



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

November 5, 1985

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:

On September 4, 1985 Mr. Sheldon Meyers, the Acting Director of the Agency's Office of Radiation Programs, requested the assistance of the Science Advisory Board in establishing emergency criteria applicable to elevated indoor radon concentrations in structures built on the Reading Prong (see the copy of the attached memorandum). Mr. Meyers sought the advice of the Radiation Advisory Committee on two issues:

1. Is a range of relative risk coefficients of 1.2 to 2.8 percent a reasonable range for the Agency to use in evaluating the risks associated with exposures at and above various alternative interim emergency action levels for the Reading Prong?
2. Are there any special considerations that should be taken into account in calculating the risks associated with short-term exposures to radon decay products versus lifetime exposures?

To familiarize the Committee with the problem that confronts the Agency, the staff of the Office of Radiation Programs met with the Radiation Advisory Committee on September 20, 1985, to discuss the scientific background of these issues, to respond to questions from the Committee members and to elaborate on the assistance sought by the Office. Subsequently, the Committee discussed the risks associated with radon exposure as they are now known. After adjournment of the meeting, the chair solicited from Committee members written responses to the issues raised by the Office, which are summarized below.

As to the first issue, it is the consensus of the Committee that the range 1.2-2.8% is too narrow. Reasonably good data are available that give values as low as 0.31% (see Whittemore and McMillan's study of Colorado miners, Journal of the National Cancer Institute 71: 489-499, 1983) and as high as 3.6% (Radford and Renard's study of Swedish iron miners, New England Journal of Medicine 310: 1485-1494, 1984).

While the confidence levels associated with these estimates include one or the other of the values that the Office proposes to use, caution dictates consideration of a wider range for several reasons. First, in some studies,

the working level months (WLM) of exposure have been overestimated, which leads to underestimation of the risk per WLM. Second, even if the WLM estimate is unbiased on average, the estimate is not particularly precise for individuals. The effect of random error in individual dose estimates is to bias the estimated risk coefficient downward (see Gilbert, Radiation Research 98: 591-605, 1984). Since it is the aim of these measures to protect human health, we believe the Agency is obliged to consider a range that includes the largest risk estimate that has scientific credibility.

The Committee unanimously views 4% as embracing the maximum credible risk estimate. There is less unanimity about the lower end of the range. Members disagree about the weight which should be placed on the Whittemore and McMillan study with the result that both 0.5% and 1.0% have proponents on the Committee. (We have stated our recommended range in single digits to avoid the suggestion of a precision that simply does not exist.)

As to the second issue posed by the Office of Radiation Programs, we are collectively aware of no convincing evidence that short-term exposures to radon or to other sources of ionizing radiation impose a smaller risk per unit exposure (in this case WLM) than do long-term exposures. However, we call to your attention that the risk estimates cited above stem from studies of occupationally exposed adults and may underestimate the risk to children in whom a given environmental radon level results in a higher radiation dose to the lungs than in adults. (National Council on Radiation Protection and Measurements Report 78, "Evaluation of Occupational and Environmental Exposures to Radon and Radon Daughters in the United States," May 1984).

We hope these scientific opinions will assist the Agency in reaching decisions on this important public health problem and stand ready to provide whatever additional assistance is requested. We request that the Agency formally respond to our report and indicate which of the recommendations the Office of Radiation Programs plans to accept and not to accept, providing the reasons in cases where the recommendations are not agreed to.

Sincerely,



William J. Schull
Chair, Radiation Advisory Committee
Science Advisory Board



Norton Nelson
Chair, Executive Committee
Science Advisory Board

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DATE: SEP 4 1985

SUBJECT: Request for SAB Assistance

FROM: Sheldon Meyers, Acting Director
Office of Radiation Programs (ANR-458)

Richard J. ...

TO: Terry Yosie, Director
Science Advisory Board (A-101)

I am writing to request the assistance of the Science Advisory Board's (SAB) Radiation Advisory Committee in reviewing the scientific basis for establishing emergency criteria applicable to elevated indoor radon concentrations in structures built on the Reading Prong.

Last year, homes built on a geologic formation in eastern Pennsylvania known as the Reading Prong were discovered to have extremely elevated indoor concentrations of radon-222 and its decay products. The Agency has assisted the State of Pennsylvania in surveying a sizeable number of houses in this area. As of mid-August, approximately 2600 homes had been surveyed. Of these, 16 homes reported radon concentrations of greater than one working level, while roughly another 275 homes had concentrations in excess of 0.1 working levels. The State estimates that there may be over 20,000 homes on this geologic formation.

While the radon levels in most homes have been temporarily reduced by increased ventilation during the summer months, the approach of cold weather heightens the need to identify what actions can and should be taken in the most severely affected homes. In order to do this, the Agency must first determine what level constitutes an emergency situation that requires prompt remediation and, beyond that, what level warrants a recommendation to evacuate residents until the radon concentration can be reduced. Because of the hazard to public health, the Agency needs to move expeditiously to develop interim recommendations for emergency action to protect occupants of the most severely contaminated homes. Before we can do this, however, we must be confident that our estimates of the risk associated with particular levels of exposure to radon decay products are reasonable, and consistent with current scientific knowledge.

As part of the Agency's recent rulemaking under the Clean Air Act limiting radon-222 emissions from underground uranium mines, the Agency evaluated health risks resulting from exposure to this pollutant. In that case, we used a range of relative risk coefficients (1.2 to 2.8 percent) which corresponds roughly to between 300 and 700 excess lung cancer deaths per 10^6 person-working level months. The risks were calculated using a life table methodology and were based on a lifetime of exposure. An

evaluation of the scientific information available to estimate hazards from exposure to radon decay products and the methodology used to make risk estimates is contained in Chapter 4 of the Agency's "Background Information Document-Standard for Radon-222 Emissions from Underground Uranium Mines." A copy of this material is attached.

In the case of the Reading Prong, our interest is both in long and short term exposure, i.e., lifetime and one to five years. As an illustration of this latter consideration, we have prepared a table, based on the previously-used range of risk coefficients and life table methodology, demonstrating the risks of fatal cancer for various ages and various exposure times. This table is also attached.

I am particularly interested in having the SAB's Radiation Advisory Committee address the following two issues:

(1) Is a range of relative risk coefficients of 1.2 to 2.8 percent a reasonable range for the Agency to use in evaluating the risks associated with exposures at and above various alternative interim emergency action levels for the Reading Prong?

(2) Are there any special considerations that should be taken into account in calculating the risks associated with a short term exposure to radon decay products versus lifetime exposure?

This review is not intended to serve as a precedent for future Agency rulemakings involving public exposure to radon decay products, nor as a definitive finding on the precise risks associated with a given level of radon exposure. Instead, it should serve as the interim basis for assessing risks associated with alternative interim emergency action levels and evacuation recommendations that will be applicable only to the Reading Prong. In the longer term, there is a much broader range of scientific issues related to an overall Agency radon program which we expect to present to and discuss with the Science Advisory Board. We believe its review of these issues will be an important part of the Agency's efforts to deal with the public health risks posed by radon.

Because the heating season is approaching, it is imperative that the Agency issue interim recommendations for emergency action within the next two months. Therefore, I would greatly appreciate your assistance in streamlining the process and encouraging the Committee members to act as promptly as possible. Please call me if you have any questions.

2 Attachments