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CDW Secretariat,
Water, Air and Climate Change Bureau
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Revised comments sent to the CDW Secretariat via email at water_eau@hc-sc.gc.ca.

RE: New Guideline for Fluoride in Drinking Water

The Learning Disabilities Association of Canada (LDAC) is a national, non-profit organization with affiliates in every province and two Territories of Canada and from these extend a network of chapters in more than 75 communities across the country. These Associations are affiliated with the LDAC and share the same aims and objectives. Our mission is to be the national voice for persons with learning disabilities and those who support them. LDAC is dedicated to a level playing field for individuals with learning disabilities to enable them to function as citizens with equitable opportunities and to develop to their chosen potential. LDAC accomplishes these goals through public awareness about the nature and impact of learning disabilities, advocacy, research, health, education and collaborative efforts.

The proposal to set the Maximum Acceptable Concentration (MAC) of fluoride in drinking water to 1.5 mg/L is disappointing, and it is unfortunate that no reference to the other recommended guidelines for the addition of fluoride in drinking water are included in the Executive Summary. e.g. the FTP Expert Panel (2007) (0.7mg/L) Health Canada's fact sheet on fluoride states: "*For those communities wishing to fluoridate their water supply, the Federal-Provincial-Territorial Committee on Drinking Water has recommended an optimal fluoride concentration of 0.8 to 1.0 mg/L*" <http://www.hc-sc.gc.ca/hl-vs/iyh-vsv/envIRON/fluor-eng.php> .

We would strongly recommend that the Federal Provincial-Territorial committee on Drinking Water (CDW secretariat) revise the Executive Summary to make it clear to readers that the proposed 1.5 mg/L Maximum Acceptable Concentration (MAC) for fluoride in drinking water is not a revised limit, but the status quo. Also it would be important to include the references to a proposed guideline for artificial water fluoridation. The executive summary is somewhat misleading to those who may be making decisions about the use of fluoride in drinking water.

We would recommend that the Federal -Provincial-territorial committee on Drinking Water (CDW) propose a MAC Guideline as close to zero as possible for the following reasons: Primarily and almost exclusively the report focused on the risks of dental or bone fluorosis from fluoride in drinking water, and fluoridated water used to make beverages. There are important health concerns about the use of fluoride in drinking water that were not addressed in the technical document. LDAC's concern is for the effects of fluoride on the developing brain, especially as these affect the developing embryo, fetuses, infants and children. In fact soluble fluoride is one of the few RfCs and RfCs in USEPA's database that are based on developmental toxicity because development is the critical effect¹, but these important effects were not addressed in the technical document .

Fluoride and Neurodevelopment

There is evidence of the neurotoxicity of fluoride. Research studies on fluoride and neurodevelopment from China, India, Iran, and Mexico found elevated levels of fluoride exposure to be associated with **IQ deficits** in children. Fluoride's impact on IQ is exacerbated among children with low-iodine exposure. A study of Chinese children reported decreased child IQ levels associated with fluoride in drinking water (Wang, 2007#221; NRC, 2006 #286). Children in this study were also exposed to arsenic in drinking water; the cumulative effects of fluoride with other water additives, such as aluminum, on the human brain are of concern. The NRC report found even more compelling - studies re the molecular, cellular, and anatomical changes in the nervous system found after fluoride exposure, suggesting that functional changes. e.g. cognitive and behavioural, could occur.

The brain requires hormonal signalling to guide development during hormone-dependent human brain development (Zoeller et al., 2002). Many synthetic chemicals, including fluoride, interfere with thyroid hormone status, or can mimic or block its actions (Brucker-Davis 1998).

Maternal thyroid levels are important to fetal brain development. The National Research Council report on Fluoride in Drinking Water (2006 pp 222) provides evidence of the effects of fluoride on thyroid hormone "Fluoride exposure in humans is associated with elevated TSH concentrations, increased goiter prevalence, and altered T4 and T3 concentrations; similar effects on T4 and T3 are reported in experimental animals." p 218 "Intake of nutrients such as calcium and iodine often is not reported in studies of fluoride effects. The effects of fluoride on thyroid function, for instance, might depend on whether iodine intake is low, adequate, or high, or whether dietary selenium is adequate.

¹ Kimmel, C. A., & Kimmel, G. L. (1994) Risk assessment and developmental toxicity. In *Developmental Toxicology*, C.A. Kimmel and J Buelke-Sam, Eds, Raven Press, New York, 1994.

As little as 0.7mg/L fluoride or 1 liter of artificially fluoridated water can suppress thyroid function if the individual is iodine deficient. (70kg/154lb person) “In humans, effects on thyroid function were associated with fluoride exposures of 0.05-0.13 mg/kg/day when iodine intake was adequate and 0.01-0.03 mg/kg/day when iodine intake was inadequate.” p 218. Iodine deficiency is increasing world-wide.” Prescriptions for the drug synthroid to treat hypothyroidism in Canada have increased seven times between 1995 and 2002 (Muir).

According to the US Centers for Disease Control and Prevention (CDC) , the average urinary iodine level today is half what it was in 1971 <http://www.cdc.gov/nchs/products/pubs/pubd/hestats/iodine.htm>. The agency estimates that 36% of U.S. women now have sub- optimal iodine intake. Adequate dietary iodine is essential for producing normal amounts of thyroid hormone. Excessive dietary fluoride can also lower thyroid hormone production. Excess fluoride and inadequate iodine intake combined increase risks of hypothyroidism.

A new study has linked fluoride to preterm birth. Preterm birth is associated with cognitive impairments and academic failure. The study using MRI was reported in Paediatrics (Limperopoulos et al., 2008) The SUNY researchers used 1993-2002 data from the NY Statewide Planning and Research Cooperative System (SPARCS), which collects patient characteristics, diagnoses, treatments, services and charges for every hospital discharge, ambulatory surgery patient and emergency department admission in New York State. They recorded fluoridation residence status (under or over 1 milligram fluoride per Liter of water) and adjusted for age, race/ethnicity, neighbourhood poverty level, hypertension and diabetes.

“Domestic water fluoridation was associated with an increased risk of preterm birth and impaired cerebellar growth. This relationship was most pronounced among women in the lowest SES [socio-economic-status] groups (>10% poverty) and those of non-white racial origin,” write Rachel Hart, et al. Department of Epidemiology & Biostatistics, SUNY School of Public Health. (Science News; Nov.12 2009)

Infant formula and infant intake

The Guideline Technical Document notes that for children aged 1-4 beverages constitute the largest source of exposure to fluoride 20-30 vs. 7- 15 ug/kg/bw/day from drinking water. Beverages are made with fluoridated water in many cases, so beverages cannot be regarded as a separate source of exposure from drinking water. The CDC recommends limiting fluoride exposure in children under eight years of age, and to use non fluoridated water when preparing infant milk formula. The primary concern is that exposures to fluoride via multiple routes of exposure, from drinking water, food and dental care products, may result in a high enough aggregate exposure to cause developmental effects.

Similarly, the American Dental Association's policy change, in November 2006, recommended that only the following types of water be used for preparing infant formula during the first 12 months of life: "purified, distilled, deionized, demineralized, or produced through reverse osmosis." This new policy, which was implemented to prevent the ingestion of too much "fluoride by babies and to lower the risk of dental "fluorosis, clearly excludes the use of "fluoridated tap water. **The burden of following this recommendation, especially for low income families, is reason alone for fluoridation to be halted immediately**". Formula made with "fluoridated water contains 250 times more "fluoride than the average 0.004 ppm concentration found in human breast milk in non-"fluoridated areas (Table 2-6, NRC, 2006).

Referring to human and animal studies related to neurobehavioral effects, the NAS (2006) reports states "the consistency of the results appears significant enough to warrant additional research on **the effects of fluoride on intelligence**". While it is clear that fluoride has beneficial effects on dental health, emerging science suggests we need to further study the dose at which fluoridation may increase risks of neurodevelopment, cancer and skeletal or dental fluorosis, particularly for sensitive individuals".

- A statement signed by over 1700 EPA scientists and health professionals called for a moratorium on fluoridation of drinking water until definitive studies are conducted to prove it is safe. The National Research Council also recommended that a risk assessment of fluoride in drinking water is warranted. We would agree with the scientists' statement that, in the absence of important toxicity data for a substance with greatest potential for direct exposure from drinking water, the precautionary approach should be applied.
- Health Canada should follow the lead of the CDC and the American Dental Association, and recommend that baby formula not be made with fluoridated water.
- The CWS should support the precautionary principle, and support a moratorium on fluoridation of drinking water until a risk assessment addresses important toxicity data re its potential to affect children's intelligence and other important health endpoints. "For little benefit, take no risk". Given its presence in toothpaste, the benefits of fluoride in drinking water are questionable, while the risks are becoming more evident. Small toxic effects on brain development and function can nevertheless have devastating effects on the child and his/her family.

Respectfully submitted

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