

**OCCUPATIONAL SAFETY
AND HEALTH STANDARDS BOARD**

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**INITIAL STATEMENT OF REASONS****CALIFORNIA CODE OF REGULATIONS**

Title 8: Section 5155
of the General Industry Safety Orders

Airborne Contaminants - Wood Dust and Western Red Cedar**SUMMARY**

Labor Code, Section 144.6 requires that the Occupational Safety and Health Standards Board (Standards Board), when dealing with standards for toxic materials and harmful physical agents, adopt standards which most adequately assure, to the extent feasible, that no employee suffer material impairment of health or functional capacity even if such employee has regular exposure to the hazard for the period of their working lifetime. This section also requires that the Standards Board base standards on research, demonstrations, experiments and other information as may be appropriate. Labor Code, Section 144.6 also lists other considerations such as the latest available scientific data in the field, the reasonableness of the standards, and experience gained under this and other health and safety laws.

On an ongoing basis with the assistance of an advisory committee, the Division of Occupational Safety and Health (Division) develops proposals to amend these airborne exposure limits known as Permissible Exposure Limits (PELs). This ongoing review is necessary to take into account changes in the information available to assess the health effects of exposures to airborne substances that can be present in the workplace.

The Division proposes to reduce the existing 8-hour time-weighted average (TWA) PEL of 5 milligrams per cubic meter of air (mg/M^3) to $1 \text{ mg}/\text{M}^3$ for wood dust (all soft and hard woods, except Western Red Cedar), and to reduce the existing 15-minute short term exposure limit (STEL) of $10 \text{ mg}/\text{M}^3$ to $5 \text{ mg}/\text{M}^3$. For Western Red Cedar the Division proposes to reduce the existing PEL of $2.5 \text{ mg}/\text{M}^3$ (8-hour TWA) to $0.5 \text{ mg}/\text{M}^3$.

Regulations, Laws, and Other Standards**Existing Title 8 Regulations**

California Code of Regulations (CCR), Title 8, Section 5155 establishes minimum requirements for controlling employee exposure to specific airborne contaminants. This section specifies several types of airborne exposure limits, including limits on exposures as an 8-hour TWA, STELs, and ceiling limits. CCR, Title 8, Section 5155 also contains requirements for measurement of workplace airborne exposures and, in certain situations, medical surveillance.

For wood dust (all soft and hard woods, except Western Red Cedar) the existing TWA PEL is 5 mg/M³ and the existing 15-minute STEL is 10 mg/M³. For Western Red Cedar the existing PEL is 2.5 mg/M³.

Labor Code

Labor Code Section 147.1 requires the Division to maintain surveillance and propose standards to the Standards Board. The Division relies in part on changes made to the Threshold Limit Values (TLVs) published by the American Conference of Governmental Industrial Hygienists (ACGIH) as a source for possible amendments to consider to CCR Title 8, Section 5155. The TLVs for wood dust and for Western Red Cedar were revised in 2005.

Federal OSHA Regulations and Other Standards

There is no Federal Occupational Safety and Health Administration (OSHA) regulation that specifically applies to wood dust. However, OSHA does have a PEL for dust not otherwise classified that would cover wood dust. The PEL in Code of Federal Regulations (CFR), Title 29 section 1910.1000 for such dust is 15 mg/M³ which is less protective than the current and proposed PELs for wood dust in CCR, Title 8, Section 5155.

SPECIFIC PURPOSE AND FACTUAL BASIS OF PROPOSED ACTION

The Division, in developing this and past proposals for amendments to CCR Title 8, Section 5155, has convened advisory committees to consider and make recommendations on the substances in the base list. These advisory committees assist the Division in evaluating and interpreting the studies and other scientific information listed in the Documents Relied Upon section that form the factual basis of proposals for revisions to CCR Title 8, Section 5155. The advisory committees for PELs also provide an additional avenue for involvement in the rulemaking process by employers and worker representatives, and by other communities that can be affected by revisions to CCR Title 8, Section 5155.

The health basis of the PEL for wood dust and Western Red Cedar was discussed by the Division's Health Expert Advisory Committee (HEAC) for PELs at three public meetings from September 2009 through June 2010. After the HEAC discussions concluded, feasibility and cost issues were taken up at a public meeting of the Division's Feasibility Advisory Committee (FAC) on October 6, 2010. Minutes of the HEAC and FAC meetings are posted on the Internet. The website address for 2009-2010 meetings is http://www.dir.ca.gov/dosh/DoshReg/5155Meetings_2009.htm.

This regulatory proposal is intended to provide worker safety at places of employment in California.

An amended PEL for wood dust is proposed to consist of an 8-hour TWA of 1 mg/M³ and a 15-minute STEL of 5 mg/M³, both measured as "total" particulate mass. An amended PEL for Western Red Cedar is proposed to consist of an 8-hour TWA of 0.5 mg/M³ total particulate mass. These amended exposure limits are necessary to assure, to the extent feasible, that no

employee will suffer material impairment of health or functional capacity from exposure to these materials over a working life.

Various wood products are manufactured and used in commercial products and in construction in California. Western Red Cedar is a specialty product used for its durability primarily in exterior construction products such as siding and fencing. According to the most recently available employment statistics, no more than about 10,000 California workers are likely to be affected by the lowered PELs [<http://www.labormarketinfo.edd.ca.gov/data/oes-employment-and-wages.html>].

The ACGIH TLV for wood dusts other than Western Red Cedar was revised in 2005 to 1 mg/M³ “inhalable” particulate mass. The ACGIH TLV for Western Red Cedar was revised in 2005 to 0.5 mg/M³ inhalable particulate. The “inhalable” particulate fraction can consist of some larger airborne particles than the “total” particulate fraction, with the result that in the same workplace environment an air sample for airborne inhalable particulate will generally collect more particulate mass than will a sample for airborne total particulate. In 2009, wood dust was added to the “Proposition 65” list of substances known to the state of California to cause cancer, based on determinations of the U.S. National Toxicology Program and the International Agency for Research on Cancer (IARC). In 2012, IARC updated its references and listing of wood dust as a group 1 carcinogen.

Wood Dust. The TLV documentation for wood dust describes the results of a large number of studies of lung function or respiratory symptoms by level of occupational exposure that indicate a dose response relationship of exposure and non-allergenic health effects. For the purpose of establishing a health based exposure limit value, the Division believes the most important of these are the studies of Mandryk et al. (1999), Chan-Yeung et al. (1980), and Andersen et al. (1977), which the ACGIH summarized and referred to specifically among those references forming the basis of its current TLV value. Compared to a control group of maintenance workers, Mandryk et al. (1999) observed reduced percent predicted lung function values among workers at four sawmills exposed to a reported mean level of inhalable dust of 4.8 mg/M³, with a reported range of exposures of 0.83 to 12.32 mg/M³. Compared to a control group with minimal exposure to wood dust, Chan-Yeung et al. (1980) reported slight decreases in lung function among workers at a pulp and paper mill with measured mean total dust exposure level of 0.5 mg/M³ (range <0.1 to 2.7 mg/M³). Andersen et al. (1977) reported among a group of furniture workers an increasing mucocilliary transport time with increasing exposure to dust starting at exposure levels below 5 mg/M³. Mucus clearance is described by Randell and Boucher (2006) as an essential innate immune protective mechanism of the airways.

The HEAC recommendation of the 8-hour TWA value proposed in this rulemaking was based on an assessment that the three studies noted and other studies discussed in the TLV documentation suggested a Lowest Observed Adverse Effect Level (LOAEL) for non-allergenic respiratory effects of not more than 5 mg/M³ total particulate. While an uncertainty factor of 10 is often applied to a LOAEL to calculate a No Observed Adverse Effect Level (NOAEL), in this case a PEL value of 1 mg/M³ was felt to be reasonable by the HEAC. Details of the HEAC discussion are available in the minutes for the meetings at which wood dust was discussed.

The HEAC also believed that since most of the studies of wood dust cited as the basis for the TLV were based upon measurements of total rather than inhalable particulate mass, that total particulate mass is the appropriate basis for the PEL. The ACGIH for the TLV used a conversion factor between total and inhalable particulate of 2.5. As a result, the PEL proposed at the same numerical value as the TLV, but based upon total rather than inhalable particulate mass, is less stringent than the TLV.

With regard to feasibility of the PEL being proposed, in a study of 10 wood processing plants in the United States with collection of 2,430 valid air samples in a variety of tasks, between 70 and 80% of results were below the 1 mg/M³ total dust level being proposed as an 8-hour TWA PEL based on a conversion factor of 1/2.5 from results of inhalable samples collected to total dust (Kalliny et al., 2008). This study found the highest levels of exposure associated with blowing down of equipment and in sanding operations. In light of the potential for significant contribution to wood dust exposure from intermittent and short term operations, especially end-of-shift equipment clean-up, a revision of the existing 15-minute STEL of 10 mg/M³ to 5 mg/M³ is proposed along with an 8-hr TWA PEL of 1 mg/M³. Revision of the STEL to provide additional exposure control is consistent with concern expressed by some FAC members that the 8-hour TWA being proposed based on total particulate mass is not as protective as the ACGIH TLV based on inhalable mass for the same 1 mg/M³ value.

Western Red Cedar. The ACGIH documentation for its TLV of 0.5 mg/M³ inhalable particulate mass for Western Red Cedar notes a number of studies showing a strong association between exposure to Western Red Cedar dust and occupational asthma. In addition to asthma, at least one study, Noertjojo, et al. (1996), has also reported an effect of exposure on lung function. A number of studies have specifically identified plicatic acid as the source of the allergenic reaction. The ACGIH notes that the exposure level at which asthma begins to develop in some workers has not been established. However, a number of studies suggest that it is less than 1 mg/M³ total dust and may be less than 0.5 mg/M³. A reduction in the PEL for Western Red Cedar from 2.5 to 0.5 mg/M³ is proposed and should provide substantial additional protection from development of occupational asthma.

TECHNICAL, THEORETICAL AND/OR EMPIRICAL STUDIES, REPORTS OR DOCUMENTS RELIED ON BY THE STANDARDS BOARD

1. American Conference of Governmental Industrial Hygienists. Documentation of Threshold Limit Values for Wood Dusts (including Western Red Cedar). 2005.
2. Office of Environmental Health Hazard Assessment, California Environmental Protection Agency. Proposition 65 CHEMICALS LISTED EFFECTIVE DECEMBER 18, 2009 AS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER OR REPRODUCTIVE TOXICITY: WOOD DUST, ZIDOVUDINE (AZT), TERT-AMYL METHYL ETHER (TAME) AND ETHYL-TERT-BUTYL ETHER (EBTE). December 18, 2009. http://oehha.ca.gov/prop65/prop65_list/121809list.html

3. Andersen, H. C., et al. Nasal cancers, symptoms and upper airway function in woodworkers. *British Journal of Industrial Medicine*. 34: 201-207. 1977.
4. California Employment Development Department OES Employment and Wages Data Tables, First Quarter 2014, <http://www.labormarketinfo.edd.ca.gov/data/oes-employment-and-wages.html>
5. Chan-Yeung, M., et al. Respiratory Survey of Workers in a Pulp and Paper Mill in Powell River, British Columbia. *American Review of Respiratory Diseases*. 122: 249-257. 1980.
6. Chan-Yeung, M. Mechanism of Occupational Asthma Due to Western Red Cedar. *American Journal of Industrial Medicine*. 25:13-18. 1994.
7. International Agency for Research on Cancer. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. Volume 100C (2012). Arsenic, Metals, Fibres and Dusts. World Health Organization. <http://monographs.iarc.fr/ENG/Monographs/vol100C/>
8. Kalliny, M. I., et al. A Survey of Size-Fractionated Dust Levels in the U.S. Wood Processing Industry. *Journal of Occupational and Environmental Hygiene*. 5: 501-510. 2008.
9. Mandryk, J., et al. Work-Related Symptoms and Dose-Response Relationships for Personal Exposures and Pulmonary Function Among Woodworkers. *American Journal of Industrial Medicine*. 35:481-490. 1999.
10. Noertjojo, H. K., et al. Western Red Cedar Dust Exposure and Lung Function: A Dose-Response Relationship. *American Journal of Respiratory and Critical Care Medicine*. 154: 968-973. 1996.
11. Occupational Safety & Health Administration, *Woodworking eTool*. https://www.osha.gov/SLTC/etools/woodworking/production_wooddust.html
12. Randell, S. H. and Boucher, R. C. Effective Mucus Clearance Is Essential for Respiratory Health. *American Journal of Respiratory Cell and Molecular Biology*. 35: 20-28. 2006.
13. Vedal, S., et al. Symptoms and Pulmonary Function in Western Red Cedar Workers Related to Duration of Employment and Dust Exposure. *Archives of Environmental Health*. 41: 179-183. 1986.
14. Letter from American Forest & Paper Association, et al, to Feasibility Advisory Committee (FAC), September 15, 2010.

15. Letter from American Wood Council, et al, to FAC, November 10, 2010.
16. Minutes of the Health Expert Advisory Committee (HEAC) meeting held on June 23, 2010, with sign-in sheets and summary report on wood dust and Western Red Cedar dated June 9, 2010, by Dr. Linda Morse.
17. Minutes of the HEAC meeting held on September 10, 2009, with sign-in sheets.
18. Minutes of the HEAC meeting held on March 24, 2010, with sign-in sheets and summary report on wood dust and Western Red Cedar dated February 1, 2010, by Dr. Linda Morse.
19. Minutes of the Feasibility Advisory Committee (FAC) meeting held on October 6, 2010, and sign-in sheets.

These documents are available for review Monday through Friday from 8:00 a.m. to 4:30 p.m. at the Standards Board Office located at 2520 Venture Oaks Way, Suite 350, Sacramento, California.

PETITION

This proposal was not the result of a petition.

ADVISORY COMMITTEE

This proposal was developed with the assistance of an advisory committee. (Attendance sheets, and minutes are included as Documents Relied Upon.)

FIRE PREVENTION STATEMENT

This proposal does not include fire prevention or protection standards. Therefore, approval of the State Fire Marshal pursuant to Government Code Section 11359 or Health and Safety Code Section 18930(a)(9) is not required.

SPECIFIC TECHNOLOGY OR EQUIPMENT

This proposal will not mandate the use of specific technologies or equipment.

ECONOMIC IMPACT ANALYSIS/ASSESSMENT

The Division has made a determination that this proposal should not result in a significant, statewide adverse economic impact directly affecting businesses, including the ability of California businesses to compete with businesses in other states. The proposed regulation will not have any effect on the creation or elimination of California jobs or the creation or elimination

of California businesses or affect the expansion of existing California businesses. The Division anticipates that any potential costs would in part be balanced by avoiding or minimizing the costs inherent in workers' compensation claims, lost work time, and productivity losses that would have been caused by workplace illnesses and injuries of employees.

This rulemaking proposes to amend the existing PELs for wood dust and for Western Red Cedar in workplace air. The PEL values proposed in this rulemaking for these dusts are the same numerical values as the current ACGIH TLV. However, because they are based on collection of "total" rather than "inhalable" particulate mass, the PELs proposed are less stringent than the ACGIH TLVs. The current TLVs for wood dust and for Western Red Cedar were adopted by ACGIH in 2005, and so professional health and safety staff and consultants of affected employers should be aware of these values at most California workplaces.

At the FAC meeting held October 6, 2010, a representative of the American Forest and Paper Association (AFPA) and the American Wood Council suggested that an 8-hour TWA PEL of 2 mg/M³ total particulate could probably be achieved by most California employers using engineering controls, but that a PEL of 1 mg/M³ would probably necessitate use of respirators by many employees. This sentiment was echoed by a representative of Sierra Pacific Industries, a large multi-location California wood products producer. However, information to support this suggestion was not provided. It was also noted in the FAC meeting that equipment blow down operations could generate high short term exposures that should be controlled.

A September 15, 2010, letter intended for FAC members was received from the AFPA and signed by representatives of eight other national wood products industry associations. The letter expressed support for the HEAC recommendation for the PEL for wood dust being based on "total" rather than "inhalable" particulate. The AFPA letter also expressed concern with the feasibility of a PEL of 1 mg/M³ based on total dust. To support its position on the feasibility of a PEL of 1 mg/M³ total dust, the AFPA letter cited data from 92 measurement results in the OSHA Integrated Management Information System (IMIS) by state and federal workplace inspection personnel between 2003, and 2009, a large set of results from a European Union database of air samples collected from 2000, to 2003, and the Kalliny et al. study. Of these the Division believes the Kalliny study data, being the most detailed, are the most relevant to consideration of the feasibility of the PEL being proposed.

The AFPA letter reported the Kalliny study's findings that 28 percent of 2,430 air samples collected at 10 wood processing operations were above a total dust level of 1 mg/M³ as calculated from collected inhalable dust samples. The letter concluded that this finding indicates that a 1 mg/M³ total dust PEL for wood dust would not be readily achievable. The letter suggests similar difficulties are reflected by the European Union database's contents of 25 percent of 35,000 air sample results from 6 countries being in the range of 1 to 2.5 mg/M³ total dust, with 16 percent being above 2.5 mg/M³ total dust. By contrast however, these data are similarly encouraging as those in the Kalliny study that most workplaces should be able to achieve compliance with a PEL of 1 mg/M³ total dust. Finally, the AFPA letter indicates that 78

percent of 92 air sample results in manufacturing operations involving wood dust in the OSHA IMIS system exceeded the proposed revised PEL of 1 mg/M³. Results from the OSHA IMIS database can be useful in assessing PEL feasibility, in this particular case the findings of the Kalliny and European Union studies cited in the AFPA letter with their much larger number of air sample results are more appropriate sources to rely on for assessing the feasibility of the proposed PEL revisions. OSHA policy is to limit inspections in which air monitoring is performed to operations lacking engineering controls. Therefore the Division believes that the OSHA dataset to which the AFPA refers is a biased one that selected for air sampling primarily those woodworking places of employment that lacked engineering controls or had significant surface dust accumulations. The OSHA database therefore tends to depict wood dust exposure.

A follow-up letter dated November 10, 2010, from the American Wood Council and a number of other organizations made reference to a study commissioned in 1987 by a group of wood industry associations to assess the potential costs of complying with PELs of 5 and 1 mg/M³. The letter indicated that the study involved 46 facilities across the United States and had concluded that in California the cost of complying with a PEL of 1 mg/M³ would be approximately \$448 million in 2010 dollars. However, the California wood products industry has changed a great deal since the time of this study, and wood dust control technologies available and in use have also changed significantly. As a result, the results of this study cannot be used to estimate current costs of compliance with a PEL of 1 mg/M³.

Based on the information above, particularly the finding in the Kalliny et al. study that almost 75 percent of over 2,400 air samples at 10 facilities of various types were in compliance with the proposed full-shift PEL, the Division does not believe there are significant costs associated with this regulatory proposal. Even in the only half dozen years since the Kalliny study, technological improvement and growth and spread of knowledge has made complying with the proposed PEL easier and in many cases far cheaper than in the past.

Most wood manufacturers with large scale facilities and large numbers of employees must rely on specialized central ventilation systems that deposit wood dust outside the work building. Though such ventilation systems can be very expensive, nearly all large wood manufacturers have had such systems installed for many years. The industry and its insurers have long recognized that such systems are necessary to prevent fires and explosions, so large wood manufacturers already have these systems, though in some cases not well-maintained. Since 2008, federal OSHA has conducted a major emphasis program on reducing the risk of dust explosions. Employers in many industries, including wood manufacturing have been responding by improving the maintenance and performance of their existing ventilation systems. Long overlooked maintenance on the ventilation systems, such as replacing inefficient ventilation fans, cleaning ducts and repairing leaks, as well as improved maintenance of wood working machines and better housekeeping of remaining fugitive dust all serve to reduce worker exposure to wood dust as a side effect of reducing the risk of wood dust explosions.

Most of the wood manufacturing facilities in the Kalliny study that are not in compliance with the proposed PEL were smaller scale facilities, employing in most cases only a few workers. In many instances, such facilities never installed central ventilation systems. However, because of

late 2007, regulatory changes adopted by the Standards Board to CCR Title 8, Section 4324, indoor utilization of small, inexpensive “enclosureless bag-type dust collectors [ECD]” is now permitted instead of designed central dust collection systems with a cyclone and/or baghouse located outside the workshop. ECD systems cost between a few hundred dollars for units servicing one or two single wood working machines to a couple of thousand for complex units servicing more machines. Another way in which wood manufacturers can reduce fugitive wood dust emissions is modification of the designed dust capture ventilation systems on existing wood working machines such as table saws and sanders. Vintage machines have ventilation designs that have been determined to be leaking and inefficient but easily and very cheaply remediated by employers by their own efforts incurring only the cost of off-the-shelf sheet metal parts (under \$100). Various sources, including federal OSHA, the National Institute for Occupational Safety and Health and numerous other sources available on the internet provide detailed instructions and designs to assist do-it-yourselfers make these modifications.

Another low-cost way to reduce wood dust exposure is to remove accumulated dust more frequently and more efficiently. Enterprises that clean by dry sweeping fugitive dust accumulations contribute both to higher airborne wood dust concentrations and to the explosion and fire risk. Low cost vacuums are an effective housekeeping alternative to sweeping. For hand operations, such as cutting with circular saws, vacuum equipped hand tools are available at costs equivalent to non-vacuum equipped models.

The above considerations [as well as other production-related changes with secondary effects reducing the amount of employee dust exposure, such as a proper alignment of cutting tools and computerized cutting] contribute to the conclusion that the *average* cost for achieving compliance with the proposed PELs to employers not already in compliance will be about \$1,000. Based upon the overall small percentage of woodworking firms not already in compliance, only about a thousand firms in California will be financially impacted.

BENEFITS OF THE PROPOSED ACTION

Both employers and employees in the wood manufacturing industry will benefit from improved employee respiratory health as a result of adoption of this proposal. The Division believes that employees in the wood manufacturing industry in California will benefit from improved respiratory health as a result of the adoption of these amended PELs. Employers will benefit from improved work attendance by employees due to improved respiratory health. Employers not already compliant with the new PELs will improve maintenance and utilization of existing mechanical exhaust ventilation to achieve ambient wood dust levels that are compliant with the new PELs. Improved mechanical exhaust dust capture will result in less dust on workplace surfaces. Less surface dust accumulation benefits employers by lowering housekeeping costs. By thus reducing workplace accumulated dust levels and associated fire hazards, employers and employees will both benefit. There are no anticipated benefits to the state’s environment.

EVIDENCE SUPPORTING FINDING OF NO SIGNIFICANT STATEWIDE ADVERSE ECONOMIC IMPACT DIRECTLY AFFECTING SMALL BUSINESSES

The Division has determined that the proposed amendments may affect small businesses. However, little economic impact is anticipated because small businesses will be able to come into compliance through the use of improved administrative procedures such as better housekeeping and better maintenance of existing mechanical exhaust ventilation. Small businesses are currently required to provide mechanical exhaust ventilation and provide adequate housekeeping in order to maintain wood dust levels below the current PELs. See also the discussion of cost impacts on private businesses, as those considerations as well as other production-related changes with secondary effects reduce the amount of employee dust exposure.

REASONABLE ALTERNATIVES TO THE PROPOSAL AND THE STANDARDS BOARD'S REASONS FOR REJECTING THOSE ALTERNATIVES

No reasonable alternatives have been identified by the Division or have otherwise been identified and brought to its attention that would be more effective in carrying out the purpose for which the action is proposed, would be as effective and less burdensome to affected private persons than the proposed action, or would be more cost-effective to affected private persons and equally effective in implementing the statutory policy or other provision of law.

Labor Code section 144.6 provides that standards dealing with toxic materials be adopted that are most adequately protective of employee health "to the extent feasible." Discussions were held in public meetings with advisory committees for both health and feasibility assessment. These discussions addressed a number of factors relevant to consideration of a particular value for the PEL proposed in this rulemaking. These discussions are described in the minutes included in the documents relied upon. Labor Code section 144.6 also provides that whenever practicable, standards for toxic materials be expressed in terms of objective criteria and of the performance desired. The proposal in this rulemaking is consistent with that stated preference in that it does not require particular specified equipment or methods for exposure level control, but rather provides an objectively stated performance criterion with affected employers determining the alternatives to use to achieve compliance in their particular operations involving employee exposure to the toxic material. The preference of Labor Code section 144.6 for performance based standards for toxic materials is consistent with the same stated preference contained in such Government Code section 11340.1(a).