



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

January 9, 1992

OFFICE OF
THE ADMINISTRATOR

EPA-SAB-RAC-92-009

Honorable William K. Reilly
Administrator
U.S. Environmental Protection Agency
401 M Street SW
Washington, DC 20460

Subject: Review of Draft Criteria Documents for Radionuclides in Drinking Water (*Drinking Water Criteria Document for Uranium*, November 1989; *External Review Draft for the Quantification of Toxicological Effects Document on Radium*, (TR-1242-67), 10 July 1990; *Quantitative Risk Assessment for Radon in Drinking Water*, May 1990; and *Quantitative Risk Assessment for Beta Particle and Gamma Emitters in Drinking Water*, May 1990.

Dear Mr. Reilly:

At the request of the Office of Drinking Water (ODW), the Radiation Advisory Committee of the Science Advisory Board established a subcommittee to review draft criteria documents and related reports that were the basis for new drinking water standards for uranium, radium, radon and man-made beta-gamma emitting radionuclides. The documents reviewed had been developed during the period November 1989-July 1990. Revised background documents have subsequently been prepared by the Office of Drinking Water.

The Subcommittee conducted the review using a series of publicly announced conference call meetings and the exchange of written comments during the period June 4-August 29, 1990. At the first meeting the Office of Drinking Water asked that the Subcommittee determine whether the criteria documents were scientifically sound. Later the Office of Drinking Water provided a formal charge identifying five specific issues. By this time the Subcommittee meetings and exchange of draft reports had already provided the Office of Drinking Water and the Office of Radiation Programs with early advice to facilitate revisions of the documents. The Subcommittee's findings, conclusions, and recommendations appear in the enclosed report, which was approved by the Radiation Advisory

Committee. The charge also requested that the Subcommittee review the draft notice to be published in the Federal Register. That request will be handled as a separate review when the draft notice is received.

The overall quality of the four draft criteria documents was not good. Taken as a set, the documents are inconsistent in approach and with Agency practice in the derivation of drinking water criteria such as those for volatile organic contaminants. The Subcommittee found that recommendations from a 1987 Science Advisory Board report on its review of the basis for standards for radionuclides in drinking water (SAB-RAC-87-035) had not been addressed. Nor did the new criteria documents address recommendations from other available SAB reports that are directly relevant (such as SAB-RAC-88-026 and SAB-EEC-89-012). Technical decisions contrary to those recommended by the SAB were presented without justification and without acknowledgement of the existence of the SAB recommended alternatives. Relevant recommendations of the National Research Council's Committee on the Biological Effects of Ionizing Radiation were ignored or selectively adopted without explanation or rationale. Uncertainties associated with the selection of particular models, specific parameters used in the models, and the final risk estimates are not adequately addressed in any of the documents.

The Subcommittee's responses to the Office of Drinking Water's five specific questions on uranium metabolism, risk from ingested radon, the basis for estimating the risks from radon in water, the use of epidemiologic data and modeled risk estimates in evaluating radium risks, and methodology for risks from man-made radionuclides follow.

- a. The estimates of the absorption, distribution, and excretion of uranium when ingested are not appropriate or supported by the data. The basis for the metabolic model chosen and the value of the gut-to-blood absorption factor (f_1) have not been adequately discussed. Furthermore, the chosen value of f_1 appears to have been arbitrarily selected from among the highest of all reported values. The uncertainties associated with parameter and model selections are not discussed.
- b. The methods employed in the radon document do not form an appropriate basis for assessing the risks of directly ingesting water containing radon. The assumption of a tap water consumption rate of 0.66 liters per day conflicts with other Agency practice as does the assumption of a 20% volatilization loss between the tap and container.


The basis for and uncertainty associated with the assumed values are not adequately addressed.

- c. The appropriate basis for estimating risks from radon in water requires that both the direct (ingestion) and indirect (inhalation) exposure routes be carefully assessed. The EPA draft document treats both pathways; however, possible inhalation exposures to high concentrations at the point of use have not been addressed. Assessment of uncertainties is an essential component of the evaluation of both pathways. The risk estimate for exposure to airborne radon presented in the document disagrees with an Agency position paper previously submitted to the SAB for review (EPA-SAB-Ltr-91-001).
- d. For radium, the available human epidemiologic data should most definitely be used to determine risk, rather than a mathematical model. This recommendation reaffirms the previous response (SAB-RAC-87-035).
- e. The methodology for assessing risk from man-made radionuclides (both individually and collectively) is incomplete because there is not a criteria document for man-made alpha-emitters. The draft document employs a set of *ad hoc* risk factors that have not been reviewed. Instead of providing the basis for selection of a guide value, the level of 4 millirem per year was assumed. The document does not employ the effective dose equivalent concept and does not adequately address uncertainties in the input parameters and risk estimates.

The Board is troubled over the failure of the Agency to address the Board's earlier comments and recommendations and also relevant recommendations of the National Research Council's Committee on the Biological Effects of Ionizing Radiation (1988, 1990). The EPA 1990 documents reflect technical decisions contrary to those specifically recommended by the SAB, selectively adopt material from other technical consensus reports, and present decisions concerning the risks of radionuclides in drinking water without justification or acknowledgement. Given this pattern, particularly the inattention to uncertainties and previous BEIR Committee and SAB recommendations, it is difficult for the Board to understand the scientific basis for the selection of maximum contaminant levels.

We believe that the specific technical issues identified in the review and the broader issue of the relationship between the SAB and the Agency are quite important and request appropriate action by the Agency to address them. We look forward to a written response from the Agency.

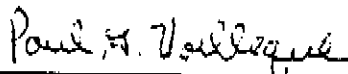
Sincerely,



Raymond C. Loehr, Chairman
Executive Committee
Science Advisory Board



Oddvar F. Nygaard, Chairman
Radiation Advisory Committee
Science Advisory Board



Paul G. Voillequé, Chairman
Radionuclides in Drinking Water
Subcommittee
Radiation Advisory Committee

Enclosure