**Characterizing Dust from Cutting Corian®, a Solid-Surface Composite Material, in a Laboratory Testing System**

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### Diagram of the laboratory testing system.



Figure S1. Diagram of the laboratory testing system.

### The dust generation rate from cutting Corian® board

The generation rate of the dust from cutting Corian® board based on the filter samples is defined and described as:

 (1)

where, Mfilter is the mass of the dust collected on the filters (unit of gram or g); Q is the volume flow rate in the testing system, 0.64 m3 s-1; nc is the number of cuts conducted during the sampling; W is the board width (12.7 cm); D is the board thickness (1.2 cm); K is the kerf width of the blade (1.9 mm); ηcorian is the density of Corian® board (1.7 g cm-3); and Qfilter is 9.0 l min-1. Gfilter represents the mass of airborne dust (total or respirable) generated per unit of mass removed from cutting the board. For each filter sample of total and respirable dust, 30 and 100 cuts (nc) were conducted, respectively, as trial tests indicated they would be sufficient for dust analysis without overloading the filter (2.0 mg/sample, NIOSH, 1998).

The three filter samples for total airborne dust returned with the same amount of dust mass, and the total airborne dust generation rate (Gfilter) calculated from equation (1) is 0.04. The result demonstrates again the high repeatability obtained from the system, and it means that there was 0.04 gram of total airborne dust generated for every gram of the board material removed by the cutting. The result from the three respirable dust samples leads to a Gfilter of 0.012±0.001 (arithmetic mean ± standard deviation of the three replicates), which means that there was about 0.012 gram of respirable dust generated for every gram of the board material removed.

### Sampling and data processing for APS and FMPS

As shown in Figure S1, the APS took samples from the duct through an isokinetic sampling probe designed for its operating flow rate, and it covered the range of aerodynamic diameter between 0.542 µm to 19.8 µm. The FMPS used the same sampling port and probe as those used for taking filter samples, and it covered the range of mobility diameter between 6 nm to 523 nm. The operating flow rate of the FMPS is 10.0 l min-1, so its sampling was anisokinetic by using the sampling probe designed for 9.0 l min-1 isokinetic sampling. However, the maximum sampling bias (for particles of 523 nm) from the anisokinetic sampling was estimated about only 0.1% by the equation from Belyaev and Levin (1974).

The data obtained directly from both APS and FMPS are number-based size distributions. The mass-based size distributions were then obtained by assuming all the particles are spherical with a known density. The chemical composition of the particles generated from the baseline test was not analyzed so unit density was assumed for them. The analysis of the filter samples suggested that aluminum hydroxide is likely the dominant component of the airborne dust from cutting Corian® board, thus the density of aluminum hydroxide (2.42 g cm-3) was used to derive the mass-based distributions for the dust from cutting Corian® board.

### A picture of the bulk dust from cutting Corian® board



Figure S2. A picture of the bulk dust from cutting Corian® board.

# **References:**

Belyaev SP, Levin LM. (1974) Techniques for collection of representative aerosol samples. J. Aerosol Sci., 5: 325-338.

NIOSH. (1998) Particulates not otherwise regulated, respirable: Method 0600. NIOSH Manual of Analytical Methods (NMAM), Issue 3. National Institute for Occupational Safety and Health.