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August 13, 1975

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NOTES ON HIGH LUNG COUNTS OF PEOPLE FROM PALOMARES AND FROM THE JEN USING THE LUNG COUNTER EQUIPMENT AND PROCEDURE PROVIDED BY RICHMOND, DEAN AND MOSS (LASL)

As of July 14, Iranzo said they had lung counted 44 people from Palomares and 29 from the JEN; five more people from Palomares were to have been counted last week. Of these 66, about 80% had lung counts ranging from zero or trace to 3 to 4 times maximum permissible lung burden. This is upsetting in many ways. If true, we have a problem on our hands! Consider all the men in the labs everywhere who have worked with the stuff! Consider the some 300 GIs who worked in the field cleanup and have never been followed up (Odlund).

If these are true, Iranzo and the JEN have opened a bag of worms that will give the Naders and NDRC groups a new supply of ammunition against enriched fuel and the breeder.

But first we have to make sure these data are reliable. As matters stand now, I spotted two things of a technical, procedural nature which might account for the trouble. One involves the counting equipment which is highly developed, sensitive, and usually operates near its limit of performance. The procedure is to use a multichannel analyzer and a special sandwich crystal with discriminator to record the 60 kv photons from the decay of Am-241, if present, and the soft L-shell x-rays in the range of 12 to 20 kv from the decay of Pu-238, if present, and Pu-239. The crystal and equipment are calibrated by means of plastic artificial lungs that have known amounts of Am-241, Pu-239 or Pu-238 equally distributed in them; they are counted inside a phantom or skeleton rib cage for geometric reasons. A further correction-calibration to account for absorption of the soft photons in the chest wall is derived by an ultrasonic device. These and other factors, some assumed, go into the calculation of Pu-239 from the net counts at the 60 kv and 12 to 20 kv channels.

Obviously, all the standards should be checked, particularly as Phil Dean believes the radioactivity is not homogeneously distributed in the lungs. The Spanish were not provided with Pu-239 lungs, only Pu-238 and Am-241 lungs, so they have no way of checking. All combinations of data are found. Some Pu-239 burdens are calculated from the Am-241; some are from the Pu-238 datum. In some cases, both Am-241 and Pu-238 data appear and the Pu-239 levels calculated may or may not agree; usually they do not.

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The short counting time--30 minutes--is about as long as the average person can be still, but it is a short time relative to the low net counts and, hence, the standard error is frequently as high or higher than the number generated. Nevertheless, a figure of 40 NCI looks impressive regardless of the ± 25.7 NCI that is tacked on.

It is not clear that they count the standard before and after each person. It is doubtful because it is a chore to set up. I asked questions about Kr-85 and other airborne contaminants but was assured that all such things were under control. I did not ask the hard questions including proof that they knew all there was to know about stability of the system, day-to-day variables, etc.--it would have been considered an insult. They do run background counts at frequent intervals.

The second item relates to an ORTEC power supply that may be functioning improperly. The red "on" light blinks on and off like an improperly tuned FM hi-fi set. This is probably a faulty bulb, but it still is disturbing that it would not have been replaced. A more important problem may lie in the fact that they must turn up 1170 volts from the mains to get 1000 volts on the output to one photomultiplier (I have reported this to ORTEC; they have not responded: ORTEC 456, 0-3kv @ 0-10 m amps. serial no. 1839). Dr. Los Santos had suspected problems with the photomultiplier tube, not the power supply, but the tube behaved normally when connected to the other power unit. Los Santos also pointed to a skewedness toward the lower energy channels at the 60 kv peak when the background is subtracted.

In short, something may be out of order in the counting system.

What to do about it?

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1. Replace the questionable plastic lungs. Have them calibrated on Dean's equipment; send, or better take, them to Madrid for check against the old ones; bring the old ones back for check on Dean's counters. Leave the new ones in Madrid.
2. Count as many people as possible either going to Madrid or coming from the Junta; e.g., I have been counted and I will be recounted anywhere I find a chest counter. Madrid says I have Am-241--I doubt it. Iranzo reads at ~3 MPLBs--we will count him when he comes over in November.
3. Have members of the Junta that show lung burdens counted repeatedly to find the degree of variance, if any. Iranzo has agreed to this.

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4. Check the urines of all people, especially those with higher lung burdens; so far all have been zero; at least some should be excreting Pu.

Phil Dean (LLL) is preparing the new plastic lungs and looking into the equipment side including the computer program for calculating the lung burdens from the printout.

Chet Richmond is examining the programs and talking with ORTEC.

I will try to keep the Embassy, State and ERDA collaborating with minimal visibility.

It is important to get these lung counts straightened out quickly. The longer we delay the greater the chances of data, which later proves false, becoming engraved in stone.

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