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BROOKHAVEN NATIONAL LABORATORY
ASSOCIATED UNIVERSITIES, INC.

Upton, Long Island, New York 11973

(516) 282 4209
FTS 666

Department of Nuclear Energy

Radiological Sciences Division

June 5, 1989

Mr. John E. Rudolf, Director
Weapons Research Division
Office of Weapons Research,
Development and Testing
U.S. Department of Energy
Washington, D.C. 20545

Dear John:

Excellent news John — all the samples, with one exception, (67 samples from the Rongelap people and 100 samples from the Utirik people) taken by Casper last September came through with flying colors. We see the following:

1. From the samples taken in Majatto, all of the plutonium results are below 170 aCi (a committed effective dose equivalent 85 mrem). The median of the distribution is 27 aCi (a committed effective dose equivalent 14 mrem).

2. With the exception noted above, the results from Utirik are similar to those of Rongelap. Including the one unverified high outcome, the median of the Utirik population is 24 aCi (a committed effective dose equivalent 12 mrem).

3. Statistical analyses indicate there are no differences between the mean and standard deviation of the distribution describing Rongelap's and Utirik's population at this time.

4. A most interesting observation is that the plutonium concentrations in the Islanders' urine samples is similar to that of our BNL individual which was used as our laboratory control up to December 31, 1988.

5. Since the beginning of this year, we are using synthetic urine instead of the BNL individual's urine in our calibration, background and quality assurance programs. We now have 63 synthetic urine results available for evaluation. The 26 of these that are background determinations have both a mean and a median of 42 tracks.

John Rudolph's Files
Letter Files
Letters - Marshall Islands 1989

Track counts from the Rongelap and Utirik samples are compared to those of the BNL individual and the synthetic urine in the attached table. The median values are all of the same magnitude, and the medians are statistically indistinguishable from one another. The median may be a more appropriate statistic than the mean since it is biased to a lesser degree by outliers. However, both measures lead to the same conclusion that the plutonium in samples from the Islanders are at background levels.

In the attached figure, the horizontal line at about 80 tracks indicates the 95% confidence limit used to describe the statistical uncertainty among the data points. The points above this line are 95% certain to contain a plutonium level higher than synthetic urine. This also indicates that our FTA sensitivity for measuring plutonium is well below the concentration level existing in urine samples taken from both Marshallese people and the BNL individual.

In February of 1989 we presented a log normal distribution with median 250 aCi for Rongelap urine data. This distribution suggested that soil contamination of the urine sample could account for the earlier "outlier" data points. Because of our extensive efforts on collecting uncontaminated urine samples which was facilitated by Majatto's low soil concentration of plutonium, the statistics of our current Rongelap data reflects our expectation that the median value is significantly lower than 250 aCi per sample. It seems very likely now that soil contamination in the earlier urine samples was giving us false information.

You may recall that one Utirik family was invited to our vessel-"Egabrag" for urine collection specifically because of their earlier high plutonium results. Their urine samples collected over 4 days on this trip were all "normal" providing another indication that soil contamination of the sample was responsible for their earlier high plutonium results. On the other hand, an inconsistency has now arisen in the Utirik population samples. An individual sampled during 1981 with a result well below a minimum detectable limit (100 aCi) provided a urine sample which contained about 800 aCi. Because this value is a factor of 10 greater than the population's standard deviation, we are now reanalyzing this individual's remaining urine and will target the individual for sampling under our "clean sampling protocol" during the upcoming bioassay mission.

Although detailed analysis is still to be completed on individual committed effective dose equivalents (i.e., the dose to be received over next 50 years), it would appear that all of the Islanders, but one, could not be exceeded 100 mrem (1 mSv) based on the maximum activity 200 aCi using a most conservative retention model. Without further confirmation the Utirik individual's committed effective dose equivalent is about 400 mrem (4 mSv).

We now have great confidence in our FTA plutonium detection capabilities and are pleased to say the Islanders' plutonium issue should be settled shortly using this summer's urine collection samples.

Sincerely,

Charles B. Meinhold, Head
Radiological Sciences Division

Casper Sun, Ph.D.

Anant Moorthy, Ph.D.

CBM:pd

Attachments

cc: H. Brown
D. Wheeler

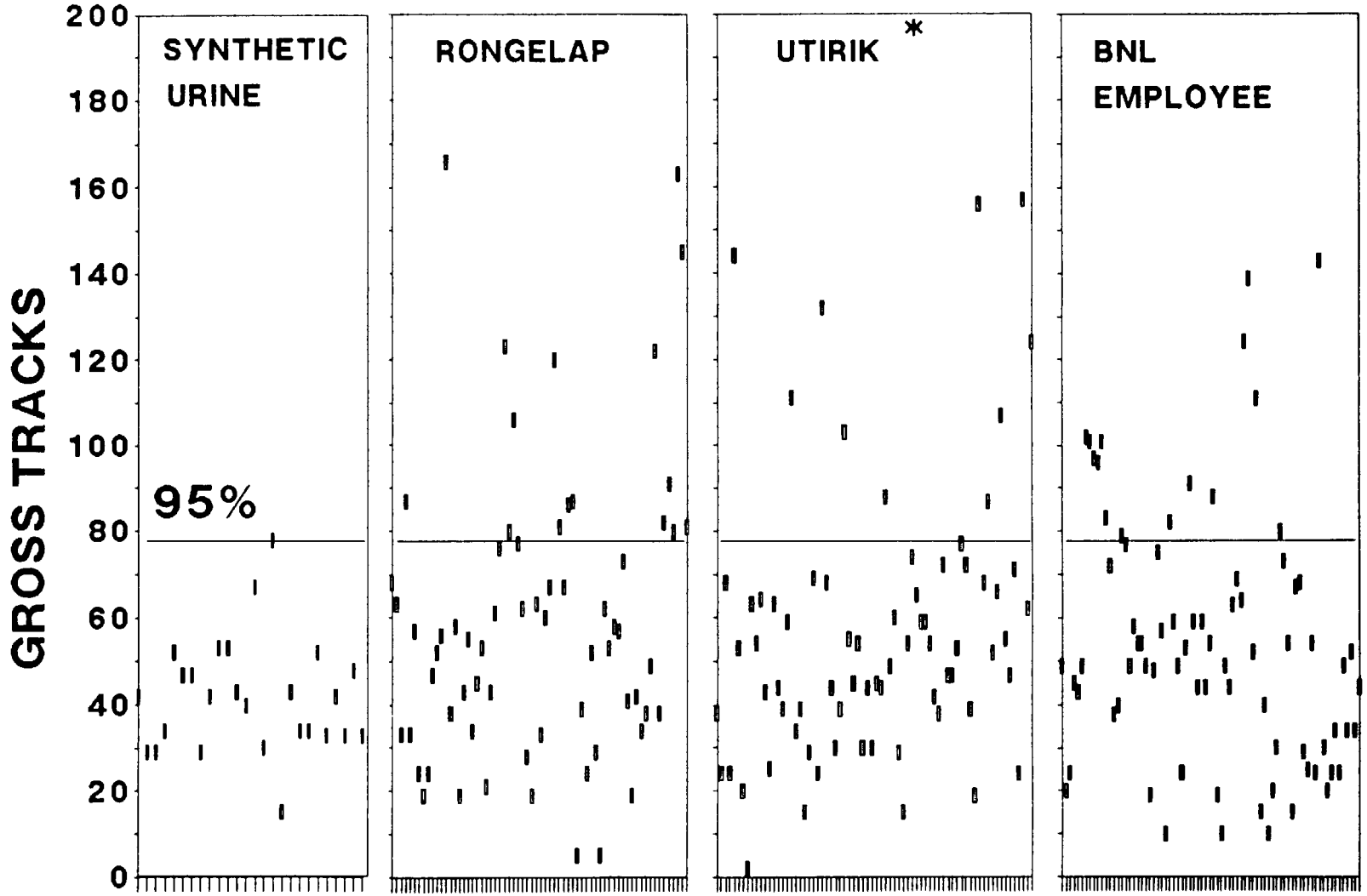
STATISTICS INFORMATION ON DATA

-- TRACKS --

	N	MEAN	SIG	MED
Rongelap	67	59	34	56
Utirik	101	56	74*	44
BNL Employee	76	54	30	49
Synthetic-Urine	26	42	13	42

* One number is unexpectedly high, sample marked for reanalysis.

DISTRIBUTION OF URINE DATA



* one datum is not plotted.