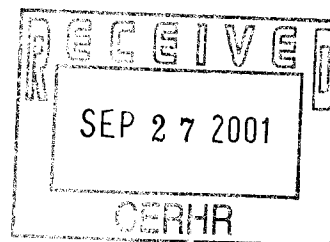


September 26, 2001

Dr. Michael D. Shelby, Ph.D.
Director, NTP Center for the Evaluation
of Risks to Human Reproduction
79 T.W. Alexander Drive, Building 4401, Room 102
P.O. Box 12233 EC-32
Research Triangle Park, NC 27709



RE: 1-bromopropane (CASRN: 106-94-5) CERHR review

Dear Dr. Shelby,

Albemarle Corporation would like to take this opportunity to comment on the upcoming evaluation of 1-bromopropane (1-BP) for human reproductive risk. Albemarle found 1-bromopropane to have many desirable characteristics as a cleaning solvent to replace ozone depleting substances in several applications. At that time, very little toxicity information had been developed on 1-BP. Albemarle began a program of toxicity testing to help fill the data gaps so that safe handling recommendations could be made. After conducting animal repeated dose studies up to 90 days in length, Albemarle joined with other 1-BP manufacturers in the Brominated Solvents Consortium (BSOC) to conduct reproductive toxicity studies, as well as to develop data on flammability and ozone depletion modeling of chemicals with short atmospheric lifetimes.

The request for comments asked for information on toxicity, production, uses and exposure. BSOC has made available to NTP the 2 generation reproductive and preliminary developmental rat study reports. Albemarle has answered CERHR questions on the 28 and 90 day rat inhalation studies, and will be glad to supply further information on those if needed.

Albemarle is concerned that several documents, including the OSHA nomination document, cite unrealistic estimates of bromine and 1-BP production. These documents also appears to equate production and emission, ignoring handling practices that minimize air releases and waste recovery and disposal practices.

1. Overestimates of Bromine Production/Availability

Several documents imply that there are no limits on bromine availability, thus, no limits on the bromine available to manufacture 1-BP. There are limits - most are economical, but some are physical limitations. For example, there are finite amounts of bromine brines that can be

taken out of underground formations in North America (Albemarle's source for bromine production). There are also reports that Chinese brine formations are limited. Economics will restrict the amount of bromine derived from brine that will be allocated to 1-BP manufacture, as opposed to more profitable bromine derivatives, as these stores are depleted. One economic limitation will be the capital costs for new plants - most existing plants are at capacity. Although seawater is a potentially unlimited source of bromine, costs involved in converting 65 ppm bromine saltwater to elemental bromine makes seawater an expensive source. We estimate that less than 15% of bromine production is from seawater plants, and we do not expect that any new seawater plants will be built in the future.

Albemarle estimates a 2% growth for bromine per annum based on historical growth rates would be more realistic than the 8% cited by some sources. Elemental bromine production by 2010 is likely not to exceed 645 kilotonnes at a realistic rate of growth.

2. Overestimates of 1-BP produced from Bromine Availability

A scientific advisory panel to the Montreal Protocol (Technology and Economic Assessment Panel, TEAP) document cites, in the US, about 40% of elemental bromine is used for flame retardants, 24% for drilling fluids, 12% for brominated pesticides, 7% for water treatment and 17% for miscellaneous uses in photography, pharmaceutical and cleaning purposes.

Albemarle does not expect brominated flame retardants to diminish in use significantly over the next ten years, and we estimate the use of bromides in the petroleum industry, and "miscellaneous" non-solvent uses will increase over the next ten years. Thus, the amount of bromine available for 1-BP production will not increase as dramatically as estimated in the TEAP report. Albemarle does not expect to devote more than 2% of its elemental bromine capacity to 1-BP production.

3. Production amounts do not equal emissions.

The TEAP document disclaimer states "Every industrial operation requires consideration of worker safety and proper disposal of contaminants and waste

products". These are the basic principles of good product stewardship. Using proper industrial operations will limit amounts of 1-BP available for emission to the environment. These operations will include measures that limit worker and environmental exposure to the solvent, and measures that properly control disposal of waste products. Models of emissions must, thus, take these measures into consideration.

These measures will consist of at least three areas:

- Restrictions on applications that are potentially emissive
- Industrial hygiene practices in solvent degreasing, and other applications
- Waste recycle and disposal

Applications Restrictions

Applications that cannot control 1-BP exposures to acceptable levels should be restricted or prohibited. The TEAP document lists adhesives as an example of emissive uses. Use of 1-BP in adhesives applications are not supported by Albemarle, and are likely to be restricted under the US SNAP program. We view 1-BP as a solvent for niche markets, where it's cleaning properties are superior, and where handling practices have demonstrated that emissions are limited. VOC regulations will also restrict how 1-BP is used in non-attainment areas. Economics will also control emissions of 1-BP from solvent application - closed systems and well operated equipment will prolong solvent life as well as control emissions.

Industrial Hygiene practices

The TEAP document criticizes some 1-BP distributors for claiming nPB as a "drop in", stating that it would encourage use of older emissive equipment. Older equipment is not necessarily emissive. Proper use of equipment is the most important factor in controlling emissions. Part "drag out" can cause unacceptable air concentrations and possible worker skin exposure, even with new equipment. Albemarle's product stewardship program involves site visits or phone consultations to make recommendations on proper equipment and handling practices.

Another part of our Product Stewardship Program is monitoring at customer's locations. We have collected personal and area samples to determine the concentration

levels of n-propyl bromide in vapor degreasing applications. The results show the majority (77%) of concentrations to be below 10 ppm. In locations with samples greater than 25 ppm, recommendations that involved changes in their work practices resulted in lower concentrations of n-propyl bromide in air to acceptable levels.

Waste disposal

In the United States, Albemarle sells the majority of Abzol Cleaner products through distributors. We have asked our distributors to offer their customers the services of a commercial organization for disposal of the product through incineration. Albemarle pays the costs of this disposal. Currently, all of the spent solvent from Albemarle sales is disposed using the services of the commercial organization or incinerated by other waste disposers or by customers directly (for fuel value).

We welcome the opportunity to work with CERHR in the evaluation process. Please feel free to contact us. I can be reached at (225) 388-7611.

Sincerely,



Nancy O'Malley, D.V.M., Ph.D.
Toxicology Advisor