

SUMMARY OF BOARD ITEM

ITEM # 02-9-03: Public Hearing to Consider Amendments to the California Reformulated Gasoline Regulations Including Refinements to the Prohibitions of MTBE and Other Oxygenates

STAFF RECOMMENDATION: The staff recommends that the Air Resources Board (ARB) approve the proposed amendments to the California Phase 3 Reformulated Gasoline (CaRFG3) regulations. The amendments would do the following: (1) revise the prohibitions of gasoline produced with the use of MTBE or other prohibited oxygenates; (2) revise the schedule for implementation of allowable residual MTBE levels in California gasoline; (3) establish specific limits on the allowable residual levels for total weight percent oxygen supplied by oxygenates other than MTBE and ethanol; (4) add provisions for documentation of the presence or absence of ethanol in CaRFG delivered to retail outlets, and make other changes.

DISCUSSION: In December 1999, the Board approved the CaRFG3 regulations which required the phase-out of MTBE by December 31, 2002 as directed by the Governor's Executive Order D-5-99. The regulations also established CaRFG3 standards to become effective on the same date. To address the question of trace amounts of MTBE that may be present as contamination, the regulations established a three-stage schedule for reducing residual levels of MTBE in CaRFG3 in the distribution system. The use of any oxygenate other than ethanol as a replacement for MTBE in California gasoline was also banned by these regulations unless a multimedia evaluation of the use of the oxygenate in California gasoline has been conducted, and the California Environmental Policy Council (CEPC) has determined that its use will not have a significant adverse impact on the public health or the environment.

On March 14, 2002, Governor Davis issued Executive Order D-52-02 which directed the ARB to postpone for one year the prohibitions regarding the

use of MTBE and other specified oxygenates in California gasoline. At a hearing on July 25, 2002, the Board approved amendments to the CaRFG3 regulations that postponed the prohibition of the use of MTBE and other oxygenates other than ethanol in California gasoline from December 31, 2002 to December 31, 2003. The amendments, which were submitted to OAL on November 8, 2002, also postponed the schedule for reducing residual levels of MTBE in CaRFG3 one year.

Staff is proposing amendments that would clarify the prohibitions on gasoline produced with the use of MTBE or other specified oxygenates. The amended regulation would remove ambiguities that could under some circumstances exclude imported blendstocks that contain MTBE and other prohibited oxygenates that are incidentally acquired through the production process or during transport.

Staff is also proposing amendments that would provide a more practical schedule for reducing residual MTBE levels. The additional time provided under the staff proposal would allow staff time to collect more data to determine the practicality of the proposed levels and timetable, and propose changes if necessary. The MTBE residual levels would be reduced in four steps instead of the three steps currently required by the regulations.

During the first six months after the MTBE phase-out – starting December 31, 2003 – California gasoline could not contain more than 0.60 volume percent MTBE. Starting July 1, 2004, gasoline would be prohibited from containing more than 0.30 volume percent MTBE and eighteen months later, starting December 31, 2005, gasoline would be prohibited from containing more than 0.15 volume percent. The residual MTBE limit would be further reduced to 0.05 volume percent starting July 1, 2007.

The current regulations do not set prohibition levels for oxygenates that have not been approved by the CEPC. The proposed amendments would establish specific limits on the allowable residual levels for

total oxygen content in gasoline from these oxygenates. This will significantly improve the enforceability of the restrictions on oxygenates both in gasoline produced in the state and imported gasoline. During the first six months after the MTBE phase-out, starting December 31, 2003, the combined oxygen concentration due to these prohibited oxygenates could not exceed 0.10 percent by weight. A final prohibition level of 0.06 weight percent would apply starting July 1, 2004.

Staff is also proposing a new provision that would require any person delivering gasoline to a retail outlet to provide to the outlet operator or responsible employee, at the time of delivery of the fuel, an invoice, bill of lading, shipping paper, or other documentation which states whether the gasoline does or does not contain ethanol, and which may identify the volumetric amount of ethanol. This documentation would provide retailers and distributors with the information needed to prevent inadvertent mixing of gasoline containing ethanol with gasoline not containing ethanol. Federal regulations prohibit such mixing between January 1 and September 15 to prevent increases in VOC emissions during the ozone season.

Staff is proposing additional amendments to ensure that the regulations work effectively. One amendment would sunset the requirement for documentation of the presence of MTBE in the gasoline delivered to retail outlets after December 30, 2003. Another amendment would replace the recently added provision regarding oxygenates in early opt-in CaRFG3 with a requirement that early opt-in CaRFG3 meet limits of 0.60 volume percent for MTBE and 0.10 weight percent oxygen collectively from the specified oxygenates other than MTBE or ethanol when it is supplied from the production or import facility. This will provide specific standards that can be monitored by refiners and importers and be readily enforced by ARB inspectors.

SUMMARY AND IMPACTS: There should be no significant negative impacts on air quality as the proposed amendments do not change the intent of the CaRFG3 regulations. The proposed changes will not significantly affect the formulation of California gasoline and as such will not adversely affect the emissions benefits from the CaRFG3 program in comparison to the existing CaRFG2 program.

There will be no significant negative impacts on water quality. The basic prohibitions against adding MTBE and other oxygenates other than ethanol remain unchanged. The proposal sets residual limits on oxygenates other than MTBE and ethanol that are as stringent as those for MTBE.

The proposed amendments are generally designed to ensure effective enforcement of the oxygenate provisions of the CaRFG3 regulations while reducing undue constraints on the gasoline distribution system during implementation of the MTBE phase-out. They do not fundamentally alter the regulations and should have no negative economic impacts.

The revised schedule for reducing residual MTBE levels could provide a benefit for the supply and price of California gasoline by allowing additional time to flush the distribution and marketing system without the need for extraordinary efforts. In addition, delaying the implementation of residual limits that may be impractical could mean prevention of interruptions in the supply and availability of gasoline for California consumers.

TITLE 13. CALIFORNIA AIR RESOURCES BOARD

NOTICE OF PUBLIC HEARING TO CONSIDER AMENDMENTS TO THE CALIFORNIA REFORMULATED GASOLINE REGULATIONS INCLUDING REFINEMENTS TO THE PROHIBITIONS OF MTBE AND OTHER OXYGENATES

The Air Resources Board (ARB or Board) will conduct a public hearing at the time and place noted below to consider amendments to the California Reformulated Gasoline (CaRFG) Regulations. The proposed amendments would (1) revise the prohibitions of gasoline produced with the use of MTBE or other prohibited oxygenates; (2) revise the schedule for implementation of allowable residual MTBE levels in California gasoline; (3) establish allowable residual levels for total weight percent oxygen supplied by oxygenates other than MTBE and ethanol; (4) add provisions for documentation of the presence or absence of ethanol in CaRFG delivered to retail outlets, and make other changes.

Date	December 12, 2002
Time	9:00 a.m.
Place	California Environmental Protection Agency Air Resources Board Central Valley Auditorium 1001 I Street Sacramento, CA 95814

This item will be considered at a two-day meeting of the Board, which will commence at 9:00 a.m. on Thursday, December 12, 2002, and may continue at 8:30 a.m. on Friday, December 13, 2002. This item may not be considered until Friday, December 13, 2002. Please consult the agenda for the meeting, which will be available at least 10 days before December 12, 2002, and posted on the ARB's website, to determine the day on which this item will be considered.

This facility is accessible to persons with disabilities. If accommodation is needed, please contact ARB's Clerk of the Board at (916) 322-5594, or Telecommunications Device for the Deaf (TDD) (916) 324-9531, or (800) 700-8326 for TDD calls from outside the Sacramento area, by November 27, 2002, to ensure accommodation.

INFORMATIVE DIGEST OF PROPOSED ACTION AND POLICY STATEMENT OVERVIEW

Sections Affected: Proposed amendments to sections 2261(b)(3), 2262.6, and 2273, and adoption of 2260(a)(26.5) and 2273.5 of Title 13, California Code of Regulations (CCR).

Background

The ARB administers the Phase 2 CaRFG (CaRFG2) regulations, which have applied to all California gasoline since March 1996. The regulations establish standards for the following eight gasoline properties: sulfur, benzene, olefin, aromatic hydrocarbon, and oxygen contents, the 50 percent distillation temperature, (T50), the 90 percent distillation temperature, (T90), and summertime Reid vapor pressure (RVP).

The CaRFG regulations allow refiners to use a "Predictive Model" to specify alternative formulations. The Predictive Model is a set of mathematical equations that relate emissions rates of exhaust hydrocarbons, oxides of nitrogen (NOx), and potency weighted toxics for four toxic air contaminants (benzene, 1,3-butadiene, formaldehyde, and acetaldehyde) to the values of the eight regulated gasoline properties. An alternative gasoline formulation is acceptable if emissions of hydrocarbons, NOx, and potency-weighted toxics resulting from this formulation are no greater than emissions from gasoline having the specifications set forth in the CaRFG2 standards. Currently, most of the gasoline sold in California complies with the CaRFG2 regulations through the use of the Predictive Model.

Since 1995, most of the state's gasoline has contained about 11 percent MTBE, which, along with ethanol, is an oxygenate that is used to introduce oxygen into gasoline and to improve octane. The widespread use of MTBE has primarily resulted from two programs mandated by the federal Clean Air Act (CAA) – the federal reformulated gasoline (RFG) program administered directly by the U.S. Environmental Protection Agency (U.S. EPA), and the wintertime oxygenates program which is ultimately administered by ARB. In areas not subject to the federal RFG or the CO wintertime oxygen requirements, the Predictive Model may be used to reduce or eliminate oxygen in California gasoline.

One of the requirements for federal RFG is that it contain at least 2.0 weight % oxygen year-round in on-road vehicles in severe and extreme non-attainment areas for ozone. By the end of 2002, the federal RFG requirements apply in San Diego County, the greater Los Angeles area (Los Angeles, Orange and Ventura Counties, and parts of Riverside and San Bernardino Counties), the greater Sacramento area (Sacramento County and parts of Yolo, Solano, Sutter, Placer, and El Dorado Counties), and the San Joaquin Valley Air Basin. Together, these areas account for about 80 percent of the gasoline sold in California. California has asked U.S. EPA to exercise its authority to waive the minimum oxygen requirement, but in June 2001 the agency denied the state's request. A lawsuit challenging the denial is currently pending in the U.S. Court of Appeals for the Ninth Circuit.

California's wintertime oxygenates requirements have resulted from requirements in the federal CAA that states mandate the use of oxygenated gasoline during the winter in most areas that are in nonattainment of the National Ambient Air Quality Standard (NAAQS) for carbon monoxide (CO). The use of oxygen in gasoline reduces emissions of CO from the existing vehicle fleet, and ambient CO concentrations are the highest in the winter. As ambient CO concentrations have declined in California as a result of its

mobile source emissions reduction programs, the ARB has been able to eliminate the winter oxygen requirement in areas where it is no longer necessary for attainment and maintenance of the NAAQS for CO. At present, the ARB requires a wintertime minimum oxygen content of 1.8 wt.% only in Los Angeles, Orange, Riverside, San Bernardino, Ventura, and Imperial counties.

Several years ago, concerns began to increase about adverse environmental impacts from the use of MTBE in the state's gasoline. The main concern with the continued use of MTBE is the potential for contamination of California's groundwater, surface water, and drinking water systems. MTBE is very soluble in water and will transfer to groundwater faster, and will travel farther and more easily than other gasoline constituents when gasoline leaks from underground storage tanks or pipelines.

The California MTBE Public Health and Environmental Protection Act of 1997 directed the University of California (U.C.) to conduct research on the effects of MTBE. The legislation also required the Governor to take appropriate action based on the U.C. findings and information from public hearings conducted on the U.C. report. On March 25, 1999, Governor Davis signed Executive Order D-5-99, in which he found that, on balance, there is a significant risk to the environment from using MTBE in gasoline in California. The Executive Order directed the California Energy Commission (CEC) to issue a timetable for the removal of MTBE from gasoline at the earliest possible date, but not later than December 31, 2002. It also directed the ARB to adopt CaRFG3 regulations that will provide additional flexibility in lowering or removing the oxygen content requirement while maintaining current emissions and air quality benefits and ensuring compliance with the State Implementation Plan (SIP).

At a December 9, 1999, hearing, the Board approved the CaRFG3 regulations consistent with the Governor's directive and the subsequent CEC recommendation that December 31, 2002 was the earliest feasible date for a ban on MTBE. The CaRFG3 regulations prohibited California gasoline produced with MTBE and other specified oxygenates starting December 31, 2002, established CaRFG3 standards applicable the same date, established a CaRFG3 Predictive Model, and made various other changes.

To address the question of trace amounts of MTBE that may be present as contamination, the CaRFG3 regulations establish a three-stage schedule for reducing residual levels of MTBE in CaRFG3 in the distribution system. The regulations require that the concentration of MTBE in distributed CaRFG3 not exceed 0.3 percent by volume beginning December 31, 2002. This level must be reduced to 0.15 percent by volume starting December 31, 2003 and 0.05 percent by volume starting December 31, 2004.

On March 14, 2002, Governor Davis issued Executive Order D-52-02, which directed the ARB to take the necessary actions, by July 31, 2002, to postpone for one year the prohibitions of the use of MTBE and other specified oxygenates in California gasoline, and the related requirements for California Phase 3 reformulated gasoline. The Governor found that it is not possible to eliminate use of MTBE on January 1, 2003 without significantly risking disruption of the availability of gasoline in California.

In response to Governor Davis's 2002 Executive Order, the Board, at a July 25, 2002 hearing, approved amendments to the CaRFG3 regulations that would postpone by one year the dates approved in December 1999 and adopted June 15, 2000. The MTBE prohibitions approved by the Board on July 25, 2002 are not yet in effect because the rulemaking process has not been completed.

The CaRFG3 regulation amendments approved by the Board in July will ban gasoline produced with the use of MTBE for all California gasoline supplied from production and import facilities starting December 31, 2003. This prohibition is phased in for most deliveries of gasoline to retail outlets occurring after February 13, 2004, and to gasoline throughout the distribution system starting March 31, 2004.

Other amendments necessary to implement the postponement of the MTBE ban were also approved at the July 2002 hearing, including the one-year postponement of the deadlines for reducing residual levels of MTBE in CaRFG3 after the addition of MTBE is banned. The amended regulations will require that the concentration of MTBE in distributed CaRFG3 not exceed 0.3 percent, by volume, beginning December 31, 2003. This level is reduced to 0.15 percent by volume starting December 31, 2004 and 0.05 percent by volume starting December 31, 2005.

The CaRFG3 regulations also impose a conditional ban on the use of any oxygenate other than ethanol as a replacement for MTBE in California gasoline. Under the amendments approved by the Board in July 2002, the ban will be phased in starting December 31, 2003 on the same schedule as the ban on gasoline produced with the use of MTBE. Such oxygenates may not be used to produce California gasoline unless a multimedia evaluation of the use of the oxygenate in California gasoline has been conducted, and the California Environmental Policy Council (CEPC) has determined that its use will not have a significant adverse impact on the public health or the environment. The current CaRFG3 regulations do not set a prohibition level for these oxygenates.

The Proposed Amendments

The intent of the CaRFG3 oxygenate prohibitions is to prohibit the intentional blending of MTBE or other prohibited oxygenates into California gasoline and to control the amount of these prohibited oxygenates present in California gasoline because of contamination or because they are unavoidable byproducts of the production process. When the Board in 1999 approved the implementation schedule for the limits on residual levels of MTBE, it directed the Executive Officer to evaluate the practicality of the specified MTBE residual limits and report back to the Board with a recommendation on whether the limits should be revised. This evaluation is necessary because if MTBE continues to be used outside California in significant quantities, MTBE could find its way into California as a contaminant in imported fuel. Also, MTBE can be formed as a contaminant in various refining and production facilities.

Data collected by ARB staff suggest that it may require more time than is currently

allowed in the regulation to reduce residual MTBE levels to the specified levels – even in an MTBE-free gasoline distribution system. Staff also considered the impact of gasoline produced in California for export to Arizona and Nevada. Eighty percent of Nevada's gasoline and 60 percent of Arizona's is produced in California. Nevada has not banned MTBE and Arizona's MTBE ban does not become effective until 180 days after California's. Therefore, MTBE-containing gasoline may still be produced in California and transported through the California distribution system after California's MTBE ban is implemented.

The staff is proposing an initial residual MTBE level of 0.60 volume percent MTBE, which is the MTBE de minimis level adopted by the ARB in September 1999 for labeling retail pumps dispensing gasoline that is not intentionally blended with MTBE. This level is also the same as the EPA's MTBE de minimis level for identifying RFG not blended with MTBE. This concentration of 0.6 volume percent is sufficiently low to prevent gasoline intentionally blended with MTBE from being labeled as non-MTBE, but it is high enough to allow gasoline blended without MTBE to be shipped within the current gasoline distribution system during the first six months of the phase-out.

The staff is also proposing delays in the implementation dates for the other phased residual limits to allow sufficient time for the residual levels of MTBE to decline without interfering with the supply and availability of gasoline in California. The additional time would also allow staff time to collect more data on residual MTBE levels in California gasoline. Staff can then determine whether the proposed levels and timetable are practical and propose changes if necessary.

Staff is also proposing allowable residual levels for oxygenates other than MTBE or ethanol to improve the enforceability of the regulation and allow the differentiation between commonly occurring trace contaminants and deliberately added oxygenates.

The staff is proposing amendments to the CaRFG3 regulations that would improve the enforceability of the regulations and also respond to the Board's directive to evaluate the practicality of the current limits on residual levels of MTBE and other prohibited oxygenates in California gasoline.

Revising the prohibitions of gasoline “produced with the use of” MTBE or other oxygenates other than ethanol. The proposed amendments would refine the prohibitions to remove the ambiguities that make the prohibitions difficult to administer, and that could under some circumstances exclude imported blendstocks that contain MTBE and other prohibited oxygenates that are incidentally acquired through the production process or during transport.

Under the staff proposal, a California refiner would be prohibited at the refinery from adding MTBE in neat form either to gasoline or blendstocks used to produce gasoline at the refinery. The refiner would also be prohibited from using any gasoline blendstock that contains more than 0.6 volume percent MTBE when it is supplied to the refinery. Imported California gasoline would only be subject to the allowable residual MTBE levels of the CaRFG3 regulations. Application of the allowable residual levels on MTBE

in imported gasoline should be sufficient to prohibit unacceptable MTBE levels while avoiding undue constraints in gasoline imports during potential supply shortages.

The proposed amendments to the prohibitions on gasoline "produced with the use of" any oxygenate other than ethanol or MTBE parallel those proposed for MTBE. They would prohibit the addition of any oxygenate, other than ethanol or MTBE, in neat form to the California gasoline or to a blending component used to produce gasoline at the refinery. They would also prohibit the use of a blending component that contained greater than 0.1 weight percent total oxygen from oxygenates other than ethanol or MTBE when it was supplied to the California production facility. Imported California gasoline would only be subject to the total oxygen weight percent limits proposed in this rulemaking, because of the difficulties in monitoring the was imported gasoline has been produced at some out-of-state location.

Rewards to the schedule for implementation of allowable residual levels of MTBE. The proposed amendments would require that MTBE residual levels be reduced in four steps instead of the three steps currently required by the regulations. During the first six months after the MTBE phase-out – starting December 31, 2003 – California gasoline could not contain more than 0.60 volume percent MTBE. Starting July 1, 2004, gasoline would be prohibited from containing more than 0.30 volume percent MTBE and eighteen months later, starting December 31, 2005, gasoline would be prohibited from containing more than 0.15 volume percent. The residual MTBE limit would be further reduced to 0.05 volume percent starting July 1, 2007. Staff will continue to evaluate the practicality of the later limits.

Establishment of allowable residual levels for oxygenates other than MTBE and ethanol. The amendments would add a schedule for specifications for total oxygen content in gasoline from oxygenates other than MTBE and ethanol. During the first six months after the MTBE phase-out, starting December 31, 2003, the combined oxygen concentration due to these prohibited oxygenates could not exceed 0.10 percent by weight. This limit of 0.10 weight percent is the oxygen level equivalent to the proposed residual limit of 0.60 volume percent for MTBE during that period. The final prohibition level of 0.06 weight percent would apply starting July 1, 2004. These proposed amendments will significantly improve the enforceability of the restrictions on oxygenates both in gasoline produced in the state and imported gasoline. The prohibitions would apply unless a multimedia evaluation of the use of the oxygenate in California gasoline has been conducted, and the CEPC has determined that such use will not cause a significant adverse impact on public health or the environment.

Documentation of the presence or absence of ethanol in CaRFG delivered to retail outlets. The proposed amendments would require any person delivering gasoline to a retail outlet to provide to the outlet operator or responsible employee, at the time of delivery of the fuel, an invoice, bill of lading, shipping paper, or other documentation which states whether the gasoline does or does not contain ethanol, and which may identify the volumetric amount of ethanol.

Other amendments. Staff is proposing additional amendments to ensure that the regulations work effectively. One amendment would sunset the requirement for documentation of the presence of MTBE in the gasoline delivered to retail outlets after December 30, 2003. Another amendment would replace the recently added provision regarding oxygenates in early opt-in CaRFG3 with a requirement that early opt-in CaRFG3 meet limits of 0.60 volume percent for MTBE and 0.10 weight percent oxygen collectively from the specified oxygenates other than MTBE or ethanol when it is supplied from the production or import facility. This will provide specific standards that can be monitored by refiners and importers and be readily enforced by ARB inspectors.

COMPARABLE FEDERAL REGULATIONS

As noted above, the U.S. EPA administers the federal RFG regulations, which by the end of 2002 will apply to about 80 percent of California's gasoline and are contained in 40 CFR §§ 80.40 and following. The federal RFG regulations do not prohibit the use of MTBE.

The U.S. EPA has published de minimis levels for oxygenates that are not intended by the producer to be blended into the reformulated gasoline, but are present as a result of operational necessity. The de minimis levels are specified in the U.S. EPA document, "RFG Questions and Answers, May 9, 1995," which provides guidance on compliance with the Agency's RFG regulations. For purposes of meeting the applicable oxygen requirements for a final gasoline blend, U.S. EPA will not consider the introduction of an oxygenate intentional if the amount of the oxygenate is not more than 0.4 volume percent for ethanol, or 0.6 volume percent for MTBE, ETBE, TAME or t-butanol, or 0.2 volume percent for methanol.

AVAILABILITY OF DOCUMENTS AND AGENCY CONTACT PERSONS

The ARB staff has prepared a Staff Report: Initial Statement of Reasons (ISOR) for the proposed regulatory action, which includes a summary of the environmental and economic impacts of the proposal and supporting technical documentation. The report is entitled "Proposed Amendments to the California Reformulated Gasoline Regulations to Amend the Prohibitions for MTBE and Other Oxygenates."

Copies of the Staff Report and the full text of the proposed regulatory language, in underline and strikeout format to allow for comparison with the existing regulations, may be accessed on the ARB's web site listed below, or may be obtained from the Public Information Office, Air Resources Board, 1001 I Street, Environmental Services Center, First Floor, Sacramento, CA 95814, (916) 322-2990 at least 45 days prior to the scheduled hearing (December 12, 2002).

Upon its completion, the Final Statement of Reasons (FSOR) will also be available and copies may be requested from the agency contact persons in this notice, or may be accessed on the ARB's web site listed below.

Inquiries concerning the substance of the proposed regulation may be directed to the designated agency contact persons, Mr. Steven Brisby, Manager, Fuels Section, (916) 322-6019, or Mr. Dean C. Simeroth, Chief, Criteria Pollutants Branch, Stationary Source Division, at (916) 322-6020.

Further, the agency representative and designated back-up contact persons to whom nonsubstantive inquiries concerning the proposed administrative action may be directed are Artavia Edwards, Manager, Board Administration & Regulatory Coordination Unit, (916) 322-6070, or Amy Whiting, Regulations Coordinator, (916) 322-6533. The Board staff has compiled a record for this rulemaking action, which includes all the information upon which the proposal is based. This material is available for inspection upon request to the contact persons.

If you are a person with a disability and desire to obtain this document in an alternative format, please contact the Air Resources Board ADA Coordinator at (916) 323-4916, or TDD (916) 324-9531, or (800) 700-8326 for TDD calls outside the Sacramento area.

This notice, the ISOR and all subsequent regulatory documents, including the FSOR, when completed, will be available on the ARB Internet site for this rulemaking at <http://www.arb.ca.gov/regact/mtberesid/mtberesid.htm>.

COSTS TO PUBLIC AGENCIES AND TO BUSINESSES AND PERSONS AFFECTED

The determinations of the Board's Executive Officer concerning the costs or savings necessarily incurred by public agencies, private persons and businesses in reasonable compliance with the proposed regulations are presented below.

In developing this regulatory proposal, the ARB staff evaluated the potential economic impacts on representative private persons or businesses. The Executive Officer has made an initial determination that the proposed regulatory action will not have a significant statewide adverse economic impact directly affecting businesses, including the ability of California businesses to compete with businesses in other states, or on representative private persons.

In developing this regulatory proposal, the ARB staff evaluated the potential economic impacts of private persons and businesses. As discussed below, the Executive Officer has determined that the proposed regulatory action will not have a significant cost impact on directly affected persons or businesses. A detailed assessment of the economic impacts of the proposed amendments can be found in the Staff Report.

The proposed amendments are generally designed to ensure effective enforcement of the oxygenate provisions of the CaRFG3 regulations while reducing undue constraints on the gasoline distribution system during implementation of the MTBE phase-out. They do not fundamentally alter the regulations and should not result in cost increases.

The proposed changes to the oxygenate prohibition provisions will provide clearly enforceable criteria for determining the acceptability of blendstocks and California gasoline. The proposed changes may provide an economic benefit as they would remove ambiguities that could have unnecessarily limited a refiner's access to imported blendstocks that contain small quantities of prohibited oxygenates that have been incidentally acquired through the production process or during transport and storage.

The proposed revisions to the schedule for implementation of allowable residual MTBE levels in California gasoline will not have a significant negative economic impact. The proposed changes could provide an economic benefit by allowing more time to flush the distribution and marketing system and reduce the levels of residual MTBE without the need for extraordinary efforts. The proposed amendments will also provide additional time to determine whether the allowable residual limits for MTBE are practical. Delaying the implementation of limits that may be impractical could benefit California consumers by preventing interruptions in the supply and availability of gasoline.

The proposed amendments establishing allowable residual levels for oxygenates other than ethanol and MTBE, will improve the enforceability of the regulation and allow the Board to delete the current requirements regarding imported gasoline produced with the use of prohibited oxygenates. Also, the removal of uncertainty regarding the status of a blendstock or gasoline could increase the efficiency of the refining process.

In accordance with Government Code section 11346.3, the Executive Officer has determined that the proposed regulatory action will not affect the creation or elimination of jobs within the State of California, the creation of new businesses or elimination of existing businesses within the State of California, or the expansion of businesses currently doing business within the State of California. An assessment of the economic impacts of the proposed regulatory action can be found in the Staff Report (ISOR).

The Executive Officer has also determined, pursuant to title 1, CCR, section 4, that the proposed regulatory action will affect small businesses. The proposed amendments to the CaRFG3 regulations are designed to assure the practical and effective implementation of the CaRFG3 prohibitions on the use of MTBE and other oxygenates other than ethanol in California gasoline. No negative economic impacts on small businesses are expected.

In accordance with Government Code sections 11346.3(c) and 11346.5(a)(11), the ARB's Executive Officer has found that the reporting requirements of the CaRFG regulations which apply to businesses are necessary for the health, safety, and welfare of the people of the State of California.

With regard to costs or savings necessarily incurred in reasonable compliance with the proposed amendments to the CaRFG regulations, the Executive Officer has determined that the proposed regulatory action will not create costs or savings, as defined in Government Code section 11346.5(a)(6), to any state agency or in federal funding to the state, costs or mandate to any local agency or school district whether or not

reimbursable by the state pursuant to part 7 (commencing with section 17500), division 4, title 2 of the Government Code, or other nondiscretionary savings to local agencies.

Before taking final action on the proposed regulatory action, the Board must determine that no alternative considered by the agency or that has otherwise been identified and brought to the attention of the agency would be more effective in carrying out the purpose for which the action is proposed or would be as effective and less burdensome to affected private persons than the proposed action.

SUBMITTAL OF COMMENTS

The public may present comments relating to this matter orally or in writing at the hearing, and in writing or by e-mail before the hearing. To be considered by the Board, written submissions not physically submitted at the hearing must be received **no later than 12:00 noon, December 11, 2002**, and addressed to the following:

Postal mail is to be sent to:

Clerk of the Board
Air Resources Board
1001 I Street, 23rd Floor
Sacramento, California 95814

Electronic mail is to be sent to: mtberesid@listserv.arb.ca.gov and received at the ARB **no later than 12:00 noon, December 11, 2002**.

Facsimile transmissions are to be transmitted to the Clerk of the Board at (916) 322-3928 and received at the ARB **no later than 12:00 noon, December 11, 2002**.

The Board requests but does not require that 30 copies of any written statement be submitted and that all written statements be filed at least 10 days prior to the hearing so that ARB staff and Board Members have time to fully consider each comment. The ARB encourages members of the public to bring to the attention of staff in advance of the hearing any suggestions for modification of the proposed regulatory action.

STATUTORY AUTHORITY AND REFERENCES

This regulatory action is proposed under that authority granted in sections 39600, 39601, 43013, 43013.1, 43018, and 43101, Health and Safety Code, and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal.3d 411, 121 Cal.Rptr. 249 (1975). This regulatory action is proposed to implement, interpret, and make specific sections 39000, 39001, 39002, 39003, 39010, 39500, 39515, 39516, 41511, 43000, 43013, 43013.1, 43016, 43018, 43101, and 43830.8, Health and Safety Code, and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal.3d 411, 121 Cal.Rptr. 249 (1975).

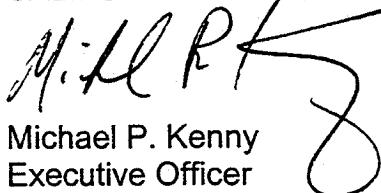
HEARING PROCEDURES

The public hearing will be conducted in accordance with the California Administrative Procedure Act, Title 2, Division 3, Part 1, Chapter 3.5 (commencing with section 11340) of the Government Code.

Following the public hearing, the Board may adopt the regulatory language as originally proposed or with nonsubstantial or grammatical modifications. The Board may also adopt the proposed regulatory language with other modifications, including but not limited to changes to the restrictions during the RVP season on blending gasoline containing ethanol with California gasoline not containing ethanol at retail outlets, if the text as modified is sufficiently related to the originally proposed text that the public was adequately placed on notice that the regulatory language as modified could result from the proposed regulatory action; in such event the full regulatory text with the modifications clearly indicated, will be made available to the public for written comment at least 15 days before it is adopted.

The public may request a copy of the modified regulatory text from the ARB's Public Information Office, Air Resources Board, 1001 I Street, Environmental Services Center, 1st Floor, Public Information Office, Sacramento, CA 95814, (916) 322-2990.

CALIFORNIA AIR RESOURCES BOARD



Michael P. Kenny
Executive Officer

Date: October 15, 2002

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs see our Web -site at www.arb.ca.gov.

California Environmental Protection Agency

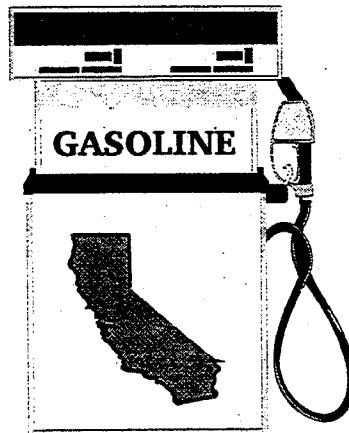


Air Resources Board

Proposed Amendments to the California Phase 3 Reformulated Gasoline Regulations

**Proposed Amendments to the California Reformulated Gasoline
Regulations Including Refinements to the Prohibitions of MTBE
and Other Oxygenates**

STAFF REPORT: INITIAL STATEMENT OF REASONS



Release Date: October 25, 2002

**State of California
California Environmental Protection Agency
AIR RESOURCES BOARD
Stationary Source Division**

**STAFF REPORT: INITIAL STATEMENT OF REASONS
PROPOSED AMENDMENTS TO THE CALIFORNIA
PHASE 3 GASOLINE REGULATIONS**

**Public Hearing to Consider Amendments to the
California Reformulated Gasoline Regulations Including
Refinements to the Prohibitions of MTBE and Other Oxygenates**

**Date of Release: October 25, 2002
Scheduled for Consideration: December 12, 2002**

Location:

**California Air Resources Board
Central Valley Auditorium, Second Floor
1001 I Street
Sacramento, California 95814**

This report has been reviewed by the staff of the Air Resources Board and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Air Resources Board, nor does mention of trade names or commercial products constitute endorsement or recommendation for use. To obtain this document in an alternative format, please contact the Air Resources Board ADA Coordinator at (916) 322-4505, TDD (916) 324-9531, or (800) 700-8326 for TDD calls from outside the Sacramento area. This report is available for viewing or downloading from the Air Resources Board's Internet site; <http://www.arb.ca.gov/regact/mtberesid/mtberesid.htm>

Acknowledgments

This report was prepared with the assistance and support from the other divisions and offices of the Air Resources Board. In addition, we would like to acknowledge the assistance and cooperation that we have received from many individuals and organizations.

Authors

Gloria Lindner, Fuels Section
Jim Guthrie, Fuels Section
Bill Riddell, Fuels Section
Jim Peterson, Industrial Section
Tom Jennings, Office of Legal Affairs

Reviewed by:

Michael Scheible, Deputy Executive Officer
Peter D. Venturini, Chief, Stationary Source Division
Robert Barham, Assistant Division Chief, Stationary Source Division
Dean C. Simeroth, Chief, Criteria Pollutants Branch
Steve Brisby, Manager, Fuels Section

Table of Contents

I.	Introduction and Summary	1
A.	INTRODUCTION	1
B.	WHY Is MTBE ADDED TO CALIFORNIA GASOLINE?	1
C.	WHY Is MTBE IN GASOLINE OF CONCERN?.....	2
D.	WHAT WERE THE DIRECTIVES OF THE GOVERNOR'S EXECUTIVE ORDER D-5-99?	3
E.	WHAT ARE THE PRESENT MTBE PROHIBITIONS?	3
F.	WHY ARE FURTHER AMENDMENTS TO THE CaRFG3 REGULATIONS NECESSARY?	3
	1. <i>Residual Levels of MTBE in California Gasoline</i>	3
	2. <i>Residual Levels of Oxygenates Other than MTBE or Ethanol</i>	4
G.	WHAT ARE THE PROPOSED AMENDMENTS?.....	4
	1. <i>Revising the Prohibitions of Gasoline "Produced With The Use Of" MTBE or Other Oxygenates Other than Ethanol</i>	4
	2. <i>Rewrites to the Schedule for Implementation of De Minimis Levels of MTBE</i>	5
	3. <i>Establishment of De Minimis Levels of Oxygenates Other than MTBE and Ethanol</i>	5
	4. <i>Documentation of the Presence or Absence of Ethanol in CaRFG Delivered to Retail Outlets</i>	6
	5. <i>Other Amendments.....</i>	6
H.	HOW WERE THE PROPOSED AMENDMENTS DEVELOPED?.....	6
I.	WHAT ALTERNATIVES WERE CONSIDERED?	7
J.	WHAT OTHER ISSUES WERE CONSIDERED?	7
K.	WHAT ARE THE EMISSION IMPACTS OF THE PROPOSED AMENDMENTS?.....	8
L.	WHAT ARE THE ENVIRONMENTAL IMPACTS OF THE PROPOSED AMENDMENTS?.....	8
	1. <i>Water quality.....</i>	8
	2. <i>Air Quality</i>	8
	3. <i>Refinery Modifications.....</i>	8
M.	WHAT IS THE COST OF THE PROPOSED AMENDMENTS?	9
	1. <i>Production Costs.....</i>	9
	2. <i>Fuel Supply and Price.....</i>	9
N.	WHAT ARE THE ECONOMIC IMPACTS?	9
II.	Recommendations.....	11
III.	Background	13
A.	REQUIREMENTS FOR OXYGENATES	13
	1. <i>Federal Reformulated Gasoline.....</i>	13
	2. <i>California Wintertime Oxygen Requirement</i>	13
B.	CONCERNS WITH THE USE OF MTBE IN CALIFORNIA GASOLINE.....	14

C.	BAN OF THE USE OF MTBE IN CALIFORNIA.....	14
1.	<i>The Governor's Executive Order D-5-99</i>	14
2.	<i>CEC's Response to the Directive of Executive Order D-5-99</i>	15
D.	POSTPONEMENT OF THE MTBE BAN	15
IV.	Existing Regulations	17
A.	CALIFORNIA REGULATIONS	17
1.	<i>MTBE Prohibitions in the California's Phase 3 Gasoline Regulations</i>	17
2.	<i>Prohibition of Oxygenates Other Than MTBE or Ethanol</i>	17
3.	<i>MTBE Labeling Requirements</i>	18
4.	<i>Restrictions During the RVP Season on Blending Gasoline Containing Ethanol with California Gasoline not Containing Ethanol</i>	18
B.	FEDERAL REGULATIONS	18
1.	<i>Federal Gasoline Additive Approval</i>	18
a)	Definition of "Substantially Similar".....	18
b)	Health Effects Testing.....	19
2.	<i>DeMinimis Levels for Oxygenates</i>	19
C.	LOCAL REGULATIONS	19
D.	ACTIONS BY OTHER STATES	19
V.	Prohibitions of Gasoline "Produced With the Use of" MTBE or Other Oxygenates Other than Ethanol	21
A.	BACKGROUND.....	21
B.	MTBE AND OTHER OXYGENATES IN GASOLINE BLENDSTOCKS.....	21
C.	PROPOSED CLARIFICATION OF "PRODUCED WITH THE USE OF MTBE"	22
D.	PROPOSED CLARIFICATION OF "PRODUCED WITH THE USE OF OXYGENATES OTHER THAN MTBE AND ETHANOL"	22
E.	RATIONALE.....	23
F.	ALTERNATIVE	24
VI.	Residual Levels of MTBE.....	25
A.	BACKGROUND.....	25
B.	PROPOSED SCHEDULE FOR REDUCING RESIDUAL LEVELS OF MTBE	25
C.	RATIONALE FOR PROPOSED SCHEDULE FOR REDUCING RESIDUAL MTBE LEVELS	26
1.	<i>Current MTBE De Minimis Levels</i>	26
2.	<i>MTBE Contamination of the Distribution System</i>	26
3.	<i>MTBE in Gasoline Blendstocks</i>	27
4.	<i>Survey of Retail Stations</i>	27
D.	ALTERNATIVES	28

VII. Residual Levels of Oxygenates Other Than Ethanol and MTBE	29
A. BACKGROUND.....	29
B. PROPOSED SCHEDULE FOR REDUCING RESIDUAL LEVELS OF OXYGENATES OTHER THAN ETHANOL AND MTBE	29
C. RATIONALE FOR PROPOSED RESIDUAL LEVELS FOR OTHER OXYGENATES.....	31
1. <i>Other Oxygenates in Gasoline Sampled at Various Retail Stations.....</i>	31
2. <i>Oxygenate contaminants in alkylates.....</i>	31
D. ALTERNATIVES	31
VIII. Documentation of Deliveries of Gasoline to Retail Outlets.....	33
A. BACKGROUND.....	33
B. PROPOSAL TO REQUIRE DOCUMENTATION OF DELIVERIES OF GASOLINE TO RETAIL OUTLETS.....	33
C. RATIONALE FOR PROPOSED AMENDMENT.....	33
D. ALTERNATIVE.....	33
IX. Other Amendments.....	35
A. EXPIRATION OF REQUIREMENT FOR DOCUMENTATION OF DELIVERIES OF MTBE GASOLINE TO RETAIL OUTLETS	35
B. RELATED AMENDMENTS TO THE OXYGENATE PROHIBITIONS FOR EARLY OPT-IN CARFG3	35
X. Restrictions During the RVP Season on Blending Gasoline Containing Ethanol with California Gasoline not Containing Ethanol.....	37
A. BACKGROUND.....	37
B. STAFF PROPOSAL	37
C. RATIONALE FOR STAFF PROPOSAL.....	38
XI. Environmental impacts of the proposed Amendments to the CaRFG3 Regulations	39
A. EFFECTS ON WATER QUALITY	39
B. EFFECTS ON AIR QUALITY	39
C. EFFECTS ON GREENHOUSE GAS EMISSIONS	39
D. EFFECTS ON ALLOWABLE EMISSIONS	39
E. OTHER ENVIRONMENTAL IMPACTS	40
F. ENVIRONMENTAL JUSTICE	40
XII. Economic Effects of the Proposed Amendments to the CaRFG3 Regulations ..	41
A. COSTS OF COMPLYING WITH THE PROPOSED REGULATION.....	41

1.	<i>Cost of Revisions to Prohibitions of Gasoline "Produced With the Use of" MTBE and Other Oxygenates Other Than Ethanol.....</i>	41
2.	<i>Cost of Changes to the Allowable Levels of MTBE.....</i>	41
3.	<i>Cost of Complying With the Allowable Limits for Oxygenates Other than MTBE and Ethanol.....</i>	41
B.	ECONOMIC EFFECTS ON SMALL BUSINESSES	42

APPENDICES

- A. Proposed Regulation Order
- B. Executive Order D-5-99
- C. CEC Report: Timetable for the Phase out of MTBE from California's Gasoline Supply
- D. Executive Order D-52-02
- E. Resolution 02-25
- F. Residual Levels of MTBE and Other Oxygenates in the Distribution System
- G. Oxygenate Contaminants in Alkylates
- H. References

I. INTRODUCTION AND SUMMARY

A. Introduction

The California Phase 3 Reformulated Gasoline (CaRFG3) regulations were adopted June 16, 2000 following a December 9, 1999 hearing by the Air Resources Board (ARB). The CaRFG3 regulations prohibited production of California gasoline, after December 31, 2002, with the use of Methyl Tertiary-Butyl Ether (MTBE), established CaRFG3 standards, and established a CaRFG3 Predictive Model. The Predictive Model provides refiners with flexibility to use alternative formulations while preserving the benefits of the program.

The CaRFG3 regulations were adopted in response to Governor Davis's March 25, 1999 Executive Order D-5-99 in which he found that, on balance, there is significant risk to the environment from using MTBE in gasoline in California. The Executive Order directed the ARB to adopt CaRFG3 regulations to phase out the use of MTBE in California gasoline by no later than December 31, 2002 and provide additional flexibility to producers of RFG in lowering or removing oxygen while preserving the existing air quality benefits of the CaRFG2 program.

In response to Governor Davis's March 14, 2002 Executive Order D-52-02, the Board, at a July 25, 2002 hearing, approved amendments to the CaRFG3 regulations that would postpone the prohibition of the use of MTBE in California gasoline by one year. The Board also approved other amendments necessary to implement the postponement of the MTBE ban. These amendments included the one-year postponement of the dates in the current schedule for reducing residual levels of MTBE in CaRFG3 after the addition of MTBE is banned, and postponement of the imposition of the CaRFG3 limits for gasoline properties for one year, from December 31, 2002 to December 31, 2003.

This report is the initial statement of reasons to support proposed additional amendments to the CaRFG3 regulations that build on the amendments approved by the Board July 25, 2002. The proposed amendments would refine the provisions imposing limits on residual levels of MTBE and other oxygenates. The rulemaking is also being conducted in response to one of the directives of Resolution 99-39 adopted by the Board at the December 1999 hearing. It directed the Executive Officer to further evaluate the practicality of the allowable MTBE residual limits for CaRFG3, including conducting one or more workshops if appropriate, and to report back to the Board with a recommendation on whether the limits should be revised.

These amendments are being proposed to provide an orderly transition away from MTBE use and to prevent any major disruptions to the production and supply of gasoline in California.

B. Why Is MTBE Added to California Gasoline?

Since 1995, most of the state's gasoline has contained about 11 percent MTBE by volume. Such extensive use of MTBE is largely the result of the requirements of the 1990 Federal Clean Air Act Amendments for a federal reformulated gasoline program, and for state-administered wintertime oxygenated gasoline programs, for specified areas in violation of the ambient air quality standards for ozone and carbon monoxide (CO), respectively. To meet the oxygenate

requirements, MTBE became the refiners' oxygenate of choice because of its blending attributes, which include its high octane rating and the fact that it dilutes undesirable gasoline components such as benzene, mixes well with gasoline, and is easily distributed in the state's pipeline system.

Since 1995, the federal reformulated gasoline (RFG) regulations adopted by the United States Environmental Protection Agency (U.S. EPA) have required the year-round use of RFG containing on average 2.0 weight percent oxygen in severe and extreme ozone non-attainment areas. By the end of 2002, the federal RFG oxygen requirement will apply to about 80 percent of the gasoline sold in California.

In response to the Clean Air Act wintertime oxygenate requirements, the ARB in 1991 adopted a program that required that gasoline sold during specified winter months contain an oxygenate. Originally, the ARB's wintertime oxygen requirement applied statewide. Currently, it applies only to Los Angeles, Orange, Riverside, San Bernardino, Ventura, and Imperial counties.

C. Why Is MTBE in Gasoline of Concern?

The main concern with the continued use of MTBE is its potential to contaminate California's ground and surface drinking water systems. Even relatively low levels of MTBE can give drinking water an unpleasant taste and odor, making the drinking water unusable. MTBE is very soluble in water and will transfer to groundwater faster, and will travel farther and more easily than other gasoline constituents such as benzene when gasoline leaks from underground storage tanks or pipelines.

With its increased use, MTBE has been found in many areas of the United States in groundwater in the vicinity of leaking underground gasoline storage tanks, in reservoirs which allow gasoline-powered watercraft, and to a lesser extent in drinking water supplies. In California, MTBE has been detected in some public drinking water supplies in diverse locations that include South Lake Tahoe, Santa Monica, Riverside, Anaheim, Los Angeles, San Francisco, Santa Clara, and San Diego. While only a small percentage of the State's community water supplies has been contaminated, about 75 percent of the drinking water wells in Santa Monica are contaminated with MTBE, and about one-third of the drinking water wells in the South Lake Tahoe Public Utility District are contaminated. A few drinking water wells in the Santa Clara Valley Water District and Sacramento have also been contaminated with MTBE. In addition, some drinking water wells have been closed down in communities as a protective measure to prevent MTBE from being drawn into the water supply system.

The California MTBE Public Health and Environmental Protection Act of 1997 directed the University of California to conduct research on the effects of MTBE. The University of California report was sent to the Governor in November 1998, and was peer reviewed by the Agency for Toxic Substances and Disease Registry, the United States Geological Survey, and other nationally recognized experts. After completion of the University of California report, two public hearings were held in February 1999. Subsequent to the hearings, the Governor issued Executive Order D-5-99, in which he found a "...significant risk to the environment from using MTBE in gasoline in California." The Executive Order directed appropriate state agencies to begin implementation of the phase-out of MTBE from California gasoline.

D. What Were the Directives of the Governor's Executive Order D-5-99?

Executive Order D-5-99 included a directive to the California Energy Commission (CEC) to develop, in consultation with the ARB, a timetable for the removal of MTBE from gasoline at the earliest possible date, but not later than December 31, 2002. The CEC subsequently determined that December 31, 2002 was the earliest feasible date. The Executive Order also directed the ARB to adopt the CaRFG3 regulations by December 1999. In addition, in the Executive Order, the Governor determined that California should request that the U.S. EPA grant California a waiver from the year-round 2.0 percent by weight minimum oxygen mandate of the federal RFG program.

E. What Are the Present MTBE Prohibitions?

The currently pending MTBE prohibitions were approved by the Board at a hearing on July 25, 2002, but they are not yet in effect because the rulemaking process has not been completed. These prohibitions postpone by one year the dates approved in December 1999 and adopted June 15, 2000. They prohibit the addition of MTBE and other oxygenates other than ethanol to California gasoline starting December 31, 2003, consistent with the Governor's March 14, 2002 Executive Order.

To address the question of trace amounts of MTBE that may be present as contamination, the CaRFG3 regulations establish a three-stage schedule for reducing residual levels of MTBE in CaRFG3 in the distribution system. The regulations require that the concentration of MTBE in distributed CaRFG3 not exceed 0.3 percent by volume beginning December 31, 2003. This level must be reduced to 0.15 percent by volume starting December 31, 2004 and 0.05 percent by volume starting December 31, 2005. The Board, in approving the original schedule in 1999, directed staff to monitor the ability of refiners to meet the limits on MTBE residual levels and re-evaluate the specified levels in 2002. This re-evaluation is necessary because if MTBE continues to be used outside California in significant quantities, MTBE could find its way into California as a contaminant in imported fuel. Also, MTBE can be formed as a contaminant in various refining and production facilities.

F. Why Are Further Amendments to the CaRFG3 Regulations Necessary?

I. Residual Levels of MTBE in California Gasoline

Following the 1999 amendments to the CaRFG regulations eliminating the wintertime oxygen requirement for the Lake Tahoe Air Basin, state agencies worked very closely with California's refiners to remove MTBE from the Lake Tahoe region's gasoline. As a result, the gasoline sold in the region has been predominantly MTBE-free since 1999. Staff has reviewed the available data from the Lake Tahoe region to determine the impact of the removal of MTBE from California gasoline sold in the Lake Tahoe Region and has found that there are still low levels of MTBE in non-oxygenated CaRFG and CaRFG with ethanol sold in that region.

Given the continued use of MTBE in other areas of the country, the amount of MTBE that may exist in finished gasoline and blendstocks will not be known until the California phase-out is well underway. The state of New York's MTBE ban will go into effect January 1, 2004. Other

states that produce a significant quantity of federal RFG, such as Texas, will still continue to use MTBE in the production of gasoline. Arizona's phase-out of MTBE will not occur until 180 days after California's phase-out. Since California refineries supply about 60 percent of Arizona's gasoline and MTBE will still be allowed to be added to gasoline for Arizona, gasoline containing MTBE may initially still be produced in California and transported through the California distribution system to Arizona.

A delay in the implementation dates of the various allowable MTBE levels will allow more time for the residual MTBE levels to decline without interfering with the supply and availability of gasoline in California. The proposed changes will provide staff more time to investigate the practicality of the allowable limits and also allow time for the public process necessary to further amend the adopted levels if this were found to be necessary.

2. Residual Levels of Oxygenates Other than MTBE or Ethanol.

Starting December 31, 2003, the CaRFG3 regulations place a conditional prohibition, on the use of oxygenates other than MTBE and ethanol to produce California gasoline. This prohibition will apply unless a multimedia evaluation of the use of the oxygenate in California gasoline has been conducted and the California Environmental Policy Council (CEPC) has determined that such use will not have a significant adverse impact on public health or the environment. This provision is designed to prevent refiners, blenders, and other entities from producing California gasoline with the use of oxygenates that have not been approved by the CEPC.

These other oxygenates may also exist in trace amounts in different refinery streams and can be found in both non-oxygenated gasoline and gasoline containing ethanol. For example, trace amounts of alcohols and ethers may be formed when small amounts of water are present during the production of alkylates.

The current regulation does not set prohibition levels for these oxygenates. Setting limits on residual levels for oxygenates other than MTBE or ethanol would increase the enforceability of the regulation and allow the differentiation between commonly occurring trace contaminants and deliberately added oxygenates.

G. What Are the Proposed Amendments?

1. Revising the Prohibitions of Gasoline "Produced With The Use Of" MTBE or Other Oxygenates Other than Ethanol

To address ambiguities regarding application of the prohibitions of gasoline "produced with the use of" MTBE or other oxygenates other than ethanol, staff is proposing more specific prohibitions that would be coupled with residual limits applying to other oxygenates as well as MTBE. The staff is proposing amendments that would refine the prohibitions to remove the ambiguities that make the prohibitions difficult to administer, and that could under some circumstances exclude imported blendstocks that contain MTBE and other prohibited oxygenates that are incidentally acquired through the production process or during transport.

The staff has proposed language that would be integrated into the MTBE prohibition provisions of section 2262.6(a)(1) to clarify the requirements of the ban on gasoline produced with the use of MTBE. The proposed language states that restrictions on the sale of gasoline produced with the use of MTBE would only apply to gasoline produced in a California production facility. The proposed amendment would prohibit the addition of methyl tertiary-butyl ether (MTBE) in neat form to the California gasoline or to a blending component used in the gasoline. It would also prohibit the use of a blending component that contained greater than 0.60 volume percent MTBE when it was supplied to the California production facility. The proposed restrictions would not apply to imported California gasoline, which would only be subject to the residual MTBE volume percent limits in section 2262.6(a)(2).

Staff is also proposing to add a separate definition in a new section, 2260(a)(26.5), to clarify the use of "produced with the use of" in the prohibition provisions of section 2262.6(c) that apply to oxygenates other than ethanol and MTBE. The restrictions would only apply to gasoline produced in a California production facility. The proposed amendment would prohibit the addition at the production facility of any oxygenate, other than ethanol or MTBE, in neat form to the California gasoline or to a blending component used in the gasoline. It would also prohibit the use of a blending component that contained greater than 0.1 weight percent total oxygen from oxygenates other than ethanol or MTBE when it was supplied to the California production facility. The proposed restrictions would not apply to imported California gasoline, which would be subject to the proposed new total oxygen weight percent de minimis limits described below.

2. Revisions to the Schedule for Implementation of De Minimis Levels of MTBE

The staff is proposing that the Board amend the California reformulated gasoline regulations to modify the schedule for reducing the de minimis levels of MTBE. It is proposed that during the first six months after the MTBE phase-out, starting December 31, 2003, California gasoline could not contain more than 0.60 volume percent MTBE. This level corresponds to the MTBE de minimis level for labeling retail pumps and to the U.S. EPA's de minimis level for MTBE in non-MTBE gasoline. It is also proposed that the schedule for reducing the de minimis levels be extended by six months so that there will be 18 months between each decrement instead of the present 12 months. Starting July 1, 2004, gasoline would be prohibited from containing more than 0.30 volume percent MTBE and eighteen months later, starting December 31, 2005, gasoline would be prohibited from containing more than 0.15 volume percent. The permanent prohibition level of 0.05 volume percent MTBE would apply starting July 1, 2007.

These revisions are being proposed to ensure an orderly reduction in residual MTBE levels and to prevent disruptions in the production and supply of gasoline in California.

3. Establishment of De Minimis Levels of Oxygenates Other than MTBE and Ethanol

Staff is proposing that the Board adopt a schedule for specifications for total oxygen content in gasoline from all oxygenates listed in ASTM D 4815-99 except MTBE and ethanol. This will significantly improve the enforceability of the restrictions on these oxygenates both in gasoline produced in the state and imported gasoline. During the first six months after the MTBE phase-out, starting December 31, 2003, the combined oxygen concentration due to these prohibited

oxygenates could not exceed 0.10 percent by weight. This limit of 0.10 weight percent is the oxygen level equivalent to the de minimis level of 0.60 volume percent for MTBE during the first six months of the phase-out. The final prohibition level of 0.06 weight percent would apply starting July 1, 2004.

4. *Documentation of the Presence or Absence of Ethanol in CaRFG Delivered to Retail Outlets*

The staff is proposing a new provision to require documentation of gasoline deliveries to retail outlets. The proposed amendment would require any person delivering gasoline to a retail outlet to provide to the outlet operator or responsible employee, at the time of delivery of the fuel, an invoice, bill of lading, shipping paper, or other documentation which states whether the gasoline does or does not contain ethanol. This proposal will provide retailers and distributors with the information needed to prevent inadvertent mixing of gasoline containing ethanol with gasoline not containing ethanol and ensure compliance with the restrictions of the CaRFG3 regulations on such mixing.

5. *Other Amendments*

The staff is proposing the following changes to clarify the requirements of the regulations and to ensure that the regulations work effectively.

The regulation currently requires that persons delivering gasoline containing MTBE to retailers provide documentation indicating the presence of MTBE in the gasoline. As this requirement will no longer be necessary after the December 31, 2003 MTBE prohibition date, staff is proposing an amendment to specify the applicable dates for this documentation.

Staff proposes that the recently added provision regarding oxygenates in early opt-in CaRFG3 be replaced by imposition of the de minimis MTBE and oxygenate limits that will apply when CaRFG3 is first required – 0.60 volume percent for MTBE and 0.10 weight percent oxygen collectively from the specified oxygenates other than MTBE or ethanol. This will provide specific standards that can be monitored by refiners and importers and be readily enforced by ARB inspectors.

H. How Were the Proposed Amendments Developed?

The staff held five workshops where the de minimis levels of MTBE and other oxygenates were discussed. The issues of blending of gasoline and documentation of gasoline deliveries with a bill of lading were discussed at the two most recent workshops. Also, there were meetings and discussions with representatives from the Western States Petroleum Association (WSPA), individual refiners, environmental organizations, the ethanol industry, representatives of other interests such as fuel suppliers and marketing associations such as the California Independent Oil Marketers Association (CIOMA). The proposed changes to the time periods associated with the allowable levels of MTBE in California gasoline are based on an assessment of other states' plans to phase out MTBE from their gasoline and how much time will be required to flush out the current statewide gasoline distribution system.

I. What Alternatives Were Considered?

Three alternatives to the proposed changes to the prohibitions on MTBE and other oxygenates other than ethanol are: maintaining the current requirements, shortening the period allowed for complying with the allowable final limits on residual levels, and extending the period even further.

The current schedule is not considered satisfactory, as it would not allow sufficient time for staff to evaluate the practicality of the allowable MTBE residual limits at each stage of the MTBE reduction. Not making the proposed change maintains a schedule that could be impractical and could lead to disruptions in the supply and availability of California gasoline. With no change to the regulation for other oxygenates, there would still be no limits specified for residual levels of oxygenates other than MTBE and ethanol, thereby making this requirement of the regulation difficult to enforce.

Decreasing the time required to meet the allowable levels of MTBE in gasoline is not consistent with staff's findings that more time is needed to evaluate the practicality of the current schedule. The effect of decreasing the time is to increase the likelihood of disruptions in the supply and availability of California gasoline.

Based on the results of a survey of retail stations, the staff believes that additional time is not needed beyond that provided in the proposed amendment. The proposed time is adequate to reduce MTBE to the final allowable residual levels. It is also adequate for evaluating the practicality of the allowable limits at each stage of the timetable and reporting to the Board as directed.

The proposed requirement for documentation of ethanol gasoline deliveries to retail outlets protects against inadvertent mixing of ethanol-blended gasoline with non-ethanol-blended gasoline at retail outlets. The alternative – not changing the regulation – was not considered satisfactory as the current regulation does not provide the documentation necessary to prevent RVP increases from inadvertent mixing.

J. What Other Issues Were Considered?

The Staff is considering a request to provide flexibility for gasoline distributors in the event that the CaRFG available to the distributor is not the same kind of CaRFG as that required by the final distribution center. Distributors are concerned that this could be an issue over the next year when there will be at least two types of oxygenated gasoline in the marketplace during the transition from MTBE gasoline to gasoline containing ethanol. Because of restrictions of the CaRFG3 regulations on mixing, the distributor must always obtain a gasoline that is the same kind as that in the retail station's storage tank. Distributors are concerned that during this transition period, there may be occasions when the available gasoline is different from the type of gasoline currently in the retail station's storage tank.

Staff believes that revisions to the regulations are not necessary to address the distributors' concerns. The CEC will have information on the availability of gasoline and the type of gasoline at terminals throughout the state. The unavailability of the correct fuel is expected to be a rare

occurrence even in those regions where the transition to ethanol fuel is still not close to completion. The ARB and CEC staffs will work together to determine the supply situation and how relief can be provided, if the need arises, without compromising air quality benefits.

K. What Are the Emission Impacts of the Proposed Amendments?

There will be no significant negative impact on emissions. The proposed limits on residual levels for MTBE and oxygenates other than MTBE and ethanol would not affect the actual content of these compounds in the gasoline. The proposed change to the dates associated with the allowable levels of MTBE in California gasoline only provides the additional time necessary to evaluate the practicality of the allowable limits and return to the Board with changes, if necessary. The proposed changes would not alter the CaRFG3 specifications that CaRFG3 be produced with no added MTBE or other oxygenates other than ethanol and therefore would not significantly impact the expected emission levels.

L. What are the Environmental Impacts of the Proposed Amendments?

1. Water quality.

There will be no significant negative impacts on water quality. The basic prohibitions against adding MTBE and other oxygenates other than ethanol remain unchanged. The proposed changes increase the enforceability of the regulations by placing a specific limit on total oxygen that may be provided by oxygenates other than MTBE and ethanol in California gasoline. Given that the prohibited oxygenates could have properties similar to those of MTBE, providing specific enforceable limits on their content in California gasoline will limit their possible impact on water quality. The changes to the schedule for reducing the allowable residual MTBE levels in California gasoline would allow evaluation of the practicality of such limits and allow sufficient time for the staff to propose amendments to the Board if necessary.

2. Air Quality

There should be no significant negative impacts on air quality as the basic MTBE prohibitions are unchanged. The proposed changes will not significantly affect the formulation of California gasoline and as such will not adversely affect emissions. The proposed changes increase the enforceability of the regulations by placing a specific enforceable limit on the trace quantities of oxygenates other than MTBE and ethanol allowable in California gasoline.

3. Refinery Modifications

The proposed changes increase the enforceability of the regulations by placing a specific limit on the trace quantities of oxygenates other than MTBE and ethanol allowable in California gasoline. The changes to the timetable for reducing the allowable residual levels of MTBE in California gasoline are to evaluate the practicality of such limits and allow sufficient time for the staff to take amendments to the Board if necessary. The proposed changes will not significantly affect the formulation or production of California gasoline, and therefore the proposed changes are not expected to affect operations at California refineries.

M. What is the Cost of the Proposed Amendments?

1. Production Costs.

There should be no significant negative impacts on the cost for production of California gasoline. The change to the schedule for reducing the allowable MTBE levels may prove beneficial by providing additional time to determine whether the allowable limits for MTBE in California gasoline are practical. Setting de minimis levels for oxygenates other than MTBE and ethanol may also have a beneficial effect by removing uncertainties regarding contamination by oxygenates other than MTBE and ethanol.

2. Fuel Supply and Price.

There should be no significant negative impacts on the supply and price of California gasoline. The proposed amendments are not expected to significantly affect the operation of California refineries. The changes could in fact provide a benefit for the supply and price of California gasoline by allowing additional time to flush the distribution and marketing system and reduce the levels of residual MTBE without the need for extraordinary efforts.

N. What are the Economic Impacts?

There should be no negative economic impacts associated with the proposed changes. The proposed changes will provide clearly enforceable criteria for determining the acceptability of blendstocks and California gasoline. The proposed changes may provide an economic benefit as it removes the ambiguities that could have unnecessarily limited a refiner's access to imported blendstocks that contain MTBE and other prohibited oxygenates other than ethanol that are incidentally acquired through the production process or during transport and storage.

The change to the schedule for reducing residual MTBE levels in California gasoline will not have a significant negative economic impact and in fact may prove beneficial by providing additional time to determine whether the allowable limits for MTBE in California gasoline are practical. Delaying the implementation of limits that may be impractical could mean prevention of interruptions in the supply and availability of gasoline for California consumers.

There will be no negative economic impacts for small businesses, as the actions of small businesses will not be affected by the proposed changes.

II. RECOMMENDATIONS.

The staff recommends that the Board adopt the proposed amendments to the California reformulated gasoline regulations, as contained in Appendix A. These amendments will:

1. Provide clarification of the phrase "produced with the use of" as it applies to the ban on the use of MTBE and other prohibited oxygenates;
2. Revise the schedule for implementation of the allowable residual MTBE levels in California gasoline;
3. Propose a schedule for implementation of allowable residual levels of total weight percent oxygen supplied by oxygenates other than MTBE and ethanol; and
4. Require documentation of the presence or absence of ethanol in CaRFG delivered to retail outlets.

Staff also recommends that cooperative efforts continue with the California Energy Commission to closely monitor gasoline supplies and to cooperatively address issues that may develop.

III. BACKGROUND

The extensive use of MTBE in California gasoline at this time is largely the result of requirements of the Federal Clean Air Act Amendments for federal reformulated gasoline that contains oxygen year round and for state administered oxygenated gasoline programs in the wintertime. Neither the Clean Air Act nor the regulations adopted to implement the Act specify which oxygenate must be used. This choice is left to the producers. MTBE and ethanol are the two principal oxygenates used to meet both the federal RFG and wintertime oxygen content requirements. In California, MTBE became the refiners' oxygenate of choice because of its blending attributes, which include its high octane rating and the fact that it dilutes undesirable gasoline components such as benzene, mixes well with gasoline, and is easily distributed in the state's pipeline system. Since 1995, most of the state's gasoline has contained about 11 percent MTBE.

A. Requirements for Oxygenates

1. *Federal Reformulated Gasoline*

The federal Clean Air Act (CAA) Amendments of 1990 directed the U.S. EPA to adopt federal RFG regulations, applicable starting January 1995. These regulations require the year-round use of RFG containing on average at least 2.0 weight percent oxygen in on-road vehicles in severe and extreme non-attainment areas for ozone. By the end of 2002, the federal RFG requirements will apply in San Diego County, the greater Los Angeles area (Los Angeles, Orange and Ventura Counties, and parts of Riverside and San Bernardino Counties), the greater Sacramento area (Sacramento County and parts of Yolo, Solano, Sutter, Placer, and El Dorado Counties), and the San Joaquin Valley Air Basin. Together, these areas account for about 80 percent of the gasoline sold in California.

2. *California Wintertime Oxygen Requirement*

In addition to the federal RFG program, the CAA amendments also required states to establish wintertime oxygenated fuel programs. This requirement generally applied to areas of the country that were in non-attainment of the National Ambient Air Quality Standard (NAAQS) for CO. Ambient CO concentrations are highest in the winter.

In 1991, ARB adopted a wintertime oxygenate requirement for gasoline to comply with federal law. Starting with the winter of 1992-1993, all California gasoline sold during specified winter months was required to contain 1.8 to 2.2 volume percent oxygen. The wintertime program was also incorporated into the Phase 2 CaRFG (CaRFG2) regulations effective in 1996.

Initially, the wintertime oxygenate requirement applied statewide because 80 percent of gasoline was consumed in CO non-attainment areas and the distribution system could not efficiently accommodate oxygenated and non-oxygenated gasoline. However, as a result of its mobile source emissions reduction programs, California no longer has exceedances of either the State or federal ambient CO standard, except in a limited region in the Los Angeles area and in Calexico in Imperial County.

In 1998, the ARB ended the wintertime oxygenate requirement for gasoline sold in areas that had demonstrated attainment of the ambient CO standard. At that time, the ARB continued the wintertime oxygen requirements until January 31, 2000 for the Lake Tahoe Air Basin and Fresno and Madera counties. In 1999, the ARB approved regulations rescinding the wintertime oxygenate requirement in the Lake Tahoe Air Basin after January 1999, to facilitate the removal of MTBE from the gasoline sold in the Lake Tahoe region. The wintertime oxygen requirements remain unchanged in Los Angeles, Orange, Riverside, San Bernardino, Ventura, and Imperial counties.

B. Concerns with the Use of MTBE in California Gasoline

The widespread use of MTBE and leaks and spills associated with the distribution of gasoline have resulted in detectable MTBE levels in a number of drinking water wells and surface water resources. Even relatively low levels of MTBE can give drinking water an unpleasant taste and odor that renders the drinking water unusable.

The main concern with the continued use of MTBE is the potential to contaminate California's groundwater, surface water, and drinking water systems. MTBE is very soluble in water and will transfer to groundwater faster, and will travel farther and more easily than other gasoline constituents such as benzene when gasoline leaks from underground storage tanks or pipelines. Lawrence Livermore National Laboratory data show that MTBE is likely present at over 10,000 underground fuel tank sites in the state. While underground storage tanks were ordered replaced or upgraded by December 22, 1998, even upgraded storage tanks are not leak-proof and leaks from upgraded gasoline storage tanks in the state are expected in the future. However, these leaks should occur much less frequently and be much less severe than what was experienced prior to the upgrade program. Also, spillage during transfers of gasoline will continue to occur as a result of accidents and equipment failure.

The California MTBE Public Health and Environmental Protection Act of 1997 directed the University of California (U.C.) to conduct research on the effects of MTBE. The legislation also required the Governor to take appropriate action based on the U.C. findings and information from public hearings conducted on the U.C. report. The University of California report was sent to the Governor in November 1998, and was peer reviewed by the Agency for Toxic Substances and Disease Registry, the United States Geological Survey, and other nationally recognized experts. After completion of the University of California report, two public hearings were held in February 1999. The Governor then issued Executive Order D-5-99 based on the UC report, the peer review comments, and information from the public hearings.

C. Ban of the Use of MTBE in California

1. The Governor's Executive Order D-5-99

On March 25, 1999, Governor Davis issued Executive Order D-5-99 (Appendix B) in which he found that "on balance, there is significant risk to the environment from using MTBE in gasoline in California." Executive Order D-5-99 also directed specific action to be taken.

The Executive Order was implemented by State agencies including the ARB, the State Water Resources Control Board (SWRCB), Office of Environmental Health Hazard Assessment (OEHHA), California Energy Commission (CEC), and the Department of Health Services (DHS). The Governor's Executive Order called for a number of steps to be taken to prohibit the use of MTBE, to evaluate the appropriate phase-out period, and to investigate the environmental effects of alternative oxygenates. The Executive Order directed the CEC to develop a timetable for removing MTBE from gasoline at the earliest possible date, but not later than December 31, 2002. The Governor further directed that steps be taken immediately to significantly reduce MTBE usage in the Lake Tahoe area and to require the labeling of gasoline pumps where CaRFG with MTBE is dispensed.

2. CEC's Response to the Directive of Executive Order D-5-99

The CEC determined that December 31, 2002 was the earliest feasible date that MTBE could be removed from RFG and that would comply with the Executive Order's directive to ensure adequate supply and availability of gasoline for California consumers. The CEC adopted their findings in the report, "Commission Findings: Timetable for the Phase-out of MTBE from California's Gasoline Supply" on June 28, 1999. A copy of the CEC analysis of the appropriate timetable to phase out the use of MTBE is in Appendix C.

The report identified several factors that would determine the feasibility of the December 31, 2002 phase-out date. The report described the refinery modifications needed to remove MTBE from the gasoline supply in California, including modifications to the gasoline distribution infrastructure. It also addressed the issues of the adequacy of ethanol supplies, project timelines, and other barriers to removing MTBE from gasoline prior to December 31, 2002. The CEC report (Appendix C) includes their findings on the factors that could affect the timetable for the phase out of MTBE.

D. Postponement of the MTBE Ban

On March 14, 2002, Governor Davis issued Executive Order D-52-02 (Appendix D), which directed the ARB to take the necessary actions, by July 31, 2002, to postpone for one year the prohibitions of the use of MTBE and other specified oxygenates in California gasoline, and the related requirements for California Phase 3 reformulated gasoline (CaRFG3). The Governor found that it is not possible to eliminate use of MTBE on January 1, 2003 without significantly risking disruption of the availability of gasoline in California.

At a July 25, 2002 hearing, the Board approved amendments to the CaRFG3 regulations consistent with the Governor's Executive Order. The amendments postponed the prohibition of the use of MTBE and other oxygenates other than ethanol in California gasoline supplied by refiners and importers from December 31, 2002 to December 31, 2003, with the downstream phase-in requirements also postponed by one year. Similarly, the schedule for reducing residual levels of MTBE in CaRFG3 was postponed one year. Starting December 31, 2003, California gasoline could not contain more than 0.30 volume percent MTBE. A residual limit of 0.15 volume percent MTBE would apply starting December 31, 2004, with a 0.05 volume percent residual limit starting December 31, 2005.

The amendments also postponed the imposition of the CaRFG3 limits for gasoline properties by one year, from December 31, 2002 to December 31, 2003. With the delay in the imposition of the MTBE prohibition, the imposition of the CaRFG3 standards will not be necessary until the new date at which the MTBE prohibition becomes effective.

There were no changes to the provisions that allow early compliance with the CaRFG3 standards. Under these provisions refiners are allowed to produce gasoline subject to the CaRFG3 standards prior to the mandatory MTBE phase-out deadline of December 31, 2003.

IV. EXISTING REGULATIONS

A. California Regulations

In response to Governor Davis's March 25, 1999 Executive Order D-5-99, the Board approved the CaRFG3 regulations at a hearing on December 9, 1999. The regulations included amendments to the CaRFG2 regulations that were designed to comply with the Executive Order directive to provide additional flexibility in lowering or removing the oxygen content requirement while maintaining current emissions and air quality benefits. A copy of the Executive Order is in Appendix B.

At a hearing on July 25, 2002, the ARB approved amendments postponing the imposition of the CaRFG3 standards and the prohibition of MTBE and other oxygenates other than ethanol in California gasoline from December 31, 2002 to December 31, 2003. Resolution 02-25, approving the amendments, is contained in Appendix E.

1. MTBE Prohibitions in the California's Phase 3 Gasoline Regulations

The CaRFG3 regulations ban gasoline produced with the use of MTBE for all California gasoline supplied from production and import facilities starting December 31, 2003. The prohibition will be phased-in downstream from refineries according to a schedule similar to the one used to phase in CaRFG2 in 1996. The regulations also establish a three-stage schedule for reducing allowable residual levels of MTBE to a final limit of 0.05 volume percent. Table 1 summarizes the current MTBE prohibitions of the CaRFG3 regulations, showing the MTBE levels that must not be exceeded during each phase of the timetable.

Table 1
Current Allowable Residual MTBE Levels

Allowable Residual MTBE Levels (volume percent)	Effective Date
0.30	Starting December 31, 2003
0.15	Starting December 31, 2004
0.05	Starting December 31, 2005

2. Prohibition of Oxygenates Other Than MTBE or Ethanol

The CaRFG3 regulations also place a conditional ban, starting December 31, 2003, on the use of oxygenates other than MTBE or ethanol to produce California gasoline. Such oxygenates may not be used to produce California gasoline unless a multimedia evaluation of the use of the oxygenate in California gasoline has been conducted, and the California Environmental Policy Council has determined that its use will not cause a significant adverse impact on public health or the environment. The current regulations do not specify residual limits for these oxygenates.

3. MTBE Labeling Requirements

In September 1999, the CaRFG regulations were amended to add labeling requirements for gasoline pumps dispensing gasoline containing MTBE. The regulation requires that gasoline containing MTBE in excess of 0.6 percent by volume be labeled at the retail level as gasoline containing MTBE. The purpose of the labeling requirements was to identify gasoline being sold at a retail gasoline outlet that had been intentionally produced with MTBE. The regulation did not limit or inhibit the use of MTBE in California gasoline.

4. Restrictions During the RVP Season on Blending Gasoline Containing Ethanol with California Gasoline not Containing Ethanol

The CaRFG3 regulations prohibit persons from combining California gasoline produced using ethanol with gasoline produced without using ethanol during the RVP season, unless the person can affirmatively demonstrate that the resulting blend complies with the RVP cap limit (section 2266.5(i)(1)). This is because of the RVP increase that occurs when ethanol is added to a non-ethanol gasoline. The regulation also allows exceptions for those instances in which the RVP standard would not apply to the gasoline because of other provisions of the regulations or because the gasoline is no longer California gasoline. The restriction does not apply to combining California gasolines that are in a motor vehicle's tank.

B. Federal Regulations

1. Federal Gasoline Additive Approval

The 1990 CAA amendments required the U.S. EPA to establish regulations for approving gasoline additives. The U.S. EPA has registered six oxygenates for use in gasoline. MTBE, ethyl tertiary butyl ether (ETBE), tertiary amyl methyl ether (TAME), diisopropyl ether (DIPE), and tertiary butyl alcohol (TBA) are registered for use at concentrations up to 2.7 percent oxygen by weight. Ethanol is approved for up to 3.5 percent oxygen or 3.7 percent oxygen if it is equivalent to 10 percent ethanol by volume. The U.S. EPA restricts the use of oxygenates in gasoline through its "substantially similar gasoline" requirement and through the requirements for compliance with the requirements of the fuels and fuel additives health effects testing regulations.

a) Definition of "Substantially Similar"

The federal Clean Air Act prohibits the use of any fuel or fuel additive in light-duty motor vehicles which is not substantially similar to that used in vehicle emissions certification unless the U.S. EPA has granted a waiver or failed to take timely action to deny a waiver. The term "substantially similar" was first defined by the U.S. EPA in an interpretive rule in 1981 [46F.R 38582 (July 28, 1981)] and then revised in 1991. The revision increased the allowable oxygen content limit in unleaded gasoline from 2.0 percent by weight to 2.7 percent by weight. Under the revision, a substantially similar unleaded gasoline may contain up to 2.7 percent oxygen by weight from any combination of aliphatic ethers and/or aliphatic alcohols excluding methanol. As a result of U.S. EPA's inaction on a waiver request in 1979, ethanol is allowed to provide 3.5 percent oxygen or 3.7 percent oxygen if it is equivalent to 10 percent ethanol by volume. The restriction for methanol content remained unchanged at 0.3 percent by volume.

b) *Health Effects Testing*

A gasoline with an oxygen content of 1.5 percent by weight or greater is subject to the Alternative Tier 2 provision of the fuel and fuel additive health effects testing regulation, as required by the Clean Air Act. The current U.S. EPA approval process requires information based on tests conducted to determine potential health effects, including, but not limited to, carcinogenic, teratogenic or mutagenic effects. A health effects testing program is currently underway to evaluate the six oxygenates registered by the U.S. EPA.

2. *DeMinimis Levels for Oxygenates*

The U.S. EPA has published de minimis levels for oxygenates that are not intended by the producer to be blended into the reformulated gasoline, but are present as a result of operational necessity. The de minimis levels are specified in the U.S. EPA's document, "RFG Questions and Answers, May 9, 1995," which provides guidance on compliance with the Agency's RFG regulations. For purposes of meeting the applicable oxygen requirements for a final gasoline blend, the U.S. EPA will not consider the introduction of an oxygenate intentional if the amount of the oxygenate is not more than 0.4 volume percent for ethanol, or 0.6 volume percent for MTBE, ETBE, TAME or t-butanol, or 0.2 volume percent for methanol.

C. Local Regulations

On March 28, 2000, the Board of Supervisors of the County of El Dorado adopted an amendment to Title 8 of the El Dorado County Code to ban the sale of fuel containing MTBE in the Lake Tahoe Basin within El Dorado County. The ban became effective thirty days following adoption.

Some local agencies are implementing programs to restrict the use of MTBE and monitor the impact of MTBE on water resources. For example, since June 1994, the Los Angeles Department of Water and Power has sampled for MTBE as part of its routine well-water monitoring. Also, the East Bay Municipal Utility District (EBMUD) allows only four-cycle engines using MTBE-free gasoline in the San Pablo Reservoir. The EBMUD also proposes to ban all motor boat engines that discharge any fuel pollutants effective January 2003.

D. Actions by Other States

The use of MTBE in gasoline in other states has resulted in contamination of drinking water and ground water resources. Some of these states have acted to protect their water supplies against contamination from MTBE by either substantially restricting or banning the use, sale or importation of fuels containing MTBE. Table 2 is a summary of the actions taken by 13 states to prohibit or reduce MTBE use in gasoline.

No state actually banned the use of MTBE prior to 1999. States either provided economic incentives to use ethanol or set oxygen specifications (3.5 weight percent) that could not be met with the use of MTBE.

Table 2

**STATES OUTSIDE OF CALIFORNIA PROHIBITING OR REDUCING
THE USE OF MTBE¹**

STATE	MTBE ACTION	DATE
Arizona	Ban	June 30, 2003 (180 days after CA)
Colorado	Phase out	May 1, 2002
Connecticut	Phase out	October 1, 2003
Illinois	Ban	July 24, 2004
Indiana	Ban	July 23, 2004
Iowa	Prohibit sale of gasoline with MTBE >2 volume %	2000
Kansas	Ban	July 1, 2004
Michigan	Prohibit use of MTBE	June 1, 2003
Minnesota	Prohibit sale of gasoline sale with MTBE >0.3 volume %	July 1, 2005
Nebraska	Prohibit sale of petroleum product with MTBE >1 volume %	2000
New York	Phase out	January 1, 2004
South Dakota	Prohibit sale of gasoline with MTBE >2 volume %	2000
Washington	Ban	December 31, 2003

¹ Platts Global Energy: <http://www.platts.com/features/mtbe/history.shtml>

Illinois Corn: www.ilcorn.org/update/html

V. PROHIBITIONS OF GASOLINE "PRODUCED WITH THE USE OF" MTBE OR OTHER OXYGENATES OTHER THAN ETHANOL

This chapter describes the staff's proposed amendments to clarify the meaning of the phrase "produced with the use of" as it applies to the ban on the use of MTBE and other oxygenates other than ethanol and MTBE in California gasoline. Staff is proposing to integrate language into the MTBE prohibition provisions of the regulation to clarify the requirements for the MTBE prohibition. Staff is also proposing a separate definition of "produced with the use of" in a new section to clarify the requirements for the prohibition on the use of other oxygenates other than ethanol and MTBE.

A. Background

The CaRFG3 regulations ban gasoline produced with the use of MTBE, for all California gasoline supplied from production and import facilities starting December 31, 2003. The regulation also sets limits on residual levels of MTBE in California gasoline once the ban has been implemented. The intent of the regulation is to prohibit the intentional blending of MTBE into California gasoline and to control the amount of MTBE present in California gasoline because of contamination or because it is an unavoidable byproduct of the production process.

The CaRFG3 regulations also prohibit gasoline produced with the use of any oxygenate other than ethanol or MTBE, starting December 31, 2003, unless its use has been approved by the California Environmental Policy Council. Currently, the regulation does not set separate residual limits for these compounds.

The focus of the discussions of the prohibitions of oxygenates in the CaRFG3 regulations has been on MTBE, but the need for clarification of "produced with the use of" also applies to the oxygenates other than ethanol and MTBE.

B. MTBE and Other Oxygenates in Gasoline Blendstocks

The staff understands that small amounts of MTBE may be unavoidably introduced into gasoline as a contaminant in the production of gasoline blendstocks such as alkylate. Alkylates have been used increasingly in gasoline to increase volume and octane. The staff believes that significant amounts of alkylate will be used in Phase 3 gasoline to replace some of the octane and volume now provided by MTBE. When blended with other gasoline components, the contribution of MTBE and other oxygenates from this source is expected to be very low. The staff estimated that alkylate could contribute 0.01 volume percent MTBE and 0.01 to 0.04 percent oxygen by weight from the other prohibited oxygenates. These levels of contamination from production of gasoline and blendstocks are very small compared to the levels of MTBE contamination expected from transport and storage operations. Small amounts of oxygenated gasoline may be commingled with non-oxygenated gasoline or blendstocks during storage and transfer operations.

One of the concerns of refiners was that the current regulation could exclude blendstocks that contain oxygenates other than ethanol that are acquired through the production process. The

regulation does not allow a non-conforming blendstock to be blended with a conforming product to produce a final gasoline that complies with the CaRFG3 standards. This restriction of the regulation could limit access to gasoline and blendstocks. A clear definition of the words "produced with the use of" is needed to avoid the overly restrictive consequences of the regulation.

C. Proposed Clarification of "Produced With the Use of MTBE"

The staff has proposed language that would be integrated into the MTBE prohibition provisions of section 2262.6(a)(1). The proposed amended section would read as follows:

"Starting December 31, 2003, no person shall sell, offer for sale, supply or offer for supply California gasoline which has been produced at a California production facility in part by either (i) adding at the California production facility any methyl tertiary-butyl ether (MTBE) in neat form to the California gasoline or to a blending component used in the gasoline; or (ii) using a blending component that contained greater than 0.60 volume percent MTBE when it was supplied to the California production facility."

Under the staff proposal, a California refiner would be prohibited at the refinery from adding MTBE in neat form either to gasoline or blendstocks used to produce gasoline at the refinery. The refiner would also be prohibited from using any gasoline blendstock that contains more than 0.6 volume percent MTBE when it is supplied to the refinery. Since the prohibitions would apply to gasoline production facilities, they would cover both a traditional refinery and a gasoline blending facility. Incidental amounts of MTBE in acquired blendstocks that occur during production processes or due to commingling would not preclude their use in the production of CaRFG in California, as long as the MTBE does not exceed the 0.6 volume percent threshold level. Blendstocks above the threshold level would never be permitted to be blended because permitting such blendstocks would result in excessive levels of MTBE in the state's gasoline.

There would be no parallel prohibition in imported gasoline that is "produced with the use of" MTBE because of the difficulties in monitoring the way imported gasoline has been produced at some out-of-state locations. Imported California gasoline would only be subject to the residual MTBE volume percent limits in section 2262.6(a)(2). Application of the de minimis limits on MTBE in imported gasoline should be sufficient to prohibit unacceptable MTBE levels while avoiding undue constraints in gasoline imports during potential supply shortages. Since importers are allowed to treat imported product as blendstock rather than finished gasoline, imported gasoline exceeding a de minimis limit of 0.3 volume percent or lower but not exceeding 0.6 volume percent could still be used as a blendstock for a California production facility as long as all requirements are met.

D. Proposed Clarification of "Produced With the Use of Oxygenates Other Than MTBE and Ethanol"

It is not practical to incorporate clarifying language into the prohibition provisions for these oxygenates in section 2262.6(c). Instead, staff is proposing to add the following definition in a new section 2260(a)(26.5).

"Produced at a California production facility with the use of any oxygenate other than ethanol or MTBE" means produced at a California production facility in part by either (i) adding at the California production facility any oxygenate, other than ethanol or MTBE, in neat form to the California gasoline or to a blending component used in the gasoline; or (ii) by using a blending component that contained greater than 0.1 weight percent total oxygen from oxygenates other than ethanol or MTBE when it was supplied to the California production facility".

The restrictions on the sale of gasoline "produced with the use of" any oxygenate other than ethanol or MTBE parallel those proposed for MTBE. The restrictions would only apply to gasoline produced in a California production facility. The proposed amendment would prohibit the addition of any oxygenate, other than ethanol or MTBE, in neat form to the California gasoline or to a blending component used in the gasoline. It would also prohibit the use of a blending component that contained greater than 0.1 weight percent total oxygen from oxygenates other than ethanol or MTBE when it was supplied to the California production facility. The proposed restrictions would not apply to imported California gasoline, which would only be subject to the total oxygen weight percent limits in section 2262.6(c)(2)&(3). This is possible because of the proposed new de minimis limits for these oxygenates.

E. Rationale

There have been two areas of ambiguity regarding the application of the prohibition of gasoline produced with the use of MTBE or other oxygenates other than ethanol. The first concerns contamination with very low levels of oxygenates that result from production of the blend components. The second concerns contamination that results from commingling of oxygenated gasoline with non-oxygenated gasoline or blendstocks during storage and transfer operations. These ambiguities make the prohibitions difficult to administer, and could under some circumstances exclude imported blendstocks that contain MTBE and other prohibited oxygenates other than ethanol that are incidentally acquired through the production process or during transport. It was therefore necessary to provide clear enforcement criteria that also addressed the concerns regarding imported gasoline and blendstocks. By clearly separating the restrictions on production at a California facility from the restrictions on finished product levels, the proposed amendment provide a means for California producers to blend a non-conforming imported blendstock containing low levels of MTBE with a conforming product but they also require that the final gasoline product comply with the CaRFG3 standards.

Under the proposed amendments, any blendstock brought to a California production facility to produce gasoline is subject to a 0.6 volume percent MTBE limit and a 0.10 weight percent limit on oxygen from oxygenates other than MTBE and ethanol. The proposed limit of 0.6 volume percent for MTBE is the same as that allowed by U.S. EPA in non-MTBE blended fuel. After the first six months following the mandatory MTBE phase-out deadline of December 31, 2003, the proposed MTBE limit for imported blendstocks will be higher than the residual limits required for finished gasoline. Since the ARB would continue the current practice of allowing imported gasoline to be treated as blendstock in the sorts of situations where it is allowed under the federal RFG regulations, gasoline over the permitted residual levels could be imported if it is

used as a blendstock at a California production facility and that California facility meets all applicable requirements.

F. Alternative

The proposed clarification addresses the ambiguities of the current regulation. Not responding to the concerns of the refiners was not an acceptable alternative. The proposed revisions establish clearly enforceable criteria and respond to the concerns of refiners that the current regulation could unnecessarily exclude imported blendstocks that contain MTBE and other prohibited oxygenates other than ethanol that are incidentally acquired through the production process or during transport and storage operations.

VI. RESIDUAL LEVELS OF MTBE

This chapter describes the staff's proposed amendments to the residual MTBE prohibitions of the CaRFG3 regulations. Staff is proposing to amend Title 13, CCR, Section 2262.6 to modify the schedule for reducing residual levels of MTBE prior to the implementation of a final prohibition level.

The text of the proposed amended regulation is presented in Appendix A.

A. Background

Since 1995, most of the state's gasoline has contained 11 percent MTBE by volume. Because of such widespread use, it is expected that MTBE will continue to be detected, although at low levels, in parts of the distribution system even after MTBE is no longer added to gasoline. The extent of this contamination will also depend on how extensively MTBE is used outside California, and how much of it finds its way into California as a contaminant in imported fuel. A significant source of blendstocks for California gasoline is the state of Texas, which has not phased out MTBE. This could be a continuing source of contamination. California gasoline produced for export could also be a source of MTBE contamination after the ban goes into effect. Eighty percent of Nevada's gasoline and 60 percent of Arizona's is produced in California. Nevada has not banned MTBE and Arizona's ban does not become effective until 180 days after California's.

The CaRFG3 regulations set an allowable residual limit of 0.3 volume percent for the first phase of a three-phase schedule. The staff expected that residual limit to be achievable once the MTBE ban became applicable and there was no more MTBE gasoline entering the gasoline distribution system in California. This took into account a transition to non-MTBE gasoline by November-December 2002 and the 45-day phase-in periods for midstream and downstream facilities. However, as directed by the Board, staff has evaluated the appropriateness of the allowable residual MTBE limits and is now proposing amendments to the current requirements.

B. Proposed Schedule for Reducing Residual Levels of MTBE

Staff is proposing a four-phase reduction in the allowable residual levels of MTBE to replace the three-phase reduction currently required by the regulations. A residual limit of 0.6 volume percent is being proposed for an initial 6-month phase and the 0.3 volume % de minimis level would become effective on July 1, 2004 instead of December 31, 2003.

The proposed amended schedule is summarized in Table 3 below. As proposed, during the first six months after the MTBE phase-out – starting December 31, 2003 – California gasoline could not contain more than 0.60 volume percent MTBE. Starting July 1, 2004, gasoline would be prohibited from containing more than 0.30 volume percent MTBE and eighteen months later, starting December 31, 2005, gasoline would be prohibited from containing more than 0.15 volume percent. The residual MTBE limit would be further reduced to 0.05 volume percent starting July 1, 2007. Staff will continue to monitor the ability of refiners to meet the later limits.

Table 3
Proposed Revisions to the Basic MTBE Prohibitions in the CaRFG3 Regulations

Allowable Residual MTBE Levels (volume percent)	Effective Date
0.60	Starting December 31, 2003
0.30	Starting July 1, 2004
0.15	Starting December 31, 2005
0.05	Starting July 1, 2007

C. Rationale for Proposed Schedule for Reducing Residual MTBE Levels

1. Current MTBE De Minimis Levels

The proposed residual MTBE limit of 0.6 volume percent for the first phase is consistent with the ARB's MTBE labeling requirements for retail pump dispensing and with the U.S. EPA's de minimis level for MTBE discussed earlier. For RFG not intentionally blended with MTBE, U.S. EPA allows up to 0.6 volume percent MTBE to be present in the non-MTBE blended fuel.

At a public hearing in June 1999, the ARB staff proposed a residual level of 0.3 volume percent for the labeling of "non-MTBE" gasoline sold in the Lake Tahoe Area. This limit was ultimately changed to 0.6 volume percent in response to comments by interested parties, and adopted September 1999. This change was made largely to account for the potential for non-MTBE RFG to be contaminated with the substantial amounts of MTBE RFG expected to remain in the California distribution system through 2002.

2. MTBE Contamination of the Distribution System

Since most gasoline in California is shipped through common pipelines, there will be many opportunities for contact, in the distribution system, between non-MTBE gasoline and gasoline containing residual amounts of MTBE. Contamination by MTBE could be expected in storage tanks, delivery trucks, and the pipeline from prior deliveries of gasoline containing MTBE. A concentration of 0.6 volume percent was believed to be sufficiently low to prevent gasoline intentionally blended with MTBE from being labeled as non-MTBE, but high enough to allow gasoline blended without MTBE to be shipped within the current gasoline distribution system:

Staff expected that once the MTBE ban became applicable, there would be no more MTBE gasoline entering the system in California and that a lower concentration of 0.3 volume percent would be appropriate for the allowable level for the first stage in the reduction of MTBE residual levels. This requirement was approved at the December 1999 public hearing.

Since then, repeated comments have suggested that the initial level of MTBE allowed in non-MTBE gasoline should be set at the same level at which it is now set for labeling, that is, 0.6 volume percent at the refinery, and that this level be maintained. It was suggested that if the initial level was not changed, refiners would be forced to begin their MTBE phase-out several

months prior to December 31, 2003. Based on these comments and the results of the staff's survey of non-MTBE gasoline at retail gas stations (Appendix F), staff proposes an initial six-month period during which the allowable residual level would be 0.6 volume percent. This timetable is compatible with the 180-day phase-out proposed in Arizona. This would then be followed by the 0.3 volume percent requirement.

3. MTBE in Gasoline Blendstocks

As discussed earlier, small amounts of MTBE may be unavoidably introduced into gasoline as a contaminant in the production of gasoline blendstocks such as alkylate. Alkylates are a mixture of high-octane, low vapor pressure, branched chain paraffinic hydrocarbons. Alkylates have been used increasingly in gasoline to increase volume and octane. The staff believes that significant amounts of alkylate will be used in Phase 3 gasoline to replace some of the octane and volume now provided by MTBE. This is supported by the Linear Programming analysis performed by MathPro Inc. for the U.S EPA to estimate the impacts of an oxygenate waiver on Phase 3 gasoline production.

The staff estimates that alkylate could contribute about 0.02 volume percent MTBE, assuming iso-octane would constitute about 20 percent of the final gasoline volume. When blended into gasoline, MTBE from the alkylate should not be present at significant levels. Appendix G reports the results of the iso-octane analysis and the assumptions used in the staff's estimates.

4. Survey of Retail Stations

Based on the results from a survey of retail stations, staff is proposing a delay in the step down from 0.30 volume percent to 0.15 volume percent. The survey results suggest that it may require more than 12 months to reduce MTBE levels below 0.30 volume percent, even in an MTBE free gasoline distribution system. The data indicate that even after two years there is still contamination in the fuel delivery system for the Lake Tahoe area. The stations in the Bay area, which are much closer to the source of production for non-MTBE fuels, also show average MTBE levels higher than 0.15 percent. This creates some uncertainty as to whether the 0.15 volume percent limit is practical. Extending this period from 12 months to 18 months will allow staff time to collect more data on residual MTBE levels in California gasoline. Staff can then determine whether the proposed lower levels are practical or propose changes if necessary.

Staff examined data collected for nine stations in the Lake Tahoe area and six in the Bay Area to determine whether the allowable residual limits could accommodate likely sources of MTBE contamination. Residual MTBE levels in these two areas were expected to be reasonable indicators of the appropriateness of the allowable residual MTBE levels. The Lake Tahoe area was considered suitable because the wintertime oxygenate requirement for the Lake Tahoe Air Basin had been eliminated prior to the start of the winter of 1999-2000. The rescission of the Lake Tahoe wintertime oxygenate requirement did not prohibit the use of MTBE in the Lake Tahoe Air Basin. Nevertheless, virtually all of the gasoline shipped to the Lake Tahoe Air Basin is believed to be MTBE-free as a result of joint efforts of CEC, ARB, and refiners to implement the directive in the Governor's Executive order to significantly reduce MTBE usage in the Lake Tahoe area, and the ordinance adopted by the El Dorado County Board of Supervisors to ban the sale of fuel containing MTBE in the Lake Tahoe Basin within El Dorado County. The Bay Area

was included because it represented the only other market in California with significant penetration of non-oxygenated gasoline.

D. Alternatives

Staff considered the following alternatives to the proposed changes:

- Not changing the regulation,
- Decreasing the time allowed to comply with the allowable residual MTBE levels, and
- Further extending the residual MTBE compliance deadlines.

No Change to the Regulation Maintaining the current requirements was not considered acceptable as this does not take account of staff's findings that the current schedule for the reduction of MTBE levels could be impractical. The staff's survey results suggest that the current regulation does not allow sufficient time to reduce the contamination of the distribution system that will continue after the MTBE ban. The current requirements could also limit the supply of imports from areas which produce MTBE gasoline. They do not make adequate allowance for imports as a source of contamination. Without enough time to reduce MTBE levels on the current schedule, suppliers could have no choice but to restrict imports from areas which produce MTBE gasoline. Also, the current schedule does not allow adequate time to evaluate the practicality of the allowable limits for MTBE at each stage of the timetable for residual MTBE reduction.

Decrease the Time Allowed to Comply with the Allowable Residual MTBE levels This alternative is inconsistent with the results of the staff's survey of retail stations. All of the reasons given above apply to this alternative. Because it allows even less time than the current regulation, this alternative would be even less effective than the current regulation.

Further Extend the Residual MTBE Compliance Deadlines Additional time is not needed beyond that proposed by staff in the amendment to the regulation. The results of the staff's survey of retail stations indicate that the proposed revised schedule allows adequate time to reduce MTBE to the allowable residual levels. The proposed amendments also provide adequate time to evaluate the practicality of the allowable limits for MTBE at each stage of the timetable for MTBE reduction and report to the Board as directed. In addition, the time proposed in the amendments should be sufficient for staff to determine whether there exists potential for significant negative impacts on the supply and availability of gasoline to California's consumers.

VII. RESIDUAL LEVELS OF OXYGENATES OTHER THAN ETHANOL AND MTBE

This chapter describes the staff's proposed amendments to the prohibitions of the CaRFG3 regulations on the use of oxygenates other than ethanol or MTBE in California gasoline. Staff is proposing amendments to Title 13, CCR, Section 2262.6(c) that would add a schedule for reducing residual levels of these prohibited oxygenates.

The text of the proposed amended regulation is presented in Appendix A.

A. Background

Theoretically, any of the six oxygenates registered by the U.S. EPA may be used in gasoline. MTBE, ETBE, TAME, DIPE, and TBA may be used at concentrations up to 2.7 percent oxygen by weight, while ethanol is approved for concentrations up to 3.5 percent oxygen or 3.7 percent oxygen if it is equivalent to 10 percent ethanol by volume. MTBE and ethanol have been the two principal oxygenates used both inside and outside of California, with TAME and ETBE used only in a small percentage of gasoline. Even with such limited use, it is expected that it will take some time for the levels of these ethers to be reduced in the distribution and marketing system. Also, as with MTBE, the extent of such contamination will also depend on how much of it finds its way into California as a contaminant in imported fuel.

The CaRFG3 gasoline regulations place a conditional ban, starting December 31, 2003, on the use of oxygenates other than ethanol or MTBE to produce California gasoline. Such oxygenates may not be used unless a multimedia evaluation of the use of the oxygenate in California gasoline has been conducted, and the California Environmental Policy Council (CEPC) has determined that such use will not have a significant adverse impact on public health or the environment.

The intent of the regulation is to prevent the intentional blending of oxygenates that have not been approved by the CEPC. However, as is the case with MTBE, these oxygenates may be present in the gasoline as trace contaminants either through unavoidable formation during the production of blendstocks or through contamination of the distribution system. The current regulations do not specify residual limits for these oxygenates that could permit the distinction between oxygenates present in the gasoline as trace contaminants and oxygenates that are intentionally added to the gasoline.

B. Proposed Schedule for Reducing Residual Levels of Oxygenates Other Than Ethanol and MTBE

Staff is proposing adoption of a schedule, summarized in Table 4, for reducing total oxygen content in gasoline from the prohibited oxygenates. These oxygenates include all of the compounds listed in ASTM D 4815-99 (Table 5) except MTBE and ethanol.

During the first six months of the MTBE phaseout, starting December 31, 2003, the total oxygen concentration from the prohibited oxygenates could not exceed 0.10 weight percent. This limit is the oxygen level equivalent to the allowable MTBE residual level during the first six months of

the MTBE phase out. By using the oxygen concentration for the limit rather than the oxygenate concentration, the effect of the differences in molecular weight of the oxygenates is eliminated. The total oxygen concentration from all of the prohibited oxygenates cannot exceed 0.06 weight percent starting July 1, 2004. The prohibition would apply unless a multimedia evaluation of the use of the oxygenate in California gasoline has been conducted, and the California Environmental Policy Council has determined that such use will not cause a significant adverse impact on public health or the environment.

Table 4

**Proposed Prohibition Levels for Oxygenates
not Approved by the California Environmental Policy Council**

Allowable Total Oxygen Levels (total wt. % oxygen)	Effective Date
0.10	Starting December 31, 2003
0.06	Starting July 1, 2004

Table 5

Alcohols and Ethers Analyzed by ASTM Test Method D4815-99

-
- Methanol
 - Ethanol
 - Isopropanol
 - n-propanol
 - iso-Butanol
 - tert*-Butanol
 - sec*-Butanol
 - n*-Butanol
 - Tert*-pentanol (*tert*- amylalcohol)
 - Methyl *tert*-butylether (MTBE)
 - Ethyl *tert*-butylether (ETBE)
 - Diisopropylether (DIPE)
 - Tert*-amylmethylether (TAME)
-

C. Rationale for Proposed Residual Levels for Other Oxygenates

1. *Other Oxygenates in Gasoline Sampled at Various Retail Stations*

The results of the staff's survey of retail stations (Appendix F) indicate the need for a schedule to address residual levels of oxygenates other than MTBE and ethanol. TAME was present in six of the 12 Bay Area stations included in the staff's survey. There was none detected in the Lake Tahoe area samples. TAME was the only oxygenate other than MTBE and ethanol detected in any of the gasolines collected by staff. In gasolines oxygenated with both TAME and MTBE, TAME provided 30 to 35 percent of the total oxygen. Where TAME appeared to be at residual levels in MTBE gasoline, the oxygen content due to TAME was 0.02 percent by weight.

2. *Oxygenate contaminants in alkylates*

The primary alkylation reaction between isobutane and butene forms the high octane 2,2,4 trimethyl pentane isomer (isooctane). However, side reactions may occur during alkylation, as described in Appendix G, to form alcohol and ether contaminants of the alkylate. Such reactions are possible because of the acidic environment during the alkylation process and the presence of small amounts of water.

Butene dimerization technologies may also be used to produce isooctene or isooctane. These processes dimerize isobutenes to isooctene and offer an optional step to hydrogenate the isooctene to isooctane. This process requires a small amount of water to form alcohols which are used to improve the selectivity to dimers and limit the formation of heavier polymers. Ether by-products are also formed, with the majority being C8 ethers (typically, di-sec-butyl ether and isobutyl-sec-butyl ether). Total oxygen concentration due to the alcohols and ethers in isooctene could range from 0.4 to 0.6 percent by weight. The hydrogenation step to produce isooctane also reduces the concentration of oxygenates. The oxygen concentration in the isooctane is expected to be in the range of 0.01 to 0.04 percent oxygen by weight. Since total olefins concentration in gasoline must be less than 10 percent, the oxygen contribution from dimerization products is expected to be very low.

D. Alternatives

Staff considered the following alternatives to the proposed changes:

- Not changing the regulation,
- Allowing less time to comply with the proposed allowable residual levels, and
- Further extending the proposed compliance deadlines.

No Change to the Regulation Maintaining the current requirements was not considered acceptable because the regulation does not define allowable residual levels for oxygenates other than MTBE and ethanol. This lack of well-defined limits makes it difficult for refiners to determine compliance with the ban against the use of these prohibited oxygenates. It also makes enforcement of the ban harder. The current regulation does not make adequate allowance for imports as a source of contamination. With the proposed change, it is now possible to apply the new residual limits to prohibit unacceptable levels in imported gasoline or blendstocks while avoiding constraints that could curtail gasoline imports during potential supply shortages. Also,

the current regulation does not establish a schedule that would allow evaluation of the practicality of the ban on the use of the prohibited oxygenates.

Decrease the Time Allowed to Comply with the Proposed Residual levels This alternative is inconsistent with the results of the staff's survey of retail stations which suggest that a shorter time period could be inadequate to reduce the contamination of the distribution system that will continue after the ban on these oxygenates.

Further Extend the Compliance Deadlines for the Proposed Residual Levels. The staff does not believe additional time is needed beyond that proposed in the amendment to the regulation. The proposed amendments also provide adequate time to evaluate the practicality of the proposed allowable residual levels at each stage of the timetable and report to the Board as directed. In addition, the time proposed in the amendments should be sufficient for staff to determine whether there exists potential for significant negative impacts on the supply and availability of gasoline to California's consumers.

VIII. DOCUMENTATION OF DELIVERIES OF GASOLINE TO RETAIL OUTLETS

This chapter discusses the staff's proposal to add a new section to the CaRFG3 regulations to require documentation of the presence of ethanol in gasoline delivered to gasoline retail outlets.

A. Background

The CaRFG3 regulations do not require labeling of pumps dispensing gasoline containing ethanol. Also, the regulations do not require any other documentation that would identify the presence of ethanol in the gasoline delivered to the retail station or the presence of ethanol in the gasoline in the retail station's storage tank at the time of delivery.

The one-year postponement of the MTBE ban together with the early opt-in provisions will likely result in at least two types of oxygenated gasoline in the marketplace over the next year. Depending on the extent to which refiners phase out MTBE early, there will be increased opportunities for inadvertent commingling of gasolines containing ethanol and non-ethanol gasoline in areas where these types of gasolines are both marketed. This inadvertent commingling could result in an increase in evaporative emissions. Documentation will provide the information needed to comply with the restrictions on commingling.

As discussed earlier, federal regulations prohibit the combining of VOC-controlled gasoline containing ethanol and VOC-controlled gasoline not containing ethanol between January 1 and September 15 to prevent RVP increases during the ozone season.

B. Proposal to Require Documentation of Deliveries of Gasoline to Retail Outlets

The staff is proposing to amend the regulations to require documentation of gasoline deliveries to retail outlets. The proposed amendment would require any person delivering gasoline to a retail outlet to provide to the outlet operator or responsible employee, at the time of delivery of the fuel, an invoice, bill of lading, shipping paper, or other documentation which identifies the presence or absence of ethanol in the gasoline.

C. Rationale for Proposed Amendment

The proposed requirement provides retailers and distributors with the information needed to prevent inadvertent mixing of gasoline containing ethanol with gasoline not containing ethanol. This information is needed to ensure compliance with the restrictions of section 2266.5(i) on the blending of gasoline containing ethanol with gasoline not containing ethanol.

D. Alternative

The staff considered not making the proposed change to the regulations but this alternative was deemed unacceptable. The current regulations do not require the documentation necessary to protect against violations of the CaRFG3 restrictions on combining California gasoline produced using ethanol with gasoline produced without using ethanol during the RVP season. The proposed amendment will provide the necessary documentation.

IX. OTHER AMENDMENTS

This chapter describes amendments proposed by staff to clarify requirements of the regulations and to ensure that the regulations work effectively.

A. Expiration of Requirement for Documentation of Deliveries of MTBE Gasoline to Retail Outlets

Staff is proposing to amend section 2273 (d) to revise the requirements for deliveries of MTBE gasoline to retail outlets. The regulation currently requires the labeling of equipment dispensing gasoline containing MTBE. This requirement was adopted in response to the Governor's Executive Order D-5-99 which directed the ARB to develop gasoline pump labeling regulations to allow consumers to make an informed choice on the type of gasoline they purchase. The regulation also required persons delivering gasoline containing MTBE to retailers to provide documentation indicating the presence of MTBE in the gasoline. This documentation provided retailers with the information needed to comply with the dispenser labeling requirements. This requirement of section 2273 (d) will no longer be necessary after the December 31, 2003 MTBE prohibition date. Therefore, staff is proposing an amendment to specify the applicable dates for the documentation requirement.

B. Related Amendments to the Oxygenate Prohibitions for Early Opt-in CaRFG3

The staff is proposing related amendments to the prohibitions of MTBE and other oxygenates other than ethanol in batches of gasoline that a refiner or importer may choose to designate as subject to the CaRFG3 standards prior to December 31, 2003 when those standards become mandatory. The amendments approved by the Board at the July 25, 2002 hearing included the addition of a provision in section 2261(b)(3)(B)4 stating that when early opt-in CaRFG3 is supplied from the refinery or import facility, it is subject to the prohibitions regarding California gasoline produced with the use of MTBE and other oxygenates other than ethanol, but not the MTBE de minimis limits. Revisions to these provisions are necessary because the current rulemaking includes the proposed elimination of the conditional prohibition of imported gasoline produced with the use of oxygenates other than MTBE or ethanol, along with the proposed addition of specific residual oxygen content limits for oxygen from the prohibited oxygenates.

Staff proposes that the recently added provision regarding oxygenates in early opt-in CaRFG3 be replaced by imposition of the de minimis MTBE and oxygenate limits that will apply when CaRFG3 is first required – 0.60 volume percent for MTBE and 0.10 weight percent oxygen collectively from the specified oxygenates other than MTBE or ethanol. This will provide specific standards that can be monitored by refiners and importers and be readily enforced by ARB inspectors.

X. RESTRICTIONS DURING THE RVP SEASON ON BLENDING GASOLINE CONTAINING ETHANOL WITH CALIFORNIA GASOLINE NOT CONTAINING ETHANOL

This chapter describes staff's consideration of a request to provide flexibility for gasoline distributors in the event that the CaRFG available to the distributor is not the same kind of CaRFG as that required by the final distribution center. Staff has found that revisions to the regulations are not necessary to address the distributors' concerns.

A. Background

When a gasoline containing ethanol is mixed with a non-ethanol gasoline, there is an increase in evaporative emissions of volatile organic compounds (VOC). This effect is due to the RVP increase that occurs when ethanol is added to a non-ethanol gasoline. The RVP increase resulting from this commingling is called the commingling impact. The federal RFG regulations prohibit the combining of VOC-controlled gasoline containing ethanol and VOC-controlled gasoline not containing ethanol in the distribution and marketing system, from January 1 through September 15, to prevent RVP increases during the ozone season. However, neither the federal nor the CaRFG3 regulations restrict the mixing of ethanol-blended gasoline with non-ethanol-blended gasoline in the vehicle fuel tank.

At a hearing on July 25, 2002, the Board approved amendments to postpone by one year the effective date of the CaRFG3 regulations and the prohibition of MTBE and other oxygenates other than ethanol in California gasoline. There were no changes to the provisions that allow early compliance with CaRFG3 standards. Individual refiners and importers will retain the ability to elect to have batches of gasoline subject to the CaRFG3 standards – including the prohibition of MTBE – prior to the new mandatory MTBE phase-out deadline of December 31, 2003. This means that over the next year, there will be two types of oxygenated gasoline in the marketplace and increased opportunities for commingling gasoline containing ethanol with MTBE gasoline or with non-oxygenated gasoline.

Gasoline distributors change suppliers as needed during temporary supply shortfalls. When most of the state's gasoline contained MTBE, the restrictions of the CaRFG3 regulations on mixing did not affect the availability of gasoline to cover temporary shortages. This situation will change as ethanol gasoline is phased in. Because of the restrictions on mixing, the distributor can only change to a supplier that can provide the same type of oxygenated gasoline as that in the retailer's storage tank. A shortage of one type of gasoline could have an impact on the supply of that gasoline to the consumers.

B. Staff Proposal

The ARB staff will continue to work with the CEC to identify and confirm the supply situation and the need for relief for a distributor. It would have to be recognized that any ARB action would not exempt a distributor in a federal RFG area from the 40 CFR section 80.78(a)(8) prohibition against combining VOC-controlled gasoline containing ethanol and VOC-controlled gasoline not containing ethanol between January 1 and September 15.

The gasoline delivered to the final distribution center may be a different type of CaRFG from the gasoline in the storage tanks only when the distributor can demonstrate that the following conditions are met:

1. The distributor has confirmed with the California Energy Commission (CEC) a determination that the conforming type of CaRFG is not available at the primary terminal and backup terminals and the CEC provides this information to the ARB's Executive Officer or designated representative;
2. The distributor has obtained approval from the Executive Officer or designated representative;
3. The approval would be subject to appropriate conditions to minimize the emissions impact. These could include reducing the gasoline volume in the storage tanks to a level sufficient to avoid a significant air quality impact, and requiring that any future fuel change be done in the non-RVP controlled season.

C. Rationale for Staff Proposal

Distributors of gasoline to retail outlets have identified the potential for interruptions of gasoline supply to retail stations as a result of the presence of at least two types of oxygenated gasoline during the transition from MTBE gasoline to gasoline containing ethanol. Because of restrictions of the CaRFG3 regulations on mixing, the distributor must always obtain a gasoline that is the same kind as that in the retail station's storage tank. Distributors are concerned that during this transition period, there may be occasions when the available gasoline is different from the type of gasoline currently in the retail station's storage tank.

The CEC will have information on the availability of gasoline and the type of gasoline at terminals throughout the state. The unavailability of the correct fuel is expected to be a rare occurrence even in those regions where the transition to ethanol fuel is still not close to completion. It is expected that the ARB and CEC staffs will work together to identify how relief can be provided without compromising air quality benefits. It is also expected that these circumstances will only occur rarely and the emissions impact is not expected to be significant.

XI. ENVIRONMENTAL IMPACTS OF THE PROPOSED AMENDMENTS TO THE CaRFG3 REGULATIONS

This chapter presents a summary of the results of the analysis of the environmental effects of the proposed amendments. The proposed amendments are required to ensure the enforceability of the regulation. The staff does not anticipate any significant adverse environmental effects associated with the proposed amendments.

The proposed amendments do not affect the requirements specified in Sections 43013.1 and 43830.8 of the California Health and Safety Code (H&SC), nor do they present any issues that were not addressed during the review by the California Environmental Policy Council which determined in 2000 that there will not be a significant adverse environmental impact on public health or the environment, including any impact on air, water, or soil, that is likely to result from the change in gasoline that is expected to be implemented to meet the CaRFG3 regulations approved by the ARB.

A. Effects on Water Quality

The proposed amendments would not change any of the CaRFG2 or CaRFG3 performance specifications, and would not create changes to the CaRFG3 regulations that would have significant impacts on water quality. The proposed revisions to the oxygenate prohibitions separates the restrictions on production at a California facility from the restrictions on finished product levels, thereby making it easier for California producers to blend a non-conforming imported blendstock containing low levels of MTBE with a conforming product, but they also require that the final gasoline product comply with the CaRFG3 standards. The proposal to set residual limits for other oxygenates other than MTBE and ethanol acknowledges the presence of these oxygenates but it sets residual limits on them as stringent as for those for the MTBE which is being phased out.

B. Effects on Air Quality

The proposed amendments do not materially affect emissions. The proposed amendments would not create a change to the intent of the CaRFG3 regulations approved in 1999 and would have no effect regarding impacts on air quality.

C. Effects on Greenhouse Gas Emissions

The proposal to modify the schedule for reducing residual levels of MTBE and other oxygenates other than ethanol should result in no significant increase or decrease of greenhouse gas emissions over what would occur with the present schedule.

D. Effects on Allowable Emissions

The proposed amendments to the CaRFG3 regulations will not adversely affect the emissions benefits from the CaRFG3 program in comparison to the existing CaRFG2 program. Thus, the amendments would maintain the consistency of the CaRFG3 regulations with the requirements of Section 43013.1(b)(1) of the California Health and Safety Code, enacted by Senate Bill 989

and the Governor's Executive Order D-5-99, that the CaRFG3 regulations maintain or improve upon the emissions and air quality benefits of CaRFG2.

E. Other Environmental Impacts

The staff has concluded that the proposed amendments will not have any other significant adverse environmental impacts.

F. Environmental Justice

There should be no environmental justice and neighborhood impacts of the proposed action. The proposed amendments are intended to comply with Governor Davis' March 25, 1999 Executive Order for the phase-out of MTBE from California gasoline while ensuring an adequate supply and availability of gasoline for California consumers and with the ARB's December 16, 1999 resolution to evaluate the practicality of the allowable MTBE residual limits for CaRFG3.

The proposed amendments provide a more practical schedule for reducing residual levels of the prohibited oxygenates. This reduces the potential for interruptions in the supply of gasoline to California consumers and the associated increases in fuel costs.

The proposed amendments do not change the basic prohibitions against adding MTBE and other oxygenates other than ethanol to California gasoline. The proposed changes set clearly enforceable limits for all of the prohibited oxygenates. This improvement in the enforceability of the prohibitions in the regulations will provide an additional level of protection for Californians living near refineries and gasoline storage facilities.

XII. ECONOMIC EFFECTS OF THE PROPOSED AMENDMENTS TO THE CARFG3 REGULATIONS

This chapter presents a summary of the staff's analysis of the economic effects of the proposed amendment. The proposed amendments to the CaRFG3 regulations would change the interim allowable residual limits of MTBE and the phase-in schedule for those limits, and add a timetable for reducing residual levels of total oxygenates other than ethanol and MTBE. The remaining changes are clean-up changes and technical modifications that clarify the intent of the regulation, and assure effective enforcement of the regulations. Therefore, the staff does not anticipate any adverse economic effects associated with the proposed amendments.

A. Costs of Complying with the Proposed Regulation

1. *Cost of Revisions to Prohibitions of Gasoline "Produced With the Use of" MTBE and Other Oxygenates Other Than Ethanol*

Staff expects the revisions will have a positive impact and potentially reduce the cost of compliance with the regulations. The proposed amendments provide clear enforcement criteria that also make it easier for California refiners to import gasoline or blendstocks. This could be an economic benefit for refiners as they will be able to avoid unnecessary constraints on gasoline imports during supply shortages.

2. *Cost of Changes to the Allowable Levels of MTBE.*

Staff expects that the changes in the timetable for reducing the allowable residual MTBE levels will not have any significant negative impacts on the cost of compliance with the regulations. The proposed changes to the MTBE prohibition requirements could prove beneficial by providing additional time to collect more data to determine whether the residual limits are practical. The changes could also provide a benefit for the supply and price of California gasoline by allowing additional time to flush the distribution and marketing system and reduce the levels of residual MTBE without the need for extraordinary efforts.

3. *Cost of Complying With the Allowable Limits for Oxygenates Other than MTBE and Ethanol.*

Staff expects that there will be no added cost associated with complying with the proposed residual limits for oxygenates other than MTBE and ethanol. Staff proposes to define allowable residual levels for oxygen that may be present in California gasoline from oxygenates that have not been approved by the CEPC for use in California gasoline. Currently, the CaRFG3 regulations simply prohibit their use. In fact, there may be an economic benefit associated with the proposed regulation as well-defined levels will allow refiners to determine whether a blend is in compliance with regulation. The removal of the uncertainty regarding the status of a blend will increase the efficiency of the refining process. Also, the test method proposed by staff is currently being used by the refiners to determine the oxygen content of California gasoline.

B. Economic Effects on Small Businesses

Government Code section 11346.2(b)(4)(B) requires the ARB to describe any alternatives it has identified that would lessen any adverse impact on small business. In defining small business, Government Code section 11342(h) explicitly excludes refiners from the definition. Also the definition includes only businesses that are independently owned and, if in retail trade, gross less than \$2,000,000 per year. Thus, our analysis of the economic effects on small business is limited to the costs to certain gasoline retailers and jobbers, where a jobber is an individual or business that purchases wholesale gasoline and delivers and sells it to another party, usually a retailer or other end-user.

The proposed amendments to the CaRFG3 regulations are designed to assure the practical and effective implementation of the CaRFG3 prohibitions on the use of MTBE and other oxygenates other than ethanol in California gasoline. As such, no significant negative economic impact is expected.

APPENDIX A

PROPOSED REGULATION ORDER

**Amendments to the California Phase 3 Gasoline (CaRFG3) Regulations
to Refine the Prohibitions of MTBE and Specified Other Oxygenates
in California Gasoline Starting December 31, 2003**

PROPOSED REGULATION ORDER

**AMENDMENTS TO THE CALIFORNIA PHASE 3 GASOLINE (CaRFG3)
REGULATIONS TO REFINE THE PROHIBITIONS OF MTBE AND SPECIFIED
OTHER OXYGENATES IN CALIFORNIA GASOLINE STARTING
DECEMBER 31, 2003**

Note: The preexisting regulation text is set forth below in normal type. The proposed amendments are shown in underline to indicate additions and ~~strikeout~~ to indicate deletions. Amendments approved by the Air Resources Board at a July 25, 2002 hearing (with modifications made available for comment September 17, 2002) but not yet filed with the Office of Administrative Law are shown in dotted underline to show additions and ~~***bold italicized strikeout***~~ to show deletions. The symbol “* * * * *” means that intervening text not proposed to be amended is not shown. Subsection headings are shown in italics and are to be italicized when printed in Barclays California Code of Regulations.

1. Add section 2260(a)(26.5), title 13, California Code of Regulations, to read as follows:

(26.5)“Produced at a California production facility with the use of any oxygenate other than ethanol or MTBE” means produced at a California production facility in part by either (i) adding at the California production facility any oxygenate, other than ethanol or MTBE, in neat form to the California gasoline or to a blending component used in the gasoline; or (ii) by using a blending component that contained greater than 0.10 weight percent total oxygen from oxygenates other than ethanol or MTBE when it was supplied to the California production facility.

* * * * *

NOTE: Authority cited: sections 39600, 39601, 43013, 43013.1, 43018, and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal.3d 411, 121 Cal.Rptr. 249 (1975). Reference: sections 39000, 39001, 39002, 39003, 39010, 39500, 39515, 39516, 41511, 43000, 43013, 43013.1, 43016, 43018, and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal.3d 411, 121 Cal.Rptr. 249 (1975).

2. Amend section 2261(b)(3), title 13, California Code of Regulations, to read as follows:

Section 2261. Applicability of Standards; Additional Standards.

* * * * *

(b) Applicability of the CaRFG Phase 3 Standards.

* * * * *

(3) *Early Compliance with the CaRFG Phase 3 Standards Before December 31, 2002*

(A) Any producer or importer wishing to supply from its production or import facility, before December 31, ~~2002~~ 2003, any final blends of gasoline subject to the CaRFG Phase 3 standards instead of the CaRFG Phase 2 standards may notify the executive officer of its wish to do so. The notification shall include all of the following:

1. The approximate date by which it intends to begin supplying from its production or import facility gasoline complying with the CaRFG Phase 3 standards if permitted to do so;
 2. A reasonably detailed demonstration of the producer's or importer's ability and plans to begin supplying from its production or import facility substantial quantities of one or more grades of gasoline meeting the CaRFG Phase 3 standards on or after the date specified;
- (B)
1. Within 15 days of receipt of a request under section 2261(b)(3)(A), the executive officer shall notify the producer or importer making the request either that the request is complete, or specifying what additional information is necessary to make the request complete.
 2. Within 15 days of notifying the producer or importer that the request is complete, the executive officer shall either grant or deny the request. If the request is granted the executive officer shall specify the date on which producers and importers may start to supply from their production or import facilities final blends that comply with the CaRFG Phase 3 standards. The executive officer shall grant the request if he or she determines it is reasonably likely that the producer or importer making the request will start supplying substantial quantities of one or more grades of gasoline complying with the CaRFG Phase 3 standards reasonably soon after the date specified. If the executive officer denies the request, he or she shall provide the producer or importer with a written statement explaining the reason for denial.
 3. Upon granting a request made under section 2261(b)(3)(A), the executive officer shall notify interested parties of the date on which (i) producers and importers will be permitted to start supplying final blends of gasoline complying with the CaRFG Phase 3 standards, and (ii) the CaRFG Phase 2 cap limits for RVP and aromatics will become 7.20 psi and 35.0 volume percent respectively for gasoline downstream of the production or import facility. This notification shall be made by posting the pertinent information on the state board's Internet site, providing electronic mail notification to all persons subscribing to the state board's Fuels-General Internet electronic mail list, and mailing notice to all persons registered as motor vehicle fuel distributors under Health and Safety Code section 43026.
 4. With respect to all final blends supplied from a production or import facility from the day specified by the executive officer in granting a request made under

section 2261(b)(3)(A) through December 30, ~~2002~~ 2003, any producer or importer may comply with the CaRFG Phase 3 standards that apply starting December 31, ~~2002~~ 2003 as an alternative to the CaRFG Phase 2 standards. Whenever a producer or importer is supplying a final blend subject to the CaRFG Phase 3 standards pursuant to this section 2261(b)(3)(B)4., any notification required by sections 2264.2 or 2265(a) shall indicate that the final blend is subject to the CaRFG Phase 3 standards. When it is sold or supplied from the production or import facility, ~~any no such final blend is subject to the prohibitions in section 2262.6(a)(1) and 2262.6(c) regarding California gasoline produced with the use of MTBE and oxygenates other than ethanol, but is not subject to the prohibition in section 2262.6(a)(2) imposing limits on the concentration of MTBE in California gasoline, may contain MTBE in concentrations greater than 0.60 volume percent, or contain a total of more than 0.10 weight percent oxygen collectively from all of the oxygenates identified in section 2262.6(c)(4) that have not received a determination by the California Environmental Council as described in section 2262.6(c)(1).~~

* * * * *

NOTE: Authority cited: sections 39600, 39601, 43013, 43013.1, 43018, and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal.3d 411, 121 Cal.Rptr. 249 (1975). Reference: sections 39000, 39001, 39002, 39003, 39010, 39500, 39515, 39516, 41511, 43000, 43013, 43013.1, 43016, 43018, 43101, and 43830.8, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal.3d 411, 121 Cal.Rptr. 249 (1975).

3. Amend section 2262.6, title 13, California Code of Regulations, to read as follows:

Section 2262.6. Prohibition of MTBE and Oxygenates Other Than Ethanol in California Gasoline Starting December 31, ~~2002~~ 2003.

(a) *Basic MTBE prohibitions.*

- (1) Starting December 31, ~~2002~~ 2003, no person shall sell, offer for sale, supply or offer for supply California gasoline which has been produced ~~at a California production facility with the use of in part by either (i) adding at the California production facility any methyl tertiary-butyl ether (MTBE) in neat form to the California gasoline or to a blending component used in the gasoline; or (ii) using a blending component that contained greater than 0.60 volume percent MTBE when it was supplied to the California production facility.~~
- (2) No person shall sell, offer for sale, supply or offer for supply California gasoline which contains MTBE in concentrations greater than: ~~0.3~~ ~~0.60~~ volume percent starting December 31, ~~2002~~ 2003, ~~0.30~~ volume percent starting July 1, 2004, ~~0.15~~ volume percent starting December 31, ~~2003~~ 2004 ~~2005~~, and ~~0.05~~ volume percent starting December 31, ~~2004~~ 2005 July 1, 2007.

(b) *Phase-in of MTBE prohibitions.*

(1) *Phase-in of MTBE prohibitions starting December 31, 2003, and 2005.* In the first year in which a prohibition applies under section 2262.6(a) starting on December 31, the prohibition shall be phased in as follows:

- (A) Starting December 31, for all sales, supplies, or offers of California gasoline by a producer or importer from its production facility or import facility.
- (B) Starting the following February 14, for all other sales, supplies, offers or movements of California gasoline except for transactions directly involving:
 1. the fueling of motor vehicles at a retail outlet or bulk purchaser-consumer facility, or
 2. the delivery of gasoline from a bulk plant to a retail outlet or bulk purchaser-consumer facility.
- (C) Starting the following March 31, for all remaining sales, supplies, offers or movements of California gasoline, including transactions directly involving the fueling of motor vehicles at a retail outlet or bulk purchaser-consumer facility.

(2) *Phase-in of MTBE prohibitions starting July 1, 2004 and 2007.* In the first year in which a prohibition applies under section 2262.6(a) starting on July 1, the prohibition shall be phased in as follows

- (A) Starting July 1, for all sales, supplies, or offers of California gasoline by a producer or importer from its production facility or import facility.
 - (B) Starting the following August 15, for all other sales, supplies, offers or movements of California gasoline except for transactions directly involving:
 1. the fueling of motor vehicles at a retail outlet or bulk purchaser-consumer facility, or
 2. the delivery of gasoline from a bulk plant to a retail outlet or bulk purchaser-consumer facility.
 - (C) Starting the following October 1, for all remaining sales, supplies, offers or movements of California gasoline, including transactions directly involving the fueling of motor vehicles at a retail outlet or bulk purchaser-consumer facility.
- (3) (2) (3) Phase-in for low-throughput fueling facilities. For the first year in which a prohibition applies under section 2262.6(a)(1),^t The prohibitions in section (a) starting respectively on December 31, 2003, July 1, 2004, December 31, 2005, and July 1, 2007,

shall not apply to transactions directly involving the fueling of motor vehicles at a retail outlet or bulk purchaser-consumer facility, where the person selling, offering, or supplying the gasoline demonstrates as an affirmative defense that the exceedance of the standard was caused by gasoline delivered to the retail outlet or bulk purchaser-consumer facility prior to ~~February 14 of that year, or delivered to the retail outlet or bulk purchaser-consumer facility directly from a bulk plant prior to March 31 of that year the date on which the delivery became subject to the prohibition pursuant to the phase-in provisions in section (b).~~

(c) *Use of oxygenates other than ethanol or MTBE in California gasoline on or after December 31, 2002 2003.*

- (1) Starting December 31, ~~2002~~ 2003, no person shall sell, offer for sale, supply or offer for supply California gasoline which has been produced at a California production facility with the use of any oxygenate other than ethanol or MTBE unless a multimedia evaluation of use of the ~~ether~~ oxygenate in California gasoline has been conducted and the California Environmental Policy Council established by Public Resources Code section 71017 has determined that such use will not cause a significant adverse impact on the public health or the environment.
- (2) Starting December 31, 2003, no person shall sell, offer for sale, supply or offer for supply California gasoline which contains a total of more than 0.10 weight percent oxygen collectively from all of the oxygenates identified in section (c)(4).
- (3) Starting July 1, 2004, no person shall sell, offer for sale, supply or offer for supply California gasoline which contains a total of more than 0.06 weight percent oxygen collectively from all of the oxygenates identified in section (c)(4).
- (4) Covered oxygenates. Oxygen from the following oxygenates is covered by the prohibitions in section 2262.6(c)(1), (2) and (3):

Methanol
 Isopropanol
 n-Propanol
 n-Butanol
 iso-Butanol
 sec-Butanol
 tert-Butanol
Tert-pentanol (*tert*-amylalcohol)
 Ethyl *tert*-butylether (ETBE)
 Diisopropylether (DIPE)
Tert-amylmethylether (TAME)

- (5) The prohibitions in section 2262.6(c)(1)and (2), and in section 2262.6(c)(3), shall be phased in respectively as follows:

(A) Starting December 31, 2003 and July 1, 2004 respectively for all sales, supplies, or offers of California gasoline by a producer or importer from its production facility or import facility.

(B) Starting February 14, 2004 and August 15, 2004 respectively for all other sales, supplies, offers or movements of California gasoline except for transactions directly involving:

1. the fueling of motor vehicles at a retail outlet or bulk purchaser-consumer facility, or
2. the delivery of gasoline from a bulk plant to a retail outlet or bulk purchaser-consumer facility.

(C) Starting March 31, 2004 and September 30, 2004 respectively for all remaining sales, supplies, offers or movements of California gasoline, including transactions directly involving the fueling of motor vehicles at a retail outlet or bulk purchaser-consumer facility.

(6) Phase-in for low-throughput fueling facilities. The prohibitions in section 2262.6(c)(1) and (2), and in section 2262.6(c)(3), starting respectively on December 31, 2003 and July 1, 2004, shall not apply to transactions directly involving the fueling of motor vehicles at a retail outlet or bulk purchaser-consumer facility, where the person selling, offering, or supplying the gasoline demonstrates as an affirmative defense that the exceedance of the standard was caused by gasoline delivered to the retail outlet or bulk purchaser-consumer facility prior to the date on which the delivery became subject to the prohibition pursuant to the phase-in provisions in section 2262.6(c)(5).

NOTE: Authority cited: sections 39600, 39601, 43013, 43013.1, 43018, and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n v. Orange County Air Pollution Control District*, 14 Cal.3d 411, 121 Cal.Rptr. 249 (1975). Reference: sections 39000, 39001, 39002, 39003, 39010, 39500, 39515, 39516, 41511, 43000, 43013, 43013.1, 43016, 43018, 43101, and 43830.8, Health and Safety Code; and *Western Oil and Gas Ass'n v. Orange County Air Pollution Control District*, 14 Cal.3d 411, 121 Cal.Rptr. 249 (1975).

4. Amend section 2273(d)(1), title 13, California Code of Regulations, to read as follows:

Section 2273. Labeling of Equipment Dispensing Gasoline Containing MTBE.

* * * * *

(d) *Deliveries of gasoline to retail outlets.*

(1) Any person delivering gasoline to a retail gasoline outlet from December 16, 1999 through December 30, 2003 shall provide to the outlet operator or responsible employee, at the time of delivery of the fuel, an invoice, bill of lading, shipping paper, or other documentation which states whether the gasoline does or does not contain 0.6 percent by volume or more MTBE, and which may identify the volumetric amount of MTBE in the

gasoline. For purposes of determining compliance with this section 2273(d), the volumetric MTBE content of gasoline shall be determined by ASTM Test Method D 4815-99, which is incorporated herein by reference, or any other test method determined by the executive officer to give equivalent results.

- (2) No person shall deliver gasoline containing 0.6 percent by volume or more MTBE to a storage tank at a retail gasoline outlet unless at the time of the delivery either:
 - (A) All pumps dispensing gasoline from the storage tank are labeled as containing MTBE, or
 - (B) The party delivering the gasoline, or on whose behalf the delivery is being made, can demonstrate that it has received and is maintaining a nonsuperceded written notification from the operator of the retail gasoline outlet that all of the outlet's gasoline dispensing equipment, or all of the outlet's dispensing equipment dispensing gasoline of the grade being delivered, is labeled as containing MTBE.

NOTE: Authority cited: Sections 39600, 39601, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal.3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39010, 39500, 39515, 39516, 41511, 43000, 43016, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal.3d 411, 121 Cal. Rptr. 249 (1975).

5. Adopt section 2273.5, title 13, California Code of Regulations, to read as follows:

Section 2273.5. Documentation Provided with Delivery of Gasoline to Retail Outlets.

Any person delivering gasoline to a retail gasoline outlet shall provide to the outlet operator or responsible employee, at time of delivery of the fuel, an invoice, bill of lading, shipping paper, or other documentation which states whether the gasoline does or does not contain ethanol, and which may identify the volumetric amount of ethanol.

NOTE: Authority cited: Sections 39600, 39601, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal.3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39010, 39500, 39515, 39516, 41511, 43000, 43016, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal.3d 411, 121 Cal. Rptr. 249 (1975).

APPENDIX B
EXECUTIVE ORDER D-5-99

EXECUTIVE DEPARTMENT
STATE OF CALIFORNIA



EXECUTIVE ORDER D-5-99

WHEREAS, the University of California prepared a comprehensive report on the "Health and Environmental Assessment of Methyl Tertiary-Butyl Ether (MTBE)" which has been peer reviewed by the Agency for Toxic Substances and Disease Registry and the United States Geological Survey and other nationally recognized experts;

WHEREAS, the University of California report was widely available for public review and written comment, including hearings in northern and southern California to receive public testimony;

WHEREAS, the findings and recommendations of the U.C. report, public testimony, and regulatory agencies are that, while MTBE has provided California with clean air benefits, because of leaking underground fuel storage tanks MTBE poses an environmental threat to groundwater and drinking water;

NOW, THEREFORE, I, GRAY DAVIS, Governor of the State of California, do hereby find that "on balance, there is significant risk to the environment from using MTBE in gasoline in California" and, by virtue of the power and authority vested in me by the Constitution and statutes of the State of California, do hereby issue this order to become effective immediately:

1. The Secretary for Environmental Protection shall convene a task force consisting of the California Air Resources Board, State Water Resources Control Board, Office of Environmental Health Hazard Assessment, California Energy Commission and the Department of Health Services for the purpose of implementing this Order.
2. On behalf of the State of California, the California Air Resources Board shall make a formal request to the Administrator of the U.S. Environmental Protection Agency for an immediate waiver for California cleaner burning gasoline from the federal Clean Air Act requirement for oxygen content in reformulated gasoline.

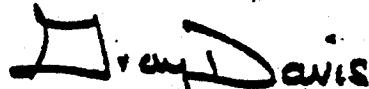
PAGE TWO

3. The California Environmental Protection Agency shall work with Senator Feinstein and the California Congressional Delegation to gain passage of Senate Bill 645. This legislation would grant authority to the Administrator of the U.S. Environmental Protection Agency to permanently waive the Clean Air Act requirements for oxygen content in reformulated gasoline to states such as California that have alternative gasoline programs that achieve equivalent air quality benefits.
4. The California Energy Commission (CEC), in consultation with the California Air Resources Board, shall develop a timetable by July 1, 1999 for the removal of MTBE from gasoline at the earliest possible date, but not later than December 31, 2002. The timetable will be reflective of the CEC studies and should ensure adequate supply and availability of gasoline for California consumers.
5. The California Air Resources Board shall evaluate the necessity for wintertime oxygenated gasoline in the Lake Tahoe air basin. The Air Resources Board and the California Energy Commission shall work with the petroleum industry to supply MTBE-free California-compliant gasoline year around to Lake Tahoe region at the earliest possible date.
6. By December 1999, the California Air Resources Board shall adopt California Phase 3 Reformulated Gasoline (CaRFG3) regulations that will provide additional flexibility in lowering or removing the oxygen content requirement and maintain current emissions and air quality benefits and allow compliance with the State Implementation Plan (SIP).
7. In order that consumers can make an informed choice on the type of gasoline they purchase, I am directing the California Air Resources Board to develop regulations that would require prominent identification at the pump of gasoline containing MTBE.
8. The State Water Resources Control Board (SWRCB), in consultation with the Department of Water Resources and the Department of Health Services (DHS), shall expeditiously prioritize groundwater recharge areas and aquifers that are most vulnerable to contamination by MTBE and prioritize resources towards protection and cleanup. The SWRCB, in consultation with DHS, shall develop a clear set of guidelines for the investigation and cleanup of MTBE in groundwater at these sites.
9. The State Water Resources Control Board shall seek legislation to extend the sunset date of the Underground Storage Tank Cleanup Fund to December 31, 2010. The proposed legislation would increase the reimbursable limits for MTBE groundwater cleanups from \$1 million to \$1.5 million.

PAGE THREE

10. The California Air Resources Board and the State Water Resources Control Board shall conduct an environmental fate and transport analysis of ethanol in air, surface water, and groundwater. The Office of Environmental Health Hazard Assessment shall prepare an analysis of the health risks of ethanol in gasoline, the products of incomplete combustion of ethanol in gasoline, and any resulting secondary transformation products. These reports are to be peer reviewed and presented to the Environmental Policy Council by December 31, 1999 for its consideration.
11. The California Energy Commission (CEC) shall evaluate by December 31, 1999 and report to the Governor and the Secretary for Environmental Protection the potential for development of a California waste-based or other biomass ethanol industry. CEC shall evaluate what steps, if any, would be appropriate to foster waste-based or other biomass ethanol development in California should ethanol be found to be an acceptable substitute for MTBE.

IN WITNESS WHEREOF I have hereunto set my hand and caused the Great Seal of the State of California to be affixed this 25th day of March 1999.



Governor of California

ATTEST:

Secretary of State

APPENDIX C

California Energy Commission Report Timetable for the Phaseout of MTBE from California's Gasoline Supply

CALIFORNIA ENERGY COMMISSION
1516 NINTH STREET
SACRAMENTO, CA 95814-5512



July 1, 1999

The Honorable Gray Davis
Governor
State Capitol Building
Sacramento, CA 95814

Dear Governor Davis:

The California Energy Commission prepared the enclosed report, ***Timetable for the Phaseout of MTBE from California's Gasoline Supply***, pursuant to Executive Order D-5-99, item 4. This order, in part, directed the Commission to develop a timetable for removing MTBE from gasoline at the earliest possible date, but not later than December 31, 2002. On June 28, 1999, the Commission conducted a public hearing and adopted this Report. It should be noted that nothing in this Report changes the findings and recommendations of the Commission's December 1998 report, ***Supply and Cost Alternatives to MTBE in Gasoline***.

The Commission wishes to note one comment it heard at the public meeting. A representative of Kern Oil and Refining Co. offered the following suggested language:

Small refiners operate under different, less flexible process scenarios than do large refiners. In particular, it should be noted that the small refiner interviewed by CEC and CARB staff indicated that these difficulties in producing complying gasoline without the use of MTBE may be insurmountable and that product specification flexibility should be considered for this class of refiner.

Kern stated that this comment related to the ARB's forthcoming decision regarding Phase 3 regulations for reformulated gasoline. Although this comment is more appropriately directed to the California Air Resources Board, the Commissioners discussed the concern and agreed it should be considered, but adopted the report unchanged.

If you have any questions regarding this report, please do not hesitate to contact me at (916) 654-5000.

Sincerely,

ROBERT PERNELL
California Energy Commission

COMMISSION FINDINGS: TIMETABLE FOR THE PHASEOUT OF MTBE FROM CALIFORNIA'S GASOLINE SUPPLY

DOCKET NO. 99-GEO-1

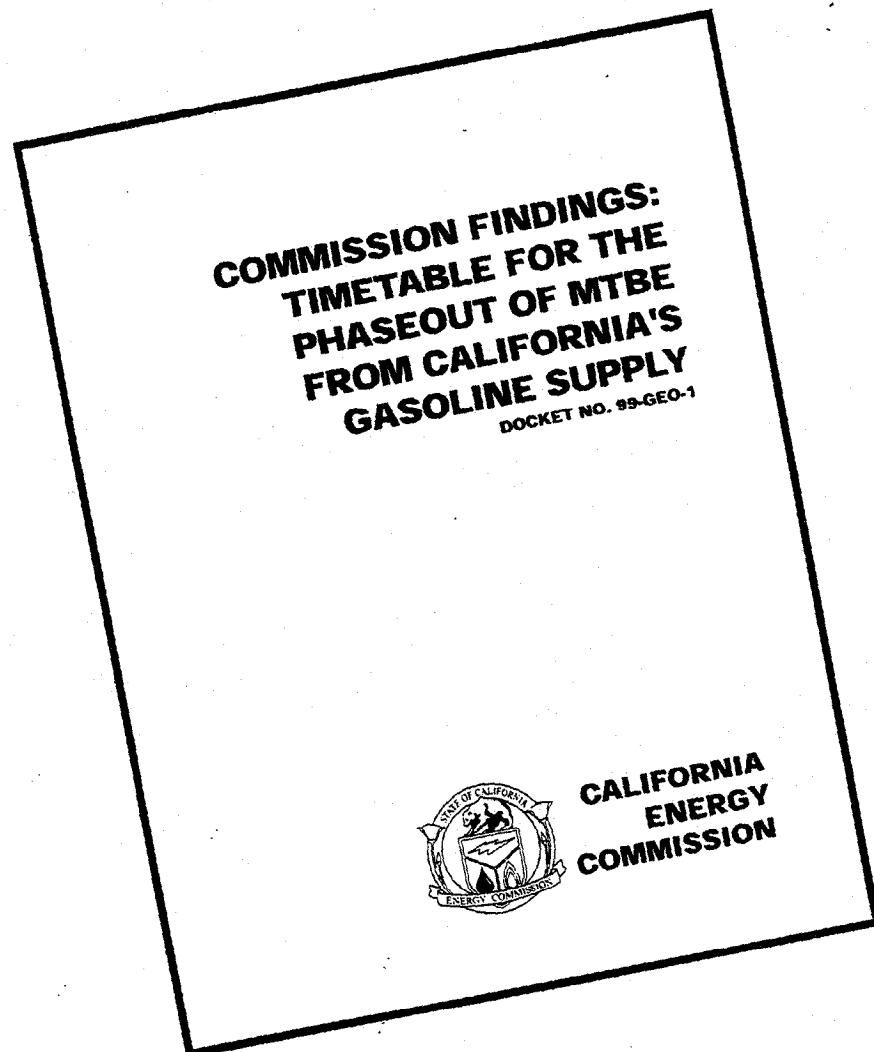
JUNE 1999



**CALIFORNIA
ENERGY
COMMISSION**

Gray Davis, Governor

P300-99-003



CALIFORNIA ENERGY COMMISSION

Robert Pernell, Chairman
David A. Rohy, Vice Chairman
Commissioners

William J. Keese

Robert A. Laurie

Michal C. Moore

Kent Smith,
Acting Executive Director

Gordon Schremp, Principal Author
Tom Glaviano, Project Manager
Gerry Bemis, Office Manager

FUEL RESOURCES OFFICE

H. Daniel Nix, Deputy Director

**ENERGY INFORMATION AND
ANALYSIS DIVISION**

Timetable for the Phaseout of MTBE from California's Gasoline Supply

Prepared by
Fuel Resources Office
Energy Information and Analysis Division
California Energy Commission
June 1999

(DOCKET NO. 99-GEO-1)

Acknowledgments

The Energy Information and Analysis Division, Fuel Office supported the work investigating the MTBE's phaseout detailed in this report. This report was prepared in consultation with the staff of the Air Resources Board. We would like to thank Commission staff, Gordon Schremp, Ramesh Ganeriwal, and Gary Yowell for their committed work in preparing this report. We would also like to thank ARB staff, Dean Simeroth and Steve Brisby, for their matched committed efforts attending the meetings and assisting in preparing this report.

List of Abbreviations

ARB	Air Resources Board
CaRFG2	California Reformulated Gasoline Phase 2
CaRFG3	California Reformulated Gasoline Phase 3
CEQA	California Environmental Quality Act
ETBE	Ethyl Tertiary Butyl Ether
MTBE	Methyl Tertiary Butyl Ether
RFG	Reformulated Gasoline
SIP	State Implementation Plan
TAME	Tertiary Amyl Methyl Ether
TBA	Tertiary Butyl Alcohol
U. S. EPA	United States Environmental Protection Agency

Table of Contents

Acknowledgments.....	2
List of Abbreviations	3
Table of Contents	4
Introduction.....	5
Organization of this Report.....	5
Background	5
MTBE Removal - Refinery Modifications.....	6
MTBE Removal - Distribution Infrastructure Modifications.....	7
MTBE Removal - Adequacy of Ethanol Supplies.....	8
MTBE Removal - Project Timelines	9
MTBE Removal - Ability to Advance the Timetable.....	10
MTBE Removal Date - When and Where?	11
MTBE Removal Prior to December 31, 2002	11
Gradually Phasing - Down MTBE for the Entire State	11
Removing MTBE from Specific Geographic Regions.....	12
Removing MTBE from Gasoline During the Winter Months.....	13
Areas of Uncertainty	13
Federal Minimum Oxygen Requirement.....	14
Viability of Ethanol	14
Phase 3 RFG Specifications	15
Other Issues.....	16

Introduction

In this report, the California Energy Commission and California Air Resources Board (ARB) staff discuss their findings for phasing out Methyl Tertiary Butyl Ether (MTBE) from the gasoline supply in California. This report is in response to Executive Order D-5-99 that was signed by Governor Gray Davis on March 25, 1999.

Organization of this Report

This report provides background information on the California gasoline industry, and the refinery modifications needed to remove MTBE from California's gasoline, including modifications to the gasoline distribution infrastructure. Other topics covered are the adequacy of ethanol supplies, project timelines, and barriers to removing MTBE before December 31, 2002 — the date specified in the Governor's Executive Order.

Background

The ARB adopted the present reformulated gasoline (CaRFG2) regulations in the fall of 1991. These measures were undertaken in response to air quality concerns and actions taken by the United States Environmental Protection Agency (U.S. EPA). The refining industry in California and other areas of the United States reacted to the change in gasoline specifications by making significant modifications to their facilities.

Since the federal Reformulated Gasoline (RFG) regulations required the use of an oxygenate, refiners were compelled to make engineering and design decisions based on the use of a specific type of oxygenate. The refiners in California selected MTBE as their oxygenate of choice, mainly due to its availability, high octane value, ability to dilute less desirable gasoline properties (such as sulfur, aromatics, and olefins), and good distillation and volatility properties. Since the spring of 1996, MTBE has been used year-round as the predominant oxygenate in gasoline at approximately 11 percent by volume.

The federal Clean Air Act requires that areas in the United States that are designated either extreme or severe ozone nonattainment regions use federal RFG that contains a minimum amount of oxygen at all times. As a result, 30 percent of the gasoline consumed nationally has to meet federal RFG requirements. There are three such areas (or air basins) in California: Sacramento, South Coast (Los Angeles and surrounding areas), and San Diego. These regions collectively account for approximately 70 percent of the gasoline sold in the state or about 10 percent of the gasoline sold nationally.

The use of MTBE in gasoline and occasional leaks and spills associated with the distribution of gasoline have resulted in detectable MTBE levels greater than the Secondary Maximum Contaminant Level of 5 parts per billion in a limited number of drinking water wells and surface water resources throughout California. To date, less than 1 percent of all the public drinking

water wells tested have revealed the presence of MTBE. Nevertheless, compared to typical gasoline blending components, MTBE is more soluble in water, is more costly to remove, and can travel farther and faster once it comes in contact with a groundwater aquifer. In drinking water, even at very low concentrations such as 5 part per billion, MTBE can produce an unpleasant odor and taste.

The main concern associated with the continued use of MTBE is the potential to contaminate existing and future water sources. In response to this and other concerns, Governor Gray Davis signed Executive Order (D-5-99) on March 25, 1999.

As stipulated in item number 4 of the Executive Order, the Energy Commission was directed, in consultation with the ARB, to develop a timetable by July 1, 1999, to remove MTBE from gasoline at the earliest possible date, but no later than December 31, 2002.

In response to this Executive Order, the Energy Commission and ARB staff held meetings with representatives of the refining companies, petroleum product pipeline operators, environmental groups, permitting agencies, and the ethanol industry. The information obtained from these meetings was used as part of the rationale for the findings presented in this document. A public workshop was held on June 18, 1999, to hear comments on the contents of the staff draft document. At an Energy Commission Business Meeting held on June 28, 1999, the staff draft document was adopted by a vote of 5-0.

MTBE Removal - Refinery Modifications

Finding: Removing MTBE from California's gasoline requires refiners to pursue a combination of compliance strategies that will involve the absence of oxygenates or the use of ethanol, or both. Also, the federal minimum oxygenate requirement which impacts about 70 percent of California gasoline limits the refiners flexibility. But in either case, to produce similar volumes of reformulated gasoline meeting California specifications without MTBE, refiners need to initiate and complete substantial modifications at their facilities.

Removing MTBE from California's gasoline will necessitate several changes at refineries as companies struggle to replace the gasoline volume and octane value that will be lost. Depending on the strategy pursued by each refiner, the complexity and cost of the projects will vary.

For those refiners that decide to use ethanol in place of MTBE, equipment to lower the volatility of blending gasoline with ethanol will need to be installed. (Volatility is a measure of how easily gasoline evaporates.) Refiners using ethanol will have to produce a base gasoline with lower volatility. This volatility is approximately 5.5 to 5.8 pounds per square inch Reid vapor pressure during the summer months. Gasoline blending components with high volatility, such as pentanes, will have to be removed so that the less volatile base gasoline can be produced. These modifications are difficult and reduce refinery flexibility. Small refiners operate under different, less flexible process scenarios than do large refiners.

Because each gallon of ethanol contains more oxygen than MTBE, refiners do not have to blend as much ethanol into the gasoline to achieve the same oxygen level achieved with 11 percent by volume MTBE. The combination of having to remove pentanes, to lower volatility to an acceptable level - up to five percent of the gasoline volume, and adding a lesser volume of ethanol, approximately six percent, rather than 11 percent, means that refiners will not be able to completely displace the volume lost with the removal of MTBE. In fact, if ethanol is used only at 5.7 percent by volume, the total decline in gasoline production capability should be about 10 percent. If refiners choose to blend with greater amounts of ethanol the deficit in production capability will be less than the 10 percent. The additional volume deficit will have to be made up by increasing other gasoline blending components such as alkylates. Refiners can accomplish this by either expanding alkylation capacity within their own facilities or by importing alkylates from outside of California.

If flexibility from the federal minimum oxygen requirement is provided, then for those refiners that choose to produce gasoline without oxygenates, some of the engineering approaches will be different. First, the refiners will not have to remove pentanes to offset the higher volatility associated with ethanol blends. Refiners will, however, have to replace the octane and volume lost from removing MTBE. In this situation, the loss in production capability would be about 11 percent. Once again, refiners are expected to make up for this volume deficit by increasing the production of desirable gasoline blending components such as alkylates or by importing additional gasoline or blending components.

Few gasoline-blending components possess octane values greater than MTBE (110) or ethanol (115). The blending octane value for alkylates is 91 to 99; this octane value may be sufficient to meet the supplemental octane needs for regular (87) and mid-grade (89) gasoline. But premium (92) gasoline blends are very difficult to make with the loss of MTBE's higher-octane value. Toluene (103) and isoctene (109) have higher octane values, but toluene is an aromatic and isoctene is an olefin, two gasoline properties that are limited by CaRFG2 specifications. A potential drawback could be the expense to produce higher octane alkylates.

MTBE Removal - Distribution Infrastructure Modifications

Finding: The modifications to the distribution infrastructure required for ethanol blending at all terminals will require up to two years to complete.

Refineries are not the only facilities that require modifications to remove MTBE. The majority of California's gasoline is transported by pipeline from the refineries to a network of storage terminals located throughout the state. Tanker trucks are then used to haul the gasoline from the terminals to service stations. For gasoline produced without ethanol, the distribution system would require little change. But if refiners produce gasoline with ethanol, then modifications to certain portions of the distribution system will be necessary.

Ethanol is miscible in water (soluble), whereas gasoline components are generally not soluble in water. Water is usually present in storage tanks and pipelines, mostly due to contamination from rainwater and small amounts of water inherent in the refinery process system. Because

petroleum products do not readily mix with water, the industry does not have much of a problem dealing with this issue unless ethanol is used.

Currently, refiners and pipeline operators are reluctant to ship gasoline blends containing ethanol through the pipeline distribution infrastructure because ethanol will absorb water and associated contaminants present in the distribution system. The ensuing contaminated gasoline could cause problems for motorists. To address this problem, refiners and pipeline operators are likely to ship a base gasoline without ethanol to the terminals. The ethanol will then be combined with the base gasoline when the two components are loaded into the delivery truck's tank. (Ethanol itself is usually transported to the terminal by rail car or by delivery truck, then stored in a separate storage tank.)

Today, less than 30 percent of the terminals in California have the capability of dispensing gasoline containing ethanol. The remaining terminals will require the installation of a separate tank for the ethanol storage. In addition, many terminals will require special blending equipment be installed so that ethanol can be mixed in the correct proportions while the tanker truck is loading. Transporting ethanol to the terminals will also require the construction of some additional rail connections, rail off-loading racks, tanker truck off-loading racks, or some combination. The permitting and construction required to upgrade all of the remaining California terminals to distribute gasoline-containing ethanol will require up to two years to complete.

Brazil is the largest producer and consumer of ethanol in the world and has a great deal of experience moving ethanol through their distribution infrastructure. However, the products that Brazil sends by pipeline have different properties than the products moved by pipeline in California. Pipeline operators in California and other areas of the United States may develop techniques for shipping ethanol through the pipeline distribution system separately, without compromising the ethanol quality. If this change in pipeline operation can be accomplished, transportation costs could be reduced for delivering ethanol to the terminals.

MTBE Removal - Adequacy of Ethanol Supplies

Finding: Although California's demand for ethanol could be met if sufficient time were provided, the availability of adequate ethanol supplies would become an issue if other areas of the country were also to ban MTBE while the federal minimum oxygenate requirement is still in place for gasoline.

Current ethanol production in the United States is approximately 100,000 barrels per day. The majority of ethanol production facilities are located in the Midwest and use corn as a feedstock. If California were to use ethanol to replace MTBE, anywhere from 35,000 to 92,000 barrels per day would be required. Even though this volume is a rather large portion of today's total domestic production, adequate ethanol supplies could be brought to California if enough time were allowed to restart idle capacity, about 20,000 barrels per day, and to build new facilities.

If other states under federal RFG requirements reach the same conclusions as California with regard to MTBE, it is likely that they too may call for its removal. If these other federal RFG areas in the U.S. were to switch from MTBE to ethanol, this action could result in the ethanol demand tripling. It is possible that, if these potential phaseouts outside of California were to coincide with the deadline set for this State, adequate supplies of ethanol would be more difficult to obtain, driving up the market price for ethanol. But even if California were the only state to switch to ethanol, this action would require significant changes to the ethanol industry that could not be accomplished in one year. Idle production capacity would have to be restarted and new ethanol facilities constructed. Although idle capacity could be brought back on line within six months, it is likely that it would take two to three years to construct new ethanol production facilities.

MTBE Removal - Project Timelines

Finding: Project timelines for refinery modifications will require between 33 and 42 months to complete, assuming the California Environmental Quality Act (CEQA) review process is optimally accomplished in 12 months. Project timelines for distribution infrastructure modifications should be less than those of the refinery projects, mainly due to shorter construction periods.

Finding: The Energy Commission and the ARB staffs should prepare progress reports on the status of projects associated with the removal of MTBE from California's gasoline. The first of these reports should be prepared April 2000. The Energy Commission and ARB would use the reports to track progress and to identify any problems early on so that appropriate action can be taken.

Producing MTBE-free gasoline in California will require substantial modifications to refineries and the distribution infrastructure and an increase in ethanol production. Typical project timelines involve a number of discreet steps that must be accomplished to bring a project to completion. The main steps include planning and engineering, approval of financing and acquisition of funds, permitting, purchase of major equipment, construction, and testing of the new and modified equipment.

Planning, engineering, funding, and equipment orders can take up to a year to complete. But there is room here to overlap some of these activities and possibly shorten this time period to six months. Although circumstances are similar for the majority of the refiners in California, small refiners will likely require more time to acquire the necessary capital before refinery modifications could be commenced. Permits associated with the refinery modifications are expected to undergo the CEQA review process. This step must be completed and the "permits to construct" issued before any construction begins.

Depending upon the size, complexity, and contentiousness of the various projects, the CEQA process could easily take one year or more to complete. Also, there is substantial uncertainty with regard to how this public process could be impacted by events beyond the control of the permit applicant. Thus, no guarantees can be made that this step could be shortened. In fact, it is

possible that the CEQA process could take longer than the anticipated 12-month review period. Once the permits have been obtained, the actual construction could be completed within 12 to 18 months. Testing the new process equipment would take approximately three months.

Previous refinery modifications undertaken to produce CaRFG2 involved a monitoring process by the ARB, which included quarterly status reports. The purpose of these quarterly reports was to ascertain the relative progress of all the refiners towards completion of their individual projects. Since the anticipated timelines for each of the projects being considered by California refiners leave little room for delay, a similar approach could provide decision-makers with valuable updates. This approach could provide an opportunity for state and local officials to rectify delays that could impact completion of the various California refinery, terminal, and ethanol plant projects.

MTBE Removal - Ability to Advance the Timetable

Finding: To ensure adequate supply and availability of gasoline for California consumers, the timetable for removal of MTBE from California's gasoline should not be advanced any earlier than the deadline of December 31, 2002.

As noted above, refiners will have to undertake major construction projects before they can produce comparable volumes of RFG without MTBE. Planning and engineering for these projects will require conservatively up to six months to complete, followed by the permitting process, ordering of major process equipment, construction, and testing of the modified equipment. In total these activities will optimistically require, on average, three years to complete.

Before implementing these projects, refiners have identified three important areas of uncertainty that need to be resolved: (1) the potential removal of the federal minimum oxygen requirement, (2) the viability of ethanol as a potential replacement for MTBE, and (3) the proposed Phase 3 reformulated gasoline (CaRFG3) specifications. Since the assessment of ethanol as an acceptable gasoline component will not be completed until December 1999 as well as the adoption of the specifications for Phase 3 RFG, refiners will most likely have to refrain from finalizing any MTBE phase-out plans until at least January, 2000.

California's gasoline supply is in a fragile balance that can be subject to strong price increases if production capability or portions of the distribution infrastructure are even moderately impacted. The recent refinery problems and associated rapid increase in gasoline prices serve as a reminder of the important role of adequate production capability.

If the timetable for removing MTBE from California's gasoline were to be advanced, all of the refiners may not have sufficient time to complete the necessary modifications to their facilities. The lack of production and an associated decrease in supply would likely lead to price increases greater than experienced during the spring of 1999. To reduce the likelihood of such an occurrence, adequate time must be provided so that the necessary modifications to the refineries, distribution infrastructures, and ethanol transportation and storage facilities can be completed.

This approach will help to ensure that all gasoline, rather than a portion of the supply, can be produced without MTBE.

MTBE Removal Date - When and Where?

Findings: The removal date for MTBE of December 31, 2002, should apply to the production or importation point for finished gasoline and the bulk distribution facilities. With this requirement, the service stations should not have to take any action to come into compliance.

Adequate time will be necessary for the new MTBE-free gasoline to work its way through the distribution system. The majority of gasoline storage tanks throughout the distribution system will have some of the old gasoline in the bottom of the tank when new delivery of gasoline arrives. The two different fuels get mixed together creating a third fuel with properties that are a mixture of the two. If the "old" gasoline happens to contain MTBE, the resulting mixture of the two fuels will also contain MTBE, but in a lower concentration.

To ensure that all of the MTBE is completely flushed from the various pipelines, storage tanks, and service stations, a certain period of time will have to pass before locations downstream from the refineries are MTBE-free. The ARB adopted a "staged" introduction strategy as part of their regulations for CaRFG2. This approach allowed an additional 90 days from the compliance date at the refinery for compliance at the service station. This strategy was quite successful because all the storage tanks were cycled through several deliveries, effectively flushing out the old gasoline with the new fuel.

MTBE Removal Prior to December 31, 2002

The concept of removing MTBE from gasoline in California prior to December 31, 2002, was discussed during the meetings with the stakeholders. Basically, the idea manifests in three forms: a gradual phasing down of MTBE for the entire state; removing MTBE from specific geographic regions, and removing MTBE from gasoline during the winter months.

Gradually Phasing - Down MTBE for the Entire State

Finding: A gradual phase-down of MTBE by 30 percent by the end of the first year is possible only if the federal minimum oxygen requirement is removed. Even if the requirement were removed, refiners would not have adequate time to complete all the necessary modifications to permit a 60 percent phase-down of MTBE by the end of the second year.

This phase down concept involves gradually removing MTBE from California gasoline over three years: 30 percent by the end of the first year, 60 percent by the end of the second year, and

100 percent by the end of the third year. The start time for the gradual phase-down concept is assumed to begin on January 1, 2000. In this case, the staff expects that the entire gasoline supply would be in compliance by the end of the third year (December 31, 2002). (But mandated gradual compliance by earlier dates is another matter.)

Although this concept appears to have merit on the surface, a closer look reveals some hurdles that would be difficult to overcome. Assuming that the base comparison for reducing MTBE is that all of California's gasoline contains 11 percent by volume MTBE, then achieving a 30 percent reduction by the end of the first year would be possible only if the federal minimum oxygen requirement were to be eliminated. Removing the oxygen requirement would allow refiners to extend the practice of producing some portion of their gasoline without MTBE to other regions of the state outside of the San Francisco Bay Area.

If the federal minimum oxygen requirement remains in effect, refiners would be required to use ethanol in approximately 70 percent of the state's gasoline. To use ethanol during the low volatility season (essentially April through October), substantial equipment modifications would be necessary, as discussed earlier. This type of refinery work would require more than 12 months to complete.

Achieving a 60 percent reduction in MTBE by the end of the second year would require substantial refinery modifications, regardless of whether the federal minimum oxygen requirement was to remain in effect or be removed. The 60 percent reduction would require refiners to make equipment changes that as discussed earlier cannot be done in less than three years. Finally, the additional record keeping to track gradual reduction goals would be a significant burden for both the industry and State agencies that enforce the gradual phase-down.

Removing MTBE from Specific Geographic Regions

Finding: Creating "MTBE-free zones" would require a number of years for the necessary refinery modifications to be completed and put the MTBE-free region at greater risk for supply disruptions and significant price spikes.

Another concept for accelerating the removal of MTBE from gasoline ahead of the December 31, 2002, deadline is that specific geographic regions of California be designated "MTBE-free zones." This type of designation would require that all grades of gasoline sold in the area be free of any MTBE.

Even though some of the San Francisco Bay Area refiners are producing the majority of their regular grade of gasoline without MTBE, expanding this practice to the rest of the gasoline sold in the region would require modifications to the refineries and changes to some portions of the distribution system. These projects would require a number of years to complete the planning, engineering, permitting, construction, and testing of the new process equipment before all grades and adequate volumes of complying gasoline could be supplied.

In addition, creating an "MTBE-free island" within the state will limit the options for suppliers to obtain alternative gasoline supplies when one or more of the refiners producing gasoline for the "MTBE-free zone" has an unanticipated production problem. Because the gasoline being sold in the "MTBE-free zone" will be unique, the availability of complying gasoline that could be used in the special region will be scarce. As a result, the recent price spike that occurred during the spring of 1999 could reoccur. But this time, the severity of the price increase would be greater for two reasons. First, suppliers of gasoline to the "MTBE-free zone" would not be able to blend-in additional volumes of MTBE to extend the gasoline supply. Second, the number of alternative sources of supply would be considerably less, limiting any relief that could be provided by importers or other producers in the state.

Most refiners in California produce gasoline for different market areas of the State. Rarely are these areas confined to a specific geographic region. Rather, over the course of a typical year, gasoline produced by a specific refiner could end up anywhere in the state. The flexibility for refiners to be able to send gasoline to any area of the State would be curtailed by the creation of an "MTBE-free zone," reducing the efficiency of the distribution system and increasing the costs for consumers.

Removing MTBE from Gasoline During the Winter Months

Finding: The seasonal removal of MTBE could not be accomplished without modifications to both the refineries and the distribution infrastructure. These projects would require a number of years to complete. However, absent a federal minimum oxygen requirement, the seasonal use of ethanol could occur on a limited basis, where and when it meets the logistical, economic, and marketing plans of the various refiners.

A third concept for accelerating the removal of MTBE from gasoline in advance of the December 31, 2002, deadline is that refiners be required to remove MTBE from all grades of gasoline during the winter months.

If the federal minimum oxygen requirement remains in effect, refiners would be required to use ethanol as a substitute for MTBE. Even if adequate ethanol supplies could be secured quickly, the refiners would not be able to blend the ethanol at the terminals without making modifications to the distribution infrastructure. These modifications would take up to two years to complete the planning, engineering, permitting, and construction to enable all of the terminals to dispense gasoline blends containing ethanol. These additional modifications would require a substantial amount of time to complete.

Areas of Uncertainty

At the meetings, stakeholders identified several areas of uncertainty that will play a major role in decisions undertaken by refiners as they plan to remove MTBE. All of these issues, except for the federal minimum oxygen requirement, should be resolved by the end of this year. This resolution will provide refiners with additional certainty that should assist them with finalizing

their engineering projects and allow them to initiate a chain of events that will eventually lead to removing MTBE from California's gasoline supply.

Federal Minimum Oxygen Requirement

Finding: Removing the federal minimum oxygen requirement would lead to an almost immediate reduction in MTBE use throughout the state to a point where at least 30 percent of the gasoline would be produced without MTBE. The use of MTBE would still continue until all modifications to the refineries had been completed.

Finding: If the federal minimum oxygen requirement is not removed, then refiners will continue using MTBE in quantities similar to today's until all modifications to the refineries are completed.

Federal law requires that regions in the United States that are either extreme or severe ozone nonattainment use federal RFG that contains a minimum amount of oxygen at all time. These areas have resulted in 30 percent of the gasoline consumed nationally having to meet federal RFG requirements. There are three such areas in California: Sacramento, South Coast (Los Angeles and surrounding areas), and San Diego. These regions collectively account for approximately 70 percent of the gasoline sold in the state or about 10 percent of the gasoline sold nationally. If this minimum oxygen requirement remains in effect, ethanol will be the most likely oxygenate to replace MTBE.

California RFG regulations allow refiners to produce complying fuel without any oxygenates. Three refiners in the San Francisco Bay Area are producing the majority of their regular grade of gasoline without adding any MTBE. This gasoline is marketed in the San Francisco region because the area is not an extreme or severe ozone nonattainment region. However, the federal minimum oxygen requirement, refiners are unable to expand this practice into the Sacramento or Southern California federal RFG areas.

Viability of Ethanol

Finding: If ethanol in gasoline is found to pose a serious risk to people's health or our drinking water resources, then the December 31, 2002, date for removal of MTBE would have to be re-evaluated because no other viable alternative to ethanol is known at this time to be acceptable to industry, regulatory agencies, and health officials.

Finding: If ethanol is not a viable alternative to MTBE, refiners could produce sufficient volumes of reformulated gasoline by the December 31, 2002, deadline only if the federal minimum oxygen requirement were to be removed no later than January 31, 2000.

Finding: An "acceptable concentration level" for ethanol in drinking water would allow state water and health officials to better assess the implications of greater ethanol use in California's gasoline.

The Governor's Executive Order (D-5-99) also specifies that any substitute for MTBE be thoroughly assessed before it can be used in California's gasoline. Ethanol will be studied to see what the potential impacts might be for burning gasoline containing ethanol in a vehicle's engine and what problems could be associated with contamination of ground and surface water sources from leaks and spills of gasoline containing ethanol. Each of these studies is scheduled to be completed by December 31, 1999.

Even though other alternative oxygenates such as ethyl tertiary butyl ether (ETBE), tertiary amyl methyl ether (TAME), and tertiary butyl alcohol (TBA) have been used in gasoline, it is believed that none of these compounds will be used by the refining industry in California. The primary reasons are that all of these compounds possess similar undesirable environmental characteristics as MTBE: they can be detected by people as an unpleasant taste or odor at very low-concentration levels, they are more soluble than gasoline in water, and the cost to remove these compounds from contaminated drinking water resources is quite high (relative to other gasoline components). It is for these reasons that ethanol is thought to be the only alternative to MTBE that would be potentially acceptable to industry, regulatory agencies, and health officials.

The fate and transport studies of ethanol in surface and groundwater should assess the potential impacts on the environment of using ethanol in gasoline. As with MTBE, the definition of "acceptable concentrations" in drinking water is a useful guideline for water agencies and other health officials. If ethanol's "acceptable concentration" level is clearly defined as part of the findings associated with the completion of the fate and transport studies, State officials will be able to better assess the implications of greater ethanol use in California's gasoline.

The fate and transport studies are also expected to assess the potential risk to the environment of gasoline blends that do not contain any oxygenates. A concern has been raised about the potential increase in the use of certain gasoline blending components, such as alkylates. A great deal of emphasis has been placed on the uncertainty of ethanol's viability in terms of delaying the investment decisions for refiners. But it should also be noted that ethanol producers would probably wait to see if ethanol is acceptable to use as a replacement for MTBE before committing any capital to either expand existing ethanol production capacity or construct new facilities.

Phase 3 RFG Specifications

Finding: Even though the Phase 3 RFG regulations may require additional refinery modifications, the December 31, 2002 deadline should still allow sufficient time to complete the extra work, if the ARB were to use this same date for the introduction of their new regulations.

The Governor's Executive Order (D-5-99) also specifies that by December 1999 the ARB shall adopt California Phase 3 Reformulated Gasoline (CaRFG3) regulations that will provide additional flexibility to refiners to remove MTBE and maintain current emissions and air quality benefits while allowing compliance with the State Implementation Plan (SIP).

To comply with the CaRFG3 specifications, some additional refinery modifications may be necessary. The timing of the introduction of CaRFG3 could be important. Planning the introduction of CaRFG3 to coincide with the December 31, 2002, date to remove MTBE could afford planning and engineering advantages for refiners, as well as having the potential to optimize some of their capital expenditures.

Other Issues

Various stakeholders raised a number of important issues as "concerns." These matters do not necessarily relate to or directly impact the timetable for removing MTBE, but they will have to be resolved before MTBE is removed from California's gasoline. The staff addressed these issues at the public workshop, discussing such matters as: the definition of "MTBE-free" gasoline, the supply impacts of defining MTBE-free gasoline at too low a concentration of MTBE, fungibility of gasoline containing ethanol, the potential for California to become a net importer of gasoline, and transportation concerns associated with the movement of large volumes of ethanol into the state.

APPENDIX D
EXECUTIVE ORDER D-52-02



Executive Order D-52-02 by the Governor of the State of California

WHEREAS, Executive Order D-5-99, issued March 26, 1999, found that, "on balance," use of MTBE posed a significant risk to California's environment. The State Energy Resource Conservation and Development Commission (Energy Commission) and the Air Resources Board (Board) were directed to develop a timetable for removing MTBE from gasoline at the earliest possible date, no later than December 31, 2002. The Board was directed to adopt regulations as needed to implement the Executive Order; and

WHEREAS, on December 9, 1999, the Board adopted regulations prohibiting the sale of gasoline containing MTBE in California after December 31, 2002; and

WHEREAS, Senate Bill 989 (Sher) of 1999 requires the Energy Commission to develop a timetable for removal of MTBE from gasoline "at the earliest possible date" that will still ensure adequate supply and availability of gasoline. (Health & Saf. Code, Section 43013.1.); and

WHEREAS, in order to comply with the federal requirements and also eliminate use of MTBE, California would need to import up to 900 million gallons of ethanol per year; and

WHEREAS, the current production, transportation and distribution of ethanol is insufficient to allow California to meet federal requirements and eliminate use of MTBE on January 1, 2003; and

WHEREAS, on June 12, 2001, the U.S. Environmental Protection Agency denied California's request for a waiver of the federal oxygen content requirement. As a result, if use of MTBE is prohibited January 1, 2003, California's motorists will face severe shortages of gasoline, resulting in substantial price increases; and

WHEREAS, strengthened underground storage tank requirements and enforcement have significantly decreased the volume and rate of MTBE discharges since Executive Order D-5-99 was issued in March of 1999;

NOW, THEREFORE, I, GRAY DAVIS, Governor of the State of California, by virtue of the power and authority vested in me by the Constitution and statutes of the State of California, do hereby issue this order to become effective immediately:

I FIND that it is not possible to eliminate use of MTBE on January 1, 2003, without significantly risking disruption of the availability of gasoline in California. This would substantially increase prices, harm California's economy and impose an unjustified burden upon our motorists.

IT IS ORDERED that by July 31, 2002, the board shall take the necessary actions to postpone for one year the prohibitions of the use of MTBE and other specified oxygenates in California gasoline, and the related requirements for California Phase 3 reformulated gasoline.

IT IS FURTHER ORDERED that the Board and Commission shall work with the petroleum industry to ensure that MTBE-free gasoline meeting California standards continues to be supplied to the Lake Tahoe region and any other areas of California currently receiving MTBE-free gasoline.

IT IS FURTHER ORDERED that the State Water Resources Control Board and the Department of Health Services shall work with California drinking water providers to ensure that the providers continue to take all appropriate measures to prevent discharge of MTBE into surface water reservoirs.

IN WITNESS WHEREOF I have hereunto set my hand and caused the Great Seal of the State of California to be affixed this the fourteenth day of March 2002.

 /signed/
Gray Davis
Governor of California

APPENDIX E
ARB RESOLUTION 02-25

State of California
AIR RESOURCES BOARD

Resolution 02-25

July 25, 2002

Agenda Item No.: 02-6-2

WHEREAS, sections 39600 and 39601 of the Health and Safety Code authorize the Air Resources Board (the Board or ARB) to adopt standards, rules and regulations and to do such acts as may be necessary for the proper execution of the powers and duties granted to and imposed upon the Board by law;

WHEREAS, sections 43018(a) and (b) of the Health and Safety Code direct the Board to endeavor to achieve the maximum degree of emission reduction possible from vehicular and other mobile sources in order to accomplish the attainment of the state ambient air quality standards at the earliest practicable date, and to take whatever actions are necessary, cost-effective, and technologically feasible to achieve, by December 31, 2000, specified reductions in the emissions of reactive organic gases, oxides of nitrogen (NOx), particulates, carbon monoxide (CO), and toxic air contaminants from vehicular sources;

WHEREAS, section 43018(c) of the Health and Safety Code provides that in carrying out section 43018, the Board shall adopt standards and regulations which will result in the most cost-effective combination of control measures on all classes of motor vehicles and motor vehicle fuel, including but not limited to specification of vehicular fuel composition;

WHEREAS, Health and Safety Code section 43013 authorizes the Board to adopt and implement motor vehicle fuel specifications for the control of air contaminants and sources of air pollution which the Board has found necessary, cost-effective, and technologically feasible to carry out the purposes of Division 26 of the Health and Safety Code;

WHEREAS, the ARB administers the Phase 2 California reformulated gasoline (CaRFG2) regulations, which became applicable March 1, 1996 and currently include the following elements:

Standards for eight gasoline properties – summertime Reid Vapor Pressure (RVP), T50 (50 percent distillation temperature), T90 (90 percent distillation temperature), and aromatic hydrocarbon, benzene, sulfur, olefin, and oxygen contents;

Establishment of an absolute "cap" limit for each specification, applicable throughout the gasoline distribution system;

Establishment of additional, more stringent "refinery" limits applicable to gasoline when it is initially supplied from the production or import facility for all specifications but RVP, and provisions authorizing compliance through a form of averaging T50, T90, and sulfur, aromatic hydrocarbon, benzene and olefin contents;

An alternative compliance mechanism under which a producer or importer may use the CaRFG2 Predictive Model to identify alternative flat and averaging refinery limits, up to the cap limits, that will result in essentially no increase in emissions of exhaust hydrocarbons, NOx, and potency weighted toxics (benzene, 1,3-butadiene, acetaldehyde and formaldehyde); the CaRFG2 Predictive Model consists of mathematical equations, based on 18 vehicle emissions test programs, that predict the changes in exhaust hydrocarbons, NOx, and potency weighted toxics resulting from different gasoline formulations;

In the case of oxygen content, a requirement that CaRFG2 sold throughout the distribution system in Los Angeles, Orange, Riverside, San Bernardino, Ventura and Imperial Counties during specified winter months must contain at least 1.8 percent by weight (wt.%) oxygen, in order to reduce emissions of CO during the season of highest CO concentrations in areas where the CO ambient air quality standards have not yet been attained; during the rest of the year and in the remainder of the state, CaRFG2 being supplied from a production or import facility is subject to an oxygen content refinery limit of 1.8 to 2.2 wt.%, but the producer or importer may use the CaRFG2 Predictive Model to reduce oxygen content to as low as 0.0 wt.%, or raise it as high as 3.5 wt.%; and

A mechanism allowing a refiner to ship a non-oxygenated gasoline blend – called "California reformulated gasoline blendstock for oxygenate blending," or "CARBOB" – from the refinery without complying with the CaRFG standards if it is specially formulated to be combined with oxygenate "downstream" from the refinery and the resulting blend will meet all of the CaRFG standards; this allows entities adding oxygenate downstream from the refinery to take advantage of the contribution it can make to complying with the CaRFG standards, particularly by diluting the concentration of compounds like benzene;

WHEREAS, virtually all current California gasoline is subject to alternative refinery flat or averaging limits designated by the producer or importer using the CaRFG2 Predictive Model;

WHEREAS, pursuant to federal Clean Air Act section 211(k), the U.S. Environmental Protection Agency (U.S. EPA) administers federal reformulated gasoline (RFG) regulations that apply – along with the CaRFG2 regulations – to the 70 percent of California gasoline that is sold in the greater Los Angeles, San Diego and Sacramento areas; these regulations require a year-round oxygen content of 2.0 wt.% or 2.1 wt.% on average, and will apply in the San Joaquin Valley area starting December 10, 2003;

WHEREAS, in order to meet the federal and California requirements for the minimum oxygen content of gasoline, refiners have primarily used the oxygenate methyl tertiary butyl ether (MTBE); in 1998, over 90 percent of California gasoline was blended with MTBE;

WHEREAS, pursuant to "The MTBE Public Health and Environmental Protection Act of 1997" (Stats. 1997, ch. 816; SB 521, Mountjoy), the University of California prepared a report on the "Health and Environmental Assessment of MTBE" and presented it to the Governor on November 12, 1998;

WHEREAS, in response to this report and subsequent written comments and hearing testimony, on March 25, 1999, Governor Gray Davis issued Executive Order D-5-99, in which he found that, "on balance, there is significant risk to the environment from using MTBE in gasoline in California," primarily because of the environmental threat of MTBE contamination of groundwater and drinking water resulting from leaking underground fuel storage tanks;

WHEREAS, Executive Order D-5-99 included a direction to the California Energy Commission (CEC), in consultation with the ARB, to develop a timetable for the removal of MTBE from California gasoline not later than December 31, 2002, and included a direction to the ARB to adopt California Phase 3 Reformulated Gasoline (CaRFG3) regulations that will provide additional flexibility in lowering or removing oxygen and maintain current emissions and air quality benefits and allow compliance with the State Implementation Plan (SIP);

WHEREAS, Senate Bill 989 (Sher), signed by the Governor on October 10, 1999, (Stats. 1999, ch. 812) enacts new section 43013.1 of the Health and Safety Code, which requires the CEC to develop a timetable for the removal of MTBE from gasoline at the earliest possible date, and requires the ARB to ensure that the CaRFG3 regulations maintain or improve upon emissions and air quality benefits achieved by CaRFG2 as of January 1, 1999, and provide additional flexibility to reduce or remove oxygen from motor vehicle fuel;

WHEREAS, California has requested that U.S. EPA waive application of the federal RFG year-round 2.0 wt.% minimum oxygen mandate, on the ground that the mandate prevents or interferes with attainment of the national ambient ozone standard in California because the mandate will preclude the production of

nonoxygenated CaRFG3 which, on average, would result in lower NOx emissions than oxygenated CaRFG3;

WHEREAS, on June 28, 1999, the CEC determined that, to ensure adequate supply and availability of gasoline for California consumers, the timetable for removal of MTBE from California's gasoline should not be advanced earlier than the deadline of December 31, 2002;

WHEREAS, at a hearing on December 9, 1999, the Board approved the CaRFG3 amendments to the CaRFG regulations, including the following major elements:

A prohibition of the use of MTBE in gasoline starting December 31, 2002;

The adoption of CaRFG3 flat, averaging and cap limits for the eight properties regulated by the CaRFG2 program; these limits become applicable December 31, 2002, although there is a mechanism which allows refiners to produce gasoline subject to the CaRFG3 standards before that date;

A new CaRFG3 Predictive Model, which includes a new evaporative hydrocarbon emissions element that will allow an alternative RVP flat limit between 6.40 and 7.20 pounds per square inch (psi), when compared against a flat limit of 6.90 psi;

Elimination of quality audit requirements in the provisions pertaining to CARBOB; and

Small refiner CaRFG3 standards with less stringent flat limits for benzene and aromatics content, T50, and T90 for a qualifying small refiner who had produced CaRFG2 in 1998 and 1999; the refiner could only use the small refiner CaRFG3 standards, however, if it offsets the excess emissions with changes to its diesel fuel produced pursuant to a mechanism to be added to the ARB's regulation limiting the aromatic hydrocarbon content of California diesel fuel;

WHEREAS, the CaRFG3 amendments became operative on September 2, 2000;

WHEREAS, at the December 9, 1999, hearing the Board directed the Executive Officer to propose to the Board, for consideration by October 2000, appropriate further amendments to the CaRFG3 regulations to assure the practical and effective implementation of the provisions on CARBOB and imported gasoline, specifications for denatured ethanol for use in motor vehicles, and amendments to the ARB's diesel fuel regulations to incorporate a mechanism for calculating small refiner offsets;

WHEREAS, at a hearing on November 16, 2000, the Board approved amendments to the CaRFG3 regulations that included the following elements:

Specifications for denatured ethanol intended for use as an oxygenate in California gasoline, and specifications for denaturants used in such ethanol;

Establishment of a new "CARBOB Model" which refiners and importers could elect to use to set limits directly applicable to the CARBOB, eliminating the need to hand-blend the CARBOB with ethanol and test the blend in order to determine compliance with the CaRFG standards that apply to gasoline being supplied from the production or import facility;

Cap limits for CARBOB that is downstream from the production or import facility;

Allowing exceptions under certain conditions of the prohibition of combining CARBOB with different kinds of CARBOB or with finished gasoline; these exceptions are designed to allow distributors to transition from one product to another if there is no overall adverse emission impact;

Adding a mechanism for a qualifying small refiner to select one of three options for producing diesel fuel in a manner that offsets the excess emissions from gasoline subject to the small refiner CaRFG3 standards in a particular year; and

Amendments that would make various other minor changes to the CaRFG regulations, including reducing the applied reproducibility of automated RVP test methods, clarifying the method for sampling gasoline, and correcting provisions on transitions to the winter oxygenates season for low-throughput stations;

WHEREAS, the existing timetable for removal of MTBE could not ensure adequate supply and availability of gasoline to meet California's demands, and shortages in gasoline supply could increase prices by 50 percent or more;

WHEREAS, on June 12, 2001, the U.S. Environmental Protection Agency denied California's request for a waiver of the federal oxygen content requirement, thereby denying California refiners the flexibility to produce non-oxygenated California reformulated gasoline more efficiently and at less cost;

WHEREAS, in order to comply with the federal requirements and also eliminate the use of MTBE, California would need up to 950 million gallons of ethanol per year;

WHEREAS, the current transportation and distribution of ethanol is insufficient to allow California to meet federal requirements and eliminate use of MTBE on January 1, 2003;

WHEREAS, on March 14, 2002, Governor Gray Davis issued Executive Order D-52-02, in which he found that it is not possible to eliminate use of MTBE on January 1, 2003 without significantly risking disruption of the availability of gasoline in California;

WHEREAS, Executive Order D-52-02 found that eliminating the use of MTBE on January 1, 2003 would substantially increase prices, harm California's economy and impose an unjustified burden on motorists;

WHEREAS, Executive Order D-52-02 included a direction to the ARB to take the necessary actions, by July 31, 2002, to postpone for one year the prohibitions of the use of MTBE and other specified oxygenates in California gasoline, and the related requirements for California Phase 3 reformulated gasoline;

WHEREAS, the ARB staff has proposed amendments to the CaRFG3 regulations which would be consistent with the Governor's Executive Order D-52-02, including the following elements:

Postponement of the prohibitions regarding methyl tertiary butyl ether (MTBE) and other oxygenates other than ethanol in California gasoline supplied by refiners and importers from December 31, 2002 to December 31, 2003, with the downstream phase-in requirements also postponed by one year;

Postponement by one year the dates in the current schedule for reducing residual levels of MTBE in CaRFG3 after the addition of MTBE is banned;

Postponement of the imposition of the CaRFG3 standards for gasoline properties for one year, from December 31, 2002 to December 31, 2003; and

Amendments that would make various minor changes to the CaRFG3 regulations, including simplifying the testing provisions for determining whether gasoline blendstock designed for blending with ethanol will comply with the CaRFG standards after it is oxygenated, and correcting errors in the assignment of RVP regulatory control periods for the North Coast Air Basin and the North Central Coast Air Basin.

WHEREAS, the California Environmental Quality Act and Board regulations require that an action not be adopted as proposed where it will have significant adverse environmental impacts if feasible alternatives or mitigation measures are available which would substantially reduce or avoid such impacts;

WHEREAS, the Board has considered the impact of the proposed amendments on the economy of the State;

WHEREAS, a public hearing and other administrative proceedings have been held in accordance with the provisions of chapter 3.5 (commencing with section 11340), part 1, division 3, title 2 of the Government Code;

WHEREAS, at the hearing the staff has suggested several modifications to the originally proposed amendments; the modifications include:

Postponing, by one year, the date for the reduction of the CaRFG3 sulfur content cap limit from 60 parts per million (ppm) to 30 ppm to make it consistent with the proposed one-year delay for implementation of the other CaRFG3 gasoline specifications;

Delaying the start of the 2003 RVP regulatory control season in the South Coast by one month to provide production and import facilities in the South Coast that comply with the original phase-out schedule the flexibility to make the transition from MTBE gasoline to ethanol gasoline and comply with RVP standards; and

Retaining the original 2002 date for the removal of the month of October from the wintertime oxygen requirement in the South Coast Air Basin as it has been demonstrated that by that date, the requirement would no longer be needed to assure that attainment of the federal carbon monoxide standard is maintained in that month;

WHEREAS, the Board finds that:

Phasing out MTBE from gasoline as scheduled by the end of 2002 with replacement by ethanol is expected to reduce the ability of in-state refineries to produce sufficient fuel to meet demand, and since the availability of imported finished gasoline or blendstocks is uncertain, there could be significant constraints on gasoline supply;

With a significant reduction in supply, prices could be expected to increase by 50 percent or more;

With the U.S. EPA's denial of California's request for a waiver of the federal oxygenate requirement, the use of MTBE cannot be eliminated until ethanol production capability in producing states is adequate, the ethanol infrastructure in state has been put into place, and sufficient ethanol reserves built up within the state;

California will need 750 to 950 million gallons of ethanol annually if MTBE is removed while the federal oxygenate requirement is still in effect, but the logistics of moving such large volumes of ethanol have not been fully resolved and there is a high probability that significant operational problems could occur in areas such as rail coordination, tank car unloading, marine receipts,

distribution of ethanol to gasoline truck terminals, and the ability to store and blend the ethanol at the gasoline truck terminals;

Therefore the amendments approved herein regarding the postponement of the ban on use of MTBE and other oxygenates other than ethanol and the postponement of the related CaRFG3 regulations are necessary to ensure compliance with the directive of Executive Order D-5-99 that the timetable for the removal of MTBE must ensure adequate supply and availability of gasoline for California consumers;

WHEREAS, pursuant to the requirements of the California Environmental Quality Act, and the Board's regulations, the Board further finds that:

The postponement of the MTBE ban and the implementation of the related CaRFG3 regulations should have no significant negative impacts on air quality; the additional emissions reductions expected with the CaRFG3 program will be postponed by one year, but only to the extent that refiners choose not to produce Phase 3 reformulated gasoline prior to the mandated deadline;

The proposed amendments do not affect an individual refiner's and importer's ongoing ability to elect to use the provisions of the CaRFG3 regulations to produce non-MTBE gasoline prior to the December 31, 2003 mandatory phase-out deadline;

The proposed one-year delay could result in an increase in evaporative emissions associated with the use of ethanol depending on the extent to which refiners elect to phase out MTBE early;

The delay could result in increased commingling of ethanol blends with non-ethanol containing gasoline in the motor vehicle fuel tank, depending on refiner choices regarding early phase-out of MTBE and replacement with ethanol; the mix of gasolines in a given area, and customer choices regarding brand and grade loyalty;

There should be no overall increase in evaporative emissions with the increase in commingling because ARB staff's field study and simulation model demonstrates that the potential RVP increase due to commingling is less than 0.1 psi and the RVP offset of 0.1 psi provided by the CaRFG3 regulations would adequately protect against an increase in evaporative emissions due to commingling;

Ethanol can have an evaporative emissions impact due to permeation of ethanol through the soft fuel system components of motor vehicles; but a delay in the phase out of MTBE will postpone the increase in ethanol

permeation emissions in so far as individual refiners choose not to remove MTBE;

The magnitude of the permeation emissions impact remains somewhat uncertain at this time, but as directed by the Board when the Board approved the CaRFG3 regulations, ARB staff is evaluating the impact of permeation through a research study co-funded by the ARB;

The proposed delay in the phase out of MTBE should result in no significant increase in greenhouse gas emissions over what would occur without the postponement;

WHEREAS, the Board further finds that:

Results of field tests conducted by the State Water Resources Control Board indicate that the strengthened underground storage tank requirements and enforcement have been very successful in reducing liquid releases of gasoline;

MTBE will continue to be in any remaining liquid and vapor leaks of gasoline from underground storage tanks during the additional year, but this impact is expected to be small compared to existing contamination;

The primary neighborhood impacts of the proposed delay of the MTBE ban would be the continued risk of contamination of groundwater and drinking water;

The neighborhood impact is mitigated to the extent that refiners remove MTBE from gasoline and change to ethanol before the mandated deadline;

WHEREAS, the Board further finds that:

Without a delay, gasoline supply shortages are likely, and with a significant reduction in supply, prices could be expected to increase by 50 percent or more;

Refiners, ethanol producers and others who have made investments to comply with the current MTBE phase out deadline may incur some costs if they elect not to phase out MTBE early;

Those businesses that have not completed the conversion may experience an economic benefit from the proposed amendments as the delay allows them time to complete the infrastructure improvements and contingency provisions needed to ensure adequate supply of MTBE-free gasoline by the new deadline;

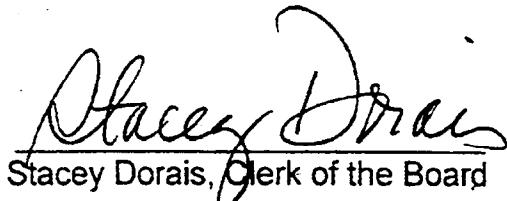
Continued use of MTBE as a fuel oxygenate for an additional year may also add to the cleanup needs the state will face over the next decade, and could extend the risk of further contamination of groundwater and drinking water;

WHEREAS, the Board further finds that there are no feasible mitigation measures or alternatives available to the Board which would further substantially reduce the potential adverse impacts of the proposed regulations herein, while at the same time providing the substantial overall public health and economic benefits as noted herein;

NOW, THEREFORE, BE IT RESOLVED that the Board hereby approves the amendments to sections 2261, 2262, 2262.4, 2262.5, 2262.6, 2262.9, 2266.5, 2269, 2271, 2272, and 2296 of title 13, California Code of Regulations, as set forth in Attachment A hereto, with the modifications to those sections set forth in Attachment B hereto.

BE IT FURTHER RESOLVED that the Board directs the Executive Officer: (1) to incorporate into the approved regulations and incorporated documents the modifications described in Attachment B hereto and such other conforming modifications as may be appropriate; (2) to make the modified regulations and incorporated documents, with the modifications clearly indicated, available for public comment for a period of at least 15 days; (3) to consider any comments on the modifications received during the supplemental comment period; and then (4) consistent with this Resolution, either to adopt the regulations as made available with any appropriate additional nonsubstantial modifications, to make additional modifications available for public comment for an additional period of at least 15 days, or to present the regulations to the Board for further consideration if he determines that this is warranted.

I hereby certify that the above is a true and correct copy of Resolution 02-25, as adopted by the Air Resources Board.



Stacey Dorais, Clerk of the Board

Resolution 02-25

July 25, 2002

Identification of Attachments to the Resolution

Attachment A: The Proposed Regulation Order attached as Appendix A to the Staff Report: Initial Statement of Reasons, release date June 7, 2002.

Attachment B: Staff's Suggested Changes to the Original Regulatory Proposal, dated July 25, 2002, and distributed at the July 25, 2002 hearing.

ATTACHMENT B**ARB STAFF'S SUGGESTED MODIFICATIONS TO THE PROPOSED AMENDMENTS TO THE CaRFG3 REGULATIONS****A. CHANGES PERTAINING TO THE REDUCTION OF THE CaRFG3 SULFUR CAP LIMIT FROM 60 PPM TO 30 PPM**

This modification postpones, by one year, the date for the reduction of the CaRFG3 sulfur content cap limit from 60 parts per million (ppm) to 30 ppm to make it consistent with the proposed one-year delay for implementation of the other CaRFG3 gasoline specifications. Staff had intended to propose a one-year postponement of the applicable dates of all CaRFG3 cap limit compliance requirements to be consistent with the proposed one-year delay of the prohibition of MTBE. However, due to an oversight, the date for the reduction of the sulfur cap limit from 60 ppm to 30 ppm was left unchanged in the proposed regulation text.

B. CHANGES TO START OF THE RVP REGULATORY CONTROL PERIOD FOR PRODUCTION AND IMPORT FACILITIES IN THE SOUTH COAST FOR THE INITIAL TRANSITION FROM MTBE TO ETHANOL GASOLINE

The current CaRFG3 regulations delay the start of the 2003 RVP regulatory control season in the South Coast by one month to allow production and import facilities flexibility to make the transition from MTBE gasoline to ethanol gasoline and comply with RVP standards. In the proposed amendments to the CaRFG3 regulations, staff proposed to postpone the applicability of this one-time delay to 2004 to maintain that flexibility and make the date consistent with the one-year postponement of the MTBE phase-out. With this modification, staff is proposing to provide this flexibility to production and import facilities that comply with the original phase-out schedule.

C. CHANGE TO THE WINTERTIME OXYGEN REQUIREMENT FOR THE SOUTH COAST

In the CaRFG3 rulemaking, the ARB eliminated the October oxygen requirement in the South Coast area after 2002 based on a demonstration that by that time the requirement would no longer be needed to assure that attainment of the federal carbon monoxide standard is maintained in that month. October is the one month in which the summertime Reid vapor pressure standards and the wintertime oxygen requirements have overlapped. While it is less important to avoid this overlap if there is not yet an effective ethanol mandate, retaining the original phase-out of the October oxygen requirement after 2002 will provide useful flexibility for refiners, especially those who have decided to stop using MTBE sooner than will be required under the proposed amendments in this rulemaking. After the April 24, 2002 workshop, staff had intended to propose no change to the phase-out of the October oxygen requirement in the preexisting regulations, but left the date change in the proposed regulation text due to an oversight.

ARB STAFF'S SUGGESTED MODIFICATIONS TO THE PROPOSED REGULATION ORDER

AMENDMENTS TO THE CALIFORNIA REFORMULATED GASOLINE REGULATIONS TO POSTPONE IMPOSITION OF THE CaRFG3 STANDARDS AND THE PROHIBITION OF MTBE AND OXYGENATES OTHER THAN ETHANOL IN CALIFORNIA GASOLINE FROM DECEMBER 31, 2002 TO DECEMBER 31, 2003

Note: The preexisting regulation text is set forth below in normal type. The originally proposed amendments are shown in underline to indicate additions and ~~strikeout~~ to indicate deletions. The subsequent modifications proposed by staff are shown in double underline to indicate additions and ~~double strikeout~~ to indicate deletions. Only the text containing proposed modifications is shown. Subsection headings in italics and bold are to be italicized when printed in Barclays California Code of Regulations. Commentaries explaining the rationale for modifications are shown in bracketed italics; they are not part of the regulations.

Amend title 13, California Code of Regulations, sections 2261, 2262, 2262.4, 2262.5, 2262.6, 2262.9, 2266.5, 2269, 2271, 2272, and 2296 to read as follows.

* * * * *

Section 2261. Applicability of Standards; Additional Standards.

(a) *Applicability of the CaRFG Phase 2 Standards.*

(1) (A) Unless otherwise specifically provided, the CaRFG Phase 2 cap limit standards set forth in section 2262, and the CaRFG Phase 2 cap limit compliance requirements in sections 2262.3(a), 2262.4(a), and 2262.5(a) and (b), shall apply:

1. starting April 15, 1996 to all sales, supplies, offers or movements of California gasoline except for transactions directly involving:
 - a. the fueling of motor vehicles at a retail outlet or bulk purchaser-consumer facility, or
 - b. the delivery of gasoline from a bulk plant to a retail outlet or bulk purchaser-consumer facility, and
2. starting June 1, 1996 to all sales, supplies, offers or movements of California gasoline, including transactions directly involving the fueling of motor vehicles at a retail outlet or bulk purchaser-consumer facility.

(B) The remaining CaRFG Phase 2 standards and requirements contained in this subarticle shall apply to all sales, supplies, or offers of California gasoline occurring on or after March 1, 1996.

(2) The CaRFG Phase 2 cap limit standards in section 2262 shall not apply to transactions directly involving the fueling of motor vehicles at a retail outlet or bulk purchaser-consumer facility, where the person selling, offering, or supplying the gasoline demonstrates as an affirmative defense that the exceedance of the pertinent standard was caused by gasoline delivered to the retail outlet or bulk purchaser-consumer facility prior to April 15, 1996, or delivered to the retail outlet or bulk purchaser-consumer facility directly from a bulk plant prior to June 1, 1996.

(b) *Applicability of the CaRFG Phase 3 Standards.*

(1) (A) Unless otherwise specifically provided, the CaRFG Phase 3 cap limit standards set forth in section 2262, and the CaRFG Phase 3 cap limit compliance requirements in 2262.3(a), 2262.4(a), and 2262.5(a) and (b), shall apply starting December 31, 2002 2003. The CaRFG Phase 3 benzene and sulfur content cap limit standards in section 2262, and the CaRFG Phase 3 benzene and sulfur content cap limit compliance requirements in 2262.3(a), shall apply:

1. starting December 31, 2002 2003 (for the benzene content cap limit and the 60 parts per million sulfur content cap limit) and December 31, 2004 2005 (for the 30 parts per million sulfur content cap limit), to all sales, supplies or offers of California gasoline from the production facility or import facility at which it was produced or imported.
2. starting February 14, 2003 2004 (for the benzene content cap limit and the 60 parts per million sulfur content cap limit) and February 14, 2005 2006 (for the 30 parts per million sulfur content cap limit) to all sales, supplies, offers or movements of California gasoline except for transactions directly involving:
 - a. the fueling of motor vehicles at a retail outlet or bulk purchaser-consumer facility, or
 - b. the delivery of gasoline from a bulk plant to a retail outlet or bulk purchaser-consumer facility, and
3. starting March 31, 2003 2004 (for the benzene content cap limit and the 60 parts per million sulfur content cap limit) and March 31, 2005 2006 (for the 30 parts per million sulfur content cap limit) to all sales, supplies, offers or movements of California gasoline, including transactions directly involving the fueling of motor vehicles at a retail outlet or bulk purchaser-consumer facility.

- (B) The remaining CaRFG Phase 3 standards and compliance requirements contained in this subarticle shall apply to all sales, supplies, or offers of California gasoline occurring on or after December 31, 2002 2003.
- (2) The CaRFG Phase 3 benzene and sulfur content cap limit standards in section 2262 shall not apply to transactions directly involving the fueling of motor vehicles at a retail outlet or bulk purchaser-consumer facility, where the person selling, offering, or supplying the gasoline demonstrates as an affirmative defense that the exceedance of the pertinent standard was caused by gasoline delivered to the retail outlet or bulk purchaser-consumer facility prior to February 14, 2003 2004 (for the benzene content limit and the 60 parts per million sulfur content limit) or February 14, 2005 2006 (for the 30 parts per million sulfur content limit) or delivered to the retail outlet or bulk purchaser-consumer facility directly from a bulk plant prior to March 31, 2003 2004 (for the benzene content limit and the 60 parts per million sulfur content limit) or March 31, 2005 2006 (for the 30 parts per million sulfur content limit).

* * * *

[Commentary: This modification postpones, by one year, the date for the reduction of the CaRFG3 sulfur content cap limit from 60 parts per million (ppm) to 30 ppm to make it consistent with the proposed one-year delay for implementation of the other CaRFG3 gasoline specifications. Staff had intended to propose a one-year postponement of the applicable dates of all CaRFG3 cap limit compliance requirements to be consistent with the proposed one-year delay of the prohibition of MTBE. However, due to an oversight, the date for the reduction of the sulfur cap limit from 60 ppm to 30 ppm was left unchanged in the proposed regulation text].

Section 2262. The California Reformulated Gasoline Phase 2 and Phase 3 Standards.

The CaRFG Phase 2 and CaRFG Phase 3 standards are set forth in the following table. For all properties but Reid vapor pressure (cap limit only) and oxygen content, the value of the regulated property must be less than or equal to the specified limit. With respect to The Reid vapor pressure cap limit and the oxygen content flat and cap limit, the limits are expressed as a range, and the Reid vapor pressure and oxygen content must be less than or equal to the upper limit, and more than or equal to the lower limit. A qualifying small refiner may comply with the small refiner CaRFG Phase 3 standards, in place of the CaRFG Phase 3 standards in this section, in accordance with section 2272.

The California Reformulated Gasoline Phase 2 and Phase 3 Standards

<i>Property</i>	<i>Flat Limits</i>		<i>Averaging Limits</i>		<i>Cap Limits</i>	
	<i>CaRFG Phase 2</i>	<i>CaRFG Phase 3</i>	<i>CaRFG Phase 2</i>	<i>CaRFG Phase 3</i>	<i>CaRFG Phase 2</i>	<i>CaRFG Phase 3</i>
Reid Vapor Pressure ¹ (pounds per square inch)	7.00	7.00 or 6.90 ²	Not Applicable	Not Applicable	7.00 ³	6.40 - 7.20
Sulfur Content (parts per million by weight)	40	20	30	15	80	60 ⁴
						30 ⁴
Benzene Content (percent by volume)	1.00	0.80	0.80	0.70	1.20	1.10
Aromatics Content (percent by volume)	25.0	25.0	22.0	22.0	30.0 ³	35.0
Olefins Content (percent by volume)	6.0	6.0	4.0	4.0	10.0	10.0
T50 (degrees Fahrenheit)	210	213	200	203	220	220
T90 (degrees Fahrenheit)	300	305	290 ⁵	295	330	330
Oxygen Content (percent by weight)	1.8 - 2.2	1.8 - 2.2	Not Applicable	Not Applicable	1.8 ⁶ - 3.5	1.8 ⁶ -3.5 ⁷
					0 ⁶ - 3.5	0 ⁶ - 3.5 ⁷
Methyl tertiary-butyl ether (MTBE) and oxygenates other than ethanol	Not Applicable	Prohibited as provided in § 2262.6	Not Applicable	Not Applicable	Not Applicable	Prohibited as provided in § 2262.6

¹ The Reid vapor pressure (RVP) standards apply only during the warmer weather months identified in section 2262.4.

² The 6.90 pounds per square inch (psi) standard flat limit applies only when a producer or importer is using the evaporative emissions model element of the CaRFG Phase 3 Predictive Model, in which case all predictions for evaporative emissions increases or decreases made using the evaporative emissions model are made relative to 6.90 psi and the gasoline may not exceed the maximum RVP cap limit of 7.2 psi. Where the evaporative emissions model element of the CaRFG Phase 3 Predictive Model is not used, the RVP of gasoline sold or supplied from the production or import facility may not exceed 7.0 psi.

³ For sales, supplies, or offers of California gasoline downstream of the production or import facility starting on the date on which early compliance with the CaRFG Phase 3 standards is permitted by the executive officer under section 2261(b)(3), the CaRFG Phase 2 cap limits for Reid vapor pressure and aromatics content shall be 7.20 psi and 35.0 percent by volume respectively.

- ⁴ The CaRFG Phase 3 sulfur content cap limits of 60 and 30 parts per million are phased in starting December 31, 2002 2003, and December 31, 2004 2005, respectively, in accordance with section 2261(b)(1)(A).
- ⁵ Designated alternative limit may not exceed 310.
- ⁶ The 1.8 percent by weight minimum oxygen content cap only applies during specified winter months in the areas identified in section 2262.5(a).
- ⁷ If the gasoline contains more than 3.5 percent by weight oxygen but no more than 10 volume percent ethanol, the maximum oxygen content cap is 3.7 percent by weight.

NOTE: Authority cited: sections 39600, 39601, 43013, 43013.1, 43018, 43101, and 43830, Health and Safety Code; and *Western Oil and Gas Ass'n v. Orange County Air Pollution Control District*, 14 Cal.3d 411, 121 Cal.Rptr. 249 (1975). Reference: sections 39000, 39001, 39002, 39003, 39010, 39500, 39515, 39516, 41511, 43000, 43013, 43013.1, 43016, 43018, 43101, 43830, and 43830.8, Health and Safety Code; and *Western Oil and Gas Ass'n v. Orange County Air Pollution Control District*, 14 Cal.3d 411, 121 Cal.Rptr. 249 (1975).

* * * *

[Commentary: The modification of the starting date for the phase-in of the 30 ppm sulfur cap limit reflects the modifications in section 2261(b)(1) and 2261(b)(2).]

* * * *

Section 2262.4. Compliance With the CaRFG Phase 2 and CaRFG Phase 3 Standards for Reid Vapor Pressure.

(a) Compliance with the cap limits for Reid vapor pressure.

- (1) No person shall sell, offer for sale, supply, offer for supply, or transport California gasoline which exceeds the applicable cap limit for Reid vapor pressure within each of the air basins during the regulatory period set forth in section (a)(2).

(2) Regulatory Control Periods.

(A) April 1 through October 31 (May 1 through October 31 in 2003 2003 and 2004):

South Coast Air Basin and Ventura County
 San Diego Air Basin
 Mojave Desert Air Basin
 Salton Sea Air Basin

(B) May 1 through September 30:

Great Basin Valley Air Basin

(C) May 1 through October 31:

San Francisco Bay Area Air Basin
 San Joaquin Valley Air Basin
 Sacramento Valley Air Basin

Mountain Counties Air Basin
 Lake Tahoe Air Basin

(D) *June 1 through September 30:*

North Coast Air Basin
 Lake County Air Basin
 Northeast Plateau Air Basin

(E) *June 1 through October 31:*

North Central Coast Air Basin
 South Central Coast Air Basin (Excluding Ventura County)

(b) *Compliance by producers and importers with the flat limit for Reid vapor pressure.*

(1) ***Reid vapor pressure standard for producers and imports.*** In an air basin during the regulatory control periods specified in section (b)(2), no producer or importer shall sell, offer for sale, supply, or offer for supply from its production facility or import facility California gasoline which has a Reid vapor pressure exceeding the applicable flat limit set forth in section 2262 unless the gasoline is supplied from the production or import facility on or after March 1, 2003 2004 and has been reported as a PM alternative gasoline formulation pursuant to section 2265(a).

(2) ***Regulatory control periods for production and import facilities.***

(A) *March 1 through October 31 (April 1 through October 31 in 2003, for early compliance with the Phase 3 Standards before December 31, 2003 under section 2261(b)(3); April 1 through October 31 in 2003 2004 only for compliance with the December 31, 2003 deadline):*

South Coast Air Basin and Ventura County
 San Diego Air Basin
 Mojave Desert Air Basin
 Salton Sea Air Basin

(B) *April 1 through September 30:*

Great Basin Valley Air Basin

(C) *April 1 through October 31:*

San Francisco Bay Area Air Basin
 San Joaquin Valley Air Basin
 Sacramento Valley Air Basin
 Mountain Counties Air Basin
 Lake Tahoe Air Basin

(D) *May 1 through September 30:*

North Coast Air Basin

~~North Central Coast Air Basin~~

Lake County Air Basin

Northeast Plateau Air Basin

(E) *May 1 through October 31:*

North Central Coast Air Basin

South Central Coast Air Basin (Excluding Ventura County)

~~North Coast Air Basin~~

* * * *

NOTE: Authority cited: sections 39600, 39601, 43013, 43013.1, 43018, and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal.3d 411, 121 Cal.Rptr. 249 (1975). Reference: sections 39000, 39001, 39002, 39003, 39010, 39500, 39515, 39516, 41511, 43000, 43013, 43013.1, 43016, 43018, 43101, 43830, and 43830.8, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal.3d 411, 121 Cal.Rptr. 249 (1975).

* * * *

[Commentary: The current CaRFG3 regulations delay the start of the 2003 RVP regulatory control season in the South Coast by one month to allow production and import facilities flexibility to make the transition from MTBE gasoline to ethanol gasoline and comply with RVP standards. In the proposed amendments to the CaRFG3 regulations, staff proposed to postpone the applicability of this one-time delay to 2004 to maintain that flexibility and make the date consistent with the one-year postponement of the MTBE phase-out. With this modification, staff is proposing to provide this flexibility to production and import facilities that comply with the original phase-out schedule.]

Section 2262.5. Compliance With the Standards for Oxygen Content.

(a) *Compliance with the minimum oxygen content cap limit standard in specified areas in the wintertime.*

(1) Within the areas and periods set forth in section (a)(2), no person shall sell, offer for sale, supply, offer for supply, or transport California gasoline unless it has an oxygen content of not less than the minimum oxygen content cap limit in section 2262.

(2) (A) November 1 through February 29:

South Coast Area
Imperial County

(B) October 1 through October 31, (1996 through 2002 ~~2003~~ 2002 only):

South Coast Area

* * * *

[Commentary: In the CarFG3 rulemaking, the ARB eliminated the October oxygen requirement in the South Coast area after 2002 based on a demonstration that by that time the requirement would no longer be needed to assure that attainment of the federal carbon monoxide standard is maintained in that month. October is the one month in which the summertime Reid vapor pressure standards and the wintertime oxygen requirements have overlapped. While it is less important to avoid this overlap if there is not yet an effective ethanol mandate, retaining the original phase-out of the October oxygen requirement after 2002 will provide useful flexibility for refiners, especially those who have decided to stop using MTBE sooner than will be required under the proposed amendments in this rulemaking. After the April 24, 2002 workshop, staff had intended to propose no change to the phase-out of the October oxygen requirement in the preexisting regulations, but left the date change in the proposed regulation text due to an oversight.]

APPENDIX F

Residual Levels of MTBE and Other Oxygenates in the Distribution System

290

Residual Levels of MTBE and Other Oxygenates in the Distribution System

A. Background

The CaRFG3 regulations establish a three-stage schedule for reducing residual levels of MTBE in CaRFG3 in the distribution system after the addition of MTBE is banned. The amended regulations, approved by the Board at a July 2002 hearing, requires that the concentration of MTBE in distributed CaRFG3 not exceed 0.3 percent, by volume, starting December 31, 2003. This level is reduced to 0.15 percent by volume starting December 31, 2004 and 0.05 percent by volume starting December 31, 2005. These limits are intended to account for MTBE contamination which could be either an unavoidable byproduct of the production process or the result of contact during storage and transfer operations between MTBE-free gasoline and gasoline or blendstocks containing residual amounts of MTBE.

In 1999, when the Board approved the schedule for implementation of the allowable MTBE residual levels, it directed the Executive Office to evaluate the practicality of the specified MTBE residual limits and report back to the Board with a recommendation on whether the limits should be revised. Staff examined residual MTBE levels in MTBE-free gasoline to determine whether the current limits on residual MTBE levels are practically achievable.

Starting December 31, 2003, the CaRFG3 regulations also place a conditional ban on the use of oxygenates other than MTBE and ethanol to produce California gasoline. This prohibition will apply unless a multimedia evaluation of the use of the oxygenate in California gasoline has been conducted and the California Environmental Policy Council (CEPC) has determined that such use will not have a significant adverse impact on public health or the environment. The regulations do not set prohibition levels for these oxygenates. Staff examined results from a survey of retail stations to determine appropriate allowable residual levels for these oxygenates.

B. Field Study

The gasoline samples were collected at service stations in June and August of 2001 as part of a field study to evaluate the impacts of commingling fuels in vehicle fuel tanks. The field study included retail stations in the Lake Tahoe area, the San Francisco Bay area, and the Los Angeles area. Since all of the Los Angeles area stations selected for the study dispensed oxygenated gasoline containing MTBE, the results from these stations were not used to estimate residual levels of MTBE or other oxygenates.

Samples from the stations' underground storage tanks were obtained using the nozzle sampling procedure described in ASTM D 5842-95, "Standard Practice for Sampling and Handling of Fuels for Volatility Measurement." Staff collected two samples of each grade of fuel. The fuel sampling protocols are described in the ARB report "Draft Assessment of Real-World Impacts of Commingling Phase 3 Reformulated Gasoline" May 28, 2002. Fuel samples were analyzed by staff of the ARB's laboratory in El Monte using the method described in ASTM D 4815-94, "Standard Test Method for Determination of MTBE, ETBE, TAME, DIPE, tertiary -Amyl alcohol and C1 to C4 Alcohols in Gasoline by Gas Chromatography."

C. Residual MTBE in Distributed Gasoline

Table 1 shows the two types of fuels – non-oxygenated and ethanol gasoline – used to determine residual MTBE levels. The maximum number of samples at each station was six – two samples each for regular, medium, and premium grades. All grades of gasoline at the nine Lake Tahoe area stations were either non-oxygenated gasoline or ethanol gasoline and could all be used to estimate residual MTBE levels. The fuels shown for six Bay area stations were selected from a larger set of 12 samples which included non-oxygenated gasolines and oxygenated gasoline containing MTBE alone, or MTBE and TAME.

Average residual MTBE levels were calculated for samples containing less than 0.6 volume percent MTBE. The results are reported in Table 1 for nine retail stations in the Lake Tahoe area and six in the Bay Area. Table 3 and Table 4 report the complete set of data used to calculate the averages shown in Table 1.

Two stations, both in the Lake Tahoe area, showed average MTBE levels that exceeded 0.3 volume percent – the initial limit for residual MTBE in CaRFG3 gasoline. The range of concentrations for the Lake Tahoe stations was 0 to 0.42 volume percent, with nearly all of the samples in the range of 0.22 to 0.37 volume percent. MTBE concentrations in the Bay area samples ranged from 0 to 0.28 volume percent.

Gasoline sold in the Lake Tahoe region has been predominantly MTBE-free since 1999. The analyses of gasoline samples collected in August 2001 suggest that it may require more than the 12 months currently allowed by the CaRFG3 regulations to reduce MTBE levels below 0.30 volume percent.

D. Other Oxygenates in Distributed Gasoline

There was no oxygenate other than ethanol and MTBE detected in the Lake Tahoe area samples and TAME was the only oxygenate other than MTBE detected in the Bay Area samples. Table 2 shows average TAME levels in samples from six of the 12 Bay Area stations included in the staff's survey. Table 5 shows the data used to calculate the averages reported in Table 2. Only samples containing both TAME and MTBE are reported in Table 2 and Table 5. The complete set of results for the Bay Area stations – including those gasolines that contained only MTBE – is reported in Table 4.

In gasolines oxygenated with both TAME and MTBE, TAME provided 30 to 35 percent of the total oxygen. Where TAME appeared to be at residual levels (stations 16 and 19), the oxygen content due to TAME was 0.02 percent by weight.

Table 1**Residual MTBE Levels in Gasoline from Various Retail Stations**

Retail Station ID	Oxygenate Used	MTBE Vol. %	MTBE Wt.%Oxygen	Total Wt.% Oxygen
1 (6)	None	0.28	0.05	0.05
2 (6)	None	0.28	0.05	0.05
3 (6)	None	0.27	0.05	0.05
4 (6)	None	0.33	0.06	0.06
5 (6)	None	0.33	0.06	0.06
6 (2)	Ethanol	0.24	0.04	2.01
7 (6)	Ethanol	0.25	0.05	2.06
8 (6)	Ethanol	0.24	0.04	2.14
9 (6)	Ethanol	0.16	0.03	2.20
12 (4)	None	0.14	0.02	0.02
13 (4)	None	0.20	0.04	0.04
14 (4)	None	0.13	0.02	0.02
15 (2)	None	0.00	0.00	0.00
17 (4)	None	0.26	0.05	0.05
18 (4)	None	0.26	0.05	0.05

Notes

- Numbers in parentheses indicate the number of samples used to calculate the average value for that retail station.
- Stations #1 through #9 were located in the Lake Tahoe area
- All other stations were located in the San Francisco Bay Area.
- Station #6 - Only the 2 premium gasoline samples contained detectable levels of MTBE. The regular and medium grades did not.
- Stations #12 and 13 – values reported for regular and medium grades. The premium grade was oxygenated with MTBE (see Table 4).
- Stations #14, 17, and 18 – values reported for regular and medium grades. The premium grade was oxygenated with MTBE and TAME (see Table 2).
- Station #15 – value reported for regular grade only. The medium and premium grades were oxygenated (see Table 2).

Table 2
TAME Levels in MTBE Gasoline from Various Bay Area Retail Stations

Retail Station ID	MTBE Vol.%	TAME Vol.%	MTBE Wt.% O ₂	TAME Wt.% O ₂	TAME Percent of Total Wt.% O ₂
14	7.68	4.65	1.40	0.76	35%
15*	3.27	1.54	0.60	0.25	30%
15	7.94	3.97	1.45	0.65	31%
16	9.68	0.12	1.77	0.02	1.1%
17	8.09	4.11	1.48	0.67	31%
18	8.24	3.97	1.50	0.65	30%
19 (1)	12.39	0.05	2.26	0.02	0.7%

Notes

- The numbers in parentheses is the number of samples used to determine the average value for that retail station. The value for each of the other stations was the average of two samples.
- * Medium grade. All other samples shown in this table are premium grade.
- Station #16 – the regular and medium grades contained MTBE but no detectable levels of TAME (see Table 4)
- Stations #14, 17, and 18 – see Table 1 for regular and medium grades

Table 3
OXYGEN CONTENT OF GASOLINE FROM LAKE TAHOE RETAIL STATIONS

#	Sampling Date	SAMPLE ID	Grade	Wt%O2	EtOH mass%	EtOH vol%	EtOH Wt.% O2	MTBE Mass %	MTBE Vol%	MTBE Wt.% O2
1	080801	2287	R	0.06	0.00	0.00	0.00	0.33	0.33	0.06
		2288	M	0.05	0.00	0.00	0.00	0.28	0.28	0.05
		2289	P	0.05	0.00	0.00	0.00	0.25	0.25	0.05
		2304	R	0.06	0.00	0.00	0.00	0.32	0.32	0.06
		2305	M	0.05	0.00	0.00	0.00	0.28	0.27	0.05
		2306	P	0.04	0.00	0.00	0.00	0.24	0.24	0.04
		Average		0.05	0.00	0.00	0.00	0.28	0.28	0.05
2	080801	6707	R	0.05	0.00	0.00	0.00	0.30	0.30	0.05
		6708	M	0.05	0.00	0.00	0.00	0.29	0.28	0.05
		6709	P	0.04	0.00	0.00	0.00	0.24	0.24	0.04
		6717	R	0.06	0.00	0.00	0.00	0.31	0.31	0.06
		6718	M	0.05	0.00	0.00	0.00	0.30	0.30	0.05
		6719	P	0.05	0.00	0.00	0.00	0.25	0.25	0.05
		Average		0.05	0.00	0.00	0.00	0.28	0.28	0.05
3	080901	9507	R	0.06	0.00	0.00	0.00	0.31	0.31	0.06
		9508	M	0.05	0.00	0.00	0.00	0.27	0.27	0.05
		9509	P	0.05	0.00	0.00	0.00	0.25	0.25	0.05
		9476	R	0.05	0.00	0.00	0.00	0.29	0.29	0.05
		9477	M	0.05	0.00	0.00	0.00	0.26	0.26	0.05
		9478	P	0.04	0.00	0.00	0.00	0.24	0.24	0.04
		Average		0.05	0.00	0.00	0.00	0.27	0.27	0.05
4	080701	6687	R	0.07	0.00	0.00	0.00	0.40	0.40	0.07
		6688	M	0.06	0.00	0.00	0.00	0.34	0.34	0.06
		6689	P	0.05	0.00	0.00	0.00	0.26	0.26	0.05
		6704	R	0.08	0.00	0.00	0.00	0.42	0.42	0.08
		6705	M	0.06	0.00	0.00	0.00	0.31	0.30	0.06
		6706	P	0.04	0.00	0.00	0.00	0.24	0.24	0.04
		Average		0.06	0.00	0.00	0.00	0.33	0.33	0.06
5	080701	9441	R	0.08	0.00	0.00	0.00	0.42	0.42	0.08
		9442	M	0.06	0.00	0.00	0.00	0.32	0.32	0.06
		9443	P	0.05	0.00	0.00	0.00	0.26	0.26	0.05
		9444	R	0.07	0.00	0.00	0.00	0.37	0.37	0.07
		9445	M	0.06	0.00	0.00	0.00	0.34	0.34	0.06
		9446	P	0.05	0.00	0.00	0.00	0.26	0.26	0.05
		Average		0.06	0.00	0.00	0.00	0.33	0.33	0.06
6	080901	1021	R	1.97	5.68	5.30	1.97	0.00	0.00	0.00
		1022	M	1.99	5.72	5.35	1.99	0.00	0.00	0.00
		1023	P	2.07	5.84	5.46	2.03	0.24	0.24	0.04
		1018	R	2.00	5.76	5.38	2.00	0.00	0.00	0.00
		1019	M	1.98	5.71	5.34	1.98	0.00	0.00	0.00
		1020	P	2.08	5.87	5.49	2.04	0.23	0.23	0.04
		Average		2.01	5.76	5.39	2.00	0.08	0.08	0.01
7	080901	6720	R	2.03	5.73	5.36	1.99	0.22	0.22	0.04
		6721	M	2.09	5.84	5.46	2.03	0.35	0.35	0.06
		6722	P	2.09	5.84	5.46	2.03	0.37	0.36	0.07
		6738	R	2.00	5.76	5.38	2.00	0.00	0.00	0.00
		6739	M	2.06	5.78	5.40	2.01	0.27	0.27	0.05
		6740	P	2.09	5.86	5.48	2.03	0.33	0.33	0.06
		Average		2.06	5.80	5.42	2.01	0.26	0.25	0.05
8	080701	1015	R	2.28	6.44	6.02	2.24	0.23	0.23	0.04
		1016	M	2.07	5.83	5.45	2.02	0.24	0.24	0.04
		1017	P	2.08	5.86	5.48	2.03	0.25	0.25	0.05
		1996	R	2.26	6.40	5.98	2.22	0.24	0.23	0.04
		1997	M	2.07	5.85	5.47	2.03	0.24	0.23	0.04
		1998	P	2.09	5.88	5.50	2.04	0.25	0.25	0.05
		Average		2.14	6.04	5.65	2.10	0.24	0.24	0.04
9	080901	9447	R	2.09	5.89	5.50	2.04	0.25	0.25	0.05
		9448	M	2.20	6.35	5.93	2.20	0.00	0.00	0.00
		9449	P	2.28	6.44	6.02	2.24	0.23	0.23	0.04
		9473	R	2.08	5.87	5.49	2.04	0.26	0.26	0.05
		9474	M	2.24	6.46	6.04	2.24	0.00	0.00	0.00
		9475	P	2.30	6.52	6.09	2.26	0.23	0.23	0.04
		Average		2.20	6.25	5.85	2.17	0.16	0.16	0.03

Table 4
OXYGEN CONTENT OF GASOLINE FROM BAY AREA RETAIL STATIONS

#	Sampling Date	SAMPLE ID	Grade	wt%O2	MTBE Mass %	MTBE Vol%	MTBE Wt.% O2	TAME Mass %	TAME Vol%	TAME Wt.% O2
10	062601	1856	R	0.25	1.37	1.36	0.25	0.00	0.00	0.00
		1857	M	0.53	2.94	2.92	0.53	0.00	0.00	0.00
		1858	P	1.74	9.61	9.56	1.74	0.00	0.00	0.00
		1875	R	0.25	1.37	1.37	0.25	0.00	0.00	0.00
		1876	M	0.90	4.96	4.93	0.90	0.00	0.00	0.00
		1877	P	1.77	9.75	9.70	1.77	0.00	0.00	0.00
11	062701	1878	R	0.14	0.78	0.78	0.14	0.00	0.00	0.00
		1879	M	0.89	4.92	4.89	0.89	0.00	0.00	0.00
		1880	P	1.74	9.59	9.54	1.74	0.00	0.00	0.00
		1909	R	0.14	0.79	0.78	0.14	0.00	0.00	0.00
		1910	M	0.90	4.97	4.94	0.90	0.00	0.00	0.00
		1911	P	1.75	9.64	9.58	1.75	0.00	0.00	0.00
12	062601	6578	R	0.05	0.28	0.28	0.05	0.00	0.00	0.00
		6579	M	0.05	0.27	0.27	0.05	0.00	0.00	0.00
		6580	P	1.73	9.54	9.49	1.73	0.00	0.00	0.00
		6593	R	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		6594	M	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		6595	P	1.76	9.69	9.64	1.76	0.00	0.00	0.00
13	062701	Average *		0.02	0.14	0.14	0.02	0.00		
		6607	R	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		6608	M	0.05	0.27	0.27	0.05	0.00	0.00	0.00
		6609	P	1.74	9.62	9.56	1.74	0.00	0.00	0.00
		6610	R	0.05	0.27	0.27	0.05	0.00	0.00	0.00
		6611	M	0.05	0.27	0.26	0.05	0.00	0.00	0.00
14	062601	6612	P	1.74	9.61	9.56	1.74	0.00	0.00	0.00
		Average *		0.04	0.20	0.20	0.04	0.00		
		9314	R	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		9315	M	0.05	0.27	0.26	0.05	0.00	0.00	0.00
		9316	P	2.18	7.76	7.72	1.41	4.90	4.69	0.77
		9335	R	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	062701	9336	M	0.05	0.25	0.25	0.05	0.00	0.00	0.00
		9337	P	2.15	7.68	7.64	1.39	4.83	4.62	0.76
		Average *		0.02	0.13	0.13	0.02	0.00		
		9338	R	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		9339	M	0.76	2.96	2.95	0.54	1.45	1.39	0.23
		9340	P	2.06	7.86	7.82	1.43	4.08	3.91	0.64
		9361	R	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		9362	M	0.93	3.62	3.60	0.66	1.78	1.70	0.28
		9363	P	2.13	8.10	8.06	1.47	4.21	4.03	0.66
		Average *		0.00	0.00	0.00	0.00	0.00		

* NOTE: Average includes only samples with MTBE content lower than 0.60 volume percent.
These met the labeling requirement for retail pumps dispensing non-MTBE gasoline.

Table 4 (cont.)
OXYGEN CONTENT OF GASOLINE FROM BAY AREA RETAIL STATIONS

#	Sampling Date	SAMPLE ID	Grade	wt%O2	MTBE Mass %	MTBE Vol%	MTBE Wt.% O2	TAME Mass %	TAME Vol%	TAME Wt.% O2
16	082801	1056	R	1.96	10.82	10.77	1.96	0.00	0.00	0.00
		1057	M	1.83	10.10	10.04	1.83	0.00	0.00	0.00
		1058	P	1.76	9.63	9.57	1.75	0.11	0.11	0.02
		1068	R	1.96	10.80	10.74	1.96	0.00	0.00	0.00
		1069	M	1.86	10.27	10.21	1.86	0.00	0.00	0.00
		1070	P	1.81	9.84	9.79	1.79	0.14	0.13	0.02
17	082901	3901	R	0.04	0.23	0.23	0.04	0.00	0.00	0.00
		3902	M	0.05	0.30	0.30	0.05	0.00	0.00	0.00
		3903	P	2.12	8.01	7.97	1.45	4.26	4.08	0.67
		3924	R	0.04	0.23	0.23	0.04	0.00	0.00	0.00
		3925	M	0.05	0.29	0.29	0.05	0.00	0.00	0.00
		3926	P	2.18	8.26	8.22	1.50	4.33	4.14	0.68
		Average *		0.05	0.26	0.26	-0.05	0.00	0.00	0.00
18	082801	6781	R	0.04	0.22	0.22	0.04	0.00	0.00	0.00
		6782	M	0.05	0.29	0.29	0.05	0.00	0.00	0.00
		6783	P	2.14	8.27	8.22	1.50	4.10	3.92	0.64
		6796	R	0.04	0.22	0.22	0.04	0.00	0.00	0.00
		6797	M	0.05	0.29	0.29	0.05	0.00	0.00	0.00
		6798	P	2.16	8.31	8.27	1.51	4.20	4.02	0.66
		Average *		0.05	0.26	0.26	0.05	0.00	0.00	0.00
19	082901	6799	R	1.60	8.80	8.75	1.60	0.00	0.00	0.00
		6800	M	1.84	10.12	10.06	1.84	0.00	0.00	0.00
		6801	P	2.17	11.99	11.92	2.17	0.00	0.00	0.00
		6815	R	1.59	8.76	8.71	1.59	0.00	0.00	0.00
		6816	M	1.84	10.12	10.07	1.84	0.00	0.00	0.00
		6817	P	2.27	12.45	12.39	2.26	0.10	0.10	0.02
20	082801	7950	R	1.40	7.72	7.68	1.40	0.00	0.00	0.00
		7951	M	1.33	7.35	7.31	1.33	0.00	0.00	0.00
		7952	P	1.80	9.91	9.86	1.80	0.00	0.00	0.00
		7979	R	1.41	7.80	7.76	1.41	0.00	0.00	0.00
		7980	M	1.35	7.47	7.43	1.35	0.00	0.00	0.00
		7981	P	1.82	10.02	9.97	1.82	0.00	0.00	0.00
21	082901	7982	R	1.59	8.78	8.73	1.59	0.00	0.00	0.00
		7983	M	1.63	9.01	8.96	1.63	0.00	0.00	0.00
		7984	P	1.75	9.64	9.59	1.75	0.00	0.00	0.00
		7011	R	1.59	8.74	8.70	1.59	0.00	0.00	0.00
		7012	M	1.69	9.33	9.28	1.69	0.00	0.00	0.00
		7013	P	1.74	9.59	9.54	1.74	0.00	0.00	0.00

* NOTE: Average includes only samples with MTBE content lower than 0.60 volume percent.
These met the labeling requirement for retail pumps dispensing non-MTBE gasoline.

Table 5
TAME CONTENT OF GASOLINE FROM BAY AREA RETAIL STATIONS

#	Sampling Date	SAMPLE ID	Grade	wt%O2	MTBE Mass %	MTBE Vol%	MTBE Wt.% O2	TAME Mass %	TAME Vol%	TAME Wt.% O2	RATIO		
											TAME O2/ TOTAL O2	MTBE O2/ TAME O2	
14	062601	9314	R	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
		9315	M	0.05	0.27	0.26	0.05	0.00	0.00	0.00			
		9316	P	2.18	7.76	7.72	1.41	4.90	4.69	0.77	0.35	1.84	
		9335	R	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
		9336	M	0.05	0.25	0.25	0.05	0.00	0.00	0.00			
		9337	P	2.15	7.68	7.64	1.39	4.83	4.62	0.76	0.35	1.84	
		Average *		2.16	7.72	7.68	1.40	4.86	4.65	0.76	0.35	1.84	
15	062701	9338	R	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
		9339	M	0.76	2.96	2.95	0.54	1.45	1.39	0.23	0.30	2.4	
		9340	P	2.06	7.86	7.82	1.43	4.08	3.91	0.64	0.31	2.2	
		9361	R	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
		9362	M	0.93	3.62	3.60	0.66	1.78	1.70	0.28	0.30	2.4	
		9363	P	2.13	8.10	8.06	1.47	4.21	4.03	0.66	0.31	2.2	
		Average *		M	0.85	3.29	3.27	0.60	1.61	1.54	0.25	0.30	2.36
			P	2.10	7.98	7.94	1.45	4.15	3.97	0.65	0.31	2.23	
16	082801	1056	R	1.96	10.82	10.77	1.96	0.00	0.00	0.00			
		1057	M	1.83	10.10	10.04	1.83	0.00	0.00	0.00			
		1058	P	1.76	9.63	9.57	1.75	0.11	0.11	0.02	0.01	101	
		1068	R	1.96	10.80	10.74	1.96	0.00	0.00	0.00			
		1069	M	1.86	10.27	10.21	1.86	0.00	0.00	0.00			
		1070	P	1.81	9.84	9.79	1.79	0.14	0.13	0.02	0.01	83.3	
		Average *		1.78	9.73	9.68	1.77	0.12	0.12	0.02	0.01	92.4	
17	082901	3901	R	0.04	0.23	0.23	0.04	0.00	0.00	0.00			
		3902	M	0.05	0.30	0.30	0.05	0.00	0.00	0.00			
		3903	P	2.12	8.01	7.97	1.45	4.26	4.08	0.67	0.31	2.2	
		3924	R	0.04	0.23	0.23	0.04	0.00	0.00	0.00			
		3925	M	0.05	0.29	0.29	0.05	0.00	0.00	0.00			
		3926	P	2.18	8.26	8.22	1.50	4.33	4.14	0.68	0.31	2.2	
		Average *		2.15	8.14	8.09	1.48	4.30	4.11	0.67	0.31	2.19	
18	082801	6781	R	0.04	0.22	0.22	0.04	0.00	0.00	0.00			
		6782	M	0.05	0.29	0.29	0.05	0.00	0.00	0.00			
		6783	P	2.14	8.27	8.22	1.50	4.10	3.92	0.64	0.30	2.3	
		6796	R	0.04	0.22	0.22	0.04	0.00	0.00	0.00			
		6797	M	0.05	0.29	0.29	0.05	0.00	0.00	0.00			
		6798	P	2.16	8.31	8.27	1.51	4.20	4.02	0.66	0.30	2.3	
		Average *		2.15	8.29	8.24	1.50	4.15	3.97	0.65	0.30	2.31	
19	082901	6799	R	1.60	8.80	8.75	1.60	0.00	0.00	0.00			
		6800	M	1.84	10.12	10.06	1.84	0.00	0.00	0.00			
		6801	P	2.17	11.99	11.92	2.17	0.00	0.00	0.00			
		6815	R	1.59	8.76	8.71	1.59	0.00	0.00	0.00			
		6816	M	1.84	10.12	10.07	1.84	0.00	0.00	0.00			
		6817	P	2.27	12.45	12.39	2.26	0.10	0.10	0.02	0.01	144	
		Average *		2.22	12.22	12.16	2.22	0.05	0.05	0.02	0.01	144	

* NOTE: Average calculated for those samples that contained detectable levels of both MTBE and TAME.

APPENDIX G

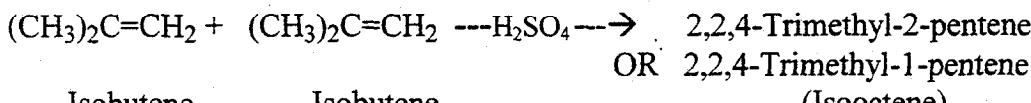
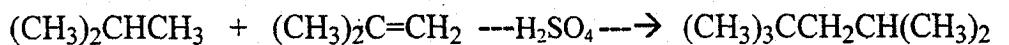
Oxygenate Contaminants in Alkylates

Oxygenate Contaminants in Alkylates

A. Background

Alkylate is a mixture of high-octane, low vapor pressure, branched chain paraffinic hydrocarbons. Alkylate is produced mainly through two processes – alkylation and dimerization with hydrogenation.

Traditional alkylation processes react light olefins, such as propene and butene, produced in catalytic crackers and cokers, with isobutane in the presence of a strong acid catalyst (sulfuric acid or hydrofluoric acid) to form alkylate product. The primary alkylation reaction between isobutane and butene forms the high octane, 2,2,4 trimethyl pentane isomer (isooctane). In the dimerization process, iso-butene reacts with itself or with other C₃-C₅ olefins, in the presence of a solid catalyst, to form isooctene and other heavier iso-olefins. The mixture of iso-olefins is then hydrogenated to form a high-octane paraffinic gasoline blendstock that is similar to alkylate.



B. Alcohol and Ether Formation in Alkylates

Side reactions may occur during alkylation to form alcohol and ether contaminants. Such reactions are possible because of the acidic environment during the alkylation process and the presence of small amounts of water. An olefin such as isobutene can react with water to form t-butyl alcohol. Once formed, alcohols can react with olefins to form ethers. Ethers can also be formed from the elimination of water between two alcohols in acidic solution. The product can contain heavier ethers but the majority are C8 ethers. Typical ethers are di-sec-butyl ether and isobutyl-sec-butyl ether.

C. Oxygenates in Alkylates

The CaRFG3 regulations require determination of the prohibited oxygenates by ASTM method D 4815-99 ("Standard Test Method for Determination of MTBE, ETBE, TAME, DIPE, tertiary -Amyl alcohol and C1 to C4 Alcohols in Gasoline by Gas Chromatography." Table 1 lists the target oxygenates.

Table 2 shows the results of an analysis of a commercial isooctane reported to ARB staff in units of volume percent oxygenate. The results were converted to weight percent oxygen using

Equation 1 below. The sample was analyzed by ASTM method D 5441-98 "Standard Test Method for Analysis of Methyl tert-Butyl Ether (MTBE) by Gas Chromatography."

The MTBE concentration in the commercial iso-octane sample was 0.074 volume percent. In a gasoline in which this iso-octane was present at 20 percent of the final volume, the MTBE concentration from this source would be 0.015 volume percent.

Table 3 shows the results of the analysis for alcohols and ethers in the iso-octene intermediate from a pilot plant dimerization process. Total oxygen concentration in the iso-octene from the alcohols and ethers containing 4 or more carbon atoms was 0.62 percent by weight. If this iso-octene were present in a gasoline at 10 percent of the final volume, the total oxygen concentration from this source would be 0.06 weight percent.

The values shown in Table 4 are the oxygenate levels in the product obtained by hydrogenation of the iso-octene intermediate for which oxygenate levels were reported in Table 3. The hydrogenation step reduced the total oxygen concentration from oxygenates from 0.62 percent by weight to 0.05 percent by weight. In a gasoline in which this iso-octane was present at 20 percent of the final volume, the MTBE concentration from this source would be 0.01 volume percent.

Calculation of Weight Percent Oxygen

The oxygenate levels were converted from volume percent concentrations to equivalent percent oxygen levels using Equation 1.

Equation 1

$$\text{Wt \% Oxygen} = \frac{D \times V \times 16.0}{D_{\text{fuel}} \times M}$$

Where:

D = Density of the oxygenate (per

D_{fuel} = Density of the fuel (assumed to be 5.75 pounds per gallon)

V = Volume percent of the oxygenate

M = Molecular mass of the oxygenate

16.0 = atomic mass of oxygen

Table 1**Alcohols and Ethers Analyzed by ASTM Test Method D4815-99**

Methanol
Ethanol
Isopropanol
n-propanol
iso-Butanol
<i>tert</i> -Butanol
<i>sec</i> -Butanol
<i>n</i> -Butanol
<i>Tert</i> -pentanol (<i>tert</i> - amyralcohol)
Methyl <i>tert</i> -butylether (MTBE)
Ethyl <i>tert</i> -butylether (ETBE)
Diisopropylether (DIPE)
<i>Tert</i> -amylmethylether (TAME)

Table 2**Oxygenates Levels in a Commercial Isooctane**

OXYGENATE	Concentration in Isooctane		Concentration in Gasoline ¹	
	Vol.% oxygenate	Wt. % oxygen	Vol.% oxygenate	Wt. % oxygen
<i>Tert</i> -pentanol (<i>tert</i> -amyralcohol)	0.0426	0.009	0.009	0.002
Methyl <i>tert</i> -butyl ether (MTBE)	0.0738	0.014	0.015	0.003
<i>Sec</i> -butyl methyl ether (MSBE)	0.1330	0.026	0.027	0.005
<i>Tert</i> -amylmethylether (TAME)	0.0398	0.007	0.008	0.001

¹ Assumes that the isooctane concentration in gasoline is 20 percent of the final volume

Table 3
Oxygenates in Isooctene Samples From a Dimerization Pilot Plant

OXYGENATE	Concentration in Isooctene		Concentration in Gasoline ¹	
	Vol.% oxygenate	Wt. % oxygen	Vol.% oxygenate	Wt. % oxygen
C4	0.50	0.11	0.05	0.011
C5	0.01	0.002	0.001	0.0002
C6	—	—	—	—
C7	0.04	0.01	0.004	0.001
C8	3.58	0.44	0.358	0.044
C9+	0.56	0.06	0.056	0.006
TOTAL	4.69	0.62	0.47	0.06

¹ Assumes that the isooctene concentration in gasoline is 10 percent of the final volume

Table 4
Oxygenates in Isooctane Samples From a Dimerization Pilot Plant

OXYGENATE	Concentration in Isooctene		Concentration in Gasoline ¹	
	Vol.% oxygenate	Wt. % oxygen	Vol.% oxygenate	Wt. % oxygen
C4	0.09	0.02	0.018	0.004
C5	—	—	—	—
C6	—	—	—	—
C7	0.02	0.003	0.004	0.001
C8	0.17	0.02	0.033	0.004
C9+	0.07	0.01	0.014	0.002
TOTAL	0.35	0.05	0.07	0.01

¹ Assumes that the isooctane concentration in gasoline is 20 percent of the final volume

APPENDIX H

References

United States Code of Federal Regulations, Title 27, Volume 1, Part 21, Formulas For Denatured Alcohol and Rum, Code of Federal Regulations, revised as of April 1, 2000.

**Materials on the Health and Environmental Assessment
of the Use of Ethanol and CaRFG3**

California Air Resources Board, Health and Environmental Assessment of the Use of Ethanol as a Fuel Oxygenate, Report to the California Environmental Policy Council in Response to Executive Order D-5-99, Volume 1, Executive Summary, December 1999.

California Air Resources Board, Health and Environmental Assessment of the Use of Ethanol as a Fuel Oxygenate, Report to the California Environmental Policy Council in Response to Executive Order D-5-99, Volume 2, Background Information on the Use of Ethanol as a Fuel Oxygenate, December 1999.

State of California, Air Resources Board and Office of Environmental Health Hazard Assessment, Health and Environmental Assessment of the Use of Ethanol as a Fuel Oxygenate, Volume 4 with Chapters 1-11, Potential Ground and Surface Water Impacts, December 1999.

State of California, Air Resources Board, Air Quality Impacts of the Use of Ethanol in California Reformulated Gasoline, Final Report to the California Environmental Policy Council with Appendices A-D, December 1999.

State of California, California Environmental Protection Agency, California Environmental Policy Council, Resolution on Environmental Impacts from Changes in Gasoline Due to the California Phase 3 Reformulated Gasoline Regulations, January 18, 2000.

State of California, California Environmental Protection Agency, California Environmental Policy Council, Transcript from Meeting on Environmental Impacts from Changes in Gasoline Due to the California Phase 3 Reformulated Gasoline Regulations, January 18, 2000.

State of California, Office of Environmental Health Hazard Assessment, Health and Environmental Assessment of the Use of Ethanol as a Fuel Oxygenate, Volume 5: Potential Health Risks of Ethanol in Gasoline, December 1999.

**Materials on the University of California Scientific Studies
of MTBE Pursuant to SB 521**

University of California, Report to the Governor and Legislature of the State of California as Sponsored by SB 521, Volume I - Summary and Recommendations, November, 1998.

University of California, Report to the Governor and Legislature of the State of California as Sponsored by SB 521, Volume II - An Evaluation of the Scientific Peer Reviewed Research and Literature on the Human Health Effects of MTBE, its Metabolites, Combustion Products and Substitute Compounds, John R. Froines, Ph.D., Principal Investigator, November, 1998.

University of California, Report to the Governor and Legislature of the State of California as Sponsored by SB 521, Volume III - Air Quality and Ecological Effects, Catherine Koshland, Ph.D., et al, November 1998.

University of California, Report to the Governor and Legislature of the State of California as Sponsored by SB 521, Volume IV - Impacts of MTBE on California Groundwater, Graham E. Fogg, et al, November, 1998.

University of California, Report to the Governor and Legislature of the State of California as Sponsored by SB 521, Volume V - Exposure of Humans to MTBE from Drinking Water, Michael L. Johnson, John Muir Institute of the Environment, University of California, Davis, November 1998.

Other Materials on MTBE

Buxton, Herbert, et al., Interdisciplinary Investigation of Subsurface Contaminant Transport and Fate at Point-Source releases of Gasoline-Containing MTBE, Paper presented at the Petroleum Hydrocarbon on Conference, November 11-14, 1997, Houston, Texas.

California Senate Office of Research, Does California Need MTBE? February 1998.

Health Effects Institute, The Potential Health Effects of Oxygenates Added to Gasoline, February 1996.

Landmeyer, James, et al., Fate of MTBE Relative to Benzene in a Gasoline-Contaminated Aquifer (1993-1998), Groundwater Monitoring & Remediation, April 17, 1998.

LFR Levine-Fricke & Santa Clara Valley Water District, Summary Report: Santa Clara Valley WaterDistrict, Groundwater Vulnerability Pilot Study, Investigation of MTBE Occurrence Associated with Operating UST Systems, July 22, 1999.

References

- American Society for Testing and Materials, ASTM D 4815-94, Standard Test Method for Determination of MTBE, ETBE, TAME, DIPE, tertiary-Amyl Alcohol and C1 to C4 Alcohols in Gasoline by Gas Chromatography, 1994.
- American Society for Testing and Materials, ASTM D 5842-95, Standard Practice for Sampling and Handling of Fuels for Volatility Measurement, 1995.
- California Energy Commission, Consultant Report by Stillwater Associates, MTBE Phase Out in California, Publication No. 600-02-008CR, March 2002.
- Math Pro, Inc. Analysis of California Phase 3 RFG Standards submitted to California Energy Commission under Subcontract No. LB60100, December 7, 1999.
- Math Pro, Inc., Analysis of the Production of California Phase 3 Reformulated Gasoline with and Without an Oxygen Waiver, submitted to the U. S. Environmental Protection Agency under EPA Purchase Order OW-2026-NASX, January 19, 2001.
- National Renewable Energy Laboratory, Environmental Life Cycle Implications of Fuel Oxygenate Production from California Biomass, May 1999
- National Research Council, Ozone-Forming Potential of Reformulated Gasoline, National Academy Press, Washington, D.C., 1999
- State of California, Air Resources Board, Assessment of the Real-World Impacts of Commingling California Phase 3 Reformulate Gasoline (Draft), May 28, 2002.
- State of California, Air Resources Board, California Phase 3 Reformulated Gasoline Regulations, Proposed Amendments to the California Reformulated Gasoline Regulations, Including a December 31, 2002 Prohibition of Using MTBE in Gasoline, Adoption of Phase 3 Gasoline Standards, a Phase 3 Predictive Model, and Other Changes. Staff Report: Initial Statement of Reasons, October 22, 1999.
- State of California, Air Resources Board, Resolution 99-39, December 9, 1999.
- State of California, Air Resources Board, Spreadsheet Calculations to Estimate the Overall Emissions Effects of Distribution Tank Transitions from a CaRFG3 CARBOB or Non-Oxygenated Gasoline to Another CaRFG3 CARBOB or Non-Oxygenated Gasoline Intended to Have a Different Ethanol Content, September 2000.

State of California, Air Resources Board, California Phase 3 Reformulated Gasoline Regulations, Proposed Amendments to the California Reformulated Gasoline Regulations, Including a December 31, 2002 Prohibition of Using MTBE in Gasoline, Adoption of Phase 3 Gasoline Standards, a Phase 3 Predictive Model, and Other Changes, Final Statement of Reasons, June 2000.

State of California, Air Resources Board, California Phase 3 Reformulated Gasoline Regulations, Proposed Amendments to the California Reformulated Gasoline Regulations Postponing Imposition of the CaRFG3 Standards and the Prohibition of MTBE and Oxygenates Other than Ethanol in California from December 31, 2002 to December 31, 2003, Staff Report: Initial Statement of Reasons, June 7, 2002.

State of California, Air Resources Board, Resolution 02-25, July 25, 2002.

State of California, Air Resources Board, The 1999 California Almanac of Emissions and Air Quality, 1999

State of California, Air Resources Board, An Overview of the Use of Oxygenates in Gasoline, September 1998

State of California, Air Resources Board, California Phase 2 Reformulated Gasoline Specifications, Volume 1, Proposed Regulations for California Phase 2 Reformulated Gasoline, Staff Report, October 4, 1991

State of California, Air Resources Board, California Procedures for Evaluating Alternative Specifications for Phase 2 Reformulated Gasoline Using the California Predictive Model, Adopted April 20, 1995

State of California, Air Resources Board, Comparison of The Effects of A Fully-Complying Gasoline Blend and A High RVP Ethanol Gasoline Blend on Exhaust and Evaporative Emissions, November 1998

State of California, California Energy Commission, Supply and Cost of Alternatives to MTBE in Gasoline, October 1998, P300-98-013

State of California, California Energy Commission, Timetable for the Phaseout of MTBE from California's Gasoline Supply, June 1999, Docket No. 99-GEO-1.

United States Department of Energy, Argonne National Laboratory, Transportation Technology R & D Center, Effects of Fuel Ethanol Use on Fuel-Cycle Energy and Greenhouse Gas Emissions, January 1999, ANL/ESD-38

Western States Petroleum Association, California Model for California Reformulated Gasoline Blendstocks for Oxygenate Blending (CARBOB), July 21, 2000.

Mormille, Melanie et al., Anaerobic Biodegradation of Gasoline Oxygenates: Extrapolation of Information to Multiple Sites and Redox Conditions, Environmental Science and Technology, Vol. 28, No. 9, 1994.

Office of Science and Technology Policy, Executive Office of the President, Fuel Oxygenates And Water Quality: Current Understanding of Sources, Occurrence in Natural Waters, Environmental Behavior, Fate, and Significance, September 1996.

Pankow, James, et al., The Urban Atmosphere as a Non-Point Source for the Transport of MTBE and Other Volatile Organic Compounds (VOCs) to Shallow Groundwater, Environmental Science and Technology, Vol. 31, No. 10, 1997.

Poulsen, Mette, et al., Dissolution of Monoaromatic Hydrocarbons into Groundwater from Gasoline-Oxygenate Mixtures, Environmental Science and Technology, Vol. 26, No. 12, 1992.

Professor Graham Fogg, University of California, Davis, memorandum to SB 1764 Committee Members, USGS News Releases on Gasoline Additive MTBE in Groundwater, April 28, 1995.

Squillace, Paul, et al., Review of the Environmental Behavior and Fate of Methyl tert-Butyl Ether, Environmental Toxicology and Chemistry, Vol. 16, No. 9, September 1997.

State of California, California Environmental Protection Agency, Review of Senate Office of Research MTBE Paper, February 16, 1998.

State of California, Office of Environmental Health Hazard Assessment, Public Health Goal for Methyl Tertiary Butyl Ether (MTBE) in Drinking Water, March 1999.

State of California, San Francisco Regional Water Quality Control Board, Recommended Interim Water Quality Objectives (or Aquatic Life Criteria) for Methyl Tertiary-Butyl Ether (MTBE), October 1, 1998.

Sulfita, Joseph, et al., Review of the Environmental Behavior and Fate of Methyl tert-Butyl Ether, Environmental Toxicology and Chemistry, Vol. 16, No. 9, September, 1997.

United States Department of Health and Human Services, Agency for Toxic Substances and Disease Registry, Toxicological Profile for Methyl T-Butyl Ether: Draft for Public Comment, February 1995.

United States Environmental Protection Agency, Drinking Water Advisory: Consumer Acceptability and Health Effects Analysis on Methyl Tertiary-Butyl Ether (MTBE), December 1997.

United States Environmental Protection Agency, Reference Concentration for Chronic Inhalation Exposure, September 1, 1993.

United States Environmental Protection Agency, Robert S. Kerr Environmental Research Laboratory, Complex Mixtures and Groundwater Quality, M.L. Brusseau, May, 1993.

United States Geological Survey, Denver's Urban Ground-Water Quality: Nutrients, Pesticides, and Volatile Organic Compounds, March 1995.

United States Geological Survey, MTBE in Ground Water of the United States – Occurrence, Potential Sources, and Long-Range Transport, 1999.

United States Geological Survey, Occurrence and Concentrations of Volatile Organic Compounds In Shallow Ground Water in the Lower Susquehanna River Basin, Pennsylvania and Maryland, June 1996.

United States Geological Survey, Occurrence of the Gasoline Oxygenate MTBE and BTEX Compounds in Urban Stormwater in the United States, 1991-1995, 1996.

United States Geological Survey, Occurrence of Volatile Organic Compounds in Streams on Long Island, New York, and New Jersey, June, 1997.

United States Geological Survey, Occurrence of Volatile Organic Compounds in Ground Water In the White River Basin, Indiana, 1994-5, June, 1996.

United States Geological Survey, Preliminary Assessment of the Occurrence and Possible Sources of MTBE in Ground Water of the United States, 1993-94, 1995.

United States Geological Survey, Volatile Organic Compounds in Groundwater in the Connecticut, Housatonic, and Thames River Basins, 1993-1995, April, 1997.

University of California, Lawrence Livermore National Laboratories, Environmental Protection Department - Environmental Restoration Division, An Evaluation of MTBE Impacts to California Groundwater Resources, June 11, 1998.

University of Wisconsin, Department of Engineering Professional Development, Special Issue on MTBE, Underground Tank Technology Update, Vol. 13, No. 4, July/August, 1999.

Westbrook, P., Shell Oil Co., Compatibility and Permeability of Oxygenated Fuels to Materials in Underground Storage and Dispensing Equipment, October 1998.