

## **The Mayak Worker Dosimetry System (MWDS-2013): Treatment of Uncertainty in Model Parameters**

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Different dose estimates have been produced for the Mayak PA workforce over recent years (DOSES-2000, DOSES-2005, MWDS-2008). The dosimetry system MWDS-2013 described here differs from previous analyses, in that it deals directly with uncertainty in the assumed model parameters. This paper details the way in which uncertainty is dealt with within MWDS-2013 to produce the final output represented by a multiple hyper-realisation of organ doses. More specifically, the paper describes:

- Application of the WeLMoS method to calculate Bayesian posterior probability distributions of organ doses.
- Extension of the WeLMoS method for dealing with multiple intake regimes.
- How shared and unshared parameters are dealt with using a multiple realisation method.
- A practical algorithm for the generation of multiple hyper-realizations.
- How to deal with uncertainty in the intake and the intake regime.

The resulting multiple hyper-realisation contains all of the information required to take account of model parameter uncertainty and the effects of shared and unshared parameters in any epidemiological analysis, which uses this information, although it is acknowledged that in practice, certain data simplifications may be required to make such analyses tractable, and comparable to previous analyses. Such simplifications are outside the scope of this paper.

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