

# Office of Environmental Health Hazard Assessment



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## MEMORANDUM

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**FROM:** David Ting, Ph.D., Chief  
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**DATE:** November 28, 2006

**SUBJECT:** UPDATE OF THE PUBLIC HEALTH GOAL FOR CHLORDANE

Under the Calderon-Sher California Safe Drinking Water Act of 1996, the Office of Environmental Health Hazard Assessment (OEHHA) develops public health goals (PHGs) for regulated chemicals in drinking water and reviews and updates the risk assessments every five years (Health and Safety Code Section 116365(e)(1)). This memorandum represents an update of the literature review and re-evaluation of the existing PHG for chlordane. Our re-evaluation supports the previous PHG derivation in 1997. We conclude that the PHG for chlordane should remain at 0.03 parts per billion (ppb) (OEHHA, 1997).

### Summary of Review

Chlordane is a broad-spectrum insecticide used to control termites and pests on field crops. Since 1988, all uses of chlordane have been banned in the United States (U.S. EPA, 2006). However chlordane is still available for human exposure because it is a very stable chemical and is anticipated to persist in the environment for some time.

California Environmental Protection Agency

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The current federal Maximum Contaminant Level (MCL) for chlordane is 2 ppb and the California MCL is 0.1 ppb. According to the California Department of Health Services monitoring report (CDHS, 2006), chlordane has not been detected in drinking water sources over the past four years (2002-2005).

The chlordane PHG of 0.03 ppb is based on cancer risk. This number was derived by using an oral cancer slope factor of  $1.3 \text{ (mg/kg-day)}^{-1}$ , which was the same as the U.S. EPA cancer potency value at that time. For non-cancer health effects, the PHG document identified a Lowest-Observed-Adverse-Effect Level (LOAEL) of 0.1 mg/kg-day, based on sex steroid-related behavioral effects in rats, using a combined uncertainty factor of 10,000. This would result in an oral Acceptable Daily Dose of  $1 \times 10^{-5} \text{ mg/kg-day}$  and a non-cancer health-protective concentration of 0.02 ppb. For the PHG, OEHHA selected to use 0.03 ppb based on the cancer endpoint. The large margin-of-safety of 6,700 for non-cancer health effects at 0.03 ppb is adequate and appropriate for protecting against potential endocrine effects in humans (OEHHA, 1997).

Several potentially relevant new studies were identified in this update. U.S. EPA (1998) published a toxicological review of chlordane and the International Agency for Research on Cancer (IARC) issued a monograph reviewing the carcinogenicity of chlordane and similar compounds (IARC, 2001). Both of these reviews reaffirm the carcinogenicity of chlordane. However, no new toxicity studies were located that appeared likely to result in a change of the PHG value for chlordane.

In the 2005 School Site Risk Assessment document, the Integrated Risk Assessment Branch of OEHHA estimated a non-cancer child-specific reference dose (chRD) of  $3.3 \times 10^{-5} \text{ mg/kg-day}$  for chlordane (OEHHA, 2005). It used the same rat study and the LOAEL as those in the PHG document, but applied an uncertainty factor of 3,000 instead of the factor of 10,000 used for the PHG, in accordance with the approach currently utilized by both OEHHA and U.S. EPA.

The U.S. EPA currently uses an oral cancer slope factor of  $0.35 \text{ (mg/kg-day)}^{-1}$  (U.S. EPA, 1998). This number is about four times lower than the one we used to derive the PHG. The U.S. EPA (1998) also has an oral reference dose (RfD) of  $5 \times 10^{-4} \text{ mg/kg-day}$ , which is 50 times higher than the health-protective value that results from the approach in the 1997 PHG document, and 15 times higher than the child-specific reference dose in the IRAB risk assessment. The U.S. EPA RfD is based on liver necrosis (with a No-Observed-Adverse-Effect Level of 0.15 mg/kg-day) in a chronic mouse study.

Based on this review, a full evaluation of the PHG might lead to a higher PHG value, but would be unlikely to lead to a lower (more health-protective) value. The California MCL is currently 3-fold higher than the chlordane PHG developed in 1997; this difference is within the range of likely revisions, if a full review were performed. Because chlordane was banned

eighteen years ago and has not been detected in drinking water sources in California for several years, we do not recommend a full revision of the PHG document at this time. OEHHA concludes that the existing PHG of 0.03 ppb chlordane in drinking water is adequate to protect the general population and sensitive subpopulations, including pregnant women and their fetuses, infants, and the elderly.

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