



Lawrence Livermore National Laboratory

717909

January 4, 1988

Mr. James Davis  
U.S. Department of Energy  
DOE SAN  
1333 Broadway  
Oakland, CA 94612

SUBJECT: Lung Counter Calibration with Inhaled Nb-92m as a "Mock Plutonium"

Dear Mr. Davis:

Enclosed for your information are documents submitted to the LLNL Human Subjects Committee regarding proposed lung counter measurements in 1988-89 on up to eight United Kingdom volunteers who will participate in a formally approved program in the UK to inhale 1 micron particles labeled with Nb-92m as a simulant for plutonium. This program follows earlier work during 1979-85 involving eight men and eleven women to study observed counting efficiencies of plutonium lung counting systems in the UK and the United States. These measurements were also compared with predicted efficiencies derived by the Livermore calibration phantom - a reference standard developed earlier for the DOE community in the U.S., which has now become an international standard.

The original purpose of the work, involving the inhalation of 5 micron particles, was to verify the accuracy of the phantom as a calibration medium for internally deposited plutonium in real people. During the course of the experiments, a trend was identified in the ratio of observed to predicted efficiencies as a function of body size. Since this finding could indicate a systematic error in the phantom (due to lung size, distribution, or thorax shape), a follow-on program has been designed to determine the influence of aerosol deposition pattern in the lungs as a function of particle size, using 1 micron particles in place of the 5 micron particles used in the preceding study. As before, the calibration factors obtained in vivo will be compared with those predicted by the LLNL phantom to further validate or establish correction factors for the phantom as a calibration standard.

In addition to LLNL, the volunteers will be measured at Argonne National Laboratory and at Battelle Pacific Northwest Laboratory during their visits to the United States. These measurements are useful to LLNL and other DOE facilities as a means of calibrating radiation detectors used in various in vivo monitoring programs and will produce valuable data, enabling us to perform our work more accurately and with more confidence.

If you have any questions regarding the above, please call Larry Anderson or Deborah Kruchten, of my staff on FTS 532-5181 or 532-5199 respectively.

Sincerely,

Thomas R. Crites, Acting Head  
Hazards Control Department

TRC/pc  
Attachments  
cc: Bart Gledhill, w/o attachments

IRB Protocol File  
Anderson IRB 88-101  
Counting of Human Subjects Containing Nb-92m, Ba-133 & Sr-85  
at the LLNL Whole Body Counter (title change at 3/8/89 mtg)

COLLECTION Institutional Review Board

REPOSITORY LLNL Doc # 717909