UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

May 27, 1987 SAB-EC-87-031

Honorable Lee M. Thomas
Administrator
U. S. Environmental Protection Agency
401 M Street, S. W.
Washington, D. C. 20460

OFFICE OF
THE ADMINISTRATOR

Dear Mr. Thomas:

The Science Advisory Board's Integrated Environmental Management Subcommittee has completed its review of EPA's Draft Kanawha Valley Toxics Screening Study and is pleased to transmit its final report to you. The Subcommittee met in public session on March 16, 1987 in Philadelphia, Pa., to review the study. During March 11-13, 1987, three representatives of the Subcommittee visited the Kanawha Valley to become more familar with its environmental problems.

The Subcommittee unanimously concludes that the Kanawha Valley study represents an important component of EPA's overall effort to develop methodologies to define public health and environmental priorities. Studies such as this provide valuable technical challenges and experiences to EPA staff, particularly those working in regional offices. And, finally, they provide a valuable means for developing closer working relationships with state and local officials and the general public.

This letter is the Subcommittee's second communication to you. On July 30, 1986 it expressed "many concerns about the ability of the current study to satisfy a number of technical issues. A chief concern is the incongruity between [the study's] .... objectives and the fact that the study design itself is not an integrated multimedia effort, nor a response to Bhopal."

Since the transmittal of that letter, EPA staff have modified the study's objectives and technical design, and have conducted supplementary analyses to support the revised objectives and design. In general, the Subcommittee believes that the staff have made appropriate responses to its major concerns. The study reaches a number of scientifically supportable conclusions about health risks from cancer in the Kanawha Valley. The study also points EPA and other interested parties in a direction for conducting further analyses of problems related to accidental releases of pollutants and acute health effects.

Specific issues addressed during the Subcommittee's review include: the study's objectives and scope; pollution sources; pollution transport and fate by media; health effects; risk communication; and recommendations for additional follow-up efforts. Attachment A presents additional, more-detailed recommendations for modifying the current study and future activities in the Kanawha Valley. Attachment B lists the Subcommittee members.

In general, the Subcommittee views the Draft Kanawha Valley Toxics Screening Study as one step of a continuing process to assess risks. The current study addresses chronic health exposures to carcinogens which represent one of many public health concerns in the Valley. As a follow-up to the current study, the Subcommittee recommends two additional steps that include:

- o Expanded monitoring of air toxics, and use of monitored values to obtain more precise estimates of exposure and health risks.

- o Greater focus on accidental releases and fugitive emissions as areas of public health concern.

The Subcommittee appreciates the opportunity to conduct an independent scientific review of these important public health issues in the Kanawha Valley. We request that EPA formally respond to our scientific advice.

Sincerely,

Ronald Wyzga, Chairman
Integrated Environmental
Management Subcommittee
Science Advisory Board

Norton Nelson, Chairman
Executive Committee
Science Advisory Board

SAB-EC-87-031

MAJOR FINDINGS AND RECOMMENDATIONS

OF THE

INTEGRATED ENVIRONMENTAL MANGEMENT SUBCOMMITTEE

ON THE

U. S. ENVIRONMENTAL PROTECTION AGENCY'S DRAFT

KANAWHA VALLEY TOXICS SCREENING STUDY

INTEGRATED ENVIRONMENTAL MANAGEMENT SUBCOMMITTEE

SCIENCE ADVISORY BOARD

U. S. ENVIRONMENTAL PROTECTION AGENCY

May, 1987

U. S. ENVIRONMENTAL PROTECTION AGENCY

NOTICE

This report has been written as a part of the activities of the Science Advisory Board, a public advisory group providing extramural scientific information and advice to the Administrator and other officials of the Environmental Protection Agency. The Board is structured to provide a balanced expert assessment of scientific matters related to problems facing the Agency. This report has not been reviewed for approval by the Agency, and hence the contents of this report do not necessarily represent the views and policies of the Environmental Protection Agency, nor of other agencies in the Executive Branch of the Federal government, nor does mention of trade names or commercial products constitute endorsement of recommendation for use.

Study Objectives and Scope

The objectives of the Kanawha Valley study are limited, but reasonably well-defined. In most instances, the study seeks to derive an upper bound for the health risks associated with airborne carcinogens for which EPA's Cancer Assessment Group has derived potency estimates. Other potential carcinogens are minimally considered, and the health risks of non-carcinogens, including those risks associated with the accidential release of chemicals such as occurred at Bhopal, are not considered. Hence, the health assessment of airborne toxics is far from complete, but this is clearly articulated in the study report. Available resources did not allow a more comprehensive assessment.

The study attempts "to develop a sense of potential public health concerns" associated with carcinogens in drinking water, surface water and hazardous wastes. The efforts are not multimedia efforts, but medium-specific efforts based upon very limited data; thus, conclusions from these efforts are subject to considerable uncertainty.

Sources

The air analyses depend very heavily upon an emissions inventory of some 450 substances developed by the West Virginia Air Pollution Control Commission (APCC). The inventory is as extensive and comprehensive as any other available information. Nevertheless, there exist some uncertainties in the inventory, particularly with respect to fugitive emissions, which the study identifies as a major source of health risk in some Kanawha Valley communities. The possibility that the inventory is incomplete is also suggested by the fact that ethylene oxide was not included for either the Belle or Nitro communities despite some limited monitoring evidence that it may be present. If a compound was not in the inventory it was not included in subsequent EPA modeling. This discrepancy underlines the need for including ethylene oxide in future monitoring programs.

The drinking water and surface water analyses depend upon monitored levels of toxics in water supply systems and fish fillets, respectively. Data are limited to a subset of all public water suppliers, with no private well samples, and to a very small number of fish sampled from only one location for a very limited number of toxic substances. The hazardous waste inventory is based upon a priority pollutant screening of inventories for a subset of RCRA and potential CERCLA sites. No information was available on the total quantity and overall composition of toxic wastes that may be entering surface or ground water. For this reason alone, the results of this part of the study are, at best, suggestive.

Transport and Exposure

The transport models used in the studies generally appear to be congruent with the study objectives. The air transport modeling addresses the concerns of the Subcommittee in its July 30, 1986 letter, although better

documentation of this modeling is needed. There is a factor of two uncertainty on point source air emissions and another uncertainty of a factor of two in dispersion modeling. The current modeling efforts do not address these potential uncertainties, although "worst case" scenarios should recognize their existence. Drinking water exposure was estimated by assuming that individuals consume two liters of the water delivered to their neighborhoods. Similar assumptions are often made in risk assessments. The surface water and hazardous waste studies are greatly hampered by a lack of data, making large assumptions necessary to estimate exposure to toxics.

Health Effects

The study evaluated 20 known or suspected cancer causing chemicals from the West Virginia APCC inventory of more than 450 compounds. The Subcommittee concludes that the current study provides useful information on health effects from cancer and environmental loadings of these 20 compounds. After finalizing the current study, EPA should conduct additional efforts that include:

- Using the APCC inventory and information on toxicity to evaluate the potential health effects of some of the remaining compounds. Of the remaining 430 or so compounds, relatively few merit further attention, but EPA and APCC should work together to identify compounds that need additional evaluation. These should be identified by defining the set of those compounds to which some exposure may be likely at known toxic levels.

- Broadening the health endpoints of concern to include non-cancer and acute effects. Concern about the potential effects from acute releases is strong within the community; hence, some priority should be given to addressing this issue. The methodologies used to address these endpoints require further development, particularly in estimating the effects of accidential releases. Some fault-tree or alternative analysis should be designed to address this possibility. Experts from other groups within the EPA should be enlisted in this effort.

- Incorporating frequency plots of pollutant concentrations versus time, in addition to stating average pollutant concentrations.

- Assessing the conversion of reference doses from the ingestion to the inhalation pathway, where reference dose information for the inhalation pathway is not available.

- Evaluating whether to develop or use biological markers for health assessment.

- Comparing risks from high mass emissions of pollutants with low toxicity, with low mass emissions of pollutants with high toxicity as a means to identify priority risk management needs.

- o Exploring other potentially useful sources of data for compounds of concern, including monographs prepared by the International Agency for Research on Cancer, Health Effects Profiles developed by the Office of Research and Development, Reportable Quantities for hazardous compounds and gaining access to information through the community right-to-know provision of Superfund.

Communication of Risks

The Subcommittee encourages EPA to continue its efforts of working with officials and citizens of the Kanawha Valley to update them on the sources and magnitude of risks they experience. In particular, EPA should seek to further improve its presentation of technical information to better enable lay persons to understand the results of technical analyses and to ensure it is understood that the risk numbers reflect upper bound estimates. Clarification of the latter issue is also needed in the executive summary of the study.

It is important for citizens, scientists and public officials to understand that the principal value of the Kanawha Valley study is as a screening study of airborne carcinogens. As the study acknowledges, a screening study should strive to ensure that all potential risks are identified even at the expense of calling attention to risks that subsequent analysis may not confirm, or will be less than indicated in the screening study. Accordingly, assumptions in screening studies are conservative in nature; assumptions should be avoided that might cause potential risks to be ignored. Within the stated scope of the study, conservative assumptions are made; for example, individuals are assumed to be exposed continuously to ambient outdoor levels of industrially emitted toxics and upper bound risk estimates are given. There are a few instances, however, where the study did not rigorously pursue conservative assumptions. These include potential uncertainties or omissions in the emissions inventory. The study suggests that point estimates could be too small (or too large) by a factor of two. For fugitive emissions it could be greater. It is important that these uncertainties and their likely direction be clearly articulated in the report along with a discussion about whether additional scenarios are necessary to consider these uncertainties.

In addition, the air quality models are equally likely to under-and-over predict ambient concentrations. The biases of the models are fairly predictable. Exposures are likely underestimated at the peaks of ridges where the river turns and when overlapping models were not used. On the other hand, the use of the Box model probably overpredicts exposure in some neighborhoods on the Valley floor, which are not adjacent to emissions sources. Although it is to the study's credit to have implemented two different modeling approaches to estimate exposure, further discussion in the report is merited on the potential model biases and on their implications for the risk estimates.

Attachment A

ADDITIONAL RECOMMENDATIONS TO THE AGENCY

A. Current Report

1. The technical assumptions for the underlying transport models should be documented and made accessible to readers of the report.

2. Given the comprehensive nature of the airborne toxic risk assessment in contrast to the rudimentary nature of the other three studies, it may be desirable to more clearly separate the air toxic studies from the others; moreover, the various studies are undertaken for differently defined geographic areas.

3. The risk estimate bounds are probably more clearly defined than in most similar documents; nevertheless, further clarification may be necessary. Cases could be presented as <X rather than the number X; attribution of cases/risk bounds by categories (industrial sources, fugitive vs. point emissions) should be more carefully qualified. Moreover, the conservatism of total case estimates is likely to be greater than estimates attributed to a single substance because of the joint probability that all substances require conservative assumptions is lower than that for a single substance.

4. Parts of Appendix C might be moved to the body of the report.

B. Future Work

1. A major public health concern among the residents of the Kanawha Valley is the risk associated with sudden accidental releases of airborne toxics. There is an urgent need to address this issue. Moreover, the current study addresses chronic health exposures, which are only one component of the many public health concerns in the Valley. A simple first step is to obtain some index of the toxicity of the remaining compounds. Information sources such as Health Effects Profiles, monographs of the International Agency for Research on Cancer, Reportable Quantities and data obtained from community right-to-know efforts, should be used. The preparation of exposure analyses will be more difficult as potential exposures to various lengths of time, including acute exposures, are estimated. Methodological help should be sought from other parts of the Agency.

2. The West Virginia Air Pollution Control Commission has developed an air emissions inventory, but the inventory represents an approximation of emissions from stationary sources. For the chemicals of the greatest public health concern, officials should undertake further monitoring to help validate the inventory. Where discrepancies arise, additional efforts will be warranted to more accurately determine sources and emissions levels.

3. The hazardous waste data considered are very limited. CERCLA requirements can perhaps provide some useful information. Other parts of EPA should be enlisted to improve the source inventory for these data. Analysis of historical operations and land use may also be useful to characterize the types of chemicals in waste sites. The fundamental approach to consider risk from hazardous waste should be replaced, however, by one that examines specific waste sites.

4. Increased monitoring data can aid the analysis of drinking water, surface water, and ground water. For chemicals of concern in the Valley, such efforts should be instituted to help ensure that no major problems are overlooked.

5. Health surveys and measurement of biological markers could provide some validation of the estimated health profile of the Valley. Such efforts will not, however, be useful when incremental risk estimates are small.

Attachment B

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