



## **APPENDIX AVAILABLE ON REQUEST**

### **Research Report 143**

#### **Measurement and Modeling of Exposure to Selected Air Toxics for Health Effects Studies and Verification by Biomarkers**

**Roy M. Harrison et al.**

#### **Appendix 6. Personal Exposure and Microenvironment Concentration Result Figures**

Note: Appendices Available on the Web appear in a different order than in the original Investigators' Report. HEI has not changed these documents.

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APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

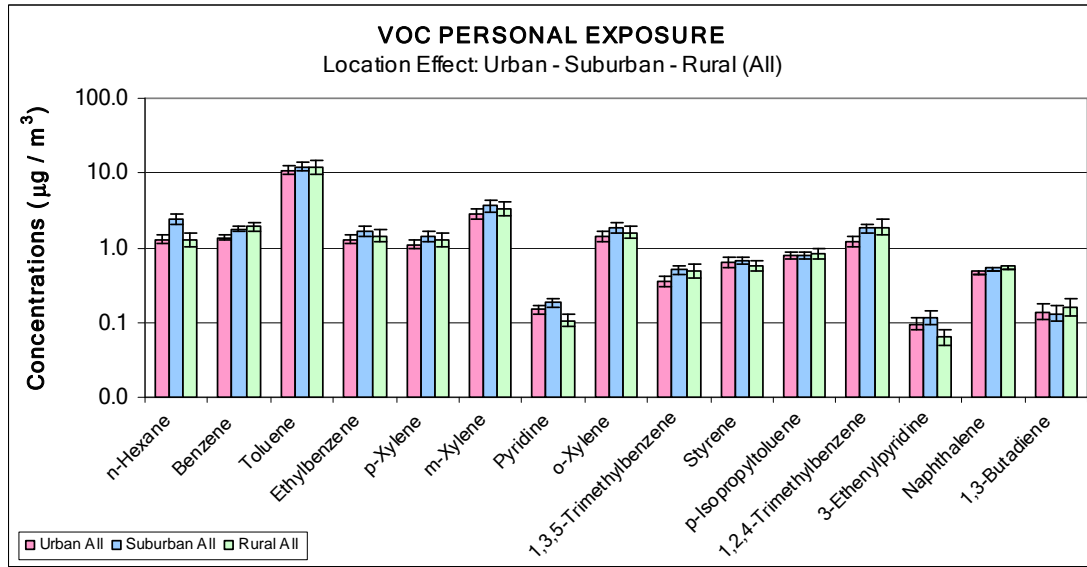


Figure A6.1. Location effect upon VOC personal exposure. ( $N_{\text{Urban}} = 191$ ,  $N_{\text{Suburban}} = 209$ ,  $N_{\text{Rural}} = 100$ )

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

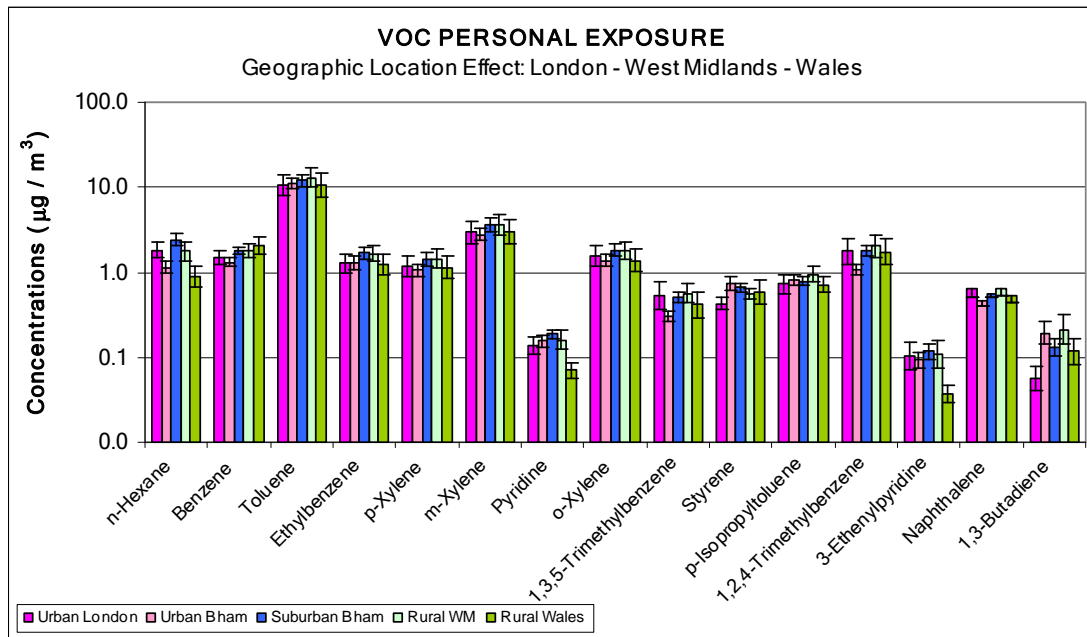


Figure A6.2. Geographic effect upon VOC personal exposure. ( $N_{\text{Urban, London}} = 55$ ,  $N_{\text{Urban, Bham}} = 136$ ,  $N_{\text{suburban}} = 209$ ,  $N_{\text{rural, WM}} = 50$ ,  $N_{\text{rural, Wales}} = 50$ )

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

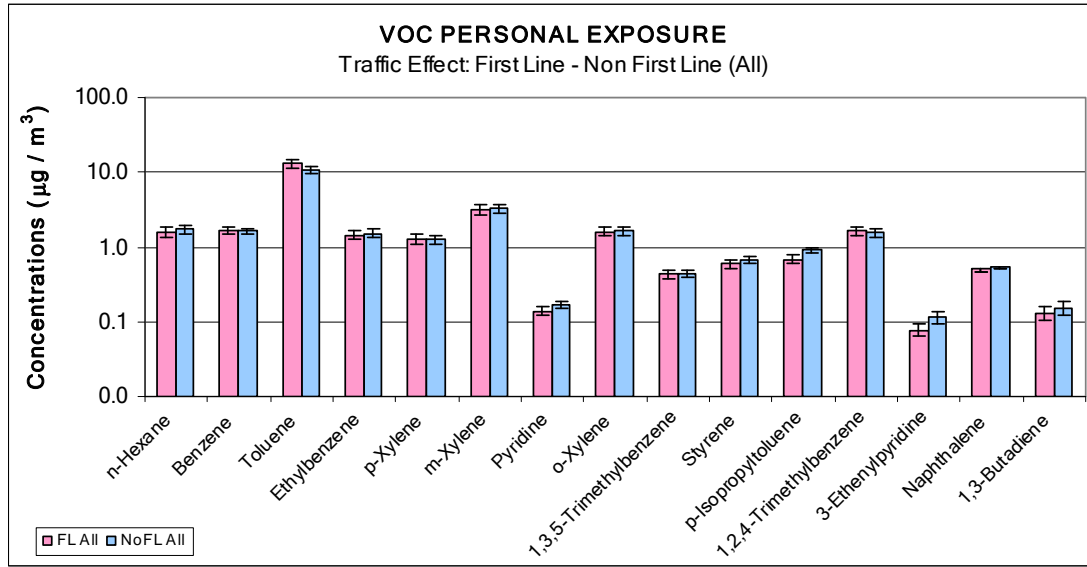


Figure A6.3. Residential traffic effect upon VOC personal exposure. ( $N_{FL} = 219$ ,  $N_{NFL} = 281$ )

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

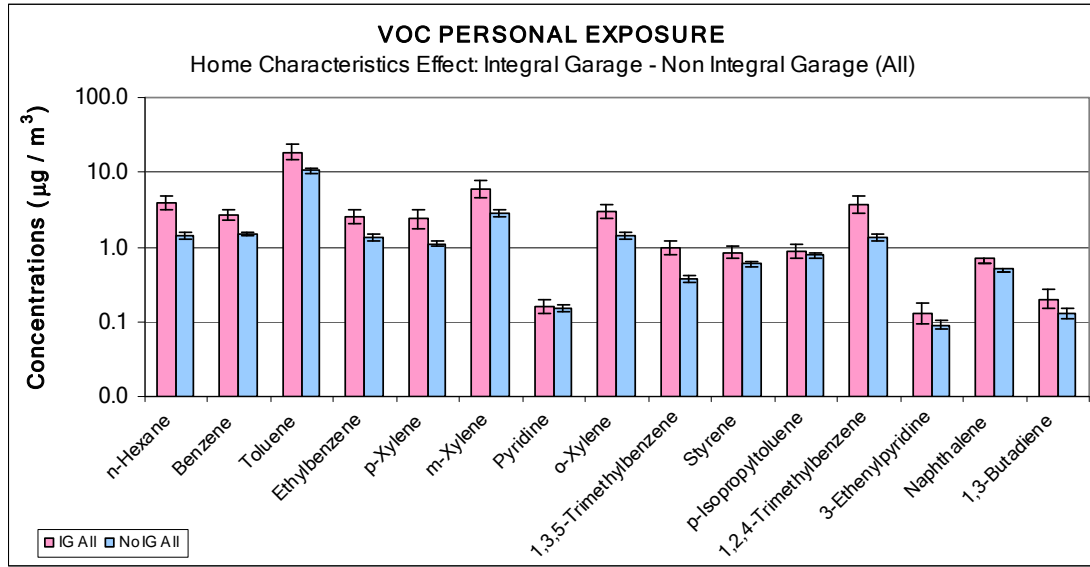


Figure A6.4. Home characteristics effect upon VOC personal exposure. ( $N_{IG} = 80$ ,  $N_{NIG} = 420$ )

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

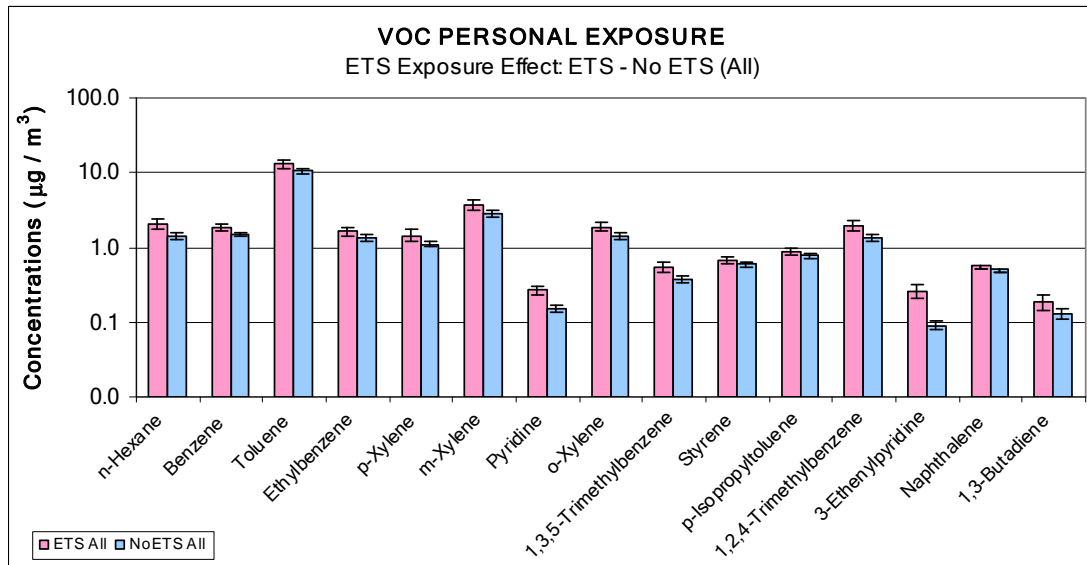


Figure A6.5. ETS effect upon VOC personal exposure. (N<sub>ETS</sub> = 195, N<sub>NETS</sub> = 305)

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

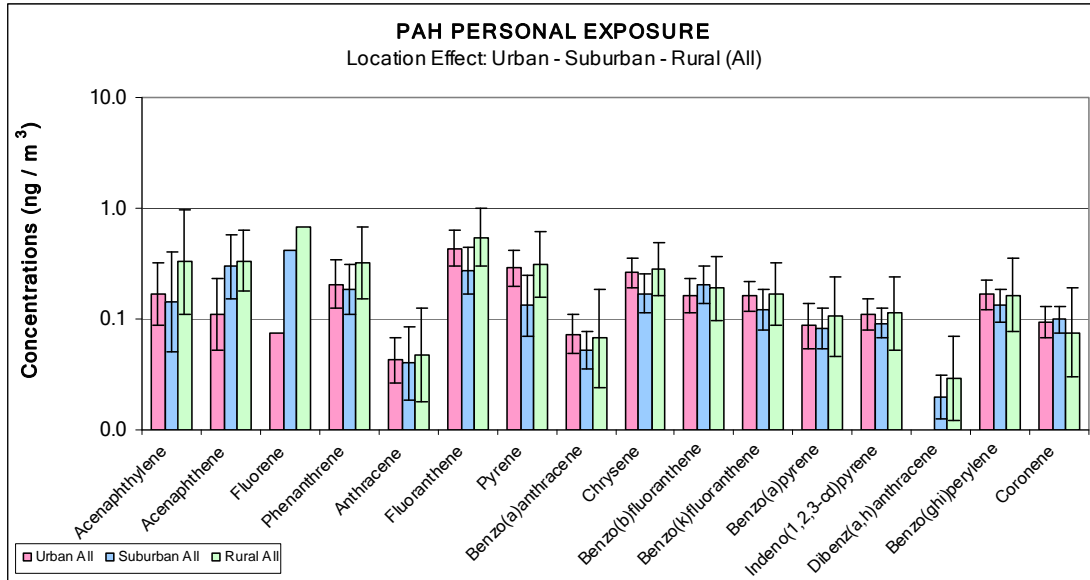


Figure A6.6. Location effect upon personal exposure to PAH. ( $N_{Urban} = 35$ ,  $N_{Suburban} = 37$ ,  $N_{Rural} = 19$ )

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

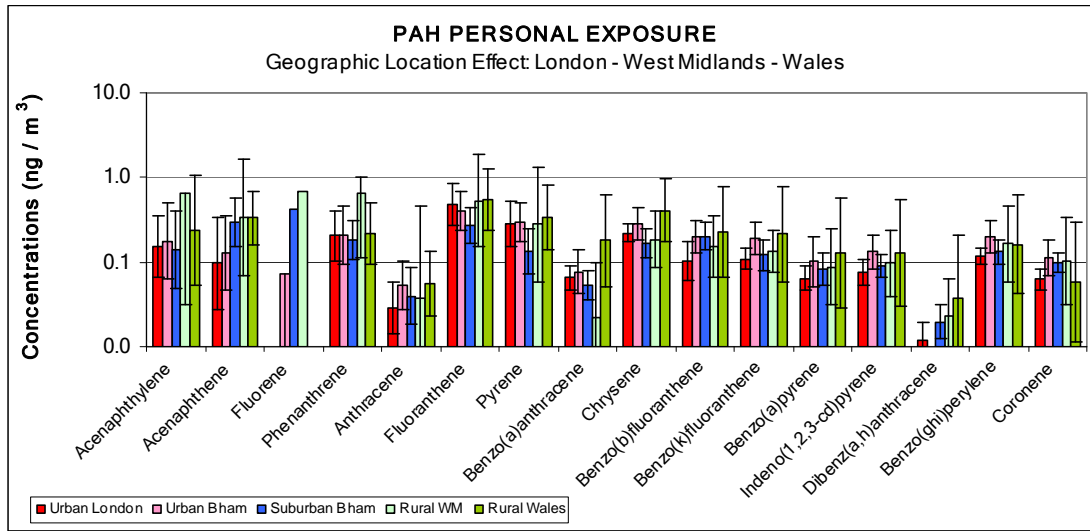


Figure A6.7. Geographic Location effect upon PAH personal exposure. ( $N_{\text{Urban, London}} = 11$ ,  $N_{\text{Urban, Bham}} = 24$ ,  $N_{\text{Suburban}} = 37$ ,  $N_{\text{Rural, WM}} = 9$ ,  $N_{\text{Rural, Wales}} = 10$ )



APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

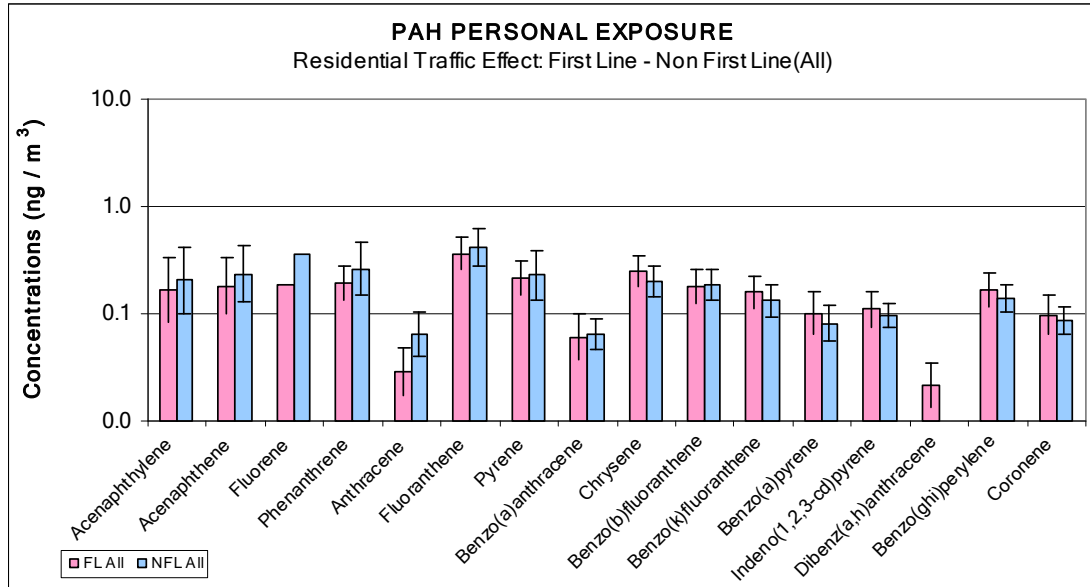


Figure A6.8. Residential traffic effect upon PAH personal exposure. (N<sub>FL</sub> = 41, N<sub>NFL</sub> = 50)

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

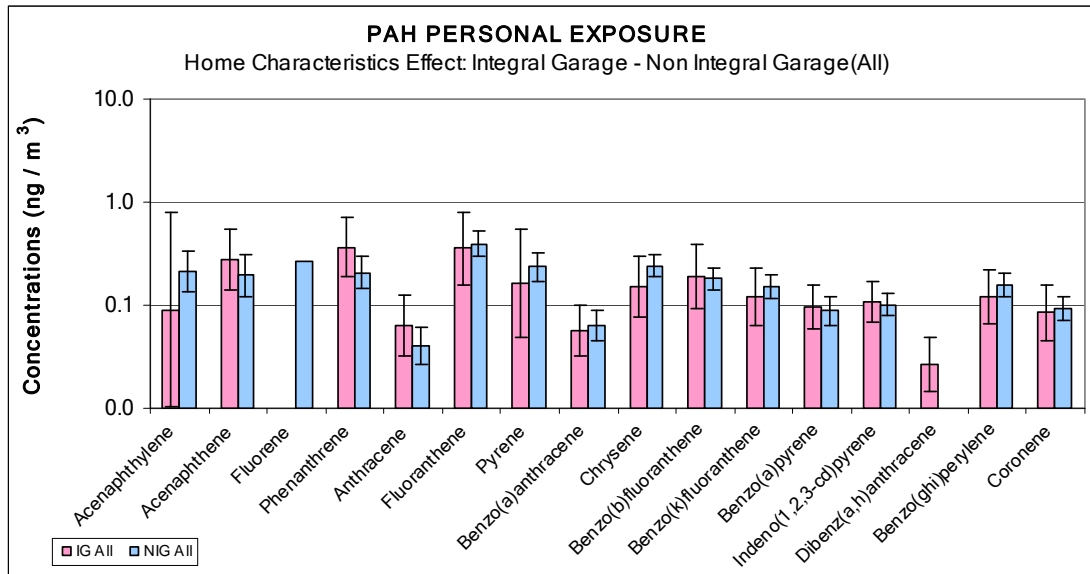


Figure A6.9. Home characteristics effect upon PAH personal exposure. (N<sub>IG</sub> = 16, N<sub>NIG</sub> = 75)

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

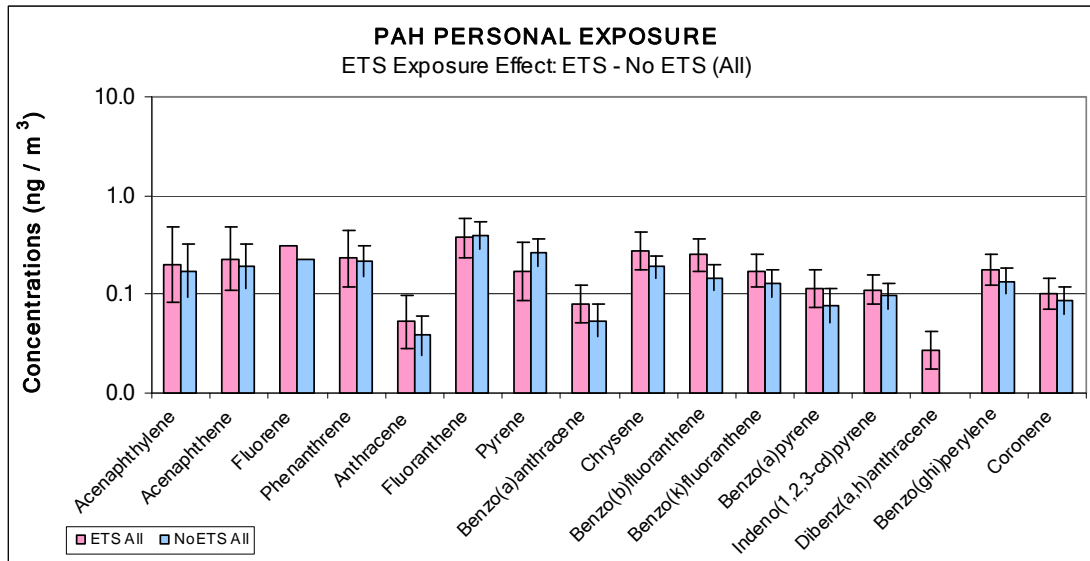


Figure A6.10. ETS effect upon PAH personal exposure. (N<sub>ETS</sub> = 35, N<sub>NETS</sub> = 56)

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

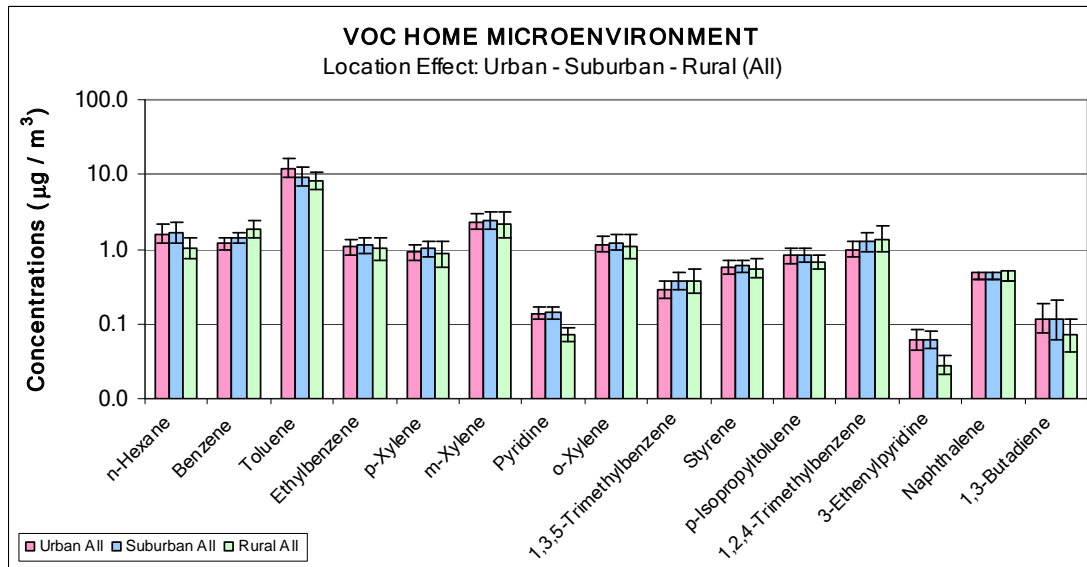


Figure A6.11. Location effect upon VOC home microenvironments. ( $N_{\text{Urban}} = 56$ ,  $N_{\text{Suburban}} = 64$ ,  $N_{\text{Rural}} = 40$ )

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

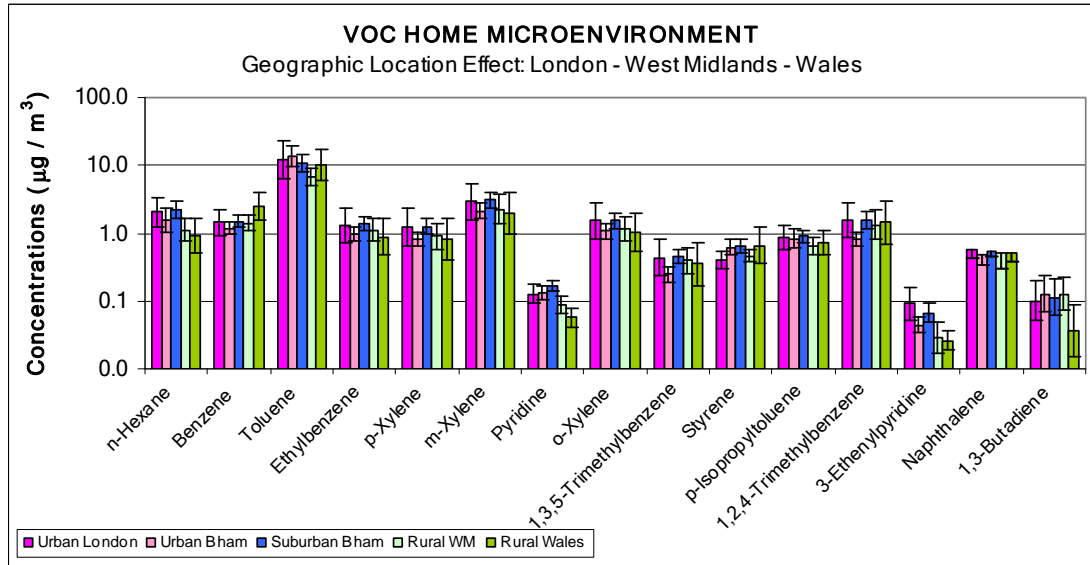


Figure A6.12. Geographic location effect upon VOC home microenvironments. ( $N_{\text{Urban, London}} = 20$ ,  $N_{\text{Urban, Bham}} = 36$ ,  $N_{\text{Suburban}} = 64$ ,  $N_{\text{Rural, WM}} = 20$ ,  $N_{\text{Rural, Wales}} = 20$ )

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

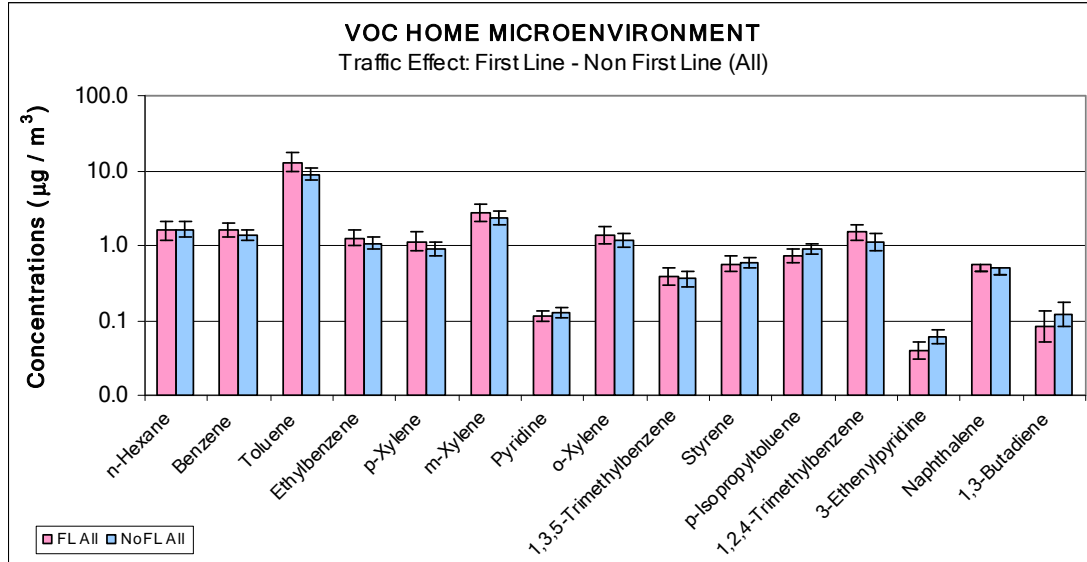


Figure A6.13. Traffic effect upon VOC home microenvironments. (N<sub>FL</sub>=78, N<sub>NFL</sub>=82)

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
CONCENTRATION RESULT FIGURES

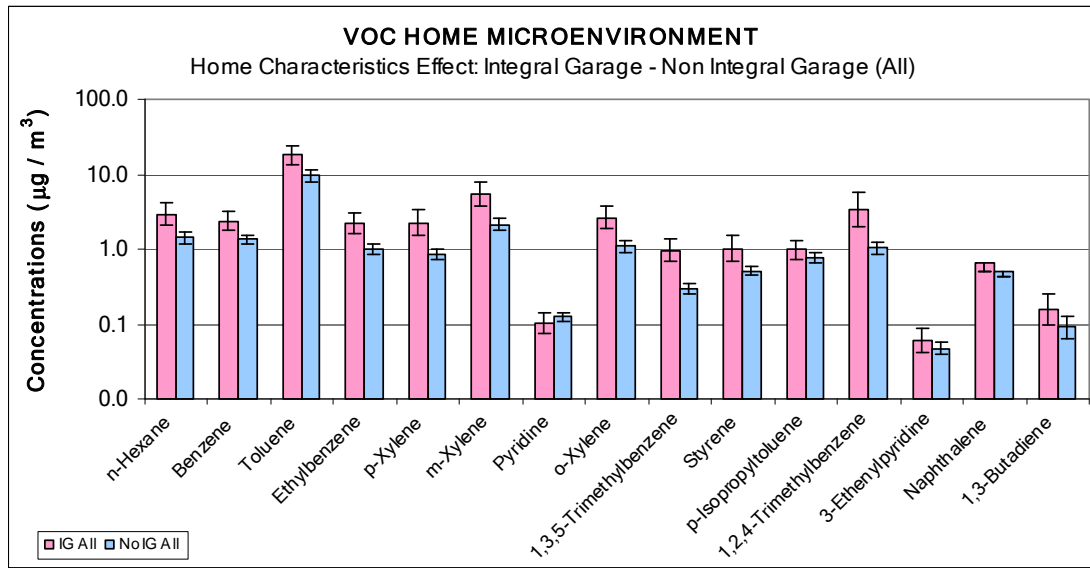


Figure A6.14. Home characteristics effect upon VOC home microenvironments. (N<sub>IG</sub>=28, N<sub>NoIG</sub>=132)

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

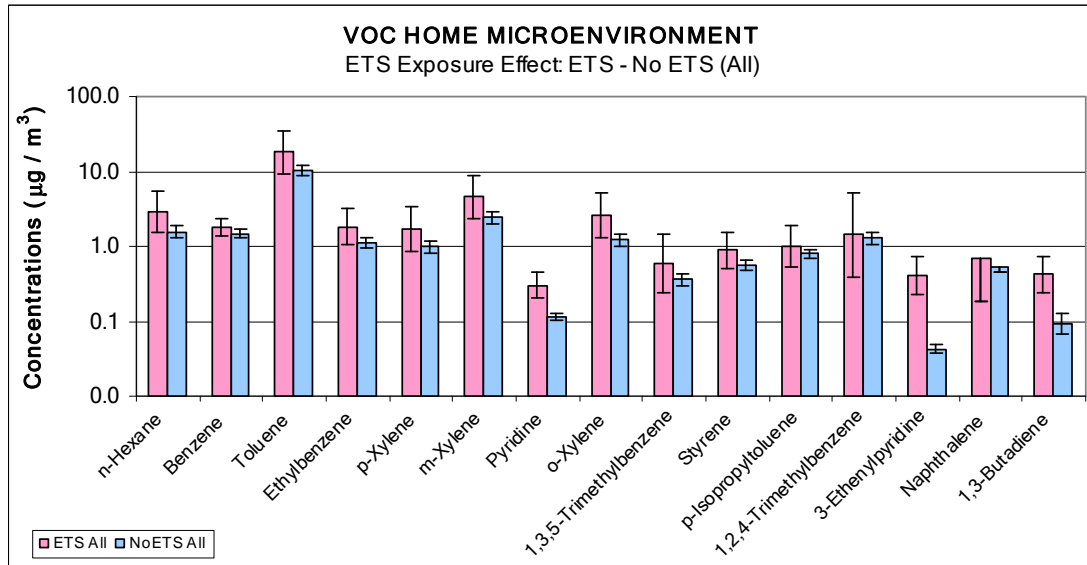


Figure A6.15. ETS exposure effect upon VOC home microenvironments. ( $N_{ETS}=10$ ,  $N_{NETS}=150$ )



APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

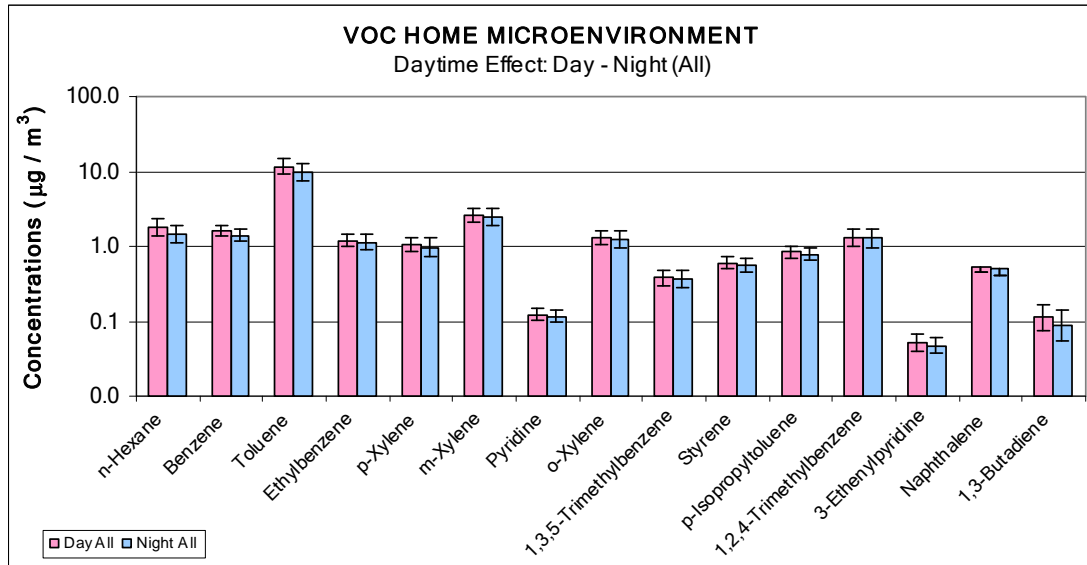


Figure A6.16. Daytime effect upon VOC home microenvironments. (N<sub>DAY</sub>=80, N<sub>NIGHT</sub>=80)

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

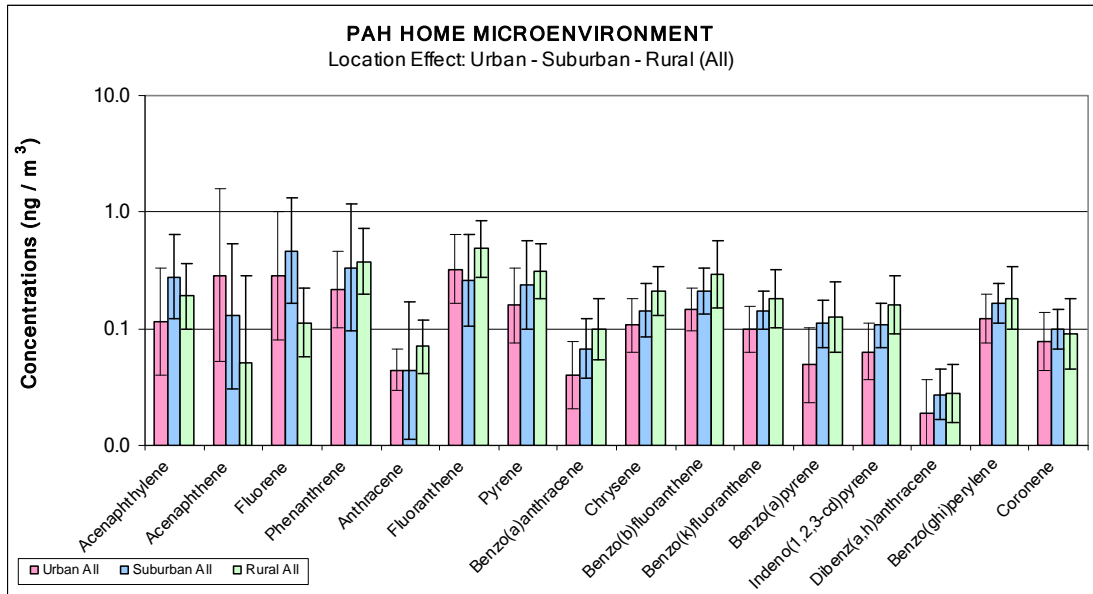


Figure A6.17. Location effect upon PAH home microenvironments. ( $N_{Urban}=22$ ,  $N_{Suburban}=35$ ,  $N_{Rural}=20$ )

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

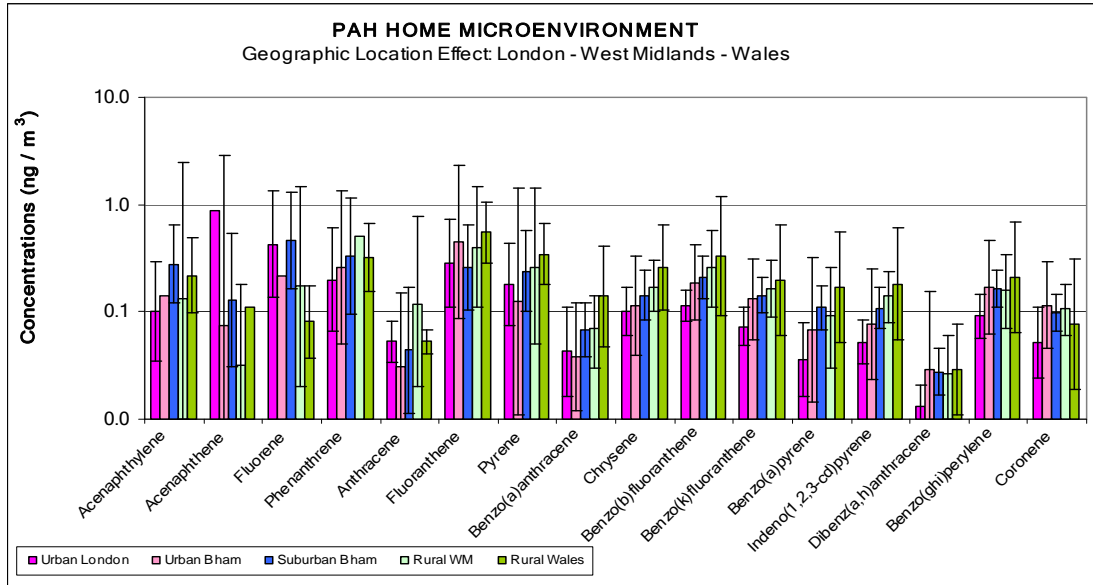


Figure A6.18. Geographic location effect upon PAH home microenvironments. (N<sub>Urban, London</sub>=8, N<sub>Urban, Bham</sub>=14, N<sub>Suburban</sub>=35, N<sub>Rural, WM</sub>=10, N<sub>Rural</sub>=10)

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

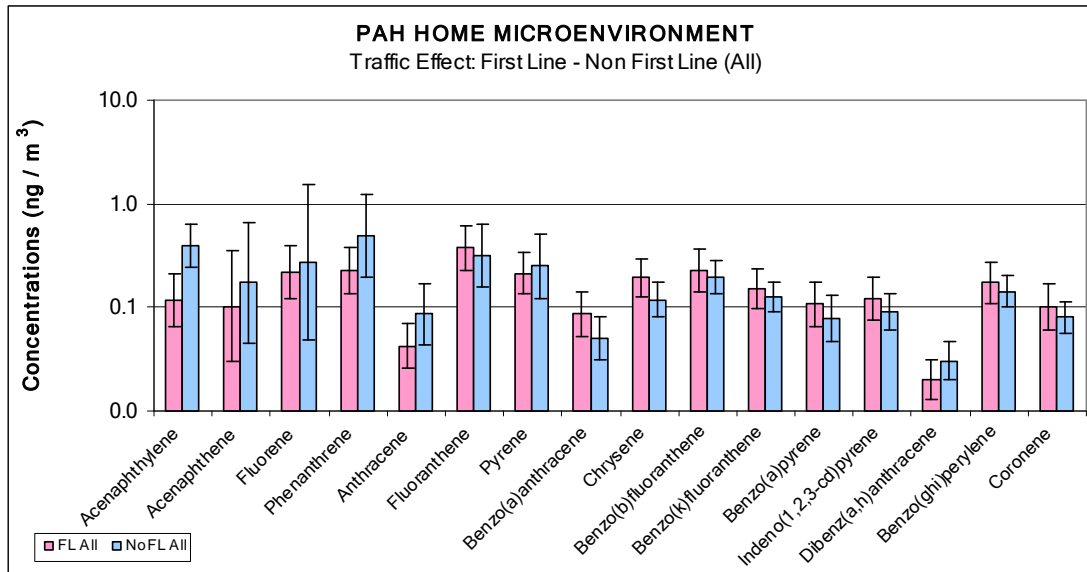


Figure A6.19. Traffic effect upon PAH home microenvironments. (N<sub>FL</sub>=22, N<sub>NFL</sub>=55)

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

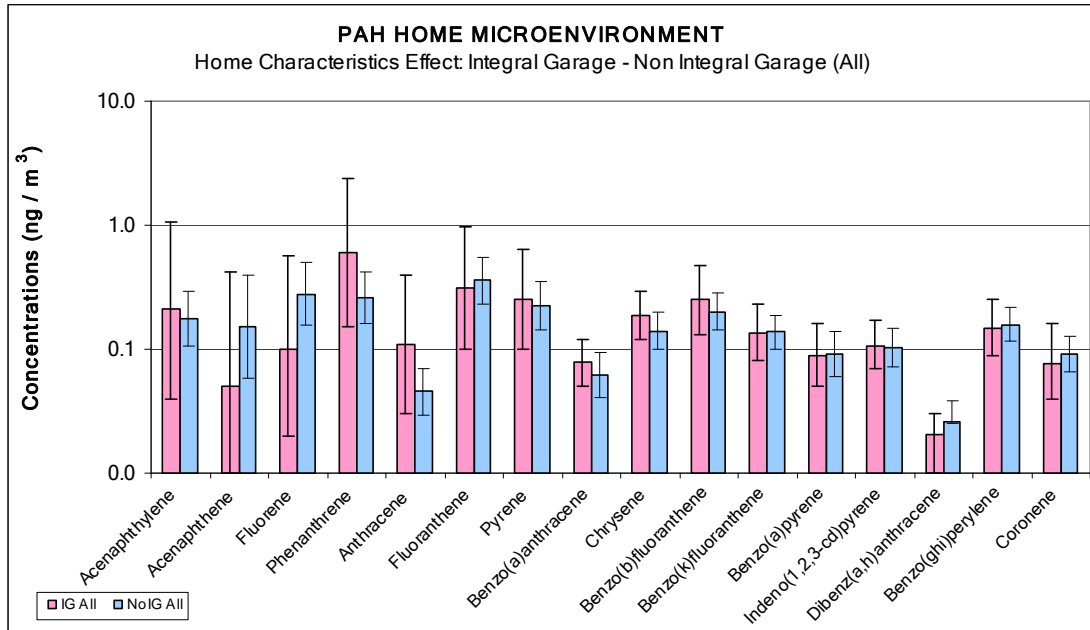


Figure A6.20. Home characteristics effect in PAH home microenvironments. (N<sub>IG</sub>=17, N<sub>NoIG</sub>=60)

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

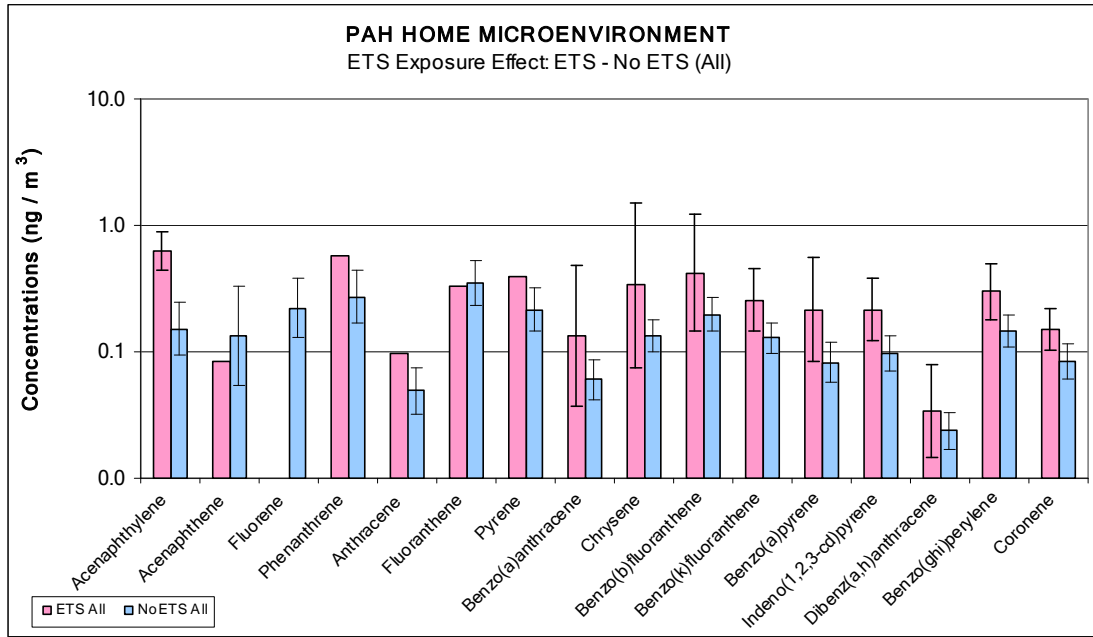


Figure A6.21. ETS exposure effect in PAH home microenvironments. (N<sub>ETS</sub>=8, N<sub>NETS</sub>=69)

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

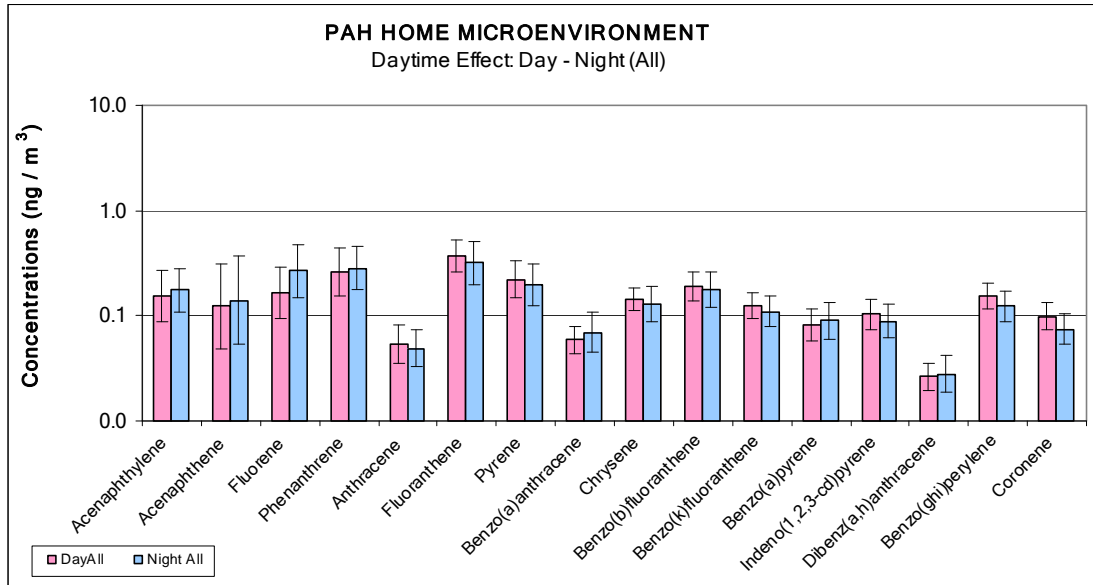


Figure A6.22. Daytime effect in PAH home microenvironments. (N<sub>DAY</sub>=39, N<sub>NIGHT</sub>=38)

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

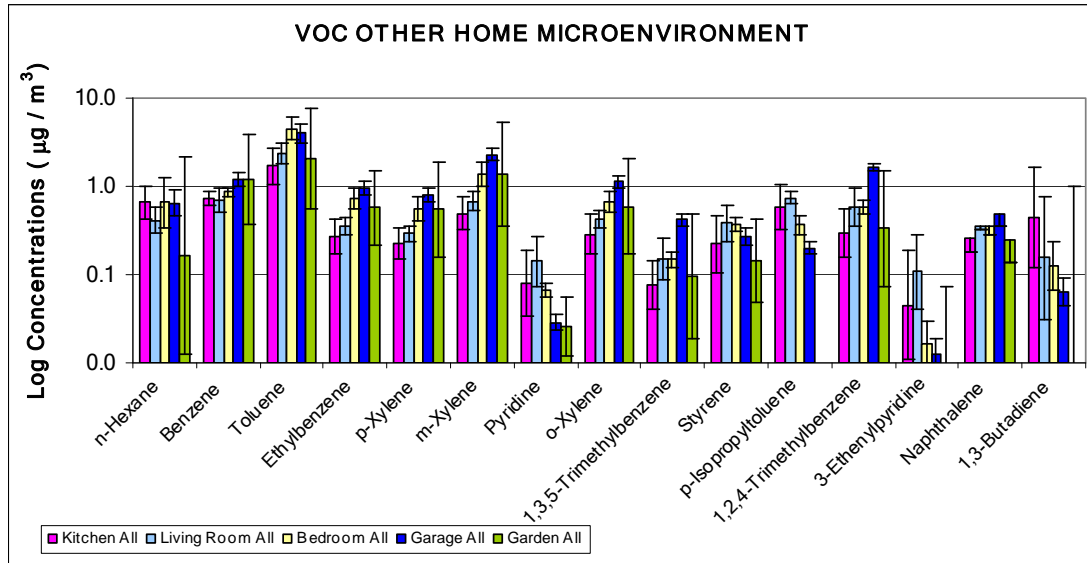


Figure A6.23. VOC in different other home microenvironments. ( $N_{\text{Kitchen}}=12$ ,  $N_{\text{Living Room}}=19$ ,  $N_{\text{Bedroom}}=15$ ,  $N_{\text{Garage}}=36$ ,  $N_{\text{Garden}}=5$ )



APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

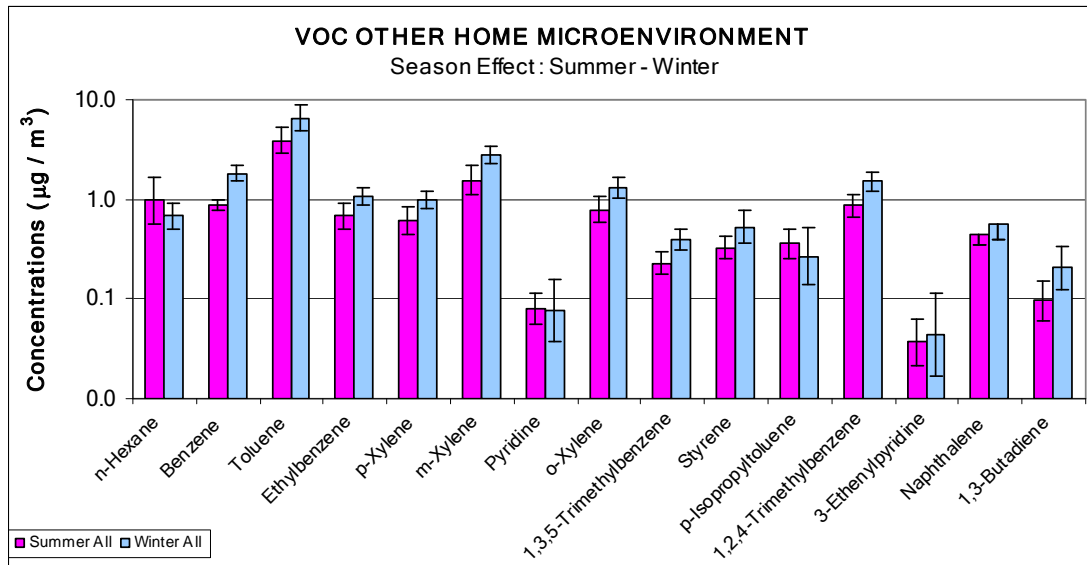


Figure A6.24. Seasonal effect upon VOC other home microenvironments. (N<sub>Summer</sub>=8, N<sub>Winter</sub>=8)

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

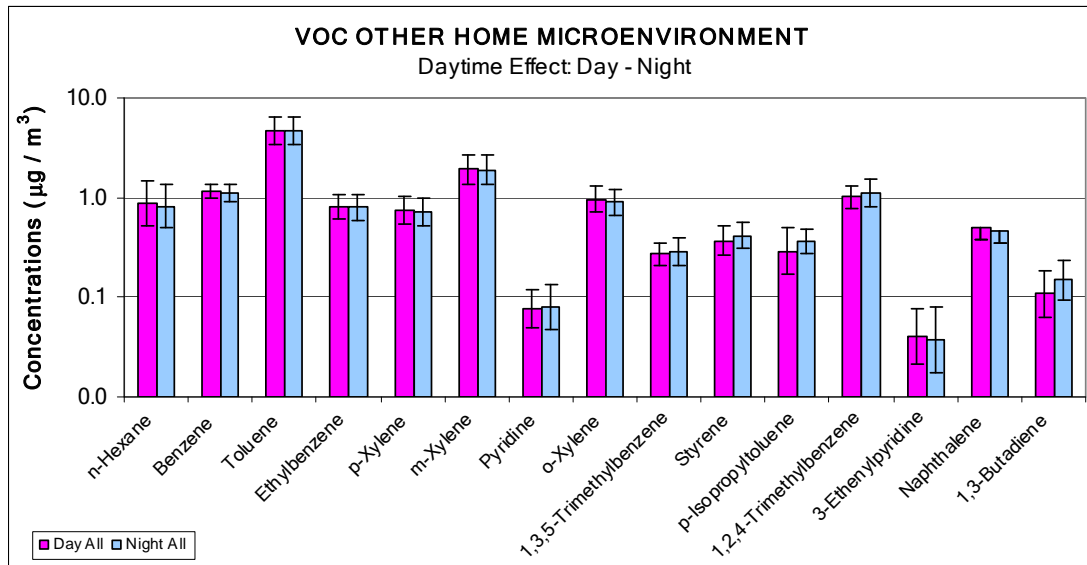


Figure A6.25. Daytime effect upon VOC other home microenvironments. (N<sub>Day</sub>=60, N<sub>Winter</sub>=42)

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

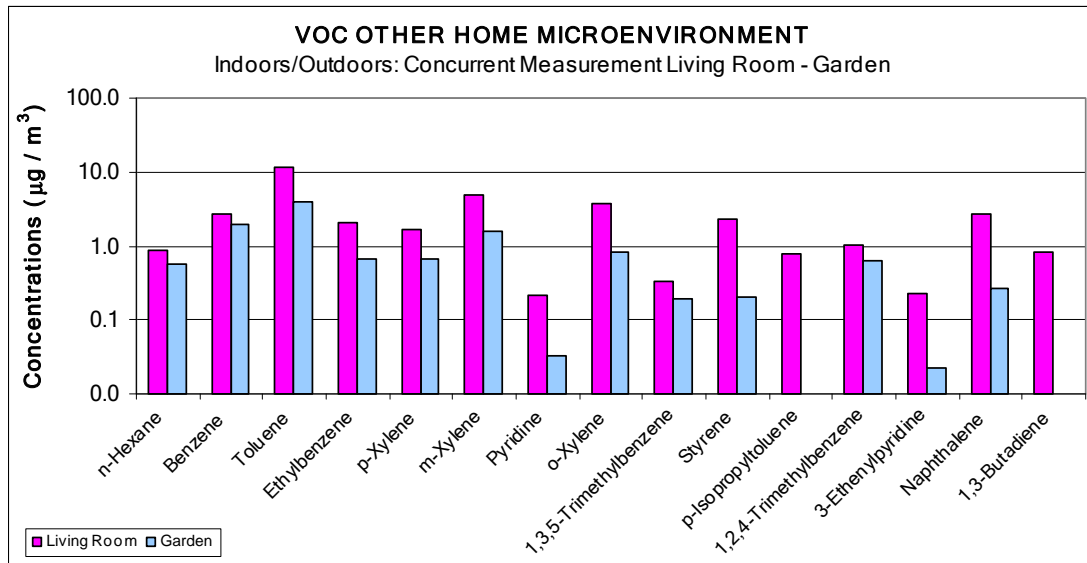


Figure A6.26. Indoors vs. outdoor effect in VOC other home microenvironments. (N<sub>Living Room</sub>=19, N<sub>Garden</sub>=5)

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

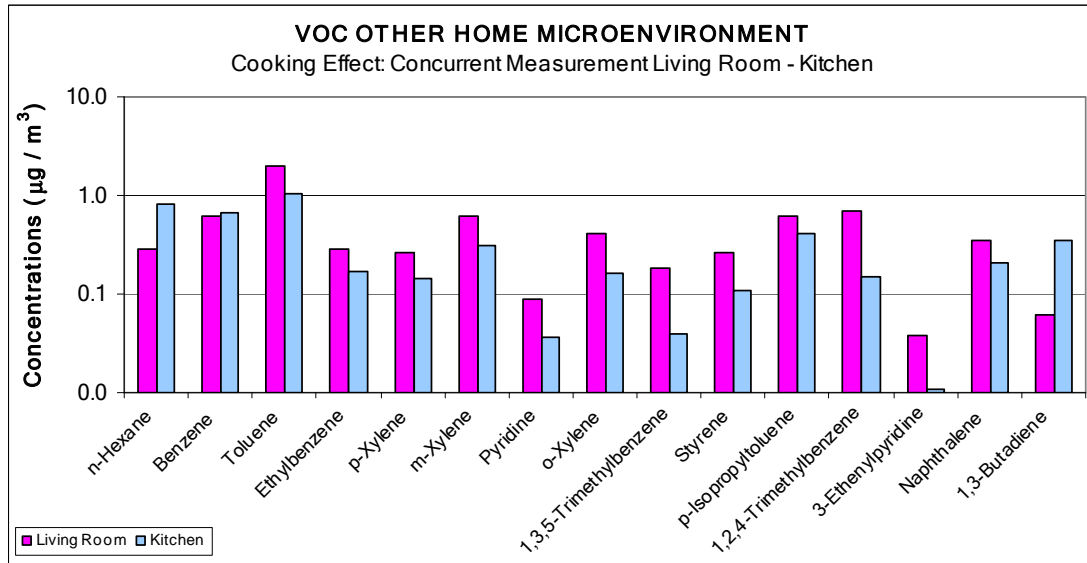


Figure A6.27. Cooking effect upon VOC other home microenvironments. (N<sub>Living Room</sub>=19, N<sub>Kitchen</sub>=12)

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

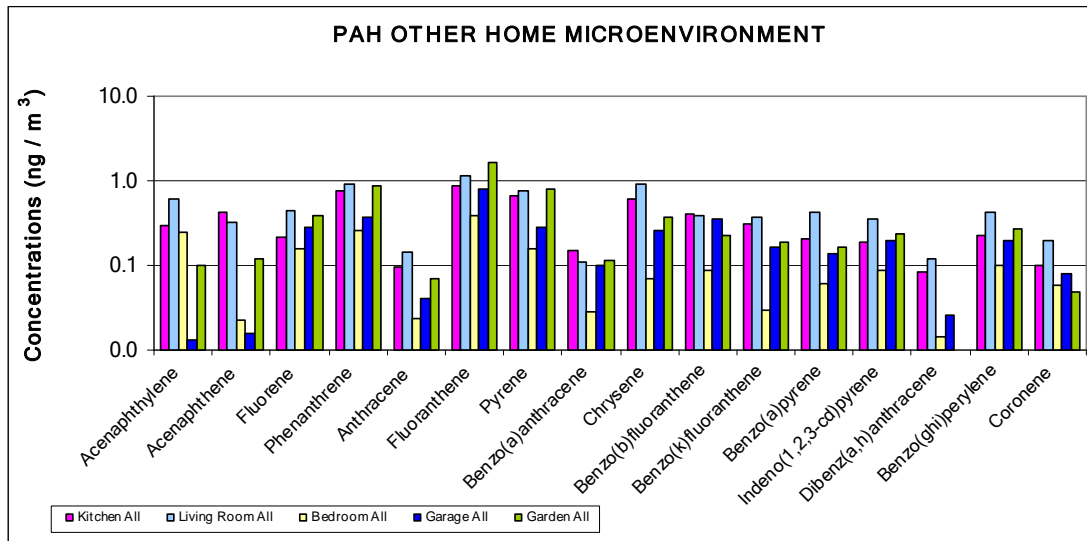


Figure A6.28. PAH in different other home microenvironments. ( $N_{\text{Kitchen}}=8$ ,  $N_{\text{Living Room}}=5$ ,  $N_{\text{Bedroom}}=4$ ,  $N_{\text{Garage}}=4$ ,  $N_{\text{Garden}}=2$ )

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

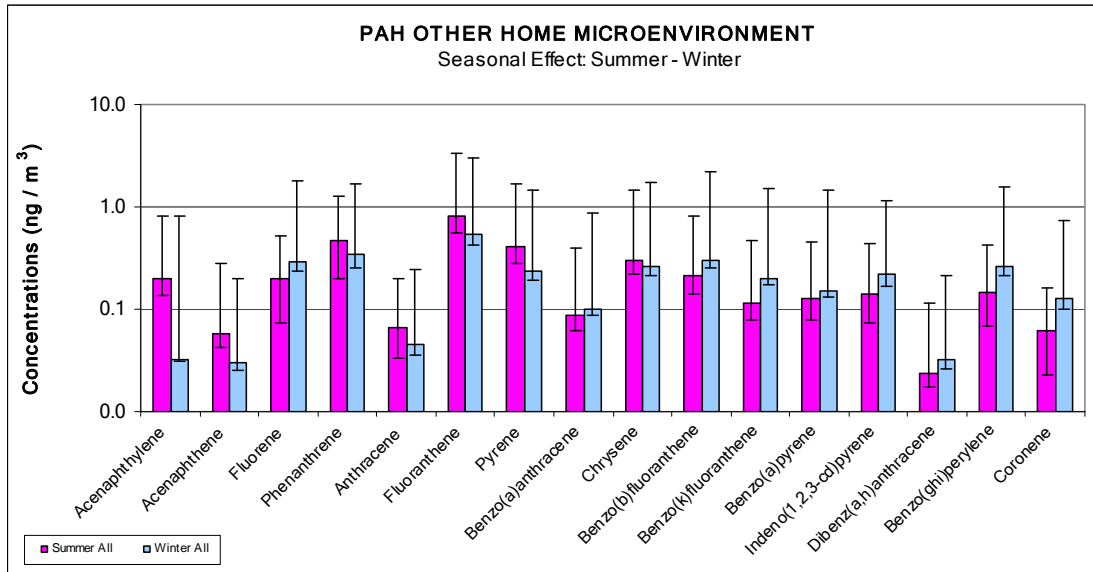


Figure A6.29. Seasonal effect in PAH other home microenvironments. ( $N_{\text{Day}}=11$ ,  $N_{\text{Winter}}=11$ )

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

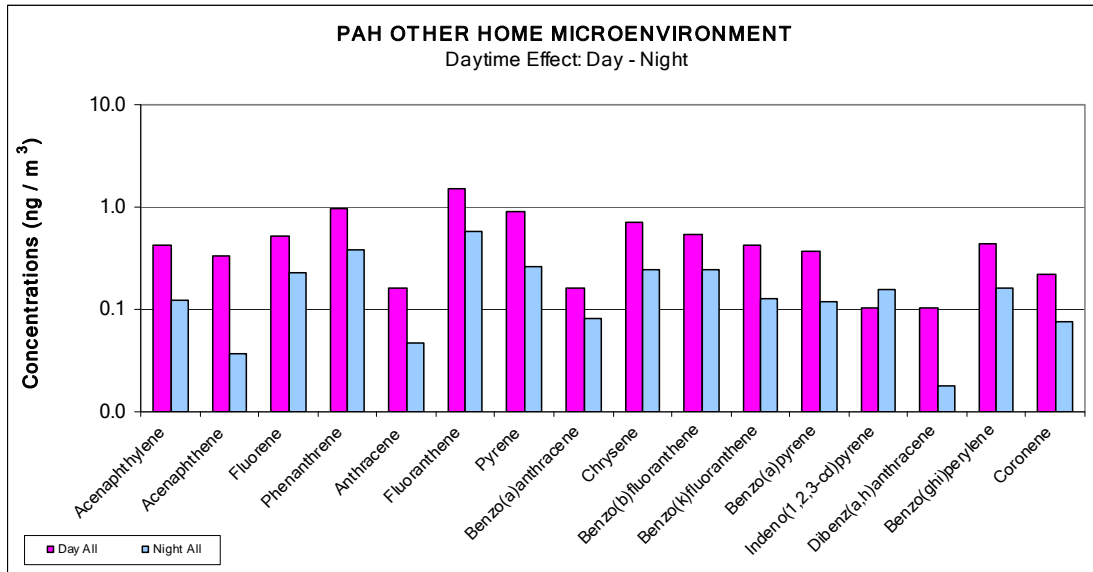


Figure A6.30. Daytime effect in PAH other home microenvironments. (N<sub>day</sub>=5, N<sub>night</sub>=5)

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

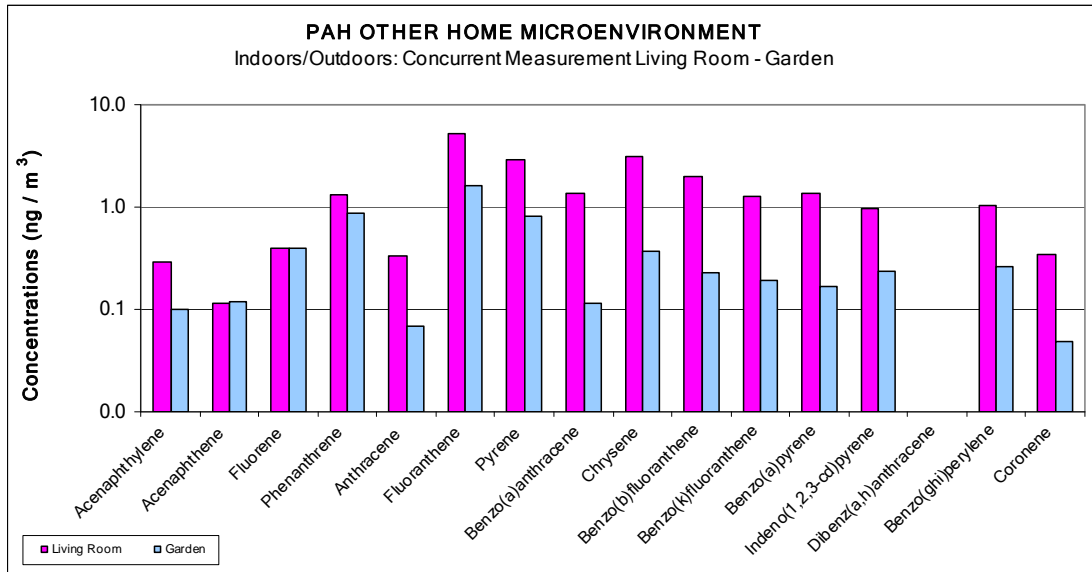


Figure A6.31. Indoors vs. outdoor effect in PAH other home microenvironments. ( $N_{\text{Living Room}}=5$ ,  $N_{\text{Garden}}=2$ )



APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

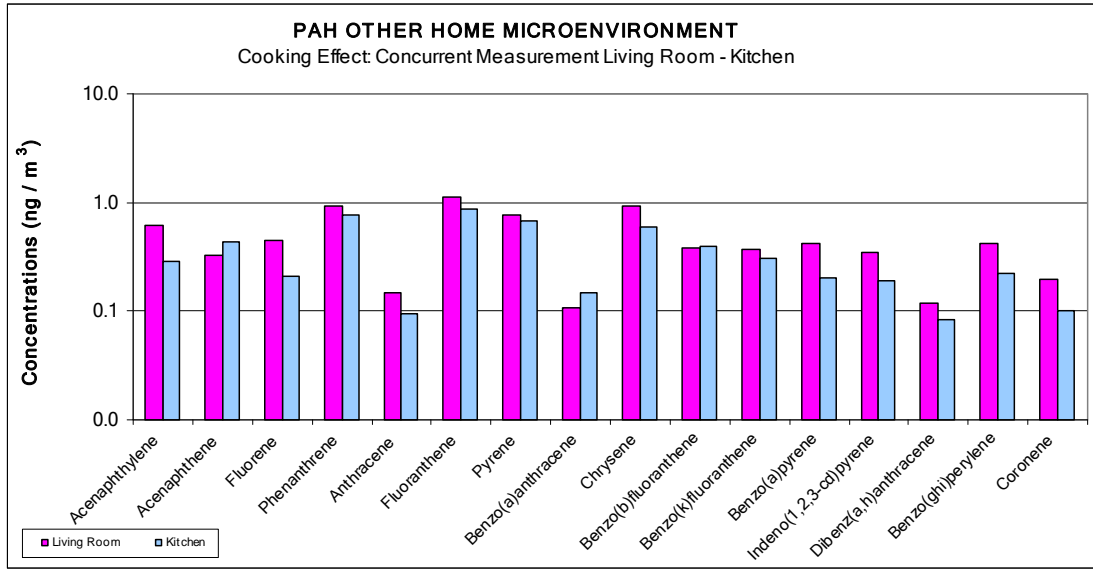


Figure A6.32. Cooking effect in PAH other home microenvironments. ( $N_{\text{Living Room}}=5$ ,  $N_{\text{Kitchen}}=8$ )

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

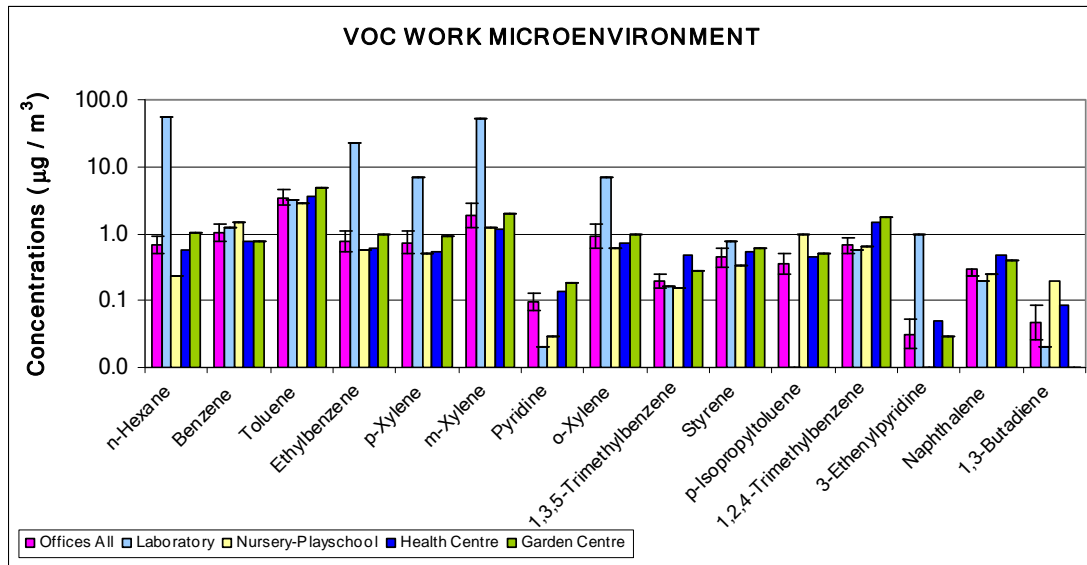


Figure A6.33. VOC in different work microenvironments. ( $N_{\text{offices}}=34$ ,  $N_{\text{laboratory}}=1$ ,  $N_{\text{nursery}}=1$ ,  $N_{\text{health centre}}=3$ ,  $N_{\text{garden centre}}=1$ )

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

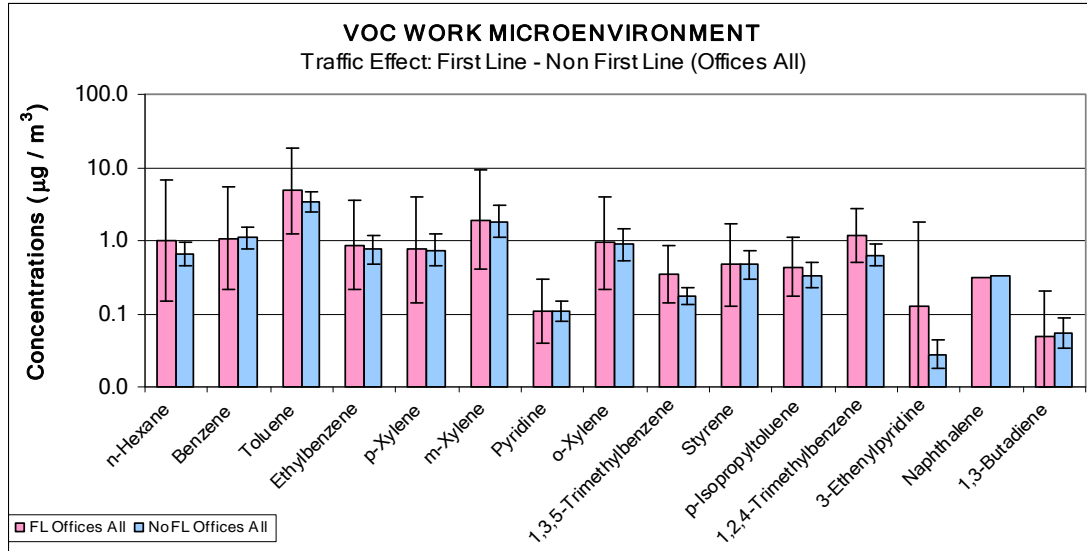


Figure A6.34. Traffic effect in offices, VOC dataset. (N<sub>FL</sub>=8, N<sub>NFL</sub>=26)

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

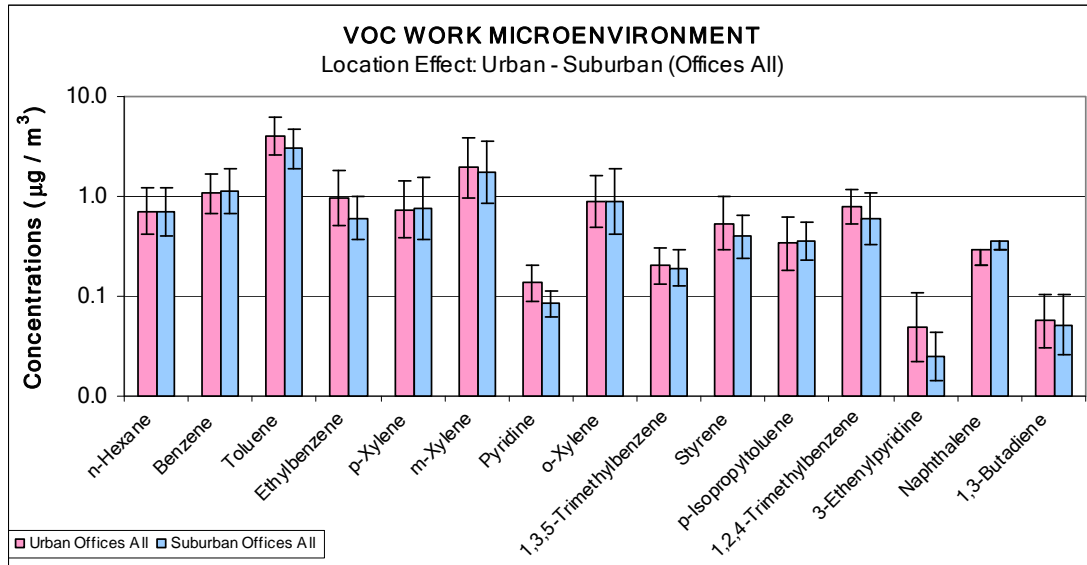


Figure A6.35. Location effect in offices, VOC dataset. (N<sub>Urban</sub>=14, N<sub>Suburban</sub>=20)

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

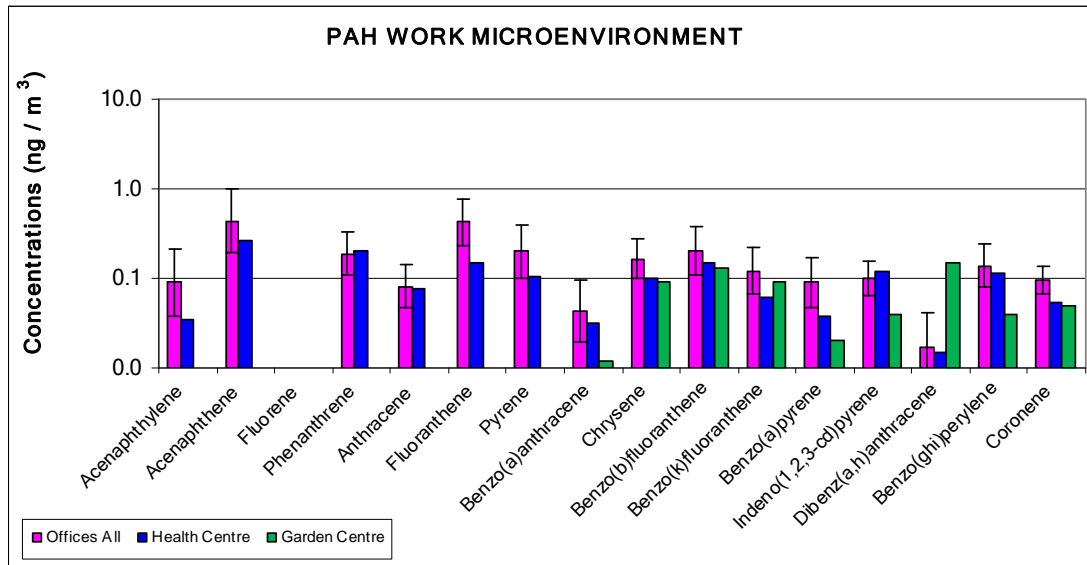


Figure A6.36. PAH in different work microenvironments. (N<sub>offices</sub>=23, N<sub>health centre</sub>=2, N<sub>garden centre</sub>=1 )

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

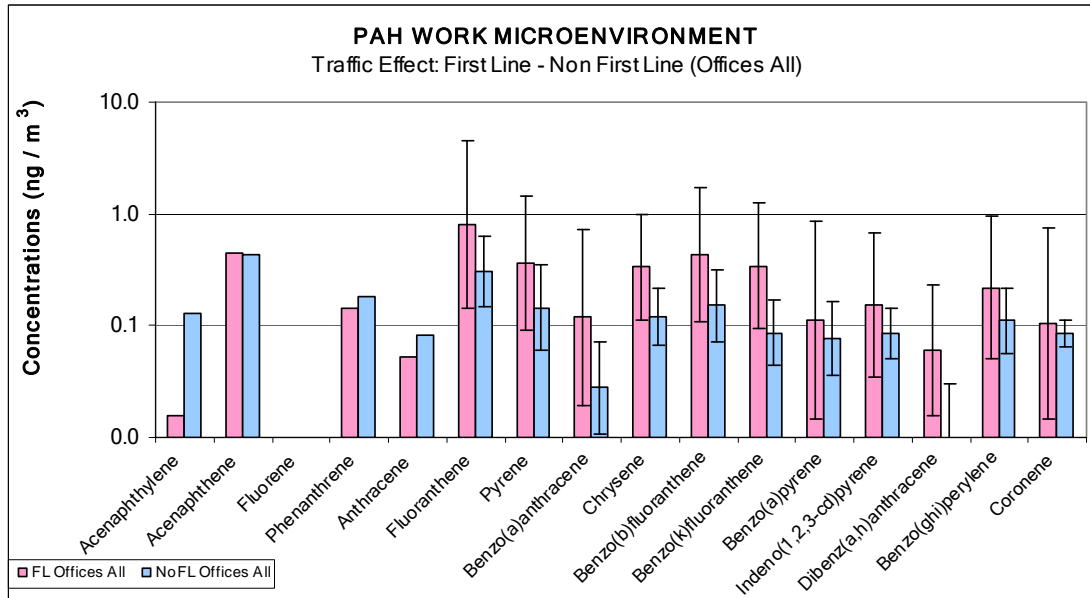


Figure A6.37. Traffic effect in offices, PAH dataset. (N<sub>FL</sub>=5, N<sub>NFL</sub>=18)

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

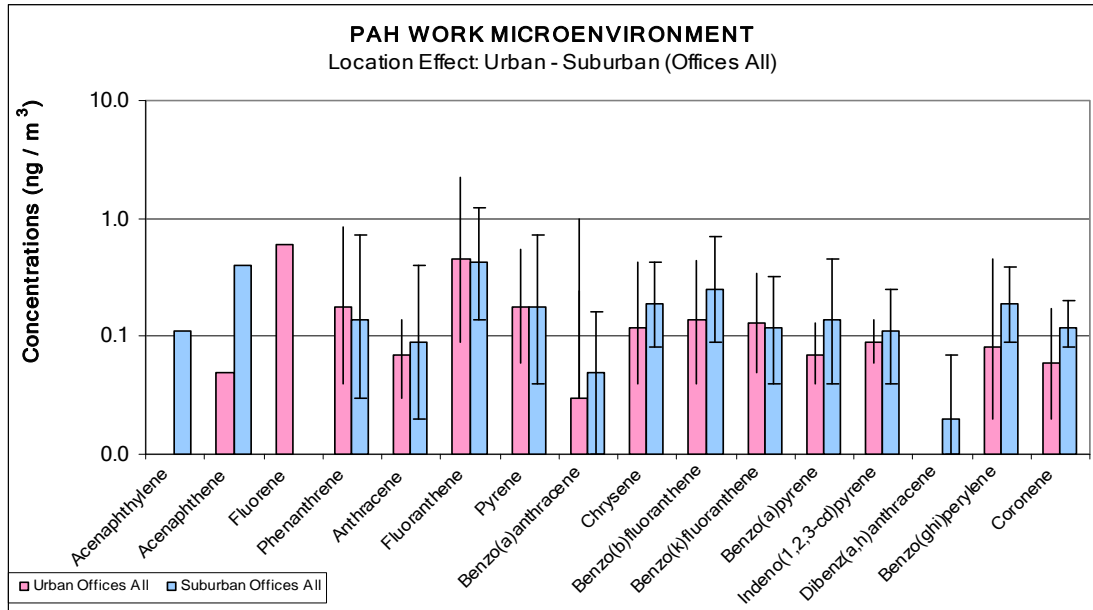


Figure A6.38. Location effect in offices, PAH dataset. (N<sub>Urban</sub>=6, N<sub>Suburban</sub>=17)

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

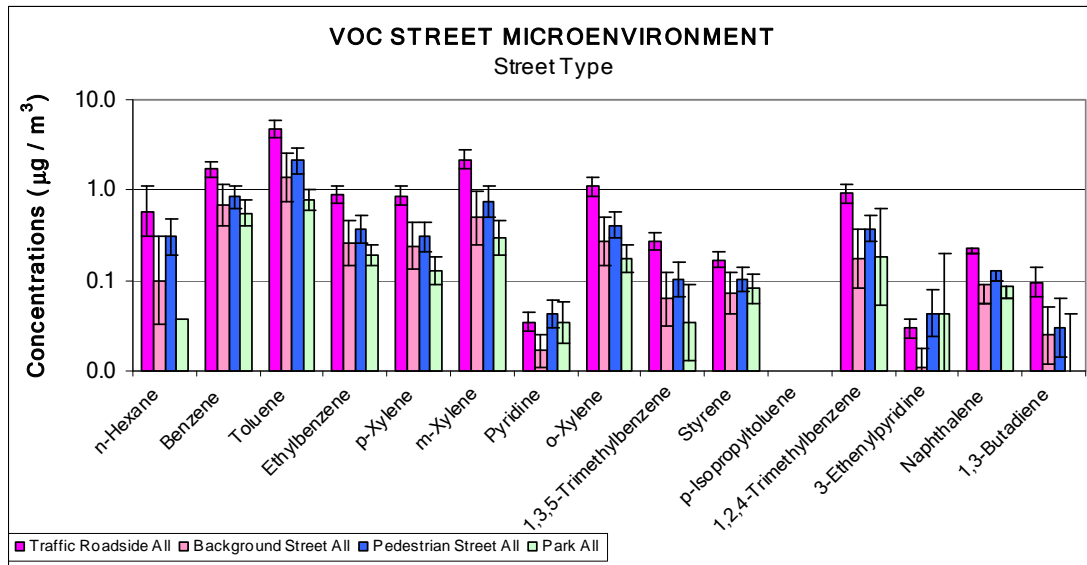


Figure A6.39. VOC in different street microenvironments. ( $N_{\text{trafficked roadside}}=21$ ,  $N_{\text{background street}}=26$ ,  $N_{\text{pedestrian street}}=9$ ,  $N_{\text{park}}=4$ )



APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

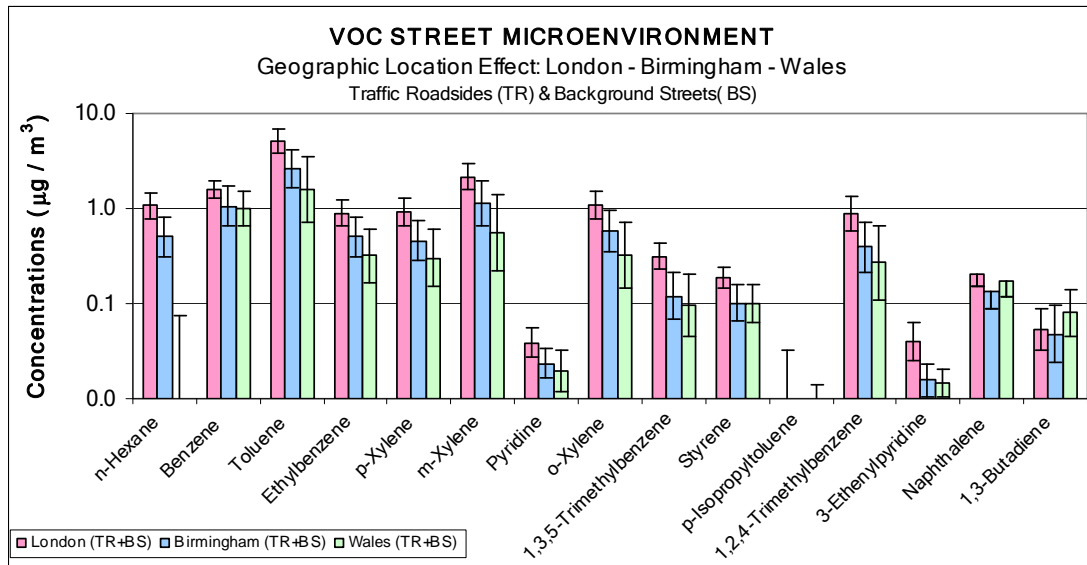


Figure A6.40. Geographic location effect in streets, VOC dataset. (N<sub>London</sub> = 8, N<sub>Bham</sub> = 39, N<sub>Wales</sub> = 8)

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

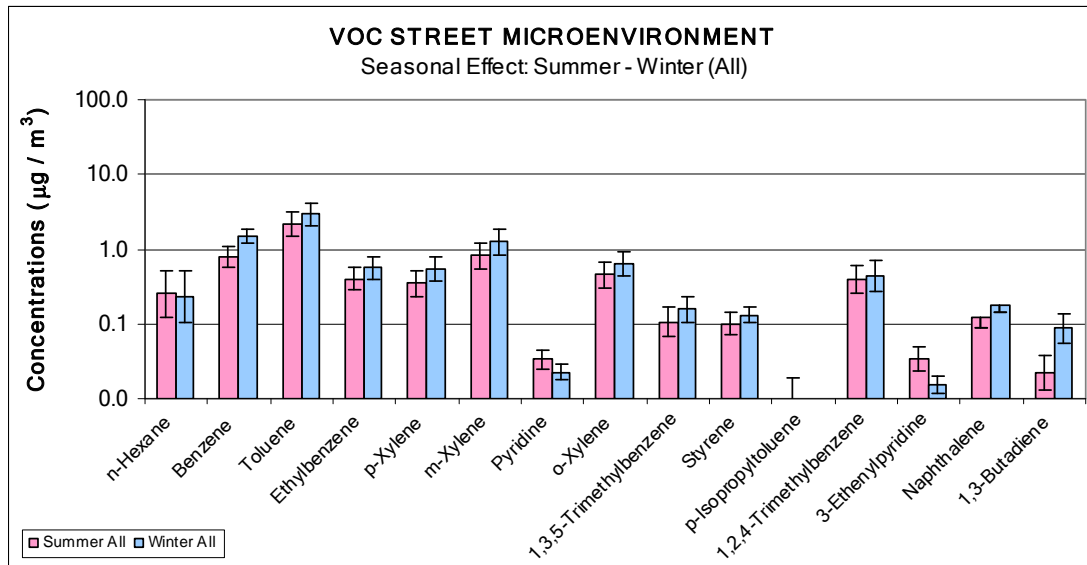


Figure A6.41. Seasonal effect in streets, VOC dataset. ( $N_{\text{Summer}} = 60$ ,  $N_{\text{Winter}} = 60$ )

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

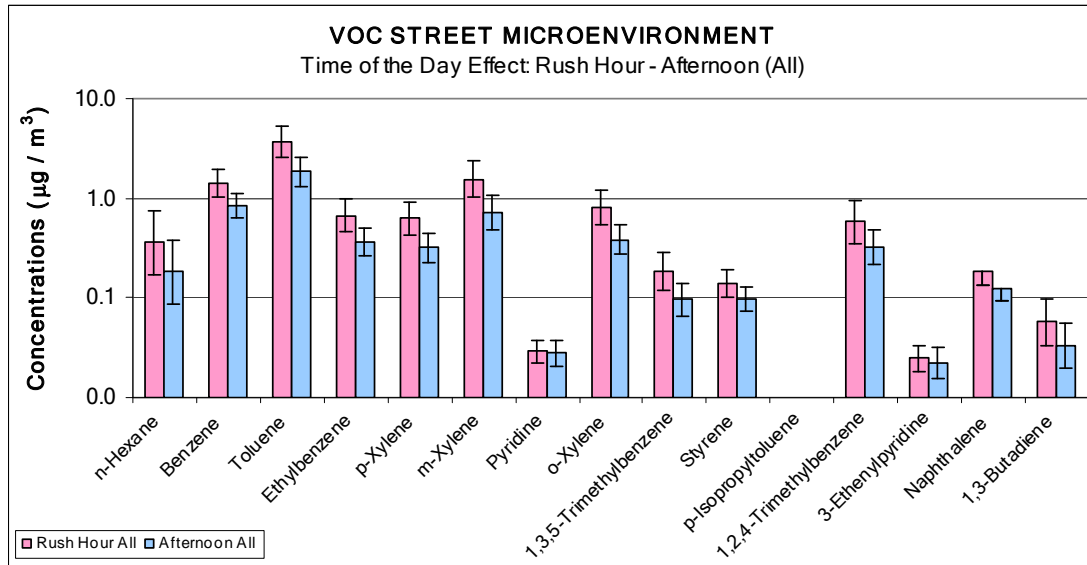


Figure A6.42. Time of day effect in streets, VOC dataset (N<sub>Rush Hour</sub> = 50, N<sub>Afternoon</sub> = 70)

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

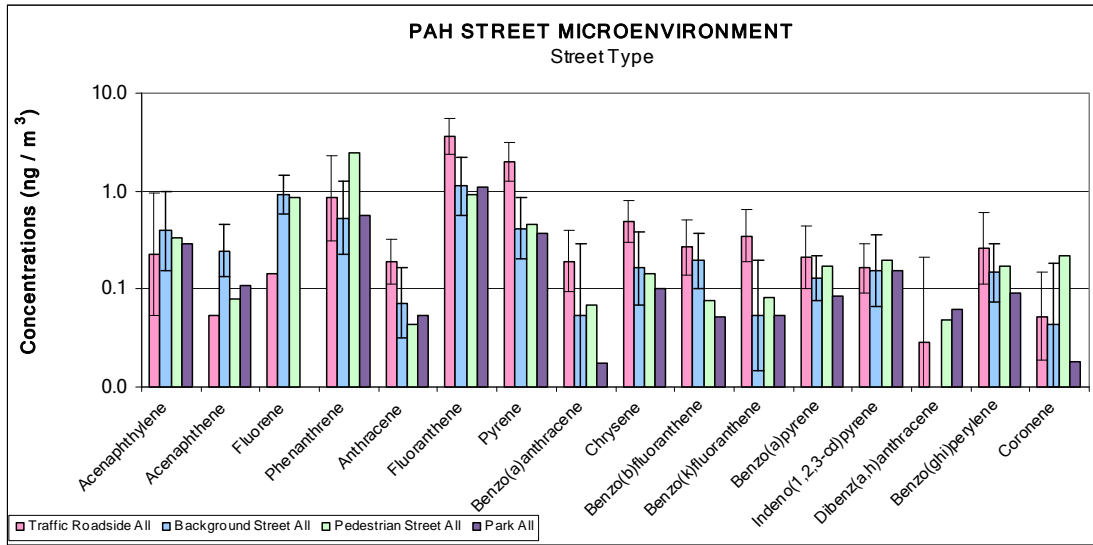


Figure A6.43. PAH in different street microenvironments. ( $N_{\text{trafficked roadside}}=8$ ,  $N_{\text{background street}}=10$ ,  $N_{\text{pedestrian street}}=4$ ,  $N_{\text{park}}=4$ )

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

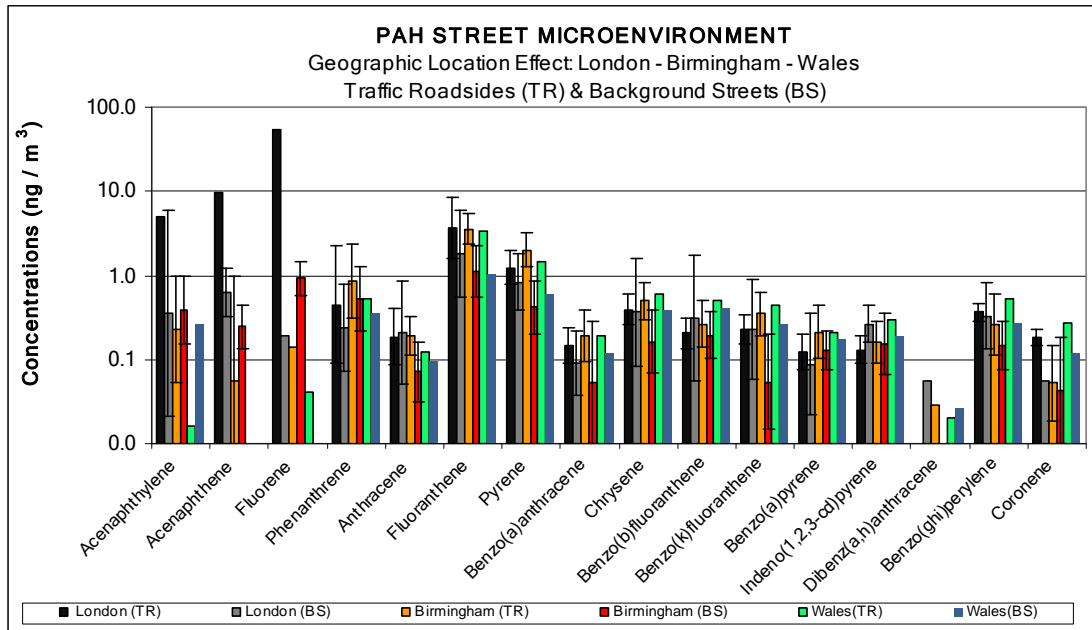


Figure A6.44. Geographic location effect in streets, PAH dataset. (N<sub>London</sub> = 8, N<sub>Bham</sub> = 10, N<sub>Wales</sub> = 8)

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

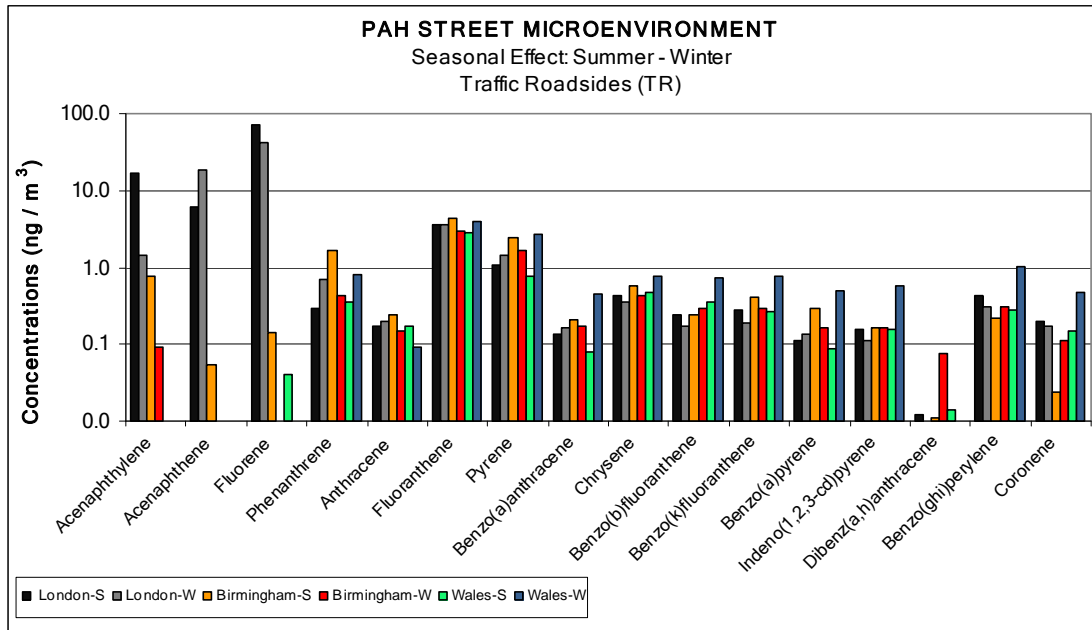


Figure A6.45. Seasonal effect in traffic roadsides, PAH dataset. ( $N_{\text{Summer}} = 30$ ,  $N_{\text{Winter}} = 30$ )

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

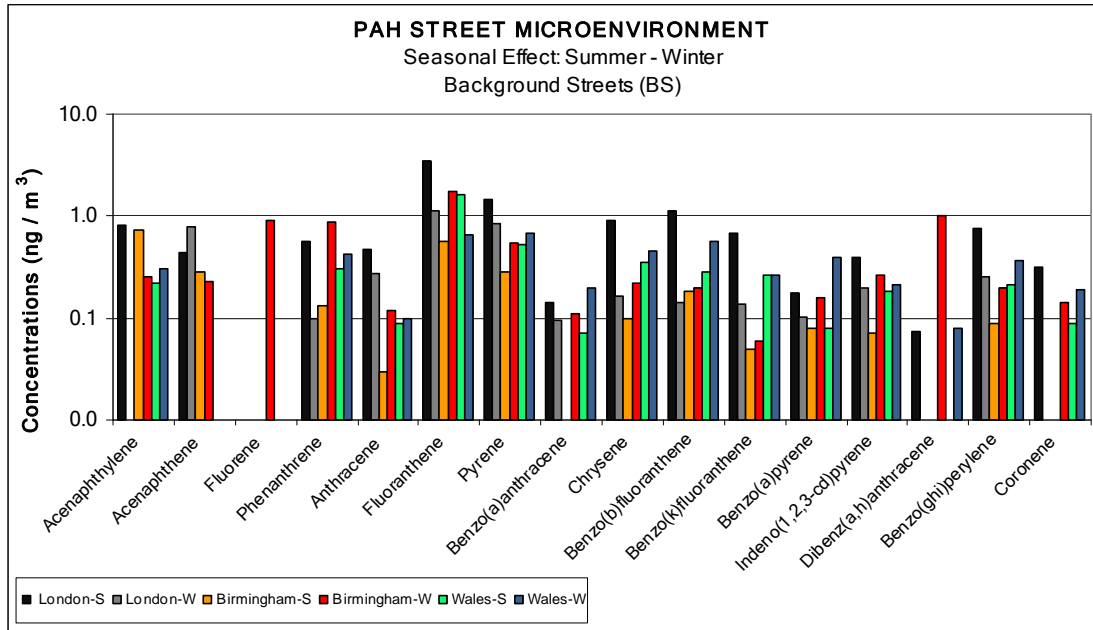


Figure A6.46. Seasonal effect in background streets, PAH dataset. (N<sub>Summer</sub>= 30, N<sub>Winter</sub>= 30)

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

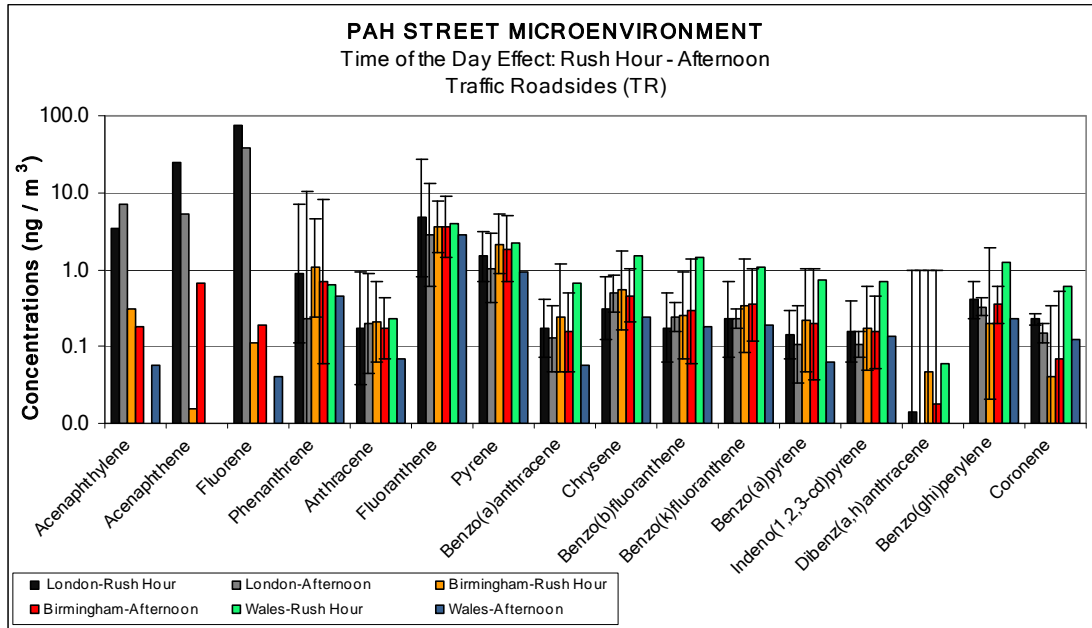


Figure A6.47. Time of the day effect in traffic roadsides, PAH dataset. ( $N_{\text{Rush Hour}} = 30$ ,  $N_{\text{Afternoon}} = 30$ )



APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

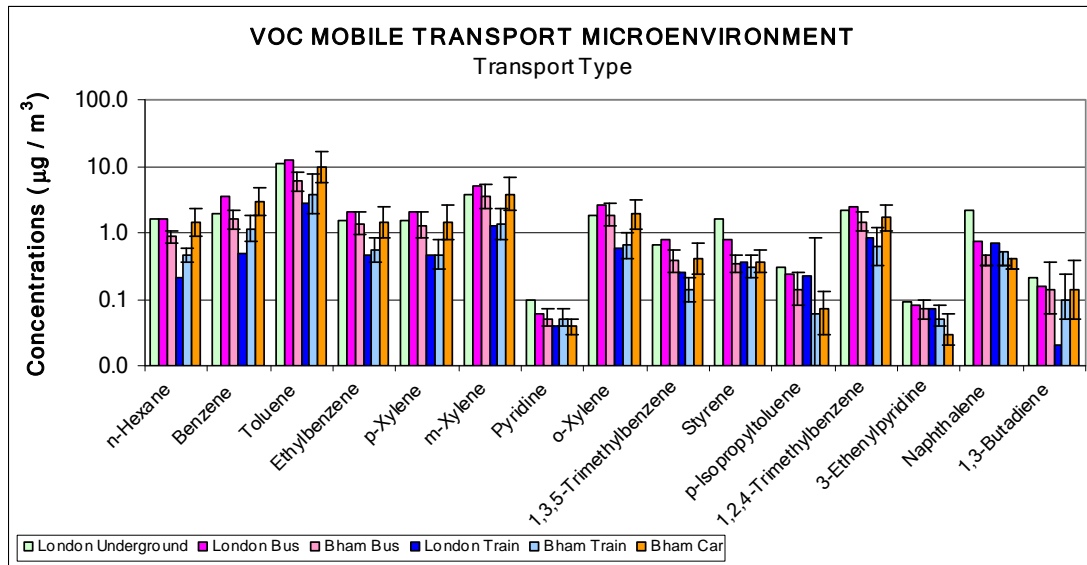


Figure A6.48. VOC in different mobile transport microenvironments. ( $N_{\text{Underground}} = 4$ ,  $N_{\text{London Bus}} = 4$ ,  $N_{\text{Bham Bus}} = 12$ ,  $N_{\text{London Train}} = 4$ ,  $N_{\text{Bham Train}} = 11$ ,  $N_{\text{Bham Car}} = 12$ )

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

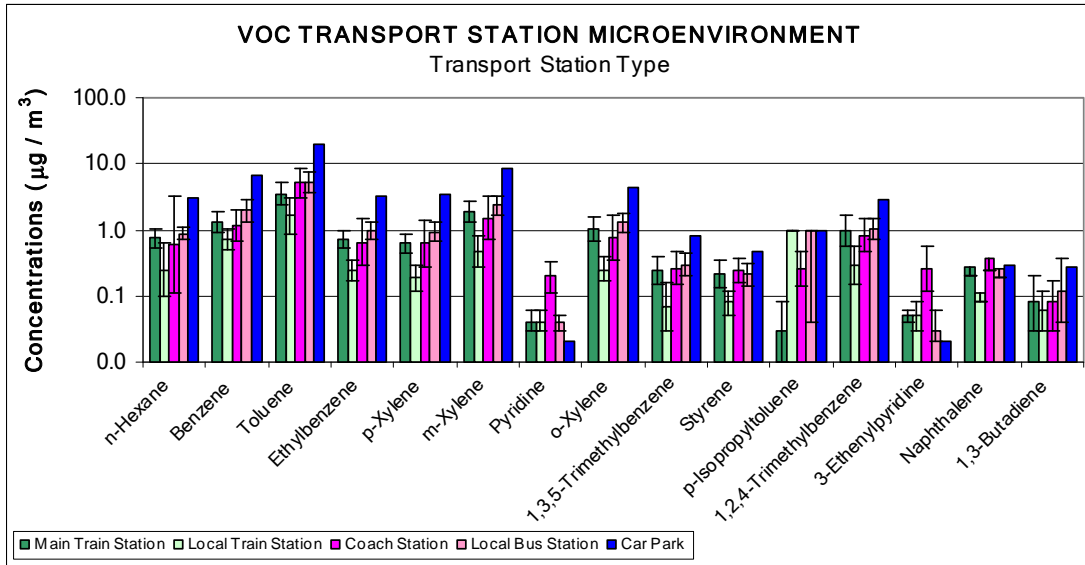


Figure A6.49. VOC in different transport station microenvironments ( $N_{\text{Main Train Station}} = 8$ ,  $N_{\text{Local Train Station}} = 8$ ,  $N_{\text{Coach Station}} = 5$ ,  $N_{\text{Local Bus station}} = 8$ ,  $N_{\text{Car Park}} = 4$ )

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

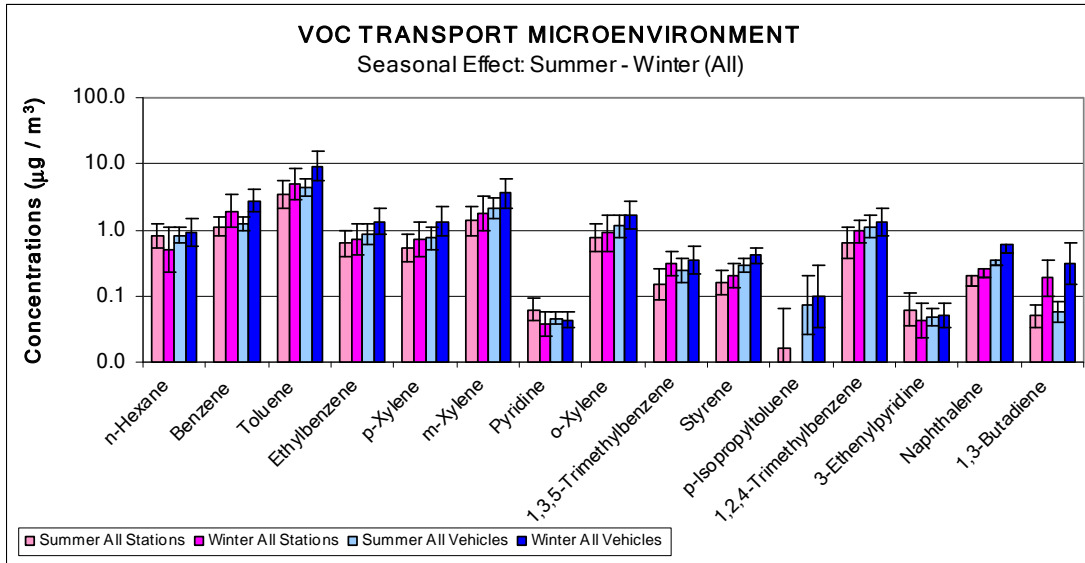


Figure A6.50. Seasonal effect in transport, VOC dataset. ( $N_{\text{Summer Station}} = 16$ ,  $N_{\text{Winter Station}} = 16$ ,  $N_{\text{Summer Vehicles}} = 18$ ,  $N_{\text{Winter Vehicles}} = 28$ )

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

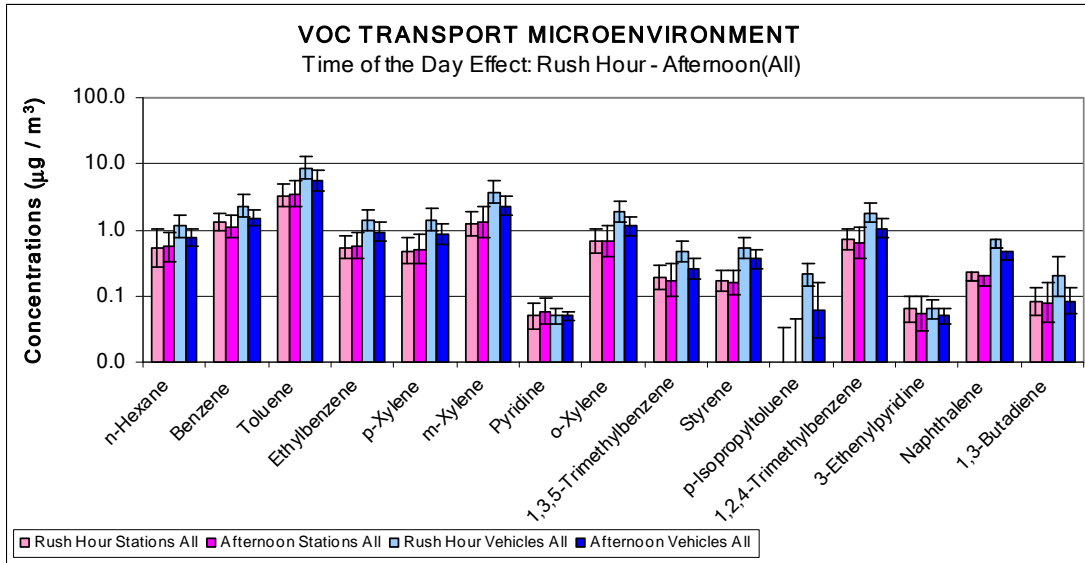


Figure A6.51. Time of day effect in mobile transport, VOC dataset. ( $N_{\text{Rush Hour Station}} = 14$ ,  $N_{\text{Afternoon Station}} = 19$ ,  $N_{\text{Rush Hour Vehicles}} = 22$ ,  $N_{\text{Afternoon Vehicles}} = 25$ )

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

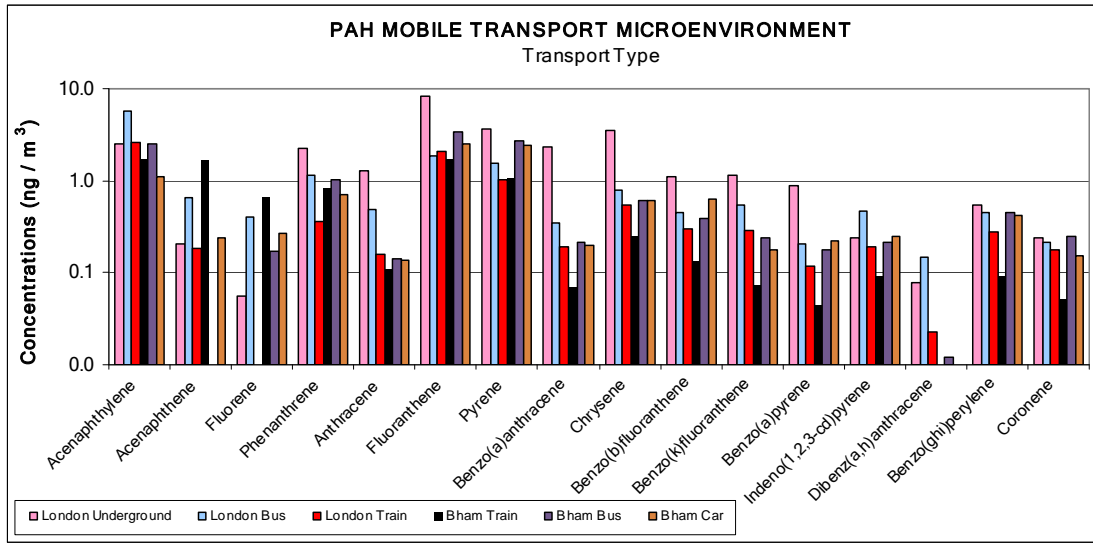


Figure A6.52. PAH in different mobile transport microenvironments ( $N_{\text{Underground}} = 4$ ,  $N_{\text{London Bus}} = 4$ ,  $N_{\text{Bham Bus}} = 3$ ,  $N_{\text{London Train}} = 4$ ,  $N_{\text{Bham Train}} = 4$ ,  $N_{\text{Bham Car}} = 4$ )

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

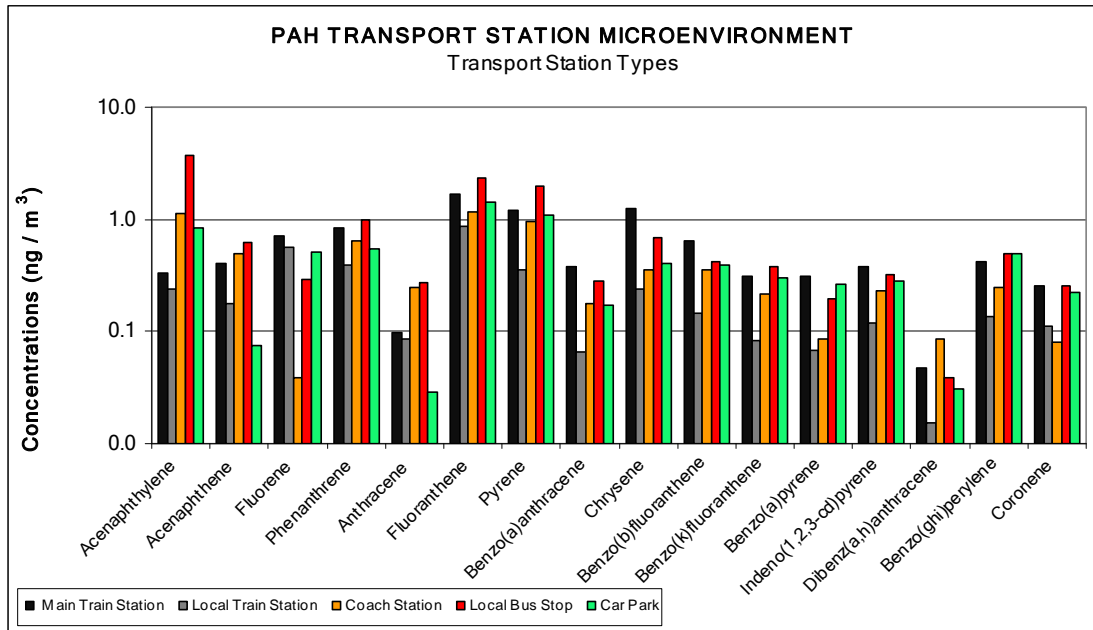


Figure A6.53. PAH in different transport station microenvironments ( $N_{\text{Main Train Station}} = 4$ ,  $N_{\text{Local Train Station}} = 4$ ,  $N_{\text{Coach Station}} = 4$ ,  $N_{\text{Local Bus station}} = 7$ ,  $N_{\text{Car Park}} = 2$ )

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

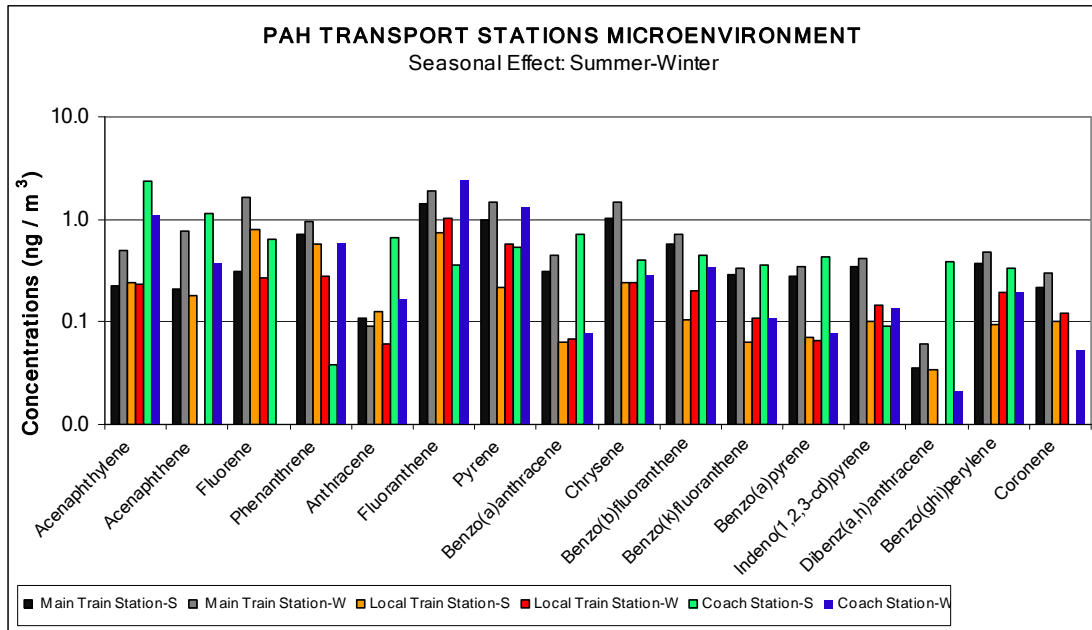


Figure A6.54. Seasonal effect upon transport, PAH dataset. ( $N_{\text{Summer Station}} = 8$ ,  $N_{\text{Winter Station}} = 12$ ,  $N_{\text{Summer Vehicles}} = 10$ ,  $N_{\text{Winter Vehicles}} = 28$ )

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

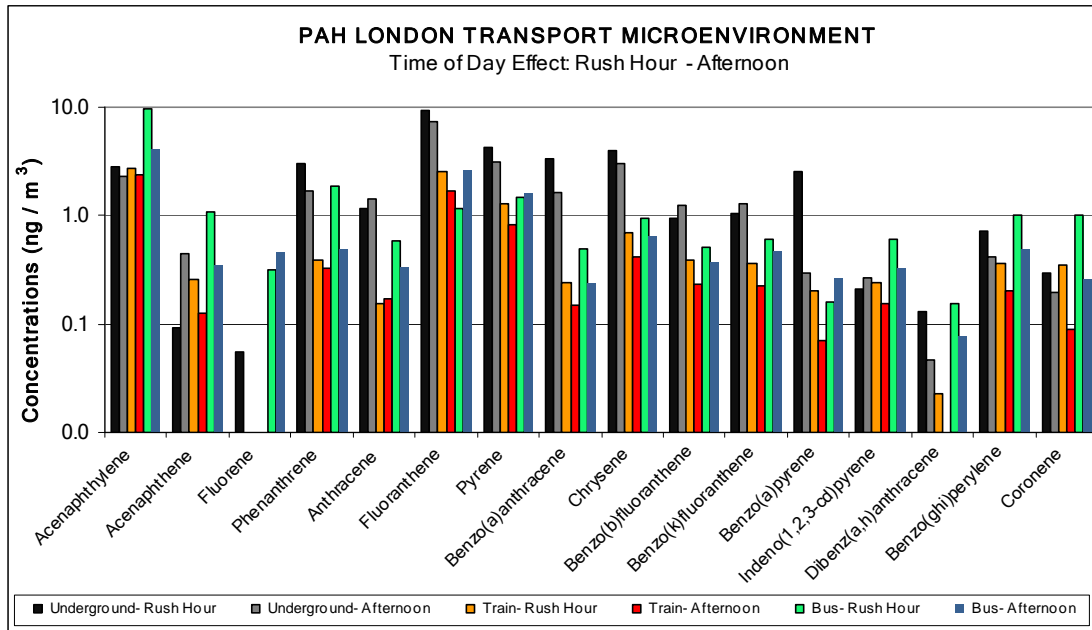


Figure A6.55. Time of day effect in London's mobile transportation system, PAH dataset.  
 (N<sub>Rush Hour Station</sub> = 14, N<sub>Afternoon Station</sub> = 19, N<sub>Rush Hour Vehicles</sub> = 10, N<sub>Afternoon Vehicles</sub> = 23)



APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

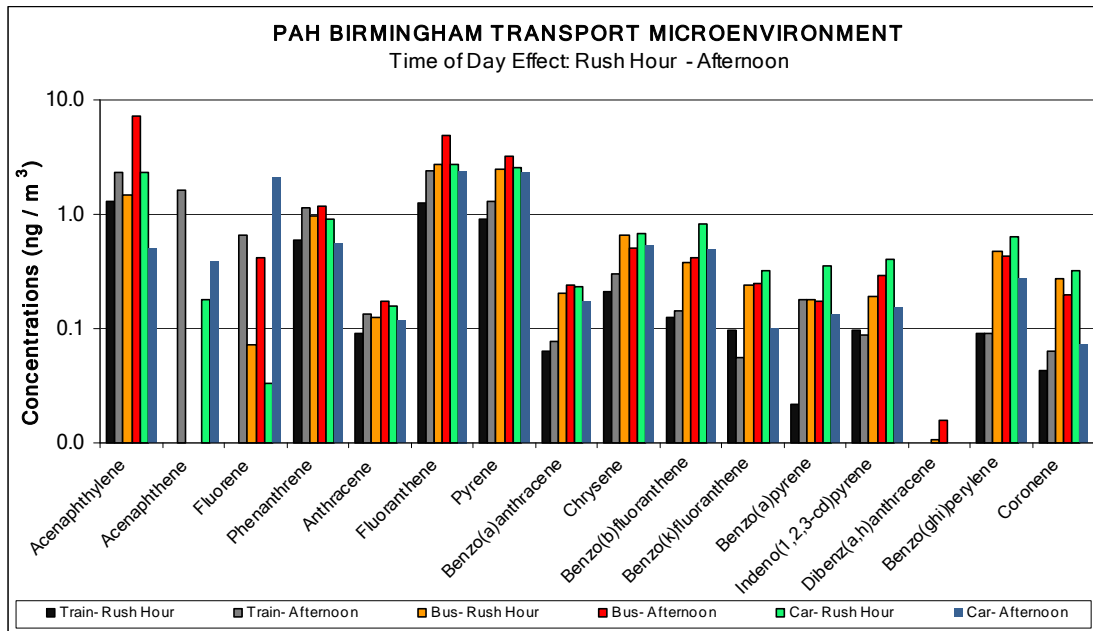


Figure A6.56. Time of day effect in Birmingham's mobile transportation system, PAH dataset ( $N_{\text{Rush Hour Station}} = 14$ ,  $N_{\text{Afternoon Station}} = 19$ ,  $N_{\text{Rush Hour Vehicles}} = 10$ ,  $N_{\text{Afternoon Vehicles}} = 23$ )

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

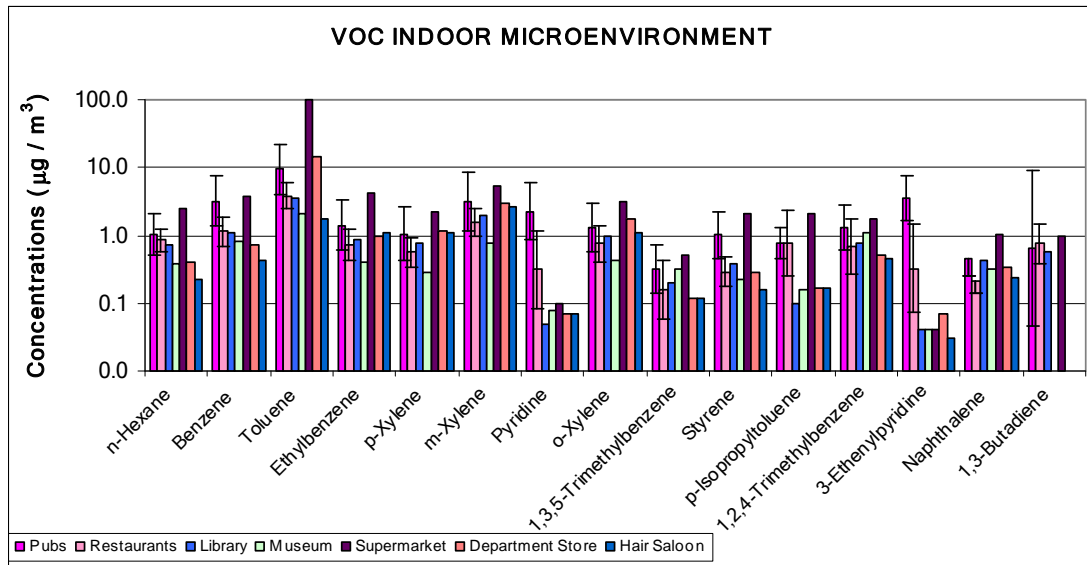


Figure A6.57. VOC in different indoor microenvironments ( $N_{\text{Pubs}} = 10$ ,  $N_{\text{Restaurant}} = 8$ ,  $N_{\text{library}} = 4$ ,  $N_{\text{Museum}} = 2$ ,  $N_{\text{Supermarket}} = 2$ ,  $N_{\text{Department Store}} = 1$ ,  $N_{\text{Hair Saloon}} = 1$ )

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

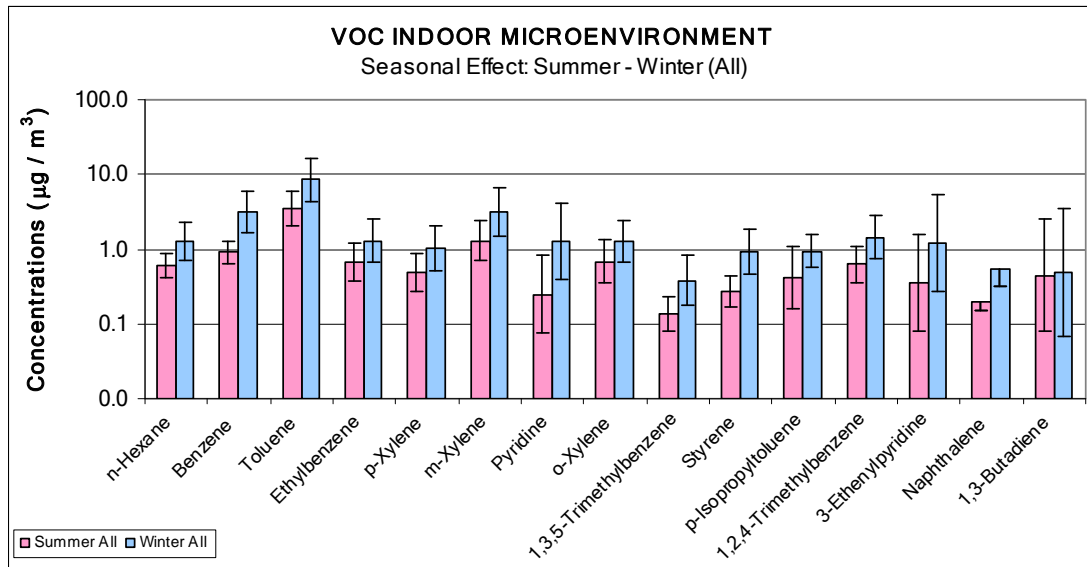


Figure A6.58. Seasonal effect in indoor microenvironments, VOC dataset ( $N_{\text{Summer}}=13$ ,  $N_{\text{Winter}}=13$ )

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

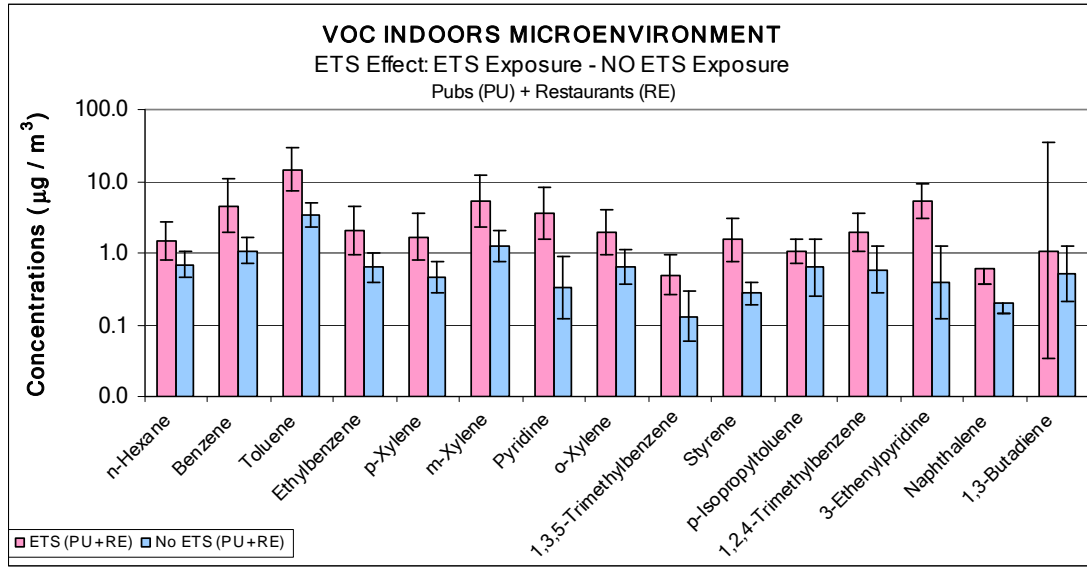


Figure A6.59. ETS effect in pubs and restaurants, VOC dataset. (N<sub>ETS</sub>=8 , N<sub>NETS</sub> =10 )

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

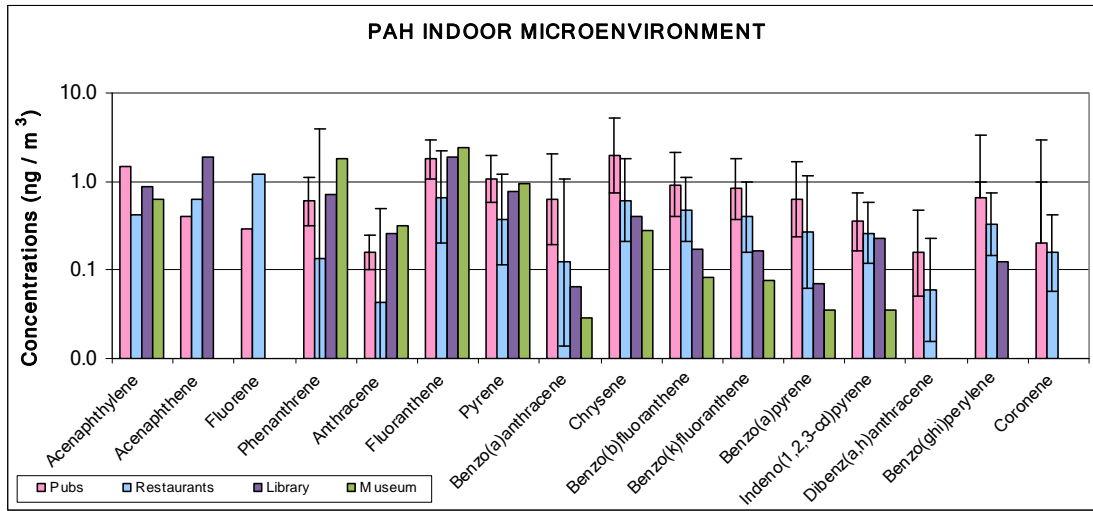


Figure A6.60. PAH in different indoor microenvironments ( $N_{\text{Pubs}}=11$ ,  $N_{\text{Restaurant}}=7$ ,  $N_{\text{library}}=4$ ,  $N_{\text{Museum}}=2$ )

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

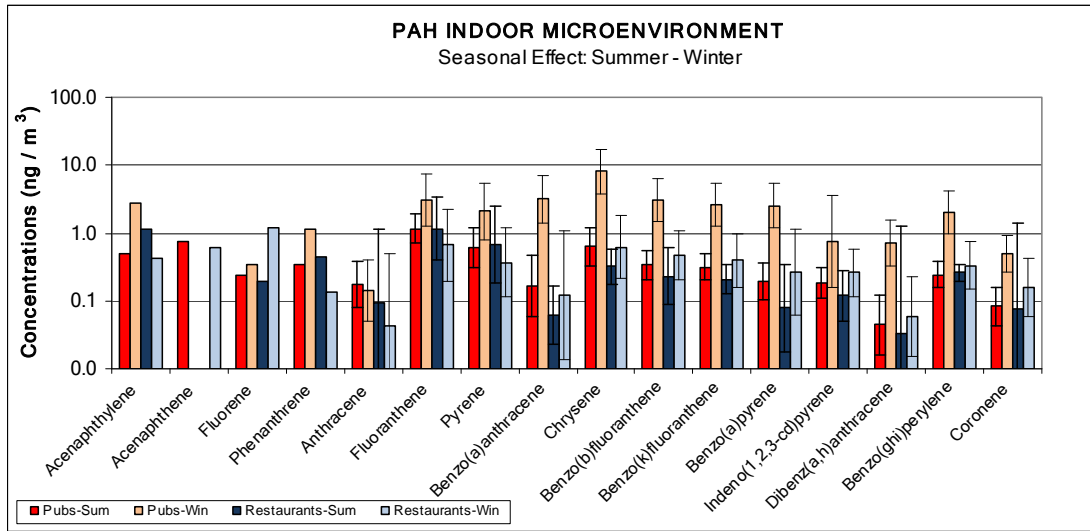


Figure A6.61. Seasonal effect in pubs and restaurants, PAH dataset ( $N_{\text{Summer}}=13$ ,  $N_{\text{Winter}}=13$ )

APPENDIX 6: PERSONAL EXPOSURE AND MICROENVIRONMENT  
 CONCENTRATION RESULT FIGURES

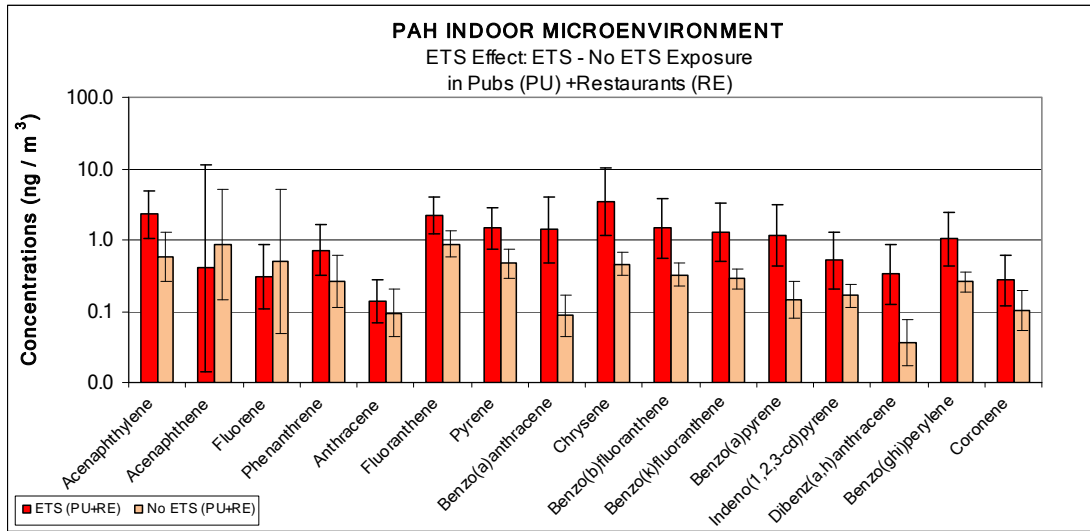


Figure A6.62. ETS effect in pubs and restaurants, PAH dataset (N<sub>ETS</sub>=16 , N<sub>NETS</sub> =20 )