

DEPARTMENT OF ECOLOGY

May 3, 2012

TO: John Price, NWP

FROM: Arthur Buchan, TCP

SUBJECT: Suggested Replacement Value for Inorganic Mercury

The Department of Energy (DOE) is proposing a modification to a default value provided for in WAC 173-340-7493 (Site Specific Terrestrial Ecological Evaluation Procedures) for the purposes of a Terrestrial Ecological Evaluation. The proposal is to replace the default value of 0.1 mg/kg (Mercury, inorganic – Soil Biota) found in Table 749-3 of the Model Toxics Control Act (MTCA) with a Lowest Observed Adverse Effect Level (LOAEL) value of 0.5 mg/kg (Mercury, inorganic – Soil Biota). The LOAEL value was derived from the same literature source as the Table 749-3 value (Efroymson et al., 1997). The original source of literature from which the 0.5 mg/kg was obtained, was from a document produced by Abbasi and Soni (1983).

- While it is recognized that WAC 173-340-7493(4) states that;
 - Toxicity reference values or soil concentrations established from the literature shall represent the lowest relevant LOAEL found in the literature.

It appears DOE cited the LOAEL identified by Abbasi and Soni (1983) summarized in the Efroymson et al. (1997) report, prior to use of a safety factor by Efroymson et al. (1997) which was applied due to low survivorship in earthworms.

- It is also recognized that Footnote (d) of Table 749-3 states that:
 - [Table Values] Based on benchmarks published in *Toxicological Benchmarks for Potential Contaminants of Concern for Effects on Soil and Litter Invertebrates and Heterotrophic Process*, Oak Ridge National Laboratory, 1997.

MTCA defines the LOAEL as the lowest concentration of a hazardous substance at which there is a statistically or biologically significant increase in the frequency or severity of an adverse effect between an exposed group and a control group. Efroymson et al. (1997) explain that toxicity benchmarks in their report were derived based (in part) on the number of values given for a chemical. Specifically, when a benchmark is based on an LC₅₀ or on some other endpoint that includes a 50% or greater reduction in survivorship, the value is divided by a factor of 5. This safety factor of 5 was applied to the 0.5 mg/kg LOAEL, because it caused a 65% reduction in earthworm survival. Therefore, it appears an appropriate LOAEL, based on Efroymson et al. (1997), would be their proposed benchmark value of 0.1 mg/kg (Inorganic Mercury).

- In addition, the Concise Explanatory Statement for the Amendments to the Model Toxics Control Act Cleanup Regulation Chapter 173-340 WAC (GQ 14.5.4) asks:

- Should proposals for modifications to default values provided in WAC 173-340-7493 meet the requirements in WAC 173-340-702(14), (15), and (16) for new scientific information?

WAC 173-340-702(16) (b) (i) states that [Criteria for quality of information].... Whether the information is based on a theory or technique that has widespread acceptance within the scientific community, and; (iv) Whether the assumptions used in applying the information to the facility are valid and would ensure the proposed modification would err on the behalf of protection of human health and the environment.

It appears the above referenced MTCA criteria (acceptance within the scientific community and err on the behalf of protection of the environment) were factored into the benchmark values provided in Table 1 (Screening benchmark concentrations for the toxicity of chemicals to earthworms) of the Efrogmson et al. (1997) report by the application of the stated safety factor [5] to the original LOAEL identified by Abbasi and Soni (1983).

As a result, Ecology does not agree with the proposed replacement value of 0.5 mg/kg as an LOAEL for Inorganic Mercury (Soil Biota). Furthermore, this proposed value lacks site-specificity. If DOE would like to provide more information regarding the proposed change, Ecology would be willing to re-evaluate at that time. Should you have any questions, please feel free to contact me as (360) 407-7146 or abuc461@ecy.wa.gov.

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