

United States Environmental Protection Agency  
March 1998

# **Analysis of Carbon Monoxide Exposure for Fourteen Cities using HAPEM-MS3**

## Appendix A

### **HAPEM-MS3 Annual Percentiles in $\mu\text{g}/\text{m}^3$ for 1990**

Note that the electronic version of Appendix A is not organized the same as the hardcopy.  
Instead of being organized just by city, it is organized by type of data and by city.

**Baltimore: City-wide**HAPEM-MS3 Annual Percentiles in  $\mu\text{g}/\text{m}^3$  for 1990

Demographic Group	25th	50th	75th	90th	95th	99th
Caucasians	638	688	692	699	1125	1136
African americans	521	626	672	1090	1096	1104
Hispanics	630	672	678	686	1098	1112
Household income lt \$10K	508	647	651	1054	1060	1067
Household income \$10K-\$25K	533	649	688	1116	1122	1129
Household income \$25K-\$50K	537	686	694	1122	1131	1141
Household income \$50K-\$75K	544	695	700	706	1138	1148
Household income gt \$75K	679	685	689	693	1112	1124
Children, 0 to 17	537	685	690	1115	1125	1133
Nonworking men, 18 to 44	559	710	721	1171	1178	1187
Working men, 18 to 44	611	725	729	735	1083	1090
Nonworking women, 18 to 44	520	663	669	1082	1090	1097
Working women, 18 to 44	568	688	691	696	1047	1052
Nonworking men, 45 to 64	520	665	672	1092	1098	1105
Working men, 45 to 64	619	729	733	738	1072	1078
Nonworking women, 45 to 64	504	644	649	1049	1057	1063
Working women, 45 to 64	563	681	685	690	1037	1043
Men, 65+	533	684	691	1126	1134	1142
Women, 65+	504	643	650	1054	1061	1068
Outdoor workers	717	824	830	1160	1165	1169
Outdoor children	560	717	721	1172	1179	1187
Heart and respiratory	509	650	655	1058	1067	1074
All persons	540	689	695	1121	1132	1142

**Boston:** City-wide

HAPEM-MS3 Annual Percentiles in  $\mu\text{g}/\text{m}^3$  for 1990

Demographic Group	25th	50th	75th	90th	95th	99th
Caucasians	611	615	646	676	679	684
African americans	600	653	658	661	664	667
Hispanics	593	601	655	661	664	669
Household income lt \$10K	572	577	630	635	637	640
Household income \$10K-\$25K	607	612	665	673	676	680
Household income \$25K-\$50K	611	616	658	677	681	686
Household income \$50K-\$75K	616	620	657	682	685	689
Household income gt \$75K	608	611	618	672	674	678
Children, 0 to 17	609	613	649	673	677	681
Nonworking men, 18 to 44	634	639	698	705	708	712
Working men, 18 to 44	646	651	690	708	710	713
Nonworking women, 18 to 44	590	594	647	655	658	662
Working women, 18 to 44	612	616	658	672	674	676
Nonworking men, 45 to 64	599	603	644	664	667	672
Working men, 45 to 64	648	652	660	707	710	713
Nonworking women, 45 to 64	577	581	617	640	642	646
Working women, 45 to 64	607	610	644	665	667	670
Men, 65+	606	611	654	671	674	678
Women, 65+	572	576	619	634	636	640
Outdoor workers	746	750	774	804	807	810
Outdoor children	642	645	685	709	711	715
Heart and respiratory	574	578	619	636	638	641
All persons	615	620	666	681	684	689

**Chicago:** City-wide

HAPEM-MS3 Annual Percentiles in  $\mu\text{g}/\text{m}^3$  for 1990

Demographic Group	25th	50th	75th	90th	95th	99th
Caucasians	480	484	489	507	792	803
African americans	400	472	482	501	527	781
Hispanics	397	473	483	493	500	780
Household income lt \$10K	382	455	469	476	505	749
Household income \$10K-\$25K	472	482	487	506	545	798
Household income \$25K-\$50K	479	484	489	508	791	804
Household income \$50K-\$75K	484	488	491	510	800	809
Household income gt \$75K	479	482	486	502	792	800
Children, 0 to 17	476	482	487	507	541	799
Nonworking men, 18 to 44	454	502	510	528	562	830
Working men, 18 to 44	507	511	518	522	775	784
Nonworking women, 18 to 44	462	468	474	491	528	774
Working women, 18 to 44	481	484	490	494	750	755
Nonworking men, 45 to 64	432	475	481	503	772	786
Working men, 45 to 64	508	512	518	524	775	780
Nonworking women, 45 to 64	452	459	464	482	748	758
Working women, 45 to 64	478	481	487	493	746	751
Men, 65+	474	480	486	514	786	794
Women, 65+	450	455	461	501	745	752
Outdoor workers	577	584	593	602	838	844
Outdoor children	500	505	509	534	566	836
Heart and respiratory	453	457	462	479	748	756
All persons	481	487	493	513	793	807

**Denver:** City-wide

HAPEM-MS3 Annual Percentiles in  $\mu\text{g}/\text{m}^3$  for 1990

Demographic Group	25th	50th	75th	90th	95th	99th
Caucasians	504	561	614	838	847	854
African americans	548	777	817	823	826	831
Hispanics	504	553	610	781	816	827
Household income lt \$10K	482	531	748	790	793	798
Household income \$10K-\$25K	506	558	616	834	839	845
Household income \$25K-\$50K	510	562	576	838	848	856
Household income \$50K-\$75K	509	569	576	844	855	862
Household income gt \$75K	499	564	573	847	853	859
Children, 0 to 17	510	562	613	817	844	851
Nonworking men, 18 to 44	518	583	644	872	877	883
Working men, 18 to 44	559	597	660	857	861	866
Nonworking women, 18 to 44	484	542	598	810	816	821
Working women, 18 to 44	530	569	629	825	828	831
Nonworking men, 45 to 64	481	540	594	808	812	816
Working men, 45 to 64	558	604	672	864	868	872
Nonworking women, 45 to 64	470	526	581	789	793	798
Working women, 45 to 64	513	563	622	815	818	821
Men, 65+	495	557	656	832	836	841
Women, 65+	467	526	621	785	788	792
Outdoor workers	652	684	752	946	951	955
Outdoor children	531	591	601	860	887	893
Heart and respiratory	474	530	585	791	795	800
All persons	509	565	621	843	850	857

**Houston:** City-wide

HAPEM-MS3 Annual Percentiles in  $\mu\text{g}/\text{m}^3$  for 1990

Demographic Group	25th	50th	75th	90th	95th	99th
Caucasians	478	481	487	619	625	630
African americans	461	466	573	595	602	607
Hispanics	465	472	578	593	612	618
Household income lt \$10K	452	455	562	571	589	593
Household income \$10K-\$25K	473	477	530	612	619	624
Household income \$25K-\$50K	479	483	527	620	627	633
Household income \$50K-\$75K	485	488	491	614	634	639
Household income gt \$75K	477	479	484	621	625	628
Children, 0 to 17	477	480	528	604	624	629
Nonworking men, 18 to 44	500	505	621	634	652	658
Working men, 18 to 44	502	505	558	634	641	645
Nonworking women, 18 to 44	462	465	518	596	603	607
Working women, 18 to 44	478	480	530	611	615	617
Nonworking men, 45 to 64	459	460	571	595	597	599
Working men, 45 to 64	508	511	565	644	647	650
Nonworking women, 45 to 64	445	448	550	578	581	584
Working women, 45 to 64	473	476	527	604	607	609
Men, 65+	482	486	604	626	629	634
Women, 65+	450	454	562	584	587	591
Outdoor workers	567	570	629	707	712	716
Outdoor children	498	500	548	629	650	654
Heart and respiratory	455	458	510	589	594	598
All persons	477	481	532	617	624	629

**Los Angeles: City-wide**

HAPEM-MS3 Annual Percentiles in  $\mu\text{g}/\text{m}^3$  for 1990

Demographic Group	25th	50th	75th	90th	95th	99th
Caucasians	840	881	955	1143	1159	1351
African americans	737	916	1001	1299	1304	1311
Hispanics	852	898	982	1317	1327	1339
Household income lt \$10K	810	888	939	1261	1267	1274
Household income \$10K-\$25K	856	905	996	1335	1348	1359
Household income \$25K-\$50K	844	894	964	1155	1342	1357
Household income \$50K-\$75K	848	883	962	1152	1174	1365
Household income gt \$75K	829	865	933	1029	1149	1343
Children, 0 to 17	850	892	989	1327	1338	1348
Nonworking men, 18 to 44	872	924	1017	1359	1378	1392
Working men, 18 to 44	890	943	996	1169	1346	1353
Nonworking women, 18 to 44	815	866	955	1280	1293	1302
Working women, 18 to 44	835	892	940	1114	1284	1290
Nonworking men, 45 to 64	823	871	935	1117	1299	1307
Working men, 45 to 64	899	949	1001	1175	1354	1362
Nonworking women, 45 to 64	783	833	892	1071	1244	1251
Working women, 45 to 64	839	888	943	1110	1276	1286
Men, 65+	835	887	954	1140	1326	1342
Women, 65+	777	827	892	1066	1236	1247
Outdoor workers	989	1035	1090	1257	1423	1428
Outdoor children	886	925	1032	1384	1391	1398
Heart and respiratory	800	850	914	1095	1274	1284
All persons	843	894	961	1153	1340	1353

**Minneapolis\St. Paul: City-wide**

HAPEM-MS3 Annual Percentiles in  $\mu\text{g}/\text{m}^3$  for 1990

Demographic Group	25th	50th	75th	90th	95th	99th
Caucasians	743	751	759	1058	1067	1077
African americans	651	725	991	1033	1038	1046
Hispanics	605	722	737	1020	1032	1043
Household income lt \$10K	626	701	711	989	997	1005
Household income \$10K-\$25K	671	746	761	1056	1063	1073
Household income \$25K-\$50K	743	751	759	1057	1068	1078
Household income \$50K-\$75K	752	757	763	1067	1076	1084
Household income gt \$75K	740	745	751	1052	1057	1064
Children, 0 to 17	741	747	753	1017	1061	1071
Nonworking men, 18 to 44	705	781	792	1102	1109	1118
Working men, 18 to 44	790	797	804	1066	1072	1078
Nonworking women, 18 to 44	657	727	739	1027	1035	1043
Working women, 18 to 44	752	757	763	1024	1028	1033
Nonworking men, 45 to 64	664	739	749	1046	1054	1064
Working men, 45 to 64	793	799	805	1060	1066	1071
Nonworking women, 45 to 64	645	712	720	1006	1012	1020
Working women, 45 to 64	743	749	754	1015	1020	1025
Men, 65+	665	742	1001	1053	1058	1066
Women, 65+	634	705	951	999	1004	1010
Outdoor workers	916	923	929	1132	1190	1196
Outdoor children	781	787	792	1067	1118	1127
Heart and respiratory	697	706	713	996	1001	1008
All persons	747	756	765	1067	1076	1086



**New York City: City-wide**

HAPEM-MS3 Annual Percentiles in  $\mu\text{g}/\text{m}^3$  for 1990

Demographic Group	25th	50th	75th	90th	95th	99th
Caucasians	610	926	936	1083	2070	2099
African americans	487	894	909	1036	1405	2025
Hispanics	625	906	921	1328	2025	2050
Household income lt \$10K	475	870	883	1262	1948	1967
Household income \$10K-\$25K	538	920	935	1330	2052	2086
Household income \$25K-\$50K	602	926	939	1081	2049	2101
Household income \$50K-\$75K	613	935	944	1035	1477	2115
Household income gt \$75K	633	920	927	1078	2059	2076
Children, 0 to 17	541	924	937	1075	1441	2087
Nonworking men, 18 to 44	617	963	975	1401	2166	2192
Working men, 18 to 44	713	961	973	1309	1950	1960
Nonworking women, 18 to 44	578	895	907	1291	2003	2031
Working women, 18 to 44	667	915	924	1266	1898	1906
Nonworking men, 45 to 64	586	907	918	1307	2028	2062
Working men, 45 to 64	727	962	970	1103	1917	1926
Nonworking women, 45 to 64	570	874	883	1025	1956	1982
Working women, 45 to 64	662	907	914	1250	1878	1887
Men, 65+	604	923	933	1075	2063	2095
Women, 65+	570	869	878	1009	1946	1970
Outdoor workers	804	1092	1101	1235	1540	2031
Outdoor children	565	971	984	1134	1421	2187
Heart and respiratory	568	873	883	1251	1951	1975
All persons	604	931	943	1336	2075	2107

**Philadelphia:** City-wide

HAPEM-MS3 Annual Percentiles in  $\mu\text{g}/\text{m}^3$  for 1990

Demographic Group	25th	50th	75th	90th	95th	99th
Caucasians	459	505	510	594	847	863
African americans	442	493	819	828	831	838
Hispanics	448	498	830	838	842	850
Household income lt \$10K	429	475	562	801	806	815
Household income \$10K-\$25K	454	501	511	843	849	859
Household income \$25K-\$50K	458	506	513	701	854	865
Household income \$50K-\$75K	464	512	516	696	860	871
Household income gt \$75K	460	503	507	588	843	853
Children, 0 to 17	456	504	511	846	852	863
Nonworking men, 18 to 44	476	526	540	887	893	906
Working men, 18 to 44	500	530	534	681	827	831
Nonworking women, 18 to 44	442	488	496	821	826	835
Working women, 18 to 44	470	503	507	797	800	803
Nonworking men, 45 to 64	445	492	501	830	835	846
Working men, 45 to 64	507	533	537	673	820	823
Nonworking women, 45 to 64	431	475	482	799	804	811
Working women, 45 to 64	467	499	502	787	790	793
Men, 65+	457	504	512	846	855	868
Women, 65+	431	475	482	797	803	811
Outdoor workers	590	605	610	881	895	898
Outdoor children	479	529	536	887	892	909
Heart and respiratory	433	478	484	801	807	816
All persons	460	508	515	850	857	869

**Phoenix:** City-wide

HAPEM-MS3 Annual Percentiles in  $\mu\text{g}/\text{m}^3$  for 1990

Demographic Group	25th	50th	75th	90th	95th	99th
Caucasians	670	763	784	828	847	1336
African americans	610	734	767	811	1275	1287
Hispanics	627	752	787	828	842	1314
Household income lt \$10K	637	722	750	791	1252	1261
Household income \$10K-\$25K	672	761	787	834	1317	1331
Household income \$25K-\$50K	637	764	782	832	845	1339
Household income \$50K-\$75K	592	773	781	806	845	1351
Household income gt \$75K	578	763	772	793	800	1330
Children, 0 to 17	633	760	783	828	839	1331
Nonworking men, 18 to 44	696	794	816	871	1379	1398
Working men, 18 to 44	711	783	809	875	882	1283
Nonworking women, 18 to 44	648	738	760	807	1278	1292
Working women, 18 to 44	679	752	775	837	1245	1255
Nonworking men, 45 to 64	643	729	748	795	1268	1275
Working men, 45 to 64	684	788	822	887	1263	1273
Nonworking women, 45 to 64	624	712	729	778	790	1245
Working women, 45 to 64	646	747	772	831	1224	1232
Men, 65+	672	766	782	804	1329	1346
Women, 65+	626	716	729	751	1240	1256
Outdoor workers	791	861	895	968	1345	1352
Outdoor children	656	789	814	855	861	1378
Heart and respiratory	635	726	746	793	1252	1270
All persons	666	761	783	829	1309	1333

**San Francisco: City-wide**

HAPEM-MS3 Annual Percentiles in  $\mu\text{g}/\text{m}^3$  for 1990

Demographic Group	25th	50th	75th	90th	95th	99th
Caucasians	647	700	800	923	932	941
African americans	530	620	689	890	898	907
Hispanics	638	691	895	909	914	922
Household income lt \$10K	517	655	773	872	876	881
Household income \$10K-\$25K	627	700	822	927	933	941
Household income \$25K-\$50K	645	701	818	927	934	943
Household income \$50K-\$75K	657	709	818	934	941	950
Household income gt \$75K	646	695	713	915	921	928
Children, 0 to 17	636	696	808	916	924	934
Nonworking men, 18 to 44	648	717	846	955	961	969
Working men, 18 to 44	682	739	854	943	946	951
Nonworking women, 18 to 44	613	673	788	892	898	905
Working women, 18 to 44	640	694	803	893	896	900
Nonworking men, 45 to 64	629	685	807	913	921	929
Working men, 45 to 64	691	742	839	940	946	952
Nonworking women, 45 to 64	597	651	755	862	869	875
Working women, 45 to 64	642	694	788	891	894	898
Men, 65+	636	693	810	923	929	937
Women, 65+	594	649	756	861	867	873
Outdoor workers	770	829	949	1026	1029	1033
Outdoor children	668	727	843	956	965	976
Heart and respiratory	609	663	772	877	883	889
All persons	643	700	815	926	933	942

**Spokane:** City-wide

HAPEM-MS3 Annual Percentiles in  $\mu\text{g}/\text{m}^3$  for 1990

Demographic Group	25th	50th	75th	90th	95th	99th
Caucasians	840	1196	1349	1660	1673	1688
African americans	887	1172	1323	1609	1617	1630
Hispanics	815	1154	1301	1599	1611	1627
Household income lt \$10K	784	1117	1263	1549	1560	1571
Household income \$10K-\$25K	832	1185	1336	1640	1657	1673
Household income \$25K-\$50K	842	1197	1344	1658	1674	1690
Household income \$50K-\$75K	846	1206	1357	1677	1687	1699
Household income gt \$75K	1178	1195	1641	1658	1664	1673
Children, 0 to 17	837	1193	1342	1655	1668	1682
Nonworking men, 18 to 44	872	1243	1404	1723	1737	1751
Working men, 18 to 44	978	1272	1402	1643	1651	1660
Nonworking women, 18 to 44	813	1156	1305	1604	1616	1630
Working women, 18 to 44	910	1205	1338	1578	1584	1592
Nonworking men, 45 to 64	820	1173	1323	1630	1643	1657
Working men, 45 to 64	994	1277	1404	1629	1637	1645
Nonworking women, 45 to 64	796	1133	1278	1577	1588	1601
Working women, 45 to 64	893	1190	1320	1568	1575	1583
Men, 65+	828	1189	1347	1661	1671	1685
Women, 65+	786	1123	1271	1566	1575	1586
Outdoor workers	1209	1489	1596	1626	1837	1845
Outdoor children	881	1261	1417	1754	1767	1780
Heart and respiratory	786	1120	1265	1553	1562	1573
All persons	846	1206	1359	1675	1689	1705

**St. Louis:** City-wide

HAPEM-MS3 Annual Percentiles in  $\mu\text{g}/\text{m}^3$  for 1990

Demographic Group	25th	50th	75th	90th	95th	99th
Caucasians	357	439	477	573	579	584
African americans	364	548	553	556	559	564
Hispanics	348	429	471	561	566	571
Household income lt \$10K	351	452	536	539	543	547
Household income \$10K-\$25K	356	438	481	570	574	579
Household income \$25K-\$50K	358	440	481	576	581	586
Household income \$50K-\$75K	361	445	484	581	586	590
Household income gt \$75K	294	437	479	567	577	582
Children, 0 to 17	356	440	482	571	577	582
Nonworking men, 18 to 44	374	462	591	599	602	607
Working men, 18 to 44	397	458	502	585	588	591
Nonworking women, 18 to 44	346	427	470	555	559	564
Working women, 18 to 44	374	438	480	562	565	567
Nonworking men, 45 to 64	347	428	550	556	559	563
Working men, 45 to 64	401	459	506	586	590	592
Nonworking women, 45 to 64	336	414	454	539	543	547
Working women, 45 to 64	371	433	475	555	558	560
Men, 65+	357	440	481	572	575	580
Women, 65+	337	415	455	540	543	547
Outdoor workers	460	516	563	645	648	651
Outdoor children	371	460	503	595	603	607
Heart and respiratory	339	417	457	543	547	551
All persons	358	442	485	575	580	585

**Washington DC: City-wide**

HAPEM-MS3 Annual Percentiles in  $\mu\text{g}/\text{m}^3$  for 1990

Demographic Group	25th	50th	75th	90th	95th	99th
Caucasians	461	504	507	631	642	798
African americans	483	490	760	767	770	775
Hispanics	449	492	499	771	777	784
Household income lt \$10K	436	475	740	747	749	752
Household income \$10K-\$25K	465	501	627	789	792	797
Household income \$25K-\$50K	466	505	510	789	797	804
Household income \$50K-\$75K	468	510	513	641	802	809
Household income gt \$75K	460	502	506	631	782	790
Children, 0 to 17	461	502	506	780	791	797
Nonworking men, 18 to 44	483	527	660	832	835	841
Working men, 18 to 44	495	532	535	767	772	775
Nonworking women, 18 to 44	447	488	493	767	771	776
Working women, 18 to 44	468	506	508	743	746	749
Nonworking men, 45 to 64	444	488	495	772	775	779
Working men, 45 to 64	501	536	539	760	765	768
Nonworking women, 45 to 64	431	473	477	745	749	753
Working women, 45 to 64	464	501	504	735	738	741
Men, 65+	459	503	632	797	801	806
Women, 65+	434	475	596	749	752	757
Outdoor workers	578	605	608	832	835	838
Outdoor children	480	525	528	820	828	833
Heart and respiratory	437	477	481	747	752	757
All persons	463	505	510	791	797	804