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*IAH*  
*Dch*

June 11, 1979

Mr. Joseph Hendrie, Chairman  
Nuclear Regulatory Commission  
1717 H Street, NW  
Washington, DC 20555

Dear Joe:

Because of your involvement in policy-making relating to blocking the uptake of radiiodines by thyroids downwind from nuclear accidents, I thought that you might be interested in the enclosed letter to Science which summarizes in a convenient form some of the relevant background information.

Sincerely yours,

*Frank*

Frank von Hippel

FvH/jp  
Enclosure

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# Letters

## Available Thyroid Protection

Public attention has focused on the immediate risks to the people nearby from a major release of radioactive gases in a nuclear reactor accident. Many more people up to hundreds of miles downwind could, however, be afflicted by thyroid tumors over the following decades as a result of the inhalation of radioactive iodine.

Fortunately, this threat to the thyroid is the radiation risk most easily defended against. The number of thyroid tumors caused by a reactor accident could be reduced 10- to 100-fold—but only if public health authorities take the trouble to make the necessary preparations. These preparations had not been made at the time of the Three Mile Island accident, and it is still not clear whether they will be made to protect against potential accidents in the future.

The risk to the thyroid is especially great in case of a reactor accident for three reasons:

- Radioactive iodine is produced copiously by the fission process.
- Radioiodines are among the first elements to boil off from damaged nuclear fuel; and
- A large fraction of the iodine which is absorbed by the human body concentrates in the thyroid.

As a result the thyroid radiation dose downwind from an accident could be tens to hundreds of times higher than the dose received by the rest of the body.

That the thyroid is sensitive to radiation—especially during childhood—has been well established as a result of the overenthusiastic use of x-rays for the treatment of various real and imagined illnesses during the first half of this century. Many thousands of children received very large doses of x-rays to their thyroids during this period and have as a result experienced a much higher than normal risk of developing thyroid tumors. Fortunately, it appears that thus far very few of these tumors have been fatal (1).

The area downwind from a nuclear accident in which there would be a high

risk of developing thyroid tumors could extend to great distances. Ten to 60 percent of exposed children 200 miles downwind could eventually develop thyroid tumors after a large release of radioiodine, according to an estimate made in 1975 by the American Physical Society's reactor safety study group (2). Baltimore is about 60 miles from Three Mile Island; Wilmington, 70 miles; Washington and Philadelphia, 90 miles; and New York, 160 miles.

The evacuation of such large cities would be impractical in the time available once it was known that a cloud of radioiodine was being blown toward them. The absorption of radioactive iodine by the thyroid can be blocked, however, by taking a large dose of non-radioactive potassium iodide, the form of iodine present in iodized salt. This strategy is well known among health physicists and, according to a study done for the Defense Civil Preparedness Agency in 1972, it would cost only about \$1 million to stockpile enough potassium iodide pills for the entire United States (3).

The most effective, potassium iodide would have to be taken before the cloud of radioiodine arrived—and the warning time could be very short. Stockpiling would therefore have to be accompanied by a public information program and the organization of a rapid distribution system. Neither the electric utilities nor their regulators have been eager to make these arrangements.

Nevertheless, the National Council on Radiation Protection and Measurement endorsed the thyroid-blocking strategy in 1977 (4) and the Food and Drug Administration (FDA) approved the use of potassium iodide for this purpose in December 1978 (5).

At the time of the Three Mile Island accident potassium iodide was not yet available for mass distribution in the proper dosages. The FDA therefore ordered large-scale production on an emergency basis and within a few days had flown enough into Harrisburg for more than a half a million people (6).

But this would have been too late if the containment building at Three Mile Is-

land had failed early in the course of the accident, and, in any case, thyroid protection was not provided for people more than a few tens of miles from the accident.

The containment building did not fail during the accident at Three Mile Island. It would be tempting fate, however, to delay much longer in having thyroid protection available nationwide.

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## References

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