Table 8

Predicted Change in Total Hydrocarbon Emissions for Fuel Mixtures in Vehicle Tank

Transition from:	Terminal Tank Heel	Vehicle 1 Predicted change for each turnover (percent)				Vehicle 2 Predicted change for each turnover (percent)				Average Change During Transition
0 to 5.7 vol%	10%	3.70	0.53	-0.15	-0.33	2.58	0.25	-0.22	-0.35	0.75%
	25%	4.36	0.99	0.05	-0.25	3.33	0.65	-0.07	-0.29	1.10%
	50%	5.53	2.21	0.87	0.23	4.69	1.85	0.69	0.14	2.03%
0 to 7.7 vol%	10%	4.14	0.73	-0.30	-0.46	3.04	0.07	-0.37	-0.48	0.80%
	25%	4.65	1.11	-0.13	-0.40	3.63	0.40	-0.23	-0.43	1.08%
	50%	5.53	2.07	0.55	0.01	4.66	1.36	0.40	-0.07	1.81%
0 to 10 vol%	10%	4.68	1.08	0.22	0.01	3.09	0.69	0.12	-0.02	1.23%
	25%	4.77	1.06	0.18	-0.01	3.17	0.66	0.09	-0.03	1.24%
	50%	5.05	1.19	0.16	-0.07	3.48	0.75	0.05	-0.09	1.32%
5.7 to 7.7 vol% (H)	10%	-0.83	-0.76	-0.59	-0.54	-1.08	-0.69	-0.57	-0.53	-0.70%
(Sulfur 20 to 14)	25%	-0.98	-0.90	-0.66	-0.56	-1.26	-0.82	-0.62	-0.55	-0.79%
	50%	-1.20	-1.23	-0.93	-0.74	-1.55	-1.16	-0.88	-0.71	-1.05%
5.7 to 7.7 vol% (L)	10%	-0.54	-0.61	-0.50	-0.47	-0.82	-0.57	-0.49	-0.47	-0.56%
(Sulfur 14 to 12)	25%	-0.66	-0.72	-0.55	-0.49	-0.97	-0.67	-0.53	-0.48	-0.63%
	50%	-0.86	-0.98	-0.76	-0.62	-1.22	-0.93	-0.72	-0.60	-0.84%
5.7 to 10 vol%	10%	-0.61	-0.32	-0.14	-0.08	-0.61	-0.26	-0.12	-0.08	-0.28%
	25%	-1.03	-0.69	-0.32	-0.15	-1.11	-0.60	-0.26	-0.13	-0.54%
	50%	-1.71	-1.57	-1.01	-0.58	-1.93	-1.49	-0.91	-0.52	-1.22%
7.7 to 10 vol%	10%	-0.60	-0.30	-0.14	-0.08	-0.57	-0.24	-0.11	-0.08	-0.27%
	25%	-0.93	-0.61	-0.29	-0.14	-0.98	-0.53	-0.24	-0.12	-0.48%
	50%	-1.45	-1.31	-0.86	-0.51	-1.60	-1.25	-0.78	-0.46	-1.03%
7.7 to 5.7 vol% (L)	10%	-0.27	0.12	0.03	0.00	-0.19	0.08	0.02	0.00	-0.03%
(Sulfur 12 to 14)	25%	-0.14	0.23	0.08	0.02	-0.03	0.18	0.06	0.01	0.05%
	50%	0.09	0.50	0.28	0.14	0.24	0.45	0.24	0.12	0.26%
7.7 to 5.7 vol% (H)	10%	-0.59	-0.25	-0.35	-0.38	-0.54	-0.29	-0.36	-0.38	-0.39%
(Sulfur 14 to 20)	25%	-0.42	-0.13	-0.29	-0.36	-0.34	-0.18	-0.32	-0.36	-0.30%
	50%	-0.13	0.19	-0.07	-0.22	0.00	0.13	-0.11	-0.24	-0.06%
10 to 5.7 vol%	10%	-0.32	-0.37	-0.27	-0.36	-0.18	-0.08	-0.31	-0.37	-0.24%
	25%	0.05	-0.07	-0.13	-0.30	0.26	0.19	-0.19	-0.33	-0.07%
	50%	0.68	0.66	0.41	0.03	1.00	0.92	0.31	-0.03	0.50%
10 to 7.7 vol%	10%	-0.35	-0.27	-0.45	-0.50	-0.40	-0.34	-0.47	-0.51	-0.41%
	25%	-0.15	-0.11	-0.38	-0.47	-0.15	-0.20	-0.41	-0.49	-0.30%
	50%	0.21	0.30	-0.08	-0.30	0.27	0.21	-0.14	-0.33	0.02%
5.7 to 0 vol%	10%	3.34	1.51	0.37	0.04	1.71	0.57	0.09	-0.03	0.95%
	25%	2.71	1.03	0.15	-0.04	1.02	0.15	-0.08	-0.09	0.61%
	50%	1.75	-0.06	-0.65	-0.55	-0.01	-0.88	-0.82	-0.55	-0.22%
7.7 to 0 vol%	10%	4.35	1.98	0.50	0.07	2.45	0.81	0.16	-0.02	1.29%
	25%	3.87	1.62	0.34	0.01	1.92	0.50	0.03	-0.06	1.03%
	50%	3.10	0.78	-0.26	-0.36	1.10	-0.28	-0.52	-0.39	0.40%
10 to 0 vol%	10%	5.38	2.47	0.64	0.11	3.33	1.11	0.23	0.00	1.66%
	25%	5.10	2.26	0.55	0.07	3.03	0.94	0.16	-0.02	1.51%
	50%	4.69	1.82	0.24	-0.12	2.62	0.55	-0.11	-0.19	1.19%

Table 9

Predicted Change in NOx Emissions for Fuel Mixtures in Vehicle Tank

Transition from:	Terminal Tank Heel	Vehicle 1 Predicted change for each turnover (percent)				Vehicle 2 Predicted change for each turnover (percent)				Average Change During Transition
0 to 5.7 vol%	10%	-2.04	-0.29	-0.11	-0.07	-1.55	-0.22	-0.09	-0.06	-0.55%
	25%	-2.22	-0.43	-0.18	-0.09	-1.75	-0.35	-0.15	-0.08	-0.66%
	50%	-2.50	-0.78	-0.45	-0.26	-2.10	-0.70	-0.40	-0.23	-0.93%
0 to 7.7 vol%	10%	-2.38	-0.66	-0.08	-0.08	-1.79	-0.08	-0.08	-0.08	-0.65%
	25%	-2.40	-0.67	-0.08	-0.08	-1.81	-0.08	-0.09	-0.08	-0.66%
	50%	-2.44	-0.69	-0.10	-0.09	-1.85	-0.10	-0.10	-0.09	-0.68%
0 to 10 vol%	10%	-3.23	-1.15	-0.45	-0.27	-2.38	-0.84	-0.37	-0.25	-1.12%
	25%	-3.02	-0.95	-0.36	-0.23	-2.11	-0.67	-0.30	-0.22	-0.98%
	50%	-2.66	-0.48	0.00	-0.01	-1.67	-0.19	0.05	-0.02	-0.62%
5.7 to 7.7 vol% (H)	10%	0.17	0.17	-0.02	-0.07	0.54	0.09	-0.04	-0.07	0.10%
(Sulfur 20 to 14)	25%	0.32	0.29	0.04	-0.04	0.72	0.21	0.01	-0.05	0.19%
	50%	0.57	0.61	0.28	0.10	1.03	0.52	0.23	0.08	0.43%
5.7 to 7.7 vol% (L)	10%	-0.35	-0.08	-0.16	-0.19	0.10	-0.11	-0.17	-0.19	-0.14%
(Sulfur 14 to 12)	25%	-0.28	-0.02	-0.14	-0.18	0.19	-0.06	-0.15	-0.18	-0.10%
	50%	-0.17	0.13	-0.03	-0.11	0.33	0.09	-0.05	-0.12	0.01%
5.7 to 10 vol%	10%	-0.12	-0.14	-0.18	-0.20	-0.06	-0.15	-0.19	-0.20	-0.16%
	25%	0.26	0.19	-0.03	-0.14	0.40	0.15	-0.06	-0.16	0.08%
	50%	0.91	0.99	0.58	0.23	1.19	0.96	0.50	0.18	0.69%
7.7 to 10 vol%	10%	0.03	-0.10	-0.17	-0.20	0.03	-0.13	-0.18	-0.20	-0.12%
	25%	0.27	0.10	-0.08	-0.16	0.31	0.06	-0.11	-0.17	0.03%
	50%	0.67	0.59	0.29	0.07	0.79	0.55	0.24	0.03	0.40%
7.7 to 5.7 vol% (L)	10%	-0.63	-1.15	-1.06	-1.04	-0.74	-1.11	-1.05	-1.04	-0.98%
(Sulfur 12 to 14)	25%	-0.70	-1.20	-1.09	-1.05	-0.82	-1.16	-1.08	-1.05	-1.02%
	50%	-0.81	-1.34	-1.19	-1.11	-0.96	-1.30	-1.17	-1.10	-1.12%
7.7 to 5.7 vol% (H)	10%	-0.05	-0.30	-0.12	-0.07	-0.07	-0.22	-0.09	-0.06	-0.12%
(Sulfur 14 to 20)	25%	-0.20	-0.42	-0.18	-0.09	-0.25	-0.34	-0.14	-0.08	-0.21%
	50%	-0.46	-0.74	-0.41	-0.24	-0.56	-0.65	-0.37	-0.21	-0.46%
10 to 5.7 vol%	10%	-0.38	-0.21	-0.22	-0.09	-0.56	-0.50	-0.17	-0.08	-0.33%
	25%	-0.78	-0.55	-0.38	-0.16	-1.04	-0.81	-0.30	-0.13	-0.52%
	50%	-1.45	-1.38	-1.01	-0.55	-1.84	-1.64	-0.89	-0.48	-1.16%
10 to 7.7 vol%	10%	-0.22	-0.47	-0.19	-0.11	-0.19	-0.36	-0.16	-0.10	-0.23%
	25%	-0.46	-0.68	-0.29	-0.15	-0.49	-0.54	-0.24	-0.13	-0.37%
	50%	-0.87	-1.18	-0.67	-0.39	-0.97	-1.05	-0.59	-0.34	-0.76%
5.7 to 0 vol%	10%	-2.50	-3.23	-3.43	-3.49	-2.80	-3.31	-3.46	-3.50	-3.22%
	25%	-2.32	-3.07	-3.36	-3.46	-2.57	-3.17	-3.40	-3.47	-3.10%
	50%	-2.00	-2.68	-3.06	-3.28	-2.20	-2.78	-3.12	-3.31	-2.80%
7.7 to 0 vol%	10%	-3.06	-3.46	-3.50	-3.51	-3.31	-3.48	-3.50	-3.51	-3.42%
	25%	-3.03	-3.43	-3.48	-3.50	-3.27	-3.45	-3.49	-3.50	-3.39%
	50%	-2.98	-3.36	-3.42	-3.46	-3.20	-3.37	-3.44	-3.47	-3.34%
10 to 0 vol%	10%	-3.99	-3.84	-3.60	-3.53	-4.13	-3.74	-3.57	-3.52	-3.74%
	25%	-4.22	-4.02	-3.69	-3.57	-4.40	-3.91	-3.64	-3.55	-3.88%
	50%	-4.60	-4.48	-4.03	-3.78	-4.85	-4.37	-3.96	-3.74	-4.23%

Table 10
Predicted Percent Change in Toxic Emissions for Fuel Mixtures in Vehicle Tank

Transition from:	Terminal Tank Heel	Vehicle 1 Predicted change for each turnover				Vehicle 2 Predicted change for each turnover				Average Change During Transition
0 to 5.7 vol%	10%	-1.94	-1.46	-1.09	-0.99	-1.82	-1.31	-1.05	-0.97	-1.33%
	25%	-2.51	-1.92	-1.31	-1.07	-2.51	-1.74	-1.23	-1.04	-1.67%
	50%	-3.49	-3.08	-2.17	-1.60	-3.67	-2.89	-2.03	-1.51	-2.56%
0 to 7.7 vol%	10%	-4.07	-4.50	-4.52	-4.49	-4.34	-4.59	-4.51	.4.49	-4.43%
	25%	-4.48	-4.83	-4.68	-4.55	-4.83	-4.89	-4.64	-4.53	-4.68%
	50%	-5.19	-5.67	-5.30	-4.93	-5.67	-5.73	-5.22	-4.88	-5.32%
0 to 10 vol%	10%	-5.19	-5.99	-6.04	-6.04	-5.71	-6.03	-6.04	-6.03	-5.88%
	25%	-5.76	-6.46	-6.27	-6.12	-6.39	-6.47	-6.23	-6.10	-6.23%
	50%	-6.68	-7.61	-7.15	-6.68	-7.49	-7.63	-7.05	-6.60	-7.11%
5.7 to 7.7 vol% (H) (Sulfur 20 to 14)	10%	-3.02	-4.09	-4.38	-4.45	-3.48	-4.21	-4.41	-4.46	-4.06%
	25%	-2.85	-3.94	-4.31	-4.43	-3.28	-4.08	-4.35	-4.44	-3.96%
	50%	-2.56	-3.59	-4.04	-4.26	-2.94	-3.73	-4.11	-4.29	-3.69%
5.7 to 7.7 vol% (L) (Sulfur 14 to 12)	10%	-0.45	-0.28	-0.16	-0.13	-0.50	-0.23	-0.15	-0.12	-0.25%
	25%	-0.63	-0.44	-0.24	-0.16	-0.72	-0.38	-0.21	-0.15	-0.37%
	50%	-0.94	-0.83	-0.54	-0.34	-1.09	-0.78	-0.49	-0.31	-0.67%
5.7 to 10 vol%	10%	-4.03	-5.49	-5.89	-6.00	-4.60	-5.66	-5.94	-6.01	-5.45%
	25%	-3.90	-5.39	-5.84	-5.98	-4.45	-5.57	-5.90	-5.99	-5.38%
	50%	-3.68	-5.13	-5.66	-5.86	-4.19	-5.31	-5.72	-5.89	-5.18%
7.7 to 10 vol%	10%	-5.53	-5.93	-6.01	-6.03	-5.73	-5.97	-6.02	-6.03	-5.91%
	25%	-5.64	-6.02	-6.06	-6.04	-5.86	-6.06	-6.06	-6.04	-5.97%
	50%	-5.81	-6.24	-6.23	-6.16	-6.06	-6.28	-6.22	-6.14	-6.14%
7.7 to 5.7 vol% (L) (Sulfur 12 to 14)	10%	-0.26	-0.29	-0.40	-0.43	-0.26	-0.33	-0.41	-0.44	-0.35%
	25%	-0.05	-0.13	-0.32	-0.40	-0.03	-0.19	-0.35	-0.41	-0.24%
	50%	0.28	0.28	-0.02	-0.22	0.38	0.22	-0.07	-0.25	0.08%
7.7 to 5.7 vol% (H) (Sulfur 14 to 20)	10%	-2.53	-1.34	-1.05	-0.97	-2.12	-1.22	-1.02	-0.97	-1.40%
	25%	-2.68	-1.47	-1.11	-1.00	-2.30	-1.34	-1.07	-0.98	-1.49%
	50%	-2.93	-1.78	-1.35	-1.15	-2.60	-1.65	-1.29	-1.12	-1.73%
10 to 5.7 vol%	10%	-3.27	-1.64	-1.09	-0.98	-2.64	-1.33	-1.05	-0.97	-1.50%
	25%	-3.45	-1.81	-1.17	-1.02	-2.86	-1.48	-1.11	-1.00	-1.74%
	50%	-3.76	-2.20	-1.48	-1.21	-3.23	-1.89	-1.40	-1.17	-2.04%
10 to 7.7 vol%	10%	-5.17	-4.62	-4.52	-4.49	-4.98	-4.58	-4.50	-4.49	-4.67%
	25%	-5.18	-4.64	-4.52	-4.49	-5.00	-4.59	-4.51	-4.49	-4.68%
	50%	-5.20	-4.67	-4.55	-4.51	-5.03	-4.62	-4.54	-4.50	-4.70%
5.7 to 0 vol%	10%	-1.85	-3.66	-4.43	-4.65	-2.65	-4.08	-4.56	-4.68	-3.82%
	25%	-1.28	-3.17	-4.20	-4.56	-1.96	-3.64	-4.37	-4.62	-3.48%
	50%	-0.33	-1.99	-3.30	-4.00	-0.83	-2.45	-3.53	-4.11	-2.57%
7.7 to 0 vol%	10%	-3.34	-4.04	-4.53	-4.68	-3.72	-4.36	-4.63	-4.70	-4.25%
	25%	-2.90	-3.68	-4.36	-4.61	-3.21	-4.04	-4.49	-4.65	-3.99%
	50%	-2.17	-2.80	-3.69	-4.22	-2.36	-3.15	-3.87	-4.28	-3.32%
10 to 0 vol%	10%	-4.05	-4.21	-4.57	-4.69	-4.23	-4.49	-4.66	-4.71	-4.45%
	25%	-3.67	-3.92	-4.43	-4.63	-3.79	-4.23	-4.55	-4.67	-4.24%
	50%	-3.04	-3.19	-3.89	-4.30	-3.07	-3.50	-4.05	-4.37	-3.68%

Table 11
Expected Changes in Statewide Exhaust Emissions
If All California Gasoline Transitioned to Different Ethanol Content

Transition from:	Terminal Tank Heel	Pollutant Exceeded	Average Change During Transition	Percent of CaRFG Benefiets
0 to 5.7 vol%	10%	HC	0.75%	0.30%
	25%	HC	1.10%	0.44%
	50%	HC	2.03%	0.82%
0 to 7.7 vol%	10%	HC	0.80%	0.32%
	25%	HC	1.08%	0.43%
	50%	HC	1.81%	0.73%
0 to 10 vol%	10%	HC	1.23%	0.50%
	25%	HC	1.24%	0.50%
	50%	HC	1.32%	0.53%
5.7 to 7.7 vol% (H) (Sulfur 20 to 14)	10%	NOx	0.10%	0.09%
	25%	NOx	0.19%	0.17%
	50%	NOx	0.43%	0.39%
5.7 to 7.7 vol% (L) (Sulfur 14 to 12)	10%	NOx	-0.14%	-0.13%
	25%	NOx	-0.10%	-0.09%
	50%	NOx	0.01%	0.01%
5.7 to 10 vol%	10%	NOx	-0.16%	-0.14%
	25%	NOx	0.08%	0.07%
	50%	NOx	0.69%	0.64%
7.7 to 10 vol%	10%	NOx	-0.12%	-0.11%
	25%	NOx	0.03%	0.03%
	50%	NOx	0.40%	0.37%
7.7 to 5.7 vol% (L) (Sulfur 12 to 14)	10%	HC	-0.03%	-0.01%
	25%	HC	0.05%	0.02%
	50%	HC	0.26%	0.10%
7.7 to 5.7 vol% (H) (Sulfur 14 to 20)	10%	HC	-0.39%	-0.16%
	25%	HC	-0.30%	-0.12%
	50%	HC	-0.06%	-0.02%
10 to 5.7 vol%	10%	HC	-0.24%	-0.09%
	25%	HC	-0.07%	-0.03%
	50%	HC	0.50%	0.20%
10 to 7.7 vol%	10%	HC	-0.41%	-0.17%
	25%	HC	-0.30%	-0.12%
	50%	HC	0.02%	0.01%
5.7 to 0 vol%	10%	HC	0.95%	0.38%
	25%	HC	0.61%	0.24%
	50%	HC	-0.22%	-0.09%
7.7 to 0 vol%	10%	HC	1.29%	0.52%
	25%	HC	1.03%	0.41%
	50%	HC	0.40%	0.16%
10 to 0 vol%	10%	HC	1.66%	0.67%
	25%	HC	1.51%	0.61%
	50%	HC	1.19%	0.48%

Table 12
Reid Vapor Pressures for Transitions from Oxygenated to Non-oxygenated Fuel

Transition from:	Terminal Tank Heel	# Weeks into 4-week Transition Period	RVP (psi)			
			Terminal	Station	Vehicle #1	Vehicle #2
5.7 to 0 vol%	10%	1	6.68	7.40	7.26	
				7.11		7.04
	25%	1	6.50	7.26	7.15	
				6.94		6.92
	50%	1	6.20	7.03	6.98	
				6.66		6.70
7.7 to 0 vol%	10%	1	6.72	7.59	7.48	
				7.24		7.22
	25%	1	6.59	7.49	7.41	
				7.12		7.13
	50%	1	6.38	7.33	7.29	
				6.92		6.98
10 to 0 vol%	10%	1	6.72	7.65	7.53	
				7.30		7.27
	25%	1	6.59	7.55	7.45	
				7.18		7.18
	50%	1	6.38	7.39	7.33	
				6.98		7.03

Table 13
Reid Vapor Pressures for Transitions from Non-oxygenated to Oxygenated Fuel

Transition from:	Terminal Tank Heel	# Weeks into 4-week Transition Period	RVP (psi)			
			Terminal	Station	Vehicle #1	Vehicle #2
0 to 5.7 vol%	10%	1	6.94	7.15	7.35	
				6.98		7.23
	25%	1	7.12	7.29	7.45	
				7.15		7.36
	50%	1	7.40	7.52	7.63	
				7.43		7.56
		2	7.12	7.18	7.29	
				7.13		7.24
0 to 7.7 vol% 0 to 10 vol%	10%	1	7.25	7.39	7.54	
				7.28		7.45
		2	7.17	7.19	7.28	
				7.18		7.25
	25%	1	7.37	7.49	7.61	
				7.39		7.54
		2	7.22	7.25	7.34	
				7.22		7.30
		3	7.18	7.19	7.22	
				7.18		7.21
	50%	1	7.57	7.65	7.73	
				7.59		7.69
		2	7.37	7.41	7.49	
				7.38		7.45
		3	7.27	7.29	7.34	
				7.27		7.32
		4	7.22	7.23	7.25	
				7.22		7.24

TABLE 15: EXAMPLE CALCULATION FOR TRANSITION FROM NON-OXYGENATED FUEL TO 7.7 VOL % ETHANOL FUEL

TERMINAL TANK TRANSITION: **0-OXY CaRFG** **TO** **TARGET CARBOB FOR 7.7 VOL.% EtOH**

PROPERTIES OF CARBOBS AT EACH TANK TURNOVER

CARBOB Properties	0-OXY CaRFG	TARGET CARBOB (7.7 vol% EtOH)	1st Turnover CARBOB	2nd Turnover CARBOB	3rd Turnover CARBOB	4th Turnover CARBOB
Aromatics, vol%	25.0	27.0	26.8	27.0	27.0	27.0
Benzene, vol%	0.6	0.75	0.74	0.75	0.75	0.75
Olefins, vol%	6.0	4.3	4.5	4.3	4.3	4.3
Sulfur, ppm	10	14	13.6	14	14	14
T50, deg. F	210	213	213	213	213	213
T90, deg. F	305	313	312	313	313	313
Oxygen, wt. %	0.0	0	0.0	0.0	0.0	0.0
RVP, psi	6.8	6.0	6.0	6.0	6.0	6.0

PROPERTIES OF FUELS PRODUCED FROM CARBOBS

FUEL Properties	0-OXY CaRFG	TARGET FUEL from CARBOB (7.7 vol% EtOH)	FUEL from 1st Turnover CARBOB	FUEL from 2nd Turnover CARBOB	FUEL from 3rd Turnover CARBOB	FUEL from 4th Turnover CARBOB
Aromatics, vol%	25.0	25.1	24.9	25.0	25.1	25.1
Benzene, vol%	0.60	0.70	0.69	0.70	0.70	0.70
Olefins, vol%	6.0	4.0	4.2	4.0	4.0	4.0
Sulfur, ppm	10.0	14.1	13.7	14.0	14.1	14.1
T50, deg. F	210	206	206	206	206	206
T90, deg. F	305	310	309	309	310	310
Ethanol, vol.%	0.0	7.7	7.7	7.7	7.7	7.7
Oxygen	0.0	2.8	2.8	2.8	2.8	2.8
RVP, psi	6.80	7.16	7.25	7.17	7.16	7.16

NOTES: PROPERTIES OF BLENDED ETHANOL FUELS CALCULATED USING WSPA CARBOB MODEL (7/20/00)
CARBOBS FROM TERMINAL TANK TURNOVERS BLENDED
WITH ETHANOL AT TARGET CONCENTRATION OF: **7.7 VOL.% EtOH**

PROPERTIES OF FUELS EVALUATED USING THE PHASE 3 PREDICTIVE MODEL
PREDICTED PERCENT CHANGE IN EMISSIONS (CANDIDATE VS REFERENCE)

POLLUTANT	0-OXY CaRFG	TARGET FUEL from CARBOB (7.7 vol% EtOH)	FUEL from 1st Turnover CARBOB	FUEL from 2nd Turnover CARBOB	FUEL from 3rd Turnover CARBOB	FUEL from 4th Turnover CARBOB
NOX	-3.51	-0.08	-0.10	-0.09	-0.08	-0.08
EXHAUST THC	1.02	-2.95	-3.27	-2.98	-2.95	-2.95
EVAP THC (Reactivity Weighted)	-2.35	6.55	8.85	6.87	6.68	6.66
CO (Reactivity Weighted)	0.00	-0.09	-0.09	-0.09	-0.09	-0.09
TOTAL THC+CO	-0.07	-0.52	-0.06	-0.47	-0.52	-0.52
POT.TOX.	-4.86	-4.48	-4.92	-4.52	-4.48	-4.48
	PASSES	**PASSES**	**PASSES**	**PASSES**	**PASSES**	**PASSES**

THE CANDIDATE FUEL **PASSES** IF THE PERCENT CHANGE IN EMISSIONS BETWEEN THE CANDIDATE FUEL AND REFERENCE FUEL IS LESS THAN OR EQUAL TO 0.04%
THE CANDIDATE FUEL **FAILS** IF THE PERCENT CHANGE IN EMISSIONS BETWEEN THE CANDIDATE FUEL AND REFERENCE FUEL IS GREATER THAN OR EQUAL TO 0.05%

1ST TERMINAL TANK TURNOVER		**RVP = 7.25**	**EXCEEDS CAP**
Heel (base CARBOB)	0-OXY CaRFG	10% of tank capacity	**PASSES**
New batch	TARGET CARBOB (7.7 vol% EtOH)	90% of tank capacity	
2ND TERMINAL TANK TURNOVER			
Heel (base CARBOB)	1st Turnover CARBOB	10% of tank capacity	**PASSES**
New batch	TARGET CARBOB (7.7 vol% EtOH)	90% of tank capacity	
3RD TERMINAL TANK TURNOVER			
Heel (base CARBOB)	2nd Turnover CARBOB	10% of tank capacity	**PASSES**
New batch	TARGET CARBOB (7.7 vol% EtOH)	90% of tank capacity	
4TH TERMINAL TANK TURNOVER			
Heel (base CARBOB)	3rd Turnover CARBOB	10% of tank capacity	**PASSES**
New batch	TARGET CARBOB (7.7 vol% EtOH)	90% of tank capacity	

TABLE 16: EXAMPLE CALCULATION FOR TRANSITION FROM NON-OXYGENATED FUEL TO 7.7 VOL % ETHANOL FUEL

UNDERGROUND TANK TRANSITION FROM **0-OXY CaRFG** **TO** **7.7 VOL% EtOH**

NEW BATCHES OF FUELS DELIVERED TO STATION

FUEL Properties	0-OXY CaRFG	FUEL from 1st Turnover CARBOB	FUEL from 1st Turnover CARBOB	FUEL from 2nd Turnover CARBOB	FUEL from 2nd Turnover CARBOB	FUEL from 3rd Turnover CARBOB	FUEL from 3rd Turnover CARBOB	FUEL from 4th Turnover CARBOB	FUEL from 4th Turnover CARBOB
Aromatics, vol%	25.0	24.9	24.9	25.0	25.0	25.1	25.1	25.1	25.1
Benzene, vol%	0.60	0.69	0.69	0.70	0.70	0.70	0.70	0.70	0.70
Olefins, vol%	6.0	4.2	4.2	4.0	4.0	4.0	4.0	4.0	4.0
Sulfur, ppm	10	14	14	14	14	14	14	14	14
T50, deg. F	210	206	206	206	206	206	206	206	206
T90, deg. F	305	309	309	309	309	310	310	310	310
Ethanol conc., vol.%	0.0	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7
Oxygen, wt. %	0.0	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
RVP, psi	6.80	7.25	7.25	7.17	7.17	7.16	7.16	7.16	7.16

NOTES: FUELS DELIVERED TO THE STATION WERE PRODUCED BY BLENDING CARBOBS FROM THE TERMINAL TANK WITH ETHANOL AT
TARGET ETHANOL CONCENTRATION OF: **7.7 VOL.%EtOH**
HEEL IN UNDERGROUND TANK **20%** OF TANK CAPACITY
CARBOB HEEL IN TERMINAL TANK WAS **10%** OF TANK CAPACITY

UNDERGROUND TANK TRANSITION FROM **0-OXY CaRFG** TO **7.7 VOL% EtOH**

FUELS PRODUCED BY MIXING UNDERGROUND TANK HEEL WITH NEW BATCH OF FUEL

FUEL Properties	0-OXY CaRFG	1st Turnover FUEL at STATION	2nd Turnover FUEL at STATION	3rd Turnover FUEL at STATION	4th Turnover FUEL at STATION	5th Turnover FUEL at STATION	6th Turnover FUEL at STATION	7th Turnover FUEL at STATION	8th Turnover FUEL at STATION	7.7 vol% EtOH FUEL
Aromatics, vol%	25.0	24.9	24.9	25.0	25.0	25.0	25.0	25.1	25.1	25.1
Benzene, vol%	0.60	0.67	0.68	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Olefins, vol%	6.0	4.5	4.2	4.1	4.0	4.0	4.0	4.0	4.0	4.0
Sulfur, ppm	10	13	14	14	14	14	14	14	14	14
T50, deg. F	210	207	206	206	206	206	206	206	206	206
T90, deg. F	305	308	309	309	309	310	310	310	310	310
Ethanol conc., vol.%	0.0	6.2	7.4	7.6	7.7	7.7	7.7	7.7	7.7	7.7
Oxygen, wt. %	0.0	2.2	2.7	2.8	2.8	2.8	2.8	2.8	2.8	2.8
RVP, psi	6.80	7.39	7.28	7.19	7.18	7.17	7.17	7.16	7.16	7.16

NOTES: HEEL IN UNDERGROUND STORAGE TANK: **20% of tank capacity**
USE ROCKE'S EQUATION TO CALCULATE **RVP BOOST** FOR FIRST UNDERGROUND TANK TURNOVER
RVP BOOST = **1.18 psi FOR HEEL FOR FIRST UNDERGROUND TANK TURNOVER**

PROPERTIES OF FUELS EVALUATED USING THE PHASE 3 PREDICTIVE MODEL
PREDICTED PERCENT CHANGE IN EMISSIONS (CANDIDATE VS. REFERENCE)

POLLUTANT	0-OXY CaRFG	1st Turnover FUEL at STATION	2nd Turnover FUEL at STATION	3rd Turnover FUEL at STATION	4th Turnover FUEL at STATION	5th Turnover FUEL at STATION	6th Turnover FUEL at STATION	7th Turnover FUEL at STATION	8th Turnover FUEL at STATION	7.7 vol% EtOH FUEL
NOX	-3.51	-1.30	-0.09	-0.09	-0.09	-0.08	-0.08	-0.08	-0.08	-0.08
EXHAUST THC	1.02	-2.60	-3.27	-3.04	-2.99	-2.96	-2.95	-2.95	-2.95	-2.95
EVAP THC (Reactivity Weighted)	-2.35	12.97	9.66	7.42	6.98	6.74	6.69	6.66	6.66	6.65
CO (Reactivity Weighted)	0.00	-0.03	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09
TOTAL THC+CO	-0.07	2.09	0.19	-0.34	-0.45	-0.50	-0.51	-0.52	-0.52	-0.52
POT.TOX.	-4.86	-4.53	-4.89	-4.60	-4.54	-4.49	-4.49	-4.48	-4.48	-4.48
	PASSES	**FAILS**	**FAILS**	**PASSES**	**PASSES**	**PASSES**	**PASSES**	**PASSES**	**PASSES**	**PASSES**

THE CANDIDATE FUEL **PASSES** IF THE PERCENT CHANGE IN EMISSIONS BETWEEN THE CANDIDATE FUEL AND REFERENCE FUEL IS LESS THAN OR EQUAL TO 0.04%
THE CANDIDATE FUEL **FAILS** IF THE PERCENT CHANGE IN EMISSIONS BETWEEN THE CANDIDATE FUEL AND REFERENCE FUEL IS GREATER THAN OR EQUAL TO 0.05%

1ST UNDERGROUND TANK TURNOVER		**RVP = 7.39**	**EXCEEDS CAP**
Heel (base fuel)	0-OXY CaRFG	20% of tank capacity	**FAILS**
New batch	FUEL from 1st Turnover CARBOB BLEND	80% of tank capacity	
2ND UNDERGROUND TANK TURNOVER		**RVP = 7.28**	**EXCEEDS CAP**
Heel	1st Turnover FUEL BLEND at STATION	20% of tank capacity	**FAILS**
New batch	FUEL from 1st Turnover CARBOB BLEND	80% of tank capacity	
3RD UNDERGROUND TANK TURNOVER			
Heel	2nd Turnover FUEL BLEND at STATION	20% of tank capacity	**PASSES**
New batch	FUEL from 2nd Turnover CARBOB BLEND	80% of tank capacity	
4TH UNDERGROUND TANK TURNOVER			
Heel	3rd Turnover FUEL BLEND at STATION	20% of tank capacity	**PASSES**
New batch	FUEL from 2nd Turnover CARBOB BLEND	80% of tank capacity	
5TH UNDERGROUND TANK TURNOVER			
Heel	4th Turnover FUEL BLEND at STATION	20% of tank capacity	**PASSES**
New batch	FUEL from 3rd Turnover CARBOB BLEND	80% of tank capacity	
6TH UNDERGROUND TANK TURNOVER			
Heel	5th Turnover FUEL BLEND at STATION	20% of tank capacity	**PASSES**
New batch	FUEL from 3rd Turnover CARBOB BLEND	80% of tank capacity	
7TH UNDERGROUND TANK TURNOVER			
Heel	6th Turnover FUEL BLEND at STATION	20% of tank capacity	**PASSES**
New batch	FUEL from 4th Turnover CARBOB BLEND	80% of tank capacity	
8TH UNDERGROUND TANK TURNOVER			
Heel	7th Turnover FUEL BLEND at STATION	20% of tank capacity	**PASSES**
New batch	FUEL from 4th Turnover CARBOB BLEND	80% of tank capacity	

TABLE 17: EXAMPLE CALCULATION FOR TRANSITION FROM NON-OXYGENATED FUEL TO 7.7 VOL % ETHANOL FUEL

VEHICLE TANK TRANSITION FROM **0-OXY CaRFG** **TO** **7.7 vol% EtOH FUEL**
VEHICLE #1

NEW BATCHES OF FUELS PRODUCED AT STATION WITH EACH UNDERGROUND TANK TURNOVER

FUEL Properties	0-OXY CaRFG	1st Turnover FUEL at STATION	3rd Turnover FUEL at STATION	5th Turnover FUEL at STATION	7th Turnover FUEL at STATION	7.7 vol% EtOH FUEL
Aromatics, vol%	25.0	24.9	25.0	25.0	25.1	25.1
Benzene, vol%	0.60	0.67	0.70	0.70	0.70	0.70
Olefins, vol%	6.0	4.5	4.1	4.0	4.0	4.0
Sulfur, ppm	10	13	14	14	14	14
T50, deg. F	210	207	206	206	206	206
T90, deg. F	305	308	309	310	310	310
Ethanol conc. vol.%	0.0	6.2	7.6	7.7	7.7	7.7
Oxygen, wt. %	0.0	2.2	2.8	2.8	2.8	2.8
RVP, psi	6.80	7.39	7.19	7.17	7.16	7.16

FUELS AT STATION PRODUCED BY MIXING UNDERGROUND TANK HEEL WITH NEW BATCH OF FUEL DELIVERED TO STATION
HEEL IN UNDERGROUND TANK **20% of tank capacity**
HEEL IN TERMINAL TANK **10% of tank capacity**

FUELS IN VEHICLE TANK PRODUCED BY MIXING VEHICLE TANK HEEL WITH NEW BATCH OF FUEL AT STATION

FUEL Properties	0-OXY CaRFG	1st Turnover FUEL in VEHICLE #1	2nd Turnover FUEL in VEHICLE #1	3rd Turnover FUEL in VEHICLE #1	4th Turnover FUEL in VEHICLE #1	7.7 vol% EtOH FUEL
Aromatics, vol%	25.0	24.9	25.0	25.0	25.0	25.1
Benzene, vol%	0.60	0.65	0.68	0.70	0.70	0.70
Olefins, vol%	6.0	4.9	4.3	4.1	4.0	4.0
Sulfur, ppm	10.0	12.2	13.5	13.9	14.0	14.1
T50, deg. F	210	207	206	206	206	206
T90, deg. F	305	307	309	309	309	310
Ethanol conc. vol.%	0.0	4.6	6.9	7.5	7.6	7.7
Oxygen, wt. %	0.0	1.7	2.5	2.7	2.8	2.8
RVP, psi	6.80	7.54	7.28	7.20	7.17	7.16

NOTE: HEEL IN VEHICLE TANK: **25% of tank capacity**
HEEL IN UNDERGROUND TANK: **20% of tank capacity**
HEEL IN TERMINAL TANK: **10% of tank capacity**
RVP BOOST = 1.18 psi FOR FIRST VEHICLE TANK TURNOVER

PROPERTIES OF FUELS IN VEHICLE TANK EVALUATED USING THE PHASE 3 PREDICTIVE MODEL
PREDICTED PERCENT CHANGE IN EMISSIONS (CANDIDATE VS REFERENCE)

POLLUTANT	0-OXY CaRFG	1st Turnover FUEL in VEHICLE #1	2nd Turnover FUEL in VEHICLE #1	3rd Turnover FUEL in VEHICLE #1	4th Turnover FUEL in VEHICLE #1	7.7 vol% EtOH FUEL
NOX	-3.51	-2.38	-0.66	-0.08	-0.08	-0.08
EXHAUST THC	1.02	-1.76	-2.80	-2.99	-2.96	-2.95
EVAP THC (Reactivity Weighted)	-2.35	17.24	9.77	7.48	6.87	6.65
CO (Reactivity Weighted)	0.00	0.00	-0.06	-0.09	-0.09	-0.09
TOTAL THC+CO	-0.07	4.14	0.73	-0.30	-0.46	-0.52
POT.TOX.	-4.86	-4.07	-4.50	-4.52	-4.49	-4.48
	PASSES	**FAILS**	**FAILS**	**PASSES**	**PASSES**	**PASSES**

THE CANDIDATE FUEL **PASSES** IF THE PERCENT CHANGE IN EMISSIONS BETWEEN THE CANDIDATE FUEL AND REFERENCE FUEL IS LESS THAN OR EQUAL TO 0.04%
THE CANDIDATE FUEL **FAILS** IF THE PERCENT CHANGE IN EMISSIONS BETWEEN THE CANDIDATE FUEL AND REFERENCE FUEL IS GREATER THAN OR EQUAL TO 0.05%

VEHICLE TANK TURNOVERS

1ST VEHICLE TANK TURNOVER: **RVP = 7.54** **EXCEEDS CAP**
Heel (base fuel): 0-OXY CaRFG 25.0% of tank capacity
New batch 1st Turnover FUEL BLEND at STATION 75.0% of tank capacity **FAILS**

2ND VEHICLE TANK TURNOVER: **RVP = 7.28** **EXCEEDS CAP**
Heel: 1st Turnover FUEL BLEND in VEHICLE #1 25.0% of tank capacity
New batch 3rd Turnover FUEL BLEND at STATION 75.0% of tank capacity **FAILS**

3RD VEHICLE TANK TURNOVER:
Heel: 2nd Turnover FUEL BLEND in VEHICLE #1 25.0% of tank capacity
New batch 5th Turnover FUEL BLEND at STATION 75.0% of tank capacity **PASSES**

4TH VEHICLE TANK TURNOVER:
Heel: 3rd Turnover FUEL BLEND in VEHICLE #1 25.0% of tank capacity
New batch 7th Turnover FUEL BLEND at STATION 75.0% of tank capacity **PASSES**

TABLE 18: EXAMPLE CALCULATION FOR TRANSITION FROM NON-OXYGENATED FUEL TO 7.7 VOL % ETHANOL FUEL

VEHICLE TANK TRANSITION FROM **0-OXY CaRFG** **TO** **7.7 vol% EtOH FUEL**
VEHICLE #2

NEW BATCHES OF FUELS PRODUCED AT STATION WITH EACH UNDERGROUND TANK TURNOVER

FUEL Properties	0-OXY CaRFG	2nd Turnover FUEL at STATION	4th Turnover FUEL at STATION	6th Turnover FUEL at STATION	8th Turnover FUEL at STATION	7.7 vol% EtOH FUEL
Aromatics, vol%	25.0	24.9	25.0	25.0	25.1	25.1
Benzene, vol%	0.60	0.68	0.70	0.70	0.70	0.70
Olefins, vol%	6.0	4.2	4.0	4.0	4.0	4.0
Sulfur, ppm	10	13.6	14.0	14.1	14.1	14
T50, deg. F	210	206	206	206	206	206
T90, deg. F	305	309	309	310	310	310
Ethanol conc. vol.%	0.0	7.4	7.7	7.7	7.7	7.7
Oxygen, wt. %	0.0	2.7	2.8	2.8	2.8	2.8
RVP, psi	6.80	7.28	7.18	7.17	7.16	7.16

FUELS AT STATION PRODUCED BY MIXING UNDERGROUND TANK HEEL WITH NEW BATCH OF FUEL DELIVERED TO STATION
HEEL IN UNDERGROUND TANK **20% of tank capacity**
HEEL IN TERMINAL TANK **10% of tank capacity**

FUELS IN VEHICLE TANK PRODUCED BY MIXING VEHICLE TANK HEEL WITH NEW BATCH OF FUEL AT STATION

FUEL Properties	0-OXY CaRFG	1st Turnover FUEL in VEHICLE #2	2nd Turnover FUEL in VEHICLE #2	3rd Turnover FUEL in VEHICLE #2	4th Turnover FUEL in VEHICLE #2	7.7 vol% EtOH FUEL
Aromatics, vol%	25.0	24.9	25.0	25.0	25.0	25.1
Benzene, vol%	0.60	0.66	0.69	0.70	0.70	0.70
Olefins, vol%	6.0	4.7	4.2	4.1	4.0	4.0
Sulfur, ppm	10.0	12.7	13.7	14.0	14.1	14.1
T50, deg. F	210	207	206	206	206	206
T90, deg. F	305	308	309	309	310	310
Ethanol conc. vol.%	0.0	5.5	7.2	7.6	7.7	7.7
Oxygen, wt. %	0.0	2.0	2.6	2.7	2.8	2.8
RVP, psi	6.80	7.45	7.25	7.19	7.17	7.16

NOTE: HEEL IN VEHICLE TANK: **25% of tank capacity**
HEEL IN UNDERGROUND TANK: **20% of tank capacity**
HEEL IN TERMINAL TANK: **10% of tank capacity**
RVP BOOST = 1.19 psi FOR FIRST VEHICLE TANK TURNOVER

PROPERTIES OF FUELS IN VEHICLE TANK EVALUATED USING THE PHASE 3 PREDICTIVE MODEL
PREDICTED PERCENT CHANGE IN EMISSIONS (CANDIDATE VS REFERENCE)

POLLUTANT	0-OXY CaRFG	1st Turnover FUEL in VEHICLE #2	2nd Turnover FUEL in VEHICLE #2	3rd Turnover FUEL in VEHICLE #2	4th Turnover FUEL in VEHICLE #2	7.7 vol% EtOH FUEL
NOX	-3.51	-1.79	-0.08	-0.08	-0.08	-0.08
EXHAUST THC	1.02	-2.26	-3.06	-2.98	-2.95	-2.95
EVAP THC (Reactivity Weighted)	-2.35	14.66	8.83	7.22	6.80	6.65
CO (Reactivity Weighted)	0.00	0.00	-0.09	-0.09	-0.09	-0.09
TOTAL THC+CO	-0.07	3.06	0.07	-0.37	-0.48	-0.52
POT.TOX.	-4.86	-4.34	-4.59	-4.51	-4.49	-4.48
	PASSES	**FAILS**	**FAILS**	**PASSES**	**PASSES**	**PASSES**

THE CANDIDATE FUEL **PASSES** IF THE PERCENT CHANGE IN EMISSIONS BETWEEN THE CANDIDATE FUEL AND REFERENCE FUEL IS LESS THAN OR EQUAL TO 0.04%
THE CANDIDATE FUEL **FAILS** IF THE PERCENT CHANGE IN EMISSIONS BETWEEN THE CANDIDATE FUEL AND REFERENCE FUEL IS GREATER THAN OR EQUAL TO 0.05%

VEHICLE TANK TURNOVERS

1ST VEHICLE TANK TURNOVER: **RVP = 7.45** **EXCEEDS CAP**
Heel (base fuel): 0-OXY CaRFG 25.0% of tank capacity
New batch 2nd Turnover FUEL BLEND at STATION 75.0% of tank capacity **FAILS**

2ND VEHICLE TANK TURNOVER: **RVP = 7.25** **EXCEEDS CAP**
Heel: 1st Turnover FUEL BLEND in VEHICLE #2 25.0% of tank capacity
New batch 4th Turnover FUEL BLEND at STATION 75.0% of tank capacity **FAILS**

3RD VEHICLE TANK TURNOVER:
Heel: 2nd Turnover FUEL BLEND in VEHICLE #2 25.0% of tank capacity
New batch 6th Turnover FUEL BLEND at STATION 75.0% of tank capacity **PASSES**

4TH VEHICLE TANK TURNOVER:
Heel: 3rd Turnover FUEL BLEND in VEHICLE #2 25.0% of tank capacity
New batch 8th Turnover FUEL BLEND at STATION 75.0% of tank capacity **PASSES**

Table 19
Predicted Change in Exhaust Emissions during Transition from one Ethanol Fuel to Another

Transition from	Pollutant	Change in Emissions estimated with Predictive Model[1] for Terminal Tank Heels of	
		10 percent	20 percent
5.7 to 7.7 vol% (H)	NOx	0.10%	0.16%
5.7 to 7.7 vol% (L)		-0.14%	-0.12%
5.7 to 10 vol%		-0.16%	-0.01%
7.7 to 10 vol%		-0.12%	-0.03%
7.7 to 5.7 vol% (L)		-0.98%	-1.00%
7.7 to 5.7 vol% (H)		-0.12%	-0.18%
10 to 5.7 vol%		-0.33%	-0.48%
10 to 7.7 vol%		-0.23%	-0.32%
5.7 to 7.7 vol% (H)	HC	-0.70%	-0.76%
5.7 to 7.7 vol% (L)		-0.56%	-0.61%
5.7 to 10 vol%		-0.28%	-0.44%
7.7 to 10 vol%		-0.27%	-0.41%
7.7 to 5.7 vol% (L)		-0.03%	0.02%
7.7 to 5.7 vol% (H)		-0.39%	-0.34%
10 to 5.7 vol%		-0.24%	-0.10%
10 to 7.7 vol%		-0.41%	-0.34%
5.7 to 7.7 vol% (H)	TOX	-4.06%	-4.00%
5.7 to 7.7 vol% (L)		-0.25%	-0.32%
5.7 to 10 vol%		-5.45%	-5.41%
7.7 to 10 vol%		-5.91%	-5.95%
7.7 to 5.7 vol% (L)		-0.35%	-0.28%
7.7 to 5.7 vol% (H)		-1.40%	-1.46%
10 to 5.7 vol%		-1.50%	-1.57%
10 to 7.7 vol%		-4.67%	-4.68%

[1] Average for 4-week transition period

Note: If the predicted change for a transition is $\leq$ 0.04%, this means that there will not be an exhaust emissions increase over the flat limit levels for that transition.

Table 20
Predicted Percent Change in Exhaust Emissions of Total Hydrocarbons During Transition from one Ethanol Fuel to Another

Transition from:	Terminal Tank Heel	Vehicle 1 Predicted change for each turnover (percent)				Vehicle 2 Predicted change for each turnover (percent)				PercentChange During Transition
5.7 to 7.7 vol% (H)	10%	-0.83	-0.76	-0.59	-0.54	-1.08	-0.69	-0.57	-0.53	-0.70%
(Sulfur 20 to 14)	20%	-0.93	-0.85	-0.63	-0.55	-1.20	-0.77	-0.60	-0.54	-0.76%
5.7 to 7.7 vol% (L)	10%	-0.54	-0.61	-0.50	-0.47	-0.82	-0.57	-0.49	-0.47	-0.56%
(Sulfur 14 to 12)	20%	-0.62	-0.68	-0.53	-0.48	-0.92	-0.63	-0.51	-0.47	-0.61%
5.7 to 10 vol%	10%	-0.61	-0.32	-0.14	-0.08	-0.61	-0.26	-0.12	-0.08	-0.28%
	20%	-0.89	-0.55	-0.25	-0.12	-0.95	-0.47	-0.20	-0.11	-0.44%
7.7 to 10 vol%	10%	-0.60	-0.30	-0.14	-0.08	-0.57	-0.24	-0.11	-0.08	-0.27%
	20%	-0.83	-0.50	-0.23	-0.12	-0.85	-0.42	-0.19	-0.10	-0.41%
7.7 to 5.7 vol% (L)	10%	-0.27	0.12	0.03	0.00	-0.19	0.08	0.02	0.00	-0.03%
(Sulfur 12 to 14)	20%	-0.18	0.19	0.06	0.01	-0.08	0.14	0.04	0.01	0.02%
7.7 to 5.7 vol% (H)	10%	-0.59	-0.25	-0.35	-0.38	-0.54	-0.29	-0.36	-0.38	-0.39%
(Sulfur 14 to 20)	20%	-0.48	-0.17	-0.32	-0.37	-0.41	-0.22	-0.34	-0.37	-0.34%
10 to 5.7 vol%	10%	-0.32	-0.37	-0.27	-0.36	-0.18	-0.08	-0.31	-0.37	-0.24%
	20%	-0.07	-0.18	-0.19	-0.33	0.11	0.09	-0.24	-0.35	-0.10%
10 to 7.7 vol%	10%	-0.35	-0.27	-0.45	-0.50	-0.40	-0.34	-0.47	-0.51	-0.41%
	20%	-0.22	-0.17	-0.41	-0.49	-0.23	-0.26	-0.44	-0.50	-0.34%

Table 21
Predicted Percent Change in Exhaust Emissions of NOx During Transition from one Ethanol Fuel to Another

Transition from:	Terminal Tank Heel	Vehicle 1 Predicted change for each turnover (percent)				Vehicle 2 Predicted change for each turnover (percent)				Average Change During Transition
5.7 to 7.7 vol% (H)	10%	0.17	0.17	-0.02	-0.07	0.54	0.09	-0.04	-0.07	0.10%
(Sulfur 20 to 14)	20%	0.27	0.25	0.02	-0.05	0.66	0.16	-0.01	-0.06	0.16%
5.7 to 7.7 vol% (L)	10%	-0.35	-0.08	-0.16	-0.19	0.10	-0.11	-0.17	-0.19	-0.14%
(Sulfur 14 to 12)	20%	-0.30	-0.04	-0.15	-0.18	0.16	-0.08	-0.16	-0.19	-0.12%
5.7 to 10 vol%	10%	-0.12	-0.14	-0.18	-0.20	-0.06	-0.15	-0.19	-0.20	-0.16%
	20%	0.13	0.06	-0.09	-0.17	0.25	0.04	-0.12	-0.18	-0.01%
7.7 to 10 vol%	10%	0.03	-0.10	-0.17	-0.20	0.03	-0.13	-0.18	-0.20	-0.12%
	20%	0.19	0.02	-0.12	-0.18	0.22	-0.01	-0.14	-0.19	-0.03%
7.7 to 5.7 vol% (L)	10%	-0.63	-1.15	-1.06	-1.04	-0.74	-1.11	-1.05	-1.04	-0.98%
(Sulfur 12 to 14)	20%	-0.67	-1.18	-1.08	-1.05	-0.79	-1.14	-1.07	-1.04	-1.00%
7.7 to 5.7 vol% (H)	10%	-0.05	-0.30	-0.12	-0.07	-0.07	-0.22	-0.09	-0.06	-0.12%
(Sulfur 14 to 20)	20%	-0.15	-0.38	-0.15	-0.08	-0.19	-0.29	-0.12	-0.07	-0.18%
10 to 5.7 vol%	10%	-0.38	-0.21	-0.22	-0.09	-0.56	-0.50	-0.17	-0.08	-0.33%
	20%	-0.65	-0.43	-0.32	-0.13	-0.88	-0.69	-0.24	-0.10	-0.48%
10 to 7.7 vol%	10%	-0.22	-0.47	-0.19	-0.11	-0.19	-0.36	-0.16	-0.10	-0.23%
	20%	-0.38	-0.60	-0.25	-0.13	-0.39	-0.47	-0.20	-0.12	-0.32%

Table 22
Predicted Percent Change in Exhaust Emissions of Toxics
During Transition from one Ethanol Fuel to Another

Transition from:	Terminal Tank Heel	Vehicle 1 Predicted change for each turnover (percent)				Vehicle 2 Predicted change for each turnover (percent)				Average Change During Transition
5.7 to 7.7 vol% (H)	10%	-3.02	-4.09	-4.38	-4.45	-3.48	-4.21	-4.41	-4.46	-4.06%
(Sulfur 20 to 14)	20%	-2.91	-4.00	-4.34	-4.44	-3.35	-4.13	-4.38	-4.45	-4.00%
5.7 to 7.7 vol% (L)	10%	-0.45	-0.28	-0.16	-0.13	-0.50	-0.23	-0.15	-0.12	-0.25%
(Sulfur 14 to 12)	20%	-0.57	-0.38	-0.21	-0.14	-0.65	-0.32	-0.18	-0.13	-0.32%
5.7 to 10 vol%	10%	-4.03	-5.49	-5.89	-6.00	-4.60	-5.66	-5.94	-6.01	-5.45%
	20%	-3.94	-5.42	-5.86	-5.99	-4.50	-5.61	-5.92	-6.00	-5.41%
7.7 to 10 vol%	10%	-5.53	-5.93	-6.01	-6.03	-5.73	-5.97	-6.02	-6.03	-5.91%
	20%	-5.61	-5.99	-6.04	-6.04	-5.81	-6.02	-6.04	-6.03	-5.95%
7.7 to 5.7 vol% (L)	10%	-0.26	-0.29	-0.40	-0.43	-0.26	-0.33	-0.41	-0.44	-0.35%
(Sulfur 12 to 14)	20%	-0.12	-0.19	-0.36	-0.42	-0.11	-0.24	-0.38	-0.42	-0.28%
7.7 to 5.7 vol% (H)	10%	-2.53	-1.34	-1.05	-0.97	-2.12	-1.22	-1.02	-0.97	-1.40%
(Sulfur 14 to 20)	20%	-2.63	-1.42	-1.09	-0.99	-2.24	-1.29	-1.05	-0.97	-1.46%
10 to 5.7 vol%	10%	-3.27	-1.64	-1.09	-0.98	-2.64	-1.33	-1.05	-0.97	-1.50%
	20%	-3.29	-1.74	-1.14	-1.00	-2.79	-1.42	-1.08	-0.98	-1.57%
10 to 7.7 vol%	10%	-5.17	-4.62	-4.52	-4.49	-4.98	-4.58	-4.50	-4.49	-4.67%
	20%	-5.18	-4.63	-4.52	-4.49	-5.00	-4.58	-4.51	-4.49	-4.68%

Table 23
Predicted Percent Change in Exhaust Emissions During Transitions Between Ethanol Fuels and Non-oxygenated Fuels not Subject to RVP Standard

Transition from	Terminal Tank Heel	Average Change During Transition (percent)		
		Hydrocarbons	NOx	Toxics
0 to 5.7 vol%	10%	-0.31%	-0.56%	-1.72%
	15%	-0.37%	-0.59%	-1.85%
	20%	-0.44%	-0.62%	-2.01%
	25%	-0.52%	-0.66%	-2.17%
	50%	-1.09%	-0.93%	-3.37%
0 to 7.7 vol%	10%	-0.44%	-0.64%	-3.99%
	15%	-0.54%	-0.64%	-4.11%
	20%	-0.65%	-0.65%	-4.24%
	25%	-0.78%	-0.65%	-4.40%
	50%	-1.65%	-0.67%	-5.47%
0 to 10 vol%	10%	-1.13%	-1.12%	-6.68%
	15%	-1.32%	-1.08%	-6.81%
	20%	-1.52%	-1.03%	-6.95%
	25%	-1.74%	-0.98%	-7.11%
	50%	-3.24%	-0.62%	-8.20%
5.7 to 0 vol%	10%	0.06%	-3.22%	-4.46%
	15%	0.14%	-3.19%	-4.31%
	20%	0.22%	-3.15%	-4.15%
	25%	0.32%	-3.11%	-3.96%
	50%	1.01%	-2.81%	-2.63%
7.7 to 0 vol%	10%	0.00%	-3.42%	-4.83%
	15%	0.10%	-3.41%	-4.70%
	20%	0.21%	-3.40%	-4.56%
	25%	0.33%	-3.40%	-4.39%
	50%	1.22%	-3.34%	-3.23%
10 to 0 vol%	10%	-0.06%	-3.75%	-5.27%
	15%	0.05%	-3.79%	-5.18%
	20%	0.18%	-3.83%	-5.07%
	25%	0.32%	-3.88%	-4.95%
	50%	1.34%	-4.23%	-4.07%

Table 24
Predicted Percent Change in Exhaust Emissions of Hydrocarbons During Transitions Between Ethanol Fuels and Non-oxygenated Fuels not Subject to RVP Standard

Transition from	Terminal Tank Heel	Vehicle 1 Predicted change for each turnover (percent)				Vehicle 2 Predicted change for each turnover (percent)				Average Change During Transition
0 to 5.7 vol%	10%	-0.04	-0.57	-0.33	-0.25	-0.25	-0.48	-0.30	-0.25	-0.31%
	15%	-0.15	-0.66	-0.36	-0.27	-0.39	-0.56	-0.32	-0.25	-0.37%
	20%	-0.27	-0.76	-0.41	-0.28	-0.53	-0.65	-0.36	-0.27	-0.44%
	25%	-0.39	-0.88	-0.47	-0.31	-0.67	-0.76	-0.42	-0.29	-0.52%
	50%	-0.96	-1.61	-1.04	-0.66	-1.36	-1.50	-0.94	-0.61	-1.09%
0 to 7.7 vol%	10%	-0.33	-0.53	-0.43	-0.32	-0.55	-0.67	-0.38	-0.30	-0.44%
	15%	-0.51	-0.67	-0.49	-0.34	-0.77	-0.80	-0.43	-0.32	-0.54%
	20%	-0.69	-0.83	-0.57	-0.37	-0.99	-0.95	-0.49	-0.34	-0.65%
	25%	-0.86	-1.01	-0.67	-0.41	-1.20	-1.12	-0.58	-0.37	-0.78%
	50%	-1.72	-2.14	-1.56	-0.97	-2.24	-2.28	-1.42	-0.88	-1.65%
0 to 10 vol%	10%	-0.92	-1.28	-1.10	-1.02	-1.40	-1.24	-1.07	-1.02	-1.13%
	15%	-1.25	-1.54	-1.21	-1.06	-1.80	-1.47	-1.16	-1.04	-1.32%
	20%	-1.56	-1.83	-1.35	-1.12	-2.18	-1.74	-1.27	-1.08	-1.52%
	25%	-1.87	-2.14	-1.54	-1.19	-2.55	-2.05	-1.43	-1.15	-1.74%
	50%	-3.28	-4.07	-3.12	-2.23	-4.23	-4.02	-2.93	-2.08	-3.24%
5.7 to 0 vol%	10%	0.24	0.09	-0.02	-0.06	0.28	0.05	-0.04	-0.06	0.06%
	15%	0.39	0.19	0.02	-0.04	0.45	0.15	0.00	-0.05	0.14%
	20%	0.54	0.31	0.08	-0.02	0.63	0.25	0.04	-0.04	0.22%
	25%	0.69	0.45	0.14	0.00	0.81	0.38	0.10	-0.01	0.32%
	50%	1.46	1.35	0.81	0.41	1.73	1.28	0.71	0.35	1.01%
7.7 to 0 vol%	10%	0.01	0.03	-0.03	-0.06	0.14	0.02	-0.04	-0.06	0.00%
	15%	0.20	0.16	0.02	-0.04	0.36	0.13	0.00	-0.05	0.10%
	20%	0.40	0.31	0.08	-0.02	0.59	0.27	0.05	-0.03	0.21%
	25%	0.60	0.48	0.17	0.02	0.82	0.42	0.12	0.00	0.33%
	50%	1.62	1.64	1.00	0.52	2.03	1.58	0.89	0.44	1.22%
10 to 0 vol%	10%	-0.22	-0.02	-0.05	-0.06	0.00	-0.01	-0.05	-0.07	-0.06%
	15%	0.01	0.13	0.01	-0.05	0.26	0.11	-0.01	-0.05	0.05%
	20%	0.23	0.30	0.09	-0.02	0.52	0.27	0.05	-0.03	0.18%
	25%	0.46	0.49	0.19	0.02	0.79	0.44	0.14	0.00	0.32%
	50%	1.66	1.83	1.13	0.59	2.20	1.77	1.01	0.51	1.34%

Table 25

Predicted Percent Change in Exhaust Emissions of NOx During Transitions Between Ethanol Fuels and Non-oxygenated Fuels not Subject to RVP Standard

Transition from	Terminal Tank Heel	Vehicle 1 Predicted change for each turnover (percent)				Vehicle 2 Predicted change for each turnover (percent)				Average Change During Transition
0 to 5.7 vol%	10%	-2.04	-0.29	-0.12	-0.07	-1.55	-0.22	-0.09	-0.06	-0.56%
	15%	-2.10	-0.33	-0.13	-0.07	-1.62	-0.26	-0.11	-0.07	-0.59%
	20%	-2.16	-0.38	-0.16	-0.08	-1.69	-0.30	-0.13	-0.07	-0.62%
	25%	-2.22	-0.43	-0.18	-0.09	-1.75	-0.35	-0.15	-0.08	-0.66%
	50%	-2.50	-0.78	-0.45	-0.26	-2.10	-0.70	-0.40	-0.23	-0.93%
0 to 7.7 vol%	10%	-2.37	-0.64	-0.06	-0.07	-1.78	-0.06	-0.07	-0.07	-0.64%
	15%	-2.38	-0.65	-0.07	-0.07	-1.79	-0.06	-0.07	-0.07	-0.64%
	20%	-2.39	-0.65	-0.07	-0.07	-1.80	-0.07	-0.07	-0.07	-0.65%
	25%	-2.40	-0.65	-0.07	-0.07	-1.80	-0.07	-0.07	-0.07	-0.65%
	50%	-2.43	-0.68	-0.09	-0.08	-1.84	-0.10	-0.09	-0.08	-0.67%
0 to 10 vol%	10%	-3.23	-1.15	-0.45	-0.27	-2.38	-0.84	-0.37	-0.25	-1.12%
	15%	-3.16	-1.09	-0.43	-0.26	-2.29	-0.80	-0.35	-0.24	-1.08%
	20%	-3.09	-1.03	-0.40	-0.25	-2.20	-0.74	-0.33	-0.23	-1.03%
	25%	-3.02	-0.95	-0.36	-0.23	-2.11	-0.67	-0.30	-0.22	-0.98%
	50%	-2.66	-0.48	0.00	-0.01	-1.67	-0.19	0.05	-0.02	-0.62%
5.7 to 0 vol%	10%	-2.51	-3.24	-3.44	-3.49	-2.80	-3.32	-3.46	-3.50	-3.22%
	15%	-2.44	-3.19	-3.42	-3.49	-2.73	-3.28	-3.45	-3.50	-3.19%
	20%	-2.38	-3.14	-3.39	-3.48	-2.65	-3.23	-3.43	-3.49	-3.15%
	25%	-2.32	-3.08	-3.36	-3.47	-2.58	-3.17	-3.40	-3.48	-3.11%
	50%	-2.01	-2.69	-3.07	-3.28	-2.20	-2.78	-3.13	-3.32	-2.81%
7.7 to 0 vol%	10%	-3.06	-3.46	-3.50	-3.51	-3.31	-3.48	-3.50	-3.51	-3.42%
	15%	-3.05	-3.46	-3.50	-3.51	-3.29	-3.47	-3.50	-3.51	-3.41%
	20%	-3.04	-3.45	-3.49	-3.51	-3.28	-3.46	-3.50	-3.51	-3.40%
	25%	-3.03	-3.43	-3.49	-3.50	-3.27	-3.45	-3.49	-3.51	-3.40%
	50%	-2.97	-3.36	-3.43	-3.47	-3.20	-3.37	-3.44	-3.47	-3.34%
10 to 0 vol%	10%	-3.99	-3.84	-3.60	-3.54	-4.13	-3.75	-3.57	-3.53	-3.75%
	15%	-4.07	-3.90	-3.63	-3.54	-4.22	-3.79	-3.59	-3.53	-3.79%
	20%	-4.15	-3.96	-3.65	-3.56	-4.31	-3.85	-3.62	-3.54	-3.83%
	25%	-4.22	-4.03	-3.69	-3.57	-4.40	-3.92	-3.65	-3.56	-3.88%
	50%	-4.60	-4.48	-4.04	-3.79	-4.85	-4.37	-3.97	-3.75	-4.23%

Table 26

Predicted Percent Change in Exhaust Emissions of Toxics During Transitions Between Ethanol Fuels and Non-oxygenated Fuels not Subject to RVP Standard

Transition from	Terminal Tank Heel	Vehicle 1 Predicted change for each turnover (percent)				Vehicle 2 Predicted change for each turnover (percent)				Average Change During Transition
0 to 5.7 vol%	10%	-3.03	-1.86	-1.25	-1.07	-2.70	-1.62	-1.17	-1.05	-1.72%
	15%	-3.29	-2.05	-1.32	-1.10	-3.01	-1.78	-1.23	-1.07	-1.85%
	20%	-3.54	-2.26	-1.42	-1.13	-3.31	-1.98	-1.31	-1.10	-2.01%
	25%	-3.79	-2.50	-1.55	-1.19	-3.61	-2.20	-1.42	-1.14	-2.17%
	50%	-5.04	-4.05	-2.74	-1.93	-5.11	-3.77	-2.53	-1.80	-3.37%
0 to 7.7 vol%	10%	-4.59	-4.06	-3.75	-3.63	-4.55	-4.01	-3.70	-3.61	-3.99%
	15%	-4.82	-4.22	-3.82	-3.65	-4.82	-4.16	-3.75	-3.63	-4.11%
	20%	-5.04	-4.41	-3.91	-3.68	-5.09	-4.33	-3.83	-3.66	-4.24%
	25%	-5.27	-4.63	-4.03	-3.73	-5.36	-4.54	-3.92	-3.69	-4.40%
	50%	-6.39	-6.02	-5.09	-4.39	-6.70	-5.94	-4.92	-4.29	-5.47%
0 to 10 vol%	10%	-6.50	-6.79	-6.67	-6.62	-6.85	-6.77	-6.65	-6.61	-6.68%
	15%	-6.73	-6.97	-6.74	-6.64	-7.13	-6.92	-6.71	-6.63	-6.81%
	20%	-6.96	-7.16	-6.84	-6.68	-7.41	-7.10	-6.78	-6.66	-6.95%
	25%	-7.19	-7.39	-6.96	-6.73	-7.68	-7.31	-6.89	-6.70	-7.11%
	50%	-8.30	-8.81	-8.06	-7.42	-9.02	-8.76	-7.92	-7.32	-8.20%
5.7 to 0 vol%	10%	-2.95	-4.43	-4.98	-5.14	-3.36	-4.64	-5.05	-5.16	-4.46%
	15%	-2.67	-4.22	-4.89	-5.11	-3.02	-4.46	-4.98	-5.14	-4.31%
	20%	-2.39	-3.99	-4.79	-5.07	-2.69	-4.25	-4.89	-5.11	-4.15%
	25%	-2.11	-3.73	-4.65	-5.01	-2.35	-4.00	-4.77	-5.06	-3.96%
	50%	-0.70	-2.00	-3.35	-4.21	-0.66	-2.26	-3.56	-4.34	-2.63%
7.7 to 0 vol%	10%	-4.20	-4.79	-5.07	-5.16	-4.27	-4.89	-5.11	-5.17	-4.83%
	15%	-3.96	-4.61	-5.00	-5.14	-3.98	-4.73	-5.05	-5.15	-4.70%
	20%	-3.71	-4.40	-4.90	-5.10	-3.68	-4.54	-4.97	-5.13	-4.56%
	25%	-3.46	-4.17	-4.78	-5.05	-3.39	-4.33	-4.87	-5.09	-4.39%
	50%	-2.22	-2.65	-3.64	-4.35	-1.90	-2.80	-3.81	-4.45	-3.23%
10 to 0 vol%	10%	-5.65	-5.23	-5.19	-5.19	-5.36	-5.19	-5.19	-5.19	-5.27%
	15%	-5.46	-5.09	-5.14	-5.17	-5.14	-5.08	-5.15	-5.18	-5.18%
	20%	-5.28	-4.94	-5.06	-5.15	-4.92	-4.94	-5.09	-5.16	-5.07%
	25%	-5.09	-4.77	-4.97	-5.11	-4.70	-4.78	-5.01	-5.13	-4.95%
	50%	-4.14	-3.63	-4.13	-4.59	-3.57	-3.64	-4.23	-4.66	-4.07%