- **Name of the Dataset:**
    - Identification of the source of in vitro toxicity of the particulate from sanding solid-surface composite

Dataset Number:

- *(To be provided)*

- **Brief description of the data written for a general audience:**
    - This dataset contains results from laboratory tests examining how dust from common solid-surface materials, like Corian® used in countertops, affects lung cells. Sanding these materials during manufacturing or installation creates fine dust containing the material itself (like aluminum trihydrate, ATH) and potentially particles from the sandpaper. There have been concerns about lung diseases, such as pulmonary fibrosis, in workers exposed to this dust. This study aimed to figure out whether the dust from the Corian® itself or tiny particles from the sandpaper (aluminum oxide, ceramic, or silicon carbide) were more responsible for harmful effects on cells. Researchers exposed cultured human lung cells (THP-1 macrophages, which act like immune cells) to fine dust collected after sanding Corian® with the different sandpapers. They also tested the cells separately with the abrasive particles used in the sandpapers and with ATH. Using advanced automated microscopy (high-content imaging), they measured signs of cell stress like cell death (apoptosis and necrosis), changes in cell growth (cell cycle), and damage to the cell's nucleus. The main finding was that the dust from sanding Corian®, as well as ATH alone, caused a specific type of cell death (apoptosis). However, this dust didn't cause significant immediate cell membrane damage or interfere strongly with how the cells divided. In contrast, the abrasive particles alone *did* cause problems with cell division and the cell cycle, along with some cell death, but their overall pattern of effects was different from the combined Corian® dust. This suggests that the Corian® material itself, likely the ATH component, is a primary driver of the initial apoptotic stress response seen in these lung cells *in vitro*.

- **A general description of the data collection methods:**
    - Bulk dust was first generated by sanding Corian® boards using three different types of commercial sandpaper (aluminum oxide, ceramic, or silicon carbide, grit 120) with an automated belt sander in a chamber.
    - A custom laboratory system was then used to suspend this bulk dust and separate the fine, respirable fraction. This system used an acoustical generator vibrating bulk dust on a latex diaphragm (15 L/min airflow), followed by dilution in a venturi stage (additional 17 L/min air).
    - The aerosol concentration was monitored, and a flow of 30 L/min was pulled through a cyclone with a 5 µm aerodynamic diameter cut-point (URG-2000-30EP) to remove larger particles.
    - The respirable particles passing through the cyclone (< 5 µm) were collected on a large PTFE filter (142mm diameter, 0.2 µm pore size) over 6-hour runs. Particle size

distribution after the cyclone was verified using a MOUDI impactor, confirming a mass median aerodynamic diameter (MMAD) of approximately 2.8-3.0 μm.

- Human monocytic cells (THP-1 line) were cultured and differentiated into macrophage-like cells. These cells were exposed for 48 hours in 96-well plates to suspensions (100 μg/ml, 10 μg/well) of the collected respirable SSC dusts (SSC Al2O3, SSC Ceramic, SSC SiC), abrasive analogue particles (Al2O3, Ceramic, SiC), aluminum trihydrate (ATH), or other controls (e.g., Min-U-Sil, PMMA).
- After exposure, cells were stained for 30 minutes with Hoechst 33342 (nuclei), CellEvent™ Caspase-3/7 Green (apoptosis), and Propidium Iodide (necrosis/membrane integrity).
- An ImageXpress Confocal HT.ai High-Content Imaging System acquired images, and MetaXpress software modules (Multi-wavelength Cell Scoring, Cell Cycle, Micronuclei) were used for automated analysis of endpoints including % apoptotic/necrotic cells, cell cycle phase distribution, and nuclear morphology metrics (e.g., % multi-nucleated, % micronucleated, NDI). The dataset contains these quantitative endpoint measurements.

- **Formatted citations of the publications that have used these data:**
  - Mandler, W.K., Mckinney, W., Qi, C., Knepp, A., Lee, E.G., Kang, S., Keeley, S., & Qian, Y. (2025). Identification of the source of in vitro toxicity of the particulate from sanding solid-surface composite.
- **Acknowledgments (e.g., original source of dataset):**

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- Disclaimer:
- The findings and conclusions in this report are those of the author(s) and do not necessarily represent the official position of the National Institute for Occupational Safety and Health (NIOSH), Centers for Disease Control and Prevention (CDC). Mention of any company or product does not constitute endorsement by NIOSH/CDC.

Citation information

- **Mandler, W. K.**, McKinney, W., Qi, C., Knepp, A., Lee, E. G., Kang, S., Keeley, S., Qian, Y. (2025). Differentiating the in vitro toxicity of solid-surface composite dust: A comparison of material components and abrasive particles. *Toxicology Letters*, 413, 111743.