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Draft Technical Report

PRELIMINARY EXPERIMENTAL DESIGNS FOR OZONE MODELING

Contract No. 68-D-02-061
Work Assignment 2-05, Task 7

for

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1.0 INTRODUCTION

This report contains three preliminary designs for review. These are based on the document "Definition of Response Surface 'Policy Space' for 8-Hour Ozone Determinations" provided by Bryan Hubbell and subsequent correspondence. A final design will be developed based on review and feedback of this preliminary designs.

2.0 DESIGNS

There are three different designs presented. The text describes some of the features and constraints associated with each. The actual designs are in Appendices A through C.

2.1   Design 1

This is one of the designs developed based on discussions with Dr. Hubbell. It has the 14 continuous variables ranges of 0 to 1.2 that the design specifications indicated. The design was formulated as follows:

There are 150 runs of which 140 are for model building (following the 10 runs per variable run of thumb) and 10 are for validation.

- •   One run is a baseline run of all ones.
- •   A Latin hypercube design of 139 runs was built on the range between 0 and 1.2.
- •   A Latin hypercube design of 10 runs was built on the range between 0.9 and 1.0.

Combining these gives an experimental design with 150 runs, which more heavily samples the range between 0 and 1.2.

The particular type of Latin hypercube used is called a maximin Latin hypercube design. In addition to being a Latin hypercube design it picks a design that maximizes the minimum distance between points. This prevents patterns and degenerate designs (like all diagonal points) being chosen by chance.

For the final design it would make sense to pick the 10 validation runs using a separate Latin hypercube of their own. Designs 2 and 3 use separate Latin hypercubes for the validation runs.

There are some nice features of the design. Figure 1 shows a histogram of Variable 1, which illustrates the uniform coverage of the design space with over sampling in the 0.9 to 1.0 range. Figure 2 shows a scatterplot of Variable 1 versus run number. This illustrates both the coverage in Variable 1 and the randomness between runs. Other variables should have very similar plots. They show both the depth and uniformity of the coverage. Even though these designs do not hit the corners as a factorial design would, there is thorough coverage of the parameter space to very near the edges.
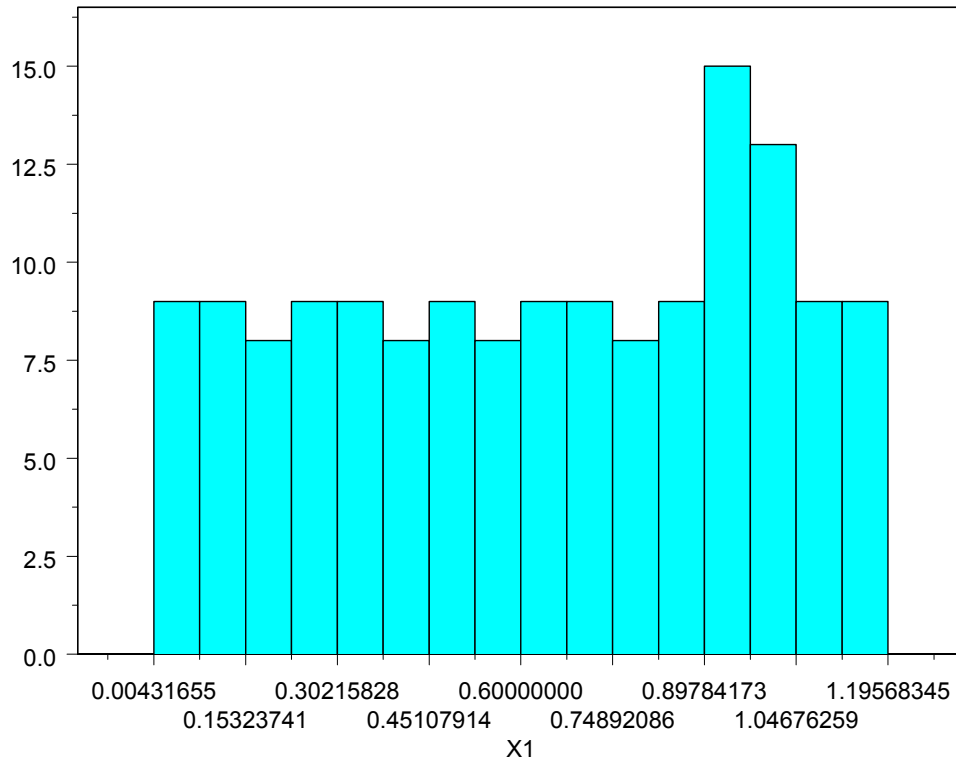
Figure 1.   Histogram of Variable X1.
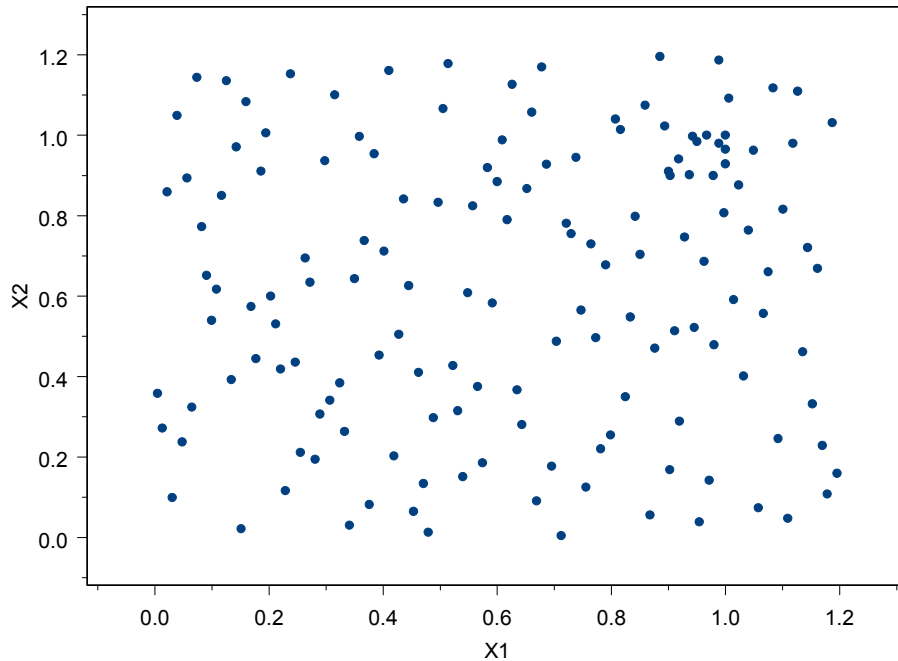
Figure 2.   **Scatterplot of Variables X1 versus X2.**

2.2   Design 2

This is another design based on conversations with Dr. Hubbell and it uses the same design for both attainment and non-attainment areas. Effectively, there are now seven parameters so half the number of runs were used, but still ten runs per variable. The design now consists of

-     One baseline run
-     A Latin hypercube of 70 runs over the full parameter space
-     A Latin hypercube of 5 runs over the 0.9 to 1.0 parameter space,

plus a Latin hypercube of 10 runs for validation purposes. This is a total of 86 runs.

2.3   Design 3

The design specification indicated several additional variables to be added at a later time. While runs can be added to a Latin hypercube design, it is not feasible to add factors or parameters after the fact. If these variables will be used eventually, it makes sense to include them now.

Latin hypercube designs are very flexible in accommodating restrictions on the number of runs (as opposed to factorial designs, for example, which are fairly rigid). While 10 runs per variable is an empirically derived rule of thumb, good designs can be developed with fewer points. While ideally 180 runs would be recommended for 18 variables, a Latin hypercube of 140 runs is a valid design that should give good results. The third design then repeats the design process of Design 1, but for 18 variables and with a Latin Hypercube validation set. Specifically, there is one baseline run, a 129 run Latin hypercube is constructed on the full range, plus a 10 run Latin hypercube on the range 0.9 to 1.0. This is followed by a 10 run Latin hypercube design on the full range for validation purposes. Due to the time it takes to process a maximin Latin hypercube design for many variables, these runs represent just a classical Latin hypercube without the maximin constraint. The maximin constraint could be applied to the final design.

APPENDIX A:

DESIGN 1

Run Number	1) Non-road VOC control in projected residual non-attainment areas	2) Non-road VOC control in attainment areas	3) Area VOC control in projected residual NA areas	4) Area VOC control in attainment areas	5) Non-road NOx control in projected residual NA areas	6) Non-road NOx control in attainment areas	7) EGU NOx control in projected residual non-attainment areas	8) EGU NOx control in attainment areas	9) Non-EGU NOx control in projected residual NA areas	10) Non-EGU NOx control in attainment areas	11) On-road VOC control in projected residual NA areas	12) On-road VOC control in attainment areas	13) On-road NOx control in projected residual NA areas	14) On-road NOx control in attainment areas
	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14
1	0.168	0.574	0.237	0.919	0.565	0.496	0.833	0.548	1.196	0.557	0.565	0.643	0.168	0.367
2	1.083	1.118	0.514	0.937	0.255	0.022	0.082	0.186	0.082	0.056	1.058	0.824	0.591	0.401
3	0.781	0.220	1.032	0.790	0.988	0.824	0.514	0.073	0.212	0.091	1.092	1.014	0.419	0.643
4	1.178	0.108	0.324	0.393	0.479	0.350	0.505	0.626	0.453	0.306	0.988	0.859	0.186	0.013
5	0.565	0.376	0.427	0.971	0.773	0.617	0.220	0.712	0.859	0.669	1.187	0.635	0.885	0.022
6	0.868	0.056	0.833	1.023	1.075	0.436	1.040	1.135	0.911	0.928	0.919	0.850	0.488	0.954
7	0.358	0.997	0.876	1.075	0.471	0.850	1.187	0.531	0.099	0.824	0.186	0.988	1.118	0.203
8	0.591	0.583	1.127	0.531	0.341	1.083	0.660	0.824	1.153	0.047	0.859	1.023	0.678	0.073
9	0.859	1.075	0.108	0.073	0.764	0.859	0.721	0.220	1.170	0.445	0.419	1.196	0.367	0.850
10	0.065	0.324	0.885	0.030	0.117	0.660	0.531	0.583	1.135	0.980	0.773	0.591	0.764	0.540
11	0.842	0.799	1.014	0.833	0.462	1.153	0.686	0.341	1.023	0.678	0.747	0.928	0.255	1.023
12	0.427	0.505	0.755	0.859	0.134	0.963	0.937	0.117	0.617	0.332	0.306	0.902	1.144	0.030
13	0.134	0.393	0.652	0.712	0.911	1.006	0.462	0.332	1.161	0.263	1.040	0.168	0.531	0.971
14	1.058	0.073	0.177	0.039	0.315	1.032	0.427	1.066	0.134	0.643	0.488	0.678	0.427	0.220
15	0.324	0.384	0.945	0.505	1.161	0.099	1.161	0.980	0.505	0.496	0.738	0.030	0.479	0.350
16	0.151	0.022	0.695	1.178	1.092	0.773	1.170	0.212	0.384	0.177	0.056	0.695	0.669	0.565
17	0.453	0.065	0.410	0.332	0.617	0.186	0.807	0.022	1.066	0.237	0.436	0.997	0.824	0.773
18	1.135	0.462	1.144	0.565	0.272	0.609	0.842	0.082	0.522	1.083	0.911	1.144	0.540	1.032
19	0.471	0.134	0.436	1.083	0.177	1.023	0.704	0.971	0.220	0.565	0.937	0.255	0.039	0.419
20	0.945	0.522	0.376	0.306	1.170	0.427	0.039	0.755	0.047	0.462	0.540	1.092	0.263	0.194
21	0.678	1.170	0.401	1.101	1.006	0.790	1.066	0.591	0.496	0.324	0.583	0.367	0.919	0.928
22	0.039	1.049	1.118	0.160	0.505	0.453	1.092	0.721	0.790	0.540	0.030	0.453	0.410	1.049
23	0.928	0.747	0.255	0.117	0.695	0.997	0.177	0.643	0.600	0.945	0.160	1.153	0.617	0.635
24	0.660	1.058	0.583	0.514	0.453	0.971	0.401	1.032	0.246	0.168	1.178	1.083	0.755	0.902
25	0.091	0.652	0.919	0.945	0.850	0.272	0.488	1.049	0.591	0.773	0.401	0.350	1.196	0.306
26	0.306	0.341	1.135	0.401	1.014	0.505	0.030	0.229	0.237	0.652	0.686	0.203	0.833	0.289
27	1.196	0.160	0.479	0.557	0.945	0.816	0.971	1.178	0.289	0.479	0.272	0.410	0.635	0.479
28	1.032	0.401	0.004	0.134	0.358	0.833	0.816	0.263	0.626	0.393	0.609	0.842	0.781	0.255
29	0.488	0.298	1.161	0.997	1.049	0.876	0.919	1.040	0.824	0.514	0.151	0.729	0.229	0.125
30	0.401	0.712	0.824	0.574	0.004	1.144	0.781	0.695	0.004	0.203	0.496	0.212	0.721	0.384

Run Number	1) Non-road VOC control in projected residual non-attainment areas	2) Non-road VOC control in attainment areas	3) Area VOC control in projected residual NA areas	4) Area VOC control in attainment areas	5) Non-road NOx control in projected residual NA areas	6) Non-road NOx control in attainment areas	7) EGU NOx control in projected residual non-attainment areas	8) EGU NOx control in attainment areas	9) Non-EGU NOx control in projected residual NA areas	10) Non-EGU NOx control in attainment areas	11) On-road VOC control in projected residual NA areas	12) On-road VOC control in attainment areas	13) On-road NOx control in projected residual NA areas	14) On-road NOx control in attainment areas
31	0.600	0.885	0.367	0.842	0.833	1.014	1.023	0.911	0.393	1.196	0.643	0.479	0.954	0.324
32	1.170	0.229	0.842	0.324	0.229	0.945	0.453	0.894	0.773	1.006	0.168	0.565	0.911	0.445
33	1.023	0.876	0.635	1.161	0.022	0.712	0.367	0.729	0.514	0.073	0.427	0.332	0.246	0.496
34	0.609	0.988	0.600	0.738	0.186	0.626	1.083	0.194	0.298	0.971	0.358	0.004	0.194	0.729
35	0.833	0.548	0.894	0.652	0.289	0.471	0.237	0.945	0.376	0.246	1.153	0.306	1.153	0.142
36	0.790	0.678	0.134	1.109	0.496	0.082	0.963	0.393	1.040	0.997	0.617	1.118	0.565	0.168
37	1.066	0.557	1.049	0.462	0.660	0.281	0.004	0.600	0.842	1.153	0.626	0.557	0.522	0.747
38	0.082	0.773	0.220	0.868	0.073	0.894	1.153	0.246	0.764	0.220	0.928	1.101	1.058	0.712
39	0.635	0.367	0.125	0.246	0.401	1.161	0.557	0.522	0.781	0.358	0.963	0.298	0.082	0.626
40	0.419	0.203	0.591	0.376	0.721	0.315	1.196	0.419	0.704	0.695	0.574	0.445	0.453	0.099
41	0.816	1.014	1.075	0.341	0.108	1.040	0.591	1.127	0.540	0.194	0.591	0.117	0.220	0.600
42	0.557	0.824	0.056	0.367	0.522	0.807	0.876	1.083	0.341	0.954	1.049	0.237	1.178	0.859
43	0.695	0.177	1.058	0.099	0.030	0.591	0.799	0.937	0.937	0.626	0.324	0.522	1.109	0.885
44	0.263	0.695	1.178	0.678	0.937	0.565	0.540	0.039	0.108	0.937	0.548	0.281	0.937	0.039
45	0.030	0.099	0.626	1.066	0.971	1.109	0.885	0.885	0.565	0.747	0.704	0.652	0.574	0.669
46	0.047	0.237	0.678	0.626	0.652	0.376	0.600	0.134	0.963	0.488	1.006	1.058	1.187	1.006
47	1.161	0.669	0.557	0.876	0.410	0.410	0.747	0.151	0.324	0.842	0.764	0.704	0.850	0.824
48	0.773	0.496	0.954	1.144	0.548	0.306	0.315	1.187	0.091	0.600	0.876	0.721	0.738	0.721
49	0.738	0.945	1.153	0.022	0.876	0.065	0.203	0.902	0.643	0.850	0.997	0.393	0.384	0.764
50	0.919	0.289	0.168	0.911	1.127	1.118	0.229	0.108	0.471	0.876	0.816	0.082	0.108	0.436
51	0.876	0.471	0.315	1.058	0.919	0.194	0.134	0.160	0.807	0.635	0.600	0.022	1.170	0.548
52	0.721	0.781	0.971	0.643	0.799	0.177	1.101	1.109	0.229	0.367	0.531	0.574	0.583	1.144
53	0.056	0.894	1.040	1.006	0.332	0.764	0.168	0.281	0.056	0.721	0.246	0.263	0.177	0.781
54	1.153	0.332	1.006	0.609	0.557	0.212	1.032	0.479	0.583	0.160	0.203	0.125	0.341	0.108
55	0.514	1.178	0.816	0.445	0.583	1.178	0.496	0.203	0.635	0.617	0.790	0.471	1.032	0.177
56	0.350	0.643	0.419	0.695	1.066	1.170	0.306	0.850	0.350	1.075	0.237	1.066	0.358	0.531
57	0.764	0.729	0.471	0.056	0.160	0.384	0.471	0.272	0.419	1.144	0.721	0.781	0.091	0.082
58	0.824	0.350	0.729	0.151	1.153	0.341	0.773	0.859	0.125	1.014	1.075	0.358	1.049	1.127
59	0.937	0.902	0.574	0.004	0.056	0.263	0.980	0.997	0.919	0.298	1.066	0.971	0.894	0.583
60	0.496	0.833	0.609	0.194	0.246	0.091	0.151	0.574	0.410	0.781	0.514	1.040	1.083	0.963
61	0.108	0.617	0.393	0.220	0.013	0.557	0.609	0.298	0.255	0.859	0.082	0.945	0.471	0.134

Run Number	1) Non-road VOC control in projected residual non-attainment areas	2) Non-road VOC control in attainment areas	3) Area VOC control in projected residual NA areas	4) Area VOC control in attainment areas	5) Non-road NOx control in projected residual NA areas	6) Non-road NOx control in attainment areas	7) EGU NOx control in projected residual non-attainment areas	8) EGU NOx control in attainment areas	9) Non-EGU NOx control in projected residual NA areas	10) Non-EGU NOx control in attainment areas	11) On-road VOC control in projected residual NA areas	12) On-road VOC control in attainment areas	13) On-road NOx control in projected residual NA areas	14) On-road NOx control in attainment areas
62	0.013	0.272	0.980	0.203	0.712	0.729	0.272	0.367	1.187	0.186	0.980	0.514	0.859	0.229
63	0.686	0.928	0.203	0.212	0.591	0.419	0.902	0.099	1.014	1.187	1.118	0.177	0.695	0.522
64	0.220	0.419	0.445	0.894	1.032	0.108	0.652	1.196	0.660	0.151	1.127	0.540	0.203	1.040
65	0.246	0.436	0.807	0.289	0.047	0.988	0.255	0.557	0.332	0.712	0.384	0.816	0.393	1.135
66	0.617	0.790	1.187	1.032	0.643	0.134	0.755	0.401	0.574	0.289	0.013	0.807	0.022	0.453
67	0.298	0.937	0.669	0.928	0.436	0.289	1.049	0.781	0.747	0.401	0.781	1.161	0.030	0.056
68	0.531	0.315	0.091	0.272	0.686	0.928	1.109	0.065	0.928	0.807	0.669	0.324	0.660	0.393
69	1.127	1.109	0.281	1.127	0.678	1.135	0.574	0.988	0.160	0.134	0.393	0.609	1.075	0.065
70	0.911	0.514	0.643	0.583	0.807	0.902	0.669	0.514	0.151	1.170	0.022	0.384	0.816	0.876
71	0.315	1.101	0.453	0.298	0.367	0.738	1.014	0.617	1.006	0.868	0.004	0.738	1.161	0.678
72	0.376	0.082	0.272	0.764	0.237	0.298	0.868	0.237	0.971	0.894	1.196	0.401	0.281	0.332
73	0.272	0.635	0.030	1.153	0.168	1.075	0.212	0.436	1.075	0.505	1.083	0.496	0.609	0.945
74	1.049	0.963	0.790	1.049	0.729	0.652	0.643	0.488	0.436	0.531	1.101	1.109	0.980	0.298
75	0.367	0.738	0.013	0.315	0.954	0.004	0.635	0.384	0.868	0.082	0.807	0.686	0.505	0.894
76	0.799	0.255	0.065	0.885	0.350	0.522	1.075	0.496	1.101	1.109	0.142	0.419	1.023	0.574
77	0.807	1.040	0.332	0.617	0.039	0.781	0.341	0.030	0.712	0.790	0.945	0.626	0.514	0.272
78	0.281	0.194	0.142	0.177	1.101	0.540	0.091	1.101	0.609	0.272	0.755	0.617	0.289	0.738
79	0.384	0.954	0.099	0.635	0.574	1.058	0.047	1.170	0.488	0.988	0.073	0.799	0.868	1.075
80	0.479	0.013	0.246	0.419	0.419	0.643	0.099	0.358	0.117	1.118	0.289	0.151	0.401	0.919
81	0.574	0.186	0.902	1.135	0.376	0.911	0.626	0.168	0.479	1.058	0.462	0.194	0.324	1.153
82	0.712	0.004	0.073	0.704	0.142	0.462	0.617	1.014	0.678	0.729	0.842	1.135	0.842	0.471
83	0.643	0.281	0.704	0.669	0.065	0.047	0.479	1.161	0.022	0.548	0.635	0.894	0.298	0.842
84	1.014	0.591	0.160	0.807	0.099	0.332	1.118	0.013	0.652	0.471	0.177	0.229	0.548	0.911
85	0.540	0.151	0.764	0.660	1.196	0.117	0.073	0.315	0.738	0.902	0.410	0.660	0.712	0.591
86	1.092	0.246	0.263	0.013	1.058	0.203	0.678	0.773	0.445	0.764	0.332	0.289	0.729	1.109
87	0.988	1.187	0.082	1.014	0.859	0.367	0.263	0.833	0.281	0.117	0.471	0.142	0.773	0.686
88	0.289	0.306	0.229	1.092	0.306	0.142	0.332	0.669	0.306	1.161	1.014	0.937	0.971	1.083
89	0.332	0.263	0.358	1.040	0.514	0.600	0.384	0.255	0.669	0.013	0.505	0.099	0.643	1.187
90	0.186	0.911	1.066	0.263	0.997	0.358	0.712	0.678	0.695	1.066	1.170	0.039	0.600	0.212
91	0.505	1.066	0.047	0.824	0.902	0.255	1.178	0.660	0.177	0.022	0.902	0.531	0.306	0.514
92	0.142	0.971	0.022	0.453	0.220	0.583	0.997	0.738	0.142	0.738	0.971	0.911	0.704	0.816

Run Number	1) Non-road VOC control in projected residual non-attainment areas	2) Non-road VOC control in attainment areas	3) Area VOC control in projected residual NA areas	4) Area VOC control in attainment areas	5) Non-road NOx control in projected residual NA areas	6) Non-road NOx control in attainment areas	7) EGU NOx control in projected residual non-attainment areas	8) EGU NOx control in attainment areas	9) Non-EGU NOx control in projected residual NA areas	10) Non-EGU NOx control in attainment areas	11) On-road VOC control in projected residual NA areas	12) On-road VOC control in attainment areas	13) On-road NOx control in projected residual NA areas	14) On-road NOx control in attainment areas
93	0.194	1.006	0.186	0.988	0.669	0.039	0.522	0.350	0.367	0.436	0.885	0.427	0.807	1.161
94	0.212	0.531	1.023	0.142	0.755	1.092	0.954	0.004	0.755	0.833	0.479	0.764	0.997	0.505
95	1.118	0.980	0.488	0.125	0.816	0.125	0.393	0.125	1.092	0.704	0.868	0.220	0.272	0.151
96	0.669	0.091	0.928	0.902	0.091	0.704	0.160	0.462	0.194	1.092	1.032	0.755	0.652	0.160
97	0.548	0.609	0.850	0.168	0.963	0.168	0.376	0.609	0.073	0.125	0.315	1.127	0.065	0.263
98	0.850	0.704	0.686	0.255	0.203	0.151	0.022	1.075	0.462	0.004	0.229	0.462	0.790	0.660
99	0.445	0.626	0.540	0.047	1.178	0.747	0.850	1.153	0.799	0.142	0.833	0.160	0.945	1.170
100	0.971	0.142	1.083	0.229	0.445	0.056	0.350	0.142	0.168	0.255	0.212	0.790	0.928	0.341
101	1.144	0.721	0.194	0.488	0.790	0.755	0.056	0.876	0.686	0.583	0.367	0.980	0.013	0.980
102	0.894	1.023	0.384	0.686	0.324	0.669	0.928	0.427	0.954	0.108	0.712	0.548	0.004	1.118
103	0.755	0.125	0.868	0.850	0.704	0.013	0.824	0.747	0.272	1.040	0.047	0.065	0.212	0.937
104	0.099	0.540	0.505	1.170	0.393	0.160	0.911	0.799	0.186	0.963	0.660	0.091	0.376	0.988
105	0.125	1.135	0.747	0.108	0.488	0.686	0.246	1.118	0.816	1.178	0.894	1.006	0.047	0.358
106	0.522	0.427	0.289	0.954	0.151	0.721	0.013	0.842	1.032	0.281	0.091	0.047	0.988	0.833
107	1.109	0.047	1.196	0.721	0.540	0.919	0.142	0.704	0.263	0.419	0.729	0.505	1.006	0.617
108	1.006	1.092	0.911	0.600	1.144	0.937	0.894	0.376	0.315	0.660	0.099	1.032	0.073	0.755
109	0.902	0.168	1.170	0.427	0.125	0.220	0.419	0.686	0.358	0.816	1.109	1.187	0.151	0.997
110	1.101	0.816	0.859	0.540	1.187	1.049	0.298	0.047	0.876	0.341	1.135	0.436	0.315	0.790
111	0.022	0.859	0.462	0.350	0.281	1.187	1.144	0.445	0.833	0.315	0.376	0.073	0.747	0.281
112	1.187	1.032	0.781	0.963	1.023	0.229	0.859	0.954	1.144	1.135	0.522	0.919	0.445	0.704
113	0.704	0.488	0.548	1.196	0.212	1.127	0.065	0.652	0.885	0.427	0.125	0.272	0.436	0.315
114	0.583	0.919	0.298	0.091	1.118	0.954	0.289	0.505	0.039	0.229	0.695	0.747	0.462	1.014
115	0.341	0.030	0.565	0.186	0.868	0.885	0.565	0.764	1.109	0.609	1.144	0.876	0.557	0.376
116	0.747	0.565	0.039	0.281	1.109	0.678	0.436	0.177	0.557	0.410	0.263	0.963	1.066	1.058
117	0.436	0.842	0.988	1.118	0.894	0.574	0.410	0.868	0.980	0.453	0.039	0.833	0.117	0.609
118	0.626	1.127	0.937	0.799	1.040	1.101	0.358	0.306	0.945	1.023	0.557	1.170	0.799	0.807
119	0.462	0.410	1.092	1.187	0.824	0.393	1.127	0.471	0.013	1.032	0.799	0.954	0.142	0.488
120	0.073	1.144	0.117	0.522	0.928	0.488	0.790	0.453	0.401	0.885	0.220	0.868	0.237	1.178
121	1.040	0.764	0.660	0.237	0.626	0.514	0.945	0.928	0.065	0.911	0.850	0.013	0.350	1.092
122	0.203	0.600	0.721	0.471	0.263	0.842	0.324	1.006	1.058	0.919	0.678	0.134	0.134	0.004

Run Number	1) Non-road VOC control in projected residual non-attainment areas	2) Non-road VOC control in attainment areas	3) Area VOC control in projected residual NA areas	4) Area VOC control in attainment areas	5) Non-road NOx control in projected residual NA areas	6) Non-road NOx control in attainment areas	7) EGU NOx control in projected residual non-attainment areas	8) EGU NOx control in attainment areas	9) Non-EGU NOx control in projected residual NA areas	10) Non-EGU NOx control in attainment areas	11) On-road VOC control in projected residual NA areas	12) On-road VOC control in attainment areas	13) On-road NOx control in projected residual NA areas	14) On-road NOx control in attainment areas
123	0.954	0.039	0.963	0.980	0.194	0.548	0.738	0.565	0.729	0.065	0.652	0.186	1.135	1.066
124	0.160	1.083	0.997	0.384	0.082	0.401	0.125	0.816	1.083	0.384	0.350	0.376	0.496	0.427
125	0.980	0.479	0.212	0.358	0.980	0.695	0.764	1.023	1.118	0.799	0.065	0.488	0.332	0.047
126	0.237	1.153	0.306	0.591	0.738	0.073	0.445	0.790	0.902	1.101	0.824	0.246	1.127	0.652
127	0.255	0.212	0.496	0.479	0.609	0.635	0.695	1.058	0.030	0.350	0.108	1.178	1.092	0.557
128	0.885	1.196	0.617	0.816	0.531	0.531	0.583	0.963	0.850	0.376	0.255	0.773	0.686	0.237
129	0.997	0.807	0.350	0.496	0.298	0.246	0.548	1.144	1.178	1.049	0.298	0.712	1.014	0.410
130	0.410	1.161	1.101	0.729	0.384	0.237	0.281	0.091	0.427	0.574	0.117	0.600	0.626	0.868
131	0.729	0.755	1.109	0.548	1.083	0.324	0.108	0.540	0.988	0.755	0.445	0.108	0.963	0.246
132	1.075	0.660	0.712	0.410	0.781	0.980	1.058	0.289	0.997	0.099	0.954	0.056	1.101	0.462
133	0.963	0.686	0.773	0.755	0.600	0.868	1.135	0.807	0.548	0.686	1.023	0.583	0.099	1.196
134	0.004	0.358	0.531	0.773	0.885	1.066	1.006	1.092	0.721	1.127	0.341	1.049	0.160	0.186
135	0.393	0.453	0.341	0.082	0.635	1.196	0.988	0.324	0.203	0.522	1.161	0.341	0.125	0.695
136	0.117	0.850	0.799	0.781	1.135	0.030	0.729	0.635	1.049	0.591	0.281	0.315	0.876	0.091
137	0.177	0.445	0.151	0.747	0.427	0.799	0.186	0.919	0.894	0.030	0.453	0.885	1.040	0.117
138	0.229	0.117	0.738	0.065	0.842	0.479	0.117	0.410	0.531	0.039	0.134	1.075	0.902	0.799
139	0.652	0.868	0.522	0.436	0.747	0.445	0.194	0.056	1.127	0.212	0.194	0.669	0.056	1.101
140	0.967	1.000	1.000	0.939	0.971	0.903	1.000	0.984	0.998	0.999	0.921	1.000	0.997	1.000
141	1.000	0.929	0.931	0.989	0.961	0.999	0.958	0.957	0.970	0.921	1.000	0.987	0.945	0.938
142	0.903	0.900	0.968	0.905	0.925	0.968	0.900	0.991	0.901	0.981	0.960	0.931	0.964	0.966
143	0.950	0.985	0.906	0.997	0.997	0.947	0.980	0.901	0.945	0.954	0.932	0.900	0.998	0.973
144	0.988	0.980	0.994	0.972	0.938	0.922	0.919	0.925	0.903	0.900	0.993	0.942	0.902	0.900
145	0.942	0.998	0.902	0.904	0.905	0.992	0.929	0.977	0.987	0.931	0.970	0.958	0.917	0.916
146	1.000	0.965	0.949	0.944	0.915	0.984	0.943	0.911	0.930	0.976	0.900	0.919	0.929	0.997
147	0.918	0.941	0.982	0.985	1.000	0.915	0.946	1.000	0.938	0.961	0.992	0.996	0.957	0.907
148	0.900	0.910	0.946	0.924	0.982	0.933	0.909	0.927	0.985	0.997	0.948	0.991	0.988	0.950
149	0.979	0.900	1.000	1.000	0.954	0.979	0.986	1.000	0.958	0.908	0.906	0.922	0.904	0.983
150	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

APPENDIX B:

DESIGN 2

Run Number	1) Non-road VOC control	2) Area VOC control	3) Non-road NOx control	4) EGU NOx control	5) Non-EGU NOx control	6) On-road VOC control	7) On-road NOx control
	X1	X2	X3	X4	X5	X6	X7
1	0.1457	0.9857	0.9343	1.0543	1.0714	0.7800	0.1114
2	0.9171	0.5571	0.7457	0.5571	0.0600	0.8143	1.1571
3	0.1971	0.8314	0.5914	0.8486	0.0257	1.1057	0.2314
4	1.0543	1.1400	1.0543	0.3686	0.0943	0.1114	0.4200
5	1.1229	1.0543	0.0600	0.6429	1.1057	0.5914	0.4543
6	0.8486	0.0943	0.6257	1.0371	0.6429	0.0943	0.9686
7	0.5914	1.0886	0.5571	0.1971	0.9857	1.0029	0.9171
8	0.7457	0.3343	0.7629	0.1114	1.0886	1.0886	0.8829
9	0.1114	0.6943	0.4029	0.0943	0.0771	0.6086	1.0029
10	0.0600	1.0714	0.8143	0.7800	0.6257	0.3343	0.5571
11	0.4714	0.7971	0.4543	0.5914	0.3857	0.0086	0.8657
12	1.0886	0.8829	0.6943	0.0771	0.9343	0.4371	0.0257
13	1.1400	0.1114	0.5057	0.7457	0.1629	1.1229	0.6429
14	0.7800	0.8143	0.3171	0.3857	1.1571	0.5229	1.1229
15	1.1914	0.4543	0.2143	0.4543	0.6086	0.7457	0.8486
16	0.5057	0.4714	0.7971	0.9857	0.9171	1.1914	1.0543
17	0.6429	0.7457	0.9000	0.6771	0.2314	0.0771	0.2657
18	0.8143	0.4200	0.8657	0.8829	0.4029	1.0200	0.0086
19	0.5400	0.8657	0.0086	0.5400	0.5743	0.1629	0.1457
20	0.6086	0.1629	0.3857	0.0086	0.7629	0.7629	0.7286
21	0.6600	0.6429	1.0200	0.2657	0.8486	1.1400	0.8143
22	0.0429	0.5057	0.6429	0.4200	0.1971	0.9171	0.0943
23	0.8657	0.7114	1.0886	0.4714	1.0200	0.3000	0.3686
24	0.3857	1.0029	0.4200	0.3514	0.4714	1.0714	1.1914
25	0.3686	0.5400	1.0371	0.7629	1.1914	0.6600	0.9514
26	0.9857	0.0429	0.2657	0.2486	0.4200	0.3171	0.1800
27	0.3171	0.6086	1.1743	0.1457	0.1286	0.9686	0.1629
28	0.4543	1.1057	0.3000	0.4886	0.2486	0.6771	0.0429
29	0.4371	0.6257	0.6771	0.9171	1.0543	0.1800	0.5057
30	0.9514	0.9171	1.1400	0.8143	1.1400	0.2143	0.7457
31	0.1286	1.1571	0.7114	0.6086	0.5229	1.1571	0.3171
32	0.6257	0.3686	0.1800	0.7286	0.5057	0.5057	0.0771
33	0.9000	1.1743	0.5229	0.9000	0.7800	0.5743	0.1286
34	0.7971	0.4886	0.9686	0.6257	0.0086	0.3514	0.7114
35	0.6943	1.0200	0.1457	1.1743	0.1457	0.2829	1.0200
36	0.5743	0.6771	0.0771	0.8657	0.3000	0.3857	1.1743
37	0.2314	0.2829	0.4886	0.2143	1.1743	0.3686	0.4371
38	0.3514	0.0257	0.7286	1.1571	0.2657	0.5571	0.6086
39	0.0943	0.3857	0.5400	0.3171	0.3171	0.1457	0.7629
40	0.1800	0.5914	0.1286	0.4029	0.7457	0.0429	0.6257
41	0.5229	1.1914	0.9171	0.1629	0.4371	0.6257	0.6600
42	1.1743	0.8486	0.8314	0.2314	0.2829	0.8657	0.9857
43	0.2486	0.9000	1.0029	0.9686	0.1800	0.7286	0.3343
44	0.3000	1.0371	0.6086	0.5229	0.8829	0.4886	0.6771
45	0.4886	0.1286	0.1629	0.2829	1.1229	0.9514	0.3000
46	0.8829	0.9514	0.2314	0.0257	0.3343	1.1743	0.5743
47	0.4200	0.4029	1.1057	0.0600	0.6600	0.8314	0.2486
48	0.2143	0.0771	0.8829	0.0429	0.8314	0.1971	1.1400

Run Number	1) Non-road VOC control	2) Area VOC control	3) Non-road NOx control	4) EGU NOx control	5) Non-EGU NOx control	6) On-road VOC control	7) On-road NOx control
49	1.1057	0.2657	0.9514	0.5057	0.7286	1.0371	1.0371
50	0.9343	0.1800	0.9857	0.1286	0.5400	0.0257	0.4886
51	0.2657	0.0086	0.1114	0.7114	1.0371	0.8486	0.8314
52	0.6771	0.2314	0.6600	0.7971	0.3686	0.7971	0.3857
53	0.9686	0.3514	0.4371	1.1914	0.8657	0.8829	0.3514
54	0.7629	1.1229	0.0257	1.0029	0.7114	0.9000	0.7800
55	0.3343	0.3171	0.2486	0.8314	0.9686	0.0600	1.1057
56	0.0257	0.2486	1.1229	0.9514	0.4543	0.5400	0.9000
57	0.8314	0.2143	0.0943	0.3343	0.9000	0.6429	0.2143
58	0.2829	0.7629	0.7800	0.3000	0.6943	0.2486	0.0600
59	0.7114	0.0600	1.1571	0.5743	0.9514	0.7114	0.5229
60	0.7286	0.5743	0.4714	1.0714	0.5914	0.4714	0.2829
61	0.4029	0.1971	0.8486	1.1057	0.1114	0.4200	0.7971
62	0.0771	0.7800	0.1971	1.0886	0.8143	1.0543	0.4714
63	0.5571	0.3000	0.3343	1.0200	0.0429	0.2657	0.5914
64	1.0200	0.6600	0.5743	1.1229	0.4886	0.6943	1.0886
65	1.0371	0.4371	0.0429	0.1800	0.2143	0.2314	0.5400
66	1.0714	0.7286	0.2829	0.9343	0.5571	0.9343	0.6943
67	0.1629	0.1457	1.0714	0.6600	0.3514	0.4543	1.0714
68	1.1571	0.5229	0.3686	1.1400	1.0029	0.1286	0.1971
69	0.0086	0.9343	0.3514	0.6943	0.6771	0.9857	0.4029
70	1.0029	0.9686	1.1914	0.4371	0.7971	0.4029	0.9343
71	0.9870	1.0000	0.9731	0.9462	1.0000	0.9705	1.0000
72	0.9161	0.9297	0.9124	1.0000	0.9521	0.9280	0.9491
73	0.9499	0.9795	1.0000	0.9000	0.9041	0.9910	0.9000
74	1.0000	0.9061	0.9433	0.9024	0.9373	0.9015	0.9883
75	0.9018	0.9644	0.9016	0.9892	0.9698	1.0000	0.9994
76	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
77	0.2624	1.1119	1.1414	0.5582	0.1607	0.2929	1.0786
78	0.3980	0.8339	0.0810	0.7436	0.0302	0.0702	0.5686
79	0.6874	0.6558	0.1612	0.9020	0.7995	0.3805	0.1405
80	0.0144	0.5696	0.4079	0.6799	0.5499	0.5289	0.6173
81	0.9823	0.2452	1.0397	0.2585	0.4282	0.7168	0.4498
82	0.9238	0.8911	0.8784	1.0619	0.7045	0.7697	0.8874
83	0.1430	0.1059	0.5183	0.2362	1.0410	1.0508	1.0918
84	1.1662	0.1922	0.6775	0.3614	0.8649	0.2018	0.2532
85	0.5748	0.3777	0.2832	1.1544	1.1360	1.1659	0.8347
86	0.7753	1.0286	0.7773	0.0479	0.2927	0.8543	0.1010

APPENDIX C:

DESIGN 3

Run Number	1) Non-road VOC control in projected residual non-attainment areas	2) Non-road VOC control in attainment areas	3) Area VOC control in projected residual NA areas	4) Area VOC control in attainment areas	5) Non-road NOx control in projected residual NA areas	6) Non-road NOx control in attainment areas	7) EGU NOx control in projected residual non-attainment areas	8) EGU NOx control in attainment areas	9) Non-EGU NOx control in projected residual NA areas	10) Non-EGU NOx control in attainment areas	11) On-road VOC control in projected residual NA areas	12) On-road VOC control in attainment areas	13) On-road NOx control in projected residual NA areas	14) On-road NOx control in attainment areas
	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1.000	0.616	0.688	0.051	0.809	0.847	0.647	0.619	0.154	1.141	0.518	0.004	0.606	0.268
3	0.086	0.307	0.388	0.656	0.080	0.877	0.897	1.141	0.816	0.409	0.699	0.040	0.750	0.814
4	0.158	0.051	0.631	0.846	0.669	0.081	0.522	1.190	0.706	0.728	0.303	0.928	0.059	0.853
5	0.420	0.033	1.187	0.069	0.597	0.517	0.217	0.719	0.842	0.642	0.602	0.184	0.906	0.703
6	0.322	0.937	1.069	0.776	0.940	0.672	0.905	0.498	1.033	0.827	1.180	0.712	0.038	0.184
7	0.831	0.454	1.117	1.185	0.475	0.972	0.962	0.657	0.203	0.276	0.907	1.042	0.008	0.794
8	0.285	0.187	0.275	0.490	0.164	0.234	0.612	1.061	0.117	0.752	0.629	1.066	0.186	0.009
9	0.814	0.215	0.959	0.675	0.088	0.504	0.740	0.755	0.692	1.034	0.739	0.917	1.090	0.684
10	0.342	1.047	1.089	0.392	0.128	0.048	0.531	1.073	0.174	0.109	0.142	1.194	0.228	0.647
11	0.644	0.345	0.189	0.621	1.123	0.825	0.600	0.525	1.029	0.067	0.352	0.338	0.568	0.013
12	0.297	1.086	0.107	0.040	0.391	0.330	0.229	0.277	1.168	1.086	0.779	0.268	0.815	0.062
13	0.126	0.959	0.507	0.459	0.044	1.001	1.076	0.445	0.611	1.001	0.820	0.520	0.669	0.168
14	0.176	0.655	0.397	0.246	0.583	1.102	0.920	1.126	0.141	0.208	0.633	0.156	0.595	0.162
15	0.004	0.792	1.018	0.064	1.106	1.087	1.161	0.484	0.832	0.405	0.917	0.318	0.703	0.119
16	0.144	0.390	0.877	0.013	0.369	0.560	1.196	0.390	1.090	0.772	0.282	0.365	1.159	0.520
17	0.247	0.095	0.418	0.693	0.951	0.430	0.189	0.472	0.960	1.186	1.056	0.055	0.650	0.675
18	0.676	0.174	0.584	0.239	0.524	1.122	0.352	0.751	0.398	0.359	0.968	0.690	1.115	1.091
19	0.109	0.639	0.353	0.571	0.134	0.125	1.125	0.307	1.063	0.582	0.197	0.622	1.136	0.923
20	0.350	0.398	1.162	0.545	0.106	0.942	0.036	0.169	1.052	0.292	0.025	0.730	1.069	0.652
21	0.363	1.094	0.457	0.505	0.738	0.839	0.420	0.714	0.776	1.159	0.059	1.077	0.763	0.909
22	0.633	0.551	0.239	0.700	0.200	0.474	0.304	0.418	0.454	1.078	1.122	0.931	0.477	0.742
23	1.068	0.361	1.169	1.058	1.021	0.914	1.037	0.827	0.483	0.835	0.954	0.577	0.546	0.307
24	0.527	0.580	1.033	0.890	0.026	0.038	0.940	1.013	0.583	0.922	0.149	0.409	0.718	0.480
25	0.599	0.770	0.453	0.931	0.053	0.071	0.797	0.319	0.900	0.915	0.649	0.538	0.094	0.281
26	0.165	0.258	0.675	0.287	1.114	0.608	0.651	0.428	0.309	0.933	1.152	0.496	0.532	0.067
27	0.193	0.204	0.982	0.181	0.397	0.310	0.402	0.408	0.386	0.421	0.278	0.651	0.955	0.989
28	0.215	0.628	0.861	0.916	0.233	0.884	1.099	0.997	0.428	0.324	0.098	0.419	0.470	0.731
29	0.334	1.137	0.408	0.194	0.825	0.201	0.383	0.842	0.347	0.005	0.481	0.331	1.084	1.101
30	0.038	0.848	0.073	1.049	0.145	0.030	0.921	0.198	0.240	0.375	0.754	1.034	1.167	0.132

Run Number	1) Non-road VOC control in projected residual non-attainment areas	2) Non-road VOC control in attainment areas	3) Area VOC control in projected residual NA areas	4) Area VOC control in attainment areas	5) Non-road NOx control in projected residual NA areas	6) Non-road NOx control in attainment areas	7) EGU NOx control in projected residual non-attainment areas	8) EGU NOx control in attainment areas	9) Non-EGU NOx control in projected residual NA areas	10) Non-EGU NOx control in attainment areas	11) On-road VOC control in projected residual NA areas	12) On-road VOC control in attainment areas	13) On-road NOx control in projected residual NA areas	14) On-road NOx control in attainment areas
31	0.053	0.871	0.658	0.880	1.188	0.354	0.815	1.094	0.180	0.477	0.236	1.125	0.429	0.219
32	0.363	1.124	0.839	0.401	0.863	0.788	0.309	1.049	1.105	1.009	0.047	0.298	0.555	0.998
33	0.709	0.081	0.171	0.963	0.319	0.405	0.290	0.777	0.603	0.877	1.137	1.142	0.808	0.153
34	0.445	0.233	0.033	0.097	1.143	1.166	0.975	1.171	1.126	0.811	0.191	0.881	1.196	0.344
35	1.034	0.421	1.198	0.601	0.769	1.025	1.184	0.266	0.101	0.980	0.876	0.307	0.677	0.373
36	0.754	0.682	1.177	0.339	0.351	0.716	0.836	0.001	0.340	0.028	1.132	0.159	0.497	0.351
37	0.469	0.879	0.974	0.586	0.774	0.373	0.763	0.016	0.868	0.101	0.871	0.774	0.919	0.971
38	0.494	1.194	0.871	1.074	1.092	0.173	1.132	0.100	0.937	0.713	0.555	0.960	0.311	0.966
39	0.764	0.780	0.496	0.814	0.655	0.926	0.271	0.808	1.179	0.885	0.792	1.081	0.280	0.319
40	0.884	0.473	0.340	0.930	0.787	0.543	0.249	0.872	0.716	0.798	0.717	0.377	0.249	0.616
41	0.679	0.087	1.114	0.901	0.892	0.761	0.430	0.612	1.081	0.538	0.708	0.749	0.111	0.725
42	1.088	0.529	0.648	0.634	0.438	0.186	0.007	1.033	0.757	0.383	1.159	0.142	0.411	0.247
43	0.488	0.414	0.773	0.648	0.563	1.008	0.784	0.205	0.640	0.781	0.977	0.803	0.972	0.201
44	0.534	0.068	0.184	0.110	0.676	0.021	0.042	0.597	0.224	0.437	0.507	0.390	0.900	0.771
45	0.068	0.105	0.741	0.954	1.197	0.719	0.142	0.293	0.416	0.755	0.396	1.100	0.509	0.079
46	0.576	0.536	0.666	1.106	0.011	0.249	0.498	1.174	0.540	0.506	0.432	0.201	1.184	0.459
47	1.184	0.276	0.817	0.025	0.190	1.138	1.152	0.650	1.159	0.142	0.808	0.236	0.865	0.820
48	0.548	0.714	0.729	1.090	1.159	0.098	0.236	0.216	0.069	1.127	0.159	1.171	0.765	0.773
49	1.013	0.826	0.227	1.134	0.747	1.195	0.380	0.537	0.825	1.048	0.569	0.132	1.037	0.212
50	0.609	0.331	1.105	0.501	0.539	0.270	0.463	0.984	0.060	0.526	1.060	0.463	0.260	0.623
51	1.140	0.231	0.828	0.996	0.036	0.002	0.709	0.236	0.127	0.135	0.319	0.288	0.833	1.080
52	0.209	1.156	0.946	0.803	0.708	0.338	0.280	0.229	0.987	1.031	0.691	0.472	0.419	0.385
53	0.640	0.719	0.588	0.082	1.086	0.579	0.485	0.152	1.111	0.555	0.532	0.830	0.775	0.895
54	0.977	0.567	0.611	0.831	0.930	0.953	0.504	0.829	0.280	0.588	0.401	0.754	0.196	0.431
55	0.806	0.751	0.699	0.578	0.060	0.268	0.847	0.489	0.499	1.197	0.548	0.980	0.036	1.172
56	0.705	0.662	0.011	0.534	0.692	0.597	0.892	0.127	0.243	0.244	0.314	0.411	0.615	0.105
57	0.790	0.841	1.056	0.372	0.342	0.063	0.864	1.022	0.663	0.117	0.270	0.111	0.274	0.638
58	0.948	0.864	0.100	0.454	0.230	1.055	1.084	0.965	0.554	0.258	1.183	0.393	0.356	0.879
59	0.995	0.005	0.913	0.729	0.796	0.291	0.867	0.540	0.372	1.119	0.354	0.291	1.044	0.934
60	0.375	0.379	0.087	1.115	0.644	0.397	0.202	0.901	1.010	0.602	1.045	0.271	0.794	0.785
61	0.798	0.644	0.782	0.910	0.415	0.769	0.807	0.566	0.162	0.174	0.818	0.821	1.145	1.021

Run Number	1) Non-road VOC control in projected residual non-attainment areas	2) Non-road VOC control in attainment areas	3) Area VOC control in projected residual NA areas	4) Area VOC control in attainment areas	5) Non-road NOx control in projected residual NA areas	6) Non-road NOx control in attainment areas	7) EGU NOx control in projected residual non-attainment areas	8) EGU NOx control in attainment areas	9) Non-EGU NOx control in projected residual NA areas	10) Non-EGU NOx control in attainment areas	11) On-road VOC control in projected residual NA areas	12) On-road VOC control in attainment areas	13) On-road NOx control in projected residual NA areas	14) On-road NOx control in attainment areas
62	0.116	1.005	0.308	0.170	0.179	1.145	0.618	0.394	0.420	0.436	0.371	0.992	0.490	0.983
63	0.896	1.002	0.117	1.031	0.840	1.040	0.703	0.730	0.079	0.489	0.782	0.886	0.162	1.076
64	0.910	0.698	0.934	0.375	0.633	0.642	0.318	0.259	1.145	0.516	0.965	0.998	0.455	0.426
65	1.145	0.904	0.280	0.446	0.568	0.133	0.252	1.118	0.913	0.453	0.223	0.952	0.051	0.470
66	0.079	0.044	0.566	1.020	1.048	0.190	0.693	0.189	0.275	1.022	0.208	0.125	0.980	0.562
67	0.264	0.570	0.159	0.789	0.876	0.368	0.171	0.045	0.512	0.679	0.838	1.111	0.069	0.274
68	1.110	0.462	1.087	1.138	0.811	0.526	0.106	0.146	0.887	0.678	0.182	1.025	0.290	0.874
69	1.074	0.486	0.019	0.764	0.285	0.963	0.081	0.053	0.306	1.181	0.109	0.948	0.868	1.132
70	0.177	0.242	0.422	0.326	0.920	0.937	0.880	0.065	0.676	0.899	1.084	1.055	0.683	0.608
71	1.164	0.165	0.217	0.271	0.462	1.074	0.734	0.690	0.929	0.807	0.923	0.349	0.585	0.371
72	0.615	0.944	0.265	0.668	0.761	0.382	0.117	0.341	1.186	0.624	1.097	0.634	0.711	0.233
73	0.871	0.401	0.198	0.295	1.148	0.792	0.664	0.921	0.525	0.909	1.023	0.258	0.690	0.545
74	0.594	1.068	0.601	0.418	0.607	0.018	1.006	0.079	0.879	0.220	0.856	0.432	0.374	1.065
75	0.975	0.974	0.152	0.632	0.435	0.464	1.090	0.926	0.211	0.742	0.995	0.227	1.128	1.164
76	1.161	1.187	0.889	0.310	0.847	0.739	1.050	0.970	0.458	0.344	0.682	0.058	0.562	0.393
77	1.093	0.602	0.929	0.752	0.359	0.554	0.052	0.037	0.685	0.352	0.259	0.541	0.369	0.040
78	0.390	0.900	0.438	0.153	0.899	0.418	1.167	1.086	0.560	0.788	0.661	0.628	0.963	1.192
79	1.049	1.056	0.708	0.120	0.212	0.443	0.470	1.031	0.627	1.165	0.243	0.723	0.318	0.485
80	1.127	0.148	0.477	0.797	0.960	1.047	0.555	0.953	0.330	0.463	0.864	1.013	0.405	1.125
81	1.054	0.742	0.252	0.301	0.620	0.773	0.264	0.371	0.738	0.718	0.836	0.604	1.175	0.538
82	0.740	0.182	0.433	0.685	1.005	0.321	0.326	0.070	0.026	1.058	0.045	0.078	0.595	0.260
83	0.659	0.341	0.523	0.470	0.469	0.157	0.165	0.334	0.803	1.148	0.898	0.608	0.945	0.454
84	0.746	1.100	1.133	0.867	0.630	0.532	0.991	0.381	0.052	0.966	0.134	0.899	0.140	0.440
85	0.102	1.174	1.044	0.992	1.133	0.640	0.064	1.196	0.438	0.027	0.567	0.017	0.630	0.503
86	0.841	1.113	0.569	1.199	0.156	1.173	1.135	0.116	0.088	0.224	0.501	0.662	0.929	0.954
87	0.305	1.015	0.324	0.258	0.905	0.450	0.977	0.185	0.800	0.866	1.114	0.844	0.262	0.713
88	0.666	0.024	1.032	0.390	0.328	0.978	1.064	0.568	0.400	0.306	0.938	0.767	0.022	0.919
89	0.203	0.949	0.797	0.715	1.077	0.993	0.359	1.109	0.261	0.955	1.196	0.188	0.739	0.758
90	0.459	0.481	0.957	0.985	0.500	0.481	1.021	0.677	0.907	0.039	0.442	0.817	0.082	0.406
91	0.228	0.544	0.695	0.856	0.999	0.589	0.561	1.162	1.074	0.013	0.582	0.480	0.240	0.856
92	0.026	0.155	0.047	1.122	0.453	0.896	0.438	0.936	0.466	0.653	1.009	0.684	1.076	0.142

Run Number	1) Non-road VOC control in projected residual non-attainment areas	2) Non-road VOC control in attainment areas	3) Area VOC control in projected residual NA areas	4) Area VOC control in attainment areas	5) Non-road NOx control in projected residual NA areas	6) Non-road NOx control in attainment areas	7) EGU NOx control in projected residual non-attainment areas	8) EGU NOx control in attainment areas	9) Non-EGU NOx control in projected residual NA areas	10) Non-EGU NOx control in attainment areas	11) On-road VOC control in projected residual NA areas	12) On-road VOC control in attainment areas	13) On-road NOx control in projected residual NA areas	14) On-road NOx control in attainment areas
93	1.180	0.132	0.296	0.515	0.007	1.129	0.133	0.348	0.768	0.474	0.124	0.448	0.214	0.750
94	0.728	0.503	0.043	1.063	0.290	0.866	1.115	0.091	0.970	0.393	0.293	0.249	1.119	0.332
95	0.776	0.439	0.146	0.205	0.936	0.491	0.680	0.242	0.949	0.608	0.374	0.029	0.852	0.831
96	0.955	0.127	0.997	0.140	0.971	0.285	0.625	0.579	0.001	0.081	0.006	0.117	0.782	1.033
97	0.276	0.018	0.761	0.197	0.244	0.298	0.954	0.667	0.981	1.107	0.419	0.027	0.128	0.694
98	1.032	0.291	0.849	0.741	0.259	0.142	0.754	0.106	0.722	0.368	0.337	1.151	0.391	0.230
99	0.724	1.076	0.063	0.973	0.311	1.162	0.678	0.362	0.943	0.706	0.521	1.190	0.446	0.501
100	0.921	0.282	0.902	1.149	0.484	0.621	0.152	1.103	0.999	0.942	0.037	0.557	0.640	1.056
101	0.455	0.317	0.826	0.850	0.595	0.091	0.208	0.504	0.789	0.670	0.078	0.567	0.299	1.136
102	0.308	0.833	0.638	0.030	1.028	0.117	0.845	0.878	1.048	1.092	0.677	0.659	1.004	0.554
103	0.935	0.990	0.995	0.427	1.061	0.858	0.546	1.053	0.534	0.616	0.010	0.787	0.347	0.944
104	0.058	0.212	1.144	1.174	0.423	0.664	0.186	0.817	0.618	0.331	0.997	1.161	1.025	1.049
105	0.825	0.922	0.379	0.820	0.831	0.687	0.717	0.638	0.252	0.265	1.078	0.704	0.168	0.587
106	0.018	0.785	0.300	0.723	0.374	0.205	0.072	0.159	0.222	0.860	0.229	0.168	0.823	0.310
107	0.553	1.029	0.800	0.359	1.168	0.163	0.418	0.281	0.728	0.126	0.170	1.091	1.056	0.525
108	0.583	0.519	0.768	0.549	0.552	1.095	0.475	0.705	0.375	0.570	0.659	1.017	1.098	0.020
109	1.123	0.306	0.547	0.227	1.054	0.728	1.029	0.588	0.029	0.990	0.892	0.092	0.459	1.024
110	0.879	0.884	0.489	0.091	0.507	0.747	0.776	0.990	0.297	0.649	1.029	0.848	0.120	0.294
111	0.239	0.586	0.531	0.127	0.734	1.182	0.453	0.686	0.108	0.186	0.115	0.097	1.016	1.008
112	0.475	1.132	1.149	0.948	1.180	0.571	0.367	0.740	0.509	0.693	0.772	0.856	1.009	0.101
113	1.192	0.917	0.555	1.006	0.102	0.222	1.174	0.026	0.590	0.975	0.389	0.791	0.178	0.574
114	0.863	0.064	0.207	0.317	0.406	0.494	0.586	1.146	0.745	0.152	0.487	1.127	0.525	0.050
115	0.507	0.734	0.129	1.084	0.683	0.689	0.339	0.904	0.046	0.198	0.726	0.218	0.085	1.116
116	0.964	0.369	1.077	0.434	0.304	0.223	0.819	0.890	1.118	0.166	0.617	0.742	0.732	0.410
117	0.256	1.168	0.250	0.268	0.175	0.352	0.584	0.784	0.572	0.054	0.333	0.489	0.936	1.189
118	0.399	0.755	0.468	0.564	0.264	0.109	0.013	0.855	1.017	0.233	0.071	0.677	0.388	1.155
119	0.512	0.690	0.512	0.611	0.114	0.700	0.574	0.768	0.645	0.845	1.098	0.508	0.336	0.603

Run Number	1) Non-road VOC control in projected residual non-attainment areas	2) Non-road VOC control in attainment areas	3) Area VOC control in projected residual NA areas	4) Area VOC control in attainment areas	5) Non-road NOx control in projected residual NA areas	6) Non-road NOx control in attainment areas	7) EGU NOx control in projected residual non-attainment areas	8) EGU NOx control in attainment areas	9) Non-EGU NOx control in projected residual NA areas	10) Non-EGU NOx control in attainment areas	11) On-road VOC control in projected residual NA areas	12) On-road VOC control in attainment areas	13) On-road NOx control in projected residual NA areas	14) On-road NOx control in attainment areas
120	0.406	1.150	0.367	1.034	0.983	0.804	0.635	0.133	0.850	0.854	0.610	1.176	0.210	0.842
121	0.917	0.118	0.909	0.009	0.868	1.115	0.022	0.624	0.131	0.311	0.455	0.210	0.843	1.153
122	0.560	0.810	0.331	0.477	0.275	0.630	1.002	0.518	0.657	0.091	0.411	0.970	0.155	0.130
123	0.412	0.673	1.005	0.350	1.035	1.062	0.094	0.943	0.324	0.057	0.090	0.870	0.656	0.189
124	1.101	0.265	0.076	1.166	0.991	0.654	0.397	0.423	1.197	0.559	0.747	0.905	0.518	0.668
125	0.855	0.613	0.134	0.523	0.071	0.424	1.060	0.451	0.493	0.502	0.469	0.530	0.018	0.803
126	0.689	0.801	0.001	0.133	0.512	0.905	0.744	0.465	0.191	0.190	0.941	0.572	0.987	0.031
127	0.036	0.980	0.719	0.161	0.215	0.259	0.930	0.861	1.140	1.112	1.165	0.361	0.887	0.585
128	0.428	0.502	0.745	0.761	0.706	0.813	0.091	0.306	0.355	0.286	0.459	0.442	0.879	0.090
129	1.015	1.040	0.618	0.223	0.544	1.021	0.130	0.796	0.859	0.548	0.587	0.068	0.330	0.360
130	0.136	0.431	0.361	1.160	0.720	0.830	0.518	0.550	0.016	1.069	1.041	0.593	0.134	0.889
131	0.987	0.900	0.909	0.984	0.968	0.995	0.919	0.975	0.962	0.947	0.991	0.905	0.926	0.941
132	0.945	0.971	0.940	0.955	0.950	0.931	0.965	0.902	0.955	0.909	0.966	0.966	0.941	0.988
133	0.972	0.913	0.964	0.992	0.981	0.982	0.946	0.927	0.906	0.991	0.909	0.955	0.934	0.979
134	0.994	0.954	0.926	0.903	0.922	0.975	0.904	0.994	0.988	0.911	0.975	0.997	0.919	0.930
135	0.932	0.966	0.977	0.919	0.977	0.946	0.995	0.937	0.910	0.959	0.914	0.915	0.991	0.958
136	0.956	0.997	0.918	0.937	0.939	0.908	0.959	0.958	0.921	0.977	0.953	0.938	0.950	0.917
137	0.968	0.946	0.954	0.920	0.946	0.922	0.931	0.943	0.973	0.988	0.982	0.983	0.903	0.929
138	0.929	0.989	0.981	0.974	0.919	0.959	0.982	0.913	0.941	0.940	0.944	0.946	0.963	0.963
139	0.904	0.938	0.941	0.946	0.900	0.912	0.971	0.961	0.997	0.965	0.931	0.978	0.974	0.997
140	0.916	0.926	0.997	0.969	0.993	0.964	0.927	0.987	0.932	0.927	0.921	0.930	0.986	0.906
141	0.218	1.119	1.137	1.104	0.234	0.237	1.063	0.749	0.948	0.744	0.675	0.823	0.820	0.987
142	1.117	0.839	0.155	0.724	1.192	0.324	1.135	1.190	0.672	0.998	0.031	1.039	1.010	0.055
143	0.740	0.457	0.742	0.387	0.686	0.387	0.331	0.917	0.748	0.536	0.948	1.126	0.088	0.674
144	0.663	0.881	0.098	0.247	0.348	1.025	0.199	0.518	0.387	0.644	0.235	0.956	0.373	1.198
145	0.409	0.237	0.385	0.229	0.930	1.096	0.682	0.104	1.012	0.873	0.972	0.012	0.596	0.936
146	0.590	0.028	1.048	0.085	1.071	0.538	0.064	0.400	0.010	0.432	1.186	0.602	0.217	0.387
147	0.075	0.518	0.250	0.679	0.486	0.814	0.829	1.074	1.098	0.255	0.415	0.572	0.617	0.514
148	0.972	1.049	0.909	1.079	0.057	0.095	0.364	0.215	0.554	0.190	0.788	0.132	1.095	0.837
149	0.883	0.303	0.616	0.909	0.727	0.950	0.499	0.671	0.135	1.138	0.351	0.475	0.858	0.228
150	0.329	0.681	0.563	0.494	0.409	0.643	0.924	0.279	0.246	0.035	0.540	0.292	0.249	0.244