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# APPENDICES

APPENDIX A: PM-10 High-Volume Air Sampler

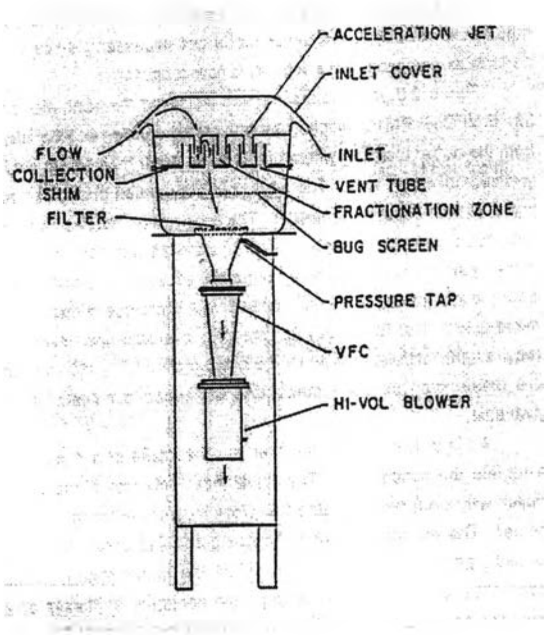


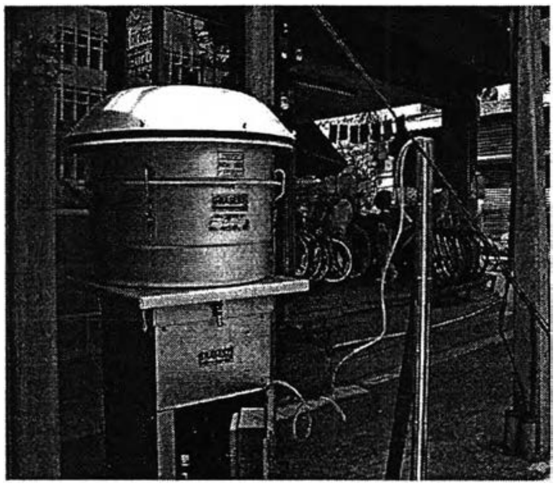

Figure A-1 PM-10 High-Volume air sampler

Method summary [a]

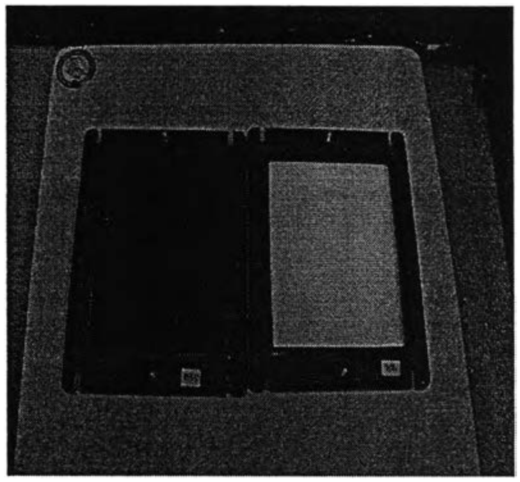
This figure presents a schematic of High Volume Air Sampler for PM-10 Model 1200 with Volumetric Flow Controller (VFC) which is the PM-10 sampler instrument met the requirements of US.EPA: RFPS - 1287 – 063. As ambient air is drawn into the inlet, it is evacuated from the buffer chamber through nine acceleration nozzles into the impaction chamber where particles larger than 10 µm are impact onto a grease collection shim. The air containing the PM-1o particle fraction is then channeled through an additional 16 vent tubes and filtered through a micro – quartz fiber filter. The filter is equilibrated and weighed before (tare) and after (gross) sampling to determine the weight (net mass) gain of sample. Sampling duration is controlled by a timer and also measured by elapsed time indicator.

To calculate the mass concentration of PM-10, the total volume of air sampled is determined from the measured actual flow rate and the sampling time. The concentration of PM-10 in the ambient air is then computed as the net mass collected divided by the volume of air sampled. Then corrected to the reference conditions ($298^0$ K, 760 mmHg).

Sample flow rate is controlled and maintained to a constant correct flow rate of 1.13 $m^3$/min (±10%) by a volumetric flow controller (VFC). To determine the sampler's operational flow rate a calibration must be conducted. The sampler's indicated flow and the reading from an elapsed time meter is used to compute the sample volume. A conventional orifice device equipped with a set of five resistance plates is used to calibrate the PM-10 Hi-Vol Sampler. This orifice device is calibrated against a standard of known accuracy. The flows determine from the orifice and look up table for VFC should be within ± 3%. The sampler should be calibrated in terms of actual conditions or in case of changing of motor brush.



PM-10 Hi-Vol Sampler at the On-Nuch roadside station



Micro-Quartz fiber filters after and before sampling

a Method Summary from Operator's and Instruction Manual High Volume PM-10 Sampler Graseby Andersen 500 Technology Court Smyrna, GA. 30082 and Graseby GMW 145 South MiamiAve. Village of Cleves, Ohio 45002.

APPENDIX B: Distributions of the PM-10 concentrations for H1-H14

| H1 | PM-10 concentration: μg/m$^3$ | | | | | | |
|---|---|---|---|---|---|---|---|
| Day | 1$^{st}$ floor | 2$^{nd}$ floor | Outdoor | Person 1 | Person 2 | Ambient | Avg. indoor |
| 1 | 40.4 | 77.8 | 92.8 | 26.0 | 30.0 | 196.6 | 59.1 |
| 2 | 66.4 | 101.7 | NA. | 44.5 | 44.3 | 209.1 | 84.0 |
| 3 | 64.3 | 78.4 | 106.3 | 37.4 | 34.3 | 196.9 | 71.4 |
| 4 | 84.4 | 105.8 | 149.2 | 61.6 | 63.9 | 133.9 | 95.1 |
| 5 | 58.3 | 66.5 | 88.7 | NA. | NA. | 149.9 | 62.4 |
| 6 | 48.2 | 70.1 | 102.3 | 49.6 | 49.8 | 174.3 | 59.2 |
| 7 | 49.7 | 106.8 | 164.2 | 39.8 | 37.7 | 126.1 | 78.3 |
| 8 | 71.5 | 67.6 | 118.4 | 49.4 | 52.6 | 105.3 | 69.6 |
| 9 | 68.2 | 81.6 | 123.0 | 48.6 | 46.1 | 107.5 | 74.9 |
| Mean | 61.3 | 84.0 | 118.1 | 44.6 | 44.8 | 155.5 | 72.7 |
| SD. | 13.6 | 16.4 | 26.8 | 10.5 | 10.9 | 40.0 | 12.0 |

| H2 | PM-10 concentration: μg/m$^3$ | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Day | 1$^{st}$ floor | 2$^{nd}$ floor | 4$^{th}$ floor | Outdoor | Person1 | Person2 | Ambient | Avg. indoor |
| 1 | 98.5 | 51.5 | 73.1 | 106.2 | 85.3 | 89.2 | 195.6 | 74.4 |
| 2 | 76.8 | 47.4 | 81.5 | 115.1 | 103.1 | 102.3 | 193.8 | 68.6 |
| 3 | 57.0 | 40.0 | 76.1 | 129.9 | 108.1 | 61.1 | 197.8 | 57.7 |
| 4 | 58.5 | 55.6 | 73.7 | 108.8 | 97.7 | NA. | 190.3 | 62.6 |
| 5 | 61.7 | 58.6 | 65.6 | NA. | 110.0 | 70.0 | 181.3 | 62.0 |
| 6 | 61.6 | 48.0 | 60.8 | 128.8 | 117.9 | 82.6 | 231.3 | 56.8 |
| 7 | 42.9 | NA. | 17.9 | 36.4 | 75.8 | 72.1 | 127.9 | 30.4 |
| 8 | 42.3 | 22.9 | 24.4 | 49.6 | 50.7 | 52.4 | 125.9 | 29.9 |
| 9 | 36.4 | 24.9 | 30.5 | 58.9 | 58.9 | 51.7 | 136.6 | 30.6 |
| Mean | 59.5 | 43.6 | 55.9 | 91.7 | 89.7 | 72.7 | 175.6 | 52.5 |
| SD. | 19.2 | 13.4 | 24.7 | 37.4 | 23.6 | 17.9 | 36.8 | 17.5 |

| H3 | PM-10 concentration: μg/m$^3$ | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Day | 1$^{st}$ floor | 2$^{nd}$ floor | 4$^{th}$ floor | Outdoor | Person1 | Person2 | Ambient | Avg. indoor |
| 1 | 111.7 | 91.0 | 74.8 | 153.8 | NA. | 108.6 | 198.7 | 92.5 |
| 2 | 62.0 | 60.3 | 51.3 | 107.0 | 66.2 | 71.6 | 205.8 | 57.9 |
| 3 | 78.7 | 55.6 | 70.3 | 127.4 | 77.3 | 82.8 | 170.5 | 68.2 |
| 4 | 139.0 | 85.9 | NA. | 183.1 | 118.3 | NA. | 241.0 | 112.4 |
| 5 | 132.5 | NA. | NA. | NA. | 106.1 | 117.4 | 215.5 | 132.5 |
| 6 | 121.4 | 89.2 | NA. | 172.3 | 102.9 | 120.0 | 215.9 | 105.3 |
| 7 | 98.8 | 57.8 | 70.8 | 115.3 | 85.0 | 96.7 | 179.5 | 75.8 |
| 8 | 96.3 | 71.1 | 73.8 | 93.7 | 91.5 | 99.9 | 141.9 | 80.4 |
| 9 | 55.7 | 48.6 | 36.3 | 54.5 | 54.6 | 40.6 | 85.2 | 46.9 |
| 10 | 58.2 | 47.1 | 48.2 | 74.7 | 59.5 | NA. | 113.5 | 51.2 |
| 11 | 65.1 | 53.3 | 46.5 | 60.1 | 63.1 | 70.5 | 103.7 | 54.9 |
| 12 | 82.5 | 55.0 | 50.8 | 78.9 | 64.8 | 67.8 | NA. | 62.7 |
| 13 | 88.6 | 57.1 | 57.0 | 84.9 | 84.5 | 102.4 | 135.3 | 67.6 |
| 14 | 57.4 | 48.7 | 41.7 | 55.3 | 56.1 | 60.9 | 127.3 | 49.3 |
| 15 | 85.0 | 48.7 | 48.8 | 72.2 | NA. | 92.9 | 139.0 | 60.8 |
| 16 | 91.1 | 95.0 | 56.2 | 82.2 | 78.3 | 120.7 | 140.2 | 80.8 |
| 17 | 83.9 | 54.2 | 62.2 | 79.0 | 84.0 | 84.2 | 131.3 | 66.7 |
| 18 | 67.4 | 45.9 | 51.0 | 79.8 | 67.5 | 75.2 | 118.7 | 54.8 |
| Mean | 87.5 | 62.6 | 56.0 | 98.5 | 78.7 | 88.3 | 156.6 | 73.4 |
| SD. | 25.5 | 17.0 | 12.0 | 39.5 | 18.9 | 23.1 | 45.4 | 23.8 |

| H4 | PM-10 concentration: µg/m$^3$ | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Day | 1$^{st}$ floor | 2$^{nd}$ floor | 4$^{th}$ floor | Outdoor | Person1 | Person2 | Ambient | Avg. indoor |
| 1 | 98.8 | 90.2 | 79.9 | 139.6 | 97.7 | 123.0 | 184.9 | 89.6 |
| 2 | 49.9 | 58.6 | 49.9 | 98.7 | 49.5 | 46.2 | 146.3 | 52.8 |
| 3 | 82.0 | 57.0 | NA. | 124.4 | 85.1 | 57.4 | 154.4 | 69.5 |
| 4 | 77.3 | 79.4 | 77.0 | 122.6 | 78.0 | 120.4 | 194.8 | 77.9 |
| 5 | 83.9 | 76.3 | 64.9 | 124.9 | 86.7 | 102.6 | 190.9 | 75.1 |
| 6 | 79.1 | 72.6 | 63.2 | 129.8 | 83.4 | 108.2 | 196.2 | 71.6 |
| 7 | 49.9 | 52.8 | 45.9 | 82.7 | 49.2 | 59.5 | 113.2 | 49.6 |
| 8 | 52.3 | 62.6 | 58.0 | 111.6 | 50.2 | 91.9 | 142.0 | 57.6 |
| 9 | 52.3 | 44.9 | 36.8 | 80.8 | 42.0 | 52.4 | 163.3 | 44.7 |
| Mean | 69.5 | 66.1 | 59.5 | 112.8 | 69.1 | 84.6 | 165.1 | 65.4 |
| SD. | 18.5 | 14.5 | 14.9 | 21.0 | 21.0 | 30.8 | 28.7 | 15.0 |

| H5 | PM-10 concentration: µg/m$^3$ | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Day | 1$^{st}$ floor | 2$^{nd}$ floor | 4$^{th}$ floor | Outdoor | Person1 | Person2 | Ambient | Avg. indoor |
| 1 | 117.4 | 117.9 | 81.6 | 175.0 | 123.2 | 90.0 | 248.0 | 105.6 |
| 2 | 96.8 | 86.1 | 88.5 | 151.3 | 79.5 | 115.9 | 196.6 | 90.5 |
| 3 | 78.7 | 66.6 | 64.7 | 110.4 | 68.5 | 59.5 | 166.5 | 70.0 |
| 4 | 47.3 | 35.6 | 44.2 | 79.2 | 53.7 | 51.7 | 143.0 | 42.4 |
| 5 | 44.1 | 33.9 | 42.1 | 68.3 | 41.5 | 49.5 | 139.6 | 40.0 |
| 6 | 42.4 | 37.5 | 47.0 | 76.9 | 59.5 | 49.0 | 134.1 | 42.3 |
| 7 | 65.0 | 37.1 | 43.9 | 69.7 | 56.3 | 61.2 | 127.8 | 48.6 |
| 8 | 54.6 | NA. | 63.5 | 84.8 | 56.4 | 52.1 | 146.8 | 59.1 |
| 9 | 55.2 | 38.9 | 53.5 | 85.2 | 47.4 | 53.9 | 146.7 | 49.2 |
| Mean | 66.8 | 56.7 | 58.8 | 100.1 | 65.1 | 64.7 | 161.0 | 60.9 |
| SD. | 25.9 | 31.0 | 17.1 | 38.2 | 24.4 | 23.0 | 38.6 | 23.4 |

| H6 | PM-10 concentration: µg/m$^3$ | | | | | | |
|---|---|---|---|---|---|---|---|
| Day | 1$^{st}$ floor | 2$^{nd}$ floor | Outdoor | Person1 | Person2 | Ambient | Avg. indoor |
| 1 | 174.5 | 66.0 | 161.0 | 104.4 | 172.4 | 189.7 | 120.2 |
| 2 | 139.8 | 70.3 | 126.7 | 115.4 | NA. | 198.7 | 105.0 |
| 3 | 135.7 | 63.7 | 140.2 | 99.7 | 138.2 | 234.8 | 99.7 |
| 4 | 125.1 | 44.2 | 112.8 | 89.3 | 52.2 | 143.1 | 84.7 |
| 5 | 113.6 | 41.8 | 98.0 | 45.6 | 108.2 | 107.1 | 77.7 |
| 6 | 87.6 | 32.9 | 76.7 | 34.3 | 81.4 | 103.5 | 60.3 |
| 7 | 105.0 | 46.4 | 112.1 | 50.4 | 110.0 | 134.7 | 75.7 |
| 8 | 99.6 | 34.1 | 85.7 | 34.4 | 93.7 | 126.1 | 66.8 |
| 9 | 76.0 | 21.7 | 72.0 | 26.1 | 74.3 | 118.0 | 48.8 |
| Mean | 117.4 | 46.8 | 109.5 | 66.6 | 103.8 | 150.6 | 82.1 |
| SD. | 30.1 | 16.7 | 29.8 | 35.1 | 38.0 | 46.1 | 22.8 |

| H7 | PM-10 concentration: µg/m$^3$ | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Day | 1$^{st}$ floor | 2$^{nd}$ floor | 3$^{rd}$ floor | Outdoor | Person1 | Person2 | Ambient | Avg. indoor |
| 1 | 52.9 | 56.5 | 56.7 | 69.2 | 71.5 | 70.4 | 142.8 | 55.4 |
| 2 | 42.8 | 40.3 | 38.3 | 95.9 | 58.2 | 45.4 | 126.0 | 40.5 |
| 3 | 61.4 | 62.4 | 63.3 | 117.0 | NA. | 71.5 | 131.9 | 62.4 |
| 4 | NA. | 35.5 | 34.4 | 99.5 | 37.4 | 39.3 | 99.5 | 34.9 |
| 5 | 35.2 | 35.3 | 34.7 | 101.0 | 39.5 | 41.5 | 109.7 | 35.1 |
| 6 | 49.7 | 41.2 | 43.8 | 102.4 | 47.0 | 48.4 | 107.6 | 44.9 |
| 7 | 22.0 | 30.5 | 31.6 | 75.2 | 35.2 | 35.0 | 132.2 | 28.1 |
| 8 | 20.8 | 27.5 | 37.1 | 70.9 | 25.8 | 25.8 | 117.9 | 28.5 |
| 9 | 17.1 | 21.4 | 18.0 | NA. | 16.8 | 19.6 | 101.7 | 18.8 |
| Mean | 37.7 | 38.9 | 39.8 | 91.4 | 41.4 | 44.1 | 118.8 | 38.7 |
| SD. | 16.6 | 13.2 | 13.5 | 17.4 | 17.4 | 17.7 | 15.2 | 13.8 |

| H8 | PM-10 concentration: µg/m$^3$ | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Day | 1$^{st}$ floor | 2$^{nd}$ floor | 3$^{rd}$ floor | Outdoor | Person1 | Person2 | Ambient | Avg. indoor |
| 1 | 92.0 | 76.1 | 66.3 | 174.8 | 67.4 | 91.6 | 186.4 | 78.1 |
| 2 | 128.9 | 102.4 | 97.6 | 191.1 | 105.8 | 116.2 | 199.6 | 109.6 |
| 3 | 113.2 | 94.0 | 80.4 | 184.7 | 105.2 | 118.2 | 198.1 | 95.8 |
| 4 | 43.8 | 36.0 | 76.6 | 92.8 | 42.5 | 41.5 | 115.3 | 52.1 |
| 5 | 50.3 | 37.9 | 75.3 | 88.6 | 79.4 | 42.5 | NA. | 54.5 |
| 6 | 50.0 | 40.3 | 33.1 | 75.8 | 42.8 | 37.5 | 96.1 | 41.1 |
| 7 | 53.9 | 41.0 | 39.9 | 107.4 | 40.8 | 62.0 | 124.0 | 44.9 |
| 8 | 68.2 | 44.2 | 45.2 | 165.4 | 43.2 | 68.5 | 199.8 | 52.5 |
| 9 | 99.3 | 58.4 | 52.3 | 124.2 | 58.0 | 91.6 | 146.3 | 70.0 |
| Mean | 77.7 | 58.9 | 63.0 | 133.9 | 65.0 | 74.4 | 158.2 | 66.5 |
| SD. | 31.4 | 25.7 | 21.5 | 45.3 | 26.5 | 31.4 | 42.8 | 23.8 |

| H9 | PM-10 concentration: µg/m$^3$ | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Day | 1$^{st}$ floor | 2$^{nd}$ floor | 4$^{th}$ floor | Outdoor | Person1 | Person2 | Ambient | Avg. indoor |
| 1 | 137.6 | 110.1 | 101.2 | 258.4 | 117.0 | 126.6 | 201.5 | 116.3 |
| 2 | 141.2 | 97.7 | 94.8 | 208.7 | 129.0 | 180.1 | 206.4 | 111.3 |
| 3 | 48.6 | 44.5 | 51.2 | 174.3 | 61.8 | 52.2 | 195.0 | 48.1 |
| 4 | 129.7 | 85.4 | 81.6 | 192.1 | 119.6 | 115.8 | 174.0 | 98.9 |
| 5 | 140.1 | 85.3 | 101.5 | 258.3 | 117.4 | 109.0 | 215.0 | 109.0 |
| 6 | 153.7 | 79.4 | 94.8 | 179.9 | 152.4 | 130.6 | 143.2 | 109.3 |
| 7 | 116.4 | 62.4 | 71.7 | 194.3 | 80.2 | 84.1 | 143.5 | 83.5 |
| 8 | 80.9 | 56.7 | 71.0 | 203.5 | 67.4 | 70.9 | 192.8 | 69.5 |
| 9 | 86.3 | 37.3 | 36.5 | 141.6 | 65.8 | 93.3 | 134.5 | 53.4 |
| Mean | 114.9 | 73.2 | 78.3 | 201.2 | 101.2 | 106.9 | 178.4 | 88.8 |
| SD. | 35.3 | 24.5 | 22.9 | 37.9 | 32.8 | 37.7 | 30.7 | 26.2 |

| H10 | PM-10 concentration: μg/m$^3$ | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Day | 1$^{st}$ floor | 2$^{nd}$ floor | 4$^{th}$ floor | Outdoor | Person1 | Person2 | Ambient | Avg. indoor |
| 1 | 201.0 | 101.1 | 123.5 | 214.4 | 170.8 | 184.1 | 187.9 | 141.9 |
| 2 | 195.0 | 120.5 | 113.9 | 183.9 | 187.3 | 201.8 | 169.0 | 143.2 |
| 3 | 196.6 | NA. | 129.8 | 187.9 | 166.7 | 194.0 | 183.0 | 163.2 |
| 4 | 57.8 | 64.3 | 54.8 | 107.1 | 51.8 | 58.9 | 131.7 | 59.0 |
| 5 | 54.1 | 68.1 | NA. | 111.5 | 54.8 | 56.8 | 121.6 | 61.1 |
| 6 | 47.3 | 53.4 | 43.6 | 109.6 | 49.7 | 55.5 | 117.3 | 48.1 |
| 7 | 63.3 | 58.2 | 48.1 | 111.4 | 80.8 | 79.5 | 122.2 | 56.5 |
| 8 | 70.5 | 61.1 | 40.9 | 138.7 | 42.3 | 41.3 | 131.7 | 57.5 |
| 9 | 47.6 | 52.5 | 45.0 | 137.1 | 50.6 | 51.4 | 135.9 | 48.4 |
| Mean | 103.7 | 72.4 | 75.0 | 144.6 | 95.0 | 102.6 | 144.5 | 86.5 |
| SD. | 70.8 | 24.8 | 39.7 | 40.6 | 61.1 | 68.9 | 27.7 | 47.7 |

| H11 | PM-10 concentration: μg/m$^3$ | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Day | 1$^{st}$ floor | 2$^{nd}$ floor | 4$^{th}$ floor | Outdoor | Person1 | Person2 | Ambient | Avg. indoor |
| 1 | 86.8 | 82.1 | 77.1 | 163.1 | 70.2 | 69.6 | 166.9 | 82.0 |
| 2 | 109.5 | 85.9 | 99.6 | 194.9 | 105.7 | 95.1 | 158.3 | 98.3 |
| 3 | 37.7 | 35.8 | 32.0 | 145.0 | 37.2 | 39.5 | 152.7 | 35.2 |
| 4 | 73.5 | 96.0 | 67.6 | 127.8 | 102.7 | 99.7 | 102.1 | 79.0 |
| 5 | 74.3 | 89.3 | 68.3 | 131.2 | 89.9 | 97.2 | 179.3 | 77.3 |
| 6 | 80.0 | 117.7 | 84.8 | 155.8 | 115.2 | 114.6 | 127.1 | 94.2 |
| 7 | 61.2 | 126.5 | 78.8 | 181.7 | 123.6 | 120.2 | 138.7 | 88.8 |
| 8 | 74.0 | 147.1 | 120.3 | 196.8 | 150.0 | 114.7 | 139.4 | 113.8 |
| 9 | 86.9 | 135.3 | 130.1 | 207.0 | 135.0 | 128.4 | 166.6 | 117.4 |
| Mean | 76.0 | 101.7 | 84.3 | 167.0 | 103.3 | 97.7 | 147.9 | 87.3 |
| SD. | 19.6 | 33.9 | 29.5 | 29.4 | 34.3 | 27.9 | 23.8 | 24.2 |

| H12 | PM-10 concentration: μg/m$^3$ | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Day | 1$^{st}$ floor | 2$^{nd}$ floor | 4$^{th}$ floor | Outdoor | Person1 | Person2 | Ambient | Avg. indoor |
| 1 | 203.1 | 155.7 | 112.6 | 195.6 | 186.8 | 173.0 | 223.7 | 157.1 |
| 2 | 213.1 | NA. | NA. | 193.6 | 194.4 | 191.4 | 237.6 | 213.1 |
| 3 | 191.9 | 145.3 | 110.5 | 163.8 | 163.0 | 195.0 | 222.2 | 149.2 |
| 4 | 134.3 | 73.5 | 55.2 | 96.6 | 150.2 | 145.2 | 150.2 | 87.7 |
| 5 | 105.0 | 79.8 | 51.8 | 109.6 | 106.3 | 111.1 | 114.9 | 78.9 |
| 6 | 93.6 | 70.2 | 52.2 | 92.4 | 100.5 | 103.1 | 108.5 | 72.0 |
| 7 | 205.9 | 91.5 | 82.3 | 197.2 | 245.9 | 169.2 | 122.7 | 126.6 |
| 8 | 200.1 | 93.5 | 84.4 | 194.6 | 137.6 | 174.7 | 126.3 | 126.0 |
| 9 | 126.6 | 73.8 | 65.8 | 129.0 | 107.6 | 136.1 | 116.4 | 88.7 |
| Mean | 163.8 | 97.9 | 76.8 | 152.5 | 154.7 | 155.4 | 158.0 | 122.1 |
| SD. | 48.1 | 33.6 | 24.8 | 45.5 | 48.5 | 33.4 | 53.7 | 46.0 |

| H13 | PM-10 concentration: μg/m$^3$ | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Day | 1$^{st}$ floor | 2$^{nd}$ floor | 4$^{th}$ floor | Outdoor | Person1 | Person2 | Ambient | Avg. indoor |
| 1 | 124.7 | 104.8 | 108.0 | 149.4 | 160.2 | NA. | 207.3 | 112.5 |
| 2 | 66.8 | 49.9 | 53.5 | 113.0 | 105.2 | 75.0 | 169.1 | 56.8 |
| 3 | 93.9 | 78.0 | 84.8 | 138.9 | 127.8 | 114.8 | 186.6 | 85.6 |
| 4 | 69.3 | 62.5 | 58.8 | 67.6 | 72.1 | 63.0 | 118.9 | 63.5 |
| 5 | 77.6 | 71.6 | 72.4 | 79.4 | 70.0 | 84.8 | 121.0 | 73.9 |
| 6 | 74.4 | 71.6 | 71.2 | 89.1 | 78.7 | 75.9 | 138.8 | 72.4 |
| 7 | 101.7 | 76.1 | 63.2 | 109.6 | 81.6 | 85.4 | 148.4 | 80.4 |
| 8 | 80.2 | 69.3 | 56.4 | 77.5 | NA. | 75.3 | 125.9 | 68.6 |
| 9 | 84.7 | 76.6 | 57.3 | 83.8 | 73.7 | 99.6 | 131.2 | 72.9 |
| Mean | 85.9 | 73.4 | 69.5 | 100.9 | 96.2 | 84.2 | 149.7 | 76.3 |
| SD. | 18.4 | 14.7 | 17.5 | 28.7 | 32.7 | 16.3 | 31.3 | 16.0 |

| H14 | PM-10 concentration: µg/m$^3$ | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Day | 1$^{st}$ floor | 2$^{nd}$ floor | 4$^{th}$ floor | Outdoor | Person1 | Person2 | Ambient | Avg. indoor |
| 1 | 144.1 | 119.6 | 67.3 | 154.9 | 52.3 | 71.5 | 175.0 | 110.3 |
| 2 | 141.7 | 103.4 | 61.9 | 106.6 | 48.6 | 58.5 | 169.2 | 102.3 |
| 3 | 144.7 | 104.8 | 60.4 | 127.5 | 53.0 | 62.6 | 163.4 | 103.3 |
| 4 | 97.2 | 59.5 | 58.3 | 179.6 | 63.5 | 63.9 | 150.6 | 71.7 |
| 5 | 148.8 | 57.2 | 64.8 | 218.8 | 58.6 | 57.3 | 171.4 | 90.3 |
| 6 | 120.8 | 35.6 | 41.0 | 120.7 | 44.5 | 45.7 | 143.4 | 65.8 |
| 7 | 48.6 | 34.5 | 35.0 | 355.8 | 17.2 | 34.8 | 126.9 | 39.4 |
| 8 | 40.5 | 22.6 | 20.8 | 318.4 | 14.2 | 27.3 | 143.6 | 28.0 |
| 9 | 42.7 | 28.0 | 23.5 | 287.6 | 17.2 | 26.9 | 113.1 | 31.4 |
| Mean | 103.2 | 62.8 | 48.1 | 207.8 | 41.0 | 49.8 | 150.8 | 71.4 |
| SD. | 47.3 | 37.2 | 18.2 | 92.5 | 19.4 | 16.7 | 21.2 | 32.4 |

APPENDIX C: Correlation coefficients between outdoor and ambient PM-10 concentrations

| House No. | Correlation coefficient | intercept | Regression coefficient |
|---|---|---|---|
| 1 | -0.569 | 179.3 | -0.411 |
| 2 | 0.961 | -68.4 | 0.915 |
| 3 | 0.928 | -30.2 | 0.849 |
| 4 | 0.716 | 26.6 | 0.522 |
| 5 | 0.977 | -55.9 | 0.969 |
| 6 | 0.839 | 28.0 | 0.541 |
| 7 | -0.405 | 149.3 | -0.479 |
| 8 | 0.984 | -23.7 | 1.032 |
| 9 | 0.738 | 39.0 | 0.91 |
| 10 | 0.970 | -61.1 | 1.424 |
| 11 | 0.246 | 122.0 | 0.305 |
| 12 | 0.519 | 83.0 | 0.439 |
| 13 | 0.983 | -33.6 | 0.899 |
| 14 | -0.676 | 651.9 | -2.946 |

# APPENDIX D: Multiple regression analysis on factors affecting personal exposure

Model Summary [g]

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics | | | | | Durbin-Watson |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | R Square Change | F Change | df1 | df2 | Sig. F Change | |
| 1[a] | .365 | .133 | .130 | 32.270 | .133 | 38.273 | 1 | 249 | .000 | |
| 2[b] | .480 | .230 | .224 | 36.143 | .097 | 31.170 | 1 | 248 | .000 | |
| 3[c] | .530 | .281 | .272 | 35.002 | .051 | 17.247 | 1 | 247 | .000 | |
| 4[d] | .592 | .351 | .340 | 33.323 | .070 | 26.523 | 1 | 246 | .000 | |
| 5[e] | .624 | .390 | .377 | 32.377 | .039 | 15.590 | 1 | 245 | .000 | |
| 6[f] | .645 | .415 | .401 | 31.747 | .026 | 10.809 | 1 | 244 | .001 | .960 |

a. Predictors: (Constant), ETS (Expose to tobacco smoke)

b.Predictors: (Constant), ETS, Winter

c.Predictors: (Constant), ETS, Winter, Conc. Outdoor

d. Predictors: (Constant), ETS, Winter, Conc. Outdoor, 1st floor door

e. Predictors: (Constant), ETS, Winter, Conc. Outdoor, 1st floor door, Bedroom with A/C

f . Predictors: (Constant), ETS, Winter, Conc. Outdoor, 1st floor door, Bedroom with A/C, Incense

g. Dependent Variable: Personal PM-10 concentration

ANOVA [g]

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1[a] | Regression | 56055.163 | 1 | 56055.163 | 38.273 | .000 |
| | Residual | 364686.192 | 249 | 1464.603 | | |
| | Total | 420741.355 | 250 | | | |
| 2[b] | Regression | 96772.951 | 2 | 48386.476 | 37.040 | .000 |
| | Residual | 323968.404 | 248 | 1306.324 | | |
| | Total | 420741.355 | 250 | | | |
| 3[c] | Regression | 118124.045 | 3 | 39374.682 | 32.138 | .000 |
| | Residual | 302617.311 | 247 | 1225.71 | | |
| | Total | 420741.355 | 250 | | | |
| 4[d] | Regression | 147576.069 | 4 | 36894.017 | 33.255 | .000 |
| | Residual | 273165.286 | 246 | 1110.428 | | |
| | Total | 420741.355 | 250 | | | |
| 5[e] | Regression | 163918.395 | 5 | 32783.679 | 31.274 | .000 |
| | Residual | 256822.960 | 245 | 1048.257 | | |
| | Total | 420741.355 | 250 | | | |
| 6[f] | Regression | 174812.356 | 6 | 29135.393 | 28.907 | .000 |
| | Residual | 245928.999 | 244 | 1007.906 | | |
| | Total | 420741.355 | 250 | | | |

a. Predictors: (Constant), ETS (Expose to tobacco smoke)

b. Predictors: (Constant), ETS, Winter

c. Predictors: (Constant), ETS, Winter, Conc. Outdoor

d. Predictors: (Constant), ETS, Winter, Conc. Outdoor, 1st floor door

e. Predictors: (Constant), ETS, Winter, Conc. Outdoor, 1st floor door, Bedroom with A/C

f . Predictors: (Constant), ETS, Winter, Conc. Outdoor, 1st floor door, Bedroom with A/C, Incense

g. Dependent Variable: Personal PM-10 concentration

Coefficients[a]

| Model [a] | Unstandardized Coefficients | | Stdized Coefficients | t | Sig. | 95% Confidence Interval for B | | Correlations | | | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | B | Std. Error | Beta | | | Lower Bound | Upper Bound | Zero-order | Partial | Part | Tolerance | VIF |
| (Constant) | 40.67 | 6.21 | | 6.550 | .000 | 28.44 | 52.89 | | | | | |
| ETS | 19.534 | 5.063 | .205 | 3.859 | .000 | 9.563 | 29.506 | .365 | .240 | .189 | .591 | 1.692 |
| Winter | 17.975 | 4.505 | .205 | 3.990 | .000 | 9.101 | 26.869 | .313 | .247 | .195 | .817 | 1.225 |
| Outdoor conc. | .233 | .040 | .312 | 5.853 | .000 | .154 | .311 | .345 | .351 | .286 | .664 | 1.507 |
| 1st floor door | 25.385 | 4.322 | .309 | 5.873 | .000 | 16.870 | 33.898 | .290 | .352 | .287 | .661 | 1.512 |
| Bedroom with A/C | -108.632 | 4.357 | -.214 | -4.277 | .000 | -27.213 | -10.051 | -.119 | -.264 | -.209 | .890 | 1.123 |
| Incence | 30.450 | 9.262 | .171 | 3.288 | .001 | 12.206 | 48.694 | .314 | .206 | .161 | .838 | 1.193 |

a Dependent Variable: Personal PM-10 Concentration

APPENDIX E: Detection limit and percent recovery of elemental compositions

| Element | Mass | Detection limit (μg/l) | %recovery |
|---|---|---|---|
| Ag | 107 | 0.01 | 110.6 ± 5.2 |
| Al | 27 | 0.14 | 117.5 ± 10.3 |
| As | 75 | 1.7 | 106.4 ± 7.5 |
| Ba | 137 | 0.05 | 91.1 ± 4.5 |
| Ca | 48 | 1.46 | 135.7 ± 9.9 |
| Cd | 111 | 0.04 | 103.5 ± 4.0 |
| Cr | 52 | 0.37 | 113.9 ± 7.6 |
| Cu | 63 | 0.22 | 108.7 ± 5.9 |
| Fe | 58 | 2.79 | 106.6 ± 5.6 |
| In | 113 | 0.02 | 103.6 ± 3.7 |
| K | 39 | 3.68 | 70.7 ± 2.5 |
| Mg | 25 | 0.40 | 105.8 ± 5.3 |
| Mn | 55 | 0.30 | 104.9 ± 6.4 |
| Na | 23 | 22.14 | 133.9 ± 18.3 |
| Ni | 60 | 5.46 | 99.0 ± 4.2 |
| Pb | 208 | 0.04 | 134.9 ± 1.6 |
| V | 50 | 0.22 | 116.1 ± 6.7 |
| Zn | 66 | 0.36 | 94.5 ± 3.4 |

# APPENDIX F: Summary results of FA/MR for personal PM-10 data

## Factor Analysis

**Correlation Matrix**

| | | Zscore(AG107) | Zscore (AL27) | Zscore (AS75) | Zscore(BA137) | Zscore (CA48) | Zscore (CD111) | Zscore (CR52) | Zscore (CU63) | Zscore (FE58) | Zscore (IN113) | Zscore (K39) | Zscore (MG25) | Zscore (MN55) | Zscore (NA23) | Zscore (NI60) | Zscore (PB208) | Zscore (V50) | Zscore (ZN64) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Correlation | Zscore(AG107) | 1.000 | -.041 | -.024 | -.024 | -.049 | .046 | .470 | .475 | .458 | .033 | -.059 | -.130 | .452 | -.116 | .447 | .191 | .470 | .147 |
| | Zscore(AL27) | -.041 | 1.000 | -.050 | -.028 | .244 | -.007 | -.036 | .043 | -.037 | .013 | .144 | .357 | .032 | .151 | -.035 | .035 | -.034 | .095 |
| | Zscore(AS75) | -.024 | -.050 | 1.000 | .313 | -.125 | -.005 | .042 | .017 | .036 | -.010 | -.064 | -.142 | -.002 | -.058 | .026 | -.094 | .034 | -.092 |
| | Zscore(BA137) | -.024 | -.028 | .313 | 1.000 | -.038 | .001 | -.013 | -.026 | -.013 | -.013 | -.078 | -.059 | -.025 | -.062 | -.013 | -.065 | -.013 | -.049 |
| | Zscore(CA48) | -.049 | .244 | -.125 | -.038 | 1.000 | .009 | .023 | .159 | .028 | .054 | .387 | .688 | .109 | .150 | .031 | .279 | .027 | .242 |
| | Zscore(CD111) | .046 | -.007 | -.005 | .001 | .009 | 1.000 | .145 | .146 | .145 | .989 | .147 | .041 | .191 | -.067 | .135 | .270 | .145 | .173 |
| | Zscore(CR52) | .470 | -.036 | .042 | -.013 | .023 | .145 | 1.000 | .875 | .990 | .117 | .012 | -.048 | .863 | -.038 | .962 | .464 | 1.000 | .383 |
| | Zscore(CU63) | .475 | .043 | .017 | -.026 | .159 | .146 | .875 | 1.000 | .859 | .133 | .129 | .164 | .891 | -.010 | .836 | .463 | .874 | .397 |
| | Zscore(FE58) | .458 | -.037 | .036 | -.013 | .028 | .145 | .990 | .859 | 1.000 | .120 | .006 | -.040 | .844 | -.030 | .974 | .481 | .991 | .406 |
| | Zscore(IN113) | .033 | .013 | -.010 | -.013 | .054 | .989 | .117 | .133 | .120 | 1.000 | .188 | .093 | .166 | -.064 | .109 | .301 | .118 | .180 |
| | Zscore(K39) | -.059 | .144 | -.064 | -.078 | .387 | .147 | .012 | .129 | .006 | .188 | 1.000 | .430 | .133 | .166 | -.013 | .228 | .013 | .110 |
| | Zscore(MG25) | -.130 | .357 | -.142 | -.059 | .688 | .041 | -.048 | .164 | -.040 | .093 | .430 | 1.000 | .104 | .306 | -.029 | .322 | -.041 | .366 |
| | Zscore(MN55) | .452 | .032 | -.002 | -.025 | .109 | .191 | .863 | .891 | .844 | .166 | .133 | .104 | 1.000 | .027 | .815 | .424 | .858 | .371 |
| | Zscore(NA23) | -.116 | .151 | -.058 | -.062 | .150 | -.067 | -.038 | -.010 | -.030 | -.064 | .166 | .306 | .027 | 1.000 | -.036 | .076 | -.039 | .137 |
| | Zscore(NI60) | .447 | -.035 | .026 | -.013 | .031 | .135 | .962 | .836 | .974 | .109 | -.013 | -.029 | .815 | -.036 | 1.000 | .468 | .963 | .397 |
| | Zscore(PB208) | .191 | .035 | -.094 | -.065 | .279 | .270 | .464 | .463 | .481 | .301 | .228 | .322 | .424 | .076 | .468 | 1.000 | .470 | .765 |
| | Zscore(V50) | .470 | -.034 | .034 | -.013 | .027 | .145 | 1.000 | .874 | .991 | .118 | .013 | -.041 | .858 | -.039 | .963 | .470 | 1.000 | .387 |
| | Zscore(ZN64) | .147 | .095 | -.092 | -.049 | .242 | .173 | .383 | .397 | .406 | .180 | .110 | .366 | .371 | .137 | .397 | .765 | .387 | 1.000 |

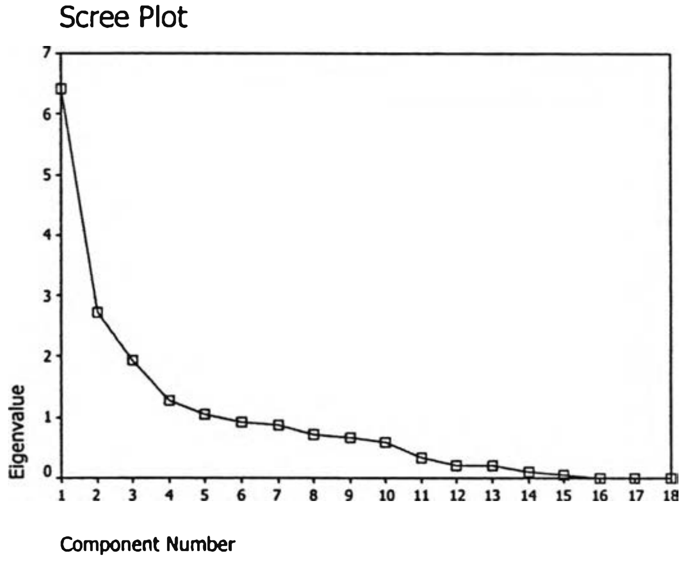
**KMO and Bartlett's Test**

| | | |
|---|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | .797 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 5412.445 |
| | df | 153 |
| | Sig. | .000 |

**Total Variance Explained**

| Component | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | | Rotation Sums of Squared Loadings | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 1 | 6.413 | 35.627 | 35.627 | 6.413 | 35.627 | 35.627 | 5.892 | 32.734 | 32.734 |
| 2 | 2.736 | 15.202 | 50.828 | 2.736 | 15.202 | 50.828 | 2.343 | 13.019 | 45.754 |
| 3 | 1.933 | 10.738 | 61.566 | 1.933 | 10.738 | 61.566 | 2.071 | 11.503 | 57.257 |
| 4 | 1.275 | 7.086 | 68.652 | 1.275 | 7.086 | 68.652 | 1.765 | 9.806 | 67.063 |
| 5 | 1.035 | 5.752 | 74.405 | 1.035 | 5.752 | 74.405 | 1.322 | 7.342 | 74.405 |
| 6 | .906 | 5.033 | 79.438 | | | | | | |
| 7 | .863 | 4.796 | 84.234 | | | | | | |
| 8 | .703 | 3.905 | 88.139 | | | | | | |
| 9 | .672 | 3.733 | 91.872 | | | | | | |
| 10 | .579 | 3.217 | 95.089 | | | | | | |
| 11 | .323 | 1.793 | 96.881 | | | | | | |
| 12 | .204 | 1.134 | 98.015 | | | | | | |
| 13 | .198 | 1.101 | 99.116 | | | | | | |
| 14 | 9.803E-02 | .545 | 99.660 | | | | | | |
| 15 | 4.396E-02 | .244 | 99.905 | | | | | | |
| 16 | 9.770E-03 | 5.428E-02 | 99.959 | | | | | | |
| 17 | 7.134E-03 | 3.963E-02 | 99.998 | | | | | | |
| 18 | 2.818E-04 | 1.566E-03 | 100.000 | | | | | | |

Extraction Method: Principal Component Analysis.



**Rotated Component Matrix[a]**

| | Component | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| Zscore(CR52) | .969 | -4.14E-02 | 4.098E-02 | .157 | 3.314E-02 |
| Zscore(V50) | .968 | -3.85E-02 | 4.109E-02 | .163 | 2.891E-02 |
| Zscore(FE58) | .958 | -4.46E-02 | 3.860E-02 | .188 | 3.135E-02 |
| Zscore(NI60) | .939 | -4.73E-02 | 2.778E-02 | .189 | 2.617E-02 |
| Zscore(CU63) | .910 | .164 | 5.787E-02 | .135 | 1.614E-02 |
| Zscore(MN55) | .899 | .135 | .101 | 9.890E-02 | 1.953E-03 |
| Zscore(AG107) | .585 | -.127 | 9.206E-03 | -8.38E-02 | -.109 |
| Zscore(MG25) | -5.45E-02 | .830 | 1.099E-02 | .317 | -4.63E-02 |
| Zscore(CA48) | 2.220E-02 | .765 | -9.84E-03 | .200 | -3.34E-02 |
| Zscore(K39) | 3.461E-02 | .656 | .230 | -2.65E-02 | -5.81E-02 |
| Zscore(AL27) | 1.905E-02 | .596 | -1.75E-02 | -.169 | 3.953E-05 |
| Zscore(NA23) | -7.31E-02 | .389 | -.175 | .204 | -4.30E-02 |
| Zscore(IN113) | 6.043E-02 | 4.782E-02 | .981 | .110 | -4.15E-03 |
| Zscore(CD111) | 8.778E-02 | -1.25E-03 | .978 | 9.148E-02 | 4.005E-03 |
| Zscore(ZN64) | .280 | .158 | 7.056E-02 | .860 | -4.17E-02 |
| Zscore(PB208) | .363 | .169 | .209 | .791 | -5.99E-02 |
| Zscore(BA137) | -3.81E-02 | -3.71E-02 | -8.66E-03 | 2.699E-02 | .815 |
| Zscore(AS75) | 3.622E-02 | -8.48E-02 | 9.366E-03 | -.101 | .792 |

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

**Component Score Coefficient Matrix**

| | Component | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| Zscore(AG107) | .134 | -.029 | .001 | -.146 | -.106 |
| Zscore(AL27) | .056 | .329 | .002 | -.263 | .026 |
| Zscore(AS75) | .008 | .028 | .011 | -.029 | .601 |
| Zscore(BA137) | -.028 | .023 | -.010 | .079 | .629 |
| Zscore(CA48) | .001 | .333 | -.033 | -.005 | .030 |
| Zscore(CD111) | -.021 | -.026 | .488 | -.040 | .001 |
| Zscore(CR52) | .174 | -.014 | -.019 | -.031 | .015 |
| Zscore(CU63) | .173 | .088 | -.008 | -.085 | .013 |
| Zscore(FE58) | .166 | -.023 | -.023 | -.003 | .015 |
| Zscore(IN113) | -.028 | -.007 | .489 | -.032 | -.001 |
| Zscore(K39) | .032 | .324 | .114 | -.192 | -.009 |
| Zscore(MG25) | -.032 | .337 | -.033 | .085 | .031 |
| Zscore(MN55) | .175 | .079 | .018 | -.111 | -.001 |
| Zscore(NA23) | -.030 | .145 | -.112 | .110 | .003 |
| Zscore(NI60) | .162 | -.025 | -.028 | .002 | .011 |
| Zscore(PB208) | -.055 | -.075 | .016 | .514 | -.003 |
| Zscore(V50) | .172 | -.014 | -.019 | -.027 | .012 |
| Zscore(ZN64) | -.082 | -.096 | -.060 | .601 | .016 |

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
Component Scores.

## Regression Analysis

**Descriptive Statistics**

| | Mean | Std. Deviation | N |
|---|---|---|---|
| CONC | 78.93130 | 42.092598 | 222 |
| APCS1 | .170305 | 1.000776 | 222 |
| APCS2 | 1.488314 | 1.000092 | 222 |
| APCS3 | .374408 | 1.000055 | 222 |
| APCS4 | .719140 | .999664 | 222 |
| APCS5 | .296080 | .999649 | 222 |

**Model Summary[c]**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics | | | | | Durbin-Watson |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | R Square Change | F Change | df1 | df2 | Sig. F Change | |
| 1 | .633[a] | .400 | .398 | 32.668331 | .400 | 146.902 | 1 | 220 | .000 | |
| 2 | .651[b] | .424 | .418 | 32.104349 | .023 | 8.797 | 1 | 219 | .003 | .821 |

a. Predictors: (Constant), APCS2

b. Predictors: (Constant), APCS2, APCS3

c. Dependent Variable: CONC

**ANOVA[c]**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 156776.5 | 1 | 156776.510 | 146.902 | .000[a] |
| | Residual | 234788.4 | 220 | 1067.220 | | |
| | Total | 391564.9 | 221 | | | |
| 2 | Regression | 165843.9 | 2 | 82921.970 | 80.453 | .000[b] |
| | Residual | 225720.9 | 219 | 1030.689 | | |
| | Total | 391564.9 | 221 | | | |

a. Predictors: (Constant), APCS2

b. Predictors: (Constant), APCS2, APCS3

c. Dependent Variable: CONC

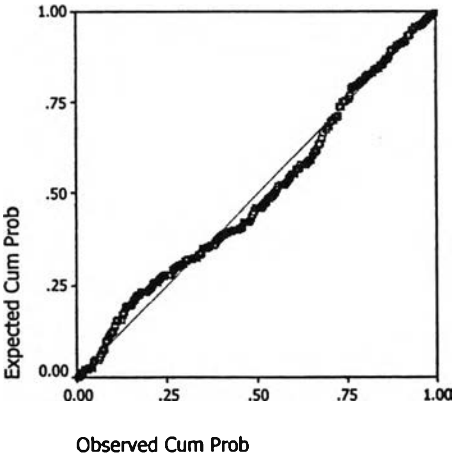
**Coefficients[a]**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. | Correlations | | |
|---|---|---|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | | Zero-order | Partial | Part |
| 1 | (Constant) | 39.294 | 3.937 | | 9.980 | .000 | | | |
| | APCS2 | 26.632 | 2.197 | .633 | 12.120 | .000 | .633 | .633 | .633 |
| 2 | (Constant) | 36.891 | 3.953 | | 9.332 | .000 | | | |
| | APCS2 | 26.636 | 2.159 | .633 | 12.335 | .000 | .633 | .640 | .633 |
| | APCS3 | 6.405 | 2.159 | .152 | 2.966 | .003 | .152 | .197 | .152 |

a. Dependent Variable: CONC

Normal P-P Plot of Regression Standard

Dependent Variable: CONC



# APPENDIX G: Summary results of FA/MR for indoor PM-10 data

## Factor Analysis

**Correlation Matrix**

| | | Zscore (AG107) | Zscore (AL27) | Zscore (AS75) | Zscore (BA137) | Zscore (CA48) | Zscore (CD111) | Zscore (CR52) | Zscore (CU63) | Zscore (FE58) | Zscore (IN113) | Zscore (K39) | Zscore (MG25) | Zscore (MN55) | Zscore (NA23) | Zscore (NI60) | Zscore (PB208) | Zscore (V50) | Zscore (ZN64) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Correlation | Zscore(AG107) | 1.000 | .013 | -.051 | .065 | .069 | -.010 | .170 | .203 | .171 | -.011 | .126 | .011 | .087 | .028 | .141 | .084 | .182 | .115 |
| | Zscore(AL27) | .013 | 1.000 | .069 | .399 | .314 | .040 | .011 | .176 | .010 | .058 | .208 | .434 | .033 | .326 | .008 | .131 | .011 | .136 |
| | Zscore(AS75) | -.051 | .069 | 1.000 | -.099 | -.095 | .004 | -.041 | -.044 | -.050 | .024 | -.008 | -.034 | -.035 | .025 | -.049 | -.016 | -.043 | -.056 |
| | Zscore(BA137) | .065 | .399 | -.099 | 1.000 | .648 | .000 | -.046 | .055 | -.040 | .026 | .464 | .691 | .004 | .185 | -.044 | .200 | -.041 | .204 |
| | Zscore(CA48) | .069 | .314 | -.095 | .648 | 1.000 | .068 | .011 | .085 | .020 | .089 | .395 | .712 | .050 | .205 | .016 | .265 | .015 | .286 |
| | Zscore(CD111) | -.010 | .040 | .004 | .000 | .068 | 1.000 | .051 | .064 | .054 | .994 | .166 | .038 | .060 | .080 | .054 | .473 | .051 | .061 |
| | Zscore(CR52) | .170 | .011 | -.041 | -.046 | .011 | .051 | 1.000 | .946 | .990 | .025 | .102 | -.002 | .947 | .047 | .989 | .191 | .999 | .210 |
| | Zscore(CU63) | .203 | .176 | -.044 | .055 | .085 | .064 | .946 | 1.000 | .934 | .042 | .135 | .072 | .933 | .077 | .933 | .177 | .943 | .185 |
| | Zscore(FE58) | .171 | .010 | -.050 | -.040 | .020 | .054 | .990 | .934 | 1.000 | .028 | .097 | .017 | .915 | .060 | .999 | .218 | .992 | .240 |
| | Zscore(IN113) | -.011 | .058 | .024 | .026 | .089 | .994 | .025 | .042 | .028 | 1.000 | .201 | .066 | .035 | .093 | .028 | .497 | .025 | .072 |
| | Zscore(K39) | .126 | .208 | -.008 | .464 | .395 | .166 | .102 | .135 | .097 | .201 | 1.000 | .401 | .112 | .313 | .090 | .302 | .106 | .209 |
| | Zscore(MG25) | .011 | .434 | -.034 | .691 | .712 | .038 | -.002 | .072 | .017 | .066 | .401 | 1.000 | .036 | .309 | .013 | .341 | .004 | .433 |
| | Zscore(MN55) | .087 | .033 | -.035 | .004 | .050 | .060 | .947 | .933 | .915 | .035 | .112 | .036 | 1.000 | .030 | .919 | .129 | .940 | .150 |
| | Zscore(NA23) | .028 | .326 | .025 | .185 | .205 | .080 | .047 | .077 | .060 | .093 | .313 | .309 | .030 | 1.000 | .059 | .104 | .052 | .156 |
| | Zscore(NI60) | .141 | .008 | -.049 | -.044 | .016 | .054 | .989 | .933 | .999 | .028 | .090 | .013 | .919 | .059 | 1.000 | .213 | .990 | .235 |
| | Zscore(PB208) | .084 | .131 | -.016 | .200 | .265 | .473 | .191 | .177 | .218 | .497 | .302 | .341 | .129 | .104 | .213 | 1.000 | .199 | .561 |
| | Zscore(V50) | .182 | .011 | -.043 | -.041 | .015 | .051 | .999 | .943 | .992 | .025 | .106 | .004 | .940 | .052 | .990 | .199 | 1.000 | .220 |
| | Zscore(ZN64) | .115 | .136 | -.056 | .204 | .286 | .061 | .210 | .185 | .240 | .072 | .209 | .433 | .150 | .156 | .235 | .561 | .220 | 1.000 |

**KMO and Bartlett's Test**

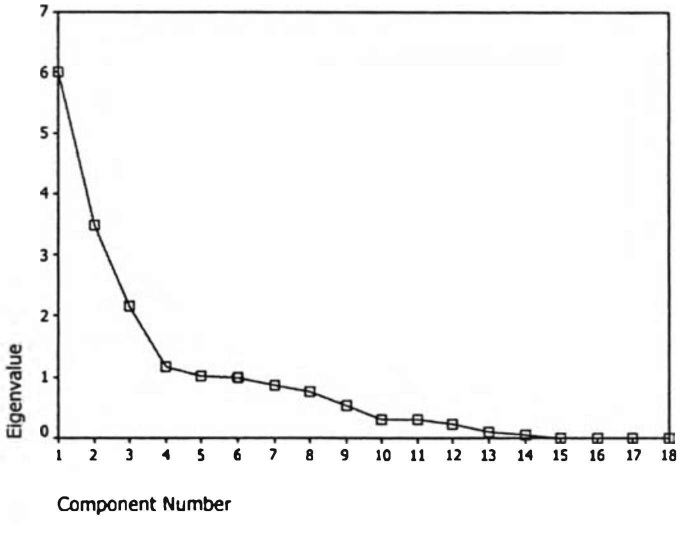
| | | |
|---|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | .760 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 9578.105 |
| | df | 153 |
| | Sig. | .000 |

**Total Variance Explained**

| Component | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | | Rotation Sums of Squared Loadings | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 1 | 6.012 | 33.401 | 33.401 | 6.012 | 33.401 | 33.401 | 5.824 | 32.355 | 32.355 |
| 2 | 3.493 | 19.404 | 52.806 | 3.493 | 19.404 | 52.806 | 3.131 | 17.394 | 49.749 |
| 3 | 2.154 | 11.967 | 64.773 | 2.154 | 11.967 | 64.773 | 2.243 | 12.458 | 62.207 |
| 4 | 1.172 | 6.510 | 71.283 | 1.172 | 6.510 | 71.283 | 1.534 | 8.523 | 70.730 |
| 5 | 1.017 | 5.650 | 76.932 | 1.017 | 5.650 | 76.932 | 1.116 | 6.202 | 76.932 |
| 6 | .983 | 5.461 | 82.393 | | | | | | |
| 7 | .865 | 4.808 | 87.201 | | | | | | |
| 8 | .755 | 4.192 | 91.393 | | | | | | |
| 9 | .540 | 3.001 | 94.394 | | | | | | |
| 10 | .317 | 1.760 | 96.155 | | | | | | |
| 11 | .308 | 1.714 | 97.868 | | | | | | |
| 12 | .222 | 1.233 | 99.101 | | | | | | |
| 13 | .101 | .562 | 99.663 | | | | | | |
| 14 | 4.459E-02 | .248 | 99.911 | | | | | | |
| 15 | 1.067E-02 | 5.928E-02 | 99.970 | | | | | | |
| 16 | 4.620E-03 | 2.567E-02 | 99.996 | | | | | | |
| 17 | 5.299E-04 | 2.944E-03 | 99.999 | | | | | | |
| 18 | 2.102E-04 | 1.168E-03 | 100.000 | | | | | | |

Extraction Method: Principal Component Analysis.

Scree Plot



**Rotated Component Matrix[a]**

| | Component | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| Zscore(CR52) | .992 | -9.64E-03 | 1.734E-02 | 8.713E-02 | -3.31E-02 |
| Zscore(V50) | .990 | -5.63E-03 | 1.670E-02 | 9.925E-02 | -3.64E-02 |
| Zscore(NI60) | .982 | -8.56E-03 | 2.010E-02 | .114 | -2.81E-02 |
| Zscore(FE58) | .982 | -4.98E-03 | 1.885E-02 | .123 | -3.56E-02 |
| Zscore(CU63) | .964 | .118 | 2.370E-02 | 2.397E-02 | -1.52E-02 |
| Zscore(MN55) | .957 | 4.394E-02 | 2.518E-02 | -3.74E-03 | -3.09E-02 |
| Zscore(BA137) | -5.51E-02 | .836 | -4.32E-02 | 6.494E-02 | -.192 |
| Zscore(MG25) | -2.81E-02 | .821 | -3.33E-02 | .329 | -1.54E-02 |
| Zscore(CA48) | -1.29E-02 | .780 | 1.299E-02 | .190 | -.203 |
| Zscore(AL27) | 5.106E-02 | .639 | 1.998E-03 | -8.24E-02 | .346 |
| Zscore(K39) | 9.286E-02 | .612 | .207 | 9.049E-02 | -3.46E-02 |
| Zscore(NA23) | 7.365E-02 | .494 | 8.035E-02 | -5.68E-02 | .383 |
| Zscore(IN113) | 4.316E-03 | 6.864E-02 | .984 | 6.022E-02 | 3.076E-02 |
| Zscore(CD111) | 3.151E-02 | 3.798E-02 | .983 | 4.228E-02 | 1.337E-02 |
| Zscore(ZN64) | .142 | .222 | -1.53E-02 | .876 | 7.662E-03 |
| Zscore(PB208) | .124 | .202 | .498 | .704 | -2.75E-03 |
| Zscore(AS75) | -2.90E-02 | -8.89E-02 | -2.60E-02 | 9.118E-02 | .832 |
| Zscore(AG107) | .162 | 4.100E-02 | -4.99E-02 | .213 | -.266 |

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

**Component Score Coefficient Matrix**

| | Component | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| Zscore(AG107) | .007 | -.021 | -.042 | .144 | -.223 |
| Zscore(AL27) | .028 | .249 | -.013 | -.171 | .306 |
| Zscore(AS75) | .007 | -.054 | -.054 | .148 | .761 |
| Zscore(BA137) | -.014 | .297 | -.035 | -.106 | -.175 |
| Zscore(CA48) | -.017 | .252 | -.023 | -.003 | -.178 |
| Zscore(CD111) | -.002 | -.010 | .460 | -.098 | -.022 |
| Zscore(CR52) | .172 | -.013 | -.007 | -.009 | -.002 |
| Zscore(CU63) | .173 | .045 | .002 | -.083 | .009 |
| Zscore(FE58) | .167 | -.018 | -.010 | .019 | -.002 |
| Zscore(IN113) | -.008 | -.003 | .457 | -.086 | -.006 |
| Zscore(K39) | .012 | .205 | .078 | -.076 | -.035 |
| Zscore(MG25) | -.026 | .241 | -.070 | .122 | .002 |
| Zscore(MN55) | .173 | .023 | .008 | -.092 | -.007 |
| Zscore(NA23) | .030 | .189 | .022 | -.132 | .340 |
| Zscore(NI60) | .168 | -.018 | -.009 | .013 | .004 |
| Zscore(PB208) | -.035 | -.065 | .143 | .468 | .023 |
| Zscore(V50) | .171 | -.014 | -.008 | .000 | -.004 |
| Zscore(ZN64) | -.042 | -.082 | -.123 | .670 | .063 |

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
Component Scores.

## Regression Analysis

**Descriptive Statistics**

| | Mean | Std. Deviation | N |
|---|---|---|---|
| CONC | 72.23888 | 35.757226 | 305 |
| APCS1 | .129140 | 1.000000 | 305 |
| APCS2 | 1.373470 | 1.000000 | 305 |
| APCS3 | .295130 | 1.000000 | 305 |
| APCS4 | .820140 | 1.000000 | 305 |
| APCS5 | .266560 | 1.000000 | 305 |

**Model Summary[c]**

| | | | | | Change Statistics | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | R Square Change | F Change | df1 | df2 | Sig. F Change | Durbin-Watson |
| 1 | .654[a] | .428 | .426 | 27.089325 | .428 | 226.669 | 1 | 303 | .000 | |
| 2 | .709[b] | .503 | .500 | 25.295741 | .075 | 45.492 | 1 | 302 | .000 | .998 |

a. Predictors: (Constant), APCS2
b. Predictors: (Constant), APCS2, APCS5
c. Dependent Variable: CONC

**ANOVA[c]**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 166337.1 | 1 | 166337.129 | 226.669 | .000[a] |
| | Residual | 222351.0 | 303 | 733.832 | | |
| | Total | 388688.1 | 304 | | | |
| 2 | Regression | 195446.0 | 2 | 97722.993 | 152.722 | .000[b] |
| | Residual | 193242.1 | 302 | 639.875 | | |
| | Total | 388688.1 | 304 | | | |

a. Predictors: (Constant), APCS2

b. Predictors: (Constant), APCS2, APCS5

c. Dependent Variable: CONC

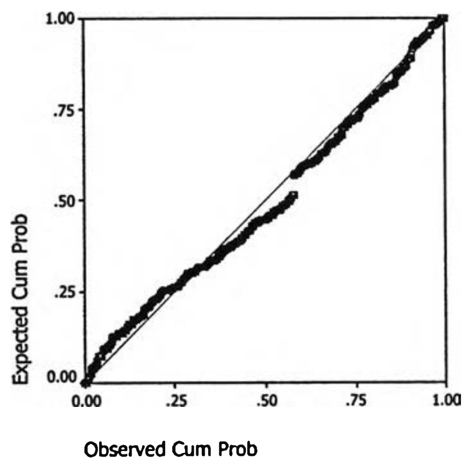
**Coefficients[a]**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. | Correlations | | |
|---|---|---|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | | Zero-order | Partial | Part |
| 1 | (Constant) | 40.111 | 2.638 | | 15.205 | .000 | | | |
| | APCS2 | 23.391 | 1.554 | .654 | 15.056 | .000 | .654 | .654 | .654 |
| 2 | (Constant) | 42.720 | 2.494 | | 17.132 | .000 | | | |
| | APCS2 | 23.391 | 1.451 | .654 | 16.123 | .000 | .654 | .680 | .654 |
| | APCS5 | -9.785 | 1.451 | -.274 | -6.745 | .000 | -.274 | -.362 | -.274 |

a. Dependent Variable: CONC

Normal P-P Plot of Regression Standard

Dependent Variable: CONC



## APPENDIX H: Summary results of FA/MR for outdoor PM-10 data

### Factor Analysis

**Correlation Matrix**

| | | Zscore (AG107) | Zscore (AL27) | Zscore (AS75) | Zscore (BA137) | Zscore (CA48) | Zscore (CD111) | Zscore (CR52) | Zscore (CU63) | Zscore (FE58) | Zscore (IN113) | Zscore (K39) | Zscore (MG25) | Zscore (MN55) | Zscore (NA23) | Zscore (NI60) | Zscore (PB208) | Zscore (V50) | Zscore (ZN64) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Correlation | Zscore(AG107) | 1.000 | -.031 | -.016 | -.037 | -.049 | -.085 | .635 | .299 | .675 | -.078 | -.119 | -.084 | .331 | -.038 | .655 | .034 | .646 | -.014 |
| | Zscore(AL27) | -.031 | 1.000 | -.087 | .756 | .861 | -.055 | -.049 | .268 | -.051 | .021 | .296 | .869 | .510 | .319 | -.070 | .446 | -.022 | .552 |
| | Zscore(AS75) | -.016 | -.087 | 1.000 | -.119 | -.081 | -.042 | -.069 | -.014 | -.087 | -.058 | .008 | -.083 | -.028 | -.016 | -.078 | -.101 | -.073 | -.041 |
| | Zscore(BA137) | -.037 | .756 | -.119 | 1.000 | .804 | -.004 | -.053 | .322 | -.021 | .073 | .326 | .750 | .494 | .158 | -.039 | .479 | -.022 | .416 |
| | Zscore(CA48) | -.049 | .861 | -.081 | .804 | 1.000 | -.032 | -.162 | .306 | -.120 | .040 | .366 | .864 | .484 | .176 | -.134 | .475 | -.129 | .510 |
| | Zscore(CD111) | -.085 | -.055 | -.042 | -.004 | -.032 | 1.000 | .106 | -.023 | .082 | .981 | .132 | -.009 | .091 | -.136 | .085 | .205 | .116 | .119 |
| | Zscore(CR52) | .635 | -.049 | -.069 | -.053 | -.162 | .106 | 1.000 | .327 | .843 | .091 | .049 | -.103 | .527 | .021 | .805 | -.082 | .996 | -.103 |
| | Zscore(CU63) | .299 | .268 | -.014 | .322 | .306 | -.023 | .327 | 1.000 | .354 | .003 | .120 | .233 | .455 | -.001 | .331 | .142 | .346 | .150 |
| | Zscore(FE58) | .675 | -.051 | -.087 | -.021 | -.120 | .082 | .843 | .354 | 1.000 | .084 | .040 | -.076 | .548 | .049 | .995 | .029 | .845 | -.054 |
| | Zscore(IN113) | -.078 | .021 | -.058 | .073 | .040 | .981 | .091 | .003 | .084 | 1.000 | .159 | .056 | .109 | -.098 | .087 | .298 | .104 | .151 |
| | Zscore(K39) | -.119 | .296 | .008 | .326 | .366 | .132 | .049 | .120 | .040 | .159 | 1.000 | .280 | .288 | .282 | .040 | .181 | .045 | .113 |
| | Zscore(MG25) | -.084 | .869 | -.083 | .750 | .864 | -.009 | -.103 | .233 | -.076 | .056 | .280 | 1.000 | .542 | .305 | -.088 | .490 | -.073 | .608 |
| | Zscore(MN55) | .331 | .510 | -.028 | .494 | .484 | .091 | .527 | .455 | .548 | .109 | .288 | .542 | 1.000 | .147 | .517 | .327 | .547 | .421 |
| | Zscore(NA23) | -.038 | .319 | -.016 | .158 | .176 | -.136 | .021 | -.001 | .049 | -.098 | .282 | .305 | .147 | 1.000 | .046 | .151 | .020 | .251 |
| | Zscore(NI60) | .655 | -.070 | -.078 | -.039 | -.134 | .085 | .805 | .331 | .995 | .087 | .040 | -.088 | .517 | .046 | 1.000 | .008 | .805 | -.071 |
| | Zscore(PB208) | .034 | .446 | -.101 | .479 | .475 | .205 | -.082 | .142 | .029 | .298 | .181 | .490 | .327 | .151 | .008 | 1.000 | -.062 | .650 |
| | Zscore(V50) | .646 | -.022 | -.073 | -.022 | -.129 | .116 | .996 | .346 | .845 | .104 | .045 | -.073 | .547 | .020 | .805 | -.062 | 1.000 | -.089 |
| | Zscore(ZN64) | -.014 | .552 | -.041 | .416 | .510 | .119 | -.103 | .150 | -.054 | .151 | .113 | .608 | .421 | .251 | -.071 | .650 | -.089 | 1.000 |

**KMO and Bartlett's Test**

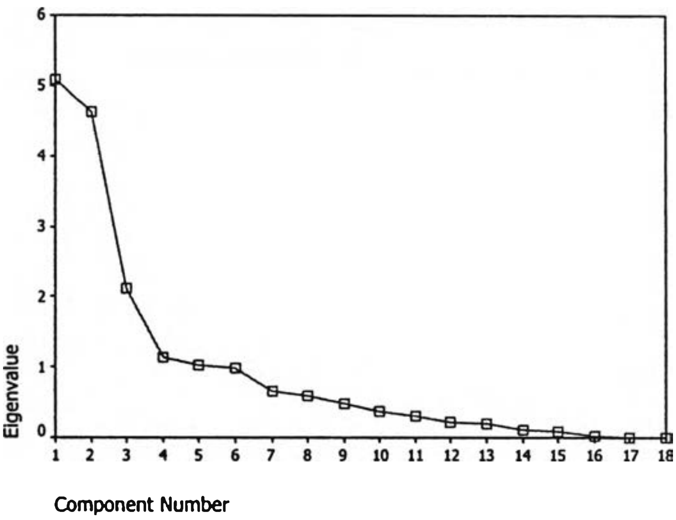
| | | |
|---|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | .753 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 2477.067 |
| | df | 153 |
| | Sig. | .000 |

**Total Variance Explained**

| Component | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | | Rotation Sums of Squared Loadings | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 1 | 5.076 | 28.197 | 28.197 | 5.076 | 28.197 | 28.197 | 4.765 | 26.473 | 26.473 |
| 2 | 4.621 | 25.675 | 53.872 | 4.621 | 25.675 | 53.872 | 4.717 | 26.203 | 52.676 |
| 3 | 2.121 | 11.784 | 65.657 | 2.121 | 11.784 | 65.657 | 2.155 | 11.975 | 64.651 |
| 4 | 1.133 | 6.296 | 71.953 | 1.133 | 6.296 | 71.953 | 1.278 | 7.099 | 71.750 |
| 5 | 1.027 | 5.703 | 77.656 | 1.027 | 5.703 | 77.656 | 1.063 | 5.906 | 77.656 |
| 6 | .986 | 5.477 | 83.133 | | | | | | |
| 7 | .646 | 3.587 | 86.720 | | | | | | |
| 8 | .596 | 3.311 | 90.031 | | | | | | |
| 9 | .477 | 2.648 | 92.679 | | | | | | |
| 10 | .376 | 2.090 | 94.769 | | | | | | |
| 11 | .314 | 1.745 | 96.514 | | | | | | |
| 12 | .213 | 1.185 | 97.699 | | | | | | |
| 13 | .191 | 1.059 | 98.758 | | | | | | |
| 14 | .116 | .647 | 99.405 | | | | | | |
| 15 | 9.066E-02 | .504 | 99.908 | | | | | | |
| 16 | 1.128E-02 | 6.268E-02 | 99.971 | | | | | | |
| 17 | 3.337E-03 | 1.854E-02 | 99.990 | | | | | | |
| 18 | 1.869E-03 | 1.039E-02 | 100.000 | | | | | | |

Extraction Method: Principal Component Analysis.

Scree Plot



**Rotated Component Matrix[a]**

| | Component | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| Zscore(CA48) | .925 | -9.45E-02 | -2.82E-02 | 6.997E-02 | 8.116E-02 |
| Zscore(MG25) | .907 | -5.89E-02 | -1.90E-02 | .164 | -5.64E-02 |
| Zscore(AL27) | .893 | -1.67E-02 | -6.96E-02 | .178 | -1.90E-02 |
| Zscore(BA137) | .862 | 6.486E-04 | 7.923E-03 | 4.793E-02 | 7.140E-02 |
| Zscore(ZN64) | .675 | -5.59E-02 | .139 | 6.302E-02 | -.388 |
| Zscore(PB208) | .619 | -1.52E-02 | .293 | 1.113E-02 | -.402 |
| Zscore(MN55) | .615 | .606 | 7.973E-02 | .104 | 7.885E-02 |
| Zscore(FE58) | -3.81E-02 | .954 | 5.201E-02 | 5.250E-02 | -6.06E-02 |
| Zscore(V50) | -4.88E-02 | .941 | 7.561E-02 | 4.733E-02 | 2.797E-02 |
| Zscore(CR52) | -8.20E-02 | .937 | 6.828E-02 | 6.204E-02 | 2.941E-02 |
| Zscore(NI60) | -6.03E-02 | .930 | 5.630E-02 | 5.886E-02 | -5.44E-02 |
| Zscore(AG107) | -1.98E-03 | .762 | -.151 | -.185 | -.116 |
| Zscore(CU63) | .430 | .451 | -5.51E-02 | -.232 | .292 |
| Zscore(CD111) | -1.13E-02 | 4.462E-02 | .980 | -2.69E-02 | -1.76E-02 |
| Zscore(IN113) | 6.491E-02 | 4.076E-02 | .979 | -1.03E-02 | -4.30E-02 |
| Zscore(NA23) | .175 | 2.829E-02 | -.167 | .827 | -.206 |
| Zscore(K39) | .303 | 3.269E-02 | .221 | .642 | .382 |
| Zscore(AS75) | -6.52E-02 | -8.14E-02 | -2.02E-02 | -1.73E-02 | .657 |

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

**Component Score Coefficient Matrix**

| | Component | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| Zscore(AG107) | .019 | .167 | -.095 | -.161 | -.119 |
| Zscore(AL27) | .187 | -.008 | -.055 | .031 | .017 |
| Zscore(AS75) | .019 | -.020 | .025 | -.020 | .625 |
| Zscore(BA137) | .200 | -.006 | -.015 | -.079 | .108 |
| Zscore(CA48) | .214 | -.026 | -.031 | -.069 | .119 |
| Zscore(CD111) | -.025 | -.012 | .461 | -.015 | .030 |
| Zscore(CR52) | -.034 | .198 | .016 | .061 | .021 |
| Zscore(CU63) | .146 | .094 | -.035 | -.268 | .300 |
| Zscore(FE58) | -.026 | .203 | .002 | .049 | -.064 |
| Zscore(IN113) | -.011 | -.013 | .457 | -.010 | .008 |
| Zscore(K39) | -.005 | -.004 | .119 | .506 | .376 |
| Zscore(MG25) | .189 | -.018 | -.032 | .018 | -.015 |
| Zscore(MN55) | .129 | .123 | .013 | .001 | .102 |
| Zscore(NA23) | -.079 | .007 | -.088 | .693 | -.215 |
| Zscore(NI60) | -.032 | .198 | .006 | .057 | -.059 |
| Zscore(PB208) | .118 | -.011 | .104 | -.065 | -.341 |
| Zscore(V50) | -.024 | .199 | .018 | .044 | .021 |
| Zscore(ZN64) | .129 | -.017 | .032 | -.029 | -.334 |

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
Component Scores.

Regression Analysis

**Descriptive Statistics**

| | Mean | Std. Deviation | N |
|---|---|---|---|
| CONC | 125.8223 | 55.768288 | 111 |
| APCS1 | 1.532980 | 1.000854 | 111 |
| APCS2 | .457192 | 1.000034 | 111 |
| APCS3 | .630754 | .999939 | 111 |
| APCS4 | 1.219807 | .999741 | 111 |
| APCS5 | .551739 | 1.000142 | 111 |

**Model Summary[c]**

| | | | | | Change Statistics | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | R Square Change | F Change | df1 | df2 | Sig. F Change | Durbin-Watson |
| 1 | .812[a] | .659 | .656 | 32.694049 | .659 | 211.059 | 1 | 109 | .000 | |
| 2 | .823[b] | .677 | .671 | 32.010515 | .017 | 5.705 | 1 | 108 | .019 | 1.092 |

a. Predictors: (Constant), APCS1

b. Predictors: (Constant), APCS1, APCS5

c. Dependent Variable: CONC

**ANOVA[c]**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 225601.0 | 1 | 225601.028 | 211.059 | .000[a] |
| | Residual | 116510.2 | 109 | 1068.901 | | |
| | Total | 342111.2 | 110 | | | |
| 2 | Regression | 231446.5 | 2 | 115723.264 | 112.937 | .000[b] |
| | Residual | 110664.7 | 108 | 1024.673 | | |
| | Total | 342111.2 | 110 | | | |

a. Predictors: (Constant), APCS1

b. Predictors: (Constant), APCS1, APCS5

c. Dependent Variable: CONC

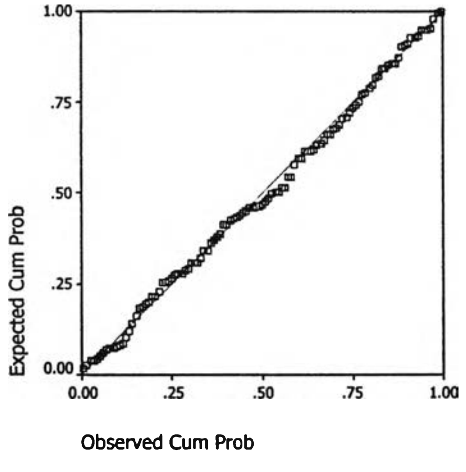
**Coefficients[a]**

| Model | | Unstandardized Coefficients B | Unstandardized Coefficients Std. Error | Standardized Coefficients Beta | t | Sig. | Correlations Zero-order | Correlations Partial | Correlations Part |
|---|---|---|---|---|---|---|---|---|---|
| 1 | (Constant) | 56.457 | 5.694 | | 9.914 | .000 | | | |
| | APCS1 | 45.248 | 3.115 | .812 | 14.528 | .000 | .812 | .812 | .812 |
| 2 | (Constant) | 52.429 | 5.825 | | 9.001 | .000 | | | |
| | APCS1 | 45.253 | 3.049 | .812 | 14.840 | .000 | .812 | .819 | .812 |
| | APCS5 | 7.289 | 3.052 | .131 | 2.388 | .019 | .130 | .224 | .131 |

a. Dependent Variable: CONC

Normal P-P Plot of Regression Standard

Dependent Variable: CONC



# BIOGRAPHY

Ms Pensri Watchalayann was born on October 5, 1962. She received her Bachelor of Science Degree in Public health (Major: Occupational Health and Safety), Mahidol University, Bangkok, Thailand in 1984. She has continued study in Toxicology, Graduate School, Mahidol University. She got her Master of Science Degree in 1989. She worked at Thammasat University for more than ten years and entered the International Postgraduate Program in Environmental Management at Chulalongkorn University in 2000 to study Doctoral Degree in Environmental Management.