



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

EPA-SAB-RAC-LTR-92-005

January 29, 1992

Honorable William K. Reilly  
Administrator  
U.S. Environmental Protection Agency  
401 M Street, S.W.  
Washington, D.C. 20460

OFFICE OF  
THE ADMINISTRATOR

Subject: Review of draft revised Citizen's Guide to Radon

Dear Mr Reilly,

The Office of Radiation Programs by its memorandum of August 21, 1991, requested that the Science Advisory Board review A Citizen's Guide to Radon. Copies of the August 28, 1991, draft Citizen's Guide were provided a few days later and the final charge, which appears below, was presented to the Radiation Advisory Committee at its public meeting September 18-20, 1991 in Washington, DC. The Office of Radiation Programs supplemented the material in the draft Citizen's Guide with briefings and handouts on the Citizen's Guide including specific items providing information on the basis for the radon risk charts contained in the Guide and on the effect of smoking on radon risk. The Committee has not received the draft "Home Buyer's and Seller's Guide to Radon".

The Committee approved the content of this report September 20 and agreed to the final language by mail and phone in early October.

The September 12, 1991 charge was:

1. Does the document properly reflect current scientific knowledge on radon, particularly in the following areas:
  - a. The discussion of short- and long-term testing
    - 1) in the last two paragraphs on page 5
    - 2) in the last two paragraphs on page 6
    - 3) in the last Myth/Fact on page 13
  - b. The characterization of risks from radon
    - 1) in the Figure on page 2
    - 2) in the section on "The Risk of Living with Radon" on page 10
    - 3) in the four risk comparison charts (included at the end of the Guide), one set of which is destined for insertion on page 11
    - 4) in the first Myth/Fact on page 12
    - 5) in the next to last Myth/Fact on page 13



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2. Based upon the Committee's prior review of short-term/long-term correlations and presentations at the September meeting, has the Agency appropriately incorporated the available technical information in reaching the policy recommendation embodied in the test protocol on p. 6?

In its review of the draft Citizen's Guide to Radon the Committee has accepted the premise that measurements on the lowest living level are the most relevant to the homeowner since they best reflect radon exposure.

The Committee's responses to each section of the charge follows.

1. *Does the document properly reflect current scientific knowledge on radon, particularly in the following areas:*

- a. *the discussion of short- and long-term testing.*

The Committee continues to affirm that a long-term test is the best basis for citizens to determine whether to fix a home; however, for those circumstances where a shorter-term decision is required or appropriate (a high reading, for example) two short-term tests, at a minimum, may be used. With this proviso, the discussion of short- and long-term radon testing reflects current scientific knowledge. The following recommendations are provided to clarify and improve the presentation of this material in the Citizen's Guide.

- (1) *In the last two paragraphs on page 5 (of the August 28 1991 revised Citizen's Guide to Radon).*

The next to the last paragraph (on short-term testing) concludes with the sentence, "However, short-term tests may be used to decide whether to fix your home." The Committee recommends that this sentence be revised to make it clear that a single short-term test is not decisive and that at least two short-term tests are needed before a decision to fix a home is made, if the preferred long-term test is not feasible.

- (2) *In the last two paragraphs on page 6 (of the August 28 1991 revised Citizen's Guide to Radon).*

The Committee's comments relevant to these paragraphs can be found in the Committee's response to the second item in the charge, which addresses the test protocol.

*(3) in the last Myth/Fact on page 13 (of the August 28 1991 revised Citizen's Guide to Radon).*

The Committee recommends that EPA revise this Myth/Fact statement to be consistent with response (1) above. The Citizen's Guide should make it clear that, at a minimum, two short-term radon tests are needed to decide whether to fix a home, if the preferred long-term test is not feasible.

The material on the uncertainty of test results around 4 pCi/L in this Myth/Fact statement is important, and should be placed closer to the front of the document, perhaps in the discussion currently found on page 6 of the Citizen's Guide. A briefer Myth/Fact statement should be retained in the list of Radon Myths.

*b. The characterization of risks from radon.*

With consideration of the following comments, the Committee believes the characterization of risks from radon will be consistent with current scientific knowledge.

*(1) In the Figure on page 2 (of the August 28 1991 revised Citizen's Guide to Radon).*

The Committee has concerns that this figure compares estimated deaths related to radon with actuarial deaths from other causes. The number of deaths from automobile accidents, drownings, fires and airline crashes are deaths that can be counted, whereas, the deaths from radon are estimates based on mathematical models. This can be considered a comparison of "apples and oranges."

The Committee recommends that the bar on the graph representing estimated radon deaths be made different from the bars for other types of deaths in order to emphasize that the radon deaths are estimates.

The Committee recommends that EPA expand the footnote for this figure to present the central estimate (consistent with the bar graph) along with the range of estimated deaths due to radon. The footnote should make it clear that the radon deaths are estimated lung cancer deaths whereas the other deaths are actuarial deaths. For comparative purposes, the footnote might include the total number of lung cancer deaths from all causes.

The figure applies to the U.S. population; the figure title should make this clear.

(2) *In the section on "The Risk of Living with Radon" on page 10 (of the August 28 1991 revised Citizen's Guide to Radon).*

The last paragraph regarding possible risks to children reflects current scientific knowledge. The Committee suggests a slight wording change, as follows:

"Children have been reported to have greater risk than adults of certain types of cancers from radiation, but there are . . ."

The Committee also suggests a wording change to the last "bullet" of the figure on this page, to read:

"whether you are now a smoker or have ever smoked."

(3) *In the four risk comparison charts (included at the end of the revised Radon Citizen's Guide), one set of which is destined for insertion on page 11.*

The Committee has several concerns with the material in these charts. One concern relates to the comparison of radon risks with chest x-rays. The reasons for this concern are that most people do not know what the risk from chest x-rays is, and that this comparison may increase the fear of chest x-rays, which are medically beneficial.

The Committee recommends that EPA not compare radon risks with those of a hazardous waste site since most people do not know what that risk is and because the Committee does not know how the estimated deaths from exposure to a hazardous waste site were arrived at.

If risks such as heart attacks are dependent on smoking status, the appropriate risk should be used when comparing with radon. The Committee recommends that the comparison chart not include too many different types of risks because it may be confusing.

The charts could give the impression that there is a threshold at 2 pCi/L. To avoid this impression, the Committee recommends that risk comparisons be added to the charts for radon concentrations of 1.3 pCi/L and 0.4 pCi/L.

The Committee has more comments on comparisons that should not be used than on comparisons that should be used. Comparison with automobile accident deaths was the more acceptable to some Committee members.

The Office of Radiation Programs reported that Rutgers University is conducting a test of the public's response to these charts. The Committee strongly recommends empirical evaluation (field testing) of these charts.

*(4) In the first Myth/Fact on page 12 (of the August 28 1991 revised Citizen's Guide to Radon).*

The Committee recommends that the following phrase be added at the end of this sentence:

"especially among smokers since the risk to smokers is much greater than for nonsmokers"

The Committee also suggested that the wording, "major health authorities" be changed to "major health organizations."

*(5) In the next-to-last Myth/Fact on page 13 (of the August 28 1991 revised Citizen's Guide to Radon)*

The Committee suggests a change of wording from "you can reduce" to "you will reduce."

*2. Based upon the Committee's prior review of the short-term/long-term correlations and presentations at the September meeting, has the Agency appropriately incorporated the available technical information in reaching the policy recommendations embodied in the test protocol on page 6? (of the August 28 1991 revised Citizen's Guide to Radon)*

The test protocol in the Citizen's Guide recommends that a short-term test be conducted first, and if the result is 4 pCi/L or higher a follow-up test is recommended. The follow-up test can either be a long-term test or a second short-term test. The Guide recommends a long-term test for a better understanding of the year round average radon level, and a second short-term test is recommended if the result is needed quickly.

The Guide appropriately notes that short-term tests are less definitive than long-term tests and it recommends a long-term follow-up test unless the result is needed quickly. The Committee has concerns about the reliability of two short-term tests being used as a basis for a decision to fix a home, but agrees with this protocol if the result must be obtained quickly.

The Committee agrees that in most cases a long-term follow-up measurement is preferable in order to obtain a year-round average radon level. An exception can be made when the short-term measurement result is several times the action level (for instance above 10 pCi/L). In this case the homeowner should arrange for a confirmatory short-term test immediately, rather than taking the time for a long-term test. This procedure will permit a quicker decision to be made as to whether actions are needed to fix the house.

If the test result is less than 4 pCi/L, it is recommended that the homeowner consider retesting in the future to reconfirm the result and to check whether

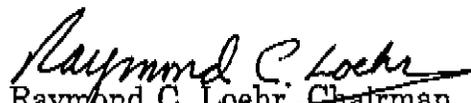
the radon level has changed. This action will reduce the number of false negative results and detect real changes due to activities such as home remodeling.

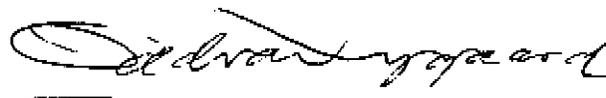
In addition to responding to particular items in the Charge, the Committee has some additional comments. The more specific wording recommendations can be found in Enclosure 2. (The Committee roster is Enclosure 1). The Committee wishes to highlight the following two additional recommendations:

1. An empirical evaluation (field testing) of this draft Citizen's Guide would be valuable because such tests are the best way to determine whether the information is presented in a manner that is likely to be accessible to the intended audience.

2. The addition of an index and glossary would be helpful.

The Science Advisory Board is pleased to have had the opportunity to review the draft document and to offer its advice. We would appreciate your response to the major points we have raised, particularly with regard to our position on long-term vs short-term testing and empirical evaluation (field testing) of the document.

  
Raymond C. Loehr, Chairman  
Science Advisory Board

  
Oddvar F. Nygaard, Chairman  
Radiation Advisory Committee

Enclosures: (1) Committee roster  
(2) Additional comments and suggestions on wording

ENCLOSURE 1

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## ENCLOSURE 2

### Additional Comments and Suggestions on Wording

1. P3, par 2, sentence 2: Change to: "That's because when you breath air containing radon, you can get lung cancer."
2. P3, par 3, sentence 2: Change "even schools" to "and schools".
3. P3, last par, sentence 2: Add phrase at end of sentence: "to acceptable levels."
4. P3, last par, after sentence 2: Add: You may be able to fix your home yourself. For information, obtain a copy of the "Consumer's Guide to Radon Reduction."
5. P4, Figure: Add as number 8: "Through well water."
6. P4, par 1, sentence 5: Change "Any home can have a radon problem." to "Any home may have a radon problem."
7. P4, italicized item in big type : Same as above.
8. P4, par 2, sentence 4: Same as above.
9. P5, par 2: Add sentence to emphasize that radon in soil gas is the principal contributor to indoor radon. Also, revise second sentence to make clear the fact that building materials are rarely a significant source of indoor radon.
10. Radon in Water, sentence 3; Reword this sentence to make it clear that the dose from drinking the water is significantly less than the dose from breathing the air.
11. P7, Radon in Water, Italicized sentence in big type: Add comment on type of detector to be used to test water in order to avoid confusion that the same type detector used to test the air can be used for water. This same comment applies to Myth/Fact 2 on p. 13.
12. P7, last par: Omit the material on point-of-entry and point-of-use treatment.
13. P9, par 1, sentence 1: This sentence raises questions about mitigation methods that generally are not by themselves, effective in reducing radon concentrations significantly. The Committee recommends that the sentence be altered to read "A variety of methods are available to reduce radon in your home. In some cases, sealing cracks in floors and walls may help reduce concentrations. In other cases, simple systems... "

14. If decisionmaking is conducted on the basis of whether the average of the two readings is lower or higher than 4 pCi/L, then a first reading above 10 pCi/L makes a second unnecessary. Perhaps the following should be added to the Citizen's Guide: "If the second test shows a level similar to or greater than the original reading, then remedial actions should be considered. If the second test shows substantially lower levels, then a third test should be considered to resolve the question of which of the earlier tests was valid."

15. p 7, par. 5: The Committee believes the data may not adequately support the statement that radon resistant construction methods will keep radon in new homes below 2 pCi/L.