APPENDIX AVAILABLE ON THE HEI WEB SITE

Research Report 178

National Particle Component Toxicity (NPACT) Initiative Report on Cardiovascular Effects

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Section 2: NPACT Animal Toxicologic Study of Cardiovascular Effects of Mixed Vehicle Emissions Combined with Non-vehicular Particulate Matter

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Appendix R. Characterization of NPACT Animal Toxicologic Exposure Atmospheres

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This document was reviewed by the NPACT Review Panel
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APPENDIX R. ATMOSPHERE CHARACTERIZATION

METHODS

The measurements and analytical techniques were summarized in Table 3. The procedures for performing these measurements are described in greater detail below. Note that all real-time measurements were recorded with 1 second resolution.

SAMPLE COLLECTION

The exposure chambers contain multiple sample ports that allowed samples to taken directly from the breathing zone of the animals (immediately above the wire cages at different levels in the chamber). With the exception of the Teflon membrane filter for metals and the filter/XAD-4 cartridge for semi-volatile organics (see low), all chamber samples were collected from the breathing zone through sample ports. Measurement frequency differed dependent on the assay. PM, CO, and NOx were measured throughout every exposure on every study day. Particle size and number characterizations were conducted at approximately the midpoint of each exposure or repeat. Detailed measurements that extended to particle and gaseous chemistry were all conducted in parallel for an atmosphere. The detailed measurements were conducted 1-2 times per atmosphere (obtained at approximately the exposure midpoint), but restricted primarily to atmospheres that were complex in composition. Therefore detailed measurements were not conducted for the S or N only atmospheres, but were conducted for MVE, MVEG, RD and the combinations of MVE plus S, RD or N. aSamples were pulled through ~ 12″ long ¼″ diameter stainless steel pros. Chamber uniformity assessments confirmed that samples could be collected in parallel ports and representative of the same atmosphere.

Particle Size Distribution

Particle size was measured by a combination of a fast-response differential mobility analyzer (approximately 5–500 nm) and an aerodynamic particle sizer (0.5–20 microns). All analyzers were operated under default settings, assuming unit density spherical particles. The fast-response differential mobility analyzer (DMA, Model 3091 Fast Response Particle Sizer [FMPS] Spectrometer, TSI, Inc., St. Paul, MN) also was used to measure particle number size distribution (in real-time) with enhanced resolution for particle size (resolution 1 second).

Chemical Characteristics of PM

Elemental and Organic Carbon Mass. Elemental and organic carbon masses were determined at DRI using pre-baked quartz fir filters by the modified Interagency Monitoring of Protected Visual Environments (IMPROVE) thermal-optical reflectance (TOR) method.

Organic Carbon Class and Species. Particulate and semi-volatile organic compounds (SVOC) were collected using Zeflour filters followed by XAD-4 resin cartridges. The target analytes included compounds that were statistically above detection limits during the Phase 1 component of the ACES program. Organic analyses for SVOC were conducted at DRI by gas chromatography/mass spectrometry (GC/MS).

Total Metals and Associated Elements. Samples for metal analysis were collected on clean Teflon membrane filters and analyzed at the DRI byenergy dispersive X-ray fluorescence. After EDXRF analysis, the Teflon-membrane filters were returned to their Petri dishes and stored under refrigeration until the XRF data validation was completed and indicates that the runs were acceptable.

Inorganic Ions: Ammonium (and Ammonia), Sulfate, Nitrate. One-half of the quartz filters (and blanks) that were collected for the carbon analysis were extracted and analyzed at DRI for water soluble chloride, nitrite, nitrate, sulfate and formic and acetic acid by ion chromatography. This extract was also analyzed for NH_4^+ by the indolphenol colorimetric method.

Gases and Vapors.

Oxides of Nitrogen, Total Hydrocarbons, Sulfur Dioxide, and Carbon Monoxide.NO_x was measured using chemiluminescent analysis (Teledyne Model 200 series, San Diego, CA; and Ecophysics 700 series, ECO Physics, Ann Arbor, Mi). CO and CO_2 concentrations were determined using a nondispersive infrared gas analyzer (California Analytical Instruments Model 600 series, California Analytical, Orange, CA). Total VOCs were measured using a real-time flame ionization detector (Model 300H, California Analytical Instruments) calibrated against a certified propane standard. Analyzers were zeroed daily using ultra zero air and calibrated with National Institute of Standards and Technology (NIST)-traceable span gases.

Gas Phase Hydrocarbon Speciation.VOCs (except acids and carbonyls, which are too polar for collection and analysis from canister) were collected using a custom-designed canister sampler (L. Sheetz Enterprises, Reno, NV). Samples were collected downstream of a NO_x denuder in a pre-cleaned Summa canister and analyzed within 30 days of collection to ensure

accurate characterization of polar compounds that may "stick" to the walls of the canister. The NO_x denuder reduced NO_x and ameliorated NO_x-VOC reactions that lead to false low concentrations of reactive compounds such as 1,3-butadiene and styrene. Analysis was conducted at DRI by GC/MS.

Analysis of Carbonyl Compounds. Carbonyl compounds were collected on DNPH-impregnated silica gel cartridges preceded by a commercially available oxidant scrubr and a Teflon membrane pre-filter to remove PM. In order to assess the trapping efficiency of the DNPH cartridge, two cartridges were used in series, and the back-up cartridge was analyzed to ensure that all carbonyls are trapped on the first cartridge. Analysis was to conducted at LRRI by LC/MS.

RESULTS

Summary of Intensive Characterization

Exposure atmospheres were analyzed in detail as defined above. An overall description of the exposure atmosphere composition for the intensive characterization was provided in the main body of the report. Individual measurements from the characterization are summarized below in Tables R.1-R.2. Measurements are either single measurements, averages of multiple measurements, or in some cases sums of groups within classes (i.e. total PAH). The uncertaintly values for particle size distribution are the geometric standard deviation among the particles. For PM, NOx and CO measurements that were made daily the error below are the standard deviation among all of the average measurements made throughout the study. The remaining errors are the propogated analytical uncertainty, which is the root mean squared error of the square of the measurement precision and the limit of quantitation. Note that the gaseous hydrocarbon/SVOC data were not analyzed in detail for S, N or RD. For comparison of relative amounts, control values were applied to those atmospheres. Figures R1-R14 provide representative particle number and mass size distribution plots obtained at each of the exposure atmospheres.

Table R.1. Composition of NPACT animal toxicology exposure atmospheres for MVE_{Low}, $MVEG_{Low}$, and the combinations of MVE_{Low} and RD, S, or N.

Exposure Atmosphere Composition	Units	MVE_{Low}	$MVEG_{Low}$	RD + MVE_{Low}	S + MVE_{Low}	N + MVE_{Low}
Particle Mass - FMPS	µg/m³	185.7	NA	91.1	99.8	61.4
Particle Count - FMPS	particle/cm^3	7.2E+05	NA	1.43E+05	5.1E+05	2.0E+05
NMAD (GSD) - FMPS	nm	64.0 (1.5)	NA	93.6 (1.5)	63.6 (1.4)	70.4 (1.5)
MMAD (GSD) - FMPS	nm	97.1 (1.5)	NA	126.8 (1.3)	90.8 (1.7)	99.6 (1.5)
NMAD (GSD) - APS	µm	0.6 (1.2)	NA	0.8 (1.4)	0.8 (1.3)	0.8 (1.3)
MMAD (GSD) - APS	µm	0.8 (1.5)	NA	1.8 (1.8)	1.0 (1.4)	1.0 (1.3)
Elemental Carbon	µg/m³	29.9 ± 0.5	0.5	33.9 ± 0.5	91.4 ± 1.6	38.7 ± 0.6
Organic Carbon	µg/m³	7.5 ± 0.3	9.9 ± 0.2	45.1 ± 2.1	34.5 ± 1.5	27.3 ± 1.1
Nitrate	µg/m³	0.9	0.2	1.2	2.9	435.7 ± 0.9
Sulfate	µg/m³	5.3	0.1	5.4	67.3 ± 0.4	8.6
Ammonium	µg/m³	3.0 ± 0.1	0.0	4 ± 0.1	33.2 ± 1.3	78.4 ± 3.1
Elements (Metals)	ng/m³	5846.8 ± 302.1	310.3 ± 1.8	108377.6 ± 1206	14246.7 ± 1222.5	15050.8 ± 934.3
Volatile Organic Compounds (VOC)	µg/m³	4571.6 ± 454.6	4784.1 ± 241.4	3826.4 ± 388	6595 ± 642.8	5325.1 ± 535.9
Carbonyl	µg/m³	11.5 ± 1.1	400.3 ± 20.3	315.9 ± 18	95.6 ± 6.6	333.3 ± 19
Hopane and Steranes	ng/m³	4.1 ± 0.4	19.6 ± 1.4	23 ± 1.9	17.7 ± 1.5	8.1 ± 0.6
Polar Compounds	ng/m³	9138.7 ± 635.3	8780.9 ± 693.1	17893.5 ± 1213.1	26125.2 ± 1737.8	34744.2 ± 2245.1
Alkanes	ng/m³	15677.0 ± 844.2	24577.6 ± 1529.2	46535.2 ± 2488.8	50659.9 ± 2717.2	59652.8 ± 3186
Polyaromatic Hydrocarbons (PAH)	ng/m³	22234.5 ± 1396.3	46.1 ± 3.2	57048.5 ± 3671.5	50285.7 ± 3184.8	66807.7 ± 4195
Nitro-PAH	ng/m³	16.8 ± 1.0	8.9 ± 0.7	22.9 ± 1.4	36.6 ± 2.2	32.4 ± 1.9
Nitrogen Oxide (NO)	µg/m³ (ppm)	4104.8 ± 1334.1 (4.0 ± 1.3)	7653.0 (7.5)	7755.0 ± 615.1 (7.6 ± 0.6)	12217.4 ± 78.6 (11.9 ± 0.1)	9396.5 ± 1464.5 (9.2 ± 1.4)
Nitrogen Dioxide (NO_2)	µg/m³ (ppm)	2045.6 ± 786.8 (1.3 ± 0.5)	3964.4 (2.5)	4017.2 ± 318.6 (2.6 ± 0.2)	6328.8 ± 40.7 (4.0 ± 0.0)	4867.6 ± 758.6 (3.1 ± 0.5)
Carbon Monoxide (CO)	µg/m³ (ppm)	32756.5 ± 6225.7 (34.2 ± 6.5)	31607.2 (33.0)	40035.7 ± 5555.2 (41.8 ± 5.8)	40131.5 ± 95.8 (41.9 ± 0.1)	31128.3 ± 383.1 (32.5 ± 0.4)
Particle Mass	µg/m³	102.5 ± 20.9	11.0	278.5 ± 12	295.5 ± 7.8	463 ± 175.4
Carbon :						
Organic Carbon Fraction 1	µg/m³	2.6 ± 0.3	6.2 ± 0.6	9.1 ± 1.1	12.1 ± 1.4	7.3 ± 0.9
Organic Carbon Fraction 2	µg/m³	2.6 ± 0.3	2.4 ± 0.2	8.5 ± 0.8	9.3 ± 0.9	8 ± 0.8
Organic Carbon Fraction 3	µg/m³	1.5 ± 0.2	1.0	13.5 ± 2	3.7 ± 0.4	5.4 ± 0.6
Organic Carbon Fraction 4	µg/m³	0.8 ± 0.1	0.4	7 ± 0.8	3.4 ± 0.3	3 ± 0.3
Pyrolyzed Organic Carbon Reflectance	µg/m³	0.1	0.0	7.0	6.1	3.6

Table R.1. Composition of NPACT animal toxicology exposure atmospheres for MVE_{Low}, $MVEG_{Low}$, and the combinations of MVE_{Low} and RD, S, or N.

Exposure Atmosphere Composition	Units	MVE_{Low}	$MVEG_{Low}$	RD + MVE_{Low}	S + MVE_{Low}	N + MVE_{Low}
Pyrolyzed Organic Carbon Transmittance	µg/m³	0.4 ± 0.1	0.0	4.1 ± 0.7	0.7 ± 0.1	3.2 ± 0.5
Organic Carbon	µg/m³	7.5 ± 0.3	9.9 ± 0.2	45.1 ± 2.1	34.5 ± 1.5	27.3 ± 1.1
Elemental Carbon Fraction 1	µg/m³	13.2 ± 1.6	0.0	34.7 ± 4.2	61.4 ± 7.5	32.6 ± 3.9
Elemental Carbon Fraction 2	µg/m³	16.6 ± 1.7	0.7	6.2 ± 0.5	36 ± 3.5	9.4 ± 0.8
Elemental Carbon Fraction 3	µg/m³	0.1	0.0	0.1	0.0	0.2
Elemental Carbon	µg/m³	29.9 ± 0.5	0.5	33.9 ± 0.5	91.4 ± 1.6	38.7 ± 0.6
Total Carbon	µg/m³	37.4 ± 0.6	10.5 ± 0.1	79.1 ± 1.1	125.9 ± 2.1	65.9 ± 0.9
Elements (Metals) :						
Sodium	ng/m³	1119.2 ± 94.4	0.0	0 ± 182.9	10443.4 ± 549.3	2397.4 ± 268.5
Magnesium	ng/m³	37.6 ± 20.0	0.0	0 ± 61.6	1205.8 ± 76.6	55.8 ± 64.5
Aluminum	ng/m³	108.4 ± 7.7	0.0	15782.9 ± 101.1	941.3 ± 28.9	961.4 ± 27.9
Silicon	ng/m³	68.0 ± 5.4	128.5 ± 0.2	58506.2 ± 275.1	0 ± 17.6	5009.9 ± 37.5
Phosphorous	ng/m³	0.0 ± 0.7	3.4	36.1 ± 2.2	10 ± 2.3	0 ± 2.1
Chlorine	ng/m³	257.4 ± 1.7	7.2	1352 ± 7.1	699.1 ± 5.5	3063.7 ± 12.5
Potassium	ng/m³	26.7 ± 0.9	4.4	3932.1 ± 7.8	40.5 ± 3.1	345.8 ± 3.4
Calcium	ng/m³	138.6 ± 4.0	93.6 ± 0.3	10897.7 ± 42.1	350.4 ± 13.5	1211.7 ± 15
Scandium	ng/m³	0.0 ± 12.0	0.0	3.5 ± 38	0 ± 41.2	0 ± 39.3
Titanium	ng/m³	8.4 ± 1.0	0.0	3057.2 ± 9.5	5.6 ± 3.3	213.1 ± 3.5
Vanadium	ng/m³	0.0 ± 0.7	0.0	0 ± 2.1	0 ± 2.2	0 ± 2.1
Chromium	ng/m³	1.6 ± 0.7	2.2	339.2 ± 2.5	9.1 ± 2.2	33.6 ± 2.2
Manganese	ng/m³	1.3 ± 2.0	0.0	242.2 ± 6.9	6.5 ± 6.9	26.9 ± 6.6
Iron	ng/m³	57.4 ± 1.0	15.2	13398.6 ± 32.9	129.4 ± 3.3	1235.6 ± 5.4
Cobalt	ng/m³	0.1 ± 0.7	0.0	0 ± 2.1	0.8 ± 2.2	0 ± 2.1
Nickel	ng/m³	0.7 ± 1.9	0.0	155.2 ± 6.2	7.7 ± 6.5	16.4 ± 6.1
Copper	ng/m³	18.2 ± 2.3	1.5	63.4 ± 7.5	22.8 ± 8	88.5 ± 7.8
Zinc	ng/m³	95.1 ± 0.9	5.7	364.3 ± 2.9	291.9 ± 2.8	297.2 ± 2.8
Gallium	ng/m³	1.1 ± 3.2	0.0	0 ± 10.1	3.3 ± 10.9	5.8 ± 10.4
Arsenic	ng/m³	0.3 ± 0.7	0.0	0 ± 2.1	0 ± 2.2	0 ± 2.1
Selenium	ng/m³	0.1 ± 0.7	2.9	0 ± 2.1	2 ± 2.2	0 ± 2.1
Bromine	ng/m³	1.0 ± 0.7	0.3	4.2 ± 2.1	8.9 ± 2.2	3.4 ± 2.1
Rubidium	ng/m³	0.4 ± 0.7	0.3	19 ± 2.1	1.7 ± 2.2	2.5 ± 2.1

Table R.1. Composition of NPACT animal toxicology exposure atmospheres for MVE_{Low}, $MVEG_{Low}$, and the combinations of MVE_{Low} and RD, S, or N.

Exposure Atmosphere Composition	Units	MVE_{Low}	$MVEG_{Low}$	RD + MVE_{Low}	S + MVE_{Low}	N + MVE_{Low}
Strontium	ng/m³	0.6 ± 0.7	3.1	65.1 ± 2.2	1.6 ± 2.2	11.9 ± 2.1
Yttrium	ng/m³	0.2 ± 0.7	2.4	7.6 ± 2.1	0 ± 2.2	1.3 ± 2.1
Zirconium	ng/m³	2.6 ± 1.1	0.0	49.3 ± 3.6	0.3 ± 3.6	5.2 ± 3.5
Niobium	ng/m³	0.0 ± 0.9	0.0	0 ± 2.9	0 ± 3.1	0 ± 3
Molybdenum	ng/m³	0.1 ± 1.4	0.0	17.8 ± 4.4	2.7 ± 4.7	6.8 ± 4.4
Palladium	ng/m³	0.8 ± 1.6	0.0	0.8 ± 4.9	4.3 ± 5.3	0 ± 5.1
Silver	ng/m³	0.0 ± 1.5	0.0	0.2 ± 4.7	1.1 ± 5.1	0 ± 4.9
Cadmium	ng/m³	0.0 ± 1.9	0.0	0.5 ± 6	0 ± 6.5	3.1 ± 6.2
Indium	ng/m³	1.2 ± 2.0	3.4	0 ± 6.4	0 ± 6.9	0 ± 6.5
Tin	ng/m³	0.0 ± 2.0	0.0	0 ± 6.4	0 ± 6.9	0 ± 6.5
Antimony	ng/m³	1.0 ± 3.2	0.0	0.2 ± 10.1	0 ± 10.9	0 ± 10.4
Cesium	ng/m³	0.0 ± 6.5	0.0	0 ± 20.5	0 ± 22.3	0 ± 21.1
Barium	ng/m³	0.0 ± 7.5	0.0	0 ± 24.7	10.7 ± 25.6	2.2 ± 24.6
Lanthanum	ng/m³	1.8 ± 9.3	0 ± 1	0 ± 29.5	0 ± 32.3	0 ± 30.8
Cerium	ng/m³	1.6 ± 8.7	0.0	12 ± 27.8	0 ± 30	0 ± 29
Samarium	ng/m³	7.0 ± 15.8	24.1 ± 0.3	0 ± 50.2	12.5 ± 54.2	11.2 ± 51.3
Europium	ng/m³	3.8 ± 22.3	0.0	30.6 ± 71.1	16.1 ± 76.8	0 ± 73
Terbium	ng/m³	0 ± 17.2	0.0	0 ± 55.1	0 ± 58.7	3.4 ± 55.5
Hafnium	ng/m³	1.1 ± 4.7	12.2 ± 0.1	1.8 ± 15	0 ± 16.2	0 ± 15.4
Tantalum	ng/m³	0 ± 2.6	0.0	0 ± 8.4	0 ± 9	0 ± 8.7
Wolfram	ng/m³	0 ± 7.4	0.0	0 ± 23.4	7 ± 25.5	0 ± 24.1
Iridium	ng/m³	0 ± 1.2	0.0	1.9 ± 3.8	0 ± 4.1	0 ± 3.9
Gold	ng/m³	0 ± 1.2	0.0	0 ± 3.7	0 ± 4	0 ± 3.8
Mercury	ng/m³	0 ± 0.7	0.0	0 ± 2.1	0 ± 2.2	0 ± 2.1
Thallium	ng/m³	0 ± 0.8	0.0	0.4 ± 2.5	0.4 ± 2.7	0 ± 2.5
Lead	ng/m³	3.9 ± 0.7	0.0	35.6 ± 2.4	8.7 ± 2.4	36.3 ± 2.4
Uranium	ng/m³	0 ± 1	0.0	0 ± 3.3	1.2 ± 3.5	0.8 ± 3.4
Alkanes Data :						
Dodecane	ng/m³	1393 ± 69.7	5073.5 ± 474.3	3958.7 ± 197.9	4048.4 ± 202.4	4698.7 ± 235.1
Norfarnesane	ng/m³	885 ± 51.8	1947.2 ± 97.8	3105.5 ± 181.7	3505.8 ± 205.1	3674.1 ± 214.9
Tridecane	ng/m³	3697.2 ± 184.9	4416.2 ± 228.3	9189 ± 459.6	11030.9 ± 551.8	12132.8 ± 606.9

Table R.1. Composition of NPACT animal toxicology exposure atmospheres for MVE_{Low}, $MVEG_{Low}$, and the combinations of MVE_{Low} and RD, S, or N.

Exposure Atmosphere Composition	Units	MVE_{Low}	$MVEG_{Low}$	RD + MVE_{Low}	S + MVE_{Low}	N + MVE_{Low}
Heptylcyclohexane	ng/m³	326.4 ± 40.9	217 ± 31.7	795.7 ± 99.7	908.7 ± 113.8	986.4 ± 123.5
Farnesane	ng/m³	713.5 ± 38	1229.1 ± 61.9	2351.1 ± 125.1	2802.7 ± 149.2	2925.3 ± 155.6
Tetradecane	ng/m³	1605 ± 80.3	2433.4 ± 122.1	6288.8 ± 314.4	6685.9 ± 334.3	7347.9 ± 367.5
Octylcyclohexane	ng/m³	160.8 ± 11.6	194.5 ± 10.2	490.3 ± 35.4	569.3 ± 41.3	554.7 ± 40.3
Pentadecane	ng/m³	1690.4 ± 84.6	2063.6 ± 103.7	6003.6 ± 300.5	5902.1 ± 295.3	7352.2 ± 367.9
Nonylcyclohexane	ng/m³	128 ± 6.5	154.8 ± 8.9	486.3 ± 24.6	438.3 ± 22.2	528.8 ± 26.7
Hexadecane	ng/m³	1321.8 ± 66.1	1546.1 ± 77.8	4127.9 ± 206.4	4119.2 ± 206	5360 ± 268.2
Norpristane	ng/m³	498.1 ± 25.2	808.4 ± 40.9	1552.6 ± 78.1	1561.8 ± 79	2165.7 ± 108.8
Decylcyclohexane	ng/m³	98.9 ± 10.6	124.8 ± 10.6	277.8 ± 29.7	267.8 ± 28.7	359.7 ± 38.4
Heptadecane	ng/m³	1020.7 ± 51.1	1591.5 ± 79.8	2577.2 ± 129.1	2916.2 ± 146.1	4003.3 ± 200.4
Heptadecane	ng/m³	603.6 ± 30.3	637.8 ± 38.7	1419.4 ± 71.4	1594.8 ± 80	2238.9 ± 112.3
Undecylcyclohexane	ng/m³	52.5 ± 7.2	60.2 ± 9	125.5 ± 17.3	135.9 ± 18.8	207.2 ± 28.4
Octadecane	ng/m³	622 ± 31.1	581.1 ± 29.5	1436 ± 71.8	1758.8 ± 87.9	2303.6 ± 115.2
Phytane	ng/m³	309.5 ± 18.2	299.4 ± 15.4	616.2 ± 35.8	883.3 ± 51.5	1064.8 ± 61.4
Dodecylcyclohexane	ng/m³	20.5 ± 3.7	44.6 ± 5.4	52.8 ± 9.6	58 ± 10.3	70 ± 12.7
Nonadecane	ng/m³	176 ± 9.1	170.5 ± 9.1	361.8 ± 18.6	587.6 ± 30.4	540.6 ± 27.5
Tridecylcyclohexane	ng/m³	9.1 ± 0.5	11.6 ± 1.3	18.8 ± 1.2	24.7 ± 1.5	28.5 ± 1.7
Eicosane	ng/m³	107.1 ± 5.4	242.2 ± 12.6	419.1 ± 21	251.6 ± 12.6	399.4 ± 20
Tetradecylcyclohexane	ng/m³	2.6 ± 0.3	1.4 ± 0.9	6 ± 0.9	9.6 ± 1.1	6 ± 1.1
Heneicosane	ng/m³	37.1 ± 2.5	36.7 ± 1.9	76.7 ± 5.1	132 ± 8.9	98.7 ± 6.4
Pentadecylcyclohexane	ng/m³	2.4 ± 0.3	1.7 ± 0.9	5.2 ± 0.6	4.6 ± 0.8	7.7 ± 0.9
Docosane	ng/m³	54.7 ± 2.7	182.3 ± 9.1	256.9 ± 12.8	79.5 ± 4	180 ± 9
Hexadecylcyclohexane	ng/m³	2 ± 0.4	1.2 ± 0.9	2.2 ± 0.6	5 ± 0.9	5.7 ± 1
Tricosane	ng/m³	21.5 ± 1.5	51.4 ± 3.6	38.8 ± 3.1	93.4 ± 6.3	45.4 ± 4
Heptadecylcyclohexane	ng/m³	4.7 ± 0.3	1.3 ± 0.9	1.2 ± 0.6	29.4 ± 1.7	8.7 ± 0.9
Tetracosane	ng/m³	38.6 ± 1.9	170.4 ± 8.8	186.5 ± 9.3	68.8 ± 3.6	124.7 ± 6.4
Octadecylcyclohexane	ng/m³	0.2 ± 0.2	0.6 ± 0.9	6.8 ± 0.8	1.5 ± 0.7	4.6 ± 0.7
Pentacosane	ng/m³	17.5 ± 0.9	78.5 ± 8.1	36.5 ± 1.9	63.2 ± 3.3	43.7 ± 2.3
Hexacosane	ng/m³	19 ± 1	88.5 ± 4.5	92.9 ± 4.7	24.3 ± 1.5	69.2 ± 3.9
Nonadecylcyclohexane	ng/m³	4.7 ± 0.4	1.6 ± 0.9	22.2 ± 1.9	7.4 ± 0.8	15 ± 1.2
Heptacosane	ng/m³	4.8 ± 0.6	16.8 ± 1.3	11.4 ± 1.4	17.8 ± 1.9	10.3 ± 1.2

Table R.1. Composition of NPACT animal toxicology exposure atmospheres for MVE_{Low}, $MVEG_{Low}$, and the combinations of MVE_{Low} and RD, S, or N.

Exposure Atmosphere Composition	Units	MVE_{Low}	$MVEG_{Low}$	RD + MVE_{Low}	S + MVE_{Low}	N + MVE_{Low}
Eicosylcyclohexane	ng/m³	0.4 ± 0.2	0.5 ± 0.9	0.4 ± 0.6	0.6 ± 0.7	1 ± 0.6
Octacosane	ng/m³	7.3 ± 0.6	35.5 ± 2.9	46.2 ± 3.3	13.7 ± 1.4	27.6 ± 1.9
Nonacosane	ng/m³	1.3 ± 0.2	1.4 ± 0.9	7 ± 0.8	10.3 ± 1.2	6.1 ± 0.7
Heneicosylcyclohexane	ng/m³	0.3 ± 0.2	9 ± 1.1	0.2 ± 0.6	1 ± 0.7	0.6 ± 0.6
Triacontane	ng/m³	4.8 ± 0.4	13.7 ± 1.2	26.5 ± 1.8	9.3 ± 1.1	9.6 ± 0.9
Hentriacontane	ng/m³	2.9 ± 0.3	0.7 ± 0.9	8.7 ± 1.2	8.7 ± 0.9	8.4 ± 1
Dotriacontane	ng/m³	2.7 ± 0.3	10.4 ± 0.9	20.4 ± 1.4	5.4 ± 0.7	11.8 ± 1.2
Tritriacontane	ng/m³	2.7 ± 0.4	1 ± 0.9	6.8 ± 1.3	3.4 ± 0.8	8.3 ± 1.3
Tetratriacontane	ng/m³	2.8 ± 0.4	5.9 ± 0.9	11.1 ± 1.2	5.2 ± 1	6.7 ± 1
Pentatriacontane	ng/m³	1.8 ± 0.5	1.3 ± 0.9	0.9 ± 0.6	7.8 ± 1.8	5.6 ± 1.3
Hexatriacontane	ng/m³	0 ± 0.2	5.2 ± 1.6	4.2 ± 0.6	3.9 ± 0.7	0.5 ± 0.6
Heptatriacontane	ng/m³	0.1 ± 0.2	0.2 ± 0.9	0.7 ± 0.6	0 ± 0.7	2.4 ± 0.6
Octatriacontane	ng/m³	0.5 ± 0.2	5.9 ± 1.2	3.5 ± 0.8	1.7 ± 0.7	1.6 ± 0.6
Nonatriacontane	ng/m³	0.1 ± 0.2	1.8 ± 0.9	0.4 ± 0.6	0.6 ± 0.7	0.3 ± 0.6
Tetracontane	ng/m³	0.4 ± 0.2	5.3 ± 0.9	1.1 ± 0.6	0 ± 0.7	0 ± 0.6
Carbonyl Data :						
Formaldehyde	µg/m³	3.4 ± 0.2	112.9 ± 5.6	85.1 ± 4.3	35.2 ± 1.8	68.2 ± 3.4
Acetaldehyde	µg/m³	0.0	113.5 ± 5.7	94 ± 4.7	14.5 ± 0.8	131.7 ± 6.6
Acrolein	µg/m³	2.5 ± 0.2	23.7 ± 1.4	31.8 ± 2	12.7 ± 0.8	35.7 ± 2.2
Glyoxal	µg/m³	0.1	0.7 ± 0.1	0.7 ± 0.1	0.4 ± 0.1	0.5 ± 0.1
acetone	µg/m³	0.0	46.9 ± 2.3	8.4 ± 0.5	0 ± 0.1	9.1 ± 0.5
Propionaldehyde	µg/m³	0.0	26.1 ± 1.3	24.7 ± 1.3	4.4 ± 0.3	29.1 ± 1.5
Crotonaldehyde	µg/m³	0.0	7.7 ± 0.4	24.1 ± 1.2	1.8 ± 0.1	16.6 ± 0.8
Methacrolein	µg/m³	0.0	3.5 ± 0.2	0 ± 0.1	0 ± 0.1	0 ± 0.1
n-butyraldehyde	µg/m³	0.0	11.1 ± 0.9	14.5 ± 1.2	3 ± 0.3	12.2 ± 1.1
2-Butanone (MEK)	µg/m³	0.0	12.8 ± 0.1	0 ± 0.1	0 ± 0.1	1.6 ± 0.2
Valeraldehyde	µg/m³	0.0	8.6 ± 0.6	9.2 ± 0.8	2.1 ± 0.2	6.3 ± 0.6
Hexaldehyde	µg/m³	0.2	9 ± 0.5	1.6 ± 0.2	0.6 ± 0.2	1.7 ± 0.2
benzaldehyde	µg/m³	2.3 ± 0.1	16.6 ± 0.8	14.2 ± 0.7	11.2 ± 0.6	11.7 ± 0.7
m-Tolualdehyde	µg/m³	3.2 ± 0.3	6.2 ± 0.3	7.9 ± 0.8	9.8 ± 0.9	8.9 ± 0.9

Table R.1. Composition of NPACT animal toxicology exposure atmospheres for MVE_{Low}, $MVEG_{Low}$, and the combinations of MVE_{Low} and RD, S, or N.

Exposure Atmosphere Composition	Units	MVE_{Low}	$MVEG_{Low}$	RD + MVE_{Low}	S + MVE_{Low}	N + MVE_{Low}
PAH Data :						
1+2ethylnaphthalene	ng/m³	660 ± 263.9	0.7	1850.9 ± 710.8	1734.5 ± 539.3	2156.3 ± 549.6
Naphthalene	ng/m³	3061.6 ± 3.7	10.4 ± 0.5	8245.7 ± 10.7	6256.2 ± 9.5	6375.6 ± 9.5
Quinoline	ng/m³	34 ± 345.3	NA	98.8 ± 589.5	88.1 ± 643.6	88.4 ± 812.2
2-methylnaphthalene	ng/m³	6576.4 ± 218.2	8.9 ± 1	11227.9 ± 477.1	12258.6 ± 491.5	15470.1 ± 606.6
1-methylnaphthalene	ng/m³	3535.7 ± 17.9	5 ± 0.3	7732.8 ± 62.5	7966.6 ± 48.3	9830.7 ± 69.3
Biphenyl	ng/m³	358.9 ± 8.3	0.5	1249.6 ± 17	966.4 ± 15.6	1386.2 ± 17.5
2-methylbiphenyl	ng/m³	113.8 ± 97.4	0.1	232.7 ± 345.3	213.5 ± 269.9	239.6 ± 423.9
2,6+2,7-dimethylnaphthalene	ng/m³	1346.8 ± 158.3	1.8 ± 0.1	4775.9 ± 563.1	3733.2 ± 434.2	5862.6 ± 672.8
1,3+1,6+1,7dimethylnaphth	ng/m³	2446.1 ± 39.3	3.5 ± 0.2	8704 ± 140.4	6710.2 ± 105	10399.1 ± 167.8
1,4+1,5+2,3-dimethylnaphth	ng/m³	708 ± 3.8	1 ± 0.1	2530.6 ± 12	1892.4 ± 13.2	3023.4 ± 12.7
Acenaphthylene	ng/m³	40.8 ± 15.9	0.3	129.2 ± 54.3	141.7 ± 42.8	136.6 ± 65
1,2-dimethylnaphthalene	ng/m³	194.4 ± 0.1	0.3	662.7 ± 0.3	522.2 ± 0.3	792.5 ± 0.3
1,8-dimethylnaphthalene	ng/m³	0 ± 0.5	0.0	0 ± 1.4	0 ± 1.8	0 ± 2.5
Acenaphthene	ng/m³	9.5 ± 30.3	0.1	26.9 ± 63.1	36.1 ± 46.4	49.3 ± 71.1
3-methylbiphenyl	ng/m³	572.4 ± 13.9	0.5	1192.9 ± 26.7	877.7 ± 20.9	1343.8 ± 32
4-methylbiphenyl	ng/m³	201 ± 6.6	0.2	386.5 ± 19.6	301.3 ± 17.5	462.6 ± 20
Dibenzofuran	ng/m³	81.8 ± 8.1	0.1	242.5 ± 24.7	216.6 ± 20	247.6 ± 28
1-ethyl-2-methylnaphthalene	ng/m³	125 ± 37	0.1	380.2 ± 128.2	308.2 ± 98.9	430.6 ± 144.8
2,3,5+I-trimethylnaphthalene	ng/m³	249.4 ± 18	0.3	864.9 ± 65.3	667 ± 50.2	976.8 ± 74.1
B-trimethylnaphthalene	ng/m³	360.9 ± 23.8	0.3	1306.7 ± 84.9	1003.9 ± 65.3	1481.2 ± 99.2
A-trimethylnaphthalene	ng/m³	476.3 ± 19.1	0.6	1698.5 ± 68.4	1305.1 ± 52.1	1984.2 ± 77.6
C-trimethylnaphthalene	ng/m³	330.2 ± 1.6	0.4	1182.6 ± 5.1	901 ± 4.3	1342.8 ± 4.7
2-ethyl-1-methylnaphthalene	ng/m³	22.7 ± 16	0.0	70.8 ± 58.8	60.1 ± 44.5	64.7 ± 66.2
E-trimethylnaphthalene	ng/m³	194.2 ± 2.5	0.3	712 ± 10.9	538.6 ± 8.1	801.4 ± 14.3
2,4,5-trimethylnaphthalene	ng/m³	20 ± 12.8	0.1	87.3 ± 44.3	64.6 ± 34.8	113.9 ± 50.7
F-trimethylnaphthalene	ng/m³	173.5 ± 1.7	0.2	602 ± 8.2	473.4 ± 8.2	688.5 ± 4.7
Fluorene	ng/m³	15.8 ± 1.4	0.1	77.4 ± 4.2	76.8 ± 3.4	44.6 ± 5
1,4,5-trimethylnaphthalene	ng/m³	27.5 ± 3.9	0.1	84.7 ± 12.9	68.7 ± 10.1	100 ± 14.3
J-trimethylnaphthalene	ng/m³	59.3 ± 2.6	0.1	198.6 ± 8.1	155 ± 8.5	220.8 ± 9.9
A-Methylfluorene	ng/m³	20.4 ± 0.4	0.1	64.5 ± 1.4	67.1 ± 1.6	78.5 ± 1.9

Table R.1. Composition of NPACT animal toxicology exposure atmospheres for MVE_{Low}, $MVEG_{Low}$, and the combinations of MVE_{Low} and RD, S, or N.

Exposure Atmosphere Composition	Units	MVE_{Low}	$MVEG_{Low}$	RD + MVE_{Low}	S + MVE_{Low}	N + MVE_{Low}
B-Methylfluorene	ng/m³	3.6 ± 1.3	0.1	12.5 ± 3.8	13.6 ± 4.2	16.2 ± 2.2
1-Methylfluorene	ng/m³	18.9 ± 1.7	0.2	55.8 ± 3.2	61.5 ± 4.8	32.3 ± 4.8
9-fluorenone	ng/m³	23.3 ± 0.7	0.9	45.6 ± 1.8	65.7 ± 2	69.8 ± 2.5
Dibenzothiophene	ng/m³	9.8 ± 5.7	0.1	27.3 ± 12.4	29.7 ± 17.4	37.9 ± 18.9
Phenanthrene	ng/m³	74.5 ± 0.2	0.7	161.2 ± 0.5	226.3 ± 0.7	244.2 ± 0.8
Anthracene	ng/m³	1.6 ± 0.3	0.0	3.6 ± 0.6	5.2 ± 1	6.1 ± 1.2
Xanthone	ng/m³	1.6 ± 0.1	0.2	3.2 ± 0.3	5.4 ± 0.3	6.6 ± 0.3
Acenaphthenequinone	ng/m³	0 ± 1.3	3.5 ± 0.2	0 ± 2.5	0 ± 4.2	0 ± 3.8
3-methylphenanthrene	ng/m³	11.2 ± 0.9	1.1 ± 0.1	20.3 ± 1.4	35.2 ± 2.7	30.9 ± 2.4
2-methylphenanthrene	ng/m³	12.8 ± 0.4	0.3	20.8 ± 0.4	39.2 ± 0.6	34.2 ± 0.3
Perinaphthenone	ng/m³	1.8 ± 0.1	0.0	1.9 ± 0.3	3.1 ± 0.3	1.5 ± 0.3
2-methylanthracene	ng/m³	0.5 ± 0.3	0.6	0.5 ± 0.5	0.8 ± 1	1 ± 0.9
4,5-methylenephenanthrene	ng/m³	2.1 ± 0.8	0.0	3.5 ± 1.3	6.7 ± 2.4	6.3 ± 2.5
9-methylphenanthrene	ng/m³	9.7 ± 0.3	0.2	15.6 ± 0.6	28.5 ± 1.6	28.3 ± 1.3
1-methylphenanthrene	ng/m³	4.2 ± 0.5	0.2	12.7 ± 0.3	31.3 ± 0.9	26.3 ± 0.7
Anthrone	ng/m³	2.6 ± 0.1	0.0	1 ± 0.3	4.8 ± 0.3	4 ± 0.3
9-methylanthracene	ng/m³	0.1 ± 0.1	0.0	0.4 ± 0.3	0.3 ± 0.4	0.4 ± 0.4
2-phenylnaphthalene	ng/m³	2.5 ± 0.2	0.1	3.4 ± 0.4	7.7 ± 1	6.4 ± 0.7
Anthraquinone	ng/m³	1.8 ± 0.2	1.2 ± 0.2	2 ± 0.3	7.2 ± 0.6	5 ± 0.5
A-dimethylphenanthrene	ng/m³	1.6 ± 0.1	0.0	1 ± 0.3	4.9 ± 0.4	3.5 ± 0.3
B-dimethylphenanthrene	ng/m³	1.3 ± 0.2	0.0	0.8 ± 0.3	4.4 ± 0.6	2.8 ± 0.5
1,7-dimethylphenanthrene	ng/m³	2 ± 0.1	0.0	1.5 ± 0.3	5.3 ± 0.6	3.5 ± 0.5
3,6-dimethylphenanthrene	ng/m³	0.9 ± 0.1	0.0	1.3 ± 0.3	3.7 ± 0.5	2.8 ± 0.3
D-dimethylphenanthrene	ng/m³	1.4 ± 0.1	0.0	0.9 ± 0.3	5.3 ± 0.4	2.3 ± 0.4
E-dimethylphenanthrene	ng/m³	0.9 ± 0.3	0.0	0.6 ± 0.4	2.7 ± 1	2.5 ± 0.6
C-dimethylphenanthrene	ng/m³	4.1 ± 0.3	0.0	4.7 ± 0.4	12.7 ± 0.9	8.5 ± 0.5
Fluoranthene	ng/m³	2.9 ± 0.5	0.1	2.7 ± 0.5	8.3 ± 1.5	3.8 ± 0.5
Pyrene	ng/m³	3.5 ± 0.1	0.1	3.1 ± 0.3	11.1 ± 0.3	4.1 ± 0.3
9-Anthraaldehyde	ng/m³	0.3 ± 0.1	0.0	0 ± 0.3	1.9 ± 0.3	2.9 ± 0.3
Retene	ng/m³	0 ± 0.1	0.0	0 ± 0.3	0 ± 0.4	0 ± 0.3
benzo(a)fluorene	ng/m³	0.1 ± 0.1	0.0	0.3 ± 0.3	0.3 ± 0.3	0.1 ± 0.3

Table R.1. Composition of NPACT animal toxicology exposure atmospheres for MVE_{Low}, $MVEG_{Low}$, and the combinations of MVE_{Low} and RD, S, or N.

Exposure Atmosphere Composition	Units	MVE_{Low}	$MVEG_{Low}$	RD + MVE_{Low}	S + MVE_{Low}	N + MVE_{Low}
benzo(b)fluorene	ng/m³	0 ± 0.1	0.0	0 ± 0.3	0.1 ± 0.3	0 ± 0.3
B-MePy/MeFl	ng/m³	0 ± 0.1	0.0	0.3 ± 0.3	0.1 ± 0.4	0.1 ± 0.3
1-MeFl+C-MeFl/Py	ng/m³	0.2 ± 0.1	0.0	0.1 ± 0.3	0.8 ± 0.4	0.2 ± 0.3
1+3-methylfluoranthene	ng/m³	0.4 ± 0.2	0.0	0.3 ± 0.4	1.3 ± 0.8	0.2 ± 0.4
4-methylpyrene	ng/m³	0.9 ± 0.1	0.0	0.8 ± 0.3	3.3 ± 0.4	0.7 ± 0.3
C-MePy/MeFl	ng/m³	0.1 ± 0.3	0.0	0 ± 0.4	0.2 ± 0.9	0 ± 0.4
D-MePy/MeFl	ng/m³	1 ± 0.1	0.0	0.8 ± 0.3	3.7 ± 0.4	0.6 ± 0.3
1-methylpyrene	ng/m³	0.3 ± 0.1	0.0	0.4 ± 0.3	1.2 ± 0.4	0.3 ± 0.3
Benzonaphthothiophene	ng/m³	0.1 ± 0.1	0.0	0.1 ± 0.3	0.5 ± 0.4	0.1 ± 0.3
benzo(c)phenanthrene	ng/m³	0.2 ± 0.3	0.0	0.1 ± 0.4	0.6 ± 0.9	0.1 ± 0.4
Benzo(ghi)fluoranthene	ng/m³	3.4 ± 0.1	0.2	2.3 ± 0.3	9.8 ± 0.3	2.1 ± 0.3
9-phenylanthracene	ng/m³	0 ± 0.1	0.0	0 ± 0.3	0 ± 0.4	0 ± 0.3
Cyclopenta(c,d)pyrene	ng/m³	0.3 ± 0.2	0.0	0.5 ± 0.4	0.7 ± 0.6	0.4 ± 0.4
Benz(a)anthracene	ng/m³	0.6 ± 0.3	0.0	0.6 ± 0.5	1.5 ± 0.9	0.5 ± 0.5
Chrysene-Triphenylene	ng/m³	2 ± 1.2	0.0	1.9 ± 1.7	5.4 ± 3.3	1.7 ± 1.5
Benzanthrone	ng/m³	3.2 ± 0.1	0.1	4 ± 0.3	8.7 ± 0.4	3.6 ± 0.4
Benz(a)anthracene-7,12-dione	ng/m³	0.6 ± 0.1	0.0	0.8 ± 0.3	1.6 ± 0.4	0.7 ± 0.3
3-methylchrysene	ng/m³	0.2 ± 0.1	0.0	0.3 ± 0.3	0.4 ± 0.3	0.3 ± 0.3
chry56m	ng/m³	0 ± 0.1	NA	0 ± 0.3	0 ± 0.3	0 ± 0.3
7-methylbenz(a)anthracene	ng/m³	0 ± 0.1	NA	0 ± 0.3	0 ± 0.4	0 ± 0.4
7,12-dimethylbenz(a)anthracene	ng/m³	0.2 ± 0.1	0.0	0.3 ± 0.3	0.6 ± 0.3	0.6 ± 0.3
Benzo(b+j+k)fluoranthene	ng/m³	0 ± 0.1	0.0	0.1 ± 0.3	0.3 ± 0.3	0.2 ± 0.3
Benzo(a)fluoranthene	ng/m³	0.1 ± 0.1	0.0	0.2 ± 0.4	0.1 ± 0.4	0.1 ± 0.4
BeP	ng/m³	0.6 ± 0.1	0.0	1 ± 0.4	1.4 ± 0.4	1.3 ± 0.4
BaP	ng/m³	0.3 ± 0.1	0.0	0.7 ± 0.3	0.7 ± 0.3	0.5 ± 0.3
Perylene	ng/m³	0.1 ± 0.1	0.0	0.2 ± 0.3	0.2 ± 0.3	0.1 ± 0.3
dibenz(a,j)acridine	ng/m³	0.1 ± 0.1	0.0	0 ± 0.3	0.2 ± 0.3	0 ± 0.3
7-methylbenzo(a)pyrene	ng/m³	0 ± 0.1	0.0	0.7 ± 0.3	0 ± 0.3	0.1 ± 0.3
bpy910dih	ng/m³	0 ± 0.1	NA	0 ± 0.3	0 ± 0.3	0 ± 0.3
Indeno[123-cd]fluoranthene	ng/m³	0 ± 0.1	0.0	0 ± 0.3	0 ± 0.3	0 ± 0.3
dibenz(a,h)acridine	ng/m³	0 ± 0.1	0.0	0 ± 0.3	0 ± 0.3	0 ± 0.3

Table R.1. Composition of NPACT animal toxicology exposure atmospheres for MVE_{Low}, $MVEG_{Low}$, and the combinations of MVE_{Low} and RD, S, or N.

Exposure Atmosphere Composition	Units	MVE_{Low}	$MVEG_{Low}$	RD + MVE_{Low}	S + MVE_{Low}	N + MVE_{Low}
Indeno[123-cd]pyrene	ng/m³	0.3 ± 0.1	0.0	0.6 ± 0.3	0.6 ± 0.3	0.9 ± 0.3
Dibenzo(ah+ac)anthracene	ng/m³	0 ± 0.1	NA	0 ± 0.3	0 ± 0.3	0 ± 0.3
Dibenzo(a,j)anthracene	ng/m³	0 ± 0.1	0.0	0 ± 0.3	0 ± 0.3	0 ± 0.3
Benzo(b)chrysene	ng/m³	0 ± 0.1	0.0	0 ± 0.3	0 ± 0.3	0.1 ± 0.3
Picene	ng/m³	0 ± 0.3	0.0	0.1 ± 0.7	0 ± 0.8	0.1 ± 0.9
Benzo(ghi)perylene	ng/m³	1.2 ± 0.1	0.0	2.3 ± 0.4	2.9 ± 0.4	3.7 ± 0.4
Anthanthrene	ng/m³	0.1 ± 0.1	0.0	0.2 ± 0.3	0.1 ± 0.3	0.1 ± 0.4
Dibenzo(a,l)pyrene	ng/m³	0 ± 0.1	0.0	0 ± 0.4	0 ± 0.4	0 ± 0.5
Coronene	ng/m³	0.2 ± 0.1	0.0	0.6 ± 0.3	0.7 ± 0.3	1.3 ± 0.3
Dibenzo(a,e)pyrene	ng/m³	0 ± 0.1	0.0	0 ± 0.3	0 ± 0.3	0 ± 0.3
Dibenzo(a,i)pyrene	ng/m³	0 ± 0.1	0.0	0 ± 0.3	0 ± 0.3	0 ± 0.3
Dibenzo(a,h)pyrene	ng/m³	0 ± 0.1	0.0	0 ± 0.3	0 ± 0.3	0 ± 0.3
Dibenzo(b,k)fluoranthene	ng/m³	0.0	0.0	0.0	0.0	0.0
Nitro-PAH Data :						
3-nitrobenzo[e]pryene	ng/m³	0.0	0.0	0.0	0.0	0.0
1-nitronaphthalene	ng/m³	3.1 ± 0.2	1.1 ± 0.1	2.9 ± 0.1	5 ± 0.2	4.3 ± 0.2
1-methyl-5-nitronaphthalene	ng/m³	0.5	0.1	1.0	0.9	1.4 ± 0.1
2-nitronaphthalene	ng/m³	7.6 ± 0.4	3.9 ± 0.4	11.1 ± 0.6	15.2 ± 0.8	15.4 ± 0.8
2-nitrobiphenyl	ng/m³	0.1	0.1	0.3	0.3	0.3
2-methyl-4-nitronaphthalene	ng/m³	0.9 ± 0.1	0.2	1 ± 0.1	1.1 ± 0.1	1 ± 0.1
1-methyl-4-nitronaphthalene	ng/m³	1.6 ± 0.2	1.7 ± 0.1	3.1 ± 0.3	4.7 ± 0.5	4.3 ± 0.4
1-methyl-6-nitronaphthalene	ng/m³	1 ± 0.1	1.5 ± 0.1	1.8 ± 0.1	3 ± 0.1	2.7 ± 0.1
3-nitrobiphenyl	ng/m³	0.1	0.1	0.2	0.3	0.3
4-nitrobiphenyl	ng/m³	0.0	0.1	0.0	0.2	0.1
1,3-dinitronaphthalene	ng/m³	0.0	0.0	0.0	0.1	0.0
1,5-dinitronaphthalene	ng/m³	0.0	0.0	0.0	0.0	0.0
5-nitroacenaphthene	ng/m³	0.0	0.0	0.0	0.0	0.0
2-nitrofluorene	ng/m³	0.0	0.0	0.0	0.0	0.0
4-nitrophenanthrene	ng/m³	0.0	0.0	0.0	0.1	0.0
9-nitroanthracene	ng/m³	0.1	0.0	0.1	0.3	0.1
9-nitrophenanthrene	ng/m³	0.0	0.0	0.0	0.1	0.0

Table R.1. Composition of NPACT animal toxicology exposure atmospheres for MVE_{Low}, $MVEG_{Low}$, and the combinations of MVE_{Low} and RD, S, or N.

Exposure Atmosphere Composition	Units	MVE_{Low}	$MVEG_{Low}$	RD + MVE_{Low}	S + MVE_{Low}	N + MVE_{Low}
1,8-dinitronaphthalene	ng/m³	0.0	0.0	0.0	0.0	0.0
3-nitrophenanthrene	ng/m³	0.4	0.1	0.2	1.4 ± 0.1	0.4
2-nitrophenanthrene	ng/m³	0.2	0.0	0.1	1.5 ± 0.1	0.6
2-nitroanthracene	ng/m³	0.0	0.0	0.0	0.1	0.0
2-nitrofluoranthene	ng/m³	0.0	0.0	0.0	0.0	0.0
3-nitrofluoranthene	ng/m³	0.0	0.0	0.0	0.0	0.0
4-nitropyrene	ng/m³	0.0	0.0	0.0	0.0	0.0
1-nitropyrene	ng/m³	1 ± 0.1	0.0	0.9	2.2 ± 0.1	1.0
2-nitropyrene	ng/m³	0.0	0.0	0.0	0.0	0.0
2,7-dinitrofluorene	ng/m³	0.0	0.0	0.0	0.0	0.0
2,7-dinitrofluoren-9-one	ng/m³	0.0	0.0	0.0	0.0	0.0
7-nitrobenz(a)anthracene	ng/m³	0.0	0.0	0.0	0.1	0.0
6-nitrochrysene	ng/m³	0.0	0.0	0.0	0.0	0.0
3-nitrobenzanthrone	ng/m³	0.0	0.0	0.0	0.0	0.0
1,3-dinitropyrene	ng/m³	0.0	0.0	0.0	0.0	0.0
1,6-dinitropyrene	ng/m³	0.0	0.0	0.0	0.0	0.0
1,8-dinitropyrene	ng/m³	0.0	0.0	0.0	0.0	0.0
6a+1e-nitrobenzpyrene	ng/m³	0.1	0.0	0.1	0.1	0.2
Polar Compounds :						
8,15-Pimaradien-18-oic acid	ng/m³	1.8 ± 0.2	0.7 ± 0.9	2.1 ± 0.6	14.8 ± 1.1	1.5 ± 0.6
Maleic acid	ng/m³	39.4 ± 2.9	640 ± 52.3	122.1 ± 9.1	189.6 ± 20.3	884.6 ± 89.6
Guaiacol	ng/m³	3.5 ± 0.5	0.4 ± 0.9	7.2 ± 1.1	13 ± 1.9	17.6 ± 2.3
Salicylic acid	ng/m³	9.1 ± 1.5	56.5 ± 3.8	7.4 ± 1.4	41.5 ± 3.6	30.9 ± 3.5
4-me-guaiacol	ng/m³	13.9 ± 1.6	10.1 ± 1.7	21.8 ± 1.6	5.4 ± 0.9	35.6 ± 5.5
2,3- and 3,5- dimethylbenzoic acid	ng/m³	0 ± 0.2	0 ± 0.9	0 ± 0.6	0 ± 0.7	0 ± 0.6
2,4-dimethylbenzoic acid	ng/m³	157.9 ± 9.3	500 ± 25	8.3 ± 1.5	4.1 ± 0.9	105.8 ± 15.9
2,5-dimethylbenzoic acid	ng/m³	117 ± 10.7	143.4 ± 22.4	154 ± 14.2	272 ± 24.9	130.6 ± 12.4
2,6-dimethylbenzoic acid	ng/m³	73.2 ± 7.3	57.3 ± 3.3	5.7 ± 0.8	261.3 ± 25.9	127.1 ± 13
3,4-dimethylbenzoic acid	ng/m³	316.6 ± 16.1	100.9 ± 5.2	310 ± 16	592.5 ± 30.4	537.1 ± 28.2
4-formyl-guaiacol (vanillin)	ng/m³	68.6 ± 3.5	0 ± 0.9	130.7 ± 6.8	0 ± 0.7	82.6 ± 4.6
4-ethyl-guaiacol	ng/m³	0.4 ± 0.2	4.1 ± 1	10.6 ± 2.2	3.8 ± 1.1	9.1 ± 1.9

Table R.1. Composition of NPACT animal toxicology exposure atmospheres for MVE_{Low}, $MVEG_{Low}$, and the combinations of MVE_{Low} and RD, S, or N.

Exposure Atmosphere Composition	Units	MVE_{Low}	$MVEG_{Low}$	RD + MVE_{Low}	S + MVE_{Low}	N + MVE_{Low}
Syringol	ng/m³	1472.4 ± 73.7	0.1 ± 0.9	4598.9 ± 230.3	6047.7 ± 302.7	9754.9 ± 488
Levoglucosan	ng/m³	20.3 ± 2.1	55 ± 11.7	11.3 ± 1.3	56.4 ± 5.3	76.3 ± 6.2
4-allyl-guaiacol (eugenol)	ng/m³	0.1 ± 0.2	1.5 ± 0.9	0.1 ± 0.6	0.1 ± 0.7	3.8 ± 0.6
Isoeugenol	ng/m³	1.3 ± 0.3	2.5 ± 0.9	4.3 ± 1	11.6 ± 2.1	8.8 ± 0.8
Isophthalic acid	ng/m³	868.6 ± 43.5	299.3 ± 17.6	880.3 ± 44.3	2735.4 ± 137.1	2214.9 ± 111.1
Phthalic acid	ng/m³	65.3 ± 6.7	48.7 ± 4.4	101.7 ± 10.5	183 ± 18.8	269.2 ± 27.4
Acetovanillone	ng/m³	18.7 ± 1	0 ± 0.9	69.8 ± 3.8	0 ± 0.7	45.6 ± 2.6
Vanillic acid	ng/m³	0 ± 0.2	4.6 ± 1.7	0.1 ± 0.6	0.3 ± 0.7	8.9 ± 0.9
4-methyl-syringol	ng/m³	441.2 ± 22.2	0 ± 0.9	948.3 ± 47.7	1486.6 ± 74.6	1288.3 ± 64.4
2,3-dimethoxybenzoic acid	ng/m³	337.4 ± 17.9	44 ± 5.5	2010.4 ± 100.8	1194.8 ± 63.6	1941.6 ± 107.5
2,4-dimethoxybenzoic acid	ng/m³	11.7 ± 0.7	0.3 ± 0.9	132.7 ± 6.9	43.5 ± 2.4	80.5 ± 5
2,5-dimethoxybenzoic acid	ng/m³	0.3 ± 0.2	11.7 ± 2.9	1 ± 0.6	1.1 ± 0.7	7.1 ± 0.8
2,6-dimethoxybenzoic acid	ng/m³	17.9 ± 1	5.3 ± 1.4	77.3 ± 4.2	41.4 ± 2.5	88.8 ± 4.6
3,4-dimethoxybenzoic acid	ng/m³	2.1 ± 0.2	5.9 ± 0.9	3.5 ± 0.6	6.6 ± 0.8	11.4 ± 0.9
3,5-dimethoxybenzoic acid	ng/m³	1.9 ± 0.3	41.4 ± 4.3	15.3 ± 2.1	8.4 ± 1.2	13.6 ± 1.7
Docosanoic acid (c22)	ng/m³	35.5 ± 4.5	2.1 ± 0.9	125.1 ± 15.7	128.8 ± 16.2	145 ± 18.2
Homovanillic acid	ng/m³	2.9 ± 0.3	2.6 ± 0.9	0 ± 0.6	4.7 ± 0.7	2.4 ± 0.6
Syringaldehyde	ng/m³	0.5 ± 0.2	35.6 ± 9.8	2.2 ± 0.7	0.8 ± 0.7	22 ± 2.9
cis-pinonic acid	ng/m³	337.6 ± 17.5	137 ± 25.2	712.9 ± 36.1	541.6 ± 27.8	656.6 ± 49.3
Syringic acid	ng/m³	0.1 ± 0.2	1.6 ± 0.9	0.2 ± 0.6	11.7 ± 1.2	8.3 ± 0.9
Myristoleic acid	ng/m³	87.4 ± 10.4	3.4 ± 1.1	21.5 ± 2.8	75.9 ± 9.4	65.7 ± 7.8
Traumatic acid	ng/m³	5.5 ± 1.1	0 ± 0.9	8.9 ± 2.2	23.8 ± 5.3	8.2 ± 2
1,11-undecanedicarboxylic acid	ng/m³	4.4 ± 0.5	5 ± 0.9	3.2 ± 0.6	20.4 ± 1.9	15.4 ± 1.1
Palmitoleic acid	ng/m³	11.2 ± 0.7	9.9 ± 3	5.9 ± 0.7	12.7 ± 1	32.7 ± 2.3
1,12-dodecanedicarboxylic acid	ng/m³	1.5 ± 0.2	0 ± 0.9	0.5 ± 0.6	1.7 ± 0.7	2.1 ± 0.6
Elaidic acid	ng/m³	18.5 ± 2.6	3.3 ± 0.9	1.9 ± 0.7	23 ± 3.1	4.8 ± 1.3
Isostearic acid	ng/m³	0.2 ± 0.2	20.4 ± 3.8	187.8 ± 9.9	611.6 ± 33.4	2591.5 ± 133.9
Dehydroabietic acid	ng/m³	3.7 ± 0.8	0 ± 0.9	0 ± 0.6	130.1 ± 13.7	1.1 ± 0.7
Pimaric acid	ng/m³	14.1 ± 1.8	4.4 ± 0.9	6.9 ± 1.3	18.1 ± 2.8	4.1 ± 1
Sandaracopimaric acid	ng/m³	35.6 ± 2.1	0 ± 0.9	14.2 ± 1.8	48.4 ± 8.8	54.5 ± 6.3
Abietic acid	ng/m³	2.5 ± 0.4	0.4 ± 0.9	1 ± 0.6	3.3 ± 0.7	0.7 ± 0.6

Table R.1. Composition of NPACT animal toxicology exposure atmospheres for MVE_{Low}, $MVEG_{Low}$, and the combinations of MVE_{Low} and RD, S, or N.

Exposure Atmosphere Composition	Units	MVE_{Low}	$MVEG_{Low}$	RD + MVE_{Low}	S + MVE_{Low}	N + MVE_{Low}
Isopimaric acid	ng/m³	3 ± 0.4	0.8 ± 0.9	1.7 ± 0.6	21.1 ± 3.4	4.9 ± 1
7-oxodehydroabietic acid	ng/m³	0.8 ± 0.3	1.5 ± 0.9	12.1 ± 2.8	7.1 ± 1.9	2.5 ± 1
Heneicosanoic acid (c21)	ng/m³	2.5 ± 0.6	0.5 ± 0.9	11.7 ± 2.9	4.4 ± 1.1	11.5 ± 2.8
Tricosanoic acid	ng/m³	4.5 ± 1.1	0 ± 0.9	18.4 ± 4.8	0.8 ± 0.7	23 ± 4.9
Tetracosanoic acid (c24)	ng/m³	5.9 ± 1	1.2 ± 0.9	54.3 ± 8.2	28.4 ± 4.5	41.6 ± 6.4
Cholesterol	ng/m³	4.6 ± 1.3	0 ± 0.9	4.8 ± 1.6	8.6 ± 2.6	4.3 ± 1.4
b-sitosterol	ng/m³	2.9 ± 0.4	0.7 ± 0.9	19 ± 2.2	18.3 ± 2.1	20.9 ± 2.4
Hexanoic acid (c6)	ng/m³	1063.2 ± 138.7	582.3 ± 49.9	1796.6 ± 234.6	1957.6 ± 255.6	2060.3 ± 269
Heptanoic acid (c7)	ng/m³	679.1 ± 68	722.6 ± 40.8	1310.2 ± 131.3	1557.4 ± 156.1	1699 ± 170.2
Benzoic acid	ng/m³	15.1 ± 0.9	1481.7 ± 80.7	21.3 ± 1.5	40.2 ± 2.6	3008.7 ± 152.9
Octanoic acid (c8)	ng/m³	67.3 ± 5.7	690.9 ± 34.5	317.8 ± 26.8	539.7 ± 45.2	1071.7 ± 89.5
o-toluic	ng/m³	600.2 ± 30.1	339.6 ± 43.6	613.8 ± 30.9	1243.4 ± 62.5	996.1 ± 50.3
m-toluic	ng/m³	831.2 ± 42	550.9 ± 36.8	1012.4 ± 51.2	1830.9 ± 92.2	1565.1 ± 78.8
Nonanoic acid (c9)	ng/m³	0 ± 0.2	531.8 ± 27.1	0 ± 0.6	0 ± 0.7	0 ± 0.6
p-toluic	ng/m³	576.3 ± 32.3	311.3 ± 15.6	478.7 ± 26.7	972.1 ± 54.6	829.2 ± 46.3
Decanoic acid (c10)	ng/m³	9.7 ± 1.1	211 ± 16.3	0 ± 0.6	2.2 ± 0.7	8.8 ± 1.4
Undecanoic acid (c11)	ng/m³	7.3 ± 1.8	101.5 ± 11	69.8 ± 6.1	12.1 ± 3.1	15.3 ± 3.9
Dodecanoic (lauric) acid (c12)	ng/m³	61.1 ± 4	114.7 ± 8.9	56.6 ± 3.9	92.4 ± 6.2	172.7 ± 11.3
Tridecanoic acid (c13)	ng/m³	18.9 ± 1.7	44.3 ± 8.6	62.1 ± 6.6	89.2 ± 8.9	83.1 ± 8.8
Myristic acid (c14)	ng/m³	141.7 ± 7.2	94.3 ± 5.2	43.6 ± 2.5	238.1 ± 12.1	62.6 ± 3.5
Pentadecanoic acid (c15)	ng/m³	36.8 ± 6	2.6 ± 0.9	45.4 ± 6	186.5 ± 29.9	146.3 ± 20.8
Palmitic acid (c16)	ng/m³	201.9 ± 10.1	25.1 ± 2	539.5 ± 27.3	1246.4 ± 62.7	765 ± 38.6
Heptadecanoic acid (c17)	ng/m³	4.6 ± 0.8	0 ± 0.9	10.6 ± 2.2	27.8 ± 4.9	10.5 ± 2
Oleic acid	ng/m³	16.5 ± 2.1	20 ± 3.1	5.8 ± 1.2	81.6 ± 10.1	4.8 ± 1
Stearic acid (c18)	ng/m³	151.2 ± 7.7	144 ± 7.7	580.1 ± 29.3	991.4 ± 49.9	676.9 ± 34.2
Nonadecanoic acid (c19)	ng/m³	0 ± 0.2	546.2 ± 64.3	0 ± 0.6	0 ± 0.7	0 ± 0.6
Eicosanoic acid (c20)	ng/m³	10.6 ± 1.8	2.4 ± 0.9	80.5 ± 13.3	56.1 ± 9.5	67.8 ± 11.4

Table R.1. Composition of NPACT animal toxicology exposure atmospheres for MVE_{Low}, $MVEG_{Low}$, and the combinations of MVE_{Low} and RD, S, or N.

Exposure Atmosphere Composition	Units	MVE_{Low}	$MVEG_{Low}$	RD + MVE_{Low}	S + MVE_{Low}	N + MVE_{Low}
Hopane & Steranes :						
17A(H),21B(H)-22,29,30-Trisnorhopane	ng/m³	0.2	1.1 ± 0.1	0.9	0.9	0.4
17A(H),21B(H)-30-Norhopane	ng/m³	0.9 ± 0.1	1.7 ± 0.1	3.9 ± 0.2	3.9 ± 0.2	2 ± 0.1
17A(H),21B(H)-Hopane	ng/m³	0.6	1.5 ± 0.1	3.4 ± 0.2	2.9 ± 0.1	1.4 ± 0.1
17B(H),21A(H)-hopane	ng/m³	0.0	0.3	0.1	0.1	0.0
22S-17A(H),21B(H)-30-Homohopane	ng/m³	0.4	0.5 ± 0.1	2.8 ± 0.1	2.3 ± 0.1	1.3 ± 0.1
22R-17A(H),21B(H)-30-Homohopane	ng/m³	0.3	0.3	1.9 ± 0.1	1.3 ± 0.1	0.8 ± 0.1
17B(H),21B(H)-Hopane	ng/m³	0.0	0.1	0.2	0.1	0.1
22S-17A(H),21B(H)-30,31-Bishomohopane	ng/m³	0.2	5.6 ± 0.2	1.5 ± 0.3	0.8 ± 0.2	0.5 ± 0.1
22R-17A(H),21B(H)-30,31-Bishomohopane	ng/m³	0.1	0.4	0.7	0.3	0.3
22S-17A(H),21B(H)-30,31,32-Trisomohopane	ng/m³	0.1	0.0	1.2 ± 0.1	0.5	0.3
22R-17A(H),21B(H)-30,31,32-Trishomohopane	ng/m³	0.1	0.1	1 ± 0.1	0.3	0.2 ± 0.1
C27-20S5A(H),14A(H)-cholestane	ng/m³	0.0	0.6	0.3	0.3	0.1
C27-20R5A(H),14B(H)-cholestane	ng/m³	0.1	0.8 ± 0.1	0.3	0.7	0.1
C27-20S5A(H),14B(H),17B(H)-cholestane	ng/m³	0.1	0.6 ± 0.1	0.3	0.2	0.1
C27-20R5A(H),14A(H),17A(H)-cholestane & C29-20S13B(H),17A(H)-dia	ng/m³	0.2	1.4 ± 0.1	0.5	0.3	0.0
C28-20S5A(H),14A(H),17A(H)-ergostane	ng/m³	0.0	0.6	0.4	0.2	0.0
C28-20R5A(H),14B(H),17B(H)-ergostane	ng/m³	0.1	0.6	0.6	0.4	0.1
C28-20S5A(H),14B(H),17B(H)-ergostane	ng/m³	0.2 ± 0.1	0.5 ± 0.1	0.4 ± 0.1	0.5 ± 0.1	0.0
C28-20R5A(H),14A(H),17A(H)-ergostane	ng/m³	0.1	1 ± 0.1	0.6 ± 0.1	0.3 ± 0.1	0.1
C29-20S5A(H),14A(H),17A(H)-stigmastane	ng/m³	0.0	0.4 ± 0.1	0.4 ± 0.1	0.1	0.1
C29-20R5A(H),14B(H),17B(H)-stigmastane	ng/m³	0.1	0.5 ± 0.1	0.4 ± 0.1	0.4 ± 0.1	0.2
C29-20S5A(H),14B(H),17B(H)-stigmastane	ng/m³	0.1	0.5	0.5 ± 0.1	0.5 ± 0.1	0.1
C29-20R5A(H),14A(H),17A(H)-stigmastane	ng/m³	0.2	0.5	0.7 ± 0.1	0.6 ± 0.1	0.0

Table R.1. Composition of NPACT animal toxicology exposure atmospheres for MVE_{Low}, $MVEG_{Low}$, and the combinations of MVE_{Low} and RD, S, or N.

Exposure Atmosphere Composition	Units	MVE_{Low}	$MVEG_{Low}$	RD + MVE_{Low}	S + MVE_{Low}	N + MVE_{Low}
Volatile Organic Compounds (VOC):						
Acetylene	µg/m³	308.1 ± 15.4	11.6 ± 0.6	179.8 ± 9	231.4 ± 11.6	205.3 ± 10.3
Ethene	µg/m³	503.2 ± 62.3	395.1 ± 19.8	668.8 ± 82.8	645.6 ± 79.9	503.4 ± 62.3
Ethane	µg/m³	430.2 ± 45.3	213.8 ± 10.7	277.2 ± 29.2	673.5 ± 71	386.3 ± 40.7
Propene	µg/m³	238.4 ± 26.3	133.3 ± 6.7	251.8 ± 27.8	272.5 ± 30	390.8 ± 43.1
Propane	µg/m³	18.9 ± 1.3	22.2 ± 2.4	18.2 ± 1.3	33.1 ± 2.3	24 ± 1.7
1,3-butadiene	µg/m³	1.5 ± 0.1	5.5 ± 0.5	1.4 ± 0.1	1.9 ± 0.1	2.5 ± 0.2
1-butene	µg/m³	43 ± 2.5	34.4 ± 1.7	54.4 ± 3.2	56.8 ± 3.4	78.1 ± 4.6
c-2-butene	µg/m³	12.4 ± 0.9	9.7 ± 0.5	9.2 ± 0.7	10.2 ± 0.8	14.4 ± 1.1
Isobutylene	µg/m³	50.2 ± 2.5	27.5 ± 1.4	42.5 ± 2.1	47.3 ± 2.4	73.9 ± 3.7
t-2-butene	µg/m³	15.3 ± 0.8	12.8 ± 0.6	12.4 ± 0.6	13.6 ± 0.7	20.5 ± 1.1
n-butane	µg/m³	161 ± 14.3	263.2 ± 13.2	125.2 ± 11.1	390.7 ± 34.7	280.1 ± 24.9
Iso-butane	µg/m³	59.7 ± 5.5	99 ± 4.9	28.3 ± 2.6	88.2 ± 8.1	40.8 ± 3.7
Iso-pentane	µg/m³	727 ± 36.4	507.4 ± 25.4	499.6 ± 25	1133.6 ± 56.7	749.1 ± 37.5
n-pentane	µg/m³	122.2 ± 14.3	372.4 ± 18.6	87.4 ± 10.3	188.8 ± 22.2	134.7 ± 15.8
1,2-butadiene	µg/m³	NA	0.7	NA	NA	NA
1-pentene	µg/m³	7.7 ± 0.4	14.6 ± 0.7	12.9 ± 0.6	13.5 ± 0.7	16.7 ± 0.8
2-methyl-1-butene	µg/m³	8.4 ± 1.2	15.9 ± 0.8	7.8 ± 1.2	9.2 ± 1.4	12.8 ± 1.9
Isoprene	µg/m³	0.0	0.2	0.0	0.0	0.0
t-2-pentene	µg/m³	9.3 ± 0.9	30.2 ± 1.5	6.8 ± 0.7	7.7 ± 0.7	12 ± 1.2
c-2-pentene	µg/m³	5.1 ± 1.2	13.5 ± 0.7	3.6 ± 0.8	4.2 ± 1	6.6 ± 1.5
2-methyl-2-butene	µg/m³	11.8 ± 2.2	27.8 ± 1.8	6.5 ± 1.2	8.8 ± 1.6	12.5 ± 2.3
2,2-dimethylbutane	µg/m³	18.3 ± 1.1	13.4 ± 0.7	28.2 ± 1.6	42.4 ± 2.5	41.9 ± 2.4
Cyclopentene	µg/m³	6.6 ± 0.8	8.4 ± 0.4	6.2 ± 0.7	6.6 ± 0.8	9.8 ± 1.1
Cyclopentane	µg/m³	12.5 ± 0.8	29.6 ± 1.5	13 ± 0.8	22.4 ± 1.4	20 ± 1.3
2,3-dimethylbutane	µg/m³	41.8 ± 5.5	291 ± 14.5	38.5 ± 5	73.6 ± 9.6	57.3 ± 7.5
2-methylpentane	µg/m³	98.9 ± 5.9	29.4 ± 1.5	125.5 ± 7.5	241.4 ± 14.5	178.6 ± 10.7
3-methylpentane	µg/m³	111.2 ± 5.6	115.6 ± 5.8	89.3 ± 4.5	185.2 ± 9.3	133.7 ± 6.7
2-methyl-1-pentene	µg/m³	11.1 ± 0.7	21.9 ± 1.1	17.4 ± 1.1	20 ± 1.3	22.4 ± 1.4
n-hexane	µg/m³	78.3 ± 23.3	147 ± 7.3	74.8 ± 22.3	138.8 ± 41.4	110.2 ± 32.8
t-2-hexene	µg/m³	3.9 ± 0.5	12.9 ± 0.6	3.2 ± 0.4	3.4 ± 0.4	5.1 ± 0.6

Table R.1. Composition of NPACT animal toxicology exposure atmospheres for MVE_{Low}, $MVEG_{Low}$, and the combinations of MVE_{Low} and RD, S, or N.

Exposure Atmosphere Composition	Units	MVE_{Low}	$MVEG_{Low}$	RD + MVE_{Low}	S + MVE_{Low}	N + MVE_{Low}
c-2-hexene	µg/m³	1.9 ± 0.4	6.7 ± 0.3	1.5 ± 0.3	1.7 ± 0.3	2.7 ± 0.5
1,3-hexadiene (trans)	µg/m³	1.5 ± 0.4	5.6 ± 0.3	0.4 ± 0.1	0.5 ± 0.2	0.0
Methylcyclopentane	µg/m³	87.3 ± 4.4	112 ± 5.6	82 ± 4.1	152.4 ± 7.6	121.4 ± 6.1
2,4-dimethylpentane	µg/m³	35 ± 1.8	20 ± 1	33.9 ± 1.7	60.9 ± 3	50.8 ± 2.5
Benzene	µg/m³	252.4 ± 46.1	299.3 ± 15	192.9 ± 35.3	366.8 ± 67.1	296.1 ± 54.1
Cyclohexane	µg/m³	51.8 ± 2.6	55.4 ± 2.8	60.6 ± 3	93.7 ± 4.7	92.1 ± 4.6
2-methylhexane	µg/m³	98 ± 4.9	82.2 ± 4.1	67.6 ± 3.4	145.4 ± 7.3	102.6 ± 5.1
2,3-dimethylpentane	µg/m³	50.2 ± 5.3	28.3 ± 1.4	51.1 ± 5.4	90.9 ± 9.7	75.7 ± 8.1
Cyclohexene	µg/m³	4.3 ± 0.4	4.9 ± 0.2	4.5 ± 0.4	5.9 ± 0.5	6.5 ± 0.6
3-methylhexane	µg/m³	108.5 ± 5.4	0.0	78.7 ± 3.9	168.8 ± 8.4	119.6 ± 6
1,3-dimethylcyclopentane (cis)	µg/m³	24.2 ± 1.2	0.0	16.3 ± 0.8	34.7 ± 1.7	24.8 ± 1.2
1-heptene	µg/m³	64.7 ± 10.2	64.7 ± 3.2	52.9 ± 8.3	98.5 ± 15.5	80.9 ± 12.8
2,2,4-trimethylpentane	µg/m³	21 ± 1	21 ± 1.1	15.1 ± 0.8	31.8 ± 1.6	22.9 ± 1.1
n-heptane	µg/m³	64.2 ± 3.2	82.3 ± 4.1	47.9 ± 2.4	101.7 ± 5.1	72.4 ± 3.6
2,3-dimethyl-2-pentene	µg/m³	0.6	1.9 ± 0.1	0.2	0.3	0.0
Methylcyclohexane	µg/m³	54.9 ± 12.7	67 ± 3.4	37.8 ± 8.7	83.7 ± 19.3	57.6 ± 13.3
2,3,4-trimethylpentane	µg/m³	15.2 ± 0.9	13.8 ± 0.7	20.8 ± 1.3	31.1 ± 1.9	30.1 ± 1.9
Toluene	µg/m³	161.3 ± 22.2	341.5 ± 17.1	123 ± 16.9	161.6 ± 22.2	214.7 ± 29.5
2-methylheptane	µg/m³	35.9 ± 1.8	33.5 ± 1.7	23.3 ± 1.2	52.9 ± 2.6	35.3 ± 1.8
4-methylheptane	µg/m³	12.1 ± 2.8	12.6 ± 0.6	8 ± 1.9	17.1 ± 4	11.3 ± 2.6
3-methylheptane	µg/m³	34.2 ± 1.7	32.8 ± 1.6	25.2 ± 1.3	50.6 ± 2.5	34.1 ± 1.7
n-octane	µg/m³	32.6 ± 7.1	39.4 ± 2	19 ± 4.1	44.5 ± 9.7	28.8 ± 6.3
Ethylbenzene	µg/m³	35.4 ± 8.1	67.2 ± 3.4	25.9 ± 5.9	30.6 ± 7	46.7 ± 10.6
m&p-xylene	µg/m³	70 ± 14.6	189.7 ± 9.5	50.5 ± 10.6	63.6 ± 13.3	85.9 ± 18
Styrene	µg/m³	2.1 ± 0.1	3.5 ± 0.2	1.4 ± 0.1	1.8 ± 0.1	2.5 ± 0.2
o-xylene	µg/m³	24.2 ± 1.2	71.3 ± 3.6	17.2 ± 0.9	22 ± 1.1	29.7 ± 1.5
n-nonane	µg/m³	15.5 ± 1.5	21.9 ± 1.1	9.9 ± 1	22 ± 2.2	14.5 ± 1.4
Isopropylbenzene	µg/m³	2.8 ± 0.3	5.3 ± 0.3	1.9 ± 0.2	2.4 ± 0.3	3.3 ± 0.4
n-propylbenzene	µg/m³	7 ± 0.8	17.4 ± 0.9	4.6 ± 0.5	5.6 ± 0.7	8.4 ± 1
Alpha-pinene	µg/m³	0.0	0 ± 0.1	0 ± 0.1	0 ± 0.1	0 ± 0.1
3-ethyltoluene	µg/m³	26.2 ± 3.9	61.1 ± 3.1	15.9 ± 2.3	20.5 ± 3	29.5 ± 4.3

Table R.1. Composition of NPACT animal toxicology exposure atmospheres for MVE_{Low}, $MVEG_{Low}$, and the combinations of MVE_{Low} and RD, S, or N.

Exposure Atmosphere Composition	Units	MVE_{Low}	$MVEG_{Low}$	RD + MVE_{Low}	S + MVE_{Low}	N + MVE_{Low}
4-ethyltoluene	µg/m³	12.6 ± 2.1	19.8 ± 1	7.4 ± 1.3	9.6 ± 1.6	14.1 ± 2.4
1,3,5-trimethylbenzene	µg/m³	11.2 ± 2.4	19.4 ± 1	6.8 ± 1.4	9.7 ± 2.1	12.4 ± 2.6
o-ethyltoluene	µg/m³	9.3 ± 1.4	16.3 ± 0.8	5.8 ± 0.9	7.7 ± 1.2	10.5 ± 1.6
1,2,4-trimethylbenzene+t-butylbenzene	µg/m³	NA	35.3 ± 1.8	NA	NA	NA
n-decane	µg/m³	6.6 ± 0.9	18.7 ± 0.9	7.2 ± 1	11.8 ± 1.6	10 ± 1.4
1,2,3-trimethylbenzene	µg/m³	6.3 ± 1	14.4 ± 0.7	4.3 ± 0.7	6.1 ± 1	7.7 ± 1.2
Indan	µg/m³	3.5 ± 0.3	6.6 ± 0.3	2.3 ± 0.2	2.8 ± 0.2	4.2 ± 0.4
1,3-diethylbenzene	µg/m³	2.9 ± 0.4	5.3 ± 0.3	2 ± 0.3	2.8 ± 0.4	3.5 ± 0.5
1,4-diethylbenzene	µg/m³	NA	6.1 ± 0.3	1.1 ± 0.1	3.5 ± 0.4	4 ± 0.4
n-butylbenzene	µg/m³	2.8 ± 0.3	0 ± 0.1	NA	NA	NA
n-undecane	µg/m³	5.6 ± 0.6	0 ± 0.1	10 ± 1	12.6 ± 1.3	14 ± 1.4

Table R.2. Composition of NPACT animal toxicology exposure atmospheres for S, N, RD, MVE_{High}, $MVEG_{High}$, and the combinations of $MVEG_{High}$ and RD, S or N.[a]

Exposure Atmosphere Composition	Units	Control	S	N	RD	MVE_{High}	$MVEG_{High}$	RD + $MVEG_{High}$	S + $MVEG_{High}$	N + $MVEG_{High}$
Particle Mass - FMPS	µg/m³	NA	190.1	27.6	5.2	120.7	NA	NA	NA	NA
Particle Count - FMPS	particle/cm^3	NA	8.8E+05	2.0E+05	4.4E+03	3.1E+05	NA	NA	NA	NA
NMAD (GSD) - FMPS	nm	NA	63.5 (1.4)	51.7 (1.5)	82.6 (2.05)	74.4 (1.6)	NA	NA	NA	NA
MMAD (GSD) - FMPS	nm	NA	85.6 (1.7)	80.1 (1.9)	199.1 (1.55)	113.7 (1.5)	NA	NA	NA	NA
NMAD (GSD) - APS	µm	NA	0.8 (1.2)	0.8 (1.3)	1.0 (1.6)	0.8 (1.3)	NA	0.9 (1.5)	0.8 (1.5)	0.8 (1.3)
MMAD (GSD) - APS	µm	NA	0.8 (1.25)	1.2 (1.4)	2.5 (1.8)	0.9 (1.3)	NA	2.0 (1.9)	0.7 (1.2)	1.2 (1.4)
Elemental Carbon	µg/m³	0.9	0.9	0.9	3.2 ± 0.1	99.5 ± 1.8	2.7 ± 0.1	4.2 ± 0.2	2.7 ± 0.1	2.7 ± 0.1
Organic Carbon	µg/m³	6.8 ± 0.1	6.8 ± 0.1	6.8 ± 0.1	47 ± 1.5	25 ± 1	22.7 ± 0.6	59.8 ± 2.1	22.7 ± 0.6	22.7 ± 0.6
Nitrate	µg/m³	0.0	0.0	245.1 ± 36.4	0.2	2.9	2.7	1.8	2.7	248.8 ± 36.4
Sulfate	µg/m³	0.3	324.5 ± 28.2	0.3	0.4	17.8 ± 0.1	0.5	0.5	316.4 ± 30.5	0.5
Ammonium	µg/m³	0.0	0.0	71.2 ± 10.6	0.2	10.1 ± 0.3	0.7	0.5	0.7	72.2 ± 10.6
Elements (Metals)	ng/m³	420 ± 800.6	420 ± 800.6	420 ± 800.6	371596.9 ± 1448.1	6550.3 ± 959.2	1662.7 ± 22.5	224123 ± 875.2	1662.7 ± 22.5	1662.7 ± 22.5
Volatile Organic Compounds (VOC)	µg/m³	79.6 ± 8.8	79.6 ± 8.8	79.6 ± 8.8	66.1 ± 5.0	15223.5 ± 1513.9	16837.9 ± 847.8	13057.5 ± 657.9	16837.9 ± 847.8	16837.9 ± 847.8
Carbonyl	µg/m³	31.9 ± 2.4	31.9 ± 2.4	31.9 ± 2.4	45.2 ± 3.6	38.4 ± 3.6	53 ± 3.2	135.7 ± 7	53 ± 3.2	53 ± 3.2
Hopane and Steranes	ng/m³	1.8 ± 0.3	1.8 ± 0.3	1.8 ± 0.3	85.6 ± 8.9	13.5 ± 1.2	21 ± 2	55.2 ± 5.5	21 ± 2	21 ± 2
Polar Compounds	ng/m³	3634.9 ± 380.3	3634.9 ± 380.3	3634.9 ± 380.3	38599.6 ± 2178.8	30431.9 ± 2115.5	5054.9 ± 431.3	22178.5 ± 1446.6	5054.9 ± 431.3	5054.9 ± 431.3
Alkanes	ng/m³	4040.4 ± 233.1	4040.4 ± 233.1	4040.4 ± 233.1	78421 ± 4577.3	52204.4 ± 2811.1	2863.4 ± 175.6	35115.5 ± 2047.1	2863.4 ± 175.6	2863.4 ± 175.6
Polyaromatic Hydrocarbons (PAH)	ng/m³	1126.8 ± 96.8	1126.8 ± 96.8	1126.8 ± 96.8	169 ± 14.6	74041 ± 4649.8	7.5 ± 0.5	138.8 ± 10.6	7.5 ± 0.5	7.5 ± 0.5
Nitro-PAH	ng/m³	0.1	0.1	0.1	47.1 ± 4.1	55.8 ± 3.2	1 ± 0.1	21.8 ± 1.8	1 ± 0.1	1 ± 0.1

a For comparison, the values listed for the gaseous components of atmospheres in which no gases or combinations were added (i.e., the S and N atmospheres) are the measured values from the control atmosphere. Also, the values listed for the gases combined with MVE gases (i.e., the S + $MVEG_{High}$ and N + $MVEG_{High}$ atmospheres) are the measured values from the $MVEG_{High}$ atmosphere.

Table R.2. Composition of NPACT animal toxicology exposure atmospheres for S, N, RD, MVE_{High}, $MVEG_{High}$, and the combinations of $MVEG_{High}$ and RD, S or N.[a]

Exposure Atmosphere Composition	Units	Control	S	N	RD	MVE_{High}	$MVEG_{High}$	RD + $MVEG_{High}$	S + $MVEG_{High}$	N + $MVEG_{High}$
Nitrogen Oxide (NO)	µg/m³ (ppm)	191.8 (0.2)	191.8 (0.2)	191.8 (0.2)	191.8 (0.2)	22754.4 ± 5721.7 (22.2 ± 5.6)	26337.1 (25.7)	19943.6 (19.4)	13238.1 ± 4207.4 (12.9 ± 4.1)	14982.6 ± 4310.1 (14.6 ± 4.2)
Nitrogen Dioxide (NO_2)	µg/m³ (ppm)	99.3 (0.1)	99.3 (0.1)	99.3 (0.1)	99.3 (0.1)	11787.2 ± 2964 (7.5 ± 1.9)	13643.1 (8.7)	10331.2 (6.6)	6923.5 ± 2202.9 (4.4 ± 1.4)	7710.2 ± 2202.9 (4.9 ± 1.4)
Carbon Monoxide (CO)	µg/m³ (ppm)	383.1 (0.4)	383.1 (0.4)	383.1 (0.4)	383.1 (0.4)	87350.7 ± 3735.4 (91.2 ± 3.9)	101909.1 (106.4)	89074.7 (93.0)	95396.1 ± 24519.5 (99.6 ± 25.6)	93193.2 ± 19347.4 (97.3 ± 20.2)
Particle Mass	µg/m³	11.0	324.5 ± 28.2	316.3 ± 47.0	358.0	309 ± 76.9	8.0	404.0	316.4 ± 30.5	321.0 ± 47.0
Carbon :										
Organic Carbon Fraction 1	µg/m³	0.8 ± 0.1	0.8 ± 0.1	0.8 ± 0.1	2.6 ± 0.2	8.8 ± 1	8.8 ± 0.9	9.4 ± 1	8.8 ± 0.9	8.8 ± 0.9
Organic Carbon Fraction 2	µg/m³	2.4 ± 0.2	2.4 ± 0.2	2.4 ± 0.2	5.1 ± 0.5	8.7 ± 0.9	7.7 ± 0.7	12.4 ± 1.2	7.7 ± 0.7	7.7 ± 0.7
Organic Carbon Fraction 3	µg/m³	3 ± 0.3	3 ± 0.3	3 ± 0.3	20.3 ± 1.8	4.9 ± 0.5	4.7 ± 0.3	21 ± 1.9	4.7 ± 0.3	4.7 ± 0.3
Organic Carbon Fraction 4	µg/m³	0.5 ± 0.01	0.5 ± 0.01	0.5 ± 0.01	13.6 ± 1.2	2.5 ± 0.2	1.5 ± 0.1	10.1 ± 0.9	1.5 ± 0.1	1.5 ± 0.1
Pyrolyzed Organic Carbon Reflectance	µg/m³	0.0	0.0	0.0	5.4 ± 0.4	0.2	0.0	6.9 ± 0.5	0.0	0.0
Pyrolyzed Organic Carbon Transmittance	µg/m³	0.6	0.6	0.6	4.9 ± 0.5	1.4 ± 0.2	1.6 ± 0.1	9.5 ± 1	1.6 ± 0.1	1.6 ± 0.1
Organic Carbon	µg/m³	6.8 ± 0.1	6.8 ± 0.1	6.8 ± 0.1	47 ± 1.5	25 ± 1	22.7 ± 0.6	59.8 ± 2.1	22.7 ± 0.6	22.7 ± 0.6
Elemental Carbon Fraction 1	µg/m³	0.2	0.2	0.2	6.4 ± 0.7	44.1 ± 5.3	0.6	6.2 ± 0.7	0.6	0.6
Elemental Carbon Fraction 2	µg/m³	0.8	0.8	0.8	2.2 ± 0.1	55.4 ± 5.5	2.1 ± 0.1	4.5 ± 0.4	2.1 ± 0.1	2.1 ± 0.1
Elemental Carbon Fraction 3	µg/m³	0.0	0.0	0.0	0.0	0.3	0.0	0.4	0.0	0.0
Elemental Carbon	µg/m³	0.9	0.9	0.9	3.2 ± 0.1	99.5 ± 1.8	2.7 ± 0.1	4.2 ± 0.2	2.7 ± 0.1	2.7 ± 0.1
Total Carbon	µg/m³	7.7	7.7	7.7	50.2 ± 0.8	124.5 ± 2.1	25.4 ± 0.3	64 ± 1.2	25.4 ± 0.3	25.4 ± 0.3
Elements (Metals) :										
Sodium	ng/m³	64.1 ± 195.4	64.1 ± 195.4	64.1 ± 195.4	0.0	3727 ± 314.4	417.4 ± 13.8	0.0	417.4 ± 13.8	417.4 ± 13.8
Magnesium	ng/m³	0 ± 62.3	0 ± 62.3	0 ± 62.3	0.0	125.1 ± 66.7	106.8 ± 0.7	0.0	106.8 ± 0.7	106.8 ± 0.7

Table R.2. Composition of NPACT animal toxicology exposure atmospheres for S, N, RD, MVE_{High}, $MVEG_{High}$, and the combinations of $MVEG_{High}$ and RD, S or N.[a]

Exposure Atmosphere Composition	Units	Control	S	N	RD	MVE_{High}	$MVEG_{High}$	RD + $MVEG_{High}$	S + $MVEG_{High}$	N + $MVEG_{High}$
Aluminum	ng/m³	0 ± 23.3	0 ± 23.3	0 ± 23.3	51441.7 ± 258.8	361 ± 25.8	263.9 ± 0.9	32914.9 ± 161.7	263.9 ± 0.9	263.9 ± 0.9
Silicon	ng/m³	80.2 ± 16.5	80.2 ± 16.5	80.2 ± 16.5	207360.2 ± 922.9	226.3 ± 17.9	523.3 ± 1.7	129498.1 ± 572.5	523.3 ± 1.7	523.3 ± 1.7
Phosphorous	ng/m³	6.6 ± 2.1	6.6 ± 2.1	6.6 ± 2.1	397.8 ± 1.3	0 ± 2.2	0.0	165.2 ± 0.5	0.0	0.0
Chlorine	ng/m³	21.7 ± 3.4	21.7 ± 3.4	21.7 ± 3.4	188.8 ± 0.4	857.2 ± 5.8	6.5	147.4 ± 0.4	6.5	6.5
Potassium	ng/m³	25.9 ± 2.9	25.9 ± 2.9	25.9 ± 2.9	14755.3 ± 19.2	88.9 ± 3.1	47.1	8469.4 ± 10.6	47.1	47.1
Calcium	ng/m³	67.3 ± 11.9	67.3 ± 11.9	67.3 ± 11.9	38696.5 ± 110.3	461.6 ± 13.3	111.3 ± 0.3	20692.4 ± 56.8	111.3 ± 0.3	111.3 ± 0.3
Scandium	ng/m³	0 ± 37.9	0 ± 37.9	0 ± 37.9	0.0	0 ± 40	16.9	0.0	16.9	16.9
Titanium	ng/m³	4.6 ± 3.1	4.6 ± 3.1	4.6 ± 3.1	5775.4 ± 11.9	27.9 ± 3.3	12.6	5293 ± 10.8	12.6	12.6
Vanadium	ng/m³	0.5 ± 2.1	0.5 ± 2.1	0.5 ± 2.1	0.0	0 ± 2.2	3.3	0.0	3.3	3.3
Chromium	ng/m³	1.9 ± 2.1	1.9 ± 2.1	1.9 ± 2.1	1106.7 ± 1.5	5.2 ± 2.2	0.8	160.2 ± 0.2	0.8	0.8
Manganese	ng/m³	3.7 ± 6.4	3.7 ± 6.4	3.7 ± 6.4	717.4 ± 1.7	4.3 ± 6.7	2.6	347.2 ± 0.7	2.6	2.6
Iron	ng/m³	55.1 ± 3.0	55.1 ± 3.0	55.1 ± 3.0	49068.2 ± 111.3	191 ± 3.4	129.8 ± 0.3	25484.1 ± 57	129.8 ± 0.3	129.8 ± 0.3
Cobalt	ng/m³	0 ± 2.1	0 ± 2.1	0 ± 2.1	0 ± 0.2	0.3 ± 2.2	0.0	0.0	0.0	0.0
Nickel	ng/m³	3.0 ± 6.0	3.0 ± 6.0	3.0 ± 6.0	569.5 ± 0.9	2.4 ± 6.3	0.4	77.9 ± 0.2	0.4	0.4
Copper	ng/m³	28.6 ± 7.5	28.6 ± 7.5	28.6 ± 7.5	174.1 ± 0.2	60.6 ± 7.8	0.0	100.4 ± 0.2	0.0	0.0
Zinc	ng/m³	23.6 ± 2.2	23.6 ± 2.2	23.6 ± 2.2	689.4 ± 1.5	316.8 ± 2.9	0.0	426.7 ± 1	0.0	0.0
Gallium	ng/m³	6.5 ± 10.1	6.5 ± 10.1	6.5 ± 10.1	0.0	3.6 ± 10.6	0.0	0.0	0.0	0.0
Arsenic	ng/m³	0 ± 2.1	0 ± 2.1	0 ± 2.1	0.0	1 ± 2.2	0.0	0.0	0.0	0.0
Selenium	ng/m³	4.5 ± 2.1	4.5 ± 2.1	4.5 ± 2.1	0.0	0.4 ± 2.2	0.0	0.0	0.0	0.0
Bromine	ng/m³	0.3 ± 2.1	0.3 ± 2.1	0.3 ± 2.1	4.1	3.2 ± 2.2	0.0	0.0	0.0	0.0
Rubidium	ng/m³	1.0 ± 2.1	1.0 ± 2.1	1.0 ± 2.1	84.3 ± 0.2	1.3 ± 2.2	0.0	37.1	0.0	0.0
Strontium	ng/m³	1.4 ± 2.1	1.4 ± 2.1	1.4 ± 2.1	288.7 ± 0.5	1.9 ± 2.2	0.0	120.7 ± 0.2	0.0	0.0

Table R.2. Composition of NPACT animal toxicology exposure atmospheres for S, N, RD, MVE_{High}, $MVEG_{High}$, and the combinations of $MVEG_{High}$ and RD, S or N.[a]

Exposure Atmosphere Composition	Units	Control	S	N	RD	MVE_{High}	$MVEG_{High}$	RD + $MVEG_{High}$	S + $MVEG_{High}$	N + $MVEG_{High}$
Yttrium	ng/m³	0.8 ± 2.1	0.8 ± 2.1	0.8 ± 2.1	17.5	0.6 ± 2.2	1.4	18.3	1.4	1.4
Zirconium	ng/m³	0.2 ± 3.3	0.2 ± 3.3	0.2 ± 3.3	149.7 ± 1	8.5 ± 3.6	0.0	74.7 ± 0.5	0.0	0.0
Niobium	ng/m³	0 ± 2.9	0 ± 2.9	0 ± 2.9	0.0	0 ± 3	0.0	0.0	0.0	0.0
Molybdenum	ng/m³	0 ± 4.3	0 ± 4.3	0 ± 4.3	0.0	0.2 ± 4.5	0.0	7.5	0.0	0.0
Palladium	ng/m³	0.1 ± 4.9	0.1 ± 4.9	0.1 ± 4.9	0.0	2.6 ± 5.2	0 ± 0.1	0.0	0 ± 0.1	0 ± 0.1
Silver	ng/m³	0 ± 4.7	0 ± 4.7	0 ± 4.7	8.9	0 ± 5	0.0	0.0	0.0	0.0
Cadmium	ng/m³	0 ± 6.1	0 ± 6.1	0 ± 6.1	6.6 ± 0.1	0 ± 6.4	0.0	0 ± 0.1	0.0	0.0
Indium	ng/m³	0 ± 6.4	0 ± 6.4	0 ± 6.4	0.0	4.1 ± 6.7	0.0	0.0	0.0	0.0
Tin	ng/m³	5.6 ± 6.4	5.6 ± 6.4	5.6 ± 6.4	0.0	0 ± 6.6	0.0	0.0	0.0	0.0
Antimony	ng/m³	0 ± 10.1	0 ± 10.1	0 ± 10.1	0.0	3.3 ± 10.6	0.0	0.0	0.0	0.0
Cesium	ng/m³	0 ± 20.5	0 ± 20.5	0 ± 20.5	0.0	0 ± 21.6	0.0	0.0	0.0	0.0
Barium	ng/m³	9.5 ± 23.6	9.5 ± 23.6	9.5 ± 23.6	0 ± 2.5	0 ± 24.9	0 ± 0	0 ± 1	0.0	0.0
Lanthanum	ng/m³	0 ± 29.3	0 ± 29.3	0 ± 29.3	0.0	6.1 ± 31.1	0 ± 1	0.0	0 ± 1	0 ± 1
Cerium	ng/m³	0 ± 27.7	0 ± 27.7	0 ± 27.7	0.0	5.2 ± 29.1	0.0	0 ± 0.1	0.0	0.0
Samarium	ng/m³	0 ± 49.7	0 ± 49.7	0 ± 49.7	0 ± 1	23.3 ± 52.5	0 ± 1.3	0.0	0 ± 1.3	0 ± 1.3
Europium	ng/m³	0 ± 71.3	0 ± 71.3	0 ± 71.3	0.0	12.8 ± 74.2	0 ± 2.4	15.7 ± 0.3	0 ± 2.4	0 ± 2.4
Terbium	ng/m³	0 ± 53	0 ± 53	0 ± 53	0 ± 0.2	0 ± 57.2	0.0	0.0	0.0	0.0
Hafnium	ng/m³	0 ± 14.8	0 ± 14.8	0 ± 14.8	0.0	3.5 ± 15.7	0.0	0.0	0.0	0.0
Tantalum	ng/m³	0 ± 8.2	0 ± 8.2	0 ± 8.2	0.0	0 ± 8.8	18.6	0.0	18.6	18.6
Wolfram	ng/m³	0 ± 23.5	0 ± 23.5	0 ± 23.5	0.0	0 ± 24.6	0.0	0.0	0.0	0.0
Iridium	ng/m³	0 ± 3.9	0 ± 3.9	0 ± 3.9	0.0	0 ± 4	0.0	0.0	0.0	0.0
Gold	ng/m³	0 ± 3.7	0 ± 3.7	0 ± 3.7	0.0	0 ± 3.9	0.0	0.0	0.0	0.0
Mercury	ng/m³	0 ± 2.1	0 ± 2.1	0 ± 2.1	0.0	0 ± 2.2	0.0	0.0	0.0	0.0
Thallium	ng/m³	0 ± 2.5	0 ± 2.5	0 ± 2.5	0.0	0 ± 2.6	0.0	0.0	0.0	0.0
Lead	ng/m³	3.2 ± 2.3	3.2 ± 2.3	3.2 ± 2.3	96.1 ± 0.2	12.9 ± 2.4	0.0	70.5 ± 0.2	0.0	0.0

Table R.2. Composition of NPACT animal toxicology exposure atmospheres for S, N, RD, MVE_{High}, $MVEG_{High}$, and the combinations of $MVEG_{High}$ and RD, S or N.[a]

Exposure Atmosphere Composition	Units	Control	S	N	RD	MVE_{High}	$MVEG_{High}$	RD + $MVEG_{High}$	S + $MVEG_{High}$	N + $MVEG_{High}$
Uranium	ng/m³	0 ± 3.3	0 ± 3.3	0 ± 3.3	0.0	0 ± 3.4	0.0	1.6	0.0	0.0
Alkanes Data :										
Dodecane	ng/m³	160.7 ± 8	160.7 ± 8	160.7 ± 8	11219.9 ± 1048.4	4638.7 ± 231.9	0 ± 0.8	4721.9 ± 441.5	0 ± 0.8	0 ± 0.8
Norfarnesane	ng/m³	108.9 ± 6.7	108.9 ± 6.7	108.9 ± 6.7	3866.8 ± 193.8	2947.1 ± 172.4	17.7 ± 1.3	2493 ± 125.1	17.7 ± 1.3	17.7 ± 1.3
Tridecane	ng/m³	303.9 ± 15.4	303.9 ± 15.4	303.9 ± 15.4	13748.1 ± 709.8	12311.5 ± 615.8	72.7 ± 4.1	5983.9 ± 309.2	72.7 ± 4.1	72.7 ± 4.1
Heptylcyclohexane	ng/m³	20.2 ± 2.8	20.2 ± 2.8	20.2 ± 2.8	423.9 ± 61.5	1087 ± 136.1	0 ± 0.8	153.3 ± 22.5	0 ± 0.8	0 ± 0.8
Farnesane	ng/m³	182.1 ± 10	182.1 ± 10	182.1 ± 10	3820.9 ± 191.5	2375.9 ± 126.5	41.7 ± 2.5	2067.6 ± 103.8	41.7 ± 2.5	41.7 ± 2.5
Tetradecane	ng/m³	238 ± 11.9	238 ± 11.9	238 ± 11.9	6957.8 ± 348.4	5344.8 ± 267.2	163.7 ± 8.6	3376.9 ± 170.5	163.7 ± 8.6	163.7 ± 8.6
Octylcyclohexane	ng/m³	29.6 ± 2	29.6 ± 2	29.6 ± 2	467.3 ± 23.8	535.6 ± 38.8	22.1 ± 1.5	359.2 ± 18.4	22.1 ± 1.5	22.1 ± 1.5
Pentadecane	ng/m³	410.6 ± 20.8	410.6 ± 20.8	410.6 ± 20.8	8201.7 ± 410.2	5628.9 ± 281.7	319.6 ± 16.2	3827.5 ± 191.8	319.6 ± 16.2	319.6 ± 16.2
Nonylcyclohexane	ng/m³	33.4 ± 2	33.4 ± 2	33.4 ± 2	840.3 ± 46.3	426.3 ± 21.6	38.7 ± 2.5	414.7 ± 23.1	38.7 ± 2.5	38.7 ± 2.5
Hexadecane	ng/m³	371.9 ± 18.6	371.9 ± 18.6	371.9 ± 18.6	7864.4 ± 393.2	4401.7 ± 220.1	362.4 ± 18.5	3390.5 ± 169.5	362.4 ± 18.5	362.4 ± 18.5
Norpristane	ng/m³	184.4 ± 9.5	184.4 ± 9.5	184.4 ± 9.5	4165.6 ± 208.7	1658.8 ± 83.8	175.6 ± 9.2	1649.4 ± 82.9	175.6 ± 9.2	175.6 ± 9.2
Decylcyclohexane	ng/m³	31.5 ± 3.6	31.5 ± 3.6	31.5 ± 3.6	639.1 ± 52.4	329.4 ± 35.2	30.7 ± 2.9	318.3 ± 26.3	30.7 ± 2.9	30.7 ± 2.9
Heptadecane	ng/m³	273.2 ± 14	273.2 ± 14	273.2 ± 14	8473.1 ± 423.9	3398.9 ± 170.3	307.8 ± 15.4	3066.5 ± 153.3	307.8 ± 15.4	307.8 ± 15.4
Heptadecane	ng/m³	217.4 ± 11.2	217.4 ± 11.2	217.4 ± 11.2	2871 ± 172.9	2009.9 ± 101.1	175.2 ± 11	1144.3 ± 69.3	175.2 ± 11	175.2 ± 11
Undecylcyclohexane	ng/m³	19.6 ± 2.9	19.6 ± 2.9	19.6 ± 2.9	201.3 ± 29.1	174.8 ± 24	20.6 ± 3.3	74.7 ± 11.1	20.6 ± 3.3	20.6 ± 3.3

Table R.2. Composition of NPACT animal toxicology exposure atmospheres for S, N, RD, MVE_{High}, $MVEG_{High}$, and the combinations of $MVEG_{High}$ and RD, S or N.[a]

Exposure Atmosphere Composition	Units	Control	S	N	RD	MVE_{High}	$MVEG_{High}$	RD + $MVEG_{High}$	S + $MVEG_{High}$	N + $MVEG_{High}$
Octadecane	ng/m³	414.5 ± 20.7	414.5 ± 20.7	414.5 ± 20.7	1565.9 ± 78.3	2071.3 ± 103.6	255.8 ± 12.8	482.8 ± 24.1	255.8 ± 12.8	255.8 ± 12.8
Phytane	ng/m³	147.6 ± 8.7	147.6 ± 8.7	147.6 ± 8.7	1034.4 ± 51.9	1030.6 ± 60.5	95.5 ± 4.8	398.1 ± 20.2	95.5 ± 4.8	95.5 ± 4.8
Dodecylcyclohexane	ng/m³	24.9 ± 4.7	24.9 ± 4.7	24.9 ± 4.7	111.2 ± 12.8	68.3 ± 12.3	14.1 ± 1.9	34.1 ± 4.2	14.1 ± 1.9	14.1 ± 1.9
Nonadecane	ng/m³	103.3 ± 5.3	103.3 ± 5.3	103.3 ± 5.3	585.8 ± 29.8	586.1 ± 30.2	60.1 ± 3.9	163.9 ± 8.7	60.1 ± 3.9	60.1 ± 3.9
Tridecylcyclohexane	ng/m³	6.1 ± 0.6	6.1 ± 0.6	6.1 ± 0.6	17.9 ± 2	30.3 ± 1.8	9.6 ± 1	12 ± 1.5	9.6 ± 1	9.6 ± 1
Eicosane	ng/m³	263.5 ± 13.2	263.5 ± 13.2	263.5 ± 13.2	380.3 ± 19	356.7 ± 17.8	165.7 ± 8.3	256.9 ± 12.8	165.7 ± 8.3	165.7 ± 8.3
Tetradecylcyclohexane	ng/m³	1.2 ± 0.6	1.2 ± 0.6	1.2 ± 0.6	7.1 ± 0.9	8.6 ± 1.1	0.9 ± 0.8	1.7 ± 0.9	0.9 ± 0.8	0.9 ± 0.8
Heneicosane	ng/m³	23.4 ± 1.6	23.4 ± 1.6	23.4 ± 1.6	79.2 ± 4.2	123.7 ± 8.3	20.9 ± 1.1	47.5 ± 2.5	20.9 ± 1.1	20.9 ± 1.1
Pentadecylcyclohexane	ng/m³	0.6 ± 0.6	0.6 ± 0.6	0.6 ± 0.6	4 ± 0.9	7.9 ± 0.9	1.8 ± 0.8	1.8 ± 0.9	1.8 ± 0.8	1.8 ± 0.8
Docosane	ng/m³	188.4 ± 9.7	188.4 ± 9.7	188.4 ± 9.7	181.6 ± 9.1	182.1 ± 9.1	128.3 ± 6.4	156.4 ± 7.8	128.3 ± 6.4	128.3 ± 6.4
Hexadecylcyclohexane	ng/m³	9.2 ± 1.7	9.2 ± 1.7	9.2 ± 1.7	1 ± 0.9	6.6 ± 1.2	0.8 ± 0.8	1.4 ± 0.9	0.8 ± 0.8	0.8 ± 0.8
Tricosane	ng/m³	9.3 ± 1.3	9.3 ± 1.3	9.3 ± 1.3	58.2 ± 3.8	71.7 ± 5	32.4 ± 2.4	49.5 ± 3.4	32.4 ± 2.4	32.4 ± 2.4
Heptadecylcyclohexane	ng/m³	0 ± 0.6	0 ± 0.6	0 ± 0.6	3.8 ± 0.9	15.7 ± 1.1	0.6 ± 0.8	1.5 ± 0.9	0.6 ± 0.8	0.6 ± 0.8
Tetracosane	ng/m³	123.1 ± 6.5	123.1 ± 6.5	123.1 ± 6.5	187.3 ± 9.6	128.4 ± 6.4	108.4 ± 5.5	155.1 ± 8.1	108.4 ± 5.5	108.4 ± 5.5
Octadecylcyclohexane	ng/m³	6.6 ± 0.7	6.6 ± 0.7	6.6 ± 0.7	2.9 ± 0.9	0.6 ± 0.6	0.7 ± 0.8	1.9 ± 0.9	0.7 ± 0.8	0.7 ± 0.8
Pentacosane	ng/m³	4.9 ± 0.6	4.9 ± 0.6	4.9 ± 0.6	80.4 ± 7.7	58.4 ± 3.1	53.2 ± 5.4	53.3 ± 5.7	53.2 ± 5.4	53.2 ± 5.4
Hexacosane	ng/m³	57.4 ± 3.2	57.4 ± 3.2	57.4 ± 3.2	108.5 ± 5.5	63.2 ± 3.3	62 ± 3.1	87.2 ± 4.4	62 ± 3.1	62 ± 3.1
Nonadecylcyclohexane	ng/m³	12.9 ± 1.4	12.9 ± 1.4	12.9 ± 1.4	0.8 ± 0.9	15.7 ± 1.3	0.6 ± 0.8	1.7 ± 0.9	0.6 ± 0.8	0.6 ± 0.8
Heptacosane	ng/m³	0 ± 0.6	0 ± 0.6	0 ± 0.6	40.9 ± 2.8	16.1 ± 1.9	25.9 ± 1.8	23.9 ± 1.7	25.9 ± 1.8	25.9 ± 1.8
Eicosylcyclohexane	ng/m³	0 ± 0.6	0 ± 0.6	0 ± 0.6	1.4 ± 0.9	1.3 ± 0.6	1 ± 0.8	1 ± 0.9	1 ± 0.8	1 ± 0.8
Octacosane	ng/m³	27.4 ± 2.2	27.4 ± 2.2	27.4 ± 2.2	40.8 ± 2.3	24.2 ± 2	30.7 ± 1.7	32.5 ± 2.2	30.7 ± 1.7	30.7 ± 1.7
Nonacosane	ng/m³	1.7 ± 0.6	1.7 ± 0.6	1.7 ± 0.6	38 ± 2.8	4.2 ± 0.7	2.8 ± 0.8	17.1 ± 1.4	2.8 ± 0.8	2.8 ± 0.8
Heneicosylcyclohexane	ng/m³	1.8 ± 0.6	1.8 ± 0.6	1.8 ± 0.6	5.5 ± 1.5	1.1 ± 0.6	4.4 ± 1.3	7.1 ± 1	4.4 ± 1.3	4.4 ± 1.3
Triacontane	ng/m³	6.9 ± 0.7	6.9 ± 0.7	6.9 ± 0.7	20.1 ± 1.2	16 ± 1.3	8 ± 0.8	18.4 ± 1	8 ± 0.8	8 ± 0.8

Table R.2. Composition of NPACT animal toxicology exposure atmospheres for S, N, RD, MVE_{High}, $MVEG_{High}$, and the combinations of $MVEG_{High}$ and RD, S or N.[a]

Exposure Atmosphere Composition	Units	Control	S	N	RD	MVE_{High}	$MVEG_{High}$	RD + $MVEG_{High}$	S + $MVEG_{High}$	N + $MVEG_{High}$
Hentriacontane	ng/m³	4.4 ± 0.8	4.4 ± 0.8	4.4 ± 0.8	16.7 ± 1.2	9.7 ± 1.1	0.2 ± 0.8	7.1 ± 0.9	0.2 ± 0.8	0.2 ± 0.8
Dotriacontane	ng/m³	7.9 ± 0.8	7.9 ± 0.8	7.9 ± 0.8	15.4 ± 1.1	8.9 ± 1	8.2 ± 0.8	12.1 ± 0.9	8.2 ± 0.8	8.2 ± 0.8
Tritriacontane	ng/m³	3.6 ± 0.8	3.6 ± 0.8	3.6 ± 0.8	9.2 ± 1.2	8.8 ± 1.4	2.3 ± 0.8	6.8 ± 0.9	2.3 ± 0.8	2.3 ± 0.8
Tetratriacontane	ng/m³	1.9 ± 0.6	1.9 ± 0.6	1.9 ± 0.6	14.9 ± 1	9.2 ± 1.5	3.5 ± 0.8	8.4 ± 0.9	3.5 ± 0.8	3.5 ± 0.8
Pentatriacontane	ng/m³	0 ± 0.6	0 ± 0.6	0 ± 0.6	2 ± 0.9	6 ± 1.6	0.4 ± 0.8	3.3 ± 1	0.4 ± 0.8	0.4 ± 0.8
Hexatriacontane	ng/m³	0 ± 0.6	0 ± 0.6	0 ± 0.6	9.7 ± 2.2	0.1 ± 0.6	7.1 ± 1.7	11 ± 2.9	7.1 ± 1.7	7.1 ± 1.7
Heptatriacontane	ng/m³	2.5 ± 0.6	2.5 ± 0.6	2.5 ± 0.6	2.4 ± 0.9	0.5 ± 0.6	0 ± 0.8	0.3 ± 0.9	0 ± 0.8	0 ± 0.8
Octatriacontane	ng/m³	0 ± 0.6	0 ± 0.6	0 ± 0.6	14.6 ± 1.9	1.8 ± 0.7	5.2 ± 0.9	8 ± 1	5.2 ± 0.9	5.2 ± 0.9
Nonatriacontane	ng/m³	0 ± 0.6	0 ± 0.6	0 ± 0.6	6.6 ± 0.9	0.3 ± 0.6	1.3 ± 0.8	1.6 ± 0.9	1.3 ± 0.8	1.3 ± 0.8
Tetracontane	ng/m³	0 ± 0.6	0 ± 0.6	0 ± 0.6	11.5 ± 1.2	1.3 ± 0.6	2.7 ± 0.8	8.7 ± 1	2.7 ± 0.8	2.7 ± 0.8
Carbonyl Data :										
Formaldehyde	µg/m³	3.7 ± 0.2	3.7 ± 0.2	3.7 ± 0.2	6.4 ± 0.4	11.2 ± 0.6	19.3 ± 1	61.5 ± 3.1	19.3 ± 1	19.3 ± 1
Acetaldehyde	µg/m³	2.8 ± 0.2	2.8 ± 0.2	2.8 ± 0.2	7.3 ± 0.4	0 ± 0.1	0 ± 0.1	0 ± 0.1	0 ± 0.1	0 ± 0.1
Acrolein	µg/m³	0 ± 0.1	0 ± 0.1	0 ± 0.1	0 ± 0.1	8.4 ± 0.5	2.9 ± 0.2	12 ± 0.7	2.9 ± 0.2	2.9 ± 0.2
Glyoxal	µg/m³	0.1 ± 0.1	0.1 ± 0.1	0.1 ± 0.1	0 ± 0.1	0.2 ± 0.1	0.5 ± 0.1	1.2 ± 0.1	0.5 ± 0.1	0.5 ± 0.1
acetone	µg/m³	21.9 ± 1.1	21.9 ± 1.1	21.9 ± 1.1	24.9 ± 1.2	0 ± 0.1	0 ± 0.1	3.7 ± 0.2	0 ± 0.1	0 ± 0.1
Propionaldehyde	µg/m³	0.6 ± 0.1	0.6 ± 0.1	0.6 ± 0.1	1.8 ± 0.1	0 ± 0.1	0.8 ± 0.1	1.1 ± 0.1	0.8 ± 0.1	0.8 ± 0.1
Crotonaldehyde	µg/m³	0.2 ± 0.1	0.2 ± 0.1	0.2 ± 0.1	0 ± 0.1	0 ± 0.1	1.7 ± 0.1	7.7 ± 0.4	1.7 ± 0.1	1.7 ± 0.1
Methacrolein	µg/m³	0 ± 0.1	0 ± 0.1	0 ± 0.1	0 ± 0.1	0 ± 0.1	0.3 ± 0.1	1.8 ± 0.1	0.3 ± 0.1	0.3 ± 0.1
n-butyraldehyde	µg/m³	0.4 ± 0.1	0.4 ± 0.1	0.4 ± 0.1	0.8 ± 0.1	0 ± 0.1	0 ± 0.1	0.3 ± 0.1	0 ± 0.1	0 ± 0.1
2-Butanone (MEK)	µg/m³	0.9 ± 0.1	0.9 ± 0.1	0.9 ± 0.1	0 ± 0.1	0 ± 0.1	0 ± 0.1	4.7 ± 0.1	0 ± 0.1	0 ± 0.1
Valeraldehyde	µg/m³	0 ± 0.1	0 ± 0.1	0 ± 0.1	0.5 ± 0.1	0 ± 0.1	0.8 ± 0.1	1.2 ± 0.1	0.8 ± 0.1	0.8 ± 0.1
Hexaldehyde	µg/m³	1.2 ± 0.1	1.2 ± 0.1	1.2 ± 0.1	1.4 ± 0.1	0.6 ± 0.1	1 ± 0.1	5.9 ± 0.3	1 ± 0.1	1 ± 0.1
benzaldehyde	µg/m³	0.2 ± 0.1	0.2 ± 0.1	0.2 ± 0.1	2.2 ± 0.2	7.5 ± 0.4	13.6 ± 0.7	22.2 ± 1.1	13.6 ± 0.7	13.6 ± 0.7
m-Tolualdehyde	µg/m³	0 ± 0.1	0 ± 0.1	0 ± 0.1	0 ± 0.1	10.6 ± 1	12.1 ± 0.6	12.1 ± 0.6	12.1 ± 0.6	12.1 ± 0.6

Table R.2. Composition of NPACT animal toxicology exposure atmospheres for S, N, RD, MVE_{High}, $MVEG_{High}$, and the combinations of $MVEG_{High}$ and RD, S or N.[a]

Exposure Atmosphere Composition	Units	Control	S	N	RD	MVE_{High}	$MVEG_{High}$	RD + $MVEG_{High}$	S + $MVEG_{High}$	N + $MVEG_{High}$
PAH Data :										
1+2ethylnaphthalene	ng/m³	10.1 ± 14.4	10.1 ± 14.4	10.1 ± 14.4	1.9 ± 0.1	2197.7 ± 878.8	0.0	2 ± 0.1	0.0	0.0
Naphthalene	ng/m³	167.6 ± 0.3	167.6 ± 0.3	167.6 ± 0.3	9.3 ± 0.5	10195.1 ± 12.2	0.1	11.3 ± 0.6	0.1	0.1
Quinoline	ng/m³	0.2 ± 8.3	0.2 ± 8.3	0.2 ± 8.3	NA	113.3 ± 1149.7	NA	NA	NA	NA
2-methylnaphthalene	ng/m³	158 ± 4.9	158 ± 4.9	158 ± 4.9	44.4 ± 5	21899.5 ± 726.4	0.1	45.9 ± 5.1	0.1	0.1
1-methylnaphthalene	ng/m³	80 ± 0.9	80 ± 0.9	80 ± 0.9	23.2 ± 1.2	11773.8 ± 59.8	0.1	21.4 ± 1.1	0.1	0.1
Biphenyl	ng/m³	17.6 ± 0.3	17.6 ± 0.3	17.6 ± 0.3	2.7 ± 0.1	1195.1 ± 27.7	0.0	1.3 ± 0.1	0.0	0.0
2-methylbiphenyl	ng/m³	0 ± 2.9	0 ± 2.9	0 ± 2.9	0.6	378.8 ± 324.3	0.0	0.3	0.0	0.0
2,6+2,7-dimethylnaphthalene	ng/m³	40.1 ± 3.9	40.1 ± 3.9	40.1 ± 3.9	8.2 ± 0.5	4485 ± 527	0.0	7.9 ± 0.5	0.0	0.0
1,3+1,6+1,7dimethylnaphth	ng/m³	60.3 ± 1.2	60.3 ± 1.2	60.3 ± 1.2	16 ± 1	8145.5 ± 130.8	0.1	15.5 ± 0.9	0.1	0.1
1,4+1,5+2,3-dimethylnaphth	ng/m³	21.3 ± 0.3	21.3 ± 0.3	21.3 ± 0.3	4.9 ± 0.3	2357.6 ± 12.7	0.0	4.7 ± 0.3	0.0	0.0
Acenaphthylene	ng/m³	0.9 ± 0.3	0.9 ± 0.3	0.9 ± 0.3	2.5 ± 0.2	136 ± 53.1	0.0	0.2	0.0	0.0
1,2-dimethylnaphthalene	ng/m³	4 ± 0.3	4 ± 0.3	4 ± 0.3	2.1 ± 0.2	647.3 ± 0.3	0.0	1.6 ± 0.2	0.0	0.0
1,8-dimethylnaphthalene	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	0.0	0 ± 1.6	0.0	0.0	0.0	0.0
Acenaphthene	ng/m³	0.6 ± 15.8	0.6 ± 15.8	0.6 ± 15.8	0.4	31.6 ± 100.8	0.0	0.1	0.0	0.0
3-methylbiphenyl	ng/m³	298 ± 7	298 ± 7	298 ± 7	2.5 ± 0.1	1906.2 ± 46.3	0.0	1.4 ± 0.1	0.0	0.0
4-methylbiphenyl	ng/m³	101.7 ± 0.3	101.7 ± 0.3	101.7 ± 0.3	1.1 ± 0.1	669.5 ± 22	0.0	0.5	0.0	0.0
Dibenzofuran	ng/m³	3.5 ± 0.3	3.5 ± 0.3	3.5 ± 0.3	0.8	272.3 ± 27.1	0.0	0.3	0.0	0.0
1-ethyl-2-methylnaphthalene	ng/m³	3.7 ± 2.7	3.7 ± 2.7	3.7 ± 2.7	0.3	416.2 ± 123.1	0.0	0.4	0.0	0.0
2,3,5+I-trimethylnaphthalene	ng/m³	18.3 ± 1.1	18.3 ± 1.1	18.3 ± 1.1	0.9 ± 0.1	830.3 ± 60.1	0.0	0.9 ± 0.1	0.0	0.0
B-trimethylnaphthalene	ng/m³	22.7 ± 1.2	22.7 ± 1.2	22.7 ± 1.2	1.3 ± 0.1	1201.9 ± 79.3	0.0	1.4 ± 0.1	0.0	0.0
A-trimethylnaphthalene	ng/m³	24.2 ± 1.2	24.2 ± 1.2	24.2 ± 1.2	1.6 ± 0.1	1585.9 ± 63.6	0.0	1.7 ± 0.1	0.0	0.0

Table R.2. Composition of NPACT animal toxicology exposure atmospheres for S, N, RD, MVE_{High}, $MVEG_{High}$, and the combinations of $MVEG_{High}$ and RD, S or N.[a]

Exposure Atmosphere Composition	Units	Control	S	N	RD	MVE_{High}	$MVEG_{High}$	RD + $MVEG_{High}$	S + $MVEG_{High}$	N + $MVEG_{High}$
C-trimethylnaphthalene	ng/m³	20 ± 0.3	20 ± 0.3	20 ± 0.3	1.3 ± 0.1	1099.6 ± 5.5	0.0	1.3 ± 0.1	0.0	0.0
2-ethyl-1-methylnaphthalene	ng/m³	0 ± 1.3	0 ± 1.3	0 ± 1.3	1.2 ± 0.1	75.6 ± 53.4	0.0	0.1	0.0	0.0
E-trimethylnaphthalene	ng/m³	15.2 ± 0.3	15.2 ± 0.3	15.2 ± 0.3	0.9 ± 0.1	646.7 ± 8.4	0.0	0.9 ± 0.1	0.0	0.0
2,4,5-trimethylnaphthalene	ng/m³	0 ± 0.8	0 ± 0.8	0 ± 0.8	0.2	66.8 ± 42.5	0.0	0.2	0.0	0.0
F-trimethylnaphthalene	ng/m³	10.6 ± 0.8	10.6 ± 0.8	10.6 ± 0.8	0.6	577.8 ± 5.6	0.0	0.6	0.0	0.0
Fluorene	ng/m³	7.7 ± 0.3	7.7 ± 0.3	7.7 ± 0.3	0.3	52.8 ± 4.6	0.0	0.1	0.0	0.0
1,4,5-trimethylnaphthalene	ng/m³	0.2 ± 0.3	0.2 ± 0.3	0.2 ± 0.3	0.4 ± 0.1	91.7 ± 12.8	0.0	0.5 ± 0.1	0.0	0.0
J-trimethylnaphthalene	ng/m³	4.4 ± 0.5	4.4 ± 0.5	4.4 ± 0.5	0.2	197.4 ± 8.6	0.0	0.2	0.0	0.0
A-Methylfluorene	ng/m³	4.2 ± 0.3	4.2 ± 0.3	4.2 ± 0.3	0.4	68 ± 1.4	0.1	0.6	0.1	0.1
B-Methylfluorene	ng/m³	0.2 ± 0.3	0.2 ± 0.3	0.2 ± 0.3	0.0	11.9 ± 4.3	0.0	0.0	0.0	0.0
1-Methylfluorene	ng/m³	0.3 ± 0.3	0.3 ± 0.3	0.3 ± 0.3	0.2	63 ± 5.7	0.0	0.1	0.0	0.0
9-fluorenone	ng/m³	2.1 ± 0.3	2.1 ± 0.3	2.1 ± 0.3	1.2 ± 0.1	77.7 ± 2.2	0.7	2.2 ± 0.1	0.7	0.7
Dibenzothiophene	ng/m³	0.3 ± 1	0.3 ± 1	0.3 ± 1	0.2	32.5 ± 19	0.0	0.4	0.0	0.0
Phenanthrene	ng/m³	13.4 ± 0.3	13.4 ± 0.3	13.4 ± 0.3	1.5 ± 0.1	247.9 ± 0.7	0.4	2.7 ± 0.1	0.4	0.4
Anthracene	ng/m³	0.3 ± 0.3	0.3 ± 0.3	0.3 ± 0.3	0.0	5.3 ± 1	0.0	0.2	0.0	0.0
Xanthone	ng/m³	0.2 ± 0.3	0.2 ± 0.3	0.2 ± 0.3	0.1	5.3 ± 0.3	0.1	0.2	0.1	0.1
Acenaphthenequinone	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	0.0	0 ± 4.4	0.0	0.0	0.0	0.0
3-methylphenanthrene	ng/m³	2.1 ± 0.3	2.1 ± 0.3	2.1 ± 0.3	0.7	37.2 ± 2.9	0.4	1.2 ± 0.1	0.4	0.4
2-methylphenanthrene	ng/m³	2.3 ± 0.3	2.3 ± 0.3	2.3 ± 0.3	0.5	42.5 ± 1.2	0.3	0.7	0.3	0.3
Perinaphthenone	ng/m³	0.8 ± 0.3	0.8 ± 0.3	0.8 ± 0.3	0.0	6.2 ± 0.4	0.0	0.0	0.0	0.0
2-methylanthracene	ng/m³	0.1 ± 0.3	0.1 ± 0.3	0.1 ± 0.3	0.2	1.6 ± 1.1	0.3	0.8	0.3	0.3
4,5-methylenephenanthrene	ng/m³	0.7 ± 0.3	0.7 ± 0.3	0.7 ± 0.3	0.1	6.9 ± 2.7	0.0	0.2	0.0	0.0
9-methylphenanthrene	ng/m³	0.8 ± 0.3	0.8 ± 0.3	0.8 ± 0.3	0.3	32.1 ± 0.9	0.2	0.4	0.2	0.2
1-methylphenanthrene	ng/m³	1.8 ± 0.3	1.8 ± 0.3	1.8 ± 0.3	0.3	14 ± 1.5	0.1	0.4	0.1	0.1
Anthrone	ng/m³	1.1 ± 0.3	1.1 ± 0.3	1.1 ± 0.3	0.8	8.6 ± 0.3	3.1 ± 0.2	1.9 ± 0.1	3.1 ± 0.2	3.1 ± 0.2

Table R.2. Composition of NPACT animal toxicology exposure atmospheres for S, N, RD, MVE_{High}, $MVEG_{High}$, and the combinations of $MVEG_{High}$ and RD, S or N.[a]

Exposure Atmosphere Composition	Units	Control	S	N	RD	MVE_{High}	$MVEG_{High}$	RD + $MVEG_{High}$	S + $MVEG_{High}$	N + $MVEG_{High}$
9-methylanthracene	ng/m³	0.1 ± 0.3	0.1 ± 0.3	0.1 ± 0.3	0.0	0.4 ± 0.5	0.0	0.0	0.0	0.0
2-phenylnaphthalene	ng/m³	0.3 ± 0.3	0.3 ± 0.3	0.3 ± 0.3	0.2	8.4 ± 0.8	0.1	0.2	0.1	0.1
Anthraquinone	ng/m³	0.2 ± 0.3	0.2 ± 0.3	0.2 ± 0.3	0.4 ± 0.1	5.8 ± 0.6	0.5 ± 0.1	0.8 ± 0.1	0.5 ± 0.1	0.5 ± 0.1
A-dimethylphenanthrene	ng/m³	0.7 ± 0.3	0.7 ± 0.3	0.7 ± 0.3	1.1 ± 0.1	5.3 ± 0.4	0.0	0.0	0.0	0.0
B-dimethylphenanthrene	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	1.1 ± 0.1	4.2 ± 0.8	0.0	0.0	0.0	0.0
1,7-dimethylphenanthrene	ng/m³	0.1 ± 0.3	0.1 ± 0.3	0.1 ± 0.3	0.0	6.8 ± 0.5	0.0	0.0	0.0	0.0
3,6-dimethylphenanthrene	ng/m³	0.1 ± 0.3	0.1 ± 0.3	0.1 ± 0.3	0.0	3 ± 0.5	0.0	0.0	0.0	0.0
D-dimethylphenanthrene	ng/m³	0.4 ± 0.3	0.4 ± 0.3	0.4 ± 0.3	0.0	4.7 ± 0.4	0.0	0.0	0.0	0.0
E-dimethylphenanthrene	ng/m³	0.4 ± 0.3	0.4 ± 0.3	0.4 ± 0.3	0.0	2.8 ± 1.1	0.0	0.0	0.0	0.0
C-dimethylphenanthrene	ng/m³	0.2 ± 0.3	0.2 ± 0.3	0.2 ± 0.3	0.0	13.5 ± 1	0.1	0.2	0.1	0.1
Fluoranthene	ng/m³	0.3 ± 0.3	0.3 ± 0.3	0.3 ± 0.3	0.4	9.8 ± 1.7	0.1	0.4	0.1	0.1
Pyrene	ng/m³	0.4 ± 0.3	0.4 ± 0.3	0.4 ± 0.3	0.3	11.6 ± 0.3	0.1	0.4	0.1	0.1
9-Anthraaldehyde	ng/m³	1.2 ± 0.3	1.2 ± 0.3	1.2 ± 0.3	0.0	1 ± 0.3	0.0	0.0	0.0	0.0
Retene	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	0.0	0 ± 0.4	0.0	0.0	0.0	0.0
benzo(a)fluorene	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	0.0	0.2 ± 0.3	0.0	0.0	0.0	0.0
benzo(b)fluorene	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	0.0	0.1 ± 0.3	0.0	0.0	0.0	0.0
B-MePy/MeFl	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	0.1	0 ± 0.4	0.0	0.1	0.0	0.0
1-MeFl+C-MeFl/Py	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	0.0	0.8 ± 0.4	0.0	0.1	0.0	0.0
1+3-methylfluoranthene	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	0.0	1.2 ± 0.7	0.0	0.0	0.0	0.0
4-methylpyrene	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	0.1	2.9 ± 0.3	0.0	0.1	0.0	0.0
C-MePy/MeFl	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	0.0	0.3 ± 0.9	0.0	0.0	0.0	0.0
D-MePy/MeFl	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	0.1	3.4 ± 0.4	0.0	0.1	0.0	0.0
1-methylpyrene	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	0.0	1.1 ± 0.4	0.0	0.1	0.0	0.0
Benzonaphthothiophene	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	0.1	0.5 ± 0.4	0.0	0.1	0.0	0.0
benzo(c)phenanthrene	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	0.0	0.7 ± 1	0.0	0.0	0.0	0.0

Table R.2. Composition of NPACT animal toxicology exposure atmospheres for S, N, RD, MVE_{High}, $MVEG_{High}$, and the combinations of $MVEG_{High}$ and RD, S or N.[a]

Exposure Atmosphere Composition	Units	Control	S	N	RD	MVE_{High}	$MVEG_{High}$	RD + $MVEG_{High}$	S + $MVEG_{High}$	N + $MVEG_{High}$
Benzo(ghi)fluoranthene	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	0.3	11.4 ± 0.3	0.1	0.2	0.1	0.1
9-phenylanthracene	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	0.0	0.1 ± 0.4	0.0	0.0	0.0	0.0
Cyclopenta(c,d)pyrene	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	0.0	0.9 ± 0.6	0.0	0.1	0.0	0.0
Benz(a)anthracene	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	0.0	1.9 ± 1	0.0	0.1	0.0	0.0
Chrysene-Triphenylene	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	0.0	6.6 ± 4	0.0	0.0	0.0	0.0
Benzanthrone	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	0.0	10.8 ± 0.4	0.0	0.0	0.0	0.0
Benz(a)anthracene-7,12-dione	ng/m³	0.1 ± 0.3	0.1 ± 0.3	0.1 ± 0.3	0.0	1.8 ± 0.4	0.0	0.0	0.0	0.0
3-methylchrysene	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	0.1	0.5 ± 0.3	0.0	0.1	0.0	0.0
chry56m	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	NA	0 ± 0.3	NA	NA	NA	NA
7-methylbenz(a)anthracene	ng/m³	0 ± 0.4	0 ± 0.4	0 ± 0.4	NA	0 ± 0.4	NA	NA	NA	NA
7,12-dimethylbenz(a)anthracene	ng/m³	0.5 ± 0.3	0.5 ± 0.3	0.5 ± 0.3	0.0	0.6 ± 0.3	0.0	0.0	0.0	0.0
Benzo(b+j+k)fluoranthene	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	0.0	0 ± 0.3	0.0	0.0	0.0	0.0
Benzo(a)fluoranthene	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	0.0	0.2 ± 0.4	0.0	0.0	0.0	0.0
BeP	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	0.4	1.8 ± 0.4	0.0	0.2	0.0	0.0
BaP	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	0.2	1.1 ± 0.3	0.0	0.1	0.0	0.0
Perylene	ng/m³	0.1 ± 0.3	0.1 ± 0.3	0.1 ± 0.3	0.1	0.3 ± 0.3	0.0	0.0	0.0	0.0
dibenz(a,j)acridine	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	1.0	0.5 ± 0.3	0.0	0.0	0.0	0.0
7-methylbenzo(a)pyrene	ng/m³	0.2 ± 0.3	0.2 ± 0.3	0.2 ± 0.3	0.6	0 ± 0.3	0.0	0.1	0.0	0.0
bpy910dih	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	NA	0 ± 0.3	NA	NA	NA	NA
Indeno[123-cd]fluoranthene	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	2.3 ± 0.1	0.1 ± 0.3	0.0	0.1	0.0	0.0
dibenz(a,h)acridine	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	1.1 ± 0.4	0 ± 0.3	0.0	0.0	0.0	0.0
Indeno[123-cd]pyrene	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	2.2 ± 0.2	1 ± 0.3	0.0	0.1	0.0	0.0
Dibenzo(ah+ac)anthracene	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	NA	0 ± 0.3	NA	NA	NA	NA
Dibenzo(a,j)anthracene	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	0.0	0.1 ± 0.3	0.0	0.0	0.0	0.0
Benzo(b)chrysene	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	1.8 ± 0.3	0 ± 0.3	0.0	0.0	0.0	0.0

Table R.2. Composition of NPACT animal toxicology exposure atmospheres for S, N, RD, MVE_{High}, $MVEG_{High}$, and the combinations of $MVEG_{High}$ and RD, S or N.[a]

Exposure Atmosphere Composition	Units	Control	S	N	RD	MVE_{High}	$MVEG_{High}$	RD + $MVEG_{High}$	S + $MVEG_{High}$	N + $MVEG_{High}$
Picene	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	0.9 ± 0.1	0.1 ± 0.9	0.0	0.1	0.0	0.0
Benzo(ghi)perylene	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	3.3 ± 0.2	3.9 ± 0.4	0.0	0.3	0.0	0.0
Anthanthrene	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	2.4 ± 0.3	0.2 ± 0.3	0.0	0.0	0.0	0.0
Dibenzo(a,l)pyrene	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	1.3 ± 0.1	0 ± 0.5	0.0	0.0	0.0	0.0
Coronene	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	3.8 ± 0.5	0.8 ± 0.3	0.0	0.1	0.0	0.0
Dibenzo(a,e)pyrene	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	3 ± 0.4	0 ± 0.3	0.0	0.0	0.0	0.0
Dibenzo(a,i)pyrene	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	2.4 ± 0.6	0 ± 0.3	0.0	0.0	0.0	0.0
Dibenzo(a,h)pyrene	ng/m³	0 ± 0.3	0 ± 0.3	0 ± 0.3	1.7 ± 0.6	0 ± 0.3	0.0	0.0	0.0	0.0
Dibenzo(b,k)fluoranthene	ng/m³	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nitro-PAH Data :										
3-nitrobenzo[e]pryene	ng/m³	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1-nitronaphthalene	ng/m³	0.0	0.0	0.0	9.3 ± 0.5	10.4 ± 0.5	0.1	4.6 ± 0.2	0.1	0.1
1-methyl-5-nitronaphthalene	ng/m³	0.0	0.0	0.0	0.8 ± 0.4	1.6 ± 0.1	0.0	0.3 ± 0.1	0.0	0.0
2-nitronaphthalene	ng/m³	0.0	0.0	0.0	25.5 ± 2.3	25.3 ± 1.3	0.3	12.5 ± 1.1	0.3	0.3
2-nitrobiphenyl	ng/m³	0.0	0.0	0.0	0.3	0.4	0.0	0.1	0.0	0.0
2-methyl-4-nitronaphthalene	ng/m³	0.1	0.1	0.1	1.9 ± 0.2	2.9 ± 0.2	0.0	0.8 ± 0.1	0.0	0.0
1-methyl-4-nitronaphthalene	ng/m³	0.0	0.0	0.0	0.9 ± 0.1	5.4 ± 0.5	0.2	0.4	0.2	0.2
1-methyl-6-nitronaphthalene	ng/m³	0.0	0.0	0.0	6.5 ± 0.3	3.3 ± 0.2	0.2	2.5 ± 0.1	0.2	0.2
3-nitrobiphenyl	ng/m³	0.0	0.0	0.0	0.8	0.4	0.0	0.3	0.0	0.0
4-nitrobiphenyl	ng/m³	0.0	0.0	0.0	0.5 ± 0.1	0.0	0.0	0.0	0.0	0.0
1,3-dinitronaphthalene	ng/m³	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
1,5-dinitronaphthalene	ng/m³	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5-nitroacenaphthene	ng/m³	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2-nitrofluorene	ng/m³	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4-nitrophenanthrene	ng/m³	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table R.2. Composition of NPACT animal toxicology exposure atmospheres for S, N, RD, MVE_{High}, $MVEG_{High}$, and the combinations of $MVEG_{High}$ and RD, S or N.[a]

Exposure Atmosphere Composition	Units	Control	S	N	RD	MVE_{High}	$MVEG_{High}$	RD + $MVEG_{High}$	S + $MVEG_{High}$	N + $MVEG_{High}$
9-nitroanthracene	ng/m³	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0
9-nitrophenanthrene	ng/m³	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
1,8-dinitronaphthalene	ng/m³	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0
3-nitrophenanthrene	ng/m³	0.0	0.0	0.0	0.2	1.3 ± 0.1	0.0	0.1	0.0	0.0
2-nitrophenanthrene	ng/m³	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0
2-nitroanthracene	ng/m³	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2-nitrofluoranthene	ng/m³	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
3-nitrofluoranthene	ng/m³	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4-nitropyrene	ng/m³	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1-nitropyrene	ng/m³	0.0	0.0	0.0	0.0	3.2 ± 0.2	0.0	0.0	0.0	0.0
2-nitropyrene	ng/m³	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2,7-dinitrofluorene	ng/m³	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2,7-dinitrofluoren-9-one	ng/m³	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7-nitrobenz(a)anthracene	ng/m³	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
6-nitrochrysene	ng/m³	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3-nitrobenzanthrone	ng/m³	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1,3-dinitropyrene	ng/m³	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1,6-dinitropyrene	ng/m³	0.0	0.0	0.0	0 ± 0.1	0.0	0.0	0.0	0.0	0.0
1,8-dinitropyrene	ng/m³	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6a+1e-nitrobenzpyrene	ng/m³	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
Polar Compounds :										
8,15-Pimaradien-18-oic acid	ng/m³	6.6 ± 0.6	6.6 ± 0.6	6.6 ± 0.6	19.8 ± 3.1	5.9 ± 0.8	24.8 ± 5	0 ± 0.9	24.8 ± 5	24.8 ± 5
Maleic acid	ng/m³	1 ± 0.6	1 ± 0.6	1 ± 0.6	3903.5 ± 319.2	131.2 ± 9.8	0 ± 0.8	1579.4 ± 129.5	0 ± 0.8	0 ± 0.8
Guaiacol	ng/m³	12.1 ± 1.7	12.1 ± 1.7	12.1 ± 1.7	73.4 ± 4.7	11.7 ± 1.6	8.4 ± 0.8	0 ± 0.9	8.4 ± 0.8	8.4 ± 0.8

Table R.2. Composition of NPACT animal toxicology exposure atmospheres for S, N, RD, MVE_{High}, $MVEG_{High}$, and the combinations of $MVEG_{High}$ and RD, S or N.[a]

Exposure Atmosphere Composition	Units	Control	S	N	RD	MVE_{High}	$MVEG_{High}$	RD + $MVEG_{High}$	S + $MVEG_{High}$	N + $MVEG_{High}$
Salicylic acid	ng/m³	1.6 ± 0.6	1.6 ± 0.6	1.6 ± 0.6	269.7 ± 15.4	30.4 ± 4.9	20.2 ± 3	260.6 ± 14.8	20.2 ± 3	20.2 ± 3
4-me-guaiacol	ng/m³	0 ± 0.6	0 ± 0.6	0 ± 0.6	359.5 ± 42.7	46.2 ± 5.5	0 ± 0.8	105 ± 12.8	0 ± 0.8	0 ± 0.8
2,3- and 3,5- dimethylbenzoic acid	ng/m³	0 ± 0.6	0 ± 0.6	0 ± 0.6	0 ± 0.9	0 ± 0.6	0 ± 0.8	0 ± 0.9	0 ± 0.8	0 ± 0.8
2,4-dimethylbenzoic acid	ng/m³	14.6 ± 2.5	14.6 ± 2.5	14.6 ± 2.5	2.3 ± 0.9	525.9 ± 30.9	332.4 ± 16.6	1000.6 ± 50	332.4 ± 16.6	332.4 ± 16.6
2,5-dimethylbenzoic acid	ng/m³	0.9 ± 0.6	0.9 ± 0.6	0.9 ± 0.6	31.4 ± 5.4	389.5 ± 35.6	40.1 ± 5.7	335.1 ± 52.1	40.1 ± 5.7	40.1 ± 5.7
2,6-dimethylbenzoic acid	ng/m³	1.8 ± 0.6	1.8 ± 0.6	1.8 ± 0.6	0 ± 0.9	243.7 ± 24.4	14.6 ± 5	7.4 ± 2.8	14.6 ± 5	14.6 ± 5
3,4-dimethylbenzoic acid	ng/m³	20.7 ± 2.5	20.7 ± 2.5	20.7 ± 2.5	174.8 ± 9.2	1054.4 ± 53.5	72.9 ± 4.4	287.9 ± 14.9	72.9 ± 4.4	72.9 ± 4.4
4-formyl-guaiacol (vanillin)	ng/m³	49.1 ± 2.8	49.1 ± 2.8	49.1 ± 2.8	89.1 ± 10.3	228.4 ± 11.7	0.3 ± 0.8	83.5 ± 9.7	0.3 ± 0.8	0.3 ± 0.8
4-ethyl-guaiacol	ng/m³	0 ± 0.6	0 ± 0.6	0 ± 0.6	0 ± 0.9	1.5 ± 0.7	0.6 ± 0.8	0 ± 0.9	0.6 ± 0.8	0.6 ± 0.8
Syringol	ng/m³	3.1 ± 0.6	3.1 ± 0.6	3.1 ± 0.6	8287.9 ± 0.9	4903.1 ± 245.5	0 ± 0.8	3159.8 ± 0.9	0 ± 0.8	0 ± 0.8
Levoglucosan	ng/m³	0 ± 0.6	0 ± 0.6	0 ± 0.6	56.1 ± 10.7	67.6 ± 6.9	10.7 ± 2.7	39.7 ± 6.4	10.7 ± 2.7	10.7 ± 2.7
4-allyl-guaiacol (eugenol)	ng/m³	0 ± 0.6	0 ± 0.6	0 ± 0.6	13.3 ± 1.1	0.2 ± 0.6	0 ± 0.8	3.9 ± 0.9	0 ± 0.8	0 ± 0.8
Isoeugenol	ng/m³	0 ± 0.6	0 ± 0.6	0 ± 0.6	4.7 ± 0.9	4.4 ± 1.1	1.7 ± 0.8	3.2 ± 0.9	1.7 ± 0.8	1.7 ± 0.8
Isophthalic acid	ng/m³	3.6 ± 0.6	3.6 ± 0.6	3.6 ± 0.6	314.3 ± 18.4	2892.6 ± 145	107.8 ± 6.5	424.4 ± 24.7	107.8 ± 6.5	107.8 ± 6.5
Phthalic acid	ng/m³	0 ± 0.6	0 ± 0.6	0 ± 0.6	241.5 ± 20.1	217.4 ± 22.2	4.8 ± 0.8	212.1 ± 17.7	4.8 ± 0.8	4.8 ± 0.8
Acetovanillone	ng/m³	20.7 ± 1.3	20.7 ± 1.3	20.7 ± 1.3	36.9 ± 0.9	62.4 ± 3.4	0 ± 0.8	16.3 ± 0.9	0 ± 0.8	0 ± 0.8
Vanillic acid	ng/m³	0 ± 0.6	0 ± 0.6	0 ± 0.6	30.5 ± 8.5	0.1 ± 0.6	2.7 ± 1.1	3.4 ± 1.4	2.7 ± 1.1	2.7 ± 1.1
4-methyl-syringol	ng/m³	1.1 ± 0.6	1.1 ± 0.6	1.1 ± 0.6	907.3 ± 0.9	1469.1 ± 73.8	0 ± 0.8	0 ± 0.9	0 ± 0.8	0 ± 0.8
2,3-dimethoxybenzoic acid	ng/m³	1.2 ± 0.6	1.2 ± 0.6	1.2 ± 0.6	95.6 ± 11.4	1123.6 ± 59.5	1.5 ± 0.8	113 ± 13.4	1.5 ± 0.8	1.5 ± 0.8
2,4-dimethoxybenzoic acid	ng/m³	4.4 ± 0.6	4.4 ± 0.6	4.4 ± 0.6	6.7 ± 1.3	38.9 ± 2.3	2.6 ± 0.8	9.5 ± 1.6	2.6 ± 0.8	2.6 ± 0.8
2,5-dimethoxybenzoic acid	ng/m³	0.1 ± 0.6	0.1 ± 0.6	0.1 ± 0.6	28.9 ± 6.5	0.9 ± 0.6	0 ± 0.8	28.9 ± 6.4	0 ± 0.8	0 ± 0.8
2,6-dimethoxybenzoic acid	ng/m³	0 ± 0.6	0 ± 0.6	0 ± 0.6	38.7 ± 7.2	59.6 ± 3.3	0 ± 0.8	19.4 ± 3.8	0 ± 0.8	0 ± 0.8
3,4-dimethoxybenzoic acid	ng/m³	0 ± 0.6	0 ± 0.6	0 ± 0.6	195.2 ± 10.2	7.1 ± 0.8	3.6 ± 0.8	90.8 ± 5	3.6 ± 0.8	3.6 ± 0.8
3,5-dimethoxybenzoic acid	ng/m³	0.7 ± 0.6	0.7 ± 0.6	0.7 ± 0.6	72.5 ± 7.3	6.2 ± 1.1	0 ± 0.8	87.2 ± 8.7	0 ± 0.8	0 ± 0.8

Table R.2. Composition of NPACT animal toxicology exposure atmospheres for S, N, RD, MVE_{High}, $MVEG_{High}$, and the combinations of $MVEG_{High}$ and RD, S or N.[a]

Exposure Atmosphere Composition	Units	Control	S	N	RD	MVE_{High}	$MVEG_{High}$	RD + $MVEG_{High}$	S + $MVEG_{High}$	N + $MVEG_{High}$
Docosanoic acid (c22)	ng/m³	84.6 ± 10.7	84.6 ± 10.7	84.6 ± 10.7	25.7 ± 4.6	118.3 ± 14.9	2.1 ± 0.8	13 ± 2.7	2.1 ± 0.8	2.1 ± 0.8
Homovanillic acid	ng/m³	0 ± 0.6	0 ± 0.6	0 ± 0.6	15.9 ± 1.5	9.7 ± 1.1	0 ± 0.8	0 ± 0.9	0 ± 0.8	0 ± 0.8
Syringaldehyde	ng/m³	0 ± 0.6	0 ± 0.6	0 ± 0.6	125.8 ± 34	1.7 ± 0.7	0 ± 0.8	3.8 ± 1.5	0 ± 0.8	0 ± 0.8
cis-pinonic acid	ng/m³	0.8 ± 0.6	0.8 ± 0.6	0.8 ± 0.6	132.9 ± 25.1	1124.1 ± 58.3	72.4 ± 12.7	143.8 ± 26.5	72.4 ± 12.7	72.4 ± 12.7
Syringic acid	ng/m³	0 ± 0.6	0 ± 0.6	0 ± 0.6	0.5 ± 0.9	0.3 ± 0.6	0 ± 0.8	0.3 ± 0.9	0 ± 0.8	0 ± 0.8
Myristoleic acid	ng/m³	4.1 ± 0.7	4.1 ± 0.7	4.1 ± 0.7	14.7 ± 3.5	291 ± 34.6	0 ± 0.8	57.3 ± 12.6	0 ± 0.8	0 ± 0.8
Traumatic acid	ng/m³	19 ± 4.1	19 ± 4.1	19 ± 4.1	27.5 ± 1.3	18.3 ± 3.6	0.1 ± 0.8	42 ± 2.1	0.1 ± 0.8	0.1 ± 0.8
1,11-undecanedicarboxylic acid	ng/m³	0 ± 0.6	0 ± 0.6	0 ± 0.6	5.3 ± 0.9	14.7 ± 1.6	0 ± 0.8	1.4 ± 0.9	0 ± 0.8	0 ± 0.8
Palmitoleic acid	ng/m³	0.1 ± 0.6	0.1 ± 0.6	0.1 ± 0.6	23.8 ± 6.2	37.2 ± 2.4	10.2 ± 2.3	17.1 ± 4.5	10.2 ± 2.3	10.2 ± 2.3
1,12-dodecanedicarboxylic acid	ng/m³	0 ± 0.6	0 ± 0.6	0 ± 0.6	0 ± 0.9	4.9 ± 0.6	0 ± 0.8	0 ± 0.9	0 ± 0.8	0 ± 0.8
Elaidic acid	ng/m³	5.7 ± 1	5.7 ± 1	5.7 ± 1	8.3 ± 1.3	61.8 ± 8.7	16 ± 2	22 ± 0.9	16 ± 2	16 ± 2
Isostearic acid	ng/m³	0 ± 0.6	0 ± 0.6	0 ± 0.6	102.4 ± 18.5	0.6 ± 0.6	0.5 ± 0.8	0 ± 0.9	0.5 ± 0.8	0.5 ± 0.8
Dehydroabietic acid	ng/m³	45.3 ± 4.9	45.3 ± 4.9	45.3 ± 4.9	455 ± 30.9	12.2 ± 2.6	285.1 ± 19.4	148.1 ± 10.3	285.1 ± 19.4	285.1 ± 19.4
Pimaric acid	ng/m³	0.8 ± 0.6	0.8 ± 0.6	0.8 ± 0.6	64.2 ± 0.9	47 ± 6	0 ± 0.8	0 ± 0.9	0 ± 0.8	0 ± 0.8
Sandaracopimaric acid	ng/m³	1.5 ± 0.6	1.5 ± 0.6	1.5 ± 0.6	15.1 ± 0.9	118.4 ± 7.1	15.8 ± 2.1	0.9 ± 0.9	15.8 ± 2.1	15.8 ± 2.1
Abietic acid	ng/m³	0 ± 0.6	0 ± 0.6	0 ± 0.6	3.3 ± 0.9	8.4 ± 1.4	0 ± 0.8	0 ± 0.9	0 ± 0.8	0 ± 0.8
Isopimaric acid	ng/m³	4 ± 1	4 ± 1	4 ± 1	21.8 ± 4.7	10.1 ± 1.4	26.4 ± 5.1	2.7 ± 1.4	26.4 ± 5.1	26.4 ± 5.1
7-oxodehydroabietic acid	ng/m³	5.7 ± 1.4	5.7 ± 1.4	5.7 ± 1.4	32.9 ± 10.1	2.8 ± 1	0.2 ± 0.8	34 ± 9.9	0.2 ± 0.8	0.2 ± 0.8
Heneicosanoic acid (c21)	ng/m³	0 ± 0.6	0 ± 0.6	0 ± 0.6	5.6 ± 0.9	8.3 ± 2.1	0 ± 0.8	4.1 ± 0.9	0 ± 0.8	0 ± 0.8
Tricosanoic acid	ng/m³	6.7 ± 1.8	6.7 ± 1.8	6.7 ± 1.8	1.7 ± 0.9	15 ± 3.7	0 ± 0.8	0 ± 0.9	0 ± 0.8	0 ± 0.8
Tetracosanoic acid (c24)	ng/m³	29 ± 4.5	29 ± 4.5	29 ± 4.5	34.5 ± 9.5	19.7 ± 3.2	2.5 ± 1.1	14.5 ± 4.2	2.5 ± 1.1	2.5 ± 1.1
Cholesterol	ng/m³	42.7 ± 11.4	42.7 ± 11.4	42.7 ± 11.4	0.2 ± 0.9	15.2 ± 4.3	0 ± 0.8	2.1 ± 0.9	0 ± 0.8	0 ± 0.8
b-sitosterol	ng/m³	7.6 ± 1	7.6 ± 1	7.6 ± 1	21.8 ± 1.1	9.6 ± 1.3	0 ± 0.8	9.9 ± 0.9	0 ± 0.8	0 ± 0.8
Hexanoic acid (c6)	ng/m³	1007.3 ± 131.7	1007.3 ± 131.7	1007.3 ± 131.7	1236.7 ± 88	3540.6 ± 462	269.1 ± 21.6	510.8 ± 38.4	269.1 ± 21.6	269.1 ± 21.6
Heptanoic acid (c7)	ng/m³	5.2 ± 0.8	5.2 ± 0.8	5.2 ± 0.8	2003.3 ±	2261.5 ±	189.5 ± 10.4	882.3 ± 45.6	189.5 ± 10.4	189.5 ± 10.4

Table R.2. Composition of NPACT animal toxicology exposure atmospheres for S, N, RD, MVE_{High}, $MVEG_{High}$, and the combinations of $MVEG_{High}$ and RD, S or N.[a]

Exposure Atmosphere Composition	Units	Control	S	N	RD	MVE_{High}	$MVEG_{High}$	RD + $MVEG_{High}$	S + $MVEG_{High}$	N + $MVEG_{High}$
					102.7	226.5				
Benzoic acid	ng/m³	105.1 ± 6.2	105.1 ± 6.2	105.1 ± 6.2	8533.7 ± 427.1	50.2 ± 3.1	251.2 ± 14.4	3790.6 ± 195.3	251.2 ± 14.4	251.2 ± 14.4
Octanoic acid (c8)	ng/m³	0 ± 0.6	0 ± 0.6	0 ± 0.6	1028.8 ± 51.4	224.2 ± 19	205.1 ± 10.3	640.5 ± 32	205.1 ± 10.3	205.1 ± 10.3
o-toluic	ng/m³	4 ± 1.1	4 ± 1.1	4 ± 1.1	1848.4 ± 255.2	1998.7 ± 100.2	18.6 ± 1.5	1258 ± 169.5	18.6 ± 1.5	18.6 ± 1.5
m-toluic	ng/m³	34.1 ± 4.5	34.1 ± 4.5	34.1 ± 4.5	2505.1 ± 179.7	2767.8 ± 140	164.9 ± 8.4	1881.1 ± 128.2	164.9 ± 8.4	164.9 ± 8.4
Nonanoic acid (c9)	ng/m³	298.1 ± 22.9	298.1 ± 22.9	298.1 ± 22.9	297.9 ± 15.4	0 ± 0.6	322.2 ± 16.1	397.2 ± 20.3	322.2 ± 16.1	322.2 ± 16.1
p-toluic	ng/m³	19.4 ± 3.8	19.4 ± 3.8	19.4 ± 3.8	1650 ± 82.9	1919.1 ± 107.4	92.8 ± 4.6	1150 ± 57.5	92.8 ± 4.6	92.8 ± 4.6
Decanoic acid (c10)	ng/m³	264.9 ± 29.1	264.9 ± 29.1	264.9 ± 29.1	75.2 ± 5.7	32.2 ± 3.8	227.4 ± 17	234.9 ± 17	227.4 ± 17	227.4 ± 17
Undecanoic acid (c11)	ng/m³	26.9 ± 6.6	26.9 ± 6.6	26.9 ± 6.6	83.3 ± 11.4	24.3 ± 6	169.8 ± 13.1	199.7 ± 21.3	169.8 ± 13.1	169.8 ± 13.1
Dodecanoic (lauric) acid (c12)	ng/m³	157.7 ± 10.3	157.7 ± 10.3	157.7 ± 10.3	55.9 ± 4.6	203.6 ± 13.2	107.6 ± 8.3	119.6 ± 9.3	107.6 ± 8.3	107.6 ± 8.3
Tridecanoic acid (c13)	ng/m³	21.3 ± 2	21.3 ± 2	21.3 ± 2	94.6 ± 32.2	62.8 ± 5.7	30.5 ± 3	122.8 ± 28	30.5 ± 3	30.5 ± 3
Myristic acid (c14)	ng/m³	175.1 ± 9.1	175.1 ± 9.1	175.1 ± 9.1	281.8 ± 16	471.8 ± 23.9	111.4 ± 6	226.8 ± 13.2	111.4 ± 6	111.4 ± 6
Pentadecanoic acid (c15)	ng/m³	74.3 ± 14.2	74.3 ± 14.2	74.3 ± 14.2	91.4 ± 5.3	122.6 ± 20	2.5 ± 0.8	429.3 ± 21.7	2.5 ± 0.8	2.5 ± 0.8
Palmitic acid (c16)	ng/m³	698.4 ± 35.2	698.4 ± 35.2	698.4 ± 35.2	727.5 ± 45.9	672.4 ± 33.8	542.5 ± 34.2	596.3 ± 37.7	542.5 ± 34.2	542.5 ± 34.2
Heptadecanoic acid (c17)	ng/m³	24.8 ± 4.3	24.8 ± 4.3	24.8 ± 4.3	19.6 ± 2.4	15.2 ± 2.7	5.3 ± 0.9	31.3 ± 2.6	5.3 ± 0.9	5.3 ± 0.9
Oleic acid	ng/m³	58.4 ± 7.2	58.4 ± 7.2	58.4 ± 7.2	98.1 ± 14.8	54.8 ± 6.9	209.9 ± 29.2	65.8 ± 9.3	209.9 ± 29.2	209.9 ± 29.2
Stearic acid (c18)	ng/m³	238.5 ± 12.2	238.5 ± 12.2	238.5 ± 12.2	313 ± 17	503.4 ± 25.5	216.2 ± 11.2	272.3 ± 15.2	216.2 ± 11.2	216.2 ± 11.2
Nonadecanoic acid (c19)	ng/m³	0 ± 0.6	0 ± 0.6	0 ± 0.6	1152.6 ± 136.9	0 ± 0.6	837.5 ± 98	947.3 ± 111.4	837.5 ± 98	837.5 ± 98
Eicosanoic acid (c20)	ng/m³	20.4 ± 3.6	20.4 ± 3.6	20.4 ± 3.6	110.5 ± 3	35.5 ± 6.1	0 ± 0.8	33.8 ± 1.7	0 ± 0.8	0 ± 0.8
Hopane & Steranes :										
17A(H),21B(H)-22,29,30-Trisnorhopane	ng/m³	0.0	0.0	0.0	2.8 ± 0.1	0.6	0.8	1.8 ± 0.1	0.8	0.8
17A(H),21B(H)-30-Norhopane	ng/m³	0.1	0.1	0.1	10 ± 0.5	3.1 ± 0.2	1.6 ± 0.1	6.1 ± 0.3	1.6 ± 0.1	1.6 ± 0.1

Table R.2. Composition of NPACT animal toxicology exposure atmospheres for S, N, RD, MVE_{High}, $MVEG_{High}$, and the combinations of $MVEG_{High}$ and RD, S or N.[a]

Exposure Atmosphere Composition	Units	Control	S	N	RD	MVE_{High}	$MVEG_{High}$	RD + $MVEG_{High}$	S + $MVEG_{High}$	N + $MVEG_{High}$
17A(H),21B(H)-Hopane	ng/m³	0.1	0.1	0.1	12.8 ± 0.8	2.1 ± 0.1	1.9 ± 0.1	7.6 ± 0.5	1.9 ± 0.1	1.9 ± 0.1
17B(H),21A(H)-hopane	ng/m³	0.0	0.0	0.0	2.4 ± 0.3	0.0	0.4	1.4 ± 0.2	0.4	0.4
22S-17A(H),21B(H)-30-Homohopane	ng/m³	0.0	0.0	0.0	8.7 ± 0.9	1.3 ± 0.1	0.8 ± 0.1	4.9 ± 0.5	0.8 ± 0.1	0.8 ± 0.1
22R-17A(H),21B(H)-30-Homohopane	ng/m³	0.2	0.2	0.2	6.7 ± 1	0.9 ± 0.1	0.6 ± 0.1	3.1 ± 0.5	0.6 ± 0.1	0.6 ± 0.1
17B(H),21B(H)-Hopane	ng/m³	0.1	0.1	0.1	0.7 ± 0.2	0.1	0.1	0.4 ± 0.1	0.1	0.1
22S-17A(H),21B(H)-30,31-Bishomohopane	ng/m³	0.0	0.0	0.0	2.5 ± 0.3	0.5 ± 0.1	6.6 ± 0.8	4.5 ± 0.4	6.6 ± 0.8	6.6 ± 0.8
22R-17A(H),21B(H)-30,31-Bishomohopane	ng/m³	0.4	0.4	0.4	7.5 ± 0.4	0.2	0.7	4.2 ± 0.2	0.7	0.7
22S-17A(H),21B(H)-30,31,32-Trisomohopane	ng/m³	0.0	0.0	0.0	5 ± 1.2	0.4	0.2 ± 0.1	2.5 ± 0.6	0.2 ± 0.1	0.2 ± 0.1
22R-17A(H),21B(H)-30,31,32-Trishomohopane	ng/m³	0.0	0.0	0.0	3.6 ± 1	0.2	0.2	2.1 ± 0.6	0.2	0.2
C27-20S5A(H),14A(H)-cholestane	ng/m³	0.0	0.0	0.0	1.1 ± 0.1	0.1	0.4	0.9	0.4	0.4
C27-20R5A(H),14B(H)-cholestane	ng/m³	0.2	0.2	0.2	1.6 ± 0.1	0.3	0.5	1.1 ± 0.1	0.5	0.5
C27-20S5A(H),14B(H),17B(H)-cholestane	ng/m³	0.0	0.0	0.0	1.5 ± 0.2	0.2	0.5 ± 0.1	1.1 ± 0.1	0.5 ± 0.1	0.5 ± 0.1
C27-20R5A(H),14A(H),17A(H)-cholestane & C29-20S13B(H),17A(H)-dia	ng/m³	0.0	0.0	0.0	2.8 ± 0.1	0.5	1.1 ± 0.1	2.4 ± 0.1	1.1 ± 0.1	1.1 ± 0.1

Table R.2. Composition of NPACT animal toxicology exposure atmospheres for S, N, RD, MVE_{High}, $MVEG_{High}$, and the combinations of $MVEG_{High}$ and RD, S or N.[a]

Exposure Atmosphere Composition	Units	Control	S	N	RD	MVE_{High}	$MVEG_{High}$	RD + $MVEG_{High}$	S + $MVEG_{High}$	N + $MVEG_{High}$
C28-20S5A(H),14A(H),17A(H)-ergostane	ng/m³	0.0	0.0	0.0	2.1 ± 0.1	0.1	0.5	1.5 ± 0.1	0.5	0.5
C28-20R5A(H),14B(H),17B(H)-ergostane	ng/m³	0.0	0.0	0.0	2.2 ± 0.1	0.3	0.5	1.6 ± 0.1	0.5	0.5
C28-20S5A(H),14B(H),17B(H)-ergostane	ng/m³	0.0	0.0	0.0	1.6 ± 0.2	0.7 ± 0.2	0.4 ± 0.1	1.3 ± 0.2	0.4 ± 0.1	0.4 ± 0.1
C28-20R5A(H),14A(H),17A(H)-ergostane	ng/m³	0.1	0.1	0.1	1.7 ± 0.3	0.3	1.1 ± 0.2	1.2 ± 0.2	1.1 ± 0.2	1.1 ± 0.2
C29-20S5A(H),14A(H),17A(H)-stigmastane	ng/m³	0.0	0.0	0.0	1.6 ± 0.2	0.1	0.4 ± 0.1	1.1 ± 0.2	0.4 ± 0.1	0.4 ± 0.1
C29-20R5A(H),14B(H),17B(H)-stigmastane	ng/m³	0.0	0.0	0.0	2 ± 0.4	0.3 ± 0.1	0.5 ± 0.1	1.4 ± 0.2	0.5 ± 0.1	0.5 ± 0.1
C29-20S5A(H),14B(H),17B(H)-stigmastane	ng/m³	0.6 ± 0.2	0.6 ± 0.2	0.6 ± 0.2	1.7 ± 0.1	0.4 ± 0.1	0.4	1 ± 0.1	0.4	0.4
C29-20R5A(H),14A(H),17A(H)-stigmastane	ng/m³	0.0	0.0	0.0	2.9 ± 0.1	0.7 ± 0.1	0.6	2 ± 0.1	0.6	0.6
Volatile Organic Compounds (VOC):										
Acetylene	µg/m³	0.4	0.4	0.4	4.1 ± 0.2	1025.9 ± 51.3	83.1 ± 4.2	53.5 ± 2.7	83.1 ± 4.2	83.1 ± 4.2
Ethene	µg/m³	1.3 ± 0.2	1.3 ± 0.2	1.3 ± 0.2	5.4 ± 0.3	1675.6 ± 207.4	1777.7 ± 88.9	1344.5 ± 67.2	1777.7 ± 88.9	1777.7 ± 88.9
Ethane	µg/m³	12.8 ± 1.4	12.8 ± 1.4	12.8 ± 1.4	7.5 ± 0.4	1432.5 ± 151	1128.9 ± 56.4	826.7 ± 41.3	1128.9 ± 56.4	1128.9 ± 56.4
Propene	µg/m³	2 ± 0.2	2 ± 0.2	2 ± 0.2	2.1 ± 0.1	793.8 ± 87.5	777.2 ± 38.9	675.1 ± 33.8	777.2 ± 38.9	777.2 ± 38.9
Propane	µg/m³	3.2 ± 0.2	3.2 ± 0.2	3.2 ± 0.2	3.2 ± 0.3	63 ± 4.4	69.4 ± 7.4	59.4 ± 6.3	69.4 ± 7.4	69.4 ± 7.4
1,3-butadiene	µg/m³	0.3	0.3	0.3	0.0	4.9 ± 0.3	22.6 ± 1.9	20 ± 1.7	22.6 ± 1.9	22.6 ± 1.9
1-butene	µg/m³	0.4	0.4	0.4	0.4	143.2 ± 8.5	188.8 ± 9.4	167.7 ± 8.4	188.8 ± 9.4	188.8 ± 9.4

Table R.2. Composition of NPACT animal toxicology exposure atmospheres for S, N, RD, MVE_{High}, $MVEG_{High}$, and the combinations of $MVEG_{High}$ and RD, S or N.[a]

Exposure Atmosphere Composition	Units	Control	S	N	RD	MVE_{High}	$MVEG_{High}$	RD + $MVEG_{High}$	S + $MVEG_{High}$	N + $MVEG_{High}$
c-2-butene	µg/m³	0.0	0.0	0.0	0.0	41.2 ± 3.1	39.4 ± 2	31.9 ± 1.6	39.4 ± 2	39.4 ± 2
Isobutylene	µg/m³	0.7	0.7	0.7	1.2 ± 0.1	167.1 ± 8.4	149.8 ± 7.5	122.1 ± 6.1	149.8 ± 7.5	149.8 ± 7.5
t-2-butene	µg/m³	0.1	0.1	0.1	0.5	50.8 ± 2.6	52.8 ± 2.6	43 ± 2.2	52.8 ± 2.6	52.8 ± 2.6
n-butane	µg/m³	6 ± 0.5	6 ± 0.5	6 ± 0.5	2.6 ± 0.1	536.2 ± 47.6	959.2 ± 48	678.4 ± 33.9	959.2 ± 48	959.2 ± 48
Iso-butane	µg/m³	1.5 ± 0.1	1.5 ± 0.1	1.5 ± 0.1	1.3 ± 0.1	198.8 ± 18.3	367.3 ± 18.4	260 ± 13	367.3 ± 18.4	367.3 ± 18.4
Iso-pentane	µg/m³	10 ± 0.5	10 ± 0.5	10 ± 0.5	3.1 ± 0.2	2420.9 ± 121	1868.3 ± 93.4	1302.6 ± 65.1	1868.3 ± 93.4	1868.3 ± 93.4
n-pentane	µg/m³	2 ± 0.2	2 ± 0.2	2 ± 0.2	2.1 ± 0.1	406.9 ± 47.7	1402.5 ± 70.1	962.6 ± 48.1	1402.5 ± 70.1	1402.5 ± 70.1
1,2-butadiene	µg/m³	NA	NA	NA	0.0	NA	4 ± 0.2	3.6 ± 0.2	4 ± 0.2	4 ± 0.2
1-pentene	µg/m³	0.2	0.2	0.2	0.2	25.7 ± 1.3	43.4 ± 2.2	39.5 ± 2	43.4 ± 2.2	43.4 ± 2.2
2-methyl-1-butene	µg/m³	0.2	0.2	0.2	0.1	28.1 ± 4.1	33.9 ± 1.7	27.5 ± 1.4	33.9 ± 1.7	33.9 ± 1.7
Isoprene	µg/m³	0.2	0.2	0.2	0.0	0.0	0.8 ± 0.1	0.7 ± 0.1	0.8 ± 0.1	0.8 ± 0.1
t-2-pentene	µg/m³	0.2	0.2	0.2	0.1	31.1 ± 3	52 ± 2.6	40.4 ± 2	52 ± 2.6	52 ± 2.6
c-2-pentene	µg/m³	0.1	0.1	0.1	0.1	16.9 ± 3.9	23.8 ± 1.2	18.7 ± 0.9	23.8 ± 1.2	23.8 ± 1.2
2-methyl-2-butene	µg/m³	0.2	0.2	0.2	0.1	39.3 ± 7.3	50.7 ± 3.3	39 ± 2.6	50.7 ± 3.3	50.7 ± 3.3
2,2-dimethylbutane	µg/m³	0.7	0.7	0.7	0.1	60.9 ± 3.5	44.4 ± 2.2	32.4 ± 1.6	44.4 ± 2.2	44.4 ± 2.2
Cyclopentene	µg/m³	0.1	0.1	0.1	0.1	21.9 ± 2.6	24 ± 1.2	21 ± 1.1	24 ± 1.2	24 ± 1.2
Cyclopentane	µg/m³	0.4	0.4	0.4	0.1	41.8 ± 2.6	86.2 ± 4.3	64.4 ± 3.2	86.2 ± 4.3	86.2 ± 4.3
2,3-dimethylbutane	µg/m³	1.2 ± 0.2	1.2 ± 0.2	1.2 ± 0.2	2.4 ± 0.1	139.2 ± 18.2	298.9 ± 14.9	548.2 ± 27.4	298.9 ± 14.9	298.9 ± 14.9
2-methylpentane	µg/m³	4 ± 0.2	4 ± 0.2	4 ± 0.2	0.1	329.2 ± 19.8	92.9 ± 4.6	67.2 ± 3.4	92.9 ± 4.6	92.9 ± 4.6
3-methylpentane	µg/m³	2.4 ± 0.1	2.4 ± 0.1	2.4 ± 0.1	0.9	370.2 ± 18.5	333.1 ± 16.7	252.7 ± 12.6	333.1 ± 16.7	333.1 ± 16.7
2-methyl-1-pentene	µg/m³	0.2	0.2	0.2	0.2	37 ± 2.3	70.9 ± 3.5	61.2 ± 3.1	70.9 ± 3.5	70.9 ± 3.5
n-hexane	µg/m³	2.1 ± 0.6	2.1 ± 0.6	2.1 ± 0.6	1.2 ± 0.1	260.8 ± 77.7	368.3 ± 18.4	291.1 ± 14.6	368.3 ± 18.4	368.3 ± 18.4
t-2-hexene	µg/m³	0.1	0.1	0.1	0.1	12.8 ± 1.6	23.7 ± 1.2	17.4 ± 0.9	23.7 ± 1.2	23.7 ± 1.2
c-2-hexene	µg/m³	0.0	0.0	0.0	0.0	6.4 ± 1.3	12.4 ± 0.6	9.1 ± 0.5	12.4 ± 0.6	12.4 ± 0.6

Table R.2. Composition of NPACT animal toxicology exposure atmospheres for S, N, RD, MVE_{High}, $MVEG_{High}$, and the combinations of $MVEG_{High}$ and RD, S or N.[a]

Exposure Atmosphere Composition	Units	Control	S	N	RD	MVE_{High}	$MVEG_{High}$	RD + $MVEG_{High}$	S + $MVEG_{High}$	N + $MVEG_{High}$
1,3-hexadiene (trans)	µg/m³	0.0	0.0	0.0	0.0	5.1 ± 1.3	11.4 ± 0.6	8 ± 0.4	11.4 ± 0.6	11.4 ± 0.6
Methylcyclopentane	µg/m³	2 ± 0.1	2 ± 0.1	2 ± 0.1	0.8	290.7 ± 14.5	284.3 ± 14.2	222.8 ± 11.1	284.3 ± 14.2	284.3 ± 14.2
2,4-dimethylpentane	µg/m³	1.0	1.0	1.0	0.3	116.6 ± 5.8	64.1 ± 3.2	46.7 ± 2.3	64.1 ± 3.2	64.1 ± 3.2
Benzene	µg/m³	2.8 ± 0.5	2.8 ± 0.5	2.8 ± 0.5	2.8 ± 0.1	840.5 ± 153.6	1197.3 ± 59.9	975.6 ± 48.8	1197.3 ± 59.9	1197.3 ± 59.9
Cyclohexane	µg/m³	1.5 ± 0.1	1.5 ± 0.1	1.5 ± 0.1	0.5	172.3 ± 8.6	144.6 ± 7.2	111.1 ± 5.6	144.6 ± 7.2	144.6 ± 7.2
2-methylhexane	µg/m³	1.5 ± 0.1	1.5 ± 0.1	1.5 ± 0.1	0.5	326.3 ± 16.3	263.1 ± 13.2	190.2 ± 9.5	263.1 ± 13.2	263.1 ± 13.2
2,3-dimethylpentane	µg/m³	1.7 ± 0.2	1.7 ± 0.2	1.7 ± 0.2	0.4	167.1 ± 17.8	89.2 ± 4.5	64.4 ± 3.2	89.2 ± 4.5	89.2 ± 4.5
Cyclohexene	µg/m³	0.0	0.0	0.0	0.1	14.2 ± 1.2	20 ± 1	16.9 ± 0.8	20 ± 1	20 ± 1
3-methylhexane	µg/m³	1.4 ± 0.1	1.4 ± 0.1	1.4 ± 0.1	0.0	361.3 ± 18.1	0.0	0.0	0.0	0.0
1,3-dimethylcyclopentane (cis)	µg/m³	0.3	0.3	0.3	0.0	80.7 ± 4	0.0	0.0	0.0	0.0
1-heptene	µg/m³	0.9 ± 0.1	0.9 ± 0.1	0.9 ± 0.1	0.4	215.4 ± 34	219.7 ± 11	165.8 ± 8.3	219.7 ± 11	219.7 ± 11
2,2,4-trimethylpentane	µg/m³	0.3 ± 0.1	0.3 ± 0.1	0.3 ± 0.1	0.1 ± 0.1	69.8 ± 3.5	61.6 ± 3.1	45.5 ± 2.3	61.6 ± 3.1	61.6 ± 3.1
n-heptane	µg/m³	1.1 ± 0.1	1.1 ± 0.1	1.1 ± 0.1	0.6	213.9 ± 10.7	268.1 ± 13.4	196.9 ± 9.8	268.1 ± 13.4	268.1 ± 13.4
2,3-dimethyl-2-pentene	µg/m³	0.0	0.0	0.0	0.0	1.9 ± 0.1	4 ± 0.2	3.1 ± 0.2	4 ± 0.2	4 ± 0.2
Methylcyclohexane	µg/m³	0.9 ± 0.2	0.9 ± 0.2	0.9 ± 0.2	0.9	182.9 ± 42.3	187.1 ± 9.4	138.6 ± 6.9	187.1 ± 9.4	187.1 ± 9.4
2,3,4-trimethylpentane	µg/m³	0.5 ± 0.1	0.5 ± 0.1	0.5 ± 0.1	0.1 ± 0.1	50.6 ± 3.2	45.1 ± 2.3	31.9 ± 1.6	45.1 ± 2.3	45.1 ± 2.3
Toluene	µg/m³	3.1 ± 0.4	3.1 ± 0.4	3.1 ± 0.4	3.9 ± 0.2	537.1 ± 73.9	974.7 ± 48.7	797.5 ± 39.9	974.7 ± 48.7	974.7 ± 48.7
2-methylheptane	µg/m³	0.5 ± 0.1	0.5 ± 0.1	0.5 ± 0.1	0.3 ± 0.1	119.6 ± 6	114.9 ± 5.7	82.5 ± 4.1	114.9 ± 5.7	114.9 ± 5.7
4-methylheptane	µg/m³	0.2 ± 0.1	0.2 ± 0.1	0.2 ± 0.1	0.1 ± 0.1	40.2 ± 9.3	42.5 ± 2.1	30.2 ± 1.5	42.5 ± 2.1	42.5 ± 2.1
3-methylheptane	µg/m³	0.5 ± 0.1	0.5 ± 0.1	0.5 ± 0.1	0.2 ± 0.1	114 ± 5.7	110.7 ± 5.5	80.8 ± 4	110.7 ± 5.5	110.7 ± 5.5
n-octane	µg/m³	0.5 ± 0.1	0.5 ± 0.1	0.5 ± 0.1	0.3 ± 0.1	108.4 ± 23.7	139.3 ± 7	99.9 ± 5	139.3 ± 7	139.3 ± 7
Ethylbenzene	µg/m³	0.6 ± 0.1	0.6 ± 0.1	0.6 ± 0.1	0.8	118 ± 26.9	231.6 ± 11.6	182.3 ± 9.1	231.6 ± 11.6	231.6 ± 11.6
m&p-xylene	µg/m³	1.4 ± 0.3	1.4 ± 0.3	1.4 ± 0.3	2.6 ± 0.1	233.3 ± 48.7	618.4 ± 30.9	492 ± 24.6	618.4 ± 30.9	618.4 ± 30.9
Styrene	µg/m³	0.1	0.1	0.1	0.6	7 ± 0.5	5 ± 0.2	4.4 ± 0.2	5 ± 0.2	5 ± 0.2
o-xylene	µg/m³	0.4	0.4	0.4	1.1 ± 0.1	80.6 ± 4	249.7 ± 12.5	196.2 ± 9.8	249.7 ± 12.5	249.7 ± 12.5

Table R.2. Composition of NPACT animal toxicology exposure atmospheres for S, N, RD, MVE_{High}, $MVEG_{High}$, and the combinations of $MVEG_{High}$ and RD, S or N.[a]

Exposure Atmosphere Composition	Units	Control	S	N	RD	MVE_{High}	$MVEG_{High}$	RD + $MVEG_{High}$	S + $MVEG_{High}$	N + $MVEG_{High}$
n-nonane	µg/m³	0.6 ± 0.1	0.6 ± 0.1	0.6 ± 0.1	1.5 ± 0.1	51.6 ± 5.1	75.9 ± 3.8	54.9 ± 2.7	75.9 ± 3.8	75.9 ± 3.8
Isopropylbenzene	µg/m³	0 ± 0.1	0 ± 0.1	0 ± 0.1	0.1 ± 0.1	9.3 ± 1.2	20 ± 1	15.2 ± 0.8	20 ± 1	20 ± 1
n-propylbenzene	µg/m³	0.1 ± 0.1	0.1 ± 0.1	0.1 ± 0.1	0.4 ± 0.1	23.3 ± 2.8	67.1 ± 3.4	49.5 ± 2.5	67.1 ± 3.4	67.1 ± 3.4
Alpha-pinene	µg/m³	0 ± 0.1	0 ± 0.1	0 ± 0.1	0 ± 0.1	0 ± 0.1	0.7 ± 0.1	0 ± 0.1	0.7 ± 0.1	0.7 ± 0.1
3-ethyltoluene	µg/m³	0.4 ± 0.1	0.4 ± 0.1	0.4 ± 0.1	1.4 ± 0.1	87.2 ± 12.8	265.7 ± 13.3	203.2 ± 10.2	265.7 ± 13.3	265.7 ± 13.3
4-ethyltoluene	µg/m³	0.2 ± 0.1	0.2 ± 0.1	0.2 ± 0.1	0.5 ± 0.1	41.9 ± 7.1	87.4 ± 4.4	66.7 ± 3.3	87.4 ± 4.4	87.4 ± 4.4
1,3,5-trimethylbenzene	µg/m³	0.2 ± 0.1	0.2 ± 0.1	0.2 ± 0.1	0.6 ± 0.1	37.4 ± 7.9	83.9 ± 4.2	64 ± 3.2	83.9 ± 4.2	83.9 ± 4.2
o-ethyltoluene	µg/m³	0.2 ± 0.1	0.2 ± 0.1	0.2 ± 0.1	0.4 ± 0.1	31.1 ± 4.7	72.1 ± 3.6	55.5 ± 2.8	72.1 ± 3.6	72.1 ± 3.6
1,2,4-trimethylbenzene+t-butylbenzene	µg/m³	NA	NA	NA	1.1 ± 0.1	NA	153.9 ± 7.7	117.4 ± 5.9	153.9 ± 7.7	153.9 ± 7.7
n-decane	µg/m³	0.7 ± 0.1	0.7 ± 0.1	0.7 ± 0.1	1.7 ± 0.1	21.9 ± 3	69.1 ± 3.5	54.2 ± 2.7	69.1 ± 3.5	69.1 ± 3.5
1,2,3-trimethylbenzene	µg/m³	0.1 ± 0.1	0.1 ± 0.1	0.1 ± 0.1	0.5 ± 0.1	21 ± 3.4	63.6 ± 3.2	48.9 ± 2.4	63.6 ± 3.2	63.6 ± 3.2
Indan	µg/m³	0.1 ± 0.1	0.1 ± 0.1	0.1 ± 0.1	0.1 ± 0.1	11.7 ± 1	26.2 ± 1.3	20.4 ± 1	26.2 ± 1.3	26.2 ± 1.3
1,3-diethylbenzene	µg/m³	0.1 ± 0.1	0.1 ± 0.1	0.1 ± 0.1	0.2 ± 0.1	9.6 ± 1.2	24.4 ± 1.2	19.6 ± 1	24.4 ± 1.2	24.4 ± 1.2
1,4-diethylbenzene	µg/m³	0 ± 0.1	0 ± 0.1	0 ± 0.1	1.2 ± 0.1	NA	30.9 ± 1.5	22.8 ± 1.1	30.9 ± 1.5	30.9 ± 1.5
n-butylbenzene	µg/m³	NA	NA	NA	0 ± 0.1	9.3 ± 1	0 ± 0.1	0 ± 0.1	0 ± 0.1	0 ± 0.1
n-undecane	µg/m³	0.7 ± 0.1	0.7 ± 0.1	0.7 ± 0.1	0 ± 0.1	18.5 ± 1.9	0 ± 0.1	0 ± 0.1	0 ± 0.1	0 ± 0.1

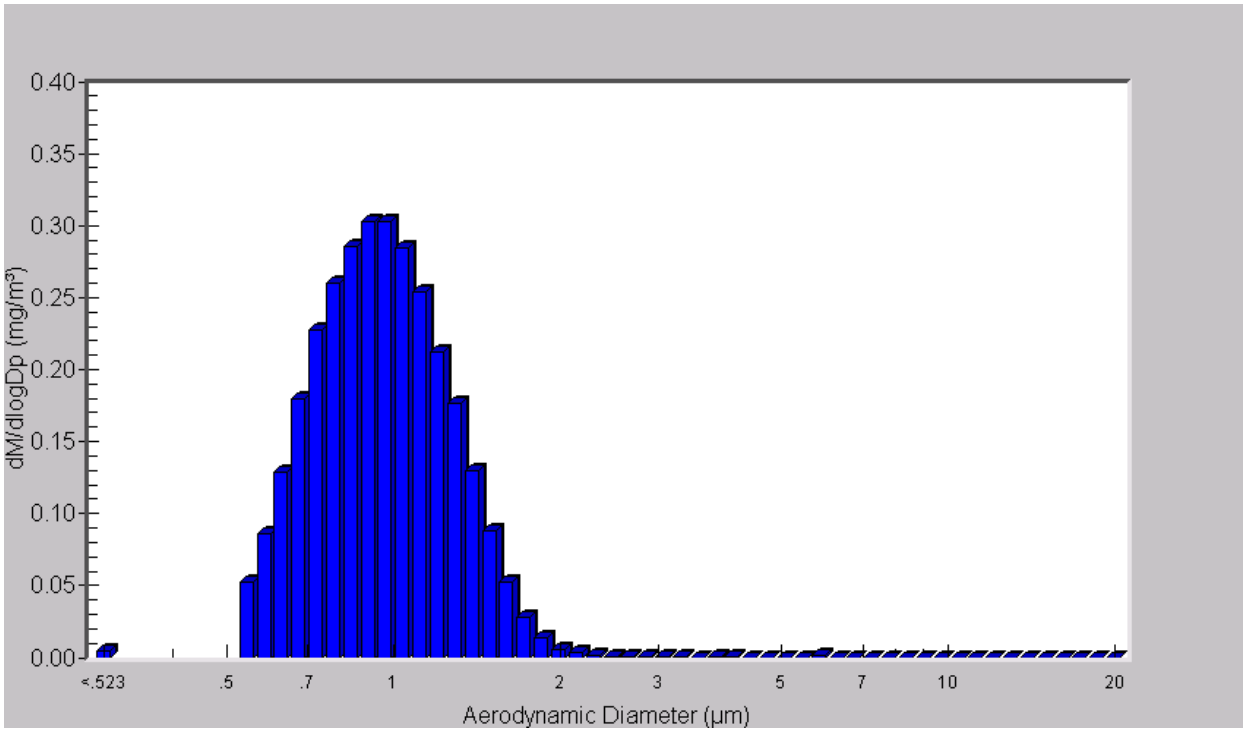

Figure R.1. Particle mass size distribution of $MVE_{High.}$

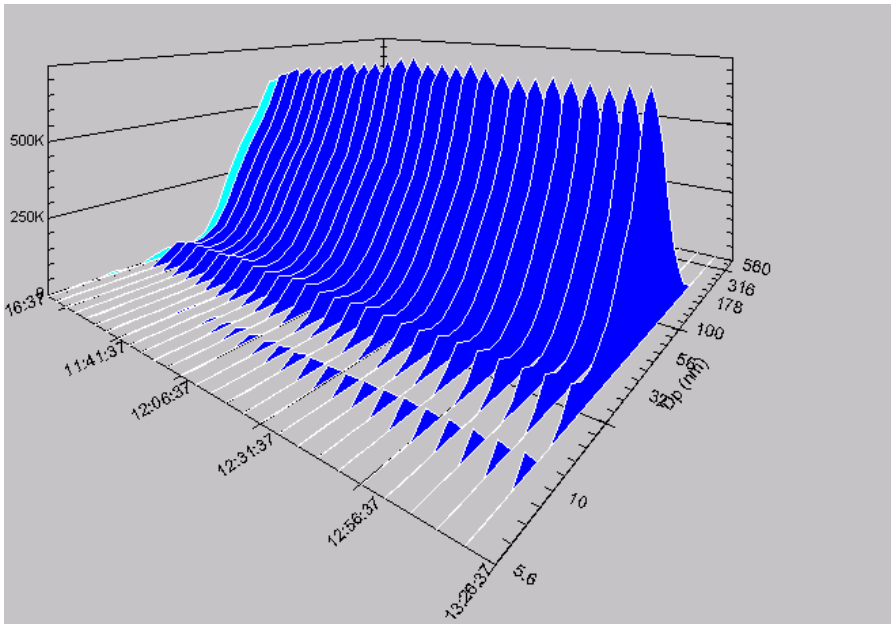

Figure R.2. Particle number size distribution for MVE_{High}

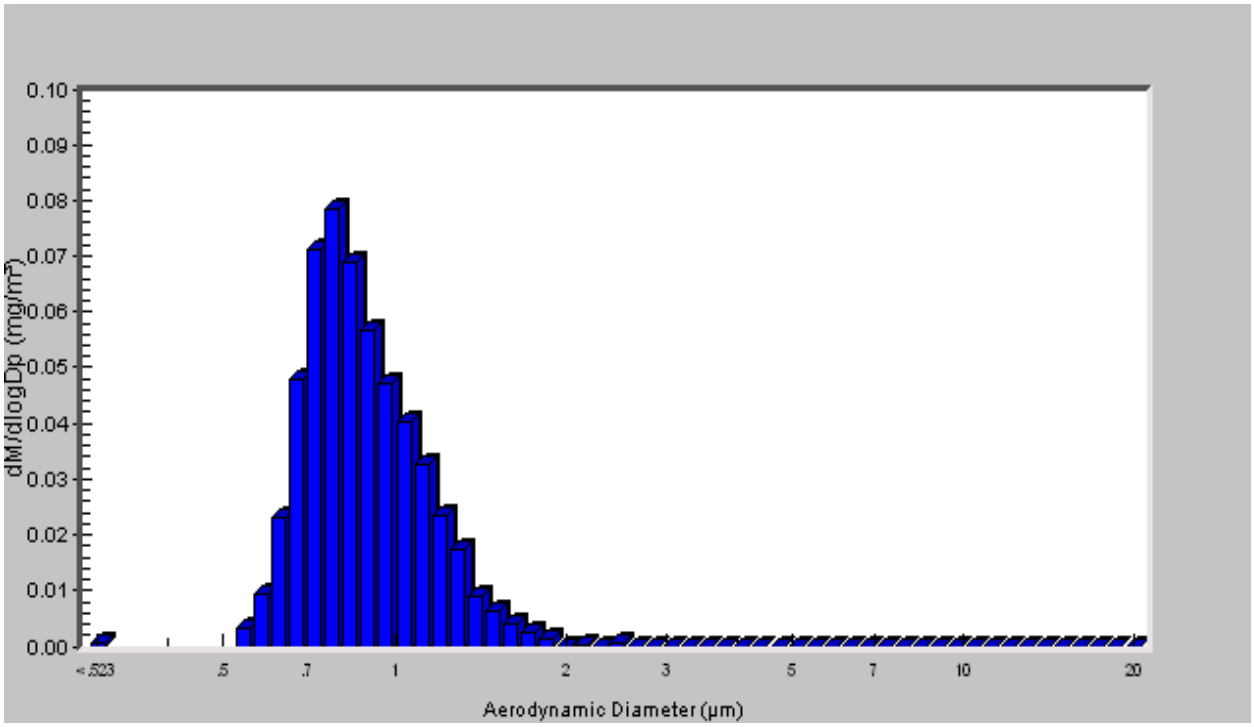

Figure R.3. Particle mass size distribution of Sulfate (S).

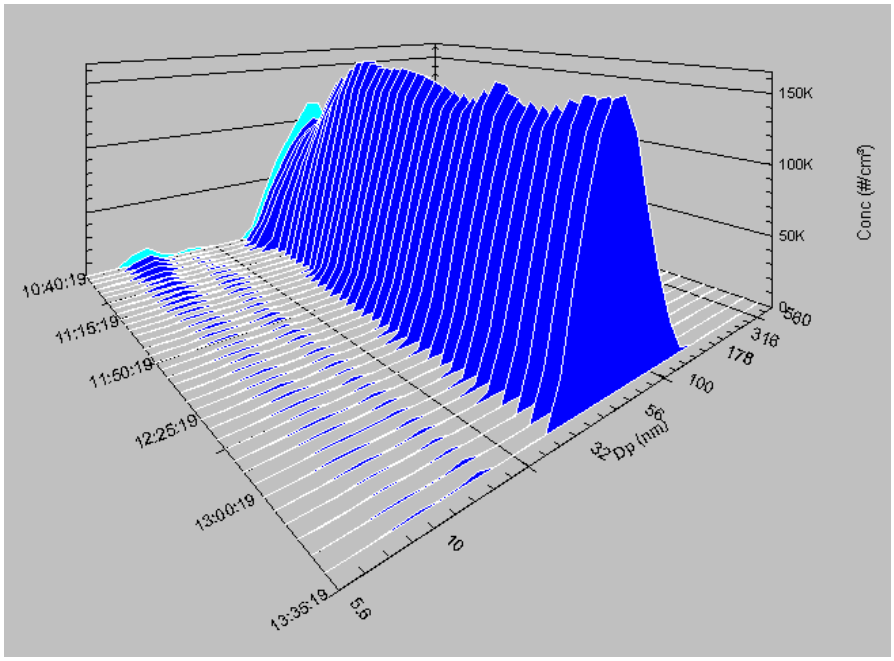

Figure R.4. Particle number size distribution for Sulfate (S).

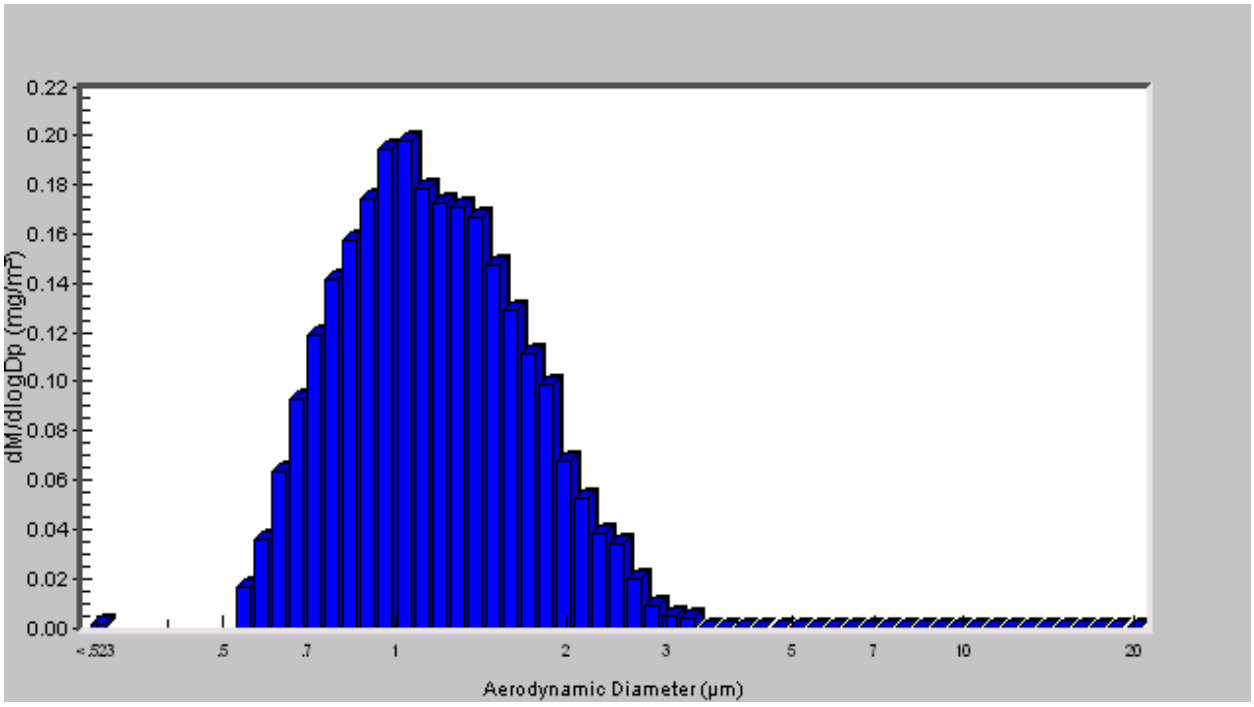

Figure R.5. Particle mass size distribution of Nitrate (N).

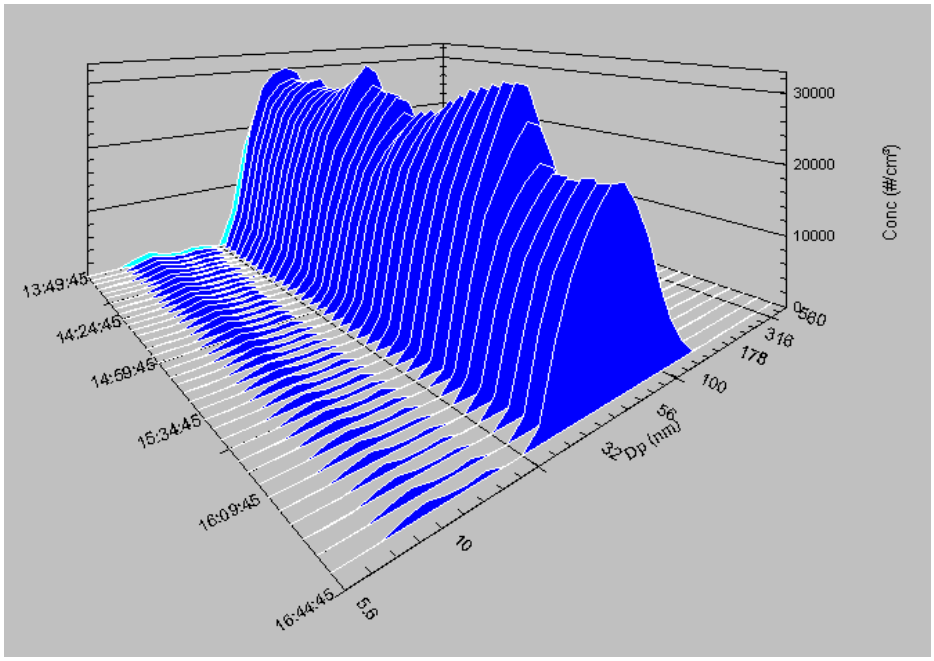

Figure R.6. Particle number size distribution for Nitrate (N).

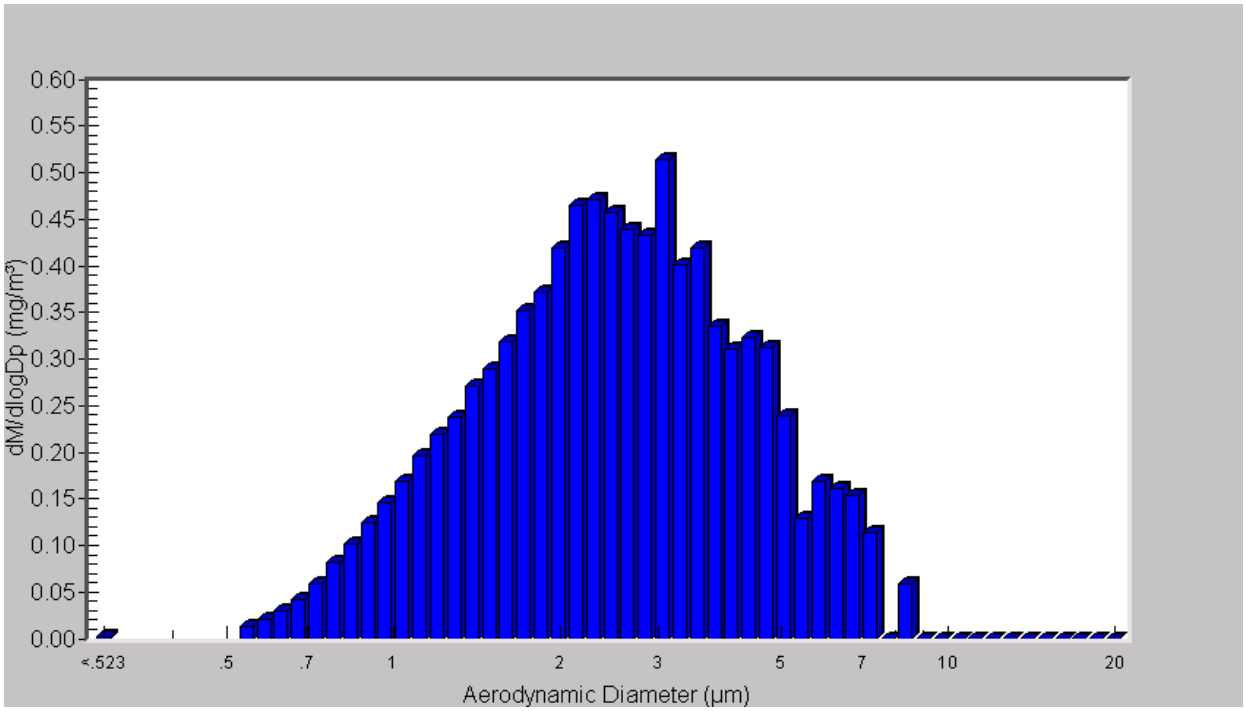

Figure R.7. Particle mass size distribution of Road Dust (RD).

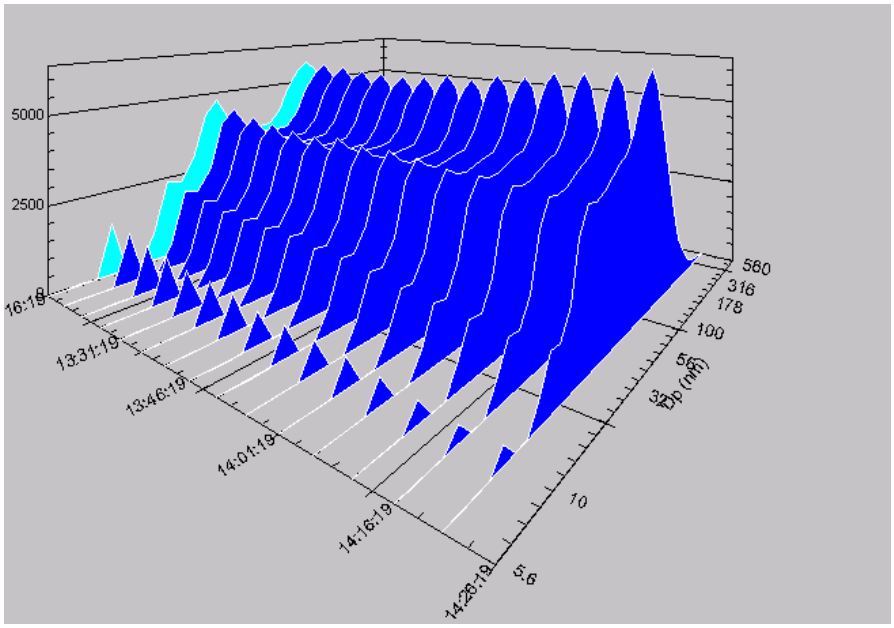

Figure R.8. Particle number size distribution for Road Dust (RD).

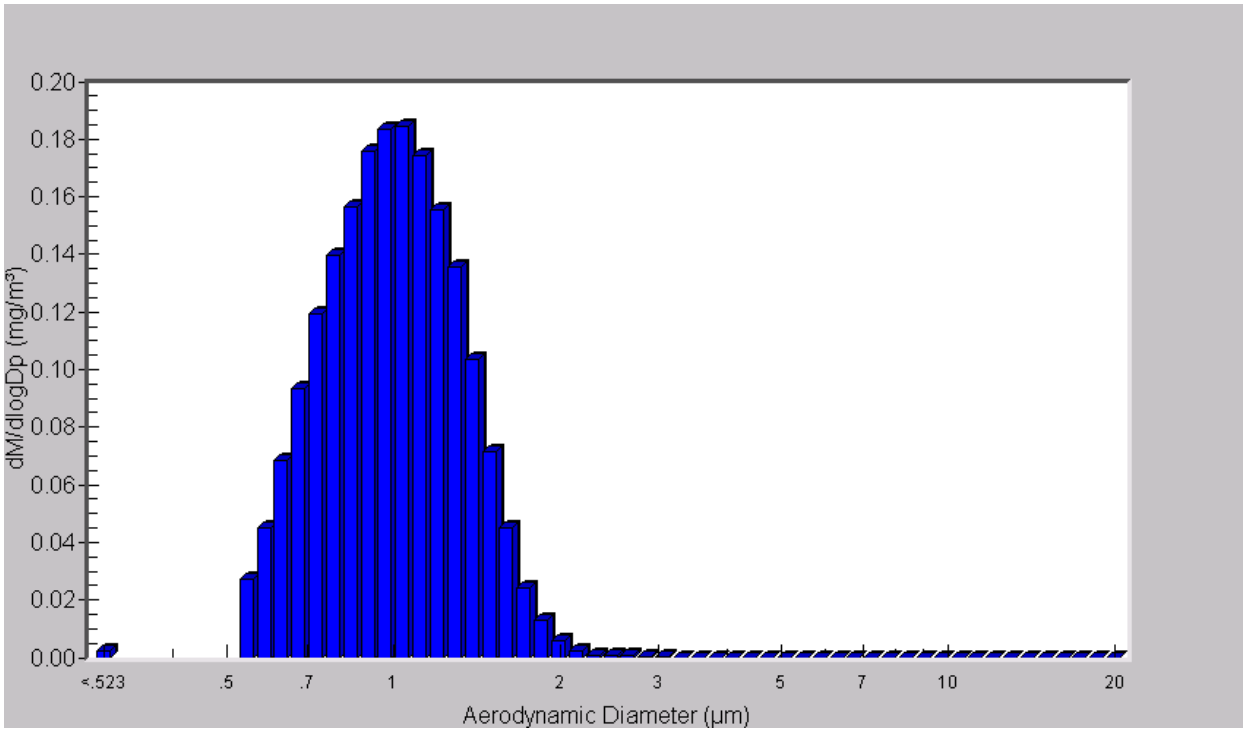

Figure R.9. Particle mass size distribution of S+ MVE.

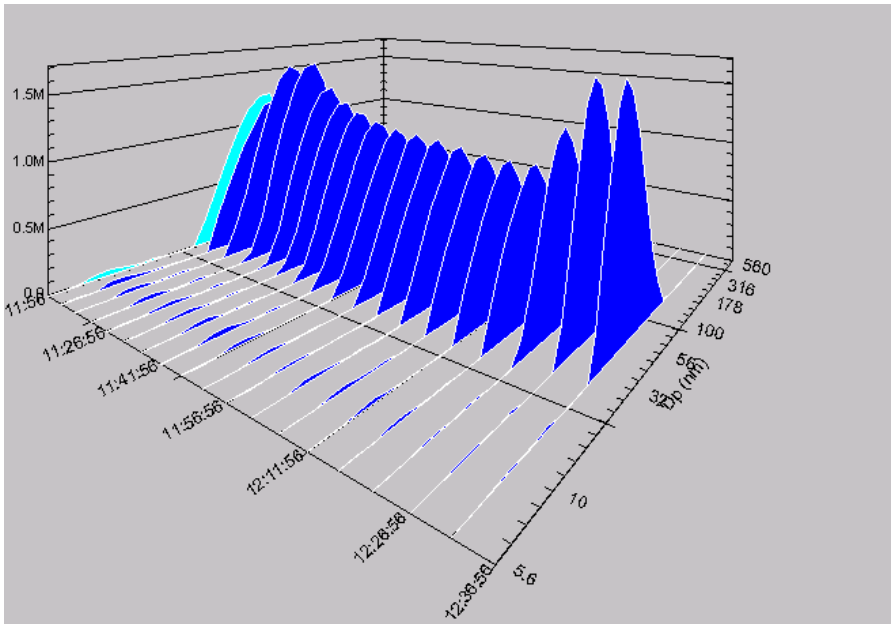

Figure R.10. Particle number size distribution for S+ MVE.

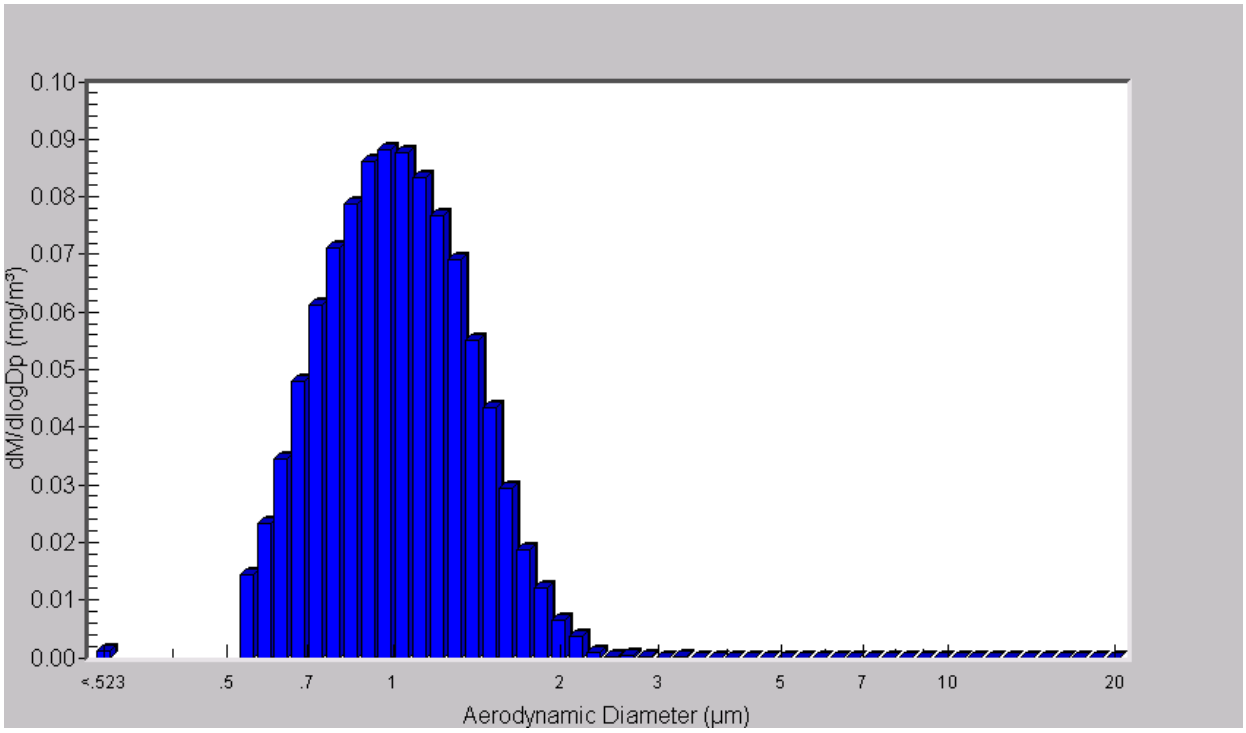

Figure R.11. Particle mass size distribution of N+ MVE.

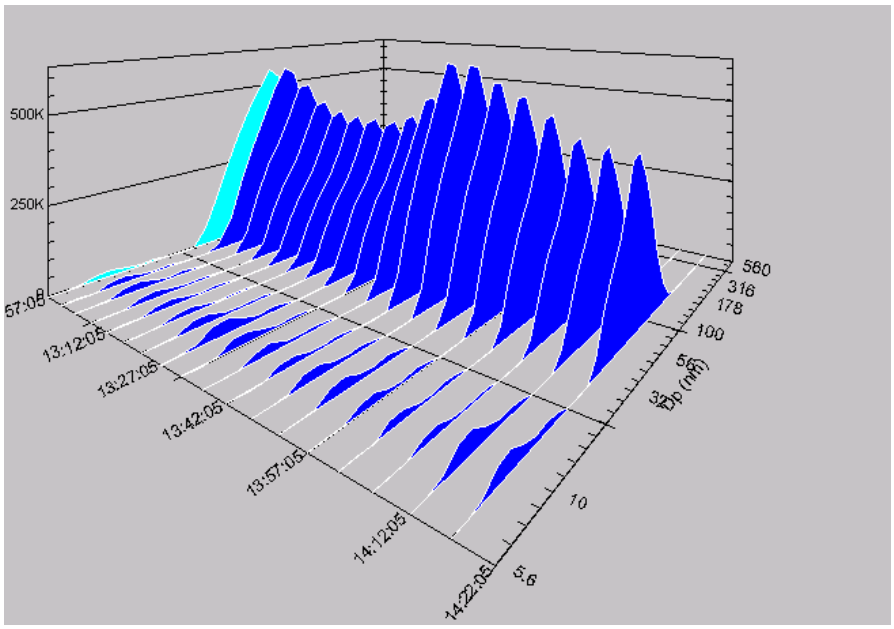

Figure R.12. Particle number size distribution for N+ MVE.

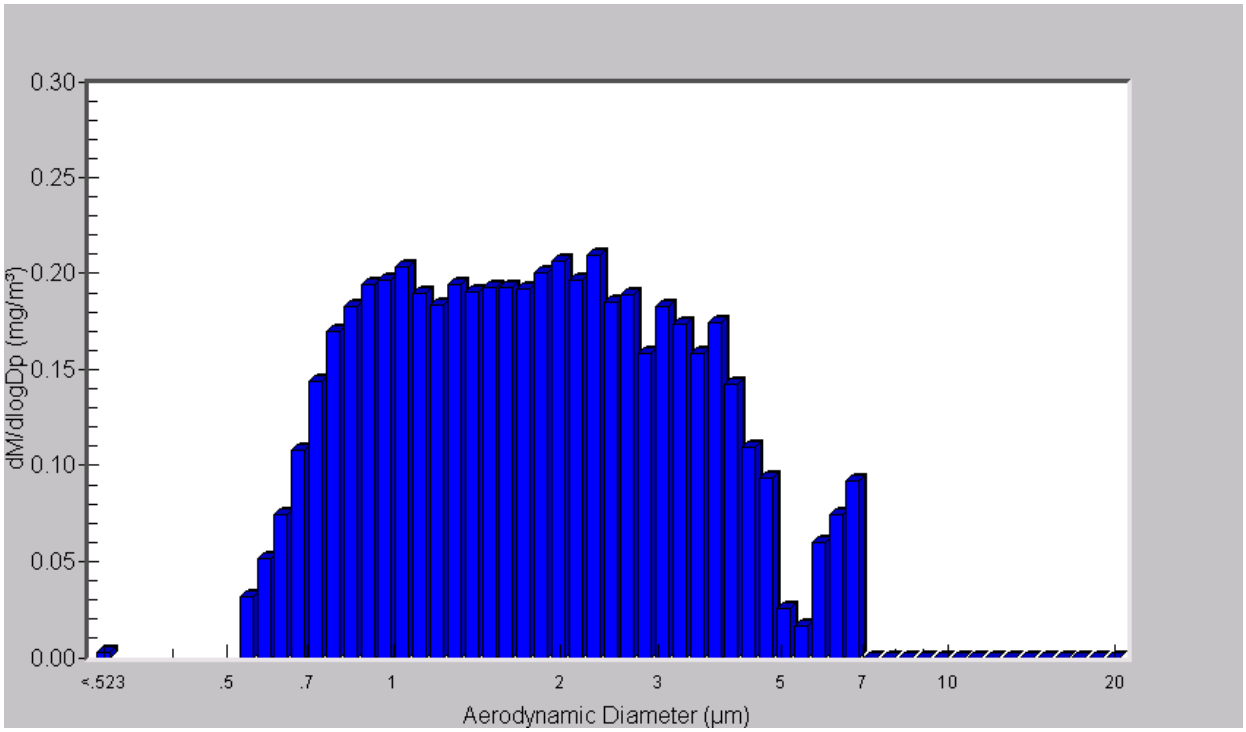

Figure R.13. Particle mass size distribution of RD+ MVE.

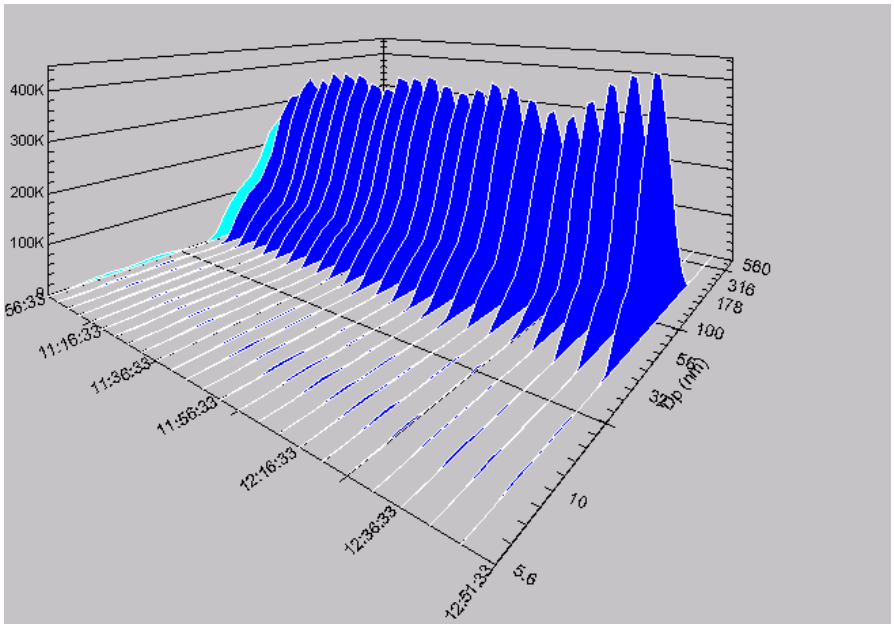

Figure R.14. Particle number size distribution for RD+ MVE.