Appendix A

Guidance on the Use of Fast-Pass IM240 Standards

Guidance on the Use of Fast-Pass IM240 Standards

A fast-pass decision is made by measuring the vehicle's cumulative emissions of each pollutant in each second, and comparing them to cumulative emission fast-pass standards for each pollutant for the second of the test under consideration. In general, if the vehicle's cumulative emissions are below a given level for all pollutants the vehicle passes. Testing continues until decisions are made for each pollutant. Measurements of all constituents shall continue to be taken as long as the test continues, including those constituents for which a decision has already been made.

These fast-pass standards are derived from an Arizona IM240 data set which included 3,718 tests. Fast-pass standards for each second represent the tenth lowest cumulative emission levels in that second obtained for vehicles failing the IM240 using the two-ways-to-pass criteria. Hence, vehicles that fall below this level are showing lower cumulative emissions at that point in the test than the cleanest vehicles failing the full test and therefore pass. Fast-pass determinations begin at second 30 of the IM240 cycle.

Beginning at second 109, fast pass decisions for HC and CO are based upon analysis of cumulative emissions in phase 2, the portion of the test beginning at second 94, as well as emission levels accumulated from the beginning of the test (the "composite" test). Fast-pass standards are derived for phase 2 of the test as described above. Since the phase 2 standards for NO_X are the same as the composite, the phase 2 NO_X fast-pass standards are also the same as the composite.

Scores

HC_t = cumulative composite HC at time = t seconds

CO_t = cumulative composite CO at time = t seconds
NOx_t = cumulative composite NOx at time = t seconds
HC_{bt} = cumulative Phase 2 HC at time = t seconds
CO_{bt} = cumulative Phase 2 CO at time = t seconds
NOx_{bt} = cumulative Phase 2 NOx at time = t seconds
Cumulative composite scores represent the cumulative grams of emissions from t = 0 seconds
Cumulative Phase 2 scores represent the cumulative grams of emissions from t = 109 seconds

Fast-Pass Standards

HC_{pt} = composite HC fast-pass standard at time = t seconds
CO_{pt} = composite CO fast-pass standard at time = t seconds
NOx_{pt} = composite NOx fast-pass standard for failing vehicles at time = t seconds
HC_{pbt} = Phase 2 HC fast-pass standard at time = t seconds
CO_{pbt} = Phase 2 CO fast-pass standard at time = t seconds
NOx_{pbt} = Phase 2 NOx fast-pass standard at time = t seconds

Fast-Pass Conditions

For $t > 30$ seconds, the vehicle shall pass if:

$HC_t < HC_{pt}$ and $CO_t < CO_{pt}$, $NOx_t < NOx_{pt}$;

additionally, for $t > 109$ seconds, the vehicle shall pass if:

$HC_{bt} < HC_{pbt}$ and $CO_{bt} < CO_{pbt}$ and $NOx_{bt} < NOx_{pbt}$ or

$HC_t < HC_{pt}$ and $CO_{bt} < CO_{pbt}$ and $NOx_{bt} < NOx_{pbt}$ or

$HC_t < HC_{pt}$ and $CO_t < CO_{pt}$ and $NOx_{bt} < NOx_{pbt}$ or

$HC_{bt} < HC_{pbt}$ and $CO_t < CO_{pt}$ and $NOx_{bt} < NOx_{pbt}$ or

$HC_{bt} < HC_{pbt}$ and $CO_t < CO_{pt}$ and $NOx_t < NOx_{pt}$ or

$HC_{bt} < HC_{pbt}$ and $CO_{bt} < CO_{pbt}$ and $NOx_t < NOx_{pt}$

IM240 FAST-PASS EMISSION STANDARDS
(grams)

Sec	Hydrocarbons						Carbon Monoxide						Oxides of Nitrogen		
	Composite	Phase 2	Composite	Phase 2	Composite	Phase 2	Composite	Phase 2	Composite	Phase 2	Composite	Phase 2			
	0.80	0.50	1.25	0.75	2.00	1.25	15.0	12.0	20.0	16.0	30.0	24.0	2.0	2.5	3.0
30	0.124	n/a	0.247	n/a	0.407	n/a	0.693	n/a	1.502	n/a	3.804	n/a	0.167	0.262	0.419
31	0.126	n/a	0.253	n/a	0.415	n/a	0.773	n/a	1.546	n/a	3.985	n/a	0.177	0.275	0.425
32	0.129	n/a	0.258	n/a	0.423	n/a	0.837	n/a	1.568	n/a	4.215	n/a	0.188	0.301	0.431
33	0.135	n/a	0.263	n/a	0.436	n/a	0.851	n/a	1.582	n/a	4.440	n/a	0.214	0.317	0.449
34	0.140	n/a	0.268	n/a	0.451	n/a	0.853	n/a	1.593	n/a	4.579	n/a	0.232	0.327	0.476
35	0.146	n/a	0.277	n/a	0.464	n/a	0.857	n/a	1.602	n/a	4.688	n/a	0.240	0.330	0.497
36	0.150	n/a	0.283	n/a	0.468	n/a	0.900	n/a	1.621	n/a	4.749	n/a	0.243	0.332	0.515
37	0.153	n/a	0.293	n/a	0.475	n/a	0.960	n/a	1.631	n/a	4.783	n/a	0.245	0.334	0.516
38	0.156	n/a	0.297	n/a	0.487	n/a	1.034	n/a	1.702	n/a	4.813	n/a	0.246	0.336	0.519
39	0.160	n/a	0.298	n/a	0.506	n/a	1.070	n/a	1.784	n/a	4.876	n/a	0.246	0.337	0.527
40	0.165	n/a	0.313	n/a	0.530	n/a	1.076	n/a	1.879	n/a	5.104	n/a	0.250	0.354	0.542
41	0.169	n/a	0.320	n/a	0.549	n/a	1.083	n/a	2.162	n/a	5.217	n/a	0.260	0.366	0.560
42	0.172	n/a	0.327	n/a	0.569	n/a	1.102	n/a	2.307	n/a	5.383	n/a	0.277	0.410	0.598
43	0.173	n/a	0.342	n/a	0.588	n/a	1.111	n/a	2.343	n/a	5.571	n/a	0.311	0.414	0.616
44	0.177	n/a	0.360	n/a	0.609	n/a	1.114	n/a	2.376	n/a	5.888	n/a	0.328	0.438	0.645
45	0.197	n/a	0.376	n/a	0.621	n/a	1.157	n/a	2.406	n/a	6.199	n/a	0.343	0.477	0.670
46	0.200	n/a	0.389	n/a	0.636	n/a	1.344	n/a	2.433	n/a	6.245	n/a	0.359	0.506	0.691
47	0.208	n/a	0.408	n/a	0.649	n/a	1.482	n/a	2.458	n/a	6.318	n/a	0.373	0.518	0.716
48	0.221	n/a	0.423	n/a	0.666	n/a	1.530	n/a	2.483	n/a	6.418	n/a	0.383	0.522	0.735
49	0.232	n/a	0.434	n/a	0.679	n/a	1.542	n/a	2.774	n/a	6.540	n/a	0.385	0.526	0.765
50	0.235	n/a	0.444	n/a	0.696	n/a	1.553	n/a	2.844	n/a	6.690	n/a	0.400	0.554	0.802
51	0.238	n/a	0.454	n/a	0.712	n/a	1.571	n/a	2.900	n/a	6.875	n/a	0.410	0.574	0.836
52	0.240	n/a	0.465	n/a	0.727	n/a	1.595	n/a	2.936	n/a	7.029	n/a	0.434	0.587	0.868
53	0.242	n/a	0.472	n/a	0.745	n/a	1.633	n/a	3.133	n/a	7.129	n/a	0.464	0.601	0.890
54	0.246	n/a	0.478	n/a	0.760	n/a	1.685	n/a	3.304	n/a	7.359	n/a	0.472	0.615	0.918
55	0.249	n/a	0.485	n/a	0.776	n/a	1.689	n/a	3.407	n/a	7.722	n/a	0.480	0.629	0.936
56	0.252	n/a	0.493	n/a	0.797	n/a	1.693	n/a	3.456	n/a	8.017	n/a	0.491	0.643	0.947
57	0.261	n/a	0.500	n/a	0.814	n/a	1.700	n/a	3.480	n/a	8.249	n/a	0.500	0.667	0.958
58	0.271	n/a	0.505	n/a	0.826	n/a	1.723	n/a	3.518	n/a	8.425	n/a	0.506	0.678	0.970
59	0.276	n/a	0.514	n/a	0.837	n/a	1.852	n/a	3.560	n/a	8.563	n/a	0.509	0.683	0.982
60	0.278	n/a	0.537	n/a	0.849	n/a	1.872	n/a	3.593	n/a	8.686	n/a	0.512	0.686	0.994
61	0.280	n/a	0.540	n/a	0.862	n/a	1.872	n/a	3.628	n/a	8.804	n/a	0.516	0.693	1.019
62	0.282	n/a	0.543	n/a	0.872	n/a	1.872	n/a	3.641	n/a	8.916	n/a	0.519	0.699	1.042
63	0.283	n/a	0.546	n/a	0.887	n/a	1.900	n/a	3.655	n/a	9.025	n/a	0.523	0.703	1.049
64	0.284	n/a	0.551	n/a	0.895	n/a	1.917	n/a	3.680	n/a	9.138	n/a	0.529	0.707	1.058
65	0.285	n/a	0.559	n/a	0.903	n/a	1.944	n/a	3.700	n/a	9.250	n/a	0.533	0.711	1.062
66	0.286	n/a	0.567	n/a	0.925	n/a	2.000	n/a	3.728	n/a	9.354	n/a	0.535	0.716	1.064
67	0.288	n/a	0.575	n/a	0.933	n/a	2.060	n/a	3.857	n/a	9.457	n/a	0.540	0.721	1.070
68	0.291	n/a	0.588	n/a	0.945	n/a	2.064	n/a	3.894	n/a	9.575	n/a	0.551	0.726	1.077
69	0.294	n/a	0.595	n/a	0.959	n/a	2.076	n/a	3.943	n/a	9.728	n/a	0.563	0.742	1.085
70	0.296	n/a	0.601	n/a	0.970	n/a	2.104	n/a	3.983	n/a	9.938	n/a	0.575	0.759	1.092
71	0.298	n/a	0.606	n/a	0.980	n/a	2.117	n/a	4.009	n/a	10.140	n/a	0.588	0.773	1.101
72	0.300	n/a	0.610	n/a	0.988	n/a	2.125	n/a	4.023	n/a	10.222	n/a	0.600	0.784	1.111
73	0.302	n/a	0.617	n/a	0.997	n/a	2.130	n/a	4.023	n/a	10.261	n/a	0.603	0.790	1.121
74	0.304	n/a	0.631	n/a	1.022	n/a	2.138	n/a	4.053	n/a	10.278	n/a	0.604	0.794	1.131

75	0.307	n/a	0.643	n/a	1.037	n/a	2.152	n/a	4.063	n/a	10.290	n/a	0.613	0.799	1.141
76	0.308	n/a	0.651	n/a	1.051	n/a	2.170	n/a	4.077	n/a	10.715	n/a	0.624	0.809	1.159
77	0.308	n/a	0.659	n/a	1.064	n/a	2.188	n/a	4.225	n/a	10.790	n/a	0.646	0.821	1.164
78	0.308	n/a	0.667	n/a	1.075	n/a	2.200	n/a	4.243	n/a	10.844	n/a	0.651	0.833	1.186
79	0.314	n/a	0.676	n/a	1.087	n/a	2.212	n/a	4.260	n/a	10.921	n/a	0.659	0.839	1.221
80	0.320	n/a	0.681	n/a	1.097	n/a	2.212	n/a	4.282	n/a	11.010	n/a	0.673	0.844	1.260
81	0.324	n/a	0.685	n/a	1.105	n/a	2.221	n/a	4.322	n/a	11.090	n/a	0.696	0.857	1.268
82	0.327	n/a	0.689	n/a	1.114	n/a	2.222	n/a	4.398	n/a	11.136	n/a	0.706	0.870	1.272
83	0.329	n/a	0.694	n/a	1.136	n/a	2.227	n/a	4.482	n/a	11.136	n/a	0.715	0.883	1.277
84	0.333	n/a	0.700	n/a	1.160	n/a	2.236	n/a	4.515	n/a	11.165	n/a	0.724	0.894	1.288
85	0.336	n/a	0.705	n/a	1.182	n/a	2.243	n/a	4.518	n/a	11.191	n/a	0.737	0.902	1.310
86	0.339	n/a	0.709	n/a	1.201	n/a	2.262	n/a	4.520	n/a	11.205	n/a	0.747	0.907	1.319
87	0.343	n/a	0.713	n/a	1.217	n/a	2.271	n/a	4.522	n/a	11.211	n/a	0.748	0.910	1.320
88	0.347	n/a	0.717	n/a	1.233	n/a	2.284	n/a	4.522	n/a	11.211	n/a	0.748	0.912	1.337
89	0.350	n/a	0.721	n/a	1.248	n/a	2.299	n/a	4.523	n/a	11.211	n/a	0.748	0.913	1.348
90	0.356	n/a	0.724	n/a	1.262	n/a	2.308	n/a	4.526	n/a	11.211	n/a	0.748	0.914	1.361
91	0.358	n/a	0.727	n/a	1.271	n/a	2.326	n/a	4.527	n/a	11.220	n/a	0.748	0.915	1.366
92	0.360	n/a	0.729	n/a	1.279	n/a	2.330	n/a	4.527	n/a	11.294	n/a	0.748	0.916	1.369
93	0.363	n/a	0.731	n/a	1.287	n/a	2.331	n/a	4.528	n/a	11.332	n/a	0.748	0.917	1.373
94	0.367	n/a	0.734	n/a	1.295	n/a	2.344	n/a	4.528	n/a	11.355	n/a	0.748	0.918	1.375
95	0.370	n/a	0.740	n/a	1.302	n/a	2.347	n/a	4.528	n/a	11.383	n/a	0.748	0.919	1.377
96	0.372	n/a	0.748	n/a	1.309	n/a	2.355	n/a	4.529	n/a	11.410	n/a	0.748	0.920	1.379
97	0.376	n/a	0.759	n/a	1.316	n/a	2.395	n/a	4.575	n/a	11.433	n/a	0.748	0.921	1.381
98	0.388	n/a	0.771	n/a	1.325	n/a	2.451	n/a	4.703	n/a	11.516	n/a	0.748	0.922	1.383
99	0.396	n/a	0.783	n/a	1.339	n/a	2.508	n/a	4.805	n/a	11.820	n/a	0.751	0.924	1.385
100	0.405	n/a	0.793	n/a	1.356	n/a	2.590	n/a	4.886	n/a	12.104	n/a	0.764	0.929	1.399
101	0.410	n/a	0.810	n/a	1.365	n/a	2.660	n/a	4.957	n/a	12.344	n/a	0.789	0.941	1.405
102	0.411	n/a	0.823	n/a	1.378	n/a	2.749	n/a	5.104	n/a	12.781	n/a	0.822	0.970	1.466
103	0.412	n/a	0.836	n/a	1.397	n/a	2.913	n/a	5.340	n/a	13.472	n/a	0.867	1.027	1.485
104	0.413	n/a	0.853	n/a	1.420	n/a	3.162	n/a	5.496	n/a	14.405	n/a	0.905	1.093	1.546
105	0.421	n/a	0.871	n/a	1.445	n/a	3.170	n/a	5.625	n/a	14.808	n/a	0.925	1.155	1.623
106	0.428	n/a	0.887	n/a	1.470	n/a	3.197	n/a	5.815	n/a	14.965	n/a	0.955	1.234	1.699
107	0.430	n/a	0.899	n/a	1.491	n/a	3.288	n/a	6.473	n/a	15.121	n/a	0.985	1.275	1.760
108	0.455	n/a	0.931	n/a	1.506	n/a	3.419	n/a	7.037	n/a	15.372	n/a	0.993	1.305	1.788
109	0.459	0.015	0.947	0.040	1.517	0.151	3.587	0.168	7.419	0.246	15.530	1.113	0.995	1.320	1.798
110	0.462	0.017	0.957	0.047	1.528	0.159	3.595	0.173	7.643	0.257	15.687	1.213	0.996	1.332	1.842
111	0.464	0.021	0.965	0.052	1.542	0.172	3.640	0.237	7.759	0.286	16.018	1.344	1.010	1.346	1.864
112	0.466	0.024	0.971	0.056	1.559	0.186	3.740	0.266	7.824	0.379	16.527	1.399	1.028	1.358	1.888
113	0.468	0.024	0.977	0.061	1.578	0.199	3.868	0.280	7.889	0.425	16.810	1.520	1.034	1.378	1.905
114	0.471	0.025	0.983	0.064	1.594	0.207	3.877	0.291	7.960	0.457	16.961	1.640	1.044	1.406	1.920
115	0.488	0.026	1.003	0.072	1.605	0.216	3.934	0.314	8.024	0.477	17.120	1.684	1.059	1.426	1.926
116	0.513	0.029	1.030	0.081	1.615	0.229	4.015	0.331	8.076	0.494	17.135	1.693	1.075	1.438	1.939
117	0.538	0.032	1.041	0.082	1.625	0.235	4.061	0.345	8.111	0.504	17.249	1.786	1.080	1.448	1.958
118	0.561	0.035	1.050	0.083	1.642	0.240	4.063	0.350	8.130	0.512	17.451	2.007	1.080	1.460	1.972
119	0.577	0.035	1.052	0.092	1.670	0.245	4.079	0.356	8.148	0.519	17.509	2.084	1.081	1.462	1.981
120	0.580	0.036	1.055	0.094	1.694	0.261	4.140	0.367	8.211	0.529	17.605	2.179	1.091	1.467	1.987
121	0.586	0.038	1.061	0.097	1.705	0.267	4.185	0.388	8.478	0.529	17.734	2.264	1.096	1.476	1.991
122	0.594	0.040	1.071	0.100	1.717	0.277	4.199	0.407	8.548	0.530	18.049	2.328	1.111	1.494	1.996
123	0.603	0.041	1.081	0.103	1.732	0.287	4.205	0.463	8.561	0.531	18.447	2.375	1.122	1.505	2.012
124	0.610	0.042	1.091	0.106	1.747	0.298	4.212	0.480	8.568	0.532	18.592	2.437	1.135	1.517	2.040
125	0.615	0.042	1.102	0.108	1.763	0.308	4.232	0.506	8.572	0.533	18.657	2.543	1.138	1.546	2.060
126	0.624	0.042	1.110	0.110	1.779	0.316	4.298	0.518	8.584	0.548	18.796	2.593	1.139	1.569	2.069
127	0.628	0.045	1.116	0.112	1.795	0.322	4.344	0.522	8.592	0.610	18.952	2.641	1.139	1.586	2.092

128	0.632	0.046	1.121	0.114	1.810	0.329	4.361	0.525	8.596	0.614	19.137	2.663	1.139	1.596	2.114
129	0.637	0.046	1.125	0.116	1.823	0.338	4.366	0.528	8.597	0.622	19.329	2.672	1.139	1.603	2.132
130	0.641	0.049	1.128	0.118	1.835	0.346	4.369	0.530	8.601	0.631	19.519	2.676	1.139	1.605	2.144
131	0.643	0.050	1.130	0.120	1.845	0.354	4.372	0.530	8.605	0.640	19.707	2.683	1.139	1.606	2.152
132	0.644	0.052	1.132	0.122	1.854	0.356	4.435	0.534	8.608	0.646	19.882	2.817	1.139	1.607	2.157
133	0.645	0.054	1.134	0.123	1.862	0.357	4.523	0.550	8.626	0.650	19.905	2.992	1.139	1.607	2.160
134	0.647	0.054	1.135	0.124	1.870	0.359	4.524	0.554	8.650	0.652	20.049	3.111	1.139	1.608	2.163
135	0.651	0.054	1.143	0.127	1.883	0.362	4.525	0.590	8.660	0.738	20.460	3.234	1.139	1.614	2.165
136	0.658	0.055	1.147	0.130	1.888	0.364	4.531	0.616	8.767	0.754	20.746	3.304	1.160	1.616	2.168
137	0.663	0.055	1.156	0.134	1.896	0.368	4.534	0.639	9.029	0.780	21.068	3.310	1.174	1.631	2.171
138	0.666	0.056	1.163	0.139	1.911	0.378	4.542	0.653	9.238	0.795	21.380	3.320	1.183	1.643	2.186
139	0.668	0.059	1.186	0.146	1.928	0.391	4.553	0.662	9.389	0.804	21.748	3.354	1.197	1.656	2.235
140	0.670	0.061	1.253	0.149	1.949	0.402	4.554	0.683	9.493	0.810	22.046	3.436	1.223	1.673	2.298
141	0.672	0.061	1.262	0.151	1.969	0.408	4.554	0.696	9.583	0.815	22.348	3.443	1.255	1.703	2.333
142	0.675	0.061	1.271	0.153	1.982	0.422	4.554	0.708	9.626	0.818	22.397	3.452	1.272	1.739	2.373
143	0.678	0.063	1.277	0.155	1.999	0.428	4.554	0.721	9.669	0.821	22.407	3.490	1.286	1.767	2.406
144	0.681	0.064	1.283	0.157	2.011	0.432	4.554	0.739	9.716	0.825	22.417	3.552	1.304	1.774	2.416
145	0.684	0.065	1.291	0.162	2.022	0.434	4.554	0.742	9.763	0.840	22.922	3.588	1.307	1.785	2.420
146	0.686	0.066	1.294	0.164	2.035	0.439	4.554	0.743	9.809	0.847	22.951	3.600	1.312	1.806	2.424
147	0.688	0.067	1.296	0.166	2.043	0.450	4.554	0.745	9.852	0.855	22.976	3.616	1.317	1.830	2.435
148	0.690	0.068	1.298	0.168	2.049	0.460	4.554	0.748	9.885	0.865	23.017	3.627	1.321	1.844	2.455
149	0.692	0.069	1.303	0.169	2.063	0.467	4.554	0.751	9.932	0.874	23.073	3.636	1.325	1.845	2.471
150	0.694	0.070	1.316	0.170	2.085	0.472	4.554	0.762	9.986	0.891	23.161	3.676	1.328	1.846	2.484
151	0.696	0.071	1.330	0.171	2.104	0.480	4.556	0.789	10.039	0.914	23.218	3.882	1.332	1.852	2.495
152	0.698	0.072	1.342	0.172	2.117	0.491	4.556	0.790	10.072	0.929	23.253	4.011	1.338	1.868	2.509
153	0.700	0.073	1.348	0.173	2.127	0.503	4.565	0.794	10.090	0.937	23.337	4.047	1.344	1.877	2.522
154	0.702	0.073	1.353	0.175	2.138	0.505	4.612	0.799	10.105	0.942	23.425	4.067	1.350	1.879	2.533
155	0.704	0.074	1.362	0.178	2.152	0.515	4.834	0.805	10.146	0.949	23.534	4.081	1.357	1.886	2.541
156	0.706	0.077	1.365	0.180	2.168	0.522	5.702	0.842	10.245	1.375	23.652	4.116	1.365	1.900	2.552
157	0.708	0.079	1.366	0.189	2.186	0.527	5.841	0.990	10.397	1.576	23.739	4.251	1.379	1.910	2.589
158	0.710	0.082	1.373	0.198	2.205	0.537	6.170	1.038	10.923	1.943	24.606	5.099	1.414	1.936	2.631
159	0.712	0.082	1.397	0.203	2.224	0.549	6.670	1.357	11.970	2.820	25.615	5.383	1.466	1.954	2.704
160	0.716	0.086	1.423	0.207	2.242	0.568	7.425	1.455	13.421	3.281	26.073	6.362	1.514	1.986	2.758
161	0.750	0.095	1.440	0.214	2.268	0.586	8.379	1.546	15.289	3.483	28.496	7.926	1.559	2.050	2.802
162	0.784	0.107	1.452	0.221	2.308	0.610	9.648	1.824	15.912	3.620	29.772	8.429	1.591	2.131	2.904
163	0.805	0.115	1.465	0.229	2.352	0.648	10.918	2.746	16.530	4.168	31.056	9.201	1.641	2.235	2.960
164	0.840	0.122	1.509	0.247	2.406	0.677	12.157	3.073	17.622	4.338	33.351	10.825	1.719	2.320	3.027
165	0.853	0.127	1.533	0.274	2.421	0.699	12.731	3.633	18.366	4.682	34.890	12.291	1.777	2.395	3.127
166	0.874	0.159	1.555	0.309	2.435	0.720	12.831	4.505	19.869	5.633	35.937	13.366	1.832	2.488	3.187
167	0.903	0.186	1.576	0.318	2.470	0.738	12.892	4.952	20.711	6.137	37.012	14.428	1.919	2.563	3.306
168	0.910	0.189	1.598	0.322	2.501	0.767	12.932	5.254	22.319	6.853	37.892	15.318	1.972	2.645	3.384
169	0.914	0.200	1.618	0.333	2.537	0.828	13.702	5.730	23.751	7.136	39.028	15.699	2.013	2.746	3.467
170	0.916	0.220	1.636	0.343	2.571	0.855	14.139	6.051	24.842	7.320	40.406	16.073	2.100	2.778	3.565
171	0.919	0.236	1.666	0.356	2.625	0.869	14.964	6.333	25.410	7.685	41.379	16.475	2.200	2.792	3.640
172	0.931	0.247	1.685	0.385	2.657	0.885	15.704	6.490	25.798	8.052	42.033	17.158	2.251	2.810	3.718
173	0.948	0.257	1.726	0.409	2.683	0.900	16.253	6.796	26.122	8.344	42.432	17.532	2.270	2.847	3.781
174	0.983	0.267	1.742	0.433	2.701	0.941	16.907	7.205	26.353	8.602	42.742	17.965	2.301	2.874	3.827
175	1.018	0.283	1.756	0.453	2.717	0.979	17.655	8.151	26.638	8.898	43.399	18.242	2.318	2.905	3.852
176	1.027	0.295	1.769	0.463	2.732	1.002	18.020	8.230	27.219	9.251	43.895	18.283	2.335	2.950	3.903
177	1.035	0.312	1.784	0.507	2.756	1.025	18.349	8.584	27.279	10.253	44.227	18.480	2.349	3.001	3.930
178	1.051	0.318	1.802	0.523	2.781	1.047	18.671	8.800	27.320	10.828	44.926	19.576	2.387	3.047	3.970
179	1.074	0.323	1.822	0.528	2.811	1.065	18.972	8.847	27.352	10.933	45.256	20.015	2.423	3.104	4.015
180	1.084	0.337	1.843	0.541	2.853	1.089	19.228	8.913	27.822	11.060	45.553	20.203	2.462	3.173	4.074

181	1.099	0.345	1.864	0.549	2.898	1.109	20.123	9.122	28.763	11.188	45.753	20.433	2.503	3.238	4.159
182	1.121	0.350	1.884	0.559	2.946	1.133	20.405	9.532	29.402	11.345	46.210	21.025	2.545	3.302	4.230
183	1.132	0.359	1.896	0.571	2.988	1.158	20.754	10.256	29.971	11.733	47.017	21.882	2.586	3.372	4.286
184	1.152	0.387	1.915	0.584	3.023	1.184	21.684	10.862	30.276	12.598	48.185	22.204	2.627	3.452	4.334
185	1.161	0.398	1.940	0.598	3.057	1.209	21.955	10.996	30.988	12.953	48.741	22.859	2.673	3.545	4.388
186	1.168	0.400	1.958	0.613	3.076	1.222	22.650	11.206	31.095	13.213	49.462	23.533	2.749	3.648	4.447
187	1.175	0.402	1.972	0.624	3.101	1.231	22.989	11.514	31.314	14.131	50.313	24.281	2.804	3.701	4.505
188	1.181	0.405	1.985	0.629	3.120	1.239	23.535	11.894	31.833	14.839	51.285	25.078	2.851	3.759	4.561
189	1.188	0.418	1.991	0.629	3.136	1.254	23.876	12.019	32.239	15.137	52.076	25.276	2.894	3.821	4.625
190	1.203	0.429	1.993	0.638	3.151	1.278	24.018	12.170	32.547	15.138	52.857	25.578	2.931	3.870	4.696
191	1.219	0.442	1.995	0.648	3.163	1.300	24.464	12.517	32.855	15.141	52.876	25.859	2.971	3.892	4.731
192	1.233	0.457	2.001	0.659	3.209	1.313	24.685	12.598	33.153	15.595	53.067	25.985	3.020	3.914	4.780
193	1.251	0.473	2.015	0.663	3.223	1.324	24.931	12.625	33.444	15.658	53.777	26.153	3.077	3.955	4.837
194	1.255	0.487	2.031	0.671	3.237	1.340	25.188	12.653	33.482	15.704	54.242	26.582	3.132	3.997	4.876
195	1.258	0.501	2.047	0.681	3.263	1.367	25.468	12.777	33.516	15.729	54.489	27.067	3.185	4.035	4.928
196	1.265	0.510	2.063	0.693	3.302	1.387	25.627	12.906	33.549	16.058	54.601	27.456	3.219	4.089	4.972
197	1.280	0.512	2.079	0.709	3.338	1.402	25.746	12.989	33.653	16.987	54.912	27.805	3.268	4.146	5.025
198	1.293	0.514	2.094	0.725	3.372	1.417	25.850	13.060	33.973	17.064	55.588	28.070	3.299	4.206	5.104
199	1.301	0.516	2.109	0.740	3.390	1.432	25.974	13.165	34.159	17.073	56.266	28.590	3.350	4.243	5.189
200	1.313	0.518	2.122	0.754	3.428	1.446	26.141	13.242	34.191	17.153	56.617	28.914	3.406	4.295	5.275
201	1.324	0.527	2.130	0.767	3.470	1.460	26.225	13.412	34.250	17.332	56.863	29.063	3.466	4.351	5.336
202	1.332	0.540	2.137	0.775	3.493	1.477	26.338	13.662	34.469	17.406	57.204	29.502	3.497	4.398	5.366
203	1.341	0.547	2.157	0.787	3.509	1.492	26.547	13.773	34.716	17.641	57.371	29.697	3.514	4.410	5.387
204	1.357	0.553	2.172	0.795	3.522	1.501	26.818	13.942	34.969	17.922	57.487	29.713	3.517	4.419	5.427
205	1.375	0.559	2.194	0.803	3.533	1.510	27.052	14.090	35.144	18.484	57.728	29.783	3.519	4.426	5.444
206	1.392	0.563	2.222	0.854	3.550	1.522	27.393	14.224	35.418	18.553	58.097	29.942	3.523	4.429	5.447
207	1.408	0.567	2.245	0.859	3.578	1.561	27.501	14.426	35.766	18.658	58.572	30.284	3.545	4.453	5.477
208	1.422	0.571	2.268	0.872	3.607	1.585	27.632	14.498	35.949	18.953	59.024	30.755	3.570	4.486	5.520
209	1.433	0.575	2.279	0.892	3.630	1.597	27.803	14.776	36.010	19.266	59.321	31.287	3.600	4.542	5.560
210	1.443	0.579	2.288	0.896	3.658	1.607	27.953	14.907	36.548	19.309	59.715	31.549	3.619	4.598	5.603
211	1.453	0.595	2.301	0.903	3.701	1.627	28.205	14.916	37.179	19.731	60.045	31.820	3.639	4.638	5.657
212	1.463	0.605	2.316	0.924	3.745	1.645	28.543	15.014	37.651	19.902	60.453	32.250	3.686	4.715	5.698
213	1.468	0.614	2.332	0.938	3.778	1.656	28.997	15.221	38.041	20.012	60.935	32.546	3.732	4.774	5.762
214	1.470	0.622	2.345	0.941	3.814	1.663	29.000	15.472	38.591	20.260	61.307	32.808	3.791	4.829	5.827
215	1.474	0.627	2.354	0.951	3.825	1.669	29.005	15.555	38.852	20.739	61.666	33.060	3.833	4.872	5.849
216	1.478	0.638	2.362	0.966	3.835	1.674	29.081	15.652	38.861	21.346	62.148	33.204	3.890	4.931	5.884
217	1.481	0.643	2.368	0.979	3.844	1.685	29.281	15.969	38.926	21.810	62.532	33.341	3.932	4.960	5.908
218	1.484	0.643	2.376	0.980	3.853	1.700	29.483	16.028	39.194	22.001	62.546	33.414	3.960	4.963	5.921
219	1.487	0.645	2.384	0.981	3.864	1.704	29.734	16.375	39.474	22.290	62.559	33.514	3.997	4.965	5.931
220	1.490	0.651	2.391	1.005	3.874	1.706	29.803	16.487	39.668	22.324	62.570	33.640	4.013	4.968	5.939
221	1.493	0.655	2.395	1.016	3.891	1.709	29.821	16.524	39.781	22.343	62.846	33.692	4.035	4.971	5.947
222	1.504	0.663	2.400	1.022	3.928	1.711	29.847	16.578	39.890	22.522	63.097	33.711	4.038	4.974	5.952
223	1.522	0.671	2.405	1.028	3.966	1.714	29.862	16.684	39.954	22.661	63.150	33.733	4.050	4.977	5.955
224	1.547	0.675	2.409	1.035	4.008	1.718	29.873	16.755	39.984	22.666	63.150	33.770	4.066	4.979	5.957
225	1.549	0.684	2.413	1.041	4.010	1.721	30.008	16.770	39.989	22.667	63.150	33.796	4.070	4.980	5.959
226	1.562	0.694	2.415	1.045	4.012	1.723	30.126	16.805	39.990	22.668	63.150	33.810	4.072	4.981	5.961
227	1.574	0.701	2.417	1.051	4.016	1.726	30.127	16.865	39.990	22.669	63.150	33.821	4.072	4.982	5.963
228	1.579	0.702	2.419	1.055	4.019	1.729	30.127	16.960	39.990	22.670	63.150	33.839	4.073	4.983	5.966
229	1.584	0.708	2.420	1.059	4.057	1.731	30.208	16.960	39.991	22.671	63.150	33.865	4.073	4.984	5.971
230	1.589	0.708	2.421	1.062	4.065	1.733	30.314	16.962	40.012	22.671	63.150	33.894	4.073	4.985	5.977
231	1.590	0.709	2.423	1.063	4.071	1.735	30.323	16.988	40.061	22.672	63.150	33.918	4.073	4.986	5.984
232	1.596	0.710	2.425	1.063	4.073	1.743	30.325	17.072	40.116	22.673	63.150	33.944	4.074	4.987	5.990
233	1.598	0.710	2.427	1.063	4.075	1.749	30.368	17.094	40.249	22.673	63.150	33.985	4.074	4.988	5.997

234	**1.604**	**0.711**	**2.429**	**1.064**	**4.077**	**1.753**	**30.411**	**17.184**	**40.253**	**22.673**	**63.153**	**34.014**	**4.075**	**4.989**	**6.004**
235	**1.610**	**0.712**	**2.430**	**1.064**	**4.079**	**1.757**	**30.416**	**17.187**	**40.290**	**22.674**	**63.159**	**34.032**	**4.075**	**4.990**	**6.012**
236	**1.612**	**0.712**	**2.431**	**1.066**	**4.081**	**1.762**	**30.428**	**17.188**	**40.385**	**22.675**	**63.173**	**34.051**	**4.076**	**4.991**	**6.024**
237	**1.613**	**0.712**	**2.432**	**1.069**	**4.083**	**1.767**	**30.430**	**17.189**	**40.488**	**22.675**	**63.193**	**34.067**	**4.076**	**4.992**	**6.037**
238	**1.614**	**0.713**	**2.433**	**1.072**	**4.084**	**1.772**	**30.452**	**17.241**	**40.720**	**22.675**	**63.214**	**34.079**	**4.076**	**4.993**	**6.049**
239	**1.615**	**0.716**	**2.434**	**1.075**	**4.085**	**1.776**	**30.488**	**17.370**	**40.763**	**22.677**	**63.233**	**34.085**	**4.076**	**4.994**	**6.060**