

RECORD #5

TITLE: Applicability Of Footnote (1) of 10 CFR 20.103(a)(1) to 10  
CFR 20.103(b)(2)

FICHE: 38321-288



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

SEP 14 1978

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Route  
FFMSI  
& Return  
JBY

MEMORANDUM FOR: J. G. Keppler, Director, Region III  
A. B. Davis, Chief, FFMSB, Region III

FROM: L. B. Higginbotham, Acting Director, FFMSI, HQ

SUBJECT: APPLICABILITY OF FOOTNOTE (1) OF 10 CFR 20.103(a)(1)  
TO 10 CFR 20.103(b)(2)

Enclosed is a response written by OHSB, Office of Standards Development, concerning the subject applicability of Footnote (1), which, according to the guidance provided, applies to any applicable subsection of 10 CFR 20.103. A verbal explanation was provided to Bert Davis on September 12, 1978.

What may not be entirely clear is the fact that the airborne concentration limit in Appendix B for tritium is one-half of the actual limit for inhalation because one half of the tritium environment to which a person is exposed is absorbed through the skin. Hence, a bioassay sample would represent both inhalation and absorption and the limit would be twice the limit for inhalation in Part 20 or about 484 microcuries. Therefore, in the case presented to HQ for clarification, the licensee is correct in his assertion.

During the discussion with Bert Davis on 9/12/78 it was agreed that OELD concurrences or opinions should not be sought because guidance is the only issue in this matter.

We consider Action Item No. F30414H3 closed.

Leo B. Higginbotham, Acting Director  
Division of Fuel Facilities and  
Materials Safety Inspection  
Office of Inspection and Enforcement

Enclosure: As stated

cc: w/enclosure  
H. E. Book, RV  
~~G. Brown, RIV~~  
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CONTACT: J. R. Metzger  
49-28188



UNITED STATES  
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SEP 14 1978

MEMORANDUM FOR: Jack R. Metzger  
Division of Fuel Facility and Materials Safety  
Office of Inspection and Enforcement

FROM: Robert E. Alexander, Chief  
Occupational Health Standards Branch  
Office of Standards Development.

SUBJECT: APPLICABILITY OF FOOTNOTE (1) OF 10 CFR 20.103(a)(1)  
TO 20.103(b)(2)

This memorandum is in response to your inquiry of September 5, 1978, transmitting Region III's question on an "exception to the concentrations for tritium" in Appendix B of 10 CFR Part 20.

Footnote (1) to 20.103(a)(1) is simply an explanatory reminder that the MPC for tritium takes into account that tritiated water vapor is considered to enter the body in equal amounts by absorption through the skin and by inhalation. These intake phenomena are characteristic of the biophysics involved and apply whenever tritium exposures of this sort are considered (irrespective of explanatory notes), i.e., they apply to paragraph 20.103(b)(2) as well as to 20.103(a)(1).

From the information in the Region III memorandum of Sept. 1, 1978, it appears that the total intake of ( $^3\text{H}_2\text{O}$ )<sub>x</sub> water vapor, as determined by bioassay, was less than double the amount permitted for 40 hours by inhalation alone; therefore, under the biophysical model used, the amount inhaled must have been less than would result from 40 MPC-hours by inhalation alone, and there would be no violation of 20.103(b)(2). If, on the other hand, it had been determined from air-sampling and working times that a person were exposed to over 40 MPC hours of intake by inhalation alone, then, by the model, it would be assumed that the total intake for that person was more than double the amount by inhalation alone for 40 MPC-hours, and the licensee would be in violation of 20.103(b)(2).

To summarize in more specific terms:

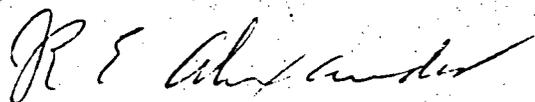
The occupational MPC<sub>a</sub> for tritium (soluble) is  $5 \times 10^{-6} \mu\text{Ci/ml}$ ; the occupational breathing rate is taken as  $6.3 \times 10^8 \text{ ml}$  per quarter; then for a 13-week quarter the breathing rate per week is

$$6.3 \times 10^8 / 13 = 4.85 \times 10^7 \text{ ml} \approx 4.9 \times 10^7 \text{ ml/wk}$$

thus,  $4.9 \times 10^7 \text{ ml/wk} \times 5 \times 10^{-6} \text{ } \mu\text{Ci/ml} = 245 \text{ } \mu\text{Ci/wk} \approx 250 \text{ } \mu\text{Ci/wk}$

is the maximum permissible intake per week by inhalation alone. (Region III calculates 242 uCi/wk by not rounding off figures, but 250 is probably within the limits of accuracy for the measurements involved).

Therefore, if the total intake in a week does not exceed about 500  $\mu\text{Ci}$  ("484"), i.e.,  $2 \times 250$ , there is apparently no violation of the 40 MPC-hour precautionary limit on intake in 20.103(b)(2). But if the intake by inhalation alone exceeds about 250 ("242")  $\mu\text{Ci}$  in that time, then there is a violation since the total intake would then be greater than the limit of about 500  $\mu\text{Ci/wk}$ .



Robert E. Alexander, Chief  
Occupational Health Standards Branch  
Office of Standards Development