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*ADMITTED IN MD ONLY

Rec'd via mail 5/22/97 Cyma.

By Telecopier
May 15, 1997

Cynthia Jones
Nuclear Regulatory Commission
Mail Stop TF5
Washington, D.C. 20555

Re: Petition of Maryann Wenli Ma

Dear Ms. Jones:

Pursuant to our telephone conversation this afternoon, I am enclosing the only information I found in our files from National Institutes of Health (NIH) notifying Dr. Ma of her radiation dosage in 1995.

As I explained in our conversation, although the enclosed document is a memorandum, dated July 30, 1996, from NIH to Dr. Wenli Ma reporting her radiation dose for 1995, our records do not reflect that NIH provided Bernabei & Katz or Dr. Ma with a copy of the memorandum. I have spoken to Dr. Ma and she has confirmed that NIH never notified her directly of either her annual radiation dose or her radiation dose after the accident.

We received the enclosed memorandum from the Department of Labor in connection with a workers' compensation claim filed by Dr. Ma. The cover letter from the Department of Labor, dated November 25, 1996 and addressed to Wenli Ma, begins with the statement,

> We have received a 26-page response dated November 14 from NIH. Lack of copy notations indicates that NIH did not share this submission with you or your attorney. Therefore, I have made two complete copies and am enclosing one for you and one for your attorney.

This statement confirms that the NIH did not provide Dr. Ma with a copy of this memorandum in November 1996.

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I have conducted a thorough search of our chronological files and I did not find any other copy of this memorandum filed either in July 1996, around the time the memorandum is dated, or at any other time, nor did I find any other document informing Dr. Ma of either her annual dosimetry results or her radiation dose after the accident.

If you need any other information in this regard, please do not hesitate to contact me.

Sincerely,

Dana L. Sullivan

Enc.

DEPARTMENT OF HEALTH & HUMAN SERVICES — Public Health Service

National Institutes of Health
Bethesda, Maryland 20892

Date: JUL 30 1996

From: Radiation Safety Officer, NIH

Subject: Report of 1995 Radiation Dose
NRC License 19-00296-10

To: Dr. Wenli Ma
[redacted]

This is to notify you of our conclusions regarding whether your intake of ^{32}P, which was detected at the National Institutes of Health (NIH) in June, 1995, resulted in your receiving a 1995 total radiation effective dose equivalent which exceeds the annual limit for occupationally exposed adults under 10 CFR 20.1201.

The U.S. Nuclear Regulatory Commission (NRC) has provided an independent estimate of your dose. The NRC indicated in a letter to NIH, dated December 1, 1995 (provided by the NRC to your attorney) that *"Our calculations indicate that Dr.Maryann Wenli Ma ingested between 30.3 to 48.1 megabequerel (MBq) [820-1300 μCi] of phosphorous-32 (P-32). This range exceeds the annual limit of intake for P-32 as stated in 10 CFR 20, Appendix B, Table 1, Column 1 which is 22.2 MBq (600 uCi). Based on these values we have estimated that Dr. Ma received an internal committed effective dose equivalent of between 80 to 127 millisieverts (mSv) [8.0 to 12.7 rem]."*

Based on our analyses we do not agree that the range of intakes the NRC has reported accurately reflect your intake and the subsequent committed effective dose equivalent. The NRC selected and reported the uppermost values of two separate statistical ranges of estimates. The highest of these is based upon the two gamma camera scans that were done by the NIH. The NRC did not factor into their evaluation of these data the inherent overestimates of ^{32}P intake derived from this method due to calibrations made with water phantoms. The necessity to apply a correction factor to such measurements is documented in the literature [1,4], as well as the NRC's own report about the similar incident at the Massachusetts Institute of Technology (MIT) [2]. The Radiation and Internal Dose Information Center (RIDIC) of the Oak Ridge Institute of Science and Education did not use the scan data in determining your intake because of the potential problems associated with this method.

The National Institutes of Health used methods which are based on internationally recommended models to calculate its reported intake estimates of 500 μCi, using NUREG/CR-4884, and 570 μCi, using INDOS, a computer code developed by Skrable Enterprises, Inc. The NUREG/CR-4884 calculation, using all available urine data, resulted in range of numerical intake estimates which range from 300 to 500 μCi. NIH also evaluated creatinine

levels in your urine samples in order to confirm sample validity.

NIH subsequently engaged an outside expert on internal dose assessment and bioassay interpretation to provide an independent analysis. The consultant suggested modification of the standard model parameters for the short term retention compartments and the use of creatinine normalized data to improve the fit of the estimate to the sample data. This modification resulted in a revised estimated intake of 840 μCi $\pm$ 86 μCi[3]. Using the standard model without modification and the iterative weighted fit, the independent expert calculated an intake estimate of 570 μCi $\pm$ 170 μCi. Assuming that the Annual Limit on Intake (ALI) of 600 μCi, as stated in the regulations, corresponds to 5 rem, an intake range of 570 to 840 μCi corresponds to an estimated committed effective dose equivalent of between 4.7 and 7.0 rem. The dose to the fetus is calculated as 3.7 to 5.4 rem using using the best available information from Battelle Pacific Northwest Laboratory (PNL)[5].

The revised estimated intake of 840 μCi, although slightly higher than the originally reported estimate of 500 μCi, would not have influenced the actions that were taken by NIH, and our conversations with the Radiation Emergency Assistance Center/Training Site (REAC/TS), which NIH consulted to facilitate expert medical assistance, indicated that no changes in their recommendations would have been made based on the revised estimate.

Both of the NRC's consultants, the Radiation and Internal Dose Information Center (RIDIC) and the Lawrence Livermore National Laboratories (LLNL) declined to use the activity data from the urine samples collected during the first two days immediately following the intake. RIDIC and LLNL did validate that, if the entire data set is used, the results are in complete agreement with those calculated by NIH. Finally, it is our opinion that reporting of only the high values of two separately calculated statistical ranges of intake, made by RIDIC (820 μCi) and LLNL (1300 μCi), is inappropriate. The entire range of estimates must be considered, and the ranges of intakes are 540 to 820 μCi for RIDIC and 53 to 1300 μCi for LLNL.

Finally, it should be pointed out that the dose levels associated with the upper range of intake estimates which the NIH calculated for you are only fractionally higher (by 2 rem) than the annual occupational limits for radiation workers. Such levels are considered to be safe and are not expected to result in a health impact.

This report is furnished to you under the provisions of the Nuclear Regulatory Commission Regulation 10 CFR Part 19. You should preserve this report for future reference.

If you wish to discuss these intake and dose estimates, please contact me (496-2254).

Robert A. Zoon, M.E., M.S.
Radiation Safety Officer, NIH

Attachment

References

1. Dettman, G.L., *Retention and Excretion of 32P Following Injestion [sic] of 32P ATP*, Note, Health Physics, Vol 46, No 1, January 1984, pp 209-211.

2. U.S. Nuclear Regulatory Commission, Ingestion of Phosphorous-32 at Massachusetts Initute of Technology, Cambridge, Massachusetts, Identified on August 19, 1995, NUREG-1535, December 1995.

3. Skrable, K, Report to National Institutes of Health of Estimated Intake and Radiation Doses from an Ingestion Intake of Phosphorus-32, Skrable Enterprises, March 4, 1996.

4. Eakins, J.D, Gomm, P.J., Jackson, S., The Determination of Phosphorous-32 in Urine and the Evaluation of the Findings for the Assessment of Internal Contamination, Health Physics , Vol 12, pp 593-603, 1966.

5. Personal communication between Mel Sikov, Ph.D., Battelle PNL, and Shawn W. Googins, M.S., CHP, National Institutes of Health.