



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

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OFFICE OF THE ADMINISTRATOR
SCIENCE ADVISORY BOARD

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Carol M. Browner
Administrator
U S Environmental Protection Agency
401 M Street, S W
Washington, D C 20460

RE Science Advisory Board Review of the Technical Basis for Listing Ammonia on the
Toxics Release

Dear Ms. Browner,

The Toxics Reporting Subcommittee of the Ecological Processes and Effects Committee of the Science Advisory Board met in Washington, D C on January 4, 1995 to discuss questions related to the listing of ammonia on the Toxics Release Inventory (TRI). The Subcommittee was briefed by EPA staff from the Office of Pollution Prevention and Toxics and the Office of Research and Development on the rationale for listing ammonia on the TRI and received public comments from scientists appearing on behalf of petitioners to delist ammonia.

1 The EPA asked the SAB to address two questions which follow with our responses.

- a. What is the most appropriate way to report releases of aqueous ammonia under the Emergency Planning and Community Right-to-Know Act (EPCRA) section-313 as non-ionized ammonia or as total ammonia?

Response of the Subcommittee The factors influencing the environmental behavior of ionized and non-ionized ammonia, and the relationships of these two forms to total ammonia, are well understood. Furthermore, the potential toxicity to aquatic life and human health, as well as potential ecological effects related to nutrient enrichment by the major forms of ammonia, are well understood. Thus, the major issues related to the question posed by the Agency to this

Subcommittee do not involve scientific uncertainties, but they relate instead to how the scientific information should be integrated into the structure of the TRI. That is, the scientific basis for regulating aqueous ammonia as detailed by EPA OPPT and ORD staff is clear and definitive.

Ionized ammonia and non-ionized ammonia always occur together, and their proportions are governed by pH and temperature. Total ammonia = ionized ammonia + non-ionized ammonia. If the concentration of any form of ammonia is known and the temperature and pH in the environment are known, then the concentrations of the other forms of ammonia can be readily calculated. These relationships hold true for the forms of ammonia in a discharge, as well as under environmental conditions. Under normal environmental conditions the ionized ammonia concentrations are much higher than the non-ionized ammonia concentrations.

Toxicity has been used as the major basis for listing other substances on the TRI. The acute toxicity of non-ionized ammonia to aquatic life is approximately 100 times greater than ionized ammonia. The toxicities of non-ionized and ionized ammonia are approximately additive. Because of the differences in potency between these forms of ammonia, under normal environmental conditions the acute toxicity of ammonia is driven almost exclusively by non-ionized ammonia concentrations. If ammonia only existed in the ionized form, then it is doubtful that ammonia would have been listed on the TRI based on the Agency's current TRI toxicity guidelines.

For example, if the policy concern is solely for aquatic toxicity, then reporting non-ionized ammonia concentrations at a standard pH and temperature (e.g., pH 7 and 15°C) would address this endpoint. If the policy concerns extend to other endpoints, e.g., nutrient enrichment, then reporting of total ammonia would be more appropriate as that would relate more clearly to concerns about the ecological consequences of eutrophication due to nitrogen nutrient enrichment which many scientists have judged to be an adverse effect on aquatic ecosystems. In this case the specific forms of ammonia are not very relevant (i.e., both ionized and non-ionized ammonia have the same nutrient enrichment properties), and total ammonia concentrations would be the most appropriate form of ammonia to report. Again, the use of standard pH and temperature conditions would also be useful. It should be noted that nitrogen is typically the limiting nutrient only in coastal waters and estuaries, but not in fresh waters where phosphates are typically the limiting nutrients.

The Subcommittee concludes that the scientific facts on the chemistry, transformations, toxicity, and ecological effects of the various forms of ammonia are well understood. Thus, the question of whether to list or how to list ammonia or any of its forms is not a scientific issue but strictly a matter of policy for the Agency to decide.

b Does total ammonia meet the EPCRA section 313 listing criteria?

Response of the Subcommittee Section 313(d)(2)(C) lists the criteria for inclusion in the TRI as toxicity, persistence, bioaccumulation, and a significantly adverse effect on the environment of sufficient seriousness in the judgement of the Administrator. The issue of toxicity was addressed above. Bioaccumulation is not a factor for ammonia. Environmental persistence is more difficult to define, because while ammonia may be unstable, the component nitrogen becomes part of a regional nitrogen cycle. The ammonia contribution to this cycle is often overlooked. Based on our evaluation of the criteria, we conclude that total ammonia meets the EPCRA section 313 listing criteria only if the Administrator determines that there is "a significant adverse effect on the environment of sufficient seriousness to warrant reporting"


2 Policy-Related Observations and Concerns

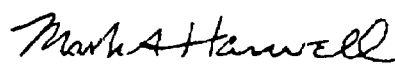
The Subcommittee was not constituted to make assessments of the scientific underpinnings of the Toxic Release Inventory (TRI) portion of EPCRA or to evaluate items of policy concerning the act, nor is the SAB constituted to make policy recommendations. Therefore the policy implications and policy recommendations cannot be addressed in depth. However, during the discussion of the issue with the Agency and the public, the Subcommittee detected some confusion about the roles and the relationships of emissions inventory, hazard assessment, exposure assessment, and risk assessment in the development of TRI listings and subsequent uses of the TRI data. The Subcommittee concluded, based on presentations by the Agency and public comments, that the TRI data are sometimes misinterpreted to imply that they are direct measurements of exposure and risk. The TRI emissions data can be useful for identifying potential targets for waste reduction. However, they do not reflect toxicity/potency of various pollutant emissions and are not related to exposure in a simple way, i.e., large emissions do not automatically imply large exposures and risks to the population. Hence, the TRI data should not be represented as measures of quantitative risk. All Subcommittee members expressed concerns about the potential for misinterpretation of the TRI data and for inadvertently directing environmental protection efforts away from the areas of most significant risk.


The Subcommittee notes that an opportunity exists for the Agency to conduct a broader evaluation of the TRI reporting system. The goal of such an evaluation would be to improve the value of the listings to the public as they interpret the significance of the information.

We appreciate the opportunity to review these questions and we look forward to your response to our comments

Sincerely yours,


Dr Genevieve Matanoski, Chair
Executive Committee
Science Advisory Board


Dr Mark Harwell, Chair
Ecological Processes and Effects Committee


Dr Rolf Hartung, Chair
Toxics Reporting Subcommittee
Ecological Processes and Effects Committee

US ENVIRONMENTAL PROTECTION AGENCY
SCIENCE ADVISORY BOARD
ECOLOGICAL PROCESSES AND EFFECTS COMMITTEE
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January 4, 1994

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SCIENCE ADVISORY BOARD STAFF

DR. EDWARD S. BENDER, Designated Federal Official, US
EPA/Science Advisory Board, 401 M Street, S.W. (1400-F),
Washington, D.C. 20460

(202) 260-6552

FAX: (202) 260-7118

MRS. CONNIE VALENTINE, Secretary to the Designated
Federal Official

(202) 260-6552

FAX: (202) 260-7118