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RECORD #166

TITLE: Questions and Answers Concerning Uptakes of AMO-2-241 -  
Information

FICHE: 03717-238

0147/80

→ Metzger



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

AUG 11 1980



MEMORANDUM FOR: G. H. Smith, Chief, FFMS Branch, Region I  
J. P. Stohr, Chief, FFMS Branch, Region II  
A. B. Davis, Chief, FFMS Branch, Region III  
G. D. Brown, Chief, FFMS Branch, Region IV  
H. E. Book, Chief, FFMS Branch, Region V

FROM: J. R. Metzger, Division of Fuel Facility and Materials  
Safety Inspection, IE

SUBJECT: QUESTIONS AND ANSWERS CONCERNING UPTAKES OF AmO<sub>2</sub>-241-  
INFORMATION

Recently, Region III submitted material for incorporation into a license undergoing renewal review in NMSS (Enclosure I), which included statements about the current regulatory policy regarding uptakes of Am-241. Enclosure II from OSD responds to those statements that provides information on bioassay and regulatory limits of intake.

Basically, studies of humans and animals with uptakes of AmO<sub>2</sub>-241 over the last few years have indicated that this compound is more soluble than previously thought. Therefore, when problems arise with licensees who use AmO<sub>2</sub>-241, we should consider the material as soluble, rather than insoluble for purposes of uptake.

*J. R. Metzger*  
J. R. Metzger  
Division of Fuel Facility and Materials  
Safety Inspection, IE

Enclosures:  
As stated

JUN 3 1980

We understand the license is being reviewed. We believe the following areas should be addressed in any new license.

1. Protective Clothing - Lab coats, gloves and shoe covers should be required in the restricted area.
2. Monitoring - All employees should be required to monitor themselves on leaving the restricted area. We recommend a hand and foot monitor be installed.
3. Bioassay - The bioassay program should include an action level with respect to urine levels. Followup bioassay should be required at certain levels. The airborne level that triggers the requirement to perform bioassay should be based on cumulative airborne exposure and not the irrational criteria of four standard deviations over background. For example, exposure to more than 40 MPC(a) hours in a week or more than 50 percent of the 520 MPC(a) hour quarterly limit might require urine bioassay to be performed.
4. Air Sampling - The licensee considers the airborne Am-241 to be insoluble. This is consistent with NUREG/CR-1156 which classifies Am O<sub>2</sub> as Class Y (relatively insoluble). However ICRP 30 considers all inhaled form of Am-241 as Class W (relatively soluble). ICRP 30 calculates a Derived Air Concentration for Am-241 fifty times lower than the MPC(a) for insoluble Am-241 in 10 CFR 20. The NRC should decide if the licensee should be allowed to control Am-241 exposures on an insoluble or soluble basis. It is hard to understand how the material could be excreted in urine if it were completely insoluble.
5. Training - The licensee should be required to document the radiation protection training of all employees.

The cognizant individual in this office on this matter is C. J. Paperiello (FTS 384-2511).

  
James G. Keppler  
Director

Enclosure: As Stated

ENCLOSURE I

DISTRIBUTION:

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 JGKeppler, RIII

AUG 5 1980

MEMORANDUM FOR: Vandy L. Miller, Chief  
 Licensing Management Branch, NMSS

FROM: Allen Brodsky  
 Occupational Health Standards Branch

SUBJECT: COMMENTS REQUESTED ON AM-241 AIR SAMPLING AND BIOASSAY  
 PROGRAMS OF MINNEAPOLIS HONEYWELL LICENSE, IN MEMO  
 FROM J. R. METZGER TO V. L. MILLER, JUNE 17, 1980

We have reviewed Item 4 referenced in the Metzger-Keppler's memo and attachments, and have the following comments:

1. The position stated in Keppler's memo and attachments that the intakes of Am-241 represented by the  $0.35 \pm 15$  dpm per day urine sample do not represent an intake exceeding 10 CFR 20 limits seems proper under current regulatory standards. The two consistent estimates obtained from the Langham-Healy model and the Fasiska et al. paper, as calculated by Carl Paperiello in Attachment 3 of the Keppler memo are probably the best estimates obtainable from a single sample.
2. It is questionable whether the single sample of  $0.35 \pm 0.15$  dpm/day actually represents a real intake, since out of the 171 samples measured it would be expected from statistical theory that the few apparent positives observed could occur above two standard errors of measurement several percent of the time, even if no Am-241 exposures actually occurred.
3. Nevertheless, future operations with Americium should be carried out with more attention to contamination control and cleanup, as recommended by Region III.
4. Since the ICRP-2 report and the related 10 CFR Part 20 standards of intake were adopted, experience with human cases and animal research have indicated that  $\text{AmO}_2$  solubilizes in the lung more rapidly than previously believed. Thus, the "soluble" rather than "insoluble" columns of Appendix B 10 CFR 20, should be used as a basis for regulatory control in future licensing and inspection action unless information specific to a particular operation is available to justify other limits.

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- 5. In determining facility equipment and procedural requirements for safe operations with  $AmO_2$ , the substance should be assumed soluble, with substantial proportions of deposition going to bone and liver within months after intake. Table 1 of the attached paper, "Determining Industrial Hygiene Requirements for Installations Using Radioactive Material," AIHA Journal, Vol. 26, May-June 1965, indicates that when  $AmO_2$  may be subject to dispersal in particulate form, consideration should be given to providing local exhaust ventilation when more than a tenth of a microcurie is handled by a worker at one time, and glovebox operations should be considered above one microcurie in process at one time.

Allen Brodsky  
Occupational Health Standards Branch

Enclosure:  
As stated

OFFICE ► OHSB:SD      OHSB:SD  
 SURNAME ► Brodsky:sh      REAlexander  
 DATE ► 8/1/80      8/1/80