14 January 2013

Michael Baes
Pesticide and Environmental Toxicology Branch
Office of Environmental Health Hazard Assessment
California Environmental Protection Agency
Oakland, California 94612

Dear Dr. Baes:

Thank you for the opportunity to comment on the December 2012 Draft Public Health Goal for Perchlorate in Drinking Water. I am writing to express my concern about the paucity of focus in the document on the primary relevant public health issue—the critically important role of iodine status in conferring susceptibility to the potential effects of perchlorate. Whether one believes that the adverse effects of perchlorate are only inferential or are clearly documented, the adverse effects of inadequate iodine are not debated. Regulating perchlorate in drinking water absent any consideration of iodine status seems unlikely to address the underlying public health problem of greatest concern.

According to the endocrinologist Dr. Gregory Brent, "[T]he most direct approach to reducing risk of perchlorate exposure in an individual is to ensure adequate iodine intake, especially in the reproductive years for women. This has been advocated in recommendations from the American Thyroid Association and The Endocrine Society."[1] Yet the draft perchlorate PHG does not acknowledge the importance of adequate iodine intake, going so far as to dismiss the significance of studies that found no effects of perchlorate on the basis that the pregnant women and children involved had high or adequate iodine intakes.

The perchlorate PHG should include a section highlighting the strong evidence that adequate iodine intake not only is essential for healthy fetal and neonatal development in general, but prevents the potential effects of perchlorate.[2] Such evidence would provide critical information for the state to consider when weighing potential risk management actions during the next phase of perchlorate regulation. For example, the state might consider an exemption for drinking water supplies with a naturally occurring iodine concentration above a certain level, perhaps also allowing municipalities to add trace levels of iodine to compensate for any perchlorate concentrations exceeding the state MCL.[3]

Preliminary calculations using NHANES data suggest that the normal goitrogen:iodine ratio in healthy people is about 2:1,[4] indicating that if a water supply exceeded the state MCL by 4 ppb, for example, 2 ppb iodine would be needed to neutralize any potential goitrogenic effects. (Both perchlorate and iodine are completely absorbed.) The validity of those preliminary estimates requires strengthening, of course, but they illustrate the general idea. Also, to eliminate the possibility of iodo-

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[1] Brent R (2010). J. Clin. Endocrinol. Metab. 95:3154
[2] See, e.g., Blount BC et al (2006) Env. Health Perspect. 114:1865; USEPA (2010) Report #10-P-0101
[3] California's Safe Drinking Water Act permits "the use of a specified treatment technique in lieu of establishing a maximum contaminant level."
[4] Voogt W, Jackson WA (2010). J. Ag. Food Chem. 58:12192

disinfection byproduct formation, iodine would have to be supplied in its most oxidized form, as iodate. It may be worth noting that FDA requires iodine supplementation for baby formula (3-7 µg iodine/30 ml formula).[5]

Presumably the State of California is committed to implementing innovative, sustainable, and cost-saving risk management solutions where possible. Not only would adding iodate to drinking water provide significant benefits by addressing the true underlying public health problem, it would cost municipalities one thousand times less than the alternative means of removing perchlorate, which requires ion-exchange treatment.

One other issue related to the draft perchlorate PHG deserves comment. The PHG is based on the old-fashioned regulatory approach of picking a point of departure and applying uncertainty factors. There are much more sophisticated, science-based approaches available for perchlorate based on its mode of action involving physiologically based pharmacokinetic/pharmacodynamic modeling, such as that which USEPA will be using.[6] Those approaches can take into account the ability of infants to metabolize perchlorate[7] and are more appropriate for the protection of sensitive life stages. The draft PHG does not even mention them. California's Safe Drinking Water Act requires that PHGs "be based on the most current principles, practices, and methods" and OEHHA should act accordingly.

I respectfully submit these thoughts for your consideration.

Sincerely,

Gail Charnley, PhD

[5] 21CFR 107.100; FDA's requirement is expressed in µg/Kcal, which results in 3-7 µg iodine/30 ml for a typical commercial formula

[6] See, e.g., USEPA (2009) Report #EPA/600/R-08/106A; USEPA Science Advisory Board recommendations at http://yosemite.epa.gov/sab/sabproduct.nsf/ea5d9a9b55cc319285256cbd005a472e/a34bd45b6e3f653985257ab100777c28/$FILE/PAP%20Report%20110912.pdf

[7] Shelor CP et al. (2012) Env. Sci. Tech. 46:5151