Sampling Firm/Consultant Guidance for Workplace Silica Exposure Assessments

Assembled by the Yale School of Medicine

General Requirements:

- Sampling preferably performed by or under the direct supervision of a Certified Industrial Hygienist (CIH).
- Methods:
  - Respirable dust – Sampling and analysis by NIOSH 0600 gravimetric analysis.
  - Respirable crystalline silica (RCS) – Sampling and analysis by NIOSH Method 7500 / OSHA ID-142 for "silica" and for the individual silica minerals of quartz, cristobalite, and tridymite.
  - Sampling using pre-weighed PVC filters and cyclone or approved equivalent device such as a SKC Parallel Particle Impactor (PPI) or the Zefon Disposable Respirable Sampler (DRS).*
- Analyses by a laboratory accredited by the AIHA-Laboratory Accreditation Program (IHPAT) for respirable crystalline silica (verification of accreditation can be confirmed from: Accreditation Directory (aihaaccreditedlabs.org).

Sampling Strategies:

- Personal breathing zone full-/near full-shift samples (as close to 480 minutes or 8 hours as possible) for evaluation against 8-hour time weighted average (TWA) occupational exposure limits. If not close to full shift, please note why. The sampling device should be turned off during scheduled breaks. For TWA samples of less than 480 minutes, please note what activities employee was engaged in during the unsampled time(s).
- When possible, collect samples for a specific job title, function, task, and specific stone type to permit assessment of dust emissions from that activity and materials, understanding that many employees use a mix of techniques and materials over a work shift.
- Ideally collect at least 3 personal samples per job title / function.
- Minimum 1 field blank per sampling campaign.
- Area samples can be helpful to document silica exposures in specific work locations or to verify absence of exposure in less frequently accessed areas.

Minimum Documentation:

- Date(s) of sampling.
- Who performed the sampling and their credentials.
- Facility name and address.
- General description of facility including:
  - Weather – prevailing wind, temperature range, and open or shut status of overhead exterior doors.
  - Approximate size of facility work area where sampling is conducted.
  - Sketch / plan showing facility, major equipment and exhaust and makeup fans (if applicable) locations.
  - Photos of specific work activities where sampling is conducted.
  - General photos of overall sampling area(s).
  - Number of employees on each shift in each job classification.
  - Statement explaining why the area monitored can be reasonably expected to have the highest exposure level, and why other work areas and shifts may have lower exposure risks.

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Minimum Documentation (*continued*):

- General description of facility including: (*continued*)
  - Statement explaining that materials being processed, work activities, volume of work, and use of controls are representative of a "typical" work day.
  - Stone products(s) processed by each employee during the time monitored, including information on silica content if known (SDS sheets).
  - Information on each employee:
    - Name and job title, function, and shift for each employee monitored.
    - Work location within facility.
- ON-OFF status of **general** ventilation exhaust fans in each area.
- Presence/type of room-level water suppression and/or Local Exhaust Ventilation **(LEV)** systems or other dust controls for machines used by operators being monitored.
  - Specific details on dust control(s) (integrated water) used at the tool.
  - Specific details on the tools and machinery used.
  - If respirators are used, document type(s) and whether they are in conformance with a company written respiratory protection program, if one exists.
- Sampling details including:
  - Pre- and post-sampling pump calibration.
  - Start/stop times.
  - Make/model for pumps and calibrator (retain serial numbers and last factory calibration date for calibrator).
  - Setting of size-selectable device(s) and media (retain lot numbers).
  - Any problems or sampling train equipment failures that could impact results.
- Completed laboratory analysis request form, requesting measurements for
  1) respirable dust by gravimetric analysis (NIOSH 0600) and
  2) respirable crystalline silica (as “silica” and individual minerals – quartz, cristobalite, and tridymite) by XRD (NIOSH 7500 / OSHA ID 142.
- Completed chain of custody.
- Sample shipping method and tracking number (unless hand delivered to laboratory).

Laboratory Results:

- Laboratory report should include:
  - Matchable sample I.D. numbers.
  - Confirmation of the analytical methods performed and notation that laboratory has AIHA IHPAT accreditation.
  - Discussion of any problems with the samples as-received or with lab analyses.

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- Results provided as concentrations of respirable dust and respirable crystalline silica (total silica and by individual mineral species) for the duration of sampling and as projected / calculated 8-hour time weighted averages (for sampling durations significantly shorter or longer than 480 minutes).

Final Consultant Report:

- The final consultant's report should provide the following elements:
  - Details on the facility, material being worked, employee work activities, controls, and sampling methods noted above.
  - Summary table showing results, with airborne concentrations for respirable dust and respirable crystalline silica reported for both the duration of the sampling period and computed for an 8-hour time weighted average (if significantly different than 480 minutes).
  - Show silica results vs. the Threshold Limit Values for RCS published by ACGIH – for information purposes only.
  - Interpretation of findings.
- Regulatory Based Recommendations for client, including:
  - Requirement to notify all exposed workers of results with 15 working days of receiving the results.
  - Supplemental required air sampling (i.e. 3 months, 6 months, other frequency).
  - Requirement to offer initial and 3-year medical monitoring–if exceeded the Action Level for > 30 days/year.
  - Requirement for a respiratory protection–including need for a written respiratory protection program, etc.
- Best Practice Based Recommendations for client including:
  - Additional engineering controls.
  - Suggested good work practices.
  - Improvements to current housekeeping practices.

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* The Zefon Disposable Respirable Inhalable Sampler (DRS) is a modified variation of the Zefon Disposable Inhalable Sampler (DIS). The DRS adds a certified foam insert that has a collection efficiency that closely matches the ISO 7708/CEN convention for respirable dust. This eliminates the need for the use of a cyclone to collect the respirable dust. The DRS meets the criteria of a sampler for the OSHA permissible exposure limit (PEL) of Respirable Crystalline Silica.