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How accurately and consistently do laboratories measure workplace concentrations of respirable crystalline silica?

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ABSTRACT

Permissible exposure limits (PELs) for respirable crystalline silica (RCS) have recently been reduced from 0.10 to 0.05 mg/m^3. This raises an important question: do current laboratory practices and standards for assessing RCS concentrations permit reliable discrimination between workplaces that are in compliance and workplaces that are not? To find out, this paper examines recent laboratory performance in quantifying RCS amounts on filters sent to them to assess their proficiency. A key finding is that accredited laboratories do not reliably (e.g., with 95% confidence) estimate RCS quantities to within a factor of 2. Thus, laboratory findings indicating that RCS levels are above or below a PEL provide little confidence that this is true. The current accreditation standard only requires laboratories to achieve estimates within three standard deviations of the correct (reference) value at least two thirds of the time, rather than a more usual standard such as within 25% of the correct value at least 95% of the time. Laboratory practices may improve as the new PEL is implemented, but they are presently essentially powerless to discriminate among RCS levels over most of the range of values that have been tested, leaving employers and regulators without a reliable means to ascertain when workplace RCS levels are above or below the PEL.

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