



THE CHLORINE INSTITUTE

1300 Wilson Boulevard, Suite 525
Arlington, VA 22209
Phone: 703-894-4140 Fax: 703-894-4130
www.chlorineinstitute.org

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Mr. Thomas Carpenter - Designated Federal Officer (DFO)
U.S. EPA SAB Staff Office
Woodies Building
1025 F Street, N.W.
Suite 3600
Washington, DC 20004

Dear Mr. Carpenter;

The Chlorine Institute appreciates the opportunity to provide comments to the SAB's Perchlorate Advisory Panel addressing EPA's white paper "Life Stage Considerations and Interpretation of Recent Epidemiological Evidence to Develop a Maximum Contaminant Level Goal for Perchlorate" (White Paper). The Chlorine Institute (CI) founded in 1924, is a 200 member, not-for-profit trade association of chlor-alkali producers worldwide, as well as packagers, distributors, users, and suppliers. The Institute's mission is the promotion of safety and the protection of human health and the environment in the manufacture, distribution and use of chlorine, sodium hydroxide, potassium hydroxide and sodium hypochlorite, plus the distribution and use of hydrogen chloride. The Institute's North American Producer members account for more than 93 percent of the total chlorine production capacity of the U.S., Canada, and Mexico.

Trace levels of perchlorates can be formed as a product of decomposition of sodium hypochlorite solution. Data indicate that perchlorate levels in sodium hypochlorite can increase over time as the sodium hypochlorite solution is stored. The amount of perchlorates formed is dependent on a number of factors including, but not limited to, the concentration of the sodium hypochlorite, the temperature of the sodium hypochlorite and the impurities in the sodium hypochlorite. As previously indicated, sodium hypochlorite is a mission chemical of the Chlorine Institute. For a variety of reasons, sodium hypochlorite is being increasingly used as a disinfectant for drinking water. Accordingly, the Institute has a strong interest in this matter.

Issue Discussion

The Chlorine Institute appreciates the work of the Science Advisory Board and believes that risk-management decisions should be based on the best available science. And because EPA's policy decisions have a major impact in the United States and elsewhere it is critical that the agency's policy decisions are firmly rooted in the best available science and that the agency's use of science is subject to rigorous peer review.

However, in reviewing this peer process it appears that information provided by the public is being treated as less valuable than the information compiled by the agency. For example, the process provides very little time to review the charge questions, key documents and ancillary materials from the relevant program office. Also, the process includes very little time for public comment which, in this case will be five minutes. The time restraint does not allow for any meaningful dialogue between the panelists and the speakers. More importantly, effective scientific exchange does not occur through public comment but rather through expert discussion. Dialogue between interested and informed experts and the peer review panel would allow for a more open discussion of the science relative to the SAB's work.

In reviewing EPA's specific charge questions to the Perchlorate Advisory Panel ("Panel") in this section CI notes that EPA has omitted a critical question which is fundamental to the overall approach when discussing the development of a Maximum Contaminant Level Goal for Perchlorates. That question concerns the appropriateness of the currently used reference dose (RfD) for perchlorate. The agency states in the White Paper that "*EPA believes that this RfD is the most scientifically defensible endpoint available at this time for assessing risk from perchlorate exposure*" The Chlorine Institute disagrees with this statement for the reasons provided in the following discussion.

The National Academy of Sciences (NAS) report on perchlorate health effects (NAS 2005) used iodide uptake inhibition as the critical effect for daily allowable perchlorate intake. Existing drinking water advisories and standards for perchlorate are all based on the assumption that a perchlorate higher than the NOEL observed over a 2-week exposure (Greer et al. (2002)), at which no biological effects were seen, could result in chronic reduction in thyroid hormone production. Risk assessments are typically developed by identifying a threshold for adverse effects and basing the risk value on an exposure below the threshold, the No Observed Adverse Effects Level (NOAEL). Thus the perchlorate RfD based on a NOEL is overly conservative.

Since publication of the NAS (2005) report and the EPA RfD for perchlorate, clinical, occupational, and epidemiological studies have been published which indicate evidence of non-adverse thyroidal compensation for perchlorate-induced inhibition of iodide uptake. In these studies, chronic exposure to perchlorate at doses higher than the (Greer (et al 2002)) NOEL

resulted in no reduction in iodide uptake (measured by RAIU) or change in thyroid hormone homeostasis. While very short-term exposure to perchlorate may produce a transient change in thyroid hormone levels in response to inhibited iodide uptake, the resilient, adaptive mechanisms that maintain homeostasis (a dynamic and controlled balance) in humans restore the balance of iodide uptake and thyroid hormone levels in the thyroid and circulating blood. In people, even with long-term exposure to perchlorate, the thyroid system is able to control these fluctuations and conserve thyroid hormone levels in the blood to maintain normal function. Thus, inhibition of thyroid iodide uptake is not an adverse effect unless extreme conditions occur, such as chronic inhibition from extremely high (i.e., therapeutic levels) exposures.

The published data for humans, including iodine-deficient pregnant women and their infants, support the choice of subclinical hypothyroidism (an adverse effect) as the critical effect, rather than short-term iodide uptake inhibition, a non-adverse effect which has been shown to occur in the absence of any adverse effects on human growth, development, or metabolism. Derivation of a scientifically valid, acceptable perchlorate drinking water level should be based on a dose estimate that is close to, but below, the actual threshold for onset of the most sensitive adverse effect (subclinical hypothyroidism). For perchlorate, this calls for chronic exposure data in humans that identifies an exposure level in which the thyroid has achieved non-adverse compensation for iodide uptake inhibition, while maintaining adequate thyroid hormone production.

Summary and Recommendation

In support of this approach the Chlorine Institute would recommend that EPA use the available chronic human data to revise the existing RfD. The updated RfD derivation should include exploring modification of the existing PBPK pregnancy model for perchlorate to account for upregulation of NIS and iodide transport and also validate modified PBPK model using iodide/CIO₄ serum and urine data from occupational and epidemiology studies. If you have any questions on the above information, or if the Chlorine Institute can be of any assistance, please contact me at (703) 894-4120.

Sincerely,

Therese M. Cirone

Vice President – Health, Environment, Safety and Security