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No opinions here expressed should be construed as reflecting official positions of the Administration of  
Roswell Park Memorial Institute or of the N.Y. State Health Department.

March 4, 1980

Richard H. Vollmer, Director  
Three Mile Island Support  
United States Nuclear  
Regulatory Commission  
Washington, D.C. 20555

Dear Mr. Vollmer:

This is an urgent appeal to the media. The federal government is about to take an irreversible step that will endanger the health and safety of hundreds of thousands of Americans downwind from Three Mile Island.

Contrary to what you may suppose or believe, the slow release of radioactive gases at TMI is not the safest way to proceed. Current scientific evidence clearly shows that the maximum genetic damage and cancer in the population will be produced by this procedure.

Please take the trouble to read and try to understand my explanation--in plain English--of the scientific facts. If you do this, you can see how both data and logic show that there is greater efficiency in producing genetic damage on a per-rad basis when there is slow release than when there is fast release.

The danger doesn't go away, it gets worse.

As further back-up I am enclosing my letter to President Carter and the abstract from a new paper based on my invited lecture to the cancer center in Heidelberg last October. What you can see from my letter to the President (which is unlikely ever to reach him) is that what creates the difficulty here is the mind-set of regulatory agencies like NRC. They are determined to have "compliance" (following the letter of the NRC regulations) even if this endangers the health and safety of hundreds of thousands of Americans.

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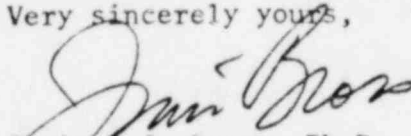
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I realize that the media is reluctant to get involved with technical issues where "experts disagree" on political issues that seem to be "pro-nuke vs anti-nuke". However, in my view the issue is: Can we prevent a major epidemic of genetic damage and cancer by using the scientific knowledge about low-level radiation risks that is now available?

Will the media let the public suffer unnecessary harm to health and safety without at least giving some warning that what might seem like the best way to proceed is, in the light of current scientific knowledge, going to be the most dangerous procedure (even if it is in compliance with NRC regulations).

Very sincerely yours,



Irwin D.J. Bross, Ph.D.  
Director of Biostatistics

IDJB/mak

Enc. (1) Why the Cancer Risk-Per-Rad is Maximized at Low Doses.

(2) Letter to President Carter, 2/28/80

(3) Abstract

## WHY THE CANCER RISK-PER-RAD IS MAXIMIZED AT LOW DOSES

While at first it might seem surprising that the risk of cancer and other manifestations of genetic damage will be greater on a per-rad basis for low doses extended over a long period of time than for high doses given in a short period, there is now little scientific question that this is actually the case.

This means that the proposed venting of radioactive gases from the Three Mile Island containment in small amounts over a longer period of time is not any safer for those living in the TMI area than an accidental loss of containment of the same amount of radiation. Spreading out a given total dose minimizes the short-term biological effects but actually maximizes the much more serious long-term effects which involve genetic damage.

There is a simple scientific explanation of why the effects are maximized by repeated low-dose exposures. We now know that the immediate cause of radiation-induced cancers is the production of a break-point or damage to the complex biochemical structure of the DNA of human genetic material. As Dr. B.N. Ames recently reported in Science, 204(4393):587-593, 1979:

"Damage to DNA appears to be the major cause of most cancers and genetic birth defects, and it may contribute to aging and heart disease."

There are two steps in the causation of cancer. First, the production of the break-point by the ionizing radiation. Second, the reproduction of this misinformation by cloning of the damaged cell. The misinformation must be reproduced many millions of times before the effects can be seen clinically. This is why low-level radiation effects are subtle and occur many years after the actual exposure.

At low levels of ionizing radiation it is unlikely that there will be a single break point produced in a given cell and extremely unlikely that there will be more than one. However, at high levels of radiation two or more break-points may occur. This heavier damage is likely to be "wasted" for the production of cancer since it may block the reproduction of the damaged cell. In effect, the cancer is caused and cured at the same time.

Because the break-points produced at high doses are "wasted" so far as the production of cancer is concerned, the risk of cancer on a per-rad basis is less at high doses than at low doses. This is not a theoretical point because in the data from the Rochester epidemic of breast cancer produced by high doses of x-ray given for post-partum mastitis this can be seen from the dosage-response curve (JNCI, 60(4): 727-728, 1978). My invited lecture at Heidelberg cites more than 20 scientific reports that support this finding on efficiency of genetic damage per rad.

Hence, the proposed venting of radioactive gases at TMI will not be safe and will actually result in the maximum risk of genetic damage and cancer for the population downwind from the containment.

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February 28, 1980

President Jimmy Carter  
White House  
1600 Pennsylvania Avenue  
Washington, D.C. 20500

Dear Mr. President:

Although there is little chance that you will see or hear about this letter, it contains an urgent warning concerning the health and safety of hundreds of thousands of Americans who live downwind or downstream from Three Mile Island.

According to the news reports, the Presidential Commission has recommended venting the radioactive gases at TMI into the atmosphere. This is said to be necessary to get the clean-up started. It is also said that by venting very slowly, the hazards from the gases will be minimal.

The latter statement sounds plausible and statements like this have been made for 25 years, but it is flatly contradicted by the scientific evidence on low-level radiation hazards that is available in 1980 (A). No matter what the rate of venting may be, the total radioactivity vented is the same. What is now clear (see the attached report that summarizes the new findings on this question) is that the amount of genetic damage in the exposed population will be maximized by slow release over an extended period. A brief non-technical scientific explanation for this is appended (B).

The assertion that this venting is necessary is also a serious technical error that derives from the mind-set of federal regulators, not from the technical evidence. There is a technical option which would not require any venting of radioactivity into the atmosphere. It is called "entombment" and with this option all of the radioactivity presently in the containment would remain in the containment. It could not be a danger to the health and safety of persons living in the general area of Three Mile Island. The basic idea of entombment is simply to immobilize the radioactivity in the air and water or elsewhere in the entombment in concrete. In effect, the containment would be partially filled up with concrete by remote-controlled processes.

President Jimmy Carter  
February 28, 1980  
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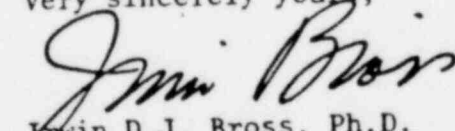
The NRC will not consider this option because the current regulations require a plant to be in good operating condition when it is entombed. TMI is obviously not in such condition. An exchange of letters between NRC and myself (C) is enclosed. It may sound incredible that a federal regulatory agency should take the position that the radioactivity should be vented, dumped into the river, or trucked out, and the health and safety of hundreds of thousands of persons endangered before it is willing to consider the entombment option. Read the letters for yourself and you can see why the Commission was misinformed.

Let me stress that this letter concerns a public health question and that "pro-nuke" vs. "anti-nuke" issues are irrelevant here. The NRC regulation makes sense in ordinary circumstances but not in the TMI accident situation. Entombment is a major option here which should be seriously considered on its own merits and should not be ruled out by fiat.

In terms of costs, it is by far the most economical option. This is true whether the costs are measured in dollars, energy, workers' lives, or residents' lives. I believe it is the only practical option and that it will be the eventual choice. Hence, before an irreversible step such as venting into the atmosphere is taken, a step that is clearly unnecessary with entombment, this option should at least get careful consideration.

I urge you to instruct the Presidential Commission to reconsider its recommendation and to prohibit venting until they have at least taken the trouble to consider the new evidence on low-level radiation hazards. As can be seen from the Abstract for my new report (which is based on an invited lecture given last October in Heidelberg at the Cancer Center), the proposed venting will maximize the risks of cancer and other manifestations of genetic damage to the persons living downwind from TMI.

Very sincerely yours,

  
Irwin D.J. Bross, Ph.D.  
Director of Biostatistics

IDJB/mak

Attachments: (A) A 1980 Reassessment of the Health Hazards of Low-Level Radiation Hazards.  
(B) Why the Cancer Risk-per-Rad is Maximized at Low Doses.  
(C) Correspondence with NRC

Abstract

A decade ago the risks of leukemia from exposures to low levels of ionizing radiation were estimated by linear extrapolation from data on persons exposed to much higher levels. In recent years, however, a number of scientific studies have reported excess risks where the data was on persons actually exposed to low-level radiation. The new findings are incompatible with the estimates based on the Linear Hypothesis although these estimates continue to be used in public health. Fifteen studies involving low-level nuclear radiation and ten studies involving diagnostic radiation are listed and briefly described. Most of these studies have positive qualitative findings but a few also have quantitative estimates of risk such as doubling doses. The qualitative findings would be extremely unlikely at the estimated exposure levels (which represent average exposures well under 5 rads or rems) if the extrapolative estimate of over 100 rads of the Federal Interagency Task Force Report were correct. The quantitative estimates from the data on persons exposed to low-level radiation give doubling doses in the vicinity of 5 rads and are also incompatible with the extrapolative estimates. The failure of the Linear Hypothesis to fit the new facts seems to reflect a greater efficiency-per-rad in producing genetic damage for the low-dose range than for the high-dose range.