

October 2006

Science Advisory Board Review of Issues Related to Mixtures of Dioxins/Furans, Polycyclic Aromatic Hydrocarbons & Polychlorinated Biphenyls

Background

The Department has begun a rulemaking process to amend the Model Toxics Control Act (MTCA) Cleanup Regulation (Chapter 173-340 WAC). This rulemaking will clarify the policies and procedures for establishing cleanup levels for mixtures of polychlorinated dibenzo-p-dioxins/ polychlorinated dibenzofurans, polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs).

Revised Questions and Preliminary SAB Responses

The Department identified a series of questions for the Board's review prior to the September 15th Board meeting. Based on the Board's review, Ecology has reorganized and modified the list of questions. The revised questions and preliminary Board responses are summarized below.

Mechanism of Action/Mode of Action

Ecology is planning to modify the MTCA rule to clarify that certain types of mixtures (e.g. dioxins/furans, PAHs, etc.) should be treated as a single hazardous substance when establishing cleanup levels and remediation levels. One of the foundations for this policy decision is the conclusion that individual members of different chemical families act through a common biological mechanism of action.

- Dioxins/Furans: Is the conclusion that dioxin and furan congeners act through a common mechanism of action consistent with current scientific information?
***Preliminary Board Response:** The Board stated that it is reasonable to conclude that the 17 dioxin and furan congeners with chlorine atoms in the 2,3,7 & 8 positions act through a common biological mechanism of action (i.e. binding to the Ah receptor) (NAS, 2006; Van den Berg, et al. 2006; EPA, 2004).*
- Carcinogenic PAHs: Is the conclusion that carcinogenic PAHs act through a common mechanism of action consistent with current scientific information?
***Preliminary Board Response:** The Board stated that it is reasonable to conclude that carcinogenic PAHs act through a common biological mechanism of action.*
- Dioxin-Like PCBs: Is the conclusion that dioxin-like PCBs act through a common mechanism of action consistent with current scientific information?
***Preliminary Board Response:** The Board stated that it is reasonable to conclude that coplanar PCBs act through a common biological mechanism of action (i.e. binding to the Ah receptor). (NAS, 2006; Van den Berg, et al. 2006; EPA, 2004).*
- Other Chemical Groups: Are there other chemical groups where current scientific information supports a conclusion that individual members of the group act through a common mechanism?

Toxic Equivalency Factors

Ecology is planning to use the Toxicity Equivalency Factors recommended by the World Health Organization (Van den Berg et al. 2006) when establishing and evaluating compliance with cleanup levels and remediation levels for dioxin and furan mixtures and dioxin-like PCBs.

- **TEFs for Dioxins/Furans:** Are the TEF values recommended by the World Health Organization (WHO) for dioxins and furans consistent with current scientific information?

Preliminary Board Response: *The Board stated that the TEF values for dioxin and furans recommended by the WHO are consistent with current scientific information.*

- **TEFs for Dioxin-Like PCBs:** Are the TEF values recommended by the World Health Organization for dioxin-like PCBs consistent with current scientific information?

Preliminary Board Response: *The Board stated that the TEF values for dioxin-like PCBs recommended by the WHO are consistent with current scientific information.*

- **TEFs for Other Hazardous Substances:** Is there sufficient scientific information currently available to establish toxic equivalency factors for other groups of hazardous substances?

Potency Equivalency Factors

Ecology is planning to use the Potency Equivalency Factors (PEFs) recommended by the California Environmental Protection Agency (Cal EPA, 2005) when establishing and evaluating compliance with cleanup levels and remediation levels for carcinogenic PAH mixtures. This would be an update of the Cal EPA factors previously addressed in a Board recommendation.

- **PEFs for Carcinogenic PAHs:** Are the PEF values recommended by the California Environmental Protection Agency consistent with current scientific information?

Preliminary Board Response: *The Board stated that the PEF values for carcinogenic PAHs recommended by the California Environmental Protection Agency are consistent with current scientific information.*

Relative Bioavailability of Dioxin and Furans in Soil

The MTCA Cleanup Regulation establishes methods for calculating soil cleanup levels based on direct contact with contaminated soils. The methods include default assumptions for gastrointestinal absorption fraction, default assumptions for dermal absorption fraction and provisions for modifying the default assumptions on a site-specific basis. In the current MTCA rule, the default assumptions for dioxin/furan mixtures are: (1) 100% of soil-bound dioxins and furans are absorbed into the body when soil is ingested; and (2) 1% of soil-bound dioxin and furans are absorbed through the skin when soil adheres to hands, arms or other parts of the body.

- **Default Gastrointestinal Absorption Fraction for Soil-Bound Dioxin/Furan Mixtures:** Ecology is considering establishing a default gastrointestinal absorption factor for dioxin/furan mixtures equal to 0.4. Is this default value consistent with current scientific information?

Preliminary Board Response: *The Board concluded that they would need additional information before responding to this question.*

- Default Dermal Absorption Fraction for Soil-Bound Dioxin/Furan Mixtures: Ecology is considering establishing a default dermal absorption factor dioxin/furan mixtures equal to 0.03. Is this value consistent with current scientific information?

***Preliminary Board Response:** The Board concluded that they would need additional information before responding to this question.*

Risk Characterization and Regulatory Implementation Issues

- Application to Soil and other Abiotic Media: Ecology is planning to continue to use the TEF and PEF values when establishing and evaluating compliance with cleanup levels and remediation levels for abiotic media (e.g. soil). Is this approach consistent with current scientific information?
- Cross-Media Transfer – Dioxin/Furans: Ecology is planning to require that cleanup proponents use congener-specific information when evaluating cross-media transfer (e.g. soil to ground water) of mixtures of dioxins, furans and/or polychlorinated biphenyls. Is this approach consistent with current scientific information?
- Cross-Media Transfer – Carcinogenic PAHs: Ecology is planning to require that cleanup proponents use PAH-specific information when evaluating the cross-media transfer (e.g. soil to ground water) of carcinogenic PAH mixtures. Is this approach consistent with current scientific information?

Next Steps

- Ecology plans to discuss the scientific issues associated with the MTCA rule amendments at the October 23rd Science Advisory Board.
- Ecology is continuing to work on the supporting analyses and information materials for the rule amendments. These include: (1) Small Business Economic Impact Statement (SBEIS) required by the Regulatory Fairness Act; (2) Evaluation of Probable Costs and Probable Benefits required under the Administrative Procedures Act; (3) Least Burdensome Analysis required under the Administrative Procedures Act; (4) Environmental Checklist required under the State Environmental Policy Act (SEPA); and (5) fact sheets to facilitate public review of the draft amendments.
- Following the October 23rd Science Advisory Board meeting, Ecology will review the Board's responses and the results of the supporting analyses. Based on that review, Ecology will make final changes (if any) to the proposed rule language.
- Ecology plans to file the proposed rule with the Code Revisor in early November. Public hearings will be held in early-to-mid-December.