

Standard Interpretations

/ Correct manner to interpret air sample measurements of an employee's asbestos exposure when the samples are overloaded.

- **Standard Number:** 1926.1101 ; 1926.1101(c)(1) ; 1926.1101(f)(1)

OSHA requirements are set by statute, standards and regulations. Our interpretation letters explain these requirements and how they apply to particular circumstances, but they cannot create additional employer obligations. This letter constitutes OSHA's interpretation of the requirements discussed. Note that our enforcement guidance may be affected by changes to OSHA rules. Also, from time to time we update our guidance in response to new information. To keep apprised of such developments, you can consult OSHA's website at <http://www.osha.gov>.

January 17, 2006

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Dear Mr. Gray:

Thank you for your letter to the Occupational Safety and Health Administration (OSHA). Your letter to our Salt Lake Technical Center (SLTC) was forwarded to OSHA's Directorate of Enforcement Programs, Office of Health Enforcement, in the national office. You requested clarification concerning OSHA's asbestos standards and the requirements for air sampling to monitor employee exposures against the permissible exposure limits (PELs). Specifically, you requested clarification in dealing with an air sample that cannot be analyzed because it is overloaded with debris. This reply letter constitutes OSHA's interpretation only of the requirements discussed and may not be applicable to any question not delineated within your original correspondence. Your paraphrased question and our reply are below.

Question: What is OSHA's guidance on the correct manner to interpret air sample measurements of an employee's asbestos exposure in determining an 8-hour time weighted average (TWA), when some of the sampled shift is measured by samples which are overloaded?

Reply: OSHA's three asbestos standards, the Construction Industry standard, 29 CFR 1926.1101, the General Industry standard, 29 CFR 1910.1001, and the Shipyard standard, 29 CFR 1915.1001, all contain employee exposure monitoring requirements related to your question. We will answer your question by first listing the applicable standard paragraphs from the construction industry standard, followed by the specific guidance you requested. The requirements and guidance are equivalent for all three asbestos standards; also our general guidance on handling overloaded air samples applies to any OSHA standard with requirements for monitoring

employee exposure to airborne contaminants.

1926.1101(c)(1) *Time-weighted average limit (TWA)* states, "The employer shall ensure that no employee is exposed to an airborne concentration of asbestos in excess of 0.1 fiber per cubic centimeter of air as an eight (8) hour time-weighted average (TWA), as determined by the method prescribed in Appendix A to this section, or by an equivalent method."

1926.1101(f)(1)(i) *General monitoring criteria* states, "Each employer who has a workplace or work operation where exposure monitoring is required under this section shall perform monitoring to determine accurately the airborne concentrations of asbestos to which employees may be exposed."

1926.1101(f)(1)(ii) states, "Determinations of employee exposure shall be made from breathing zone air samples that are representative of the 8-hour TWA and 30-minute short-term exposures of each employee."

1926.1101(f)(1)(iii) states, "Representative 8-hour TWA employee exposure shall be determined on the basis of one or more samples representing full-shift exposure for employees in each work area. Representative 30-minute short-term employee exposures shall be determined on the basis of one or more samples representing 30 minute exposures associated with operations that are most likely to produce exposures above the excursion limit for employees in each work area."

These standards require employers to monitor employee exposures by collecting representative air samples whose aggregate sampling time is as close as possible to the employee's full work shift, not to exceed 8 hours. OSHA's 8-hour TWA PELs were established on the basis of a standard 8-hour work shift. For certain asbestos work activities that expose employees to high concentrations of dust, such as construction work, personal air samples can become overloaded quickly with dust and fibers. Therefore, it may be necessary to take several, sequential air samples during the work shift. These sample results are then added together to calculate the employee's cumulative exposure as an 8-hour TWA. The computation formula for adding multiple samples from a monitored work shift's exposure is the standard industrial hygiene formula for cumulative exposures, as listed in OSHA's Air contaminants standards (see 1910.1000(d)(1) or 1915.1000(d)(1)).

While monitoring an employee's exposure to an airborne contaminant, such as asbestos, occasionally samples are lost, damaged, overloaded, or are otherwise unusable. Analytical laboratories report such samples as "VOID," with a note of explanation. An overloaded asbestos air sample is one in which non-asbestos dust obscures some or all of the fibers on the filter and therefore makes it impossible to accurately determine the concentration of asbestos in the laboratory's microscopic analysis. Such samples should **not** be counted by an employer in TWA calculations of employee exposure. The use of a "zero" exposure result for such samples is inappropriate; it will underestimate the employee's true exposure. An employer has the responsibility to "accurately" determine his employee's exposure to asbestos.

The air in the workplace during time periods represented by overloaded samples was not properly sampled and, instead, should be re-sampled using lower volume samples so that they do not become overloaded. In the 1926.1101 standard, paragraph 5.2.8 of Appendix B suggests sampling procedures to avoid the problem of overloading asbestos samples with non-asbestos dust. For example, the suggested maximum sampling volume for asbestos removal operations exhibiting visible dust is 100 liters of air.

The word "representative" in the context of the standard does not mean a representative subset of time, say one hour of an 8-hour work shift. It means that the TWA sampling represents the day-to-day exposure of all employees who perform similar asbestos activities in a given work area. Although the minimum sampling duration for measuring an 8-hour TWA is not specified in the asbestos standards, several other OSHA substance-specific

standards (e.g., arsenic, benzene, cadmium, and coke oven emissions) require full-shift personal sampling to monitor at least seven (7) continuous hours of an employee's work shift in order to be considered sufficient to determine the 8-hour TWA.

In summary, the exposure monitoring requirements in the asbestos standards, as with other OSHA health standards, require the employer to monitor employee exposures initially and routinely so that appropriate hazard control measures are implemented and maintained to protect the employees. These requirements are intended to have the employer regularly collect sample sets which accurately measure employee exposures with statistical significance and a deliberate sampling strategy to demonstrate all employee exposures in all hazardous work activities.

Thank you for your interest in occupational safety and health. We hope you find this information helpful. OSHA requirements are set by statute, standards, and regulations. Our interpretation letters explain these requirements and how they apply to particular circumstances, but they cannot create additional employer obligations. This letter constitutes OSHA's interpretation of the requirements discussed. Note that our enforcement guidance may be affected by changes to OSHA rules. Also, from time to time we update our guidance in response to new information. To keep apprised of such developments, you can continue to consult OSHA's website at www.osha.gov. If you have any further questions, please feel free to contact the Office of Health Enforcement at 202-693-2190.

Sincerely,

Richard E. Fairfax, Director
Directorate of Enforcement Programs

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