

## **The Mayak Worker Dosimetry System (MWDS-2013): Uncertainty in the Measurement of Pu Activity in a 24-Hour Urine Sample of a Typical Mayak PA Worker**

Vadim Vostrotin<sup>1</sup>, Alan Birchall<sup>2</sup>, Alexey Zhdanov<sup>1</sup>, Demetrio Gregoratto<sup>3</sup>, Klara Suslova<sup>1</sup>, James Marsh<sup>3</sup>, Alexander Efimov<sup>1</sup>

<sup>1</sup>*Southern Urals Biophysics Institute, Russia;* <sup>2</sup>*Global Dosimetry Ltd., UK;* <sup>3</sup>*Public Health England, UK*

In the Mayak Worker Dosimetry System (MWDS-2013), intakes of plutonium and organ doses are assessed on the basis of measurements made on the plutonium content of 56 400 urine samples. Altogether, there were urine bioassays for 7591 (29%) of the 25 757 cohort members who were employed any time at Mayak between 1948 and 1982. These measurements are subject to uncertainty due to many factors (e.g. whether or not creatinine is measured, the volume of the sample, whether diethylenetriaminepentaacetic acid was administered, etc.) and this uncertainty will affect not only the uncertainty in the estimated doses, but also the values of the doses themselves. Therefore, it is important for the estimated uncertainty to be as accurate as possible. The input to the dose calculation requires an estimate of the plutonium activity in a true 24-hour sample. The uncertainty in this activity is approximated by a lognormal distribution. The aim of this paper is to describe and justify how the parameters of this lognormal distribution are derived from the raw data. Histograms of the distribution of sample volumes are given for both sexes. The method of calculation of the decision threshold and relative standard uncertainty (RSU) of a measurement result for Pu activity in a worker's urine sample is shown. Diagrams of correlation between Pu activity in collected urine and its RSU are given.

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