MPPD validation report

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Date: 01/12/2024

With MPPD v3.04

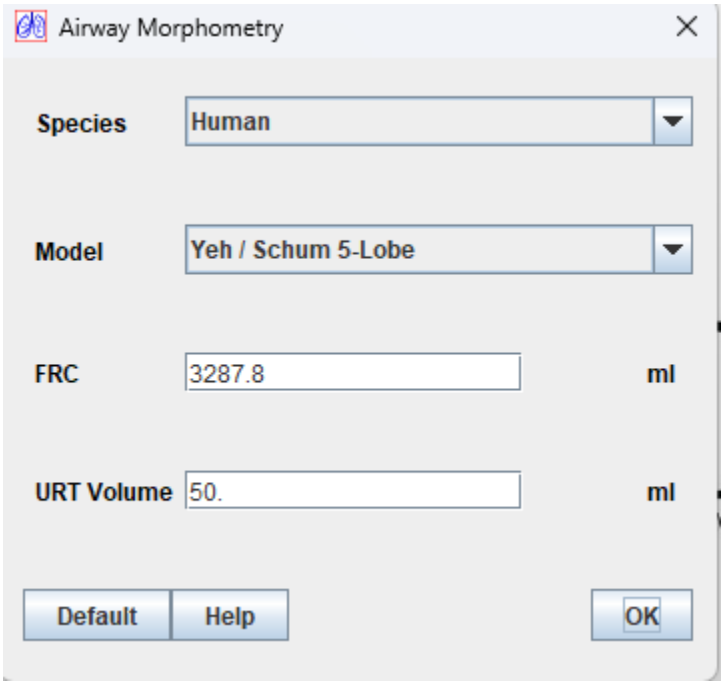
This report contains the calculation results from the MPPD v3.04. Two different nebulizers， low VMD and STD VMD, are tested. Two different breathing profiles, shallow breathe and deep breathe, are tested. The detailed information are shown in Table 1 below:

Settings	Nebulizer	Breathing profile	VMD [μm]	GSD	Aerosol concentration [mg/m^3]	Tidal [mL]	Breaths/min
1	Low VMD	Shallow	6.77	2.22	47.8	600	12
2	STD VMD	Shallow	6.93	2.05	168.6	600	12
3	Low VDM	Deep	6.77	2.22	47.8	1000	9

Note: Based on Yeh(1980),FRC = 0.6*TLC = 5479.6*0.6 = 3287.8 [mL]

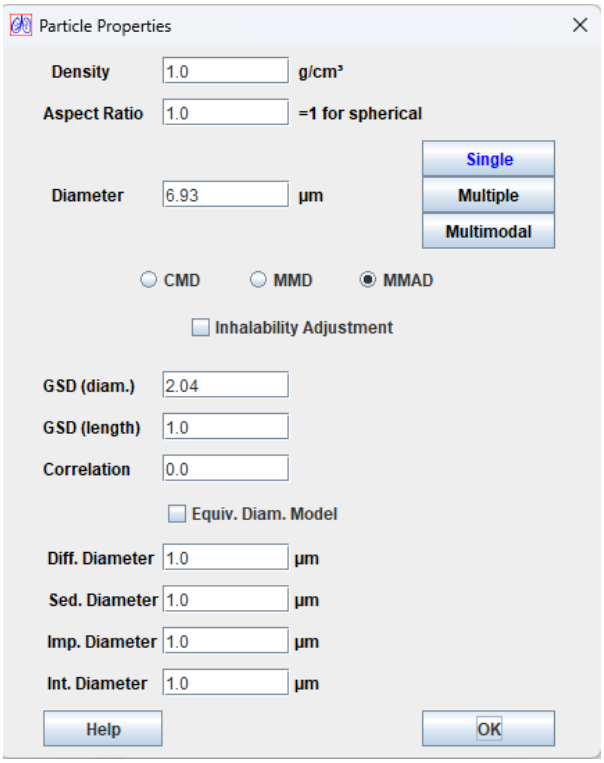
URT volume is set to be 50 mL (MPPD default value)from Overton and Graham (1989) and Hart, et al. (1963).

Airway Morphometry:

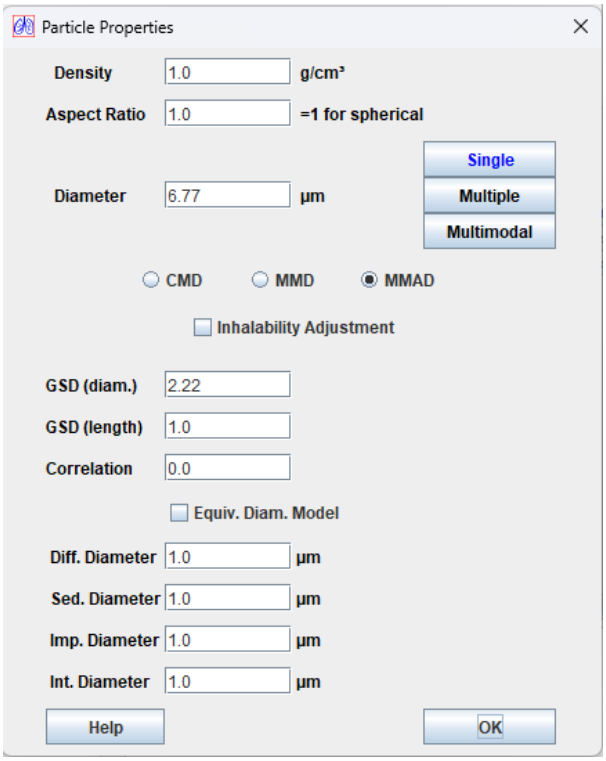


Aerosol properties:

STD VMD:

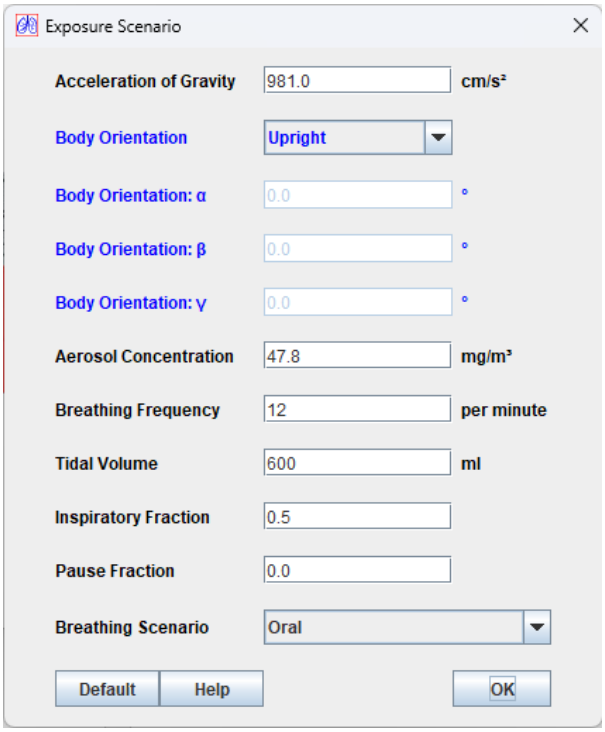


Low VMD:

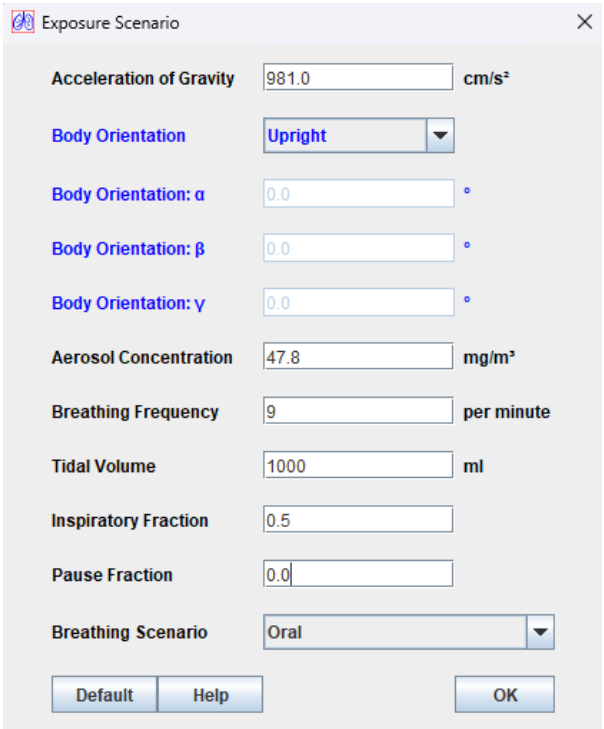


Exposure scenario:

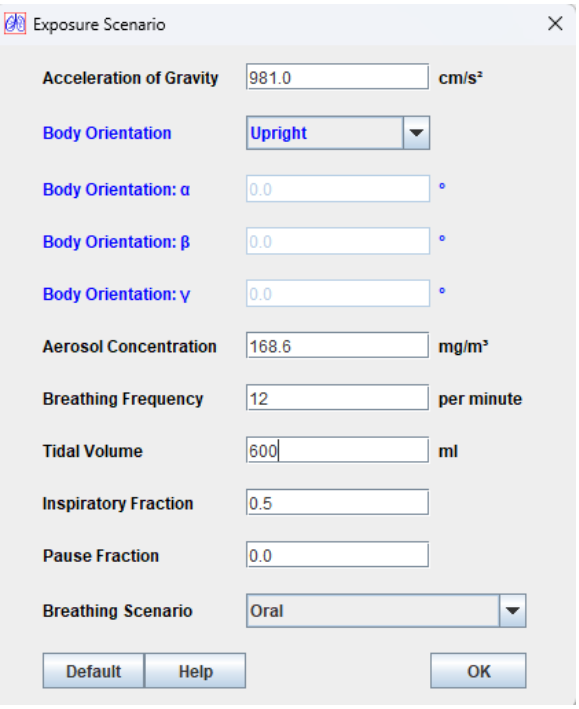
Shallow breath (low VMD):



Deep breath (low VMD):

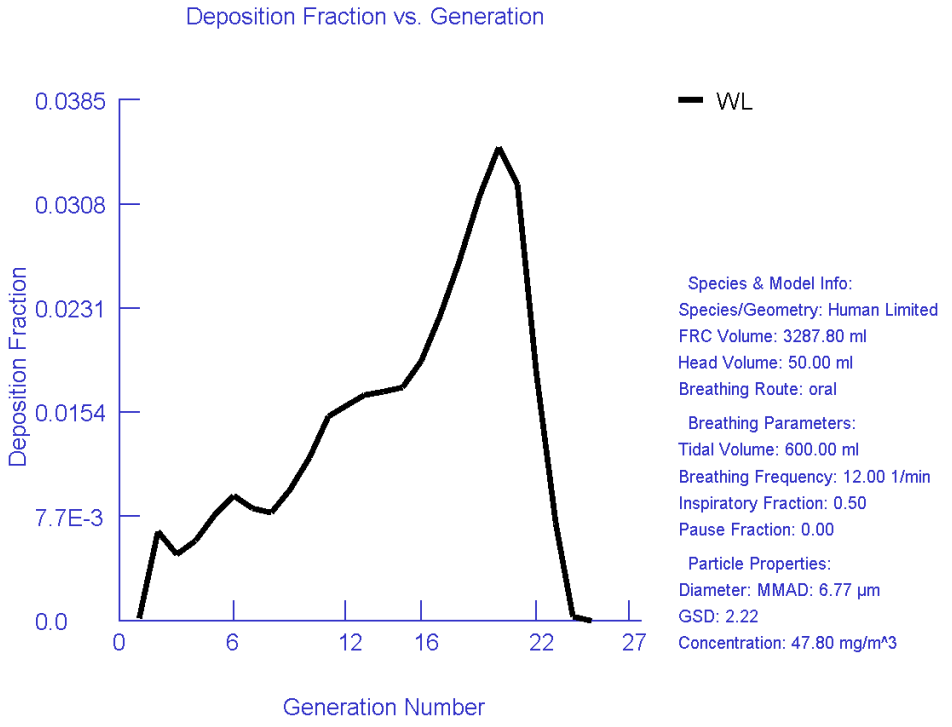


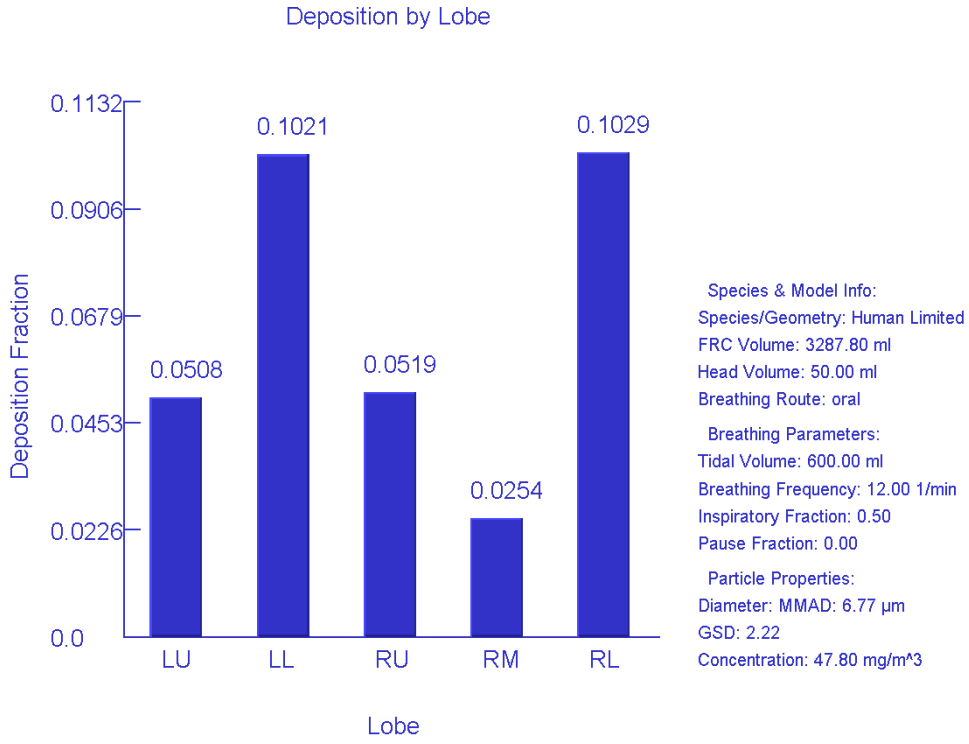
Shallow breath (STD VMD):



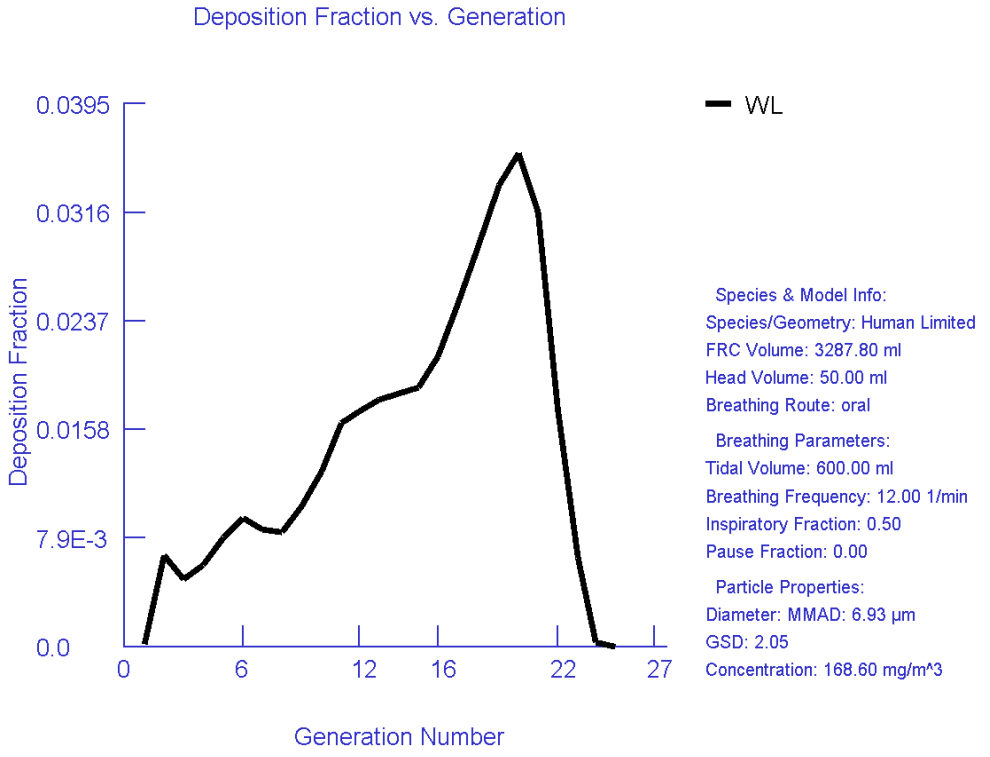
Results:

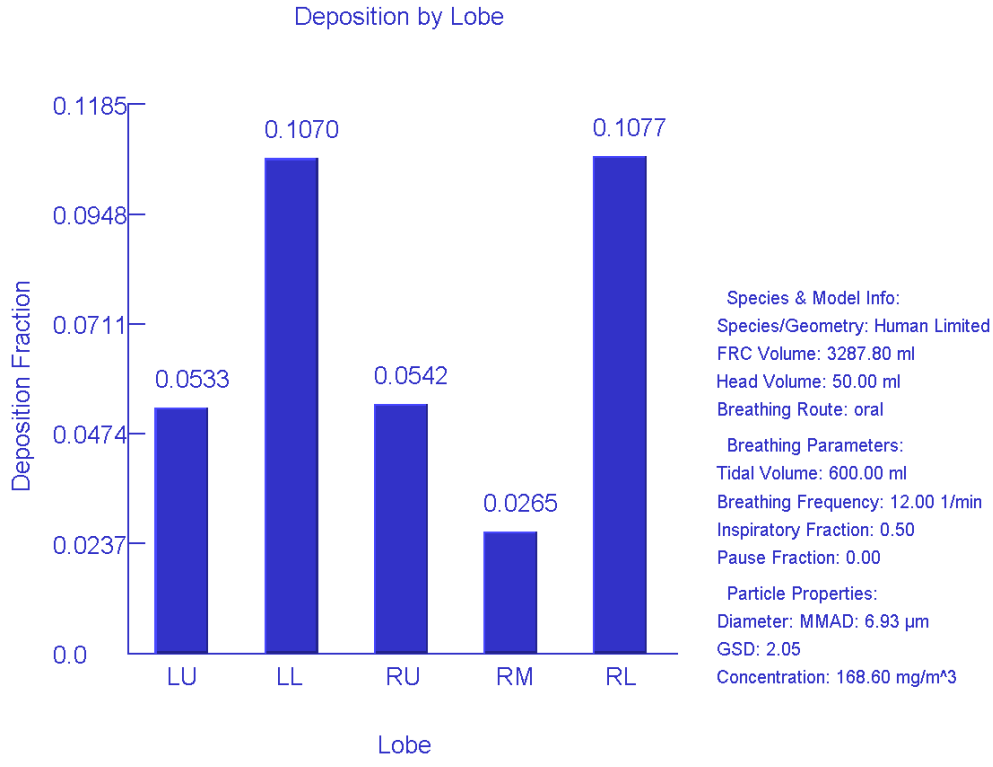
Setting 1:



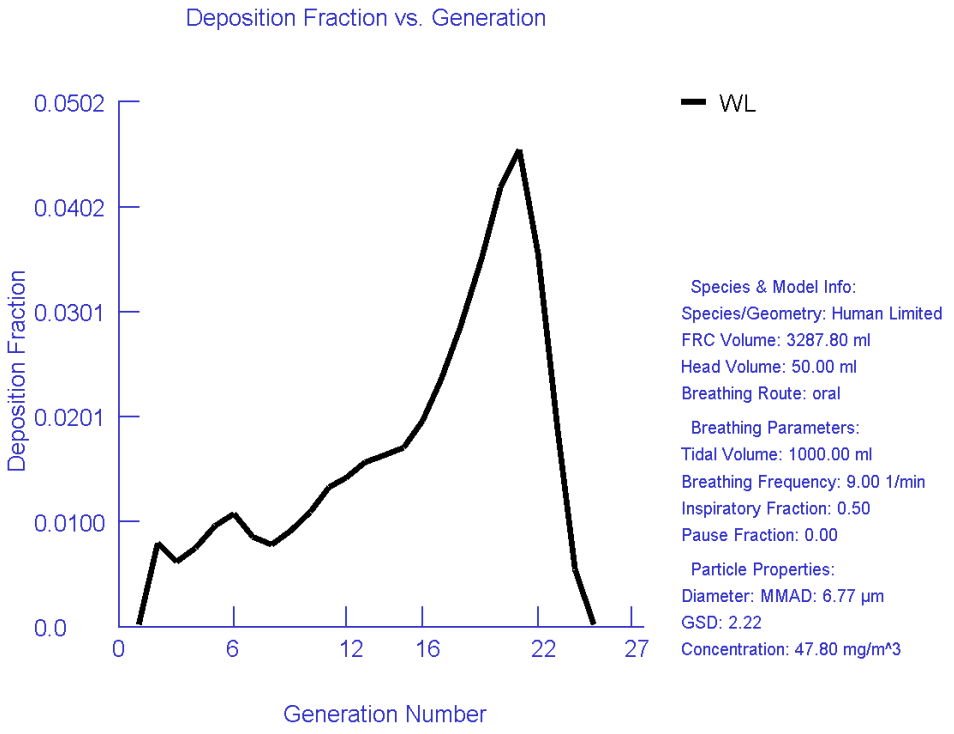


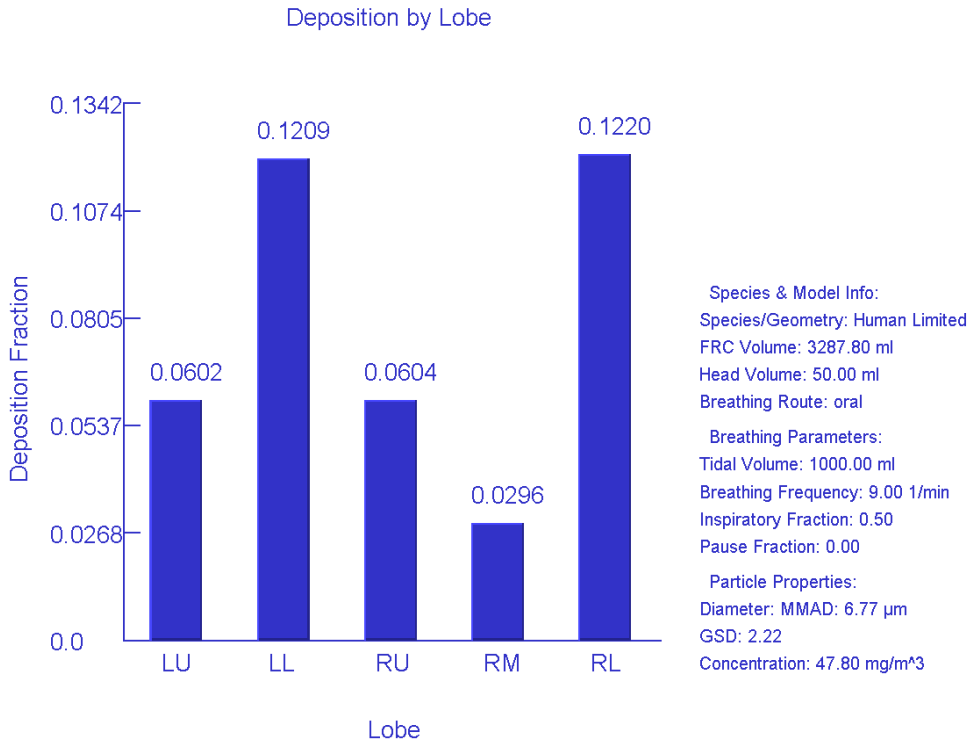
Setting 2:


Deposition Fraction vs. Generation
0.0395
0.0316
0.0237
0.0158
7.9E-3
0.0
Deposition Fraction
0
6
12
16
22
27
Generation Number
WL
Species & Model Info:
Species/Geometry: Human Limited
FRC Volume: 3287.80 ml
Head Volume: 50.00 ml
Breathing Route: oral
Breathing Parameters:
Tidal Volume: 600.00 ml
Breathing Frequency: 12.00 1/min
Inspiratory Fraction: 0.50
Pause Fraction: 0.00
Particle Properties:
Diameter: MMAD: 6.93 µm
GSD: 2.05
Concentration: 168.60 mg/m^3


Deposition by Lobe
0.1185
0.0948
0.0711
0.0474
0.0237
0.0
Deposition Fraction
0.0533
0.1070
0.0542
0.0265
0.1077
LU
LL
RU
RM
RL
Lobe
Species & Model Info:
Species/Geometry: Human Limited
FRC Volume: 3287.80 ml
Head Volume: 50.00 ml
Breathing Route: oral
Breathing Parameters:
Tidal Volume: 600.00 ml
Breathing Frequency: 12.00 1/min
Inspiratory Fraction: 0.50
Pause Fraction: 0.00
Particle Properties:
Diameter: MMAD: 6.93 µm
GSD: 2.05
Concentration: 168.60 mg/m^3

Setting 3:


Deposition Fraction vs. Generation
WL
0.0502
0.0402
0.0301
0.0201
0.0100
0.0
Deposition Fraction
0
6
12
16
22
27
Generation Number
Species & Model Info:
Species/Geometry: Human Limited
FRC Volume: 3287.80 ml
Head Volume: 50.00 ml
Breathing Route: oral
Breathing Parameters:
Tidal Volume: 1000.00 ml
Breathing Frequency: 9.00 1/min
Inspiratory Fraction: 0.50
Pause Fraction: 0.00
Particle Properties:
Diameter: MMAD: 6.77 µm
GSD: 2.22
Concentration: 47.80 mg/m^3


Deposition by Lobe
0.1342
0.1074
0.0805
0.0537
0.0268
0.0
Deposition Fraction
0.0602
0.1209
0.0604
0.0296
0.1220
LU
LL
RU
RM
RL
Lobe
Species & Model Info:
Species/Geometry: Human Limited
FRC Volume: 3287.80 ml
Head Volume: 50.00 ml
Breathing Route: oral
Breathing Parameters:
Tidal Volume: 1000.00 ml
Breathing Frequency: 9.00 1/min
Inspiratory Fraction: 0.50
Pause Fraction: 0.00
Particle Properties:
Diameter: MMAD: 6.77 µm
GSD: 2.22
Concentration: 47.80 mg/m^3