core content
- Competent and Qualified person(s) responsibilities
- Evaluation and management of silica exposures
- Medical monitoring and evaluations
- Respiratory protection program
- Hazard Communication, as defined within EWU's Accident Prevention Program

Employees exposure assessments

Identification of silica hazards to EWU's workforce requires on-going representative sampling for employees and their respective work activities as to the possible release of respirable crystalline silica in the work environment.

Employees subject to work that require construction, demolition, excavation, and/or renovation activities to campus facilities where established silica content is known, will have evaluations completed to assess their acute and cumulative exposures. In this regard, EWU accepts to limit airborne concentrations of RCS to a permissible exposure limit (PEL) for quartz, tridymite, or cristobalite silica(s) to no more than 50 micrograms in excess of a time-weighted average of eight hours (TWA^8); or an Action Level response of 25 micrograms (TWA^8) for any employee. Short-term exposure limits (STEL) of 30 micrograms for quartz, or 15 micrograms for tridymite and/or cristobalite silica for no more than fifteen minutes for all worker exposures will be recognized.

Identification of Action Levels, PELs, and STELs for crystalline silica will be a collaborative effort with EWU Facilities staff, campus contractors, and the EWU EH&S department. Air monitoring and/or analytical sampling within the workplace, coordination of construction and planning activities and adverse changes in work performance will identify exposure concerns for EWU employees to silica. Any associated personal protective equipment (PPE), administrative, or engineering controls present in the workplace for limiting silica exposures should be in use while monitoring for silica.

Performance option

Assessment of a TWA^8 for employees can be characterized by the combination of observation for respirable silica(s) or objective information sufficient to accurately define work exposures to respirable crystalline silica.

Scheduled monitoring option

Initial monitoring may assess the 8-hour TWA on the basis of personal breathing zone samples that reveal respirable crystalline silica for respective employee shifts, job classification, and designated work areas.

In the event, several employees share a workspace, a representative fraction of that group may be monitored for silica in areas expected to have the greatest potential for exposures. When determinate sampling for employees concludes that crystalline silica is below action levels, a secondary sample set must be taken within six months

of the initial, until two consecutive measurements taken seven or more days apart indicate analytical data below action levels. Further testing will not be required in these evaluated employee work areas, unless a change in work conditions justify re-testing.

If sample testing indicates measurement above the action level, but at or below the PEL, testing of the workspace within six months of the initial sampling is required. Furthermore, if sampling indicates crystalline silica above the established PEL, additional testing must occur within three months of initial sampling for safe worker environments.

Changes in work production, process, control equipment, or work practices may effectively create additional exposures to workers than previously established. Expected re-evaluation of work environment sampling will occur for determinate work area(s) remain below respirable crystalline silica action levels.

Recordkeeping

Documentation for employee exposures and workplace monitoring will require accurate and ready employee reference. Sample events for silica exposure must contain the following criteria for compliance with WAC 296-840-155, Recordkeeping:

- Date, duration, number identification, and the results of each sample taken
- Task event(s) for the work being performed
- Analytical criteria and method used for sampling respirable silica dusts
- Identify the name and employee number of the individual sampled, and a representative job classification of those persons sampled

Objective information gathered during sampling exposure assessments must additionally reference the crystalline silica-containing material(s) in question, the respective silica material source and type; with specific job tasks or activities about which work exposure created silica-containing dusts.

Medical monitoring

Maintenance of employee exposure records shall be kept in accordance to WAC 296-802, Employee medical and exposure records. Medical evaluation for employees with silica exposures will afforded to those completing construction tasks with silica dust exposures 30 or more days per year above recognized action levels of 25 micrograms per eight-hour shift. Individuals in performance of job duties other than construction activities, creating RCS exposures above action levels for more than thirty or more days per year will be included for medical examination review.

EWU employees designated for inclusion into the medical surveillance programs shall receive an initial baseline examination. If a previous employee medical examination have met requirements of medical monitoring within the previous three years of employment, an evaluation will not be necessary. Yearly workplace monitoring and workplace exposures will be compiled for assessment of worker safety through EWU's Medical Questionnaire for employees with respirable crystalline silica exposures.

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