ICRP-66/130 KDEP validation report

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With KDEP1

Input specifications:

Monodispersed: T/F **Input: F**
This indicates the particle follows a log-normal distribution. Notice: this script does not allow the user to specify how polydisperse is the particle, there for only MMAD values are used as inputs for the size of the particle.
Details:
Pg 15 in the manuscript:
If the aerosol is log-normally dispersed, then either the AMAD or the AMTD will be given as a parameter. ICRP 66 allows either d_{ae} or d_{th} to be log-normally distributed (Page 47, equations 17 and 18) both with a geometric standard deviation which is a function of the AMTD (Page 47, equation 16). As a result, the deposition values for a log-normally dispersed aerosol always depend on the AMTD, even when thermodynamics do not play an important role in the deposition itself. Although the aerodynamic equivalent and thermodynamic diameters cannot be log-normally distributed in the same aerosol, the deposition efficiencies are broadly similar for both cases. Nonetheless, the differences are significant enough to strongly suggest that the published values were calculated by integrated over d_{ae} for all particle sizes.

Nose breather: T/F **Input: F**
F indicates the breather use both nose and mouth.
Details:
Pg 7 in the manuscript
These categories were defined by ICRP Publication 66 (ICRP 1994). Nose-breathers breathe exclusively through their noses except during strenuous activities, while mouth-breathers breathe through their noses and mouths regardless of the activity.

Subject: 1-8 **Input: 1**
1 as adult male.

Activity: 1-7 **Input: 2**
2 as sitting.

Rho: density of the aerosol **Input: 1 g/cm^3**
Assuming density of water, which is 1 g/cm^3

Shape Factor **Input: 1**
Assuming perfectly spherical.

U: wind velocity **Input: 1**

Pg 7 on the manuscript

Wind Speed This is the speed at which air enters the respiratory tract (either through the mouth or nasal passages). It was found to have little impact on deposition for a wide range of plausible values. A default value of 1 m · s−1. is used.

P: atmospheric pressure [mmHg] **Input: 76**

Chronic: T/F **Input: F**

Pg 8 on the manuscript

This indicates whether the intake is assumed to be chronic or acute, which determines whether the activities will be weighted by time or by volume of air breathed.

AMAD/MMAD choices:

6.77 µm: Measured VMD/MMAD of low VMD nebulizer via OPS.

Deposition region:

The regions defined by the ICRP are: **ET1 (anterior nasal), ET2 (Naso-oropharynx/Larynx), BB (Bronchi), bb (Bronchioles), and AI (Alveolar Interstitium**).

Calculation results:

AMAD [µm]	ET1	ET2	BB	bb	AI	Total
6.77	0.274504	0.236541	3.92E-02	3.94E-02	0.130894	0.720589