



## APPENDIX AVAILABLE ON THE HEI WEB SITE

### Communication 17

#### **Advanced Collaborative Emissions Study (ACES) Phase 3A: Characterization of U.S. 2007-Compliant Diesel Engine and Exposure System Operation**

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#### **Appendix D. Detailed Chamber Composition**

Note: Appendices Available on the Web may appear in a different order than in the original Investigators' Report, and some remnants of their original names may be apparent. HEI has not changed the content of these documents, only the letter identifier.

Appendix D was originally Appendix C

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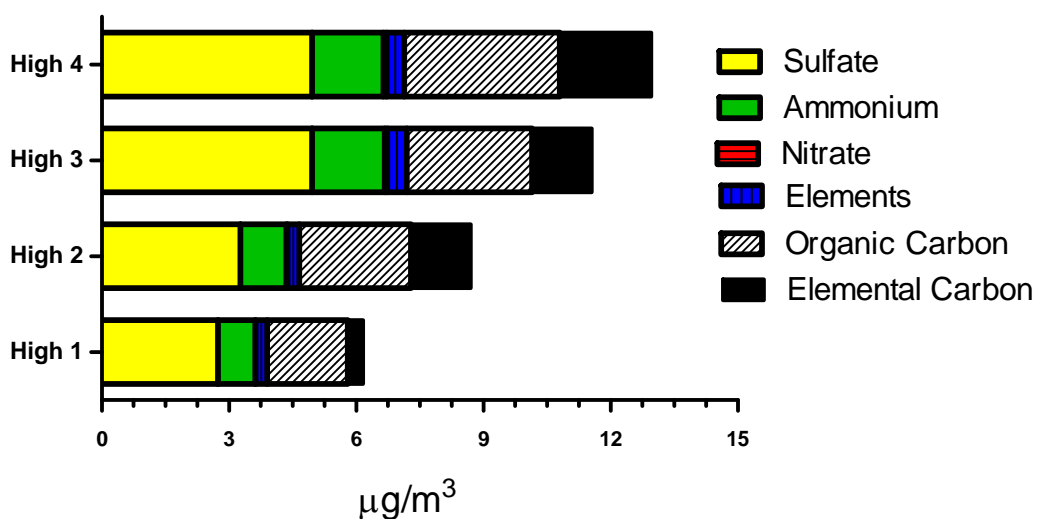
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## APPENDIX C

### Detailed Chamber Composition

Appendix C describes the detailed composition of the high exposure level test atmospheres measured from Engine B. Measurements include detailed analysis of semivolatile organic compounds, volatile organic compounds, elements (metals), carbon, and inorganic ions. Four detailed measurements were conducted, representing the average integrated concentration present over a 16 hr ACES cycle. As expected, the majority of the measured atmosphere constituents were low in concentration. Among the semivolatile compounds, hopanes/steranes were not detected. In the remaining compounds, there was very little observed on the filter, which was analyzed separately from the XAD sorbent that captures the gas phase semivolatiles. The major classes of gas phase semivolatiles that were observed included the aliphatic (straight chain and cyclic), acids, and lower molecular weight polycyclic aromatic hydrocarbons. For the volatile organic compounds, the majority of the compounds were observed in the light (< C5) fraction, and were mostly acetylene and the alkanes/alkenes. There were some aromatics observed (e.g., Toluene), but Benzene concentration was low. For the particle characterization, there was reasonable agreement (~ 10%) between weighed mass and the sum of measured species considering the uncertainty in each of the measurements. Figure C-1 below shows the composition of the particulate matter in the exposure atmosphere. Carbon accounted for approximately one-third of the mass, and the carbon was primarily organic. The inorganic ions (mostly sulfate and ammonium) made up about half of the mass as well. The remaining mass was made up of the elements.



**Figure C-1.** Composition of particulate matter in the ACES high-level exposure atmosphere.



| Semivolatile Organic Compounds            | Units             | Particle (Filter) |                | Semivolatile (XAD) |                | Particle (Filter) |                | Semivolatile (XAD) |                | Particle (Filter) |                | Semivolatile (XAD) |        |
|---|-------------------|-------------------|----------------|--------------------|----------------|-------------------|----------------|--------------------|----------------|-------------------|----------------|--------------------|--------|
|   |                   | High Chamber 1    | High Chamber 1 | High Chamber 2     | High Chamber 2 | High Chamber 3    | High Chamber 3 | High Chamber 4     | High Chamber 4 | High Chamber 4    | High Chamber 4 |                    |        |
|   |                   | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00   |
| 22R-17A(H),21B(H)-30,31-Bishomohopane     | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00   |
| 22S-17A(H),21B(H)-30,31,32-Trisomohopane  | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.12               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00   |
| 22R-17A(H),21B(H)-30,31,32-Trisomohopane  | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00   |
| C27-20S5A(H),14A(H)-cholestane            | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00   |
| C27-20R5A(H),14B(H)-cholestane            | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00   |
| C27-20S5A(H),14B(H),17B(H)-cholestane     | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00   |
| C27-20R5A(H),14A(H),17A(H)-ergostane & C; | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00   |
| C28-20S5A(H),14A(H),17A(H)-ergostane      | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00   |
| C28-20R5A(H),14B(H),17B(H)-ergostane      | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00   |
| C28-20S5A(H),14B(H),17B(H)-ergostane      | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00   |
| C29-20S5A(H),14A(H),17A(H)-stigmastane    | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00   |
| C29-20R5A(H),14B(H),17B(H)-stigmastane    | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00   |
| C29-20S5A(H),14B(H),17B(H)-stigmastane    | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00   |
| 1+2ethylnaphthalene                       | ng/m <sup>3</sup> | 0.00              | 17.35          | 0.00               | 33.35          | 0.00              | 26.20          | 0.00               | 358.28         | 0.00              | 20.13          | 0.00               | 346.54 |
| naphthalene                               | ng/m <sup>3</sup> | 0.03              | 187.71         | 0.04               | 359.85         | 0.30              | 886.28         | 0.10               | 1890.00        | 0.00              | 90.00          | 0.00               | 90.00  |
| Quinoline                                 | ng/m <sup>3</sup> | 0.00              | 0.59           | 0.00               | 2.58           | 0.00              | 0.86           | 0.00               | 3.62           | 0.00              | 0.90           | 0.00               | 0.90   |
| 1-methylnaphthalene                       | ng/m <sup>3</sup> | 0.00              | 32.09          | 0.00               | 101.68         | 0.03              | 72.42          | 0.00               | 242.00         | 0.00              | 45.66          | 0.00               | 45.66  |
| 2-methylnaphthalene                       | ng/m <sup>3</sup> | 0.00              | 23.82          | 0.00               | 77.85          | 0.00              | 57.43          | 0.00               | 189.00         | 0.00              | 36.91          | 0.00               | 36.91  |
| Biphenyl                                  | ng/m <sup>3</sup> | 0.00              | 17.68          | 0.00               | 50.32          | 0.00              | 44.80          | 0.00               | 144.00         | 0.00              | 30.40          | 0.00               | 30.40  |
| 1,3+1,6+1,7-dimethylnaphth                | ng/m <sup>3</sup> | 0.00              | 282.04         | 0.00               | 447.73         | 0.09              | 438.34         | 0.00               | 1313.00        | 0.00              | 418.31         | 0.00               | 418.31 |
| 2,6+2,7-dimethylnaphthalene               | ng/m <sup>3</sup> | 0.00              | 108.11         | 0.00               | 108.11         | 0.00              | 53.37          | 0.00               | 166.00         | 0.00              | 25.20          | 0.00               | 25.20  |
| 2-methylbiphenyl                          | ng/m <sup>3</sup> | 0.00              | 38.49          | 0.05               | 214.23         | 0.00              | 103.96         | 0.00               | 311.00         | 0.00              | 30.08          | 0.00               | 30.08  |
| 1,8-dimethylnaphthalene                   | ng/m <sup>3</sup> | 0.00              | 12.88          | 0.00               | 79.96          | 0.00              | 35.93          | 0.00               | 113.00         | 0.02              | 16.12          | 0.00               | 16.12  |
| Acenaphthylene                            | ng/m <sup>3</sup> | 0.00              | 4.98           | 0.00               | 5.01           | 0.00              | 4.30           | 0.00               | 13.00          | 0.00              | 4.36           | 0.00               | 4.36   |
| Acenaphthene                              | ng/m <sup>3</sup> | 0.00              | 4.98           | 0.00               | 22.42          | 0.00              | 10.43          | 0.00               | 31.00          | 0.00              | 4.78           | 0.00               | 4.78   |
| 1,4+1,5+2,3-dimethylnaphth                | ng/m <sup>3</sup> | 0.00              | 0.08           | 0.00               | 0.12           | 0.00              | 0.07           | 0.00               | 0.27           | 0.00              | 0.27           | 0.00               | 0.27   |
| 1,2-dimethylnaphthalene                   | ng/m <sup>3</sup> | 0.00              | 5.74           | 0.00               | 7.91           | 0.00              | 7.42           | 0.00               | 22.00          | 0.00              | 7.84           | 0.00               | 7.84   |
| Dibenzofuran                              | ng/m <sup>3</sup> | 0.00              | 135.70         | 0.00               | 241.90         | 0.00              | 233.96         | 0.00               | 700.00         | 0.00              | 200.96         | 0.00               | 200.96 |
| 3-methylbiphenyl                          | ng/m <sup>3</sup> | 0.00              | 67.71          | 0.00               | 156.22         | 0.00              | 124.29         | 0.00               | 373.00         | 0.00              | 105.85         | 0.00               | 105.85 |
| 4-methylbiphenyl                          | ng/m <sup>3</sup> | 0.00              | 4.33           | 0.00               | 5.71           | 0.00              | 5.70           | 0.00               | 17.00          | 0.00              | 5.00           | 0.00               | 5.00   |
| Fluorene                                  | ng/m <sup>3</sup> | 0.00              | 4.00           | 0.00               | 7.46           | 0.00              | 5.45           | 0.00               | 16.00          | 0.00              | 3.62           | 0.00               | 3.62   |
| B-trimethylnaphthalene                    | ng/m <sup>3</sup> | 0.00              | 14.45          | 0.00               | 37.81          | 0.00              | 23.57          | 0.00               | 71.00          | 0.00              | 14.59          | 0.00               | 14.59  |
| 1-ethyl-2-methylnaphthalene               | ng/m <sup>3</sup> | 0.00              | 16.95          | 0.10               | 42.86          | 0.00              | 27.37          | 0.00               | 83.00          | 0.00              | 16.81          | 0.00               | 16.81  |
| 2-ethyl-1-methylnaphthalene               | ng/m <sup>3</sup> | 0.00              | 18.55          | 0.00               | 50.00          | 0.00              | 29.45          | 0.00               | 88.00          | 0.00              | 17.96          | 0.00               | 17.96  |
| E-trimethylnaphthalene                    | ng/m <sup>3</sup> | 0.00              | 16.41          | 0.00               | 41.33          | 0.00              | 24.95          | 0.00               | 74.00          | 0.00              | 14.89          | 0.00               | 14.89  |
| F-trimethylnaphthalene                    | ng/m <sup>3</sup> | 0.00              | 1.09           | 0.00               | 0.36           | 0.00              | 0.26           | 0.00               | 0.77           | 0.00              | 0.17           | 0.00               | 0.17   |
| J-trimethylnaphthalene                    | ng/m <sup>3</sup> | 0.00              | 10.70          | 0.00               | 30.84          | 0.00              | 18.92          | 0.00               | 55.00          | 0.00              | 11.59          | 0.00               | 11.59  |
| 1,4,5-trimethylnaphthalene                | ng/m <sup>3</sup> | 0.00              | 3.91           | 0.00               | 6.76           | 0.00              | 5.02           | 0.00               | 15.00          | 0.00              | 3.48           | 0.00               | 3.48   |
| 2,4,5-trimethylnaphthalene                | ng/m <sup>3</sup> | 0.00              | 9.09           | 0.00               | 22.76          | 0.00              | 14.51          | 0.00               | 41.00          | 0.00              | 8.61           | 0.00               | 8.61   |
| 2,3,5+4-trimethylnaphthalene              | ng/m <sup>3</sup> | 0.00              | 14.81          | 0.00               | 16.95          | 0.00              | 17.75          | 0.00               | 52.00          | 0.00              | 17.98          | 0.00               | 17.98  |
| A-trimethylnaphthalene                    | ng/m <sup>3</sup> | 0.00              | 0.41           | 0.00               | 5.46           | 0.00              | 3.70           | 0.00               | 10.00          | 0.00              | 2.29           | 0.00               | 2.29   |
| C-trimethylnaphthalene                    | ng/m <sup>3</sup> | 0.00              | 6.09           | 0.00               | 15.91          | 0.00              | 9.48           | 0.00               | 25.00          | 0.00              | 6.48           | 0.00               | 6.48   |
| Anthracene                                | ng/m <sup>3</sup> | 0.00              | 3.45           | 0.00               | 7.75           | 0.00              | 4.48           | 0.00               | 13.00          | 0.00              | 3.98           | 0.00               | 3.98   |
| Phenanthrene                              | ng/m <sup>3</sup> | 0.00              | 1.17           | 0.00               | 2.44           | 0.00              | 1.18           | 0.00               | 3.00           | 0.00              | 0.91           | 0.00               | 0.91   |
| 9-fluorenone                              | ng/m <sup>3</sup> | 0.00              | 3.83           | 0.00               | 6.59           | 0.00              | 4.68           | 0.00               | 13.00          | 0.00              | 3.93           | 0.00               | 3.93   |
| A-Methylfluorene                          | ng/m <sup>3</sup> | 0.00              | 4.51           | 0.04               | 4.60           | 0.00              | 7.43           | 0.01               | 22.00          | 0.00              | 7.27           | 0.00               | 7.27   |
| B-Methylfluorene                          | ng/m <sup>3</sup> | 0.00              | 0.11           | 0.00               | 0.28           | 0.00              | 0.40           | 0.00               | 1.00           | 0.00              | 0.23           | 0.00               | 0.23   |
| 1-Methylfluorene                          | ng/m <sup>3</sup> | 0.01              | 29.64          | 0.09               | 36.14          | 0.10              | 38.45          | 0.13               | 111.00         | 0.00              | 41.18          | 0.00               | 41.18  |
| Dibenzothiophene                          | ng/m <sup>3</sup> | 0.00              | 1.04           | 0.01               | 1.97           | 0.00              | 1.30           | 0.00               | 3.00           | 0.00              | 1.55           | 0.00               | 1.55   |
| 4,5-methylenepheneanthrene                | ng/m <sup>3</sup> | 0.00              | 1.12           | 0.00               | 4.50           | 0.00              | 2.67           | 0.00               | 7.00           | 0.00              | 2.19           | 0.00               | 2.19   |
| Perinaphthenone                           | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00   |
| Acenaphthenequinone                       | ng/m <sup>3</sup> | 0.00              | 1.96           | 0.00               | 2.70           | 0.04              | 2.56           | 0.01               | 7.00           | 0.00              | 1.68           | 0.00               | 1.68   |
| 1-methylphenanthrene                      | ng/m <sup>3</sup> | 0.00              | 2.05           | 0.02               | 2.79           | 0.00              | 2.56           | 0.01               | 7.00           | 0.00              | 2.40           | 0.00               | 2.40   |
| 2-methylanthracene                        | ng/m <sup>3</sup> | 0.00              | 0.42           | 0.00               | 0.36           | 0.00              | 0.39           | 0.00               | 1.00           | 0.00              | 1.48           | 0.00               | 1.48   |
| 3-methylphenanthrene                      | ng/m <sup>3</sup> | 0.00              | 0.22           | 0.00               | 1.21           | 0.00              | 0.77           | 0.00               | 2.00           | 0.00              | 0.27           | 0.00               | 0.27   |

| Semivolatile Organic Compounds       | Units             | Particle (Filter) |                | Semivolatile (XAD) |                | Particle (Filter) |                | Semivolatile (XAD) |                | Particle (Filter) |                | Semivolatile (XAD) |                |
|--------------------------------------|-------------------|-------------------|----------------|--------------------|----------------|-------------------|----------------|--------------------|----------------|-------------------|----------------|--------------------|----------------|
|                                      |                   | High Chamber 1    | High Chamber 1 | High Chamber 2     | High Chamber 2 | High Chamber 3    | High Chamber 3 | High Chamber 4     | High Chamber 4 | High Chamber 4    | High Chamber 4 | High Chamber 4     | High Chamber 4 |
|                                      |                   | 0.00              | 1.93           | 0.01               | 2.44           | 0.00              | 2.51           | 0.01               | 2.82           |                   |                |                    |                |
| 2-methylphenanthrene                 | ng/m <sup>3</sup> | 0.00              | 1.93           | 0.01               | 2.44           | 0.00              | 2.51           | 0.01               | 2.82           |                   |                |                    |                |
| 9-methylphenanthrene                 | ng/m <sup>3</sup> | 0.00              | 1.66           | 0.00               | 2.26           | 0.00              | 2.19           | 0.00               | 1.96           |                   |                |                    |                |
| Xanthone                             | ng/m <sup>3</sup> | 0.00              | 0.99           | 0.01               | 1.67           | 0.00              | 1.57           | 0.00               | 1.61           |                   |                |                    |                |
| 2-phenylaphthalene                   | ng/m <sup>3</sup> | 0.00              | 0.04           | 0.00               | 0.74           | 0.00              | 0.46           | 0.00               | 0.58           |                   |                |                    |                |
| 9-methylanthracene                   | ng/m <sup>3</sup> | 0.00              | 0.12           | 0.00               | 0.22           | 0.00              | 0.29           | 0.00               | 0.13           |                   |                |                    |                |
| Anthrone                             | ng/m <sup>3</sup> | 0.00              | 0.40           | 0.00               | 0.26           | 0.00              | 0.72           | 0.00               | 0.75           |                   |                |                    |                |
| Fluoranthene                         | ng/m <sup>3</sup> | 0.00              | 0.89           | 0.00               | 1.48           | 0.00              | 1.84           | 0.00               | 2.36           |                   |                |                    |                |
| A-dimethylphenanthrene               | ng/m <sup>3</sup> | 0.00              | 0.47           | 0.00               | 0.64           | 0.00              | 0.94           | 0.00               | 0.47           |                   |                |                    |                |
| B-dimethylphenanthrene               | ng/m <sup>3</sup> | 0.00              | 0.12           | 0.00               | 0.54           | 0.00              | 0.64           | 0.00               | 0.39           |                   |                |                    |                |
| C-dimethylphenanthrene               | ng/m <sup>3</sup> | 0.00              | 0.41           | 0.00               | 0.81           | 0.00              | 0.56           | 0.00               | 0.59           |                   |                |                    |                |
| 1,7-dimethylphenanthrene             | ng/m <sup>3</sup> | 0.00              | 0.24           | 0.00               | 0.65           | 0.00              | 0.71           | 0.00               | 0.44           |                   |                |                    |                |
| 3,6-dimethylphenanthrene             | ng/m <sup>3</sup> | 0.00              | 0.17           | 0.00               | 0.38           | 0.00              | 0.41           | 0.00               | 0.31           |                   |                |                    |                |
| D-dimethylphenanthrene               | ng/m <sup>3</sup> | 0.01              | 0.07           | 0.00               | 0.37           | 0.00              | 0.23           | 0.00               | 0.28           |                   |                |                    |                |
| E-dimethylphenanthrene               | ng/m <sup>3</sup> | 0.00              | 0.55           | 0.02               | 1.16           | 0.00              | 1.29           | 0.00               | 1.00           |                   |                |                    |                |
| Antraquinone                         | ng/m <sup>3</sup> | 0.04              | 2.18           | 0.18               | 3.06           | 0.13              | 3.31           | 0.31               | 3.65           |                   |                |                    |                |
| benzo(a)fluorene                     | ng/m <sup>3</sup> | 0.02              | 1.47           | 0.16               | 2.23           | 0.27              | 2.68           | 0.47               | 2.71           |                   |                |                    |                |
| benzo(b)fluorene                     | ng/m <sup>3</sup> | 0.00              | 0.10           | 0.00               | 0.19           | 0.00              | 0.03           | 0.06               | 0.00           |                   |                |                    |                |
| Pyrene                               | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.01           | 0.00              | 0.02           | 0.00               | 0.00           |                   |                |                    |                |
| 9-Anthraaldehyde                     | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           |                   |                |                    |                |
| Retene                               | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.03           | 0.00              | 0.07           | 0.00               | 0.00           |                   |                |                    |                |
| B-MePy/MeFl                          | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.04           | 0.00              | 0.04           | 0.00               | 0.00           |                   |                |                    |                |
| 1-MeFl+C-MeFl/Py                     | ng/m <sup>3</sup> | 0.00              | 0.04           | 0.00               | 0.11           | 0.00              | 0.08           | 0.00               | 0.00           |                   |                |                    |                |
| C-MePy/MeFl                          | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.04           | 0.00              | 0.07           | 0.00               | 0.00           |                   |                |                    |                |
| D-MePy/MeFl                          | ng/m <sup>3</sup> | 0.00              | 0.04           | 0.00               | 0.04           | 0.00              | 0.08           | 0.01               | 0.00           |                   |                |                    |                |
| 1+3-methylfluoranthene               | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.04           | 0.00              | 0.03           | 0.00               | 0.00           |                   |                |                    |                |
| 1-methylpyrene                       | ng/m <sup>3</sup> | 0.00              | 0.02           | 0.00               | 0.05           | 0.00              | 0.00           | 0.00               | 0.00           |                   |                |                    |                |
| 4-methylpyrene                       | ng/m <sup>3</sup> | 0.00              | 0.03           | 0.00               | 0.00           | 0.00              | 0.02           | 0.00               | 0.00           |                   |                |                    |                |
| Benzo(g,h)fluoranthene               | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.03           | 0.00              | 0.03           | 0.00               | 0.00           |                   |                |                    |                |
| benzo(c)phenanthrene                 | ng/m <sup>3</sup> | 0.00              | 0.04           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           |                   |                |                    |                |
| Benzonaphthothiophene                | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.15           | 0.03               | 0.00           |                   |                |                    |                |
| Chrysene-Triphenylene                | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           |                   |                |                    |                |
| 9-phenylanthracene                   | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           |                   |                |                    |                |
| Cyclopenta(c,d)pyrene                | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.01               | 0.00           | 0.00              | 0.00           | 0.02               | 0.00           |                   |                |                    |                |
| Benzo(a)anthracene                   | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           |                   |                |                    |                |
| Benzanthrone                         | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.30               | 0.00           | 0.00              | 0.00           | 0.00               | 0.19           |                   |                |                    |                |
| 7,12-dimethylbenz(a)anthracene       | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           |                   |                |                    |                |
| 5+6-methylchrysene                   | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           |                   |                |                    |                |
| 3-methylchrysene                     | ng/m <sup>3</sup> | 0.00              | 0.01           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           |                   |                |                    |                |
| 7-methylbenz(a)anthracene            | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.02           | 0.00               | 0.00           |                   |                |                    |                |
| Benzo(a)fluoranthene                 | ng/m <sup>3</sup> | 0.02              | 0.00           | 0.00               | 0.00           | 0.03              | 0.07           | 0.00               | 0.05           |                   |                |                    |                |
| Benzo(b,h)fluoranthene               | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.01           | 0.00               | 0.00           |                   |                |                    |                |
| Benzo(a)anthracene-7,12-dione        | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           |                   |                |                    |                |
| 3-methylcholanthrene                 | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           |                   |                |                    |                |
| BaP                                  | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           |                   |                |                    |                |
| BeP                                  | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.05           |                   |                |                    |                |
| Perylene                             | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           |                   |                |                    |                |
| dibenz(a,h)acridine                  | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           |                   |                |                    |                |
| dibenz(a,j)acridine                  | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           |                   |                |                    |                |
| Indeno(1,23-cd)fluoranthene          | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           |                   |                |                    |                |
| 7-methylbenzo(e)pyrene               | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.13           |                   |                |                    |                |
| 9,10-dihydrobenzo(a)pyrene-7(8H)-one | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           |                   |                |                    |                |
| Indeno(1,23-cd)pyrene                | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           |                   |                |                    |                |
| Dibenzo(a,h+ac)anthracene            | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           |                   |                |                    |                |
| Dibenzo(a,j)anthracene               | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           |                   |                |                    |                |
| 7H-dibenzofc,g]carbazole             | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           |                   |                |                    |                |
| Anthanthrene                         | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           |                   |                |                    |                |
| Benzo(g,h)perylene                   | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.01              | 0.00           | 0.02               | 0.00           |                   |                |                    |                |



| Semivolatile Organic Compounds     | Units             | Particle (Filter) |                | Semivolatile (XAD) |                | Particle (Filter) |                | Semivolatile (XAD) |                | Particle (Filter) |                | Semivolatile (XAD) |          |
|------------------------------------|-------------------|-------------------|----------------|--------------------|----------------|-------------------|----------------|--------------------|----------------|-------------------|----------------|--------------------|----------|
|                                    |                   | High Chamber 1    | High Chamber 1 | High Chamber 2     | High Chamber 2 | High Chamber 3    | High Chamber 3 | High Chamber 4     | High Chamber 4 | High Chamber 4    | High Chamber 4 |                    |          |
| 1,12-dodecanedicarboxylic acid     | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00     |
| elaidic acid                       | ng/m <sup>3</sup> | 3.40              | 86.79          | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 5.18     |
| isostearic acid                    | ng/m <sup>3</sup> | 2.80              | 4.98           | 0.00               | 0.00           | 0.00              | 2.62           | 9.51               | 0.00           | 0.00              | 2.45           | 0.00               | 0.00     |
| hexanedioic (adipic) acid (d-6)    | ng/m <sup>3</sup> | 65.25             | 9.25           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 1.65     |
| dehydroabiatic acid                | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00     |
| pimaric acid                       | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00     |
| sandaracopimaric acid              | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00     |
| abietic acid                       | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00     |
| isopimaric acid                    | ng/m <sup>3</sup> | 0.95              | 0.00           | 0.00               | 0.00           | 2.18              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00     |
| 7-oxodehydroabiatic acid           | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 4.85     |
| heneicosanoic acid (c21)           | ng/m <sup>3</sup> | 0.47              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00     |
| tricosanoic acid                   | ng/m <sup>3</sup> | 0.44              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00     |
| tetracosanoic acid (c24)           | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00     |
| cholesterol                        | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00     |
| b-sitosterol                       | ng/m <sup>3</sup> | 5.64              | 172.70         | 0.00               | 0.00           | 123.29            | 0.00           | 205.20             | 0.00           | 0.00              | 0.00           | 0.00               | 212.98   |
| hexanoic acid (c6)                 | ng/m <sup>3</sup> | 4.39              | 161.49         | 0.00               | 0.00           | 159.02            | 0.00           | 227.52             | 0.00           | 0.00              | 0.00           | 0.00               | 196.00   |
| heptanoic acid (c7)                | ng/m <sup>3</sup> | 4.79              | 3283.88        | 0.00               | 0.00           | 851.52            | 0.00           | 4004.45            | 0.00           | 0.00              | 0.00           | 0.00               | 2549.04  |
| benzoic acid                       | ng/m <sup>3</sup> | 0.00              | 89.91          | 0.00               | 0.00           | 120.46            | 0.00           | 168.54             | 0.00           | 0.00              | 0.00           | 0.00               | 96.99    |
| octanoic acid (c8)                 | ng/m <sup>3</sup> | 0.03              | 57.20          | 0.00               | 0.00           | 172.28            | 0.01           | 226.24             | 0.00           | 0.00              | 0.00           | 0.00               | 128.07   |
| o-toluic                           | ng/m <sup>3</sup> | 0.09              | 81.29          | 0.00               | 0.00           | 275.16            | 0.43           | 390.28             | 0.00           | 0.00              | 0.00           | 0.00               | 207.95   |
| m-toluic                           | ng/m <sup>3</sup> | 0.00              | 237.44         | 0.00               | 0.00           | 194.25            | 0.00           | 277.35             | 0.00           | 0.00              | 0.00           | 0.00               | 183.41   |
| nonanoic acid (c9)                 | ng/m <sup>3</sup> | 0.00              | 50.49          | 0.00               | 0.00           | 155.18            | 0.00           | 236.45             | 0.00           | 0.00              | 0.00           | 0.00               | 111.77   |
| p-toluic                           | ng/m <sup>3</sup> | 0.00              | 14.47          | 0.00               | 0.00           | 0.00              | 2.43           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00     |
| decanoic acid (c10)                | ng/m <sup>3</sup> | 0.00              | 19.62          | 0.00               | 0.00           | 3.03              | 0.00           | 10.09              | 0.00           | 0.00              | 0.00           | 0.00               | 16.50    |
| undecanoic acid (c11)              | ng/m <sup>3</sup> | 5.95              | 43.61          | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 1.57     |
| dodecanoic (lauric) acid (c12)     | ng/m <sup>3</sup> | 0.00              | 13.19          | 0.00               | 0.00           | 0.00              | 0.00           | 28.18              | 0.00           | 0.00              | 0.00           | 0.00               | 19.67    |
| tridecanoic acid (c13)             | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00     |
| myristic acid (c14)                | ng/m <sup>3</sup> | 0.00              | 10.06          | 0.00               | 0.00           | 0.00              | 0.00           | 8.66               | 0.00           | 0.00              | 0.00           | 0.00               | 10.45    |
| pentadecanoic acid (c15)           | ng/m <sup>3</sup> | 61.44             | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 7.91               | 0.00           | 0.00              | 0.00           | 0.00               | 7.91     |
| palmitic acid (c16)                | ng/m <sup>3</sup> | 0.00              | 1.56           | 0.00               | 0.00           | 0.00              | 0.00           | 6.56               | 0.00           | 0.00              | 0.00           | 0.00               | 4.20     |
| heptadecanoic acid (c17)           | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 9.93               | 0.00           | 0.00              | 0.00           | 0.00               | 30.38    |
| oleic acid                         | ng/m <sup>3</sup> | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00     |
| stearic acid (c18)                 | ng/m <sup>3</sup> | 0.23              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00     |
| nonadecanoic acid (c19)            | ng/m <sup>3</sup> | 0.00              | 2.13           | 0.00               | 0.00           | 3.32              | 0.00           | 0.00               | 0.00           | 0.00              | 0.00           | 0.00               | 0.00     |
| eicosanoic acid (c20)              | ng/m <sup>3</sup> | 0.11              | 0.87           | 0.11               | 0.11           | 1.67              | 0.11           | 1.31               | 0.11           | 0.11              | 0.11           | 0.11               | 1.01     |
| Sum Semivolatile Organic Compounds | ng/m <sup>3</sup> | 639.14            | 10285.58       | 458.30             | 14388.44       | 498.10            | 516.92         | 19189.39           | 11454.14       | 11454.14          | 11454.14       | 11454.14           | 11454.14 |

| <b>Volatile Organic Compounds</b> | <b>Units</b>      | <b>High Chamber 1</b> | <b>High Chamber 2</b> | <b>High Chamber 3</b> | <b>High Chamber 4</b> |
|-----------------------------------|-------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| acetylene                         | µg/m <sup>3</sup> | 9.71                  | 0.17                  | 10.86                 | 7.64                  |
| ethene                            | µg/m <sup>3</sup> | 1.72                  | 2.45                  | 3.46                  | 2.35                  |
| ethane                            | µg/m <sup>3</sup> | 7.18                  | 6.34                  | 9.48                  | 9.57                  |
| propene                           | µg/m <sup>3</sup> | 1.72                  | 1.45                  | 1.67                  | 1.78                  |
| propane                           | µg/m <sup>3</sup> | 1.22                  | 1.29                  | 2.16                  | 2.09                  |
| 1,3-butadiene                     | µg/m <sup>3</sup> | 0.04                  | 0.03                  | 0.02                  | 0.00                  |
| 1-butene                          | µg/m <sup>3</sup> | 0.26                  | 0.21                  | 0.29                  | 0.27                  |
| c-2-butene                        | µg/m <sup>3</sup> | 0.15                  | 0.09                  | 0.08                  | 0.08                  |
| isobutylene                       | µg/m <sup>3</sup> | 2.54                  | 1.49                  | 1.36                  | 1.31                  |
| t-2-butene                        | µg/m <sup>3</sup> | 0.40                  | 0.11                  | 0.11                  | 0.12                  |
| n-butane                          | µg/m <sup>3</sup> | 1.57                  | 1.54                  | 2.24                  | 2.07                  |
| iso-butane                        | µg/m <sup>3</sup> | 1.17                  | 1.29                  | 1.66                  | 1.77                  |
| iso-pentane                       | µg/m <sup>3</sup> | 0.17                  | 0.18                  | 0.19                  | 0.21                  |
| n-pentane                         | µg/m <sup>3</sup> | 1.39                  | 1.30                  | 1.53                  | 1.29                  |
| 1,2-butadiene                     | µg/m <sup>3</sup> | 0.11                  | 0.10                  | 0.12                  | 0.11                  |
| iso-butane                        | µg/m <sup>3</sup> | 0.06                  | 0.06                  | 0.06                  | 0.09                  |
| 1-butene + isobutene              | µg/m <sup>3</sup> | 0.74                  | 0.71                  | 0.81                  | 0.74                  |
| 1,3-butadiene                     | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| n-butane                          | µg/m <sup>3</sup> | 0.06                  | 0.07                  | 0.08                  | 0.06                  |
| t-2-butene                        | µg/m <sup>3</sup> | 0.04                  | 0.03                  | 0.04                  | 0.03                  |
| c-2-butene                        | µg/m <sup>3</sup> | 0.04                  | 0.04                  | 0.05                  | 0.04                  |
| 1,2-butadiene                     | µg/m <sup>3</sup> | 0.05                  | 0.05                  | 0.08                  | 0.07                  |
| iso-pentane                       | µg/m <sup>3</sup> | 0.03                  | 0.03                  | 0.04                  | 0.04                  |
| 1-pentene                         | µg/m <sup>3</sup> | 0.06                  | 0.06                  | 0.07                  | 0.05                  |
| 2-methyl-1-butene                 | µg/m <sup>3</sup> | 0.37                  | 0.48                  | 0.65                  | 0.22                  |
| n-pentane                         | µg/m <sup>3</sup> | 0.06                  | 0.06                  | 0.08                  | 0.06                  |
| isoprene                          | µg/m <sup>3</sup> | 0.30                  | 0.28                  | 0.35                  | 0.27                  |
| t-2-pentene                       | µg/m <sup>3</sup> | 0.09                  | 0.08                  | 0.15                  | 0.14                  |
| c-2-pentene                       | µg/m <sup>3</sup> | 0.38                  | 0.38                  | 0.45                  | 0.41                  |
| 2-methyl-2-butene                 | µg/m <sup>3</sup> | 0.02                  | 0.03                  | 0.04                  | 0.04                  |
| 2,2-dimethylbutane                | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| cyclopentene                      | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| cyclopentane                      | µg/m <sup>3</sup> | 0.22                  | 0.21                  | 0.33                  | 0.23                  |
| 2,3-dimethylbutane                | µg/m <sup>3</sup> | 0.13                  | 0.13                  | 0.20                  | 0.19                  |
| 2-methylpentane                   | µg/m <sup>3</sup> | 2.97                  | 3.03                  | 2.95                  | 2.98                  |
| 3-methylpentane                   | µg/m <sup>3</sup> | 0.46                  | 0.47                  | 1.06                  | 0.69                  |
| 2-methyl-1-pentene                | µg/m <sup>3</sup> | 0.10                  | 0.10                  | 0.21                  | 0.11                  |
| n-hexane                          | µg/m <sup>3</sup> | 0.05                  | 0.08                  | 0.38                  | 0.07                  |
| t-2-hexene                        | µg/m <sup>3</sup> | 0.06                  | 0.12                  | 0.13                  | 0.14                  |
| c-2-hexene                        | µg/m <sup>3</sup> | 0.02                  | 0.02                  | 0.04                  | 0.03                  |
| 1,3-hexadiene (trans)             | µg/m <sup>3</sup> | 0.06                  | 0.10                  | 0.14                  | 0.07                  |
| methylcyclopentane                | µg/m <sup>3</sup> | 0.23                  | 0.25                  | 0.46                  | 0.32                  |
| 2,4-dimethylpentane               | µg/m <sup>3</sup> | 0.44                  | 0.43                  | 0.83                  | 0.60                  |
| benzene                           | µg/m <sup>3</sup> | 0.23                  | 0.25                  | 0.56                  | 0.34                  |
| cyclohexane                       | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| 2-methylhexane                    | µg/m <sup>3</sup> | 0.91                  | 1.04                  | 2.75                  | 1.51                  |
| 2,3-dimethylpentane               | µg/m <sup>3</sup> | 0.06                  | 0.08                  | 0.21                  | 0.09                  |
| cyclohexene                       | µg/m <sup>3</sup> | 1.39                  | 2.33                  | 2.06                  | 1.05                  |
| 3-methylhexane                    | µg/m <sup>3</sup> | 0.13                  | 0.17                  | 0.50                  | 0.26                  |
| 1,3-dimethylcyclopentane (cis)    | µg/m <sup>3</sup> | 0.05                  | 0.07                  | 0.14                  | 0.09                  |
| 1-heptene                         | µg/m <sup>3</sup> | 0.09                  | 0.09                  | 0.32                  | 0.14                  |
| 2,2,4-trimethylpentane            | µg/m <sup>3</sup> | 0.46                  | 0.53                  | 1.53                  | 0.71                  |
| n-heptane                         | µg/m <sup>3</sup> | 0.31                  | 0.33                  | 0.87                  | 0.40                  |
| 2,3-dimethyl-2-pentene            | µg/m <sup>3</sup> | 0.76                  | 0.78                  | 2.20                  | 0.98                  |
| methylcyclohexane                 | µg/m <sup>3</sup> | 0.12                  | 0.11                  | 0.12                  | 0.11                  |



| <b>Volatile Organic Compounds</b>                          | <b>Units</b>      | <b>High Chamber 1</b> | <b>High Chamber 2</b> | <b>High Chamber 3</b> | <b>High Chamber 4</b> |
|--|-------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| 2,3,4-trimethylpentane                                     | µg/m <sup>3</sup> | 0.36                  | 0.34                  | 0.93                  | 0.43                  |
| toluene  | µg/m <sup>3</sup> | 1.83                  | 1.67                  | 3.53                  | 2.11                  |
| 2-methylheptane  | µg/m <sup>3</sup> | 0.12                  | 0.11                  | 0.31                  | 0.14                  |
| 4-methylheptane  | µg/m <sup>3</sup> | 0.33                  | 0.30                  | 0.76                  | 0.37                  |
| 3-methylheptane  | µg/m <sup>3</sup> | 0.01                  | 0.00                  | 0.00                  | 0.01                  |
| n-octane   | µg/m <sup>3</sup> | 0.89                  | 0.82                  | 1.74                  | 0.96                  |
| ethylbenzene   | µg/m <sup>3</sup> | 0.33                  | 0.30                  | 0.83                  | 0.36                  |
| m&p-xylene   | µg/m <sup>3</sup> | 0.39                  | 0.41                  | 1.00                  | 0.43                  |
| styrene  | µg/m <sup>3</sup> | 0.39                  | 0.34                  | 0.77                  | 0.38                  |
| o-xylene   | µg/m <sup>3</sup> | 0.80                  | 0.66                  | 2.06                  | 0.83                  |
| n-nonane   | µg/m <sup>3</sup> | 5.88                  | 4.98                  | 17.13                 | 6.46                  |
| isopropylbenzene   | µg/m <sup>3</sup> | 0.49                  | 0.39                  | 1.42                  | 0.53                  |
| n-propylbenzene  | µg/m <sup>3</sup> | 0.10                  | 0.07                  | 0.22                  | 0.09                  |
| alpha-pinene   | µg/m <sup>3</sup> | 0.25                  | 0.21                  | 0.83                  | 0.30                  |
| 3-ethyltoluene   | µg/m <sup>3</sup> | 0.26                  | 0.19                  | 0.84                  | 0.28                  |
| 4-ethyltoluene   | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| 1,3,5-trimethylbenzene                                     | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| o-ethyltoluene   | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| 1,2,4-trimethylbenzene+t-butylbenzene                      | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| n-decane   | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| 1,2,3-trimethylbenzene                                     | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| indan  | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| 1,3-diethylbenzene   | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| 1,4-diethylbenzene   | µg/m <sup>3</sup> | 1.33                  | 1.60                  | 0.72                  | 0.66                  |
| n-butylbenzene   | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| n-undecane   | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Formaldehyde   | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| acetaldehyde   | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Acrolein   | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Acrolein-X   | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Glyoxal  | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| acetone  | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Propionaldehyde  | µg/m <sup>3</sup> | 0.49                  | 0.01                  | 0.54                  | 0.38                  |
| Crotonaldehyde   | µg/m <sup>3</sup> | 0.14                  | 0.20                  | 0.28                  | 0.19                  |
| Methacrolein   | µg/m <sup>3</sup> | 0.36                  | 0.32                  | 0.47                  | 0.48                  |
| n-butyraldehyde  | µg/m <sup>3</sup> | 0.16                  | 0.13                  | 0.16                  | 0.17                  |
| 2-Butanone (MEK)   | µg/m <sup>3</sup> | 0.07                  | 0.07                  | 0.12                  | 0.11                  |
| Valeraldehyde  | µg/m <sup>3</sup> | 0.01                  | 0.01                  | 0.00                  | 0.00                  |
| Hexaldehyde  | µg/m <sup>3</sup> | 0.02                  | 0.01                  | 0.02                  | 0.02                  |
| benzaldehyde   | µg/m <sup>3</sup> | 0.01                  | 0.00                  | 0.00                  | 0.00                  |
| m-Tolualdehyde   | µg/m <sup>3</sup> | 0.13                  | 0.07                  | 0.07                  | 0.07                  |
| <b>SUM VOC</b>   |                   | <b>56.03</b>          | <b>44.30</b>          | <b>90.91</b>          | <b>59.79</b>          |
| <b>Carbon and Ions</b>                                     |                   |                       |                       |                       |                       |
| Organic carbon,thermal method, reflectance concentration   | µg/m <sup>3</sup> | 1.90                  | 2.63                  | 2.96                  | 3.67                  |
| Elemental carbon,thermal method, reflectance concentration | µg/m <sup>3</sup> | 0.69                  | 1.41                  | 1.40                  | 2.16                  |
| Sodium concentration (qualitative only)                    | µg/m <sup>3</sup> | 0.19                  | 0.20                  | 0.33                  | 0.28                  |
| Magnesium concentration (qualitative only)                 | µg/m <sup>3</sup> | 0.02                  | 0.02                  | 0.04                  | 0.03                  |
| Aluminum concentration                                     | µg/m <sup>3</sup> | 0.00                  | 0.01                  | 0.02                  | 0.02                  |
| Silicon concentration                                      | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.01                  | 0.00                  |
| Phosphorous concentration                                  | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Sulfur concentration                                       | µg/m <sup>3</sup> | 1.21                  | 1.49                  | 2.19                  | 2.25                  |
| Chlorine concentration                                     | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Potassium concentration                                    | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Calcium concentration                                      | µg/m <sup>3</sup> | 0.01                  | 0.01                  | 0.01                  | 0.01                  |
| Scandium concentration                                     | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |

| <b>Volatile Organic Compounds</b> | <b>Units</b>      | <b>High Chamber 1</b> | <b>High Chamber 2</b> | <b>High Chamber 3</b> | <b>High Chamber 4</b> |
|-----------------------------------|-------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Titanium concentration            | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Vanadium concentration            | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Chromium concentration            | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Manganese concentration           | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Iron concentration                | µg/m <sup>3</sup> | 0.02                  | 0.00                  | 0.01                  | 0.01                  |
| Cobalt concentration              | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Nickel concentration              | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Copper concentration              | µg/m <sup>3</sup> | 0.01                  | 0.00                  | 0.01                  | 0.00                  |
| Zinc concentration                | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.01                  | 0.01                  |
| Gallium concentration             | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Arsenic concentration             | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Selenium concentration            | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Bromine concentration             | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Rubidium concentration            | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Strontium concentration           | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Yttrium concentration             | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Zirconium concentration           | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Niobium concentration             | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Molybdenum concentration          | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Palladium concentration           | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Silver concentration              | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Cadmium concentration             | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Indium concentration              | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Tin concentration                 | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Antimony concentration            | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Cesium concentration              | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Barium concentration              | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Lanthanum concentration           | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Cerium concentration              | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Samarium concentration            | µg/m <sup>3</sup> | 0.00                  | 0.01                  | 0.00                  | 0.00                  |
| Europium concentration            | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Terbium concentration             | µg/m <sup>3</sup> | 0.00                  | 0.02                  | 0.01                  | 0.02                  |
| Hafnium concentration             | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Tantalum concentration            | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Wolfram concentration             | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Iridium concentration             | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Gold concentration                | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Mercury concentration             | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Thallium concentration            | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Lead concentration                | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Uranium concentration             | µg/m <sup>3</sup> | 0.00                  | 0.00                  | 0.00                  | 0.00                  |
| Nitrate concentration             | µg/m <sup>3</sup> | 0.01                  | 0.06                  | 0.13                  | 0.06                  |
| Sulfate concentration             | µg/m <sup>3</sup> | 2.74                  | 3.27                  | 4.96                  | 4.96                  |
| Ammonium concentration            | µg/m <sup>3</sup> | 0.88                  | 1.08                  | 1.71                  | 1.68                  |
| Sum of Carbon                     | µg/m <sup>3</sup> | 2.60                  | 4.04                  | 4.36                  | 5.83                  |
| Sum of Elements                   | µg/m <sup>3</sup> | 1.48                  | 1.77                  | 2.65                  | 2.66                  |
| Sum Ions                          | µg/m <sup>3</sup> | 3.63                  | 4.41                  | 6.80                  | 6.70                  |
| Sum of Measured Particle Species  | µg/m <sup>3</sup> | 7.71                  | 10.22                 | 13.81                 | 15.19                 |
| Particle Mass on Sample Day       | µg/m <sup>3</sup> | 6.00                  | 7.00                  | 9.00                  | 11.00                 |