Table 3. Summer Emission Effects of Replacing MTBE with Ethanol in Reformulated Gasoline

Property	Baseline Fuel	MTBE 11.2 Volume Percent		Ethanol 5.8 Volume Percent		Ethanol 10 Volume Percent		Federal RFG Emission Requirements
		Target Fuel Properties		Target Fuel Properties		Target Fuel Properties		
MTBE (wt% oxygen)	0	2.0		0.0		0.0		
ETBE (wt% oxygen)	0	0.0		0.0		0.0		
Ethanol (wt% oxygen)	0	0.0		2.0		3.5		
TAME (wt% oxygen)	0	0.0		0.0		0.0		
Sulfur (ppm)	339	132.0		140.0		133.8		
RVP (psi)	8.7	6.4		7.5		7.4		
E200 (%)	41	45.9		42.6		45.2		
E300 (%)	83	77.3		75.9		77.0		
Aromatics (vol%)	32	25.7		27.3		26.1		
Olefins (vol%)	9.2	9.1		9.6		9.2		
Benzene (vol%)	1.53	0.3		0.4		0.3		
	mg/mi	mg/mi	Percent Change from Baseline	mg/mi	Percent Change from Baseline	mg/mi	Percent Change from Baseline	
Exhaust VOC	907.0	790.9	-12.80	856.2	-5.60	822.7	-9.29	
Nonexhaust VOC	492.1	245.5	-50.11	326.2	-33.71	316.0	-35.78	
Total VOC	**1,399.1**	**1,036.4**	**-25.92**	**1,182.4**	**-15.48**	**1,138.7**	**-18.61**	
Exhaust benzene	53.5	28.6	-46.55	29.7	-44.60	26.9	-49.83	
Nonexhaust benzene	5.5	0.7	-87.26	1.0	-82.43	0.9	-83.58	
Acetaldehyde	4.4	4.2	-6.09	7.6	71.76	10.9	144.71	
Formaldehyde	9.7	11.8	22.08	10.7	10.40	10.8	10.97	
Butadiene	9.4	9.1	-3.27	9.6	2.14	8.8	-6.40	
POM	3.0	2.7	-12.80	2.9	-5.60	2.8	-9.29	
Total exhaust toxics	80.1	56.4	-29.65	60.4	-24.54	60.0	-25.06	
Total toxics	**85.6**	**57.1**	**-33.35**	**61.4**	**-28.26**	**60.9**	**-28.82**	
NO_x	**1340.0**	**1231.3**	**-8.11**	**1243.6**	**-7.20**	**1234.5**	**-7.87**	
VOC Reduction			**-25.92**		**-15.48**		**-18.61**	≥25.9-percent Reduction
Toxics Reduction			**-33.35**		**-28.26**		**-28.82**	≥20.0-percent Reduction
NO_X Reduction			**-8.11**		**-7.20**		**-7.87**	≥5.5-percent Reduction
Benzene Vol%		**0.3**		**0.4**		**0.3**		≤1.0 volume percent

Definition of abbreviations and technical terms:

wt% = weight percent;
ppm = parts per million;
psi = pounds per square inch;
vol% = volume percent;
VOC = volatility organic compounds;
POM = polycyclic organic materials;
mg/mi = milligrams per mile;
MTBE = methyl tertiary butyl ether;
ETBE = ethyl tertiary butyl ether;
TAME = tertiary amyl methyl ether;
RVP = Reid vapor pressure.

Source: Energy Information Administration.