Alternatives Assessment Examples Review

Document Title: Pilot Study to Support Alternatives Analysis: Evaluating Alternatives to Methylene Chloride in Paint Stripper

Link to Document: http://www.dtsc.ca.gov/SCP/upload/DTSC_Final_Quant_AA_pilot_UCSB-1.pdf

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Purpose of the Report: The authors, who prepared this report for the Department of Toxic Substances Control (DTSC), conducted a quantitative analysis of the exposure and life cycle impacts for a methylene chloride-based paint stripper and its alternatives. The analysis is based on a previous qualitative analysis presented in Appendix B. It is not intended to be a complete and comprehensive Alternatives Analysis meeting the requirements of DTSC's Safer Consumer Products regulations.

Report Summary: This study uses different Life Cycle Assessment approaches and exposure models to quantify upstream (from materials extraction to product manufacturing) and downstream (from use to end-of-life) impacts of paint strippers containing methylene chloride and other alternative chemicals, as well as one nonchemical alternative, the sanding method. It provides an example of how to evaluate hazard and multimedia life cycle impacts of nonchemical drop-in substitution alternatives.

Key Findings:

Identification of alternatives: The alternatives identified by this study include both chemical substitutes and nonchemical process changes.

Exposure: The study presents one simplified model approach to evaluate exposure for the use phase. The scope of the assessment is clear and the model assumptions are clearly presented, although the reasoning, justification, and consistency for model selection can be improved. This model combines exposure data with the hazard information to compare alternatives for their adverse impacts. Sensitivity analysis is performed for several parameters in the exposure model to assess the significance of data gaps and uncertainties.

Life cycle impacts: The study presents examples using two different Life Cycle Assessment (LCA) approaches to evaluate upstream impacts. These two primary types of LCA methods include process-based LCA and economic input-output LCA (EIO-LCA). Processed-based LCA analyzes the actual process in the life cycle of a product, and assesses materials and resource usage, emissions, and waste for a given process. EIO-LCA uses historical economic transaction data between industry sectors along the supply chain to evaluate potential environmental impacts of a product. It also applies two different fate-transport models to determine the downstream impacts of two chemical-based paint strippers in air and water. The limitations of different methodologies and models are discussed in the reports.

Data gaps and uncertainty: The study presents a good example of how to fill data gaps and analyze, illustrate, and document uncertainties, for example, to assess upstream impacts and human health impacts. It also demonstrates how sensitivity analyses are used for quantitatively estimating impacts of different assumptions and for determining what factors are important for decision-making.