

Standard Interpretations / 8-hour total weight average (TWA) permissible exposure limit (PEL).

- **Standard Number:** 1910.1000 ; 1910.1001 ; 1910.1017 ; 1910.1018 ; 1910.1025 ; 1910.1027 ; 1910.1028 ; 1910.1029 ; 1910.1043 ; 1910.1044 ; 1910.1045 ; 1910.1047 ; 1910.1048 ; 1910.1050 ; 1910.1051 ; 1910.1052

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 <https://www.osha.gov>.

October 6, 1995

Mr. Mark Nicas
University of California
Environmental Health Sciences
School of Public Health
140 Warren Hall
Berkeley, California 94720-7360

Dear Mr. Nicas:

This is in response to your letter of July 7, addressed to Mr. Joseph A. Dear, Assistant Secretary for the Occupational Safety and Health Administration (OSHA), requesting an interpretation on 8-hour total weight average (TWA) permissible exposure limit (PEL) as defined in 29 CFR 1910.1000 and in other substance-specific health standards.

The 8-hour TWA PEL is defined in the Federal Register, Vol. 57, No. 114, June 12 1992, pps 26539, 26556, 26572, 26573 and 26590 as follows:

"TWA is the employee's average airborne exposure in any 8-hour work shift of a 40-hour work week which shall not be exceeded."

The 8-hour TWA PEL is the level of exposure established as the highest level of exposure an employee may be exposed to without incurring the risk of adverse health effects. This should not be confused with short term exposure limits (STELs) or peaks. Therefore, your interpretation #1 comes closest to OSHA's definition of an 8-hour TWA PEL. OSHA would be justified in issuing a citation when personal air sampling indicates employee exposure to be in excess of the PEL on the day sampled.

It is well established by the industrial hygiene profession that a workplace survey should be conducted in a facility

to determine the potential for exposure(s) in excess of established exposure levels such as the PEL and TLV's. This survey must include job tasks and the potential created for the exposure by these tasks over all operational shifts as well as the potential for increased exposure(s) as a result of production/work demands. The industrial hygiene survey will allow the employer to establish which shift(s), process(es), etc. need to be sampled in order to acquire a representative sampling of employee exposure. Good industrial hygiene practice dictates that significant changes in the work process would call for additional personal air monitoring thus acquiring revised data which will be representative of employee exposure(s).

As you may be aware, the State of California administers its own occupational safety and health program under a plan approved and monitored by Federal OSHA. Therefore, employers in California must comply with State occupational safety and health requirements. States are required to adopt and enforce occupational safety and health standards at least as effective as those promulgated by Federal OSHA and may be more stringent. If you would like further information regarding California occupational safety and health requirements, you may contact the California Department of Industrial Relations directly at the following address:

[Chuck Cake, Acting Director
California Department of Industrial Relations
Office of the Director
455 Golden Gate Avenue
San Francisco CA 94102

Telephone: (415) 703-5070]

We hope this information is helpful. If you have any further questions, please contact the [Office of Health Enforcement at (202) 693-2109].

Sincerely,

Joseph A. Dear
Assistant Secretary

(Corrections 5/23/2003) Please see the May 13, 1999 letter to Mr. Douglas S. Ellmann, Esq. for additional clarification on this issue.

July 7, 1995

Joe Dear, Assistant Secretary of Labor
Occupational Safety & Health Administration
U.S. Department of Labor
Room S2316
200 Constitution Avenue, N.W.
Washington, D.C. 20210

Dear Sir:

I am writing to secure your official interpretation of an OSHA health standard, namely, the 8-hour TWA permissible exposure limit (PEL) as defined in 29 CFR 1910.1000 and in other substance-specific health standards. Let me provide a background for this request.

Many people believe that an 8-hr TWA PEL is an 8-hr TWA value not to be exceeded on any workday, in other words, the PEL is an absolute limit on the 8-hr TWA value. According to this interpretation of the PEL as an absolute limit, if the 8-hr TWA value exceeded the PEL value on, say, 1 in 1000 workdays, the employer would be deemed out of compliance and OSHA would be justified in issuing a citation for over-exposure. Also according to this interpretation, it would be true that if the 8-hr TWA equaled the PEL value on every workday, the employer would be deemed in compliance and OSHA would not be justified in issuing a citation. I call this Interpretation #1.

In contrast, some people believe that an 8-hr TWA PEL is an 8-hr TWA value that may not be exceeded on the great majority of workdays, say, 95%, although it may be exceeded on the remainder. According to this interpretation of the PEL as a permissible percent exceedance, if the 8-hr TWA value exceeded the PEL value on, say, 100 in 1000 workdays (10%), the employer would be deemed out of compliance and OSHA would be justified in issuing a citation for over-exposure. But if the 8-hr TWA value exceeded the PEL value on only 50 in 1000 workdays (5%), the employer would be deemed in compliance and OSHA would not be justified in issuing a citation. I call this Interpretation #2.

Finally, other people believe that an 8-hr TWA PEL is a permissible long-term mean value, in other words, the permissible mean of all the 8-hr TWA values that may occur. According to this interpretation of the PEL as a permissible mean, if the 8-hr TWA value exceeded the PEL value on, say, 300 in 1000 workdays (30%), but the mean of these 1000 8-hr TWA values was below the PEL value, the employer would be deemed in compliance and OSHA would *not* be justified in issuing a citation for over-exposure. On the other hand, if the mean of these 1000 8-hr TWA values exceeded the PEL value, the employer would be deemed out of compliance and OSHA would be justified in issuing a citation. I call this Interpretation #3.

Given this preface, my question is the following: Which of these three interpretations is OSHA's official interpretation of the 8-hr TWA PEL, or does OSHA have a different official interpretation? For example, perhaps it's Interpretation #2, but with the permissible percent exceedance being only 1% of workdays.

My question is not academic, because its answer broadly impacts industrial hygiene sampling strategies and the interpretation of exposure data with respect to compliance with the OSHA PEL's. For example, if the PEL is an absolute limit on the 8-hr TWA value (Interpretation #1) and an employer wants to determine compliance with the PEL, then the employer should monitor on the "worst-case" day, that is, the day when the very highest exposure is expected to occur. Further, if Interpretation#1 is correct, then the employer should *not* monitor on a randomly selected day *nor* on a "representative" (i.e., average) day, because the highest exposure is not likely to occur on a random day or a "representative" day. On the other hand, if the PEL is a permissible long-term mean value (Interpretation #3) and an employer wants to determine compliance with the PEL, then the employer should monitor on a "representative" day, or perhaps on several randomly selected days (so that the mean may be statistically estimated), but should not monitor on the "worst-case" day because the 8-hr TWA value on the "worst-case" day will almost always be greater than the long-term mean value.

Let me say that I find the language and rationale in many OSHA substance-specific standards inconsistent with respect to this question. For example, in the benzene standard (29 CFR 1910. 1018), the 8-hr TWA PEL was based on risk assessments that related cumulative dose to lifetime cancer risk, such that exposure *at* the PEL value every day over a working lifetime would result in a certain permissible increment of cancer risk. Because the cumulative dose is equal to the product of the long-term mean exposure level and exposure duration, it would seem logical that the PEL be viewed as a permissible long-term mean value (Interpretation #3). Further, under paragraph (e) *Exposure Monitoring*, the standard states that "representative 8-hr TWA employee exposures shall be determined..." Again, the term "representative" implies a determination of the long-term mean 8-hr TWA exposure value. However, the benzene standard also incorporates the "action level" decision logic, where the

action level is set at one-half the 8-hr TWA PEL value. The provenance of this action level is a 1975 NIOSH analysis which explicitly assumed that it was permissible for the 8-hr TWA value to exceed the PEL value on 5% of all workdays (Interpretation #2). Finally, based on my own experience as an OSHA compliance officer, I know that finding an 8-hr TWA benzene exposure above the PEL value on just one inspection day warrants issuing a citation for over-exposure (Interpretation #1).

In closing, your official interpretation would clear up a good deal of confusion among industrial hygienists. Further, it could be referenced in the next edition of the AIHA monograph *A Strategy for Occupational Exposure Assessment* which is currently in development. I greatly appreciate your responding at your earliest convenience.

Sincerely,

Mark Nicas, PhD, MPH, CIH
Research Industrial Hygienist
Member, AIHA Exposure Assessment Strategies Committee

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Frequently Asked
Questions
A - Z Index

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