J. Hatleur
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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

APR 18 1980

MEMORANDUM FOR: K. R. Goller, Director
Div. of Siting, Health & Safeguards Standards, OSD

FROM: D. Muller, Acting Director
Division of Site Safety & Environmental Analysis, NRR

SUBJECT: FEB. 29, 1980, COMMISSION INFORMATION MEMO REGARDING THYROID ABNORMALITIES NEAR TMI

As you know, NRR and OSD jointly evaluated the February 21, 1980, Washington Post article. While we strongly endorse the conclusion in the memorandum, we feel some of the information in Enclosure 2 is potentially misleading, and should be clarified.

On page 3,[1] beginning at midpage, the statement is made that the "maximum airborne iodine concentrations of 120-250 pCi/m^3 occurred mid-April in connection with replacement of the auxiliary building charcoal filters". Those concentration values came from the Report of the Task Group on Health Physics and Dosimetry of the President's Commission. On p. 177 of that report, it is stated that the "Maximum Positive Results" of 250 pCi/m^3 was reported on-site by the NRC during the period April 1 through May 21. The maximum off-site concentration was 50 pCi/m^3. The on-site mean of the three positive samples (out of a total of 102 samples, three had detectable levels of I-131) was 40 pCi/m^3 + 12 pCi/m^3. The actual off-site mean concentration would have been much lower. The same table reports 119 pCi/m^3 as the maximum off-site concentration observed by DOE during the period March 29 through April 16. It is our understanding that the 119 pCi/m^3 value represents a sample taken from the elevated plume by helicopter on April 14, in the vicinity of the auxiliary building vent (see PNO-79-67V, p. 3, April 15) during the time the charcoal filters were being changed. Therefore, this value should be more properly termed an on-site sample. It may be interesting to point out that one helicopter pilot received a whole body count after that or a similar flight; no detectable I-131 was measured. (The minimum detectable activity was about 2 nanocuries, which, if present, would have resulted in a thyroid dose commitment of about 12 mrem).

[1] The following comment also applies to pp. 2-3 of the March 23, 1980, memorandum from R. Goldsmith, OSD.

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The sentence which follows implies that the "approximately 20 millirem" dose to a child was due primarily to the mid-April releases. The NRR I-131 release estimates are attached for your information.[2] Essentially all the estimates are based on measured concentrations and were performed by Frank Cardile, who is now a member of your staff. As can be seen, about half of the I-131 releases had occurred by April 5, about 75% of the I-131 releases had occurred by April 14, and about 95% of the I-131 releases had occurred by April 21. The time sequence of releases is critical since nearly all of the direct evidence of possible I-131 uptake by area residents was through the public whole body counting program. That program was carried out principally during the period April 10 through April 18 (some additional counts, including recounts of several people, were carried out as late as June 26, 1979.) As noted in ENO-0637 (Annex to Appendix C), there was no radioactivity (including I-131) detected in any member of the public (99% of whom lived within three miles of TMI-2).[3] Again, it is important to note that the whole body counting system used would have detected I-131 burdens in excess of about 2 nanocuries, which would have resulted in a dose of about 12 mrem to the thyroid of an adult. It is also interesting to note that the first people to be counted[4] included nearby dairy farmers who were continuously present during all of the I-131 releases, whose cows' or goats' milk contained up to about 40 pCi/liter of I-131, and who drank their milk. Again, no I-131 was detected.

We also take exception with the final paragraph on p. 5[5] which estimates an expected number of hypothyroid cases based on a presumed linear dose-response assumption. Hypothyroidism is a yes or no situation based on

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[2]This document was the basis for the calculated 19 mrem thyroid dose reported on p. 20, ENO-637; and included the period through May 9, 1979.

[3]Detailed results will be reported in forthcoming NUREG-0636 by R. L. Gotchy and R. J. Bores (Region I).

[4]By invitations from Dr. R. L. Gotchy, NRR, who established and directed the public whole body counting program in Middletown for the NRC.

[5]This same comment also applies to p. 3 of the March 24, 1980, memorandum from R. Goldsmith, OSD.

the ability of the thyroid to secrete adequate amounts of thyroid hormones. In other words, hypothyroidism has a fairly well defined threshold below which no early hypothyroidism could ever occur. It has clearly been established that no fetal thyroid doses in excess of 0.2 rem could have occurred (and more likely values are at least an order-of-magnitude lower).[6] It has also been established that it takes orders of magnitude greater doses than occurred around TMI to induce clinical evidence of hypothyroidism (i.e. large amounts of thyroid tissue must be destroyed). Therefore, the expected cases of fetal hypothyroidism would be zero as a result of the TMI-2 accident. On the other hand, treatment of latent thyroid cancer involves effective removal of the thyroid gland (i.e., it would result in what could be termed "latent" hypothyroidism). Therefore, there is a small probability that future cases could occur as a result of the accident. The NRR staff estimates that less than one case of "latent" hypothyroidism would be expected to occur among the 2.2 million people living within 50 miles of TMI.[7]

David R. Muller

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cc: R. Goldsmith
H. Peterson
J. Lafleur
J. Fouchard
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F. Congel
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[6] In a memorandum from R. Gotchy, NRR, dated Feb. 29, 1980 to R. Goldsmith, OSD, it was noted that due to atmospheric dispersion of released I-131, it is unlikely that average fetal thyroid doses 4-5 miles from TMI-2 would have exceeded about 10 mrem, and I-131 doses beyond 5 miles (e.g., Lancaster, Bucks or Lehigh Counties) would have been much lower.

[7] 4,850 person-thyroid-rem X 134 thyroid cancers per million person-thyroid-rem = 0.65 thyroid cancers
Risk Ref: WASH-1400, App. VI, Chapter 9 (1975).