# Impacts of Regulation on U.S. Gasoline Composition

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19th Annual National TANKS CONFERENCE & EXPO
The Henry B. Gonzalez Convention Center
March 5 - 7, 2007
NEIWPCC EPA ASTSWMO

**How much benzene is in gasoline? Do we still have MTBE in reformulated gasoline (RFG)?** The answers to these questions depend on some technical factors, but usage of these compounds is strongly dependent on regulations governing gasoline composition. The most important gasoline regulations are the Clean Air Act Amendments of 1990 which established the winter oxygenate program beginning in 1992, and the reformulated gasoline program which began in 1995. Then beginning in 2000 some states and local governments banned MTBE totally or in part. The 2005 Energy Policy Act removed the oxygenated additive mandate from RFG. In addition to RFG limitations on benzene (<1%), additional limits throughout the U.S. (<0.62%) are coming with the implementation of the Mobile Sources Air Toxics (MSAT) rule in 2011.

1

All of the rules associated with these programs set limits and have been effective at various dates in various locations. **Winter oxygenated** gasoline contains an oxygenated additive for 2 to 4 months during the year, depending on the state requirements. This program sets no limits on benzene concentrations.

**Reformulated gasoline** limits benzene to a nominal level of 1% and until 2006 required an oxygenated additive at 2.0% oxygen by weight. Since the standards can be met on an averaged basis, individual samples may vary significantly from these levels. Where conventional gasoline is used, benzene levels are set from 1990 producer baselines and can range up to 5%. MTBE or other ethers can appear in conventional gasoline as it serves as an octane booster (2% to 7%, typically).

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Because of concerns over ground water contamination, in 2000 individual states and some local governments began to **ban MTBE**. The bans have different effective dates and allow for different maximum MTBE levels or require total bans.

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**Nationwide gasoline** composition data are compiled by the EPA Office of Transportation and Air Quality, Northrup-Grumman in Bartlesville, Oklahoma, the Department of Energy, Energy Information Agency (EIA) and EPA Office of Research and Development.

EIA data document the removal of MTBE from RFG.

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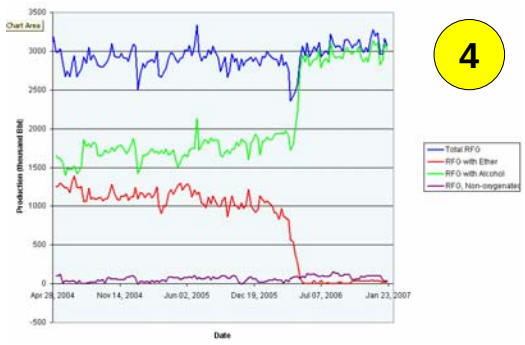


**New York City**, for example, entered the winter oxygenates program in 1992, entered the reformulated gasoline program in 1995, exited the winter oxygenates program in 1998, and MTBE was banned in New York in 2004. Data for premium gasoline from the Northup-Grumman data set show that the MTBE concentrations of fuel sold in the New York area tracked the requirements. Because the standards can be met on an averaged basis, and other oxygenates are not shown, low MTBE concentrations do not imply non-compliant gasoline.

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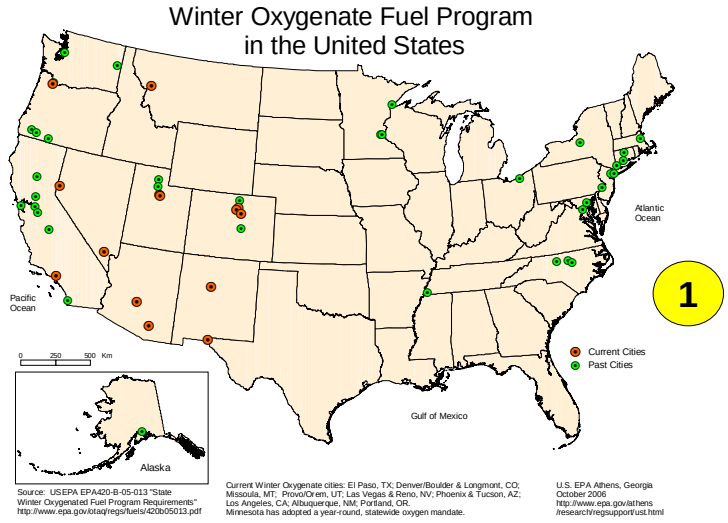
Winter Oxygenate Fuel Program in the United States




Source: USEPA EPA420-B-05-013 "State Winter Oxygenated Fuel Program Requirements" http://www.epa.gov/otaq/regs/fuels/420b05013.pdf

Current Winter Oxygenate cities: El Paso, TX; Denver/Boulder & Longmont, CO; Missoula, MT; Provo/Orem, UT; Las Vegas & Reno, NV; Phoenix & Tucson, AZ; Los Angeles, CA; Albuquerque, NM; Portland, OR. Minnesota has adopted a year-round, statewide oxygen mandate.

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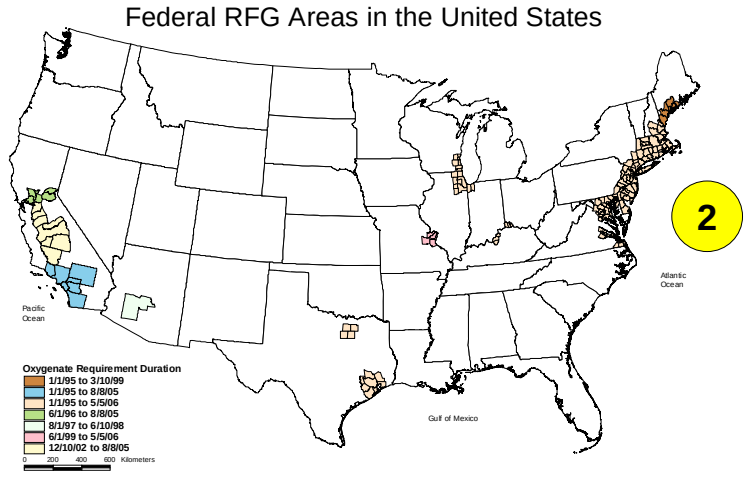
Federal RFG Areas in the United States




Source: 40 CFR 80.70
Whole county boundaries shown for partial counties: Grundy & Kendall in Illinois, Bullitt & Oldham in Kentucky. Not represented: above 4500' on White Face Mtn in Essex County, New York.

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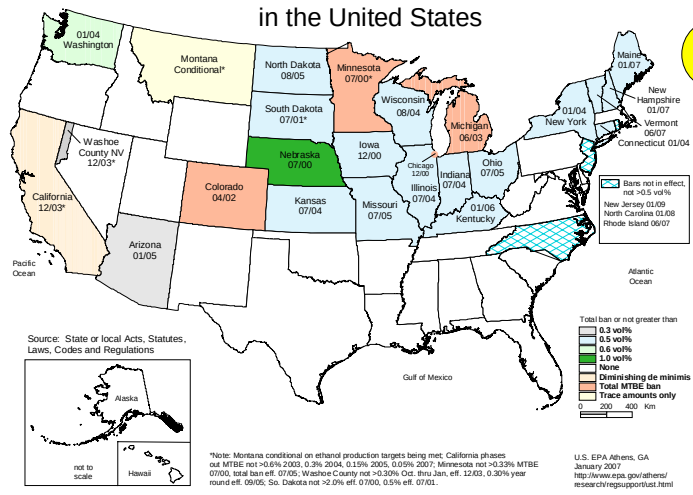
MTBE Bans and Phaseout Dates in the United States




Source: State or local Acts, Statutes, Laws, Codes and Regulations

*Note: Montana conditional on ethanol production targets being met; California phases out MTBE not >0.6% 2003, 0.3% 2004, 0.15% 2005, 0.05% 2007; Minnesota not >0.33% MTBE 07/00, total ban eff. 07/05; Washoe County not >0.30% Oct. thru Jan, eff. 12.03, 0.30% year round eff. 09/05; So. Dakota not >2.0% eff. 07/00, 0.5% eff. 07/01.

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**MTBE (vol %), High Octane, New York, NY**