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FEB 23 1993

R. HINDERER

February 18, 1993

TO: Bob Hinderer

RE: Additives Piece

Attached is the additives one-pager to be included in the Greenpeace rebuttal packet. I believe that all of the changes you suggested (and the rewrite provided by Larry Brecker on replacements) are included.

If you have any additional input after reviewing this revision, please let me know within the next week. Thanks, in advance, for your help.

Regards,

Meredith
Meredith N. Scheck

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Revised 2/15/93

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- ★ PVC plasticizers are well-researched; found to be safe.
 - Heavy metal stabilizers being phased-out; those used in PVC make a small contribution to landfills.
 - Additives do not hamper the recyclability of PVC.
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Additives

The additives found in PVC compounds help to make it one of the most versatile, cost-efficient materials in the world. Without additives, literally hundreds of commonly used PVC products would not exist. Many materials are useless until they undergo a similar modification process. Steel, for instance, contains among other things, chromium, nickel and molybdenum.

Individual additives include stabilizers, colorants, impact modifiers, processing aids and plasticizers. Each typically constitutes a small part of the overall PVC formulation and their use is closely regulated by a number of agencies including the Environmental Protection Agency, the Food & Drug Administration and the National Sanitation Foundation. All additives used in food and drug applications must be those that have been declared "generally recognized as safe" by the FDA, or have specific regulatory clearance. Because of PVC's physical nature, many of the ingredients are locked or tightly held in the polymer, limiting the potential for human contact or release to the environment. The potential health and safety effects of all PVC additives, as well as all feedstocks, are fully detailed by each manufacturer in "material safety data sheets (MSDS)," which are required by U.S. law. These are available to anyone who wishes to review them, and must be provided to all plant workers.

Plasticizer Research

Plasticizers and stabilizers in particular have been researched at length to determine their potential impact on human health and the environment. In the case of plasticizers, there has been much debate over that impact due to the differing methods used to evaluate them. For example, while the U.S. National Toxicology Program and the International Agency for Research on Cancer have classified the plasticizer DEHP (di-2-ethylhexyl-phthalate) as a possible human carcinogen, their methodologies have been criticized for potentially inaccurately ascribing results obtained with rodents to humans.¹ The Specialized Experts Working Group of the European Commission for instance, has concluded that there is no evidence to warrant the classification of DEHP as a carcinogen.²

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Nor is DEHP regulated as a carcinogen by the U.S. Food & Drug Administration, which has long governed the plasticizer's use in medical devices and in food contact applications. Additional evidence indicates that replacing DEHP-plasticized PVC in medical applications like blood bags will create a new problem. For instance, while DEHP is known to actually protect red blood cells from deterioration, one proposed PVC-replacement, EVA (ethyl vinyl acetate), can hydrolyze to form acetic acid, thereby affecting the pH of the blood product being stored in it. With blood products, EVA also has a shorter shelf life and is far more expensive than PVC.

Conversely, DEHP has long been known to be incompatible with fatty foods, and is no longer used in food wrap (cling film) for products like cheese. However, flexible PVC film is considered the most desirable material for wrapping meats, as it is oxygen-permeable and maintains the bright red color needed to make meats salable to consumers, as well as extending the shelf life of meats.

DEHP is also widely used in applications such as wallcoverings and resilient flooring, and has been examined for its potential contribution to "indoor air pollution." In the most recent study, conducted by the Environ Corporation for the Chemical Manufacturers Association Phthalate Esters Panel, results indicate that plasticizers volatilizing from this type of product present an "insignificant" risk as defined by the California Health and Welfare Agency guidelines for consumer products.³

Stabilizer Replacement

Heavy metal-based heat stabilizers containing cadmium and lead are generally recognized as undesirable additives in PVC formulations and are being phased out of use. In the United States, cadmium stabilizers are primarily used in general purpose plasticized PVC applications and it is estimated that approximately 50 percent of these stabilizers have already been replaced by non-cadmium products.

Lead stabilizers are used in PVC wire and cable insulation, where the electrical properties lead provides have been difficult to attain with replacement stabilizer systems. However, new non-lead stabilizers for wire and cable applications are now being introduced and are expected to eventually replace the use of lead. In the meantime, specific programs have been developed to capture and recycle scrap wire and cable insulation so that the material can be diverted from landfills and incinerators. One such program uses reclaimed PVC wire and cable "fluff" to make traffic cones to U.S. Department of Transportation specifications. Other uses for lead stabilizers have essentially been eliminated.

Rigid vinyl compounds used to make such items as siding, window frames and pipe are stabilized with tin compounds to provide durability and weatherability. Inorganic tin, the ultimate product when tin stabilizers break down, is accepted as non-toxic. Both rigid and flexible PVC compounds intended for food-contact applications use FDA-regulated stabilizers based on calcium and zinc, or tin.

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It's important to note that heavy metals are found in numerous non-PVC applications such as car batteries (lead), and in ceramic glazes, rubber products and galvanized water pipe (cadmium).⁴ According to a study conducted by Franklin Associates, only about 15 percent of the cadmium found in municipal solid waste can be traced to PVC.⁵ Eliminating PVC or the use of heavy metal stabilizers in it will not eliminate the need for precautionary solid waste management practices that address the presence of these stabilizers in incinerators and landfills. It should also be noted, in a study conducted by NUS Corporation of Pittsburgh, that cadmium leaching from landfills has been measured on a parts per million basis, which is considered too small to be a health problem.⁶ Ironically, PVC liners have been used for a number of years in landfills to contain such leaching, specifically because they are so resistant to the aggressive conditions typically found there.

Recycling Developments

PVC additives in general do not decrease the recyclability of PVC since individual PVC formulations are typically compatible within limits, and second generation compounds can be modified to include properties that are missing from the original recycle. In general, PVC is recycled from a first-generation product with very demanding properties to a second generation product that is less demanding. If anything, the additives present in the first generation product will enhance the performance of the second generation product.

¹"Plasticisers: A Consideration of Their Impact on Health and the Environment," paper presented by D.F. Cadogan, Plasticisers Sector Group, CEFIC, Brussels.

²Official Journal of the European Communities, No. C 94/9.

³"Effects of Vinyl Products on Indoor Air Quality," The Vinyl Institute, January 1990.

⁴"Heavy Metals in Combustion of Plastics," J.P. Wagner, M.A. El-Ayyoubi, R.B. Konzen, The National Environmental Journal, November/December 1991.

⁵"PVC is a Good Bet to Survive Its Global Environmental Travails," Modern Plastics, June 1990.

⁶Modern Plastics.

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