Exposure Monitoring Report Summary EMRS 4

Working Near a Circular Saw Cut Station

IMPORTANT NOTICE

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James Hardie performed monitoring to determine Respirable Crystalline Silica (RCS) dust concentrations at varying distances from Cut Stations where Fiber Cement Products (FCP) were being cut with circular saws. The purpose of the monitoring was to produce objective data[1] potentially useful for compliance under the exposure assessment performance option of OSHA's RCS standard for Construction (29 CFR §1926.1153(d)(2)(ii)). Objective Data may be used when the task is performed under the same conditions as during the monitoring. Monitoring was conducted per NIOSH Method 7500 using a size-selective cyclone for Respirable Dust, with sample analysis conducted by a Laboratory Accredited by the American Industrial Hygiene Association.

Testing Conditions

A. Tools

- 7¼ in. Circular Saws (e.g., Makita 5007F)equipped with Diablo 7¼ in. 4-Tooth Polycrystalline Diamond (PCD) Tipped saw blade (a.k.a., HardieBlade®)
- A floor fan (Ridgid AM2560 - 1625 CFM) was used at Cut Stations as a control to disperse RCS dust generated and minimize worker exposures to RCS

B. Weather (environmental conditions)

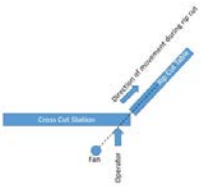
- All samples were collected outside
- Wind varied during monitoring events from calm (0 to 2 mph) to moderately windy (15 to 22 mph)
- RH% varied from 9 to 45 %, and Temperature ranged from 37 to 82 °F

C. Other Conditions

- Circular saws cut James Hardie FCP at 2 separate Cut Station Configurations. The Cut Stations were established and operated to duplicate scenarios of cutting plank siding in a jobsite setting

[1] The term "objective data" means information, such as air monitoring data from industry-wide surveys or calculations based on the composition of a substance, demonstrating employee exposure to silica associated with a particular product or material or a specific process, task, or activity. The data must reflect workplace conditions closely resembling, or with a higher exposure potential than, the processes, types of material, control methods, work practices, and environmental conditions in the employer's current operations. Objective data reflecting "worst case" conditions, in particular, may be helpful in characterizing exposures for purposes of determining coverage under the standard.
From Occupational Exposure to Respirable Crystalline Silica 29 C.F.R. § 1910.1053; Frequently Asked Questions for General Industry; https://www.osha.gov/dsg/topics/silicacrystalline/SilicaGeneralIndustryFAQs.pdf

Cut Station Configuration 1



Cut Station Configuration 2

- At each Cut Station, James Hardie 8 ¼ inch by $^{5}/_{16}$ inch plank siding was cut to simulate jobsite production based on typical construction scenarios
- The siding was cut at 60 linear feet per hour including 1 rip cut every 3 hours. This rip cut further simulates actual jobsite production
- All cutting activities were performed in 5-minute intervals. One minute was spent cutting 7 pieces of siding with a circular saw and 4 minutes were spent no cutting (i.e., waiting), which simulates actual jobsite production pace accounting for measurement, layout, and installation time

Control Setup

- 12 Area samples were collected at locations downwind of Cut Stations 1 and 2, and at a distance of 7 feet from the respective Cut Stations
- 8 Area samples were collected downwind of Cut Station 1, and 4 Area samples were collected downwind of Cut Station 2

Results

Area Sample Results

Date (Wind Conditions)	Monitoring Duration	Cut Station No.[1]	RCS[2] Sample Concentration	8-Hour TWA Concentration	Comment[3]
12/12/2017 (Unknown)	124 Minutes	1	<17.0 µg/m³ (4)	<4.4 µg/m³ (4)	Sample Concentration below lab's detection limit
12/12/2017 (Unknown)	179 Minutes	1	11.5 µg/m³	4.3 µg/m³	Sample Concentration below OSHA AL
12/14/2017 (Northwest 6 – 15 MPH)	165 Minutes	1	<12.0 µg/m³	<4.1 µg/m³	Sample Concentration below lab's detection limit
12/15/2017 (West 1 – 7 MPH)	149 Minutes	1	13.5 µg/m³	4.2 µg/m³	Sample Concentration below OSHA AL
12/18/2017 (North 1 – 8 MPH)	244 Minutes	1	<8.0 µg/m³	<4.1 µg/m³	Sample Concentration below lab's detection limit
12/19/2017 (Southwest 1 -2 MPH)	187 Minutes	1	<11.0 µg/m³	<4.3 µg/m³	Sample Concentration below lab's detection limit
12/20/2017 (Southwest 6 – 10 MPH)	367 Minutes	1	<5.0 µg/m³	<3.8 µg/m³	Sample Concentration below lab's detection limit
12/21/2017 (Northwest 7 – 22 MPH)	398 Minutes	1	<5.0 µg/m³	<4.1 µg/m³	Sample Concentration below lab's detection limit
12/15/2017 (West 1 – 7 MPH)	165 Minutes	2	<12.0 µg/m³	<4.1 µg/m³	Sample Concentration below lab's detection limit
12/15/2017 (West 1 – 7 MPH)	151 Minutes	2	<13.0 µg/m³	<4.1 µg/m³	Sample Concentration below lab's detection limit
12/19/2017 (Southwest 1 -2 MPH)	190 Minutes	2	<11.0 µg/m³	<4.4 µg/m³	Sample Concentration below lab's detection limit
12/20/2017 (Southwest 6 – 10 MPH)	362 Minutes	2	<6.0 µg/m³	<4.5 µg/m³	Sample Concentration below lab's detection limit

(1) All Area Samples collected approximately 7 feet downwind of Cut Stations 1 and 2
(2) RCS means Respirable Crystalline Silica in the Form of Quartz
(3) OSHA Permissible Exposure Limit (PEL) of 50.0 µg/m³ and Action Level (AL) of 25.0 µg/m³ for Respirable Crystalline Silica exposure under (29 CFR 1926.1153)
(4) Units = µg/m³ (micrograms of Respirable Crystalline Silica per cubic meter of air)

- **The table presents that the fan was effective at minimizing RCS concentrations to below the OSHA AL for the monitored period and well below the OSHA PEL when corrected to an 8-hour TWA.**

- Natural wind direction should always be considered when determining Cut Station set-up as windy conditions alone may be useful as a control to minimize RCS exposures for workers.

Formula for TWA

The **Permissible Exposure Limit (PEL)** is a legal limit for permissible exposure of an employee to RCS. OSHA requires an employer to keep employee exposures at or below the PEL of 50 µg/m3 or RCS calculated as an 8-hour TWA (29 CFR § 1926.1153(d)(1)). A TWA (time-weighted average) is the average exposure workers have to RCS over an 8-hour work period. This means the exposure level as an 8-hour TWA is ≤50 µg/m3; and can be as high as ≤100 µg/m3 as a 4-hour TWA if assuming no exposure to RCS for the remainder of the shift. Further, the 2-hour TWA can be as high as ≤200 µg/m3 (assuming no exposure for the remainder of the shift) and a 1-hour TWA can be as high as ≤400 µg/m3 (assuming no exposure for the remainder of the shift).

Calculating the TWA: A TWA is equal to the sum of the various time periods in an 8-hour work day multiplied by the level of RCS dust exposure during each period, divided by the hours in the workday. Specifically,

$$\text{8-Hour TWA} = \frac{[t1c1 + t2c2 + \ldots tncn]}{8 \text{ hours}}$$

Where "t" represents the time for each period and "c" indicates the concentration of RCS exposure during that period in micrograms per cubic meter (µg/m3). For example…

An employee is exposed to RCS during 3 separate periods during an 8-hour work day. Period 1 was performed for 1 hour with an RCS exposure of 200 µg/m3; Period 2 was performed for 2 hours with an RCS exposure of 60 µg/m3; and Period 3 was performed for 1.5 hours with an RCS exposure of 40 ug/m3. The employee had no further RCS exposure for the remaining 3.5 hours of his shift.

$$\text{8-hour TWA} = \frac{[(1 \text{ hour})(200 \text{ µg/m3}) + (2 \text{ hours})(60 \text{ µg/m3}) + (1.5 \text{ hours})(40 \text{ µg/m3}) + (3.5 \text{ hours})(0 \text{ µg/m3})]}{8 \text{ hours}}$$

OR
8-hour TWA = [200 µg/m3 + 120 µg/m3 + 60 µg/m3 + 0 µg/m3]/8 hours
8-hour TWA = [380 µg/m3] /8 hours
8 hour TWA = 47.5 µg/m3 (In this example, the employee's TWA (47.5 µg/m3) is below the PEL of 50 µg/m3)

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. SP18115 12/19