



## Western Red Cedar Asthma

### Background Information

Western Red Cedar (*Thuja plicata*) wood has many structural and decorative uses. Its popularity stems from its light weight, straight grain and durability. There are many small to medium-size sawmills and shake mills in the Pacific Northwest that specialize in Western Red Cedar.

Western Red Cedar contains relatively high volatile and non-volatile compounds. Of these compounds, plicatic acid (a non volatile component in the wood) has been identified as the component of Western Red Cedar that is likely responsible for causing an array of pathological changes consistent with inflammatory and allergic reactions. Plicatic acid concentrations are highest in Western Red Cedar, although Eastern White Cedar (*Thuja occidentalis*) and Japanese Cedar (*Cryptomeria japonica*) also contain it.

Western Red Cedar is noted for causing or exacerbating asthma, rhinitis, and conjunctivitis in some individuals who are exposed to the dust created when processing the lumber. This guide is intended to describe the problems associated with Western Red Cedar and offer suggestions on how to limit potential claim problems resulting from exposures.

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Western red cedar asthma (WRCA) is the most common form of occupational asthma in the northwest United States and in British Columbia. It is estimated that 5 to 10 percent of those exposed to Western Red Cedar (WRC) dust in an occupational setting will develop sensitization. The actual percentages, however, may be higher because it is believed that some affected workers will voluntarily find other work when symptoms arise, and will not report the illness. An individual may develop symptoms within weeks of exposure, or it may take many years. There is no known method of predetermining if an individual will become reactive to the dust. Smoking and allergic history are not necessarily good predictors for who will develop WRCA.

The disease is often difficult to diagnose, especially in the early stages. Initial symptoms may be cough, sputum (phlegm) production and rhinitis (runny nose). It also may be mistaken for a cold or bronchitis. Later symptoms are more severe and include chest tightness, shortness of breath and wheezing.

Those who have developed WRCA may experience symptoms immediately after dust exposure or they may be delayed and occur several hours after exposure began. Thus, it may be some time before the association between symptoms and workplace exposures is identified. Once an employee is sensitized, it may take less and less exposure to cedar dust to cause symptoms.

The disease can progress to a permanent chronic asthma, even after exposure has ceased. Usually this occurs after months or years of continued exposure while symptoms are present. About half of the workers with WRCA continue to have asthma symptoms after red cedar exposure ceases. Changes which occur in the lung after the development of WRCA cause the airways to become more responsive to other stimuli such as cold air, exercise or chemical vapors. This airway reaction to a variety of stimuli is thought to be responsible for the persistence of WRCA and is typical of asthma in general. Thus, it is imperative to minimize the exposure to as low as reasonably achievable before sensitization takes place. If sensitization has already taken place, it is important to identify employees in the early stages of the disease, provide proper medical care and remove them from further exposure.

Normally, eliminating exposure is accomplished by placing the sensitized individual in a work area where there is no exposure to cedar dust. In most cedar operations, this is not possible. Since removal from exposure could mean loss of employment, this is not an easy task. One alternative to this situation is the use of respiratory protection. The typical filtering facepiece (disposable mask) has not been effective in preventing symptoms. The twin cartridge elastomeric respirator may be a more beneficial choice than the filtering facepiece style because the seal is less prone to leakage. Both of these types of respirators are uncomfortable to wear for long periods of time and momentary removal may allow enough dust to be inhaled to trigger the symptoms.

These respirators also operate at negative pressure inside the mask, so any amount of leakage around the face piece seal can also result in dust inhalation.

Therefore, the use of respiratory protection may not be adequate to protect a sensitized worker from further symptoms, but may be helpful in some cases.

Asthmatic individuals may also have greater difficulty in breathing against the resistance of a negative pressure respirator, especially if their asthma is active. A medical evaluation is necessary to determine whether an employee can wear such a respirator.

Knowing that once an employee is sensitized, he or she can react to small amounts of dust, which may be present on work clothing or surfaces. Showering, including a shampoo, and changing clothing before leaving work, is recommended for sensitized individuals who continue to work.

### **Occupational Exposure Limits**

Currently there is no specific Permissible Exposure Limit (PEL) for Western red cedar dust. The OR-OSHA PEL for non-allergenic wood dust is 10 mg/M<sup>3</sup> but this clearly does not provide adequate protection for exposures to WRC dust. British Columbia has had a PEL for Western red cedar dust of 2.5 mg/M<sup>3</sup> for a number of years. This standard does not guarantee worker protection since valid cases of red cedar asthma have arisen from exposures less than 2.5 mg/M<sup>3</sup>.

The National Institute for Occupational Safety and Health (NIOSH) has a Recommended Exposure Limit (REL) of 1.0 mg/M<sup>3</sup> (total dust). The American Conference of Governmental Industrial Hygienists (ACGIH) has adopted a Threshold Limit Value (TLV) of 0.5 mg/M<sup>3</sup>, inhalable fraction. This occupational exposure limit is set to protect exposed workers from developing occupational asthma and is based on extensive WRC data sets as well as studies from sawmill workers.

The inhalable fraction is used for all wood dust TLVs due to the evidence of an increased risk of upper and lower respiratory symptoms, and sino-nasal cancer. The concentration of the inhalable fraction of dust is measured using special sampling devices. A conversion factor for estimating the inhalable dust concentration from "total dust" measurements is provided in the documentation for the cedar dust TLV. This is done by multiplying the total dust concentration by 2.5, as the "total dust" method underestimates the inhalable fraction of dust exposure.

The ACGIH has also adopted a sensitization (SEN) notation for WRC, based on evidence of WRC being a sensitizer to the skin and respiratory tract.

Western red cedar dust is a known cause of respiratory disease. It is not known why some individuals react and others do not. Employers with WCR dust exposures should reduce levels to the lowest feasible level and inform affected workers of the hazards and symptoms associated with sensitization. Medical care should be obtained early in the disease process and affected workers removed from exposure. Again, once an individual is sensitized, an extremely low dust exposure can trigger symptoms. Thus increased ventilation will not be successful in creating a safe workplace for a sensitized worker.

## **Resources**

- OSHA Preamble, Air Contaminants (29 CFR 1910.1000)
- Documentation of the Threshold Limit Value for Wood Dusts, ACGIH ©2005.