# Occupational Exposure to Respirable Crystalline Silica in Stone Countertop Fabrication Facilities in Georgia

Sean Castillo, Brandon Philpot, Jenny Houlroyd, CIH, Robert Hendry, Vicki Ainslie, Hilarie Warren, CIH
Georgia Institute of Technology, Enterprise Innovation Institute, Safety, Health, and Environmental Services

## ABSTRACT


- According to OSHA, nearly 2.3 million people in the United States are exposed to silica – a known carcinogen - at work. Over-exposure to respirable crystalline silica (RCS) can lead to the incurable lung disease silicosis. The Georgia Tech OSHA Consultation Program has consulted with stone countertop fabrication companies operating n Georgia, discovering that many facilities struggle to achieve adequate worker protection even with control methods in place. Exposure sources of RCS include cutting, grinding, and polishing stone products. Facilities often perform these tasks dry, which exacerbates RCS exposure and leads to overexposures. This presentation discusses the exploratory findings of RCS exposure assessments at stone fabrication facilities and challenges of compliance with the silica standard as well as current practices that often lead to overexposure. Throughout the 2017-2020 fiscal year (FY) 12 RCS sampling visits were conducted, which identified 39 employees with exposures to RCS at levels exceeding the applicable OSHA exposure limits.


## BACKGROUND

- Engineered stone: quartz aggregate is binded by polymer adhesives. Engineered stone countertop fabrication in America has increased by approximately 800% from 2010-2018 [1]
- Fabrication (cutting, polishing, grinding, etc.) releases RCS into the atmosphere.
- RCS exposure can lead to an incurable lung disease called Silicosis, as well as lung cancer, and bronchitis. Silicosis also prevents symptoms such as shortness of breath, fever, and respiratory failure which can lead to death. [2]
- Per CDC from 2017-2019; 18 cases of silicosis due to engineered stone fabrication were reported, including 2 fatalities.
- June 23, 2018: New OSHA Silica Standard for general industry went into effect with a Permissible Exposure Limit (PEL) of **50 µg/m³** and an Action Level (AL) of **25 µg/m³**. The full scope of the standard will go into effect on June 23, 2020.
- OSHA Revised a National Emphasis Program (NEP) to identify and reduce or eliminate worker exposures to RCS.[3]
- Silica exposure controls include water-fed equipment, increasing ventilation in the facility, and limiting time spent working with engineered stone, among others.
- Percentage silica is variable in different types of stone:

  Engineered stone: >93%, Quartzite: 95%, Quartzitic sandstone: 90%, Sandstone: 60%, and Granite: 10-45%[4]

## OBJECTIVES

- Assess employee exposure to silica in engineered stone manufacturing facilities in Georgia before and after implementation of controls.
- Provide guidance and information to employers about the causes and risks of, and control methods for silica exposure in the facility.
- Assess compliance with the OSHA General Industry Silica Standard.

## METHODS

- Performed industrial hygiene assessments for personal exposure to RCS using personal air pumps using PVC media with BGI and Dorr Oliver personal cyclones.
- Compared exposure results against OSHA exposure limits.
- 8 initial visits and 4 follow up visits to stone countertop fabrication facilities in the FYs of 2017-2020.

A.

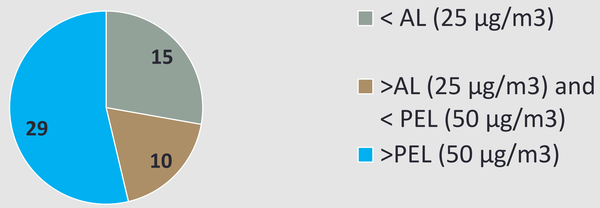
B.

A. Employee using water-fed router

B. Employee using polisher in “dry room” without water-fed tools

## RESULTS

**Count of Employee Exposures by Exposure Category**
**Total of 54 Employees Monitored**

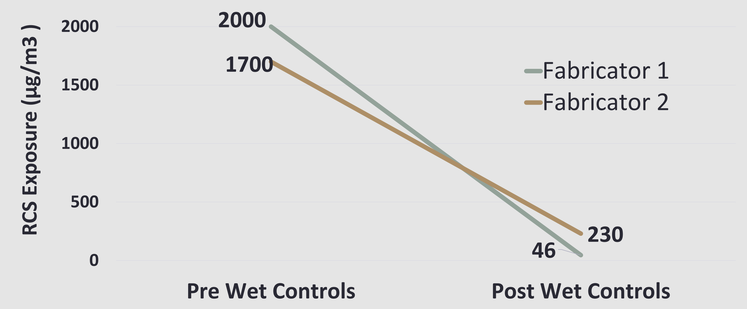



- Maximum personal exposure to RCS: 2,000 µg/m³ (40 times the OSHA PEL—50 µg/m³)

## RESULTS

- One follow-up reduced employee exposures to RCS from above the PEL to under the OSHA AL with adherence to water-fed tools and disallowing the use of compressed air to clean.
- One follow-up reduced exposures from 40 times the PEL to 4.6 times the PEL (case study)
- One follow up did not reduce employee exposures to below the PEL
- One follow-up reduced exposures from above the PEL to above the AL, however, tasks and durations were different for the visits.

**Engineered Stone Countertop Fabrication Case Study**
**Introduction of Wet-Cutting Controls**




## CONCLUSIONS

- Many employees are overexposed to RCS, in small sample size
- All facilities monitored had at least 1 employee exposure above the OSHA AL of 25 µg/m³
- Wet controls in the facility can reduce employee personal exposure to RCS however, Implementing only one control strategy (primarily wet controls) is not always sufficient to reduce employees’ exposure to RCS below the OSHA PEL. Therefore additional controls (ex. Increased local exhaust ventilation) should be researched and implemented.
- More follow up studies will be needed to assess employee personal exposure to RCS as we expect silicosis clusters due to fabrication to become public as diagnostic strategies are improved.

## ACKNOWLEDGEMENTS & CITATIONS


- **Thank you to the OSHA Consultation Program (21D) for allowing us to pursue these sampling visits.**


- **Please view our oral presentation at https://youtu.be/jopEtkBsJV8**
- **References available upon request**