

**Compilation of Public Comments on the EPA SAB RAC
Draft Report on the EPA Radiation Risk White Paper
(September 5, 2007 SAB Telecon)**

a) **Dr. Arjun Makhijani:**

30 August 2007

Granger Morgan, Chair, Science Advisory Board
Jill Lipoti, Chair, Radiation Advisory Committee
U.S. Environmental Protection Agency
Washington, D.C.

By e-mail to Miller.Tom@epamail.epa.gov
cc: Jack Kooyoomjian

Subject: Comments on the July 18, 2007 SAB review of the EPA draft White paper “Modifying EPA Radiation Risk Models Based on BEIR VII” provided for the meeting of the SAB by teleconference, 5 September 2007.

Dear Drs. Morgan and Lipoti:

The following are my comments on the July 18, 2007, SAB review of the EPA draft White paper “Modifying EPA Radiation Risk Models Based on BEIR VII” for your consideration at the September 5, 2007, teleconference call and in the process of finalization of the review.

Issue 1: “Exposed” and “non-exposed” populations

On page 4 of the letter, the review states that

Thus, as a cautionary note, the RAC recommends that the EPA discuss potential problems associated with the use of LNT dose response model risk estimates in very low dose settings. Currently at these low doses, statistically significant differences between the cancer rates among “exposed” (defined study populations) and “non-exposed” (defined comparison populations) are not observed. These near background doses are only a fraction of those that have been found to be associated with statistically significant differences in cancer frequency between “exposed” and “non-exposed” populations.

The same or similar language also appears elsewhere (page 4 of the summary and page 23 of the review). The fact that statistically significant excess cancers due to

exposures resulting from anthropogenic activities cannot be detected is not relevant to protection of public health. The relevant fact is that over 70 years, natural background provides at least 6 rem cumulative dose, usually more. Since there is clear evidence of risk at several rem or more, the linear-no-threshold hypothesis applies and the cancers would be expected to occur. The difficulty of detecting the excess in epidemiological studies should not be allowed to confuse the central issue, which is this:

All anthropogenic doses, no matter how small, are expected to cause increased cancer risk. The best present estimate is that the increased risk is proportional to dose. One Anthropogenic exposures occur on top of cumulative natural exposures, which are large enough to create some cancer risk.

I recommend that the passage on page 4 of the letter and the companion passages (p. 4 of the summary and p. 23 of the report) be deleted and replaced by the three italicized sentences above.

2. Fetal dose and risk

Question 2h of the charge to the committee concerned fetal exposure and risk. It is reproduced below from p. 21 of the review:

Estimation of risk due to prenatal exposure. EPA's current lifetime risk estimates do not include risk from prenatal exposure, and BEIR VII does not provide them. The draft White Paper uses ICRP recommendations to project its risks of childhood cancers induced by in utero exposure. Please comment on the soundness of the approach described in the draft White Paper to apply ICRP as described in Section IV.

The response of the committee is deficient in one fundamental respect because it omits important elements of risk. It also endorses an incorrect approach to estimating certain fetal doses. I consider each of these issues in turn.

Omissions of risk

The charge to the committee was not restricted to cancer risk, but to “[e]stimation of risk due to fetal exposure.” Cancer risk may not be the main risk due to radiation exposure in very early stages of fetal development. Early pregnancy failures (for instance in the first two to three weeks) and malformations are also risks when exposure occurs in the first few weeks. The committee should have considered these risks. Granted that some of these risks are difficult to evaluate, notably from internal exposure (see below), but that fact itself is relevant and important enough that it should be explicit. The EPA needs to develop a research agenda to get reliable quantitative estimates of non-cancer risks of early fetal exposure. It also needs to set standards in a way that are protective and reasonably conservative.

Incorrect exposure assessment

The review has endorsed the ICRP approach for estimating fetal radiation dose (p. 2 of the letter, p. 3 of the Executive Summary, and p. 21 of the full review). For instance, p. 3 of the Executive Summary, states

The RAC concludes that it would be reasonable for the EPA to use the referenced estimates of cancer risk from *in utero* exposure to external radiation sources, and the dose coefficients provided by the ICRP as a basis for developing its risk estimates for *in utero* radiation exposure from internally-deposited radionuclides.

This recommendation should be accompanied by a critical caveat regarding an important limitation of the ICRP risk estimates. Specifically, the ICRP 88 assumption that the dose to the embryo/fetus in the first eight weeks of pregnancy is the same as that to the uterine wall¹ is not valid for alpha emitters and for low-energy beta radiation emitters, such as tritium. The actual deposition of alpha and low-energy beta emitters in the embryo/fetus needs to be determined to estimate dose and risk.

In other words, since the ICRP's model is not valid for the cases cited, a new one is needed for the first eight weeks of development of the embryo/fetus for alpha and low-energy beta emitters. This is especially important since structural organization and a substantial component of organogenesis occur in the embryo/fetus over this period. This period is therefore especially important for the risk of malformations and early pregnancy failures. The context of this comment is provided on page 73 of IEER's report *Science for the Vulnerable* (by Arjun Makhijani, Brice Smith, and Michael C. Thorne). It is on IEER's website at:

<http://www.ieer.org/campaign/report.pdf>

I specifically pointed out this problem to the RAC in written comments, with specific recommendations as to how the text should be corrected. My letter of March 12, 2007, to the Designated Federal Official, written for the RAC's consideration is attached (See Attachment 1). I have been given to understand that it was transmitted to the members of the RAC. (Some of the language in this letter is drawn from my March 12, 2007 letter).

I am mystified that the July 18, 2007, draft report does not even mention this comment or deal with the issue in any way. The ICRP model is clearly inapplicable to certain radionuclides, including alpha-emitters and tritium. This is

¹ International Commission on Radiological Protection. *Doses to the Embryo And Fetus From Intakes Of Radionuclides By The Mother*. ICRP publication 88. Annals of the ICRP, 31(1/3) 2001. Corrected version. Oxford: Pergamon, May 2002, p. 20.

an issue of immense potential importance that should not be ignored or brushed under the rug. For instance, discharges of tritium from nuclear power plants and tritium contamination of water due to nuclear weapons activities in decades gone by, is widespread. Is the EPA going to assess the impact to developing fetuses based on an evidently incorrect model? And is the RAC willing to go on the record as having endorsed the ICRP model without due consideration of its obvious deficiencies in regard to certain radionuclides for the critical first eight weeks of pregnancy?

It would be understandable if the RAC had not addressed the issue due to an oversight. But given the circumstances, I would think that the RAC and the SAB would not want to find themselves in the embarrassing position of brushing a significant scientific problem under the rug, after it has clearly been pointed out to them. The embarrassment would be compounded since the problem was pointed out as part of public comment to a committee chartered under the Federal Advisory Committee Act (FACA).

In sum, the RAC has failed to properly review the ICRP model. The review must be modified to explicitly discuss the ICRP model for fetal dose, including dose from alpha-emitters and tritium during the first eight weeks of pregnancy. This modification will require substantial work. I recommend therefore that the SAB send back the review to the RAC for detailed consideration of the specifics of the ICRP model for the first eight weeks of pregnancy and of non-cancer risks extending to the first 14 weeks of pregnancy. I expect that there will be one or public meetings during which the public may provide comment on the RAC's work in progress on this point. I also recommend that the non-cancer risks discussed above be part of the same reconsideration and redrafting of the report.

Issue 3: RBE for low-energy photons and tritium beta particles

The review has concluded that an RBE for low-energy photons (<30 KeV) and low-energy beta particles, such as those from tritium, "in the range of 2 to 2.5 seems reasonable" (p. 2 of the letter, p. 2 of the Executive Summary, and p. 20 of the report).

IEER supports that shift away from an RBE of one for these radiation types and the choice of 2 to 2.5 for non-pregnant adults. However, in the case of tritium, the RAC report does not discuss the dependence of the tritium RBE on age at exposure and on the form of tritium (tritiated water versus organically bound tritium). I discussed this in some detail in my letter of March 12, 2007. I also included the table of RBEs that my colleagues and I calculated based on the research of Harrison, Khursheed and Lambert.² This is all reproduced in Attachment 1.

² J.D. Harrison, A. Khursheed, and B.E. Lambert. "Uncertainties in dose and coefficients for intakes of tritiated water and organically bound forms of tritium by members of the public." *Radiation protection dosimetry*, v. 98, no. 3 (2002), pages 299-311.

I recommend that the SAB adopt the following conclusions regarding low-energy photon and low-energy beta radiation exposure, including exposure to beta radiation from tritium.

1. An RBE in the range of 2 to 2.5 for low-energy photons and electrons, including tritiated water, should be adopted for purposes of setting radiation protection standards for non-pregnant adults.
2. An RBE of 4 to 5 for low-energy photons and electrons, including tritiated water, should be adopted in radiation standards for fetal exposure and for children.
3. The RBE for organically-bound tritium (OBT) is higher than that of tritiated water, possibly by a factor of 2 to 2.5, as indicated by Harrison, Khursheed and Lambert 2002. The EPA should initiate a review of the issue of OBT in order to develop the appropriate regulatory guidance both as regards the RBE and as regards the circumstances in which the use of a higher RBE is warranted.
4. The EPA should also initiate a review as to whether a higher RBE is warranted for prospective fathers in view of the potential exposure of germ-line cells to tritium.

I made the first three suggestions in my March 12, 2007, letter. I have added the fourth here. I note that the RAC also rejected the first three suggestions without discussion of the underlying scientific issues. The RAC and SAB are obliged to take public comment into account. My comments were based on published scientific work and a reasonable and specific critique of the draft. I do not expect that every comment be accepted, of course. But there is no evidence in the July 18, 2007, draft or any other public material that the serious underlying scientific issues were given consideration by the RAC before it forwarded the report to the SAB. On this account as well, the review should be sent back for reconsideration and redrafting.

Issue 4: Section 8 of the review: Issues beyond the charge

On page 25 the, July 18, 2007, draft of the review states

The RAC received written and oral comments from members of the public which raised concern about the need to set radiation protection standards for the most sensitive population for specific cancer end points, instead of the use of "Reference Man." The RAC understands that in the existing Federal Guidance Report 13, EPA-ORIA has already used the current ICRP age groups (infant, 5-10, 15-20 year olds) in both the cancer risk coefficients and the underlying radiation dose coefficient. The RAC recommends that EPA continue this practice so that

individuals using the Federal Guidance for assessing compliance can be explicit about ages and make appropriate assumptions.

This section is substantially different than the February 2007 draft of the review, which recommended that the EPA consider the ICRP 89 Reference Family concept as a replacement for “Reference Man.”

An endorsement of FGR 13 is not a substitute for getting rid of Reference Man. First of all, the age-specific risk factors in FGR 13 are not gender-specific. The EPA averages male and female risks in its regulatory practice in a way that is entirely inappropriate, given the evolution of radiation risk assessment since FGR 11 and BEIR V. When these latter documents were the most recent science, a sex-specific differentiation of overall cancer risk was not necessary. The risk to females as estimated in BEIR V was about 5 percent greater than the risk to males (in the case of a single exposure of 10 rem). BEIR VII is a radical departure from BEIR V. In this regard FGR 13 is a radical departure from FGR 11 as well. Yet, the review contains no discussion of sex-specific overall risk factors of exposure to radiation (other than the risk model for lung cancer in women). Neither does the report consider the implications of incorporating the age- and sex-specific risk factors for reducing overall dose limits. The implications for female children versus male children are also important, since females are at greater risk when they are young as well. The FGR 13 CD containing the numerical dose and risk conversion factors by radionuclide does not provide any sex-specific risk factors. It averages risks in a way that is prejudicial to females, including female children, since they are now known to be at higher risk overall, and at much higher risk for certain cancers.

Finally, the problem of fetal exposure also has a sex-specific aspect. Males continuously produce germ-line cells, but ova are produced when a female is in utero. Hence, in utero exposure must also consider females and males according to the risks that they face; it must also factor in inter-generational risks. I had recommended not only that the RAC specifically recommend that Reference Man be abandoned (a recommendation that was accepted in the February draft, in milder form, and then rescinded without explanation). I had also recommended that those most at risk be protected. I noted that in some situations the most at risk might be children, in other situations it might be breast feeding or pregnant women, in others, men who want to be fathers, or, in yet others, the embryo/fetus. None of these considerations found their way into the report. Even men in their potential capacity as fathers were not considered.

It should also be noted that FGR 11 is still the basis of the levels of maximum allowable exposure in many circumstances. For instance, FGR 11 and Reference Man are still the basis of ResRad, the computer model that is used to estimate the dose from residual radioactivity in soil and that is used to set clean-up levels at contaminated sites. It is unconscionable that, at a time when the ICRP itself has moved away from a concept of a young “Caucasian” male being at the center of

the radiation protection universe, the RAC should maintain silence on this critical problem. It is even more mysterious that, having recognized it as an issue and made a rather mild recommendation to the EPA to wake up to a world in which there are women, children, and non-Caucasians, the RAC should have retreated, at least implicitly, into a White male domain without explanation.

I am certain that the public would be appalled should the SAB not make an explicit recommendation that the EPA reject any standards and guidance based on Reference Man. An explicit statement referring to the need to change all standards, regulations, and guidance (including models such as ResRad) is necessary. On this matter as well, the SAB should send the review back to the RAC for reconsideration, including taking public comment. I also recommend that when the RAC and SAB reject public comment that some explanation be provided as to the scientific basis for its rejection.

I will be making public comment along the lines of this letter during your September 5, 2007, teleconference call. Your DFO, Tom Miller, advised me to send you written comments in advance so that you could see it before your call and consider it. I look forward to hearing your response to the above concerns, analysis, and recommendations on September 5, 2007.

Thank very much.

Yours sincerely,

/ Signed /

Arjun Makhijani, Ph.D.
President, Institute for Energy and Environmental Research

b) Dr. Clark Bullard:

To Tom Miller

Now is the time for EPA to abandon Reference Man and set standards to protect those most at risk, including pregnant women, infants, and children, with sex-specific risks factored in. Women face a significantly higher overall risk of getting cancer than men for the same exposure to radiation.

The White Paper should be revised ASAP to state this in no uncertain terms. Then the Director or the President should carry the message to the public, explaining that this long-overdue action has finally been taken.

It will give Americans a reason to be proud of their government in these troubling times.

Thank you for your consideration.

c) **Mr. and Mrs G. and D. Peters**

Please revise the draft of the review of the EPA White Paper to explicitly recommend that the EPA abandon "Reference Man" and set standards to protect those most at risk, including pregnant women, infants, and children, with sex-specific risks factored in. Women face a significantly higher overall risk of getting cancer than men for the same exposure to radiation.

Thank you.

d) **Mr. P. R. Shirvalkar**

I am writing to encourage you to revise the draft of the EPA White paper on Radiation hazards. In particular, I support that the EPA should abandon the obsolete criterion of the 'Reference Man' and rather should be more practical in considering how radiation impacts individuals in this country. As the EPA is responsible for setting standards of protection for people vulnerable to radiation (pregnant women, children) I urge that you explicitly recommend the use of a 'Reference Family.'

Scientists worldwide will use these standards, based on your recommendations, for reporting results and interpretations of their findings. Further, political actions are surely contingent on such findings.

Thanks for your time.

I would appreciate a conference call listening phone number to listen in on the Radiation Advisory Committee's review on this matter.

e) **Ms. E. Tracy**

I understand the EPA's Science Advisory Board is meeting Sept 5th to consider the latest draft of its report reviewing the EPA's approach to radiation protection, including the Radiation Advisory Committee's review of the white paper. I understand that the meeting is open to the public, but to listen in by phone I need to know the conference call number to use to call in.

I believe the draft of the review of the EPA White Paper should be revised to explicitly recommend that the EPA abandon Reference Man and set standards to protect those most at risk, including pregnant women, infants, and children, with sex-specific risks factored in. Women face a significantly higher overall risk of getting cancer than men for the same exposure to radiation.

Please let me know the phone number to use to listen in on the meeting.

f) **Mr. J. Davis**

The draft of the review of the EPA White Paper should be revised to explicitly recommend that the EPA abandon Reference Man and set standards to protect those most at risk, including pregnant women, infants, and children, with sex-

specific risks factored in. Women face a significantly higher overall risk of getting cancer than men for the same exposure to radiation.

g) **Ms. B. Miller**

I am writing to urge the EPA to revise the agency's draft white paper entitled Modifying EPA Radiation Risk Models Based on Bier VII to explicitly recommend that the EPA abandon Reference Man and set standards to protect those most at risk, including pregnant women, infants, and children, with sex-specific risks factored in.

It is old news that women's health differs substantially from men's. Women face a significantly higher overall risk than do men of getting cancer from the same exposure to radiation. As a woman, I was appalled to learn that EPA set radiation standards based on Reference Man, a young male. Surely we must base such standards on risks to the most vulnerable!

Once again, I urge the EPA to revise the draft white paper and set radiation standards to protect those most at risk.

h) **Ms. L. White:**

I understand that the EPA's Science Advisory Board will consider the latest draft of its report reviewing the EPA's approach to radiation protection in a teleconference call on September 5, 2007, starting at 1 p.m.

Regarding the draft of the review of the EPA White Paper: It should be revised to explicitly recommend that the EPA **abandon Reference Man and focus on Reference Family and set standards to protect those most at risk: infants, children and pregnant women with gender-specific risks factored in.** Women face a significantly higher overall risk of getting cancer than men for the same exposure to radiation.

Also, **I request a conference call number** that I can call so that I can listen to the discussion on the Radiation Advisory Committee's review of the EPA White paper on radiation protection.

i) **Ms. J. Lombardo**

Dear Mr. Miller,

http://www.epa.gov/sab/pdf/draft_report_on_bier_vii_white_paper_07-18-07.pdf

The above draft of the review of the EPA White Paper should be revised to explicitly recommend that the EPA abandon Reference Man and set standards to protect those most at risk, including pregnant women, infants, and children, with sex-specific risks factored in. Women face a significantly higher overall risk of getting cancer than men for the same exposure to radiation.

j) Mrs. P. Dressler:

I the EPA fails to protect us from the onslaught of radiation exposure who will. We as American Citizens who are faced daily with ongoing impact of radiation exposure must have access to what is going on with regard to regulation of the nuclear industry and its impact on all of us. The cancer rate in this country is out of control and much of it could be attributed to radiation exposure.

I request the following inquiries:

1. The draft of the review of the EPA White Paper should be revised to explicitly recommend that the EPA abandon Reference Man and set standards to protect those most at risk, including pregnant women, infants, and children, with sex-specific risks factored in. Women face a significantly higher overall risk of getting cancer than men for the same exposure to radiation.
2. I request a conference call number that I could call so that I can listen to the discussion on the Radiation Advisory Committee's review of the EPA White paper on radiation protection.

k) Dr. B. S. Lacy:

1. The draft of the review of the EPA White Paper should be revised to explicitly recommend that the EPA abandon Reference Man and set standards to protect those most at risk, including pregnant women, infants, and children, with sex-specific risks factored in. Women face a significantly higher overall risk of getting cancer than men for the same exposure to radiation.

2. I request a conference call number that I could call so that I can listen to the discussion on the Radiation Advisory Committee's review of the EPA White paper on radiation protection.

l) Ms. M. Bottesch:

The draft of the review of the EPA White Paper should be revised to explicitly recommend that the EPA abandon Reference Man and set standards to protect those most at risk, including pregnant women, infants, and children, with sex-specific risks factored in. Women face a significantly higher overall risk of getting cancer than men for the same exposure to radiation.

Why is it so hard for this government to protect its citizens? The science is there, the knowledge is there, what's the problem? We are not all MEN - we are women, pregnant women, infants and children. Above all, the precautionary principle should be your guide line. Please see that this is so.

m) Dr. G. Griffith:

I have read the draft review of the White Paper "Modifying EPA Radiation Risk Models Based on Bier VII" and comments, and would urge the Board to abandon the Reference Man standard and adopt the Reference Family concept, with special

attention to elevated risk to the embryo/fetus and all females. The most vulnerable must be fully protected, especially from inter-generational effects.

Thank you for your consideration.

n) **Mr. C. Clark:**

The draft of the review of the EPA White Paper should be revised to explicitly recommend that the EPA abandon Reference Man and set standards to protect those most at risk, including pregnant women, infants, and children, with sex-specific risks factored in. Women face a significantly higher overall risk of getting cancer than men for the same exposure to radiation.

I request a conference call number that I could call so that I can listen to the discussion on the Radiation Advisory Committee's review of the EPA White paper on radiation protection.

o) **Ms. J. J. MacNulty:**

Regarding the upcoming draft review of EPA White Paper on acceptable radiation standards, I wish to add my voice to those calling for BETTER STANDARDS, to include the increased vulnerability of pregnant women and the unborn, infants, children, the infirm and the aged...in other words, the human family...nor should we ignore our brethren of the plant and animal worlds, other life forms...Please contact me at jmacnulty@adelphia.net regarding protocol for listening in on the conference call to the discussion/review by the Radiation Advisory Council of the EPA offering. Many thanks.

Yours truly,

PS Better still, please cancel the nuclear option, -- so dangerous, so costly, so everlasting, and so slow... and spend our trillions developing safe, sane, sustainable energy options...that is the mandate of your Agency, is it not?

p) **Mr. T. V. Connor:**

The draft of the review of the EPA white paper should be revised to explicitly recommend that the EPA abandon reference man and set standards to protect those most at risk, including pregnant women, infants and children with sex-specific risks factored in. Women face a significantly higher overall risk of getting cancer for the same dose of radiation. These simulations must reflect real-world conditions for all our Citizens. Thank you for allowing my input.

q) **Ms. N. Burton:**

1. The draft of the review of the EPA White Paper should be revised to explicitly recommend that the EPA abandon Reference Man and set standards to protect those most at risk, including pregnant women, infants, and children, with sex-specific risks factored in. Women face a significantly higher overall risk of getting cancer than men for the same exposure to radiation.

2. I request a conference call number that I could call so that I can listen to the discussion on the Radiation Advisory Committee's review of the EPA White paper on radiation protection.

r) **Mr. J. Cape:**

The draft of the review of the EPA White Paper should be revised to explicitly recommend that the EPA abandon Reference Man and set standards to protect those most at risk, including pregnant women, infants, and children, with sex-specific risks factored in. Women face a significantly higher overall risk of getting cancer than men for the same exposure to radiation.

s) **Ms. N. Berkheimer:**

I am writing you regarding the draft of the review of the EPA White Paper should be revised to explicitly recommend that the EPA abandon Reference Man and set standards to protect those most at risk, including pregnant women, infants, and children, with sex-specific risks factored in. Women face a significantly higher overall risk of getting cancer than men for the same exposure to radiation.

I request a conference call number that I could call so that I can listen to the discussion on the Radiation Advisory Committee's review of the EPA White paper on radiation protection.

Thank you for taking my thoughts into consideration.

t) **Ms. J. Nelson:**

Re. human exposure to radiation:

The draft of the review of the EPA White Paper should be revised to explicitly recommend that the EPA abandon Reference Man and set standards to protect those most at risk, including pregnant women, infants, and children, with sex-specific risks factored in. Women face a significantly higher overall risk of getting cancer than men for the same exposure to radiation.

Thank you for your consideration.

u) **Ms. S. Schlesinger:**

I am writing to express my concerns. I strongly believe that the draft of the review of the EPA White Paper should be revised to explicitly recommend that the EPA abandon Reference Man and set standards to protect those most at risk, including pregnant women, infants, and children, with sex-specific risks factored in. Women face a significantly higher overall risk of getting cancer than men for the same exposure to radiation.

I would also like to request a conference call number that I could call so that I can listen to the discussion on the Radiation Advisory Committee's review of the EPA White paper on radiation protection.

v) **Dinda Evans:**

1. The draft of the review of the EPA White Paper should be revised to explicitly recommend that the EPA abandon Reference Man and set standards to protect those most at risk, including pregnant women, infants, and children, with sex-specific risks factored in. Women face a significantly higher overall risk of getting cancer than men for the same exposure to radiation.
2. I request a conference call number that I could call so that I can listen to the discussion on the Radiation Advisory Committee's review of the EPA White paper on radiation protection.

The us people don't trust the us government anymore: from Love Canal, Silkwood, Poisoned chinese products (that cost us workers their jobs as well as health, rising homelessness, pollution, rampant immigration that let in terrorists to sell weapons to police forces or reduce us civil liberties or immigration used to attack resources, drive down wages & raise land costs while they give away us jobs to foreign countries or alien workers: It is way past time that the us government and us agencies started protecting us citizens from internal and external forces.

w) **T. U. Fountain:**

The draft of the review of the EPA White Paper should be revised to explicitly recommend that the EPA abandon Reference Man and set standards to protect those most at risk, including pregnant women, infants, and children, with sex-specific risks factored in. Women face a significantly higher overall risk of getting cancer than men for the same exposure to radiation and children are most at risk. To protect our future, we need to protect our children from exposure to harmful substances such as radiation.

Sincerely,

x) **Mr. A. Hanson:**

The draft of the review of the EPA White Paper should be revised to explicitly recommend that the EPA abandon Reference Man and set standards to protect those most at risk, including pregnant women, infants, and children, with sex-specific risks factored in. Women face a significantly higher overall risk of getting cancer than men for the same exposure to radiation.

I request a conference call number that I could call so that I can listen to the discussion on the Radiation Advisory Committee's review of the EPA White paper on radiation protection.

Sincerely,

y) **Mr. F. Belcastro:**

The draft of the review of the EPA White Paper should be revised to explicitly recommend that the EPA abandon Reference Man and set standards to protect

those most at risk, including pregnant women, infants, and children, with sex-specific risks factored in. Women face a significantly higher overall risk of getting cancer than men for the same exposure to radiation.

z) **Ms. N. Hanson:**

The draft of the review of the EPA White Paper should be revised to explicitly recommend that the EPA abandon Reference Man and set standards to protect those most at risk, including pregnant women, infants, and children, with sex-specific risks factored in. Women face a significantly higher overall risk of getting cancer than men for the same exposure to radiation.

I request a conference call number that I could call so that I can listen to the discussion on the Radiation Advisory Committee's review of the EPA White paper on radiation protection.

aa) **Mr. R. Voelker:**

The draft of the review of the EPA White Paper should be revised to explicitly recommend that the EPA abandon Reference Man and set standards to protect those most at risk, including pregnant women, infants, and children, with sex-specific risks factored in. Women face a significantly higher overall risk of getting cancer than men for the same exposure to radiation.

bb) **Dr. J. Snyder:**

As a pediatrician, I urge you to reconsider the designation of a "reference man" to set standards with regard to risk assessment to radiation exposures. The one-size-fits-all model is too simplistic, and will put women and children at risk.

The draft of the review of the EPA White Paper should be revised to explicitly recommend that the EPA abandon Reference Man and set standards to protect those most at risk, including pregnant women, infants, and children, with sex-specific risks factored in. Women face a significantly higher overall risk of getting cancer than men for the same exposure to radiation.

I request a conference call number that I could call so that I can listen to the discussion on the Radiation Advisory Committee's review of the EPA White paper on radiation protection.

cc) **Dr. M. J. Ryan**

I am writing re: Reference Man. I urge the following:

1. The draft of the review of the EPA White Paper should be revised to explicitly recommend that the EPA abandon Reference Man and set standards to protect those most at risk, including pregnant women, infants, and children, with sex-specific risks factored in. Women face a significantly higher overall risk of getting cancer than men for the same exposure to radiation.

2. I request a conference call number that I could call so that I can listen to the discussion on the Radiation Advisory Committee's review of the EPA White paper on radiation protection.

dd) **Mr. C. Broscius:**

1. The draft of the review of the EPA White Paper should be revised to explicitly recommend that the EPA abandon Reference Man and set standards to protect those most at risk, including pregnant women, infants, and children, with sex-specific risks factored in. Women face a significantly higher overall risk of getting cancer than men for the same exposure to radiation.

2. I request a conference call number that I could call so that I can listen to the discussion on the Radiation Advisory Committee's review of the EPA White paper on radiation protection.

ee) **Ms. E. Wynne:**

1. The draft of the review of the EPA White Paper should be revised to explicitly recommend that the EPA abandon Reference Man and set standards to protect those most at risk, including pregnant women, infants, and children, with sex-specific risks factored in. Women face a significantly higher overall risk of getting cancer than men for the same exposure to radiation.

2. I request a conference call number that I could call so that I can listen to the discussion on the Radiation Advisory Committee's review of the EPA White paper on radiation protection.

ff) **Mr. L. R. Karpen:**

Please send me a conference call number for the September 5 conference call on radiation protection--so that I can listen to the discussion on the Radiation Advisory Committee's review of the EPA White paper on radiation protection. Also: The draft of the review of the EPA White Paper should be revised to recommend explicitly that the EPA abandon Reference Man, but instead set standards to protect those most at risk--pregnant women, infants and children, with sex-specific risks factored in. Women face a much higher overall risk of getting cancer than men for the same exposure to radiation.

gg) **Mr. M. Clinton:**

1. The draft of the review of the EPA White Paper should be revised to explicitly recommend that the EPA abandon Reference Man and set standards to protect those most at risk, including pregnant women, infants, and children, with sex-specific risks factored in. Women face a significantly higher overall risk of getting cancer than men for the same exposure to radiation.

2. I request a conference call number that I could call so that I can listen to the discussion on the Radiation Advisory Committee's review of the EPA White paper on radiation protection.

hh) **Ms. L. Garvey:**

I strongly urge you to NIX the 'reference (white male) man' and change it to the reality of those most at risk, to protect them (women & children & people of color).

Do your job- Protect the environment!- You work for American citizens, not industry!

Your attention to this most urgent matter would be much appreciated by all present & future generations of all species. Remember, we are all dependent upon mother nature.

Thank you

ii) **Ms. J. Poulson:**

The draft of the review of the EPA White Paper should be revised to explicitly recommend that the EPA abandon Reference Man and set standards to protect those most at risk, including pregnant women, infants, and children, with sex-specific risks factored in. Women face a significantly higher overall risk of getting cancer than men for the same exposure to radiation. I request a conference call number that I could call so that I can listen to the discussion on the Radiation Advisory Committee's review of the EPA White paper on radiation protection. I would like the number for the conference call, too, please. Thanks.

jj) **Mr. J. Goldman:**

I am disappointed that the EPA seems to be reversing its earlier recommendation to abandon Reference Man and instead base the standards on those most at risk, including pregnant women infants, and children, with sex-specific risks factored in. Women face a significantly higher overall risk of getting cancer than men for the same exposure to radiation. The draft of the review of the EPA White Paper should be revised to explicitly recommend changing this standard.

Please send me the conference call number so that I can listen to the discussion on the Radiation Advisor Committee's review of the EPA White paper on radiation protection.

Thank you.

Sincerely,

kk) **Dr. R. Bertell:**

The use of the Reference man - basically the "Caucasian soldier, young, male, healthy and 20-30 years old" - was first proposed by the physicists of the Manhattan Project in 1950. It is now almost 60 years since this was made the "standard" for radiation protection, and everyone knows that it is not protective of children or women. It is a racist and sexist standard, which fails miserably to protect those who most need protection! Nuclear fallout from bomb tests and nuclear power reactors have blanketed the whole population with radiation -the embryos, fetuses, infants, children and women, the young and the old, the sick and the well.

I would urge you to explicitly remove this concept and clearly renounce it in your BEIR VII White Paper. The EPA is mandated to protect the health of all citizens! Your mandate is not fulfilled when you rule in favor of protecting only the white adult male. Protecting the weaker members of society provides even more protection for the adult male!

I do not understand how this perverse concept of the Standard Man has corrupted our regulatory framework for so mindlessly for so long.

ll) **Kata Orndorff:**

I am writing to you concerning the EPA White Paper concerning radiation protection. It is very important that the draft of the review of the EPA White Paper should be revised to explicitly recommend that the EPA abandon Reference Man and set standards to protect those most at risk, including pregnant women, infants, and children, with sex-specific risks factored in. Women face a significantly higher overall risk of getting cancer than men for the same exposure to radiation.

mm) **Mr. E. Ball:**

The draft of the review of the EPA White Paper should be revised to explicitly recommend that the EPA abandon Reference Man and set standards to protect those most at risk, including pregnant women, infants, and children, with sex-specific risks factored in. Women face a significantly higher overall risk of getting cancer than men for the same exposure to radiation.

Thanks.

Sincerely,

nn) **T. Barrie:**

I respectfully request that the draft of the review of the EPA White Paper be revised to explicitly recommend that the EPA abandon Reference Man and set standards to protect those most at risk to radiation exposure, including pregnant women, infants, and children, with sex-specific risks factored in. Women face a significantly higher overall risk of getting cancer than men for the same exposure to radiation.

It only makes sense that any risk model on radiation health effects use the group most likely to have adverse health problems from exposure to radiation. Setting the standard using the effects on the group(s) most at risk will ensure that the majority of the population is fully protected.

Thank you for your kind consideration.

Sincerely,

oo) **Mahnaz:**

1. The draft of the review of the EPA White Paper should be revised to explicitly recommend that the EPA abandon Reference Man and set standards to protect those most at risk, including pregnant women, infants, and children, with sex-specific risks factored in. Women face a significantly higher overall risk of getting cancer than men for the same exposure to radiation.
2. I request a conference call number that I could call so that I can listen to the discussion on the Radiation Advisory Committee's review of the EPA White paper on radiation protection.

pp) **Ms. K. Marshall:**

1. The draft of the review of the EPA White Paper should be revised to explicitly recommend that the EPA abandon Reference Man and set standards to protect those most at risk, including pregnant women, infants, and children, with sex-specific risks factored in. Women face a significantly higher overall risk of getting cancer than men for the same exposure to radiation.
2. I request a conference call number that I could call so that I can listen to the discussion on the Radiation Advisory Committee's review of the EPA White paper on radiation protection.

qq) **Ms. H. M. Corneli:**

I have been concerned about our postures on radioactive material since the 1980's when I was a citizen member of the Radiation Protection Council of Wisconsin.

I recommend that your current draft review of the EPA White Paper be revised. It should (1) explicitly recommend that the EPA abandon Reference Man and (2) set standards to protect those most at risk, including pregnant women, infants, and children, with sex-specific risks factored in. (Women face a significantly higher overall risk of getting cancer than men for the same exposure to radiation.) In addition, I request a conference call number that would enable me to listen to the discussion on the Radiation Advisory Committee's review of said EPA White paper.

rr) **Dr. S. Joyce:**

I am sure you have loved ones in life who are not men.

The review of the EPA White Paper should explicitly recommend that the EPA abandon Reference Man and set standards to protect those most at risk, including pregnant women, infants, and children, with sex-specific risks factored in, where applicable. For example, as you know, women face a significantly higher overall risk of getting cancer than men for the same exposure to radiation.

ss) **Ms. J. L. Fry:**

Just like many other people, because of my work I am not able to make my comments known in person on this matter of Reference Man; and I am not able to participate in the discussion by phone conference call for the same reason. I do

appreciate that such communication is available but I write you now because I must rely upon you to take my wishes to the meeting Wednesday September 5th for me.

Please do request on my behalf that the draft of the review of the EPA White Paper be revised to explicitly recommend that the EPA abandon Reference Man and set standards to protect those most at risk, including pregnant women, infants and children, with sex specific risks factored in. Women face a significantly higher overall risk of getting cancer than men for the same exposure to radiation.

I appreciate the opportunity to have some input to this process. I sincerely hope the realization of how severe the consequences are to the different segments of our population will become part of the body of knowledge and inform the EPA discussion and work to keep us all out of harms way when it comes to radiation exposure. As our aggregate knowledge increases so too must our decisions based on that knowledge.

I think of the airline industry that has redefined individual weight guidelines because individuals today weight more on the average than they did in the past. We MUST pay attention to these things and take them into consideration as they come to light. The chances for exposure to women and children are greatly increased now after the cold war and as the world looks to nuclear power for its energy.

Please carry my input to the meeting. Thank you for your help in this matter.

tt) **Ms. L. Keir:**

This letter is to support the ICRP's "Reference Family" concept in the Environmental Protection Agency's Science Advisory Board's considerations this week. You may consider this as public comment.

For a decade, those of us on the Hanford Health Effects Subcommittee listened to public comment from site population survivors and soldier's and worker's families about the health effects of radiation. Infants, children, and pregnant women surely must be referenced, including their specific risk factors. The EPA's Radiation Advisory Committee as well as the Science Advisory Board, must be aware of the National Cancer Institute's long-delayed announcement that some US counties thousands of miles from weapons site releases have received multirad doses of I-131, as well as other radioactive isotopes.

Our Subcommittee was composed of scientists, industry and government officials, as well as tribal members and site population representatives. We met under the guidance of the Centers for Disease Control and the Agency for Toxic Substances and Disease Registry. We were very diverse in our views, but after heated discussion and much study, we agreed that all future production, testing, cleanup and transport of nuclear material a) must include independent, concurrent medical

and environmental monitoring; and b) risk estimates and assessments should reference models representative of the most sensitive among the populations affected.

Respectfully Submitted

Linda Keir, Member: Hanford Health Effects Subcommittee, 1995-2004

uu) **D. Boughton**

Unlike the vested interests of government and industry but like most citizens of the planet earth, I cannot attend the public hearing nor can I participate by phone but I do wish to be heard.

Unlike the vested interest of government and industry who are undoubtedly represented by "Reference Man" but like most citizens who are male or female and whose age can vary from birth until death and whose weight can vary from five pounds to several hundred and whose racial background can be varied and are not represented by "Reference Man," I request that "Reference Man" be abolished and a realistic representation be accepted.

vv) **Ms. J. Arends:**

Concerned Citizens for Nuclear Safety (CCNS), a Santa Fe-based NGO, has been monitoring and participating in the developments to eliminate the Reference Man and to encourage EPA to adopt standards protective of the most vulnerable: women, pregnant women, infants and children. In that regard, CCNS requests:

1. The draft of the review of the EPA White Paper must be revised to explicitly recommend that the EPA abandon Reference Man and set standards to protect those most at risk, including pregnant women, infants, and children, with sex-specific risks factored in. Women face a significantly higher overall risk of getting cancer than men for the same exposure to radiation.
2. A conference call number that I could call so that I can listen to the discussion on the Radiation Advisory Committees review of the EPA White paper on radiation protection.

I may be interested in making a public comment during the call. I look forward to your response.

ww) **Ms. C. Sullivan:**

May I please have a conference call number to hear the discussion by the Radiation Advisory Committee of the EPA White Paper on radiation protection?

I have been reading the review draft and urge RAC to incorporate the following in its recommendations:

1) ---our improved knowledge about the greater health effects of low-level radiation in the fetus and in women. For example, 'Reference Man' must be retired as woefully erroneous for exposures to women, to the developing human fetus, and to reflecting the sex and age based character of radiation risk.

2) ---the urgent need to incorporate improvements to the ICRP model for early (to 3 months) effects of alpha and low-energy beta emitters on both cancer and morphogenesis endpoints in the human fetus. I urge RAC to consider this point as extremely important since nuclear power plants and the US nuclear weapons program have and continue to cause environmental contamination with the beta-emitting tritium.

3) ---the need to broaden the scope of low level radiation health impacts beyond cancer to non-cancer endpoints, (Zhores Medvedev, In The Legacy of Chernobyl, expresses the view that Chernobyl's ultimate health toll will be ~ 1/3 from cancer and ~ 2/3 from other diseases that defeat radiation-weakened immune systems).

Thank you, and again please let me know the phone number for listening to the conference meeting tomorrow the 5th of September.