BV

GOVERNOR GRAY DAVIS

March 29, 1999

Honorable Dianne Feinstein
United States Senate
331 Senate Hart Office Building
Washington, DC 20510

Subject: Support for MTBE legislation

Dear Senator ~~Feinstein~~ Diane:

I am writing to offer my strong support for your legislation to waive the 2% oxygenate requirement for reformulated gasoline under the Clean Air Act.

As you know, many California communities have suffered significant contamination of their drinking water sources from the gasoline oxygenate methyl tertiary butyl ether (MTBE). MTBE is known to cause cancer in animals and has been identified by several major scientific bodies as having the potential to cause cancer in humans.

Data from the Lawrence Livermore National Laboratory shows that MTBE has been detected at over 4,600 leaking underground fuel tank sites after inspecting only half the known sites. Over 60% of the reservoirs in the state have detected MTBE, and many public drinking water sources in areas like Santa Monica, Santa Clara, Sacramento and Lake Tahoe have been contaminated and shut down due to MTBE.

On March 25, I made a determination that the use of MTBE in gasoline poses a significant risk to California's environment. That determination, required by state law, was based upon a study by the University of California, peer review comments of that study by the U.S. Geological Survey, and the Agency for Toxic Substance and Disease Registry, and testimony heard at three days of public hearings conducted by the California Environmental Protection Agency.

As a result of that determination I have directed the appropriate state regulatory agencies to devise and carry out a plan to begin an immediate phase-out of MTBE from California gasoline, with 100% removal to be achieved no later than December 31, 2002.

However, in order for California to achieve this necessary goal without a major disruption of our fuel supply, it is imperative that Congress give states the flexibility to meet federal Clean Air Act emission standards without mandatory use of oxygenates. Your legislation provides exactly the flexibility California needs without weakening air quality regulations.

The California Energy Commission and the University of California study have warned that an immediate ban or precipitous phase-out of MTBE would result in catastrophic price increases with a heavy impact on our economy. Most California refineries and terminals are not equipped to handle ethanol, the only viable alternative oxygenate, at this time. The re-tooling necessary to shift to an alternate such as ethanol would take a period of years and a multi-billion dollar capital investment by the oil and gas industry. The amount of ethanol California would need to import from other states and countries to cover an immediate ban on MTBE would amount to half of all the ethanol produced in the United States last year.

Finally, I take seriously the admonition by the UC study that California learn from its mistake with MTBE and research the environmental impacts of any alternative before mandating its widespread use. Therefore I have ordered the California Air Resources Board and the State Water Resources Control Board to conduct an analysis of ethanol and any other alternative oxygenate in air, surface water and ground water. I am also directing the Office of Environmental Health Hazard Assessment to prepare an analysis of the health risks of ethanol in gasoline, including the products of incomplete combustion.

Ethanol may very well play a large role in California's future fuel supply. But if California, or any state, can meet the emission standards of the Clean Air Act -- with or without the use of oxygenates -- we should be permitted to do so.

Having that flexibility now will allow us to stop any further contamination of our drinking water while we transition away from MTBE. But your legislation is critical to California's ability to invest in a long term solution. One that protects our water, keeps us on the road to clean air, and ensures an uninterrupted, affordable fuel supply.

I thank you for your leadership on this important issue. Please know that I will support your legislative efforts in any way I can.

Sincerely,

Gray

GRAY DAVIS

GOVERNOR GRAY DAVIS

April 12, 1999

The Honorable Carol M. Browner, Administrator
Environmental Protection Agency (A-100)
401 "M" Street, S.W.
Washington, D.C. 20460

Dear Ms. Browner:

I am writing to request that the U.S. Environmental Protection Agency (U.S. EPA) take prompt action to waive federal requirements that all gasoline sold in the Sacramento region and most of Southern California contain a minimum oxygen content pursuant to the provisions of the 1990 amendments to the Clean Air Act.

As I am sure you are aware, on March 26, 1999, I concluded that the use of the oxygenate methyl tertiary-butyl ether (MTBE) in California gasoline poses a significant risk to California's environment, and, accordingly, directed that MTBE be phased out of California gasoline as soon as possible. A copy of my Executive Order D-5-99, which identifies the actions we will take to remove MTBE from gasoline, is enclosed.

One of the essential elements for a rapid phase down, and eventual phase-out of MTBE in California, is action by the EPA to eliminate the current mandate that California gasoline subject to the federal reformulated gasoline (RFG) program — about 70 percent of all gasoline in the state — must contain by weight at least 2.0 percent oxygen year-round. Your action to provide this relief is needed for several compelling reasons.

Many California refineries have the capability to produce significant amounts of gasoline that provides all of the required emission reductions without using MTBE or any other oxygenate. The only reason such MTBE-free gasoline is not being made available today is U.S. EPA's enforcement of the 2.0 percent oxygen requirement. Your approval of our requested action would enable several refiners to greatly reduce their use of MTBE in the very near future.

In terms of the eventual phase-out of MTBE, your action is equally important. Under the current U.S. EPA requirements, once MTBE is phased out, the 70 percent of California gasoline that is sold in areas subject to the federal RFG program would need to be oxygenated with ethanol. Relying on ethanol exclusively for this volume of gasoline,

approximately 10 billion gallons per year, would increase the time needed to complete our phase-out of MTBE, and result in higher fuel costs to California consumers. Your action to allow the required emissions reductions to be achieved without using a minimum oxygen content in every gallon of fuel would allow us to reduce risks of future water contamination sooner, meet California's growing demand for fuel and allow flexibility to make more economical blends of gasoline.

Finally, time is of the essence. California refineries must begin a time consuming and expensive retooling process to eliminate their current reliance on MTBE. In order to complete the phase-out of MTBE by December 31, 2002 or earlier, the refiners must start immediately with the planning and design phases of the necessary refinery and distribution system modifications. It is clear that the approach taken by industry will differ substantially depending on whether, upon completion of the modifications, refiners will be subject to a mandatory federal RFG minimum oxygen requirement. Without the mandatory oxygen requirement, the industry can design in greater flexibility and less costly processes. But in order to make informed planning and design decisions, the refiner must know in 1999 — not just in 2001 or 2002 or 2003 — that they will have flexibility with respect to oxygen requirements.

Because California has historically experienced the worst air quality in the nation and has long been engaged in pioneering efforts to reduce the contribution of motor vehicles to air pollution, the state has been granted unique authority by the Clean Air Act and the EPA to administer a state fuels program to reduce motor vehicle emissions. California is the only area in the country where the federal RFG requirements apply in conjunction with comprehensive and demonstrably more effective state standards for cleaner burning gasoline. The California regulations provide complete assurances that a waiver of the federal RFG year-round minimum oxygen content requirement will not result in a loss of any air quality.

Our regulations accomplish the needed emissions reductions without requiring a minimum level of oxygen. Numerous assessments by the auto and fuels industry, government agencies, and most recently scientists at the University of California confirm that a minimum oxygen content is not essential to making RFG that meets all emission reduction requirements. Therefore, application of the current minimum oxygen content requirement serves absolutely no purpose in California relative to its intended air quality rationale — to reduce ozone precursors and toxic emissions from vehicles.

In contrast, the minimum oxygen content requirement is having one clear effect on another area of the environment. It is increasing the risk that leaking tanks and boat

engine discharges pose to water quality. As the University of California study of MTBE indicated, California's ground and surface water resources are seriously at risk because of discharges of gasoline that has been oxygenated with MTBE. Over 60 percent of the reservoirs tested have detectable levels of MTBE, and many public drinking water sources in areas like Santa Monica, Santa Clara, Sacramento and South Lake Tahoe have been contaminated and shut down because of MTBE contamination. This is what led me to direct the appropriate state regulatory agencies to devise and carry out a plan to complete the expeditious phase-out of MTBE from California gasoline.

However, in order for California to achieve this essential protection of water quality quickly and at an affordable cost, we must have flexibility relative to the minimum oxygen content currently enforced by U.S. EPA. We need this action quickly, and I am calling on you to use your broad authority to protect both the air and water environment by allowing California's reformulated gasoline rules, which provide all of the emission benefits of the federal RFG, to be applied in lieu of the counterproductive federal minimum oxygen content requirement.

Your prompt approval of this request will help us limit any further contamination of drinking water while we transition away from MTBE. It will not risk any adverse impact on air quality due to California's more effective state gasoline regulations. It will enable us to devise the most expeditious and cost-effective solution to the MTBE problem in California. One that will protect our water and keep us on the road to clean air.

Thank you for your consideration of this request. Enclosed is a more detailed discussion of this issue and materials that support our request. As always we are ready to work with you to ensure that California and the EPA are working together to ensure environmental protection.

Sincerely,

Gray Davis

GRAY DAVIS

Enclosures

cc: Winston Hickox, Secretary for the Environmental Protection Agency

BASIS FOR WAIVER OF THE FEDERAL REFORMULATED GASOLINE REQUIREMENT FOR YEAR-ROUND OXYGENATED GASOLINE IN CALIFORNIA

On March 26, 1999 Governor Gray Davis took decisive action to begin the phase-out of the oxygenate methyl tertiary butyl ether (MTBE) in California gasoline. California's decision was based on a comprehensive, yearlong study by scientists from the University of California (U.C.). Executive Order D-5-99 outlines the state's action plan for removing MTBE from our gasoline. One of the essential elements for a successful MTBE phase-out in California is a waiver by the U.S. Environmental Protection Agency (U.S. EPA) of its current regulatory mandate that California gasoline subject to the federal reformulated gasoline (RFG) — about 70 percent of all gasoline in the state — must contain at least 2.0 percent by weight oxygen year-round.

Clean Air Act (CAA) section 211(k)(2)(B) expressly authorizes the Administrator to waive the federal RFG oxygen requirement in California if the requirement will prevent or interfere with attainment of the federal ambient ozone standard in a nonattainment area. The unique circumstances in California justify a section 211(k)(2)(B) waiver. If the Administrator concludes that such waiver cannot be issued based on this section, however, it is imperative that the oxygen mandate be waived on other grounds. California's rule for reformulated gasoline produces greater emission benefits than required federally, but do not necessitate a minimum concentration of oxygen in all gasoline. Application of the current minimum oxygen content requirement serves absolutely no purpose in California relative to its intended air quality rationale – to reduce ozone precursors and toxic emissions from vehicles.

In contrast, the minimum oxygen content requirement is having one clear effect on another area of the environment. It is increasing the risk that leaking tanks and boat engine discharges pose to water quality. As the U.C. study of MTBE indicated, California's ground and surface water resources are seriously at risk because of discharges of gasoline that has been oxygenated with MTBE.

Even without the authority in the Clean Air Act to waive the oxygen requirement, we believe that the Administrator could use broad, general authority and discretion to grant flexibility that has no adverse effect on air quality, and is needed to protect water resources.

Why California is Phasing-Out MTBE

California is phasing out MTBE in the states gasoline because of the threat it presents to California's groundwater, surface water, and drinking water systems. MTBE is highly soluble in water and will transfer to groundwater faster, 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 shows that MTBE has been detected at over 4,600 leaking underground fuel tank sites in the state, even though only half the total sites have been inspected. While underground storage tanks were ordered replaced or upgraded by December 22, 1998, it is clear that even upgraded storage tanks are not leak-proof and future leaks from a small percentage of the many thousands of gasoline storage tanks in the state will continue in the future.

Why MTBE is Used in California Gasoline

Although small volumes of MTBE have been used as an octane enhancer in some California gasoline since the late 1970's, its use did not become widespread until implementation of the CAA Amendments of 1990.

The California wintertime oxygenates program. New CAA section 211(m) imposed requirements on states containing areas that were designated carbon monoxide (CO) nonattainment and met other specified criteria. There were 39 such areas in the country, and eight of these were in California. Section 211(m) conditionally required the states to submit State Implementation Plan (SIP) revisions requiring that gasoline sold in those areas contain at least 2.7 wt.% oxygen in the wintertime months when CO concentrations were the highest, starting in November 1992. Section 211(m)(3)(A) directed U.S. EPA to waive the requirement, allowing a state to require less of the oxygen additives, if the state shows that gasoline with 2.7 wt.% oxygen would prevent or interfere with the state's attainment of a state or national primary air quality standard other than CO.

Because there were so many CAA section 211(m) areas in California, in response to section 211(m) the ARB adopted statewide oxygen requirements for wintertime gasoline starting November 1992. Our Board adopted a minimum wintertime oxygen limit of 1.8 wt.% and a maximum limit of 2.2 wt.%. The maximum limit was imposed in 1991 because the Board concluded from available test data that increasing the oxygen content of gasoline beyond about 2 wt.% will increase overall emissions of oxides of nitrogen (NOx), which contributes to ozone formation and atmospheric particulate matter (PM). During the winter, most urban areas in California exceed the federal and state ambient air quality standards for PM, and some exceed the ambient standards for ozone.

When the California Phase 2 RFG (CaRFG) regulations described below became applicable in March 1996, they retained the mandatory minimum oxygen content requirements for wintertime gasoline. Because of the continuing replacement of older, higher emitting vehicles with new lower-emitting vehicles certified to the stringent California emission standards, along with the wintertime oxygenates program, maximum CO concentrations have improved throughout the state. In March 1998, U.S. EPA redesignated ten of California's CO federal nonattainment areas (63 FR 1503 (March 31, 1998)), and only the greater Los Angeles area remains nonattainment for the federal CO standard. After concluding that the wintertime oxygenates requirements were no longer necessary in many areas to maintain the CO standard, last August our Board eliminated the mandatory minimum oxygen standard of at least 1.8 wt.% for wintertime gasoline in a major portion of the state. The requirement remained permanently in the counties of Los Angeles, Orange, Riverside, San Bernardino Ventura and Imperial only, and remained only through January 31, 2000 in Fresno and Madera Counties and the Lake Tahoe Air Basin. The ARB plans in the next few weeks to schedule a hearing to remove this last requirement for the winter of 1999-2000, given the very serious MTBE contamination problem in the Lake Tahoe area and

our ability to demonstrate that oxygenated wintertime gasoline is no longer needed for CO attainment in those areas.

The federal RFG program in California. The Clean Air Act Amendments of 1990 also added CAA section 211(k), which directed U.S. EPA to issue federal RFG regulations applicable starting in January 1995 in the nine major metropolitan areas in the country with the worst ozone pollution. These included two major areas of California - the Los Angeles-Anaheim-Riverside area (the counties of Los Angeles, Orange and Ventura, southwestern San Bernardino County and western Riverside counties), and San Diego County. Because its ozone nonattainment status was "bumped up" to severe, the Sacramento Metro ozone nonattainment area (Sacramento and Yolo Counties, western Placer and El Dorado Counties, and eastern Solano and southern Sutter Counties) became subject to the federal RFG regulations in June 1996. The gasoline sold in these three federal RFG areas now makes up about 70 percent of all of the gasoline sold in California.

The stated objective of the federal RFG program is to reduce emissions of ozone-forming volatile organic compounds during the high ozone season and emissions of toxic air contaminants during the entire year. (CAA §211(k)(1).) Unless a specified gasoline formula was more stringent, Congress directed U.S. EPA to require a performance standards for federal RFG that generally would achieve a "Phase I" 15 percent reduction in both summertime VOC and toxics emissions starting January 1995, and cumulative "Phase II" reductions of 25 percent respectively starting in 2000. U.S. EPA established a "complex model" (distinguished from a "simple model" that was available during 1995 - 1997) to be used to demonstrate reductions in VOC and toxics emissions.

Clean Air Act section 211(k)(2) provides that the federal RFG regulations are also to impose four additional requirements — NOx emissions from so-called baseline vehicles no greater than NOx emissions from those vehicles when using "baseline gasoline"; a benzene content no greater than 1.0 percent; no heavy metals; and an oxygen content of at least 2.0 wt.%. U.S. EPA's federal RFG regulations impose a minimum oxygen content standard of 2.0 wt.% for all gasoline produced by a refiner electing to be subject to "per-gallon" standards, or an average standard of 2.1 wt.% with a per-gallon minimum of 1.5 wt.% for refiners electing to be subject to averaged standards. (40 CFR §80.41). Thus 70 percent of California's gasoline is now subject to the year-round minimum oxygen content standards of 2.0 or 2.1 wt.% regardless of the VOC, NOx and toxics emissions reductions shown by U.S. EPA's complex model.

The CaRFG program. The CaRFG regulations became applicable in March 1996. They are designed to achieve maximum reductions in emissions of VOCs, NOx, and potency-weighted toxics, as well as wintertime CO where needed. They establish standards for eight different gasoline properties — Reid vapor pressure (RVP), benzene, sulfur, aromatic hydrocarbon, olefins, oxygen, T50 and T90. For most of these properties, the regulations contain "flat" limits, "averaging" limits and "cap" limits. For example, the flat, averaging and cap limits for sulfur are 40, 30, and 80 ppm respectively. The more stringent

flat and averaging limits apply only at the refinery or gasoline import facility, while the cap limits apply throughout the gasoline distribution system. A refiner shipping batches of gasoline from a refinery decides whether to comply using flat limits or averaging limits. If the flat limit for a property such as sulfur is chosen, every batch of gasoline must meet the flat limit. If averaging is chosen, the refiner assigns different batch limits for each batch (never exceeding the cap limit), and within an 180-day period batches exceeding the averaging limits must be offset by batches cleaner than the averaging limit.

A key feature of the CaRFG regulations is the "California Predictive Model," which refiners may use to vary the properties of a gasoline formulation as long as the model shows that emissions of hydrocarbons, NOx, and potency-weighted toxics will not increase compared to a blend meeting all of the cleaner-burning gasoline specifications. The Board adopted the California Predictive Model in 1994. The model is based on a wide variety of test programs evaluating the effect of fuel properties on emissions, and indicates that increases in oxygen content will increase emissions of NOx and potency weighted toxics, and will decrease emissions of hydrocarbons. Except where the mandatory wintertime oxygenates requirements remain, a refiner is allowed to ship a batch of gasoline from the refinery with an oxygen content below 1.8 wt.% — including zero oxygen — as long as the Predictive Model shows that the combined properties of the batch will not increase emissions HC, NOx or potency-weighted toxics compared to the corresponding flat or averaging limits in the regulations.

Given the Predictive Model mechanism, in the near future the California regulations will mandate oxygen *only* during the wintertime in the six counties in the greater Los Angeles area. This provides significantly more oxygenate flexibility than do the federal RFG regulations with their year-round 2.0 wt.% minimum oxygen requirement. It is important to note, though, that a specific oxygen mandate is only one reason why refiners may use MTBE or other oxygenates. It is clear that MTBE has provided blending characteristics that have significantly aided refiners in meeting the CaRFG standards. And even without an oxygen mandate, ethanol as the most likely oxygenate substitute for MTBE would be expected to be in widespread use in California because of the continuing wintertime oxygenates requirements in the Los Angeles area and the octane benefits provided by ethanol.

A Waiver of the Mandatory Oxygen Requirement in California Is Justified and Will Not Result in Air Quality Degradation

Section 211(k)(2)(B) authorizes the Administrator to waive the 2.0 wt.% minimum oxygen requirement for federal RFG "for any ozone nonattainment area upon a determination by the Administrator that compliance with such requirement would prevent or interfere with the attainment by the area of a national primary ambient air quality standard." Therefore it is clear that Congress recognized that the minimum oxygen requirement could be waived under certain circumstances where other unacceptable environmental harm could occur. The ARB will be revising its CaRFG program this year, and continuing the oxygen mandate will make it more difficult to maintain the emission reductions benefits need for

California's SIP. Additionally, it is clear that maintaining the oxygen mandate will significantly slow down the removal of MTBE from California gasoline, and thus increase the risk of water contamination. For both these reasons, it is appropriate and permissible for the Administrator to waive the inflexible oxygen requirement.

Furthermore, the existence of the CaRFG regulations place California in a unique position with regard to the federal RFG program, as recognized in the "California enforcement exemption" contained in 40 CFR §80.81. Because California has historically experienced the worst air quality in the nation and has long been engaged in pioneering efforts to reduce the contribution of motor vehicles to air pollution, the state has been granted unique authority to administer a state fuels program to reduce motor vehicle emissions. California is the only area in the country where the federal RFG requirements apply in conjunction with comprehensive and aggressive state standards for cleaner burning gasoline. While the VOC emissions reductions achieved by the CaRFG regulations are similar than those that will result from the year 2000 Phase 2 federal RFG standards, the California standards achieve more than twice the NOx reductions and about 50 percent greater toxics reductions. Since the primary reason we control both VOCs and NOx is to reduce ozone formation, on balance the CaRFG program will achieve significantly greater reductions of ozone formation and toxics than will the federal RFG program in any other state.

As MTBE is phased out of California gasoline, ethanol is almost surely the only oxygenate that would replace MTBE under a continuing federal RFG 2.0 wt.% minimum oxygen mandate. The other possible oxygenates are ETBE (ethyl tertiary butyl ether), TAME (tertiary amyl methyl ether) and TBA (tertiary butyl alcohol). These three oxygenates present the same sort of threat to groundwater contamination as MTBE and therefore would not be acceptable MTBE substitutes. It is ARB's understanding that ethanol is the only oxygenate being seriously considered by California refiners to be used in place of MTBE. Accordingly, all analyses of the effect of the federal RFG oxygen mandate in California where MTBE is no longer used must assume that ethanol is used as the substitute oxygenate.

The substantial economic impact of the universal use of ethanol in all federal RFG areas in California stems from the costs of obtaining the necessary volumes of ethanol and the costs associated with production of the base gasoline blendstocks into which the ethanol will be blended. Attached are two reports that include discussions of the costs of oxygenating California gasoline with ethanol exclusively: The California Energy Commission (CEC) January 1999 Report, "Supply and Cost of Alternatives to MTBE in Gasoline," and the MathPro March 18, 1999 analysis conducted for Chevron Products Company and Tosco Corporation, "Potential Economic Benefits of the Feinstein-Bilbray Bill."

If MTBE is completely phased out of California gasoline in about three years and the federal RFG oxygen mandate is not waived, California refiners would need as much as 75,000 barrels a day of ethanol per day to meet demand according to the CEC Report. The United States produces about 80,000 barrels per day of ethanol to meet current demand for

all uses, with another 30,000 barrels per day of spare production currently idle. California will have to compete with other states if ethanol demand increases quickly and dramatically.

A key blending characteristic of ethanol is that when it is used as an oxygenate in gasoline, it significantly raises the gasoline's Reid vapor pressure (RVP), a measurement of the propensity of the gasoline to evaporate. Adding between 5 and 10 percent ethanol to gasoline (resulting in oxygen contents between about 1.9 and 3.5 wt.% oxygen) will increase the RVP of the gasoline by about 1 pound per square inch (psi); the increase with MTBE is only about 0.1 psi. This means that in the summertime high-ozone RVP control period (which stretches from March 1 through October 31 in the greater Los Angeles area), refiners using ethanol to satisfy the federal RFG oxygen mandate will have to make a blending gasoline having an RVP about 1 psi lower than the applicable standard. The federal RFG regulations do not provide a special RVP allowance for gasoline containing ethanol. In California, the ARB recently eliminated an RVP waiver for gasoline containing 10-percent ethanol because it found that the ozone benefits associated with the exhaust emissions from elevated-RVP gasoline are overwhelmed by the increase in ozone-forming potential from the increased evaporative emissions.

In order to produce a blending gasoline with a sufficiently low RVP, more of the lighter components must be removed from the gasoline. This means a substantial loss of volume that must be made up, and the need to find an alternative market for the lighter components that have been removed. Ethanol has never been used in the summertime on a widespread basis in a major metropolitan area that is subject to the more stringent VOC-control Region 1 RVP standard.

Continuing the federal RFG oxygen mandate in California despite the MTBE phase-out will significantly increase the cost of gasoline in the state, and could cause substantial disruptions in our gasoline distribution system, *with no corresponding ozone air quality benefits.* The increased costs attributable to the federal oxygen mandate will significantly reduce the ability of the ARB to adopt other ozone-reducing elements when it adopts "California Phase 3 Reformulated Gasoline" (CaRFG3) regulations in December of this year as directed by Governor Davis. It is also possible that there will be no cost-effective way for the federal RFG areas in California to be supplied with gasoline that is universally blended with ethanol and meets all state and federal air quality requirements. In this case as well, a waiver of the federal RFG oxygen mandate in California would be necessary to avoid increases of ozone-forming emissions in the state.

There is an *immediate* need for the waiver of the federal RFG mandatory oxygen requirement. In order to complete the phase-out of MTBE by December 31, 2002 or earlier, the refiners must start immediately with the planning and design phases of the necessary refinery and distribution system modifications. It is clear that the approach taken by a refiner could differ substantially depending on whether upon completion of the modifications the refiner will be subject to a mandatory federal RFG minimum oxygen requirement. Without the mandatory oxygen requirement, the refiner can design in greater flexibility and less costly

processes. But in order to make informed planning and design decisions, the refiner must know in 1999 — not just in 2001 or 2002 or 2003 — that the mandatory oxygen requirement is being waived. A waiver or other elimination of the oxygen requirement after the refinery investments are made could result in the worst of all worlds for a refiner who has relied on the continued imposition of the requirement.

Moreover, there will be a major effort to eliminate the use of MTBE in various areas of the state considerably before December 2002. For instance, we expect there will be areas in the state where drinking water supplies are so vulnerable that MTBE will have to immediately be eliminated from the area's gasoline. Where the area is subject to the federal RFG requirements, there may be no time to wait the projected 18 to 24 months to complete the modifications to storage tanks, unloading facilities and blending equipment necessary to use ethanol as an alternative oxygenate. Other oxygenates may either be unavailable or present essentially the same threat of groundwater contamination as MTBE. In such a case, refiners must be permitted to distribute nonoxygenated gasoline — as long as it meets all of the requirements of our California Predictive Model requirements and federal RFG requirements other than minimum oxygen.

One final aspect of an oxygen waiver bears emphasis — even with a waiver of the federal RFG oxygen mandate, *a significant portion of California gasoline would still contain ethanol.* The MathPro analysis indicates that from a cost-savings perspective, the optimal share of nonoxygenated CaRFG would be less than 50 percent. Moreover, ethanol would still be needed to meet the continuing requirement for oxygenated gasoline in the winter in the greater Los Angeles area.

California Air Resources Board
April, 1999

Winston H. Hickox
Secretary for
Environmental
Protection

Air Resources Board

Alan C. Lloyd, Ph.D.
Chairman
2020 L Street • P.O. Box 2815 • Sacramento, California 95812 • www.arb.ca.gov

Gray Davis
Governor

July 9, 1999

Mr. Robert Perciasepe
Assistant Administrator for Air and Radiation
U.S. Environmental Protection Agency (6101)
401 M. Street, S.W.
Washington, D.C. 20460

Re: Support Materials for California's Request for a Waiver from the Requirement that Federal RFG Contain at Least 2 Percent Oxygen Year-Round

Dear Mr. Perciasepe:

I am attaching a set of supplemental materials in support of California's request for a waiver under Clean Air Act section 211(k)(2)(B) from the requirement that federal reformulated gasoline contain at least 2.0 volume percent oxygen year-round. This waiver request was made in Governor Davis's April 12, 1999 to Administrator Carol Browner. The materials I am now transmitting are identical to the materials I gave you on June 21, 1999, except that Attachment I has been updated to reflect the emissions comparison based on the federal complex model.

I believe that our analysis presents a substantial and compelling justification for the requested waiver. Please call me at (916) 445-4383 if you have any questions. Your staff can address any questions to Dean Simeroth at (916) 322-6020 on technical issues, and to Tom Jennings at (916) 323-9608 on legal issues.

Sincerely,

Michael P. Kenny
Executive Officer

Attachment

Basis for a Waiver From the Federal RFG 2.0 Percent Oxygen Requirement For California As Authorized in CAA §211(k)(2)(B)

California believes that U.S. EPA can and should waive the year-round 2.0 percent by weight (wt.%) oxygen requirement for federal reformulated gasoline (RFG) in each of California's three federal RFG areas. This waiver is justified by the technical analysis of the California Air Resources Board (ARB) that maintaining the federal 2.0 wt.% oxygen requirement after MTBE has been phased out of California gasoline will diminish the extent to which the *California* RFG regulations can achieve emission reductions over and above the reductions achieved by the federal program. This loss of additional benefits from the California program will interfere with attainment of the national ambient air quality standards for ozone, PM10 and PM2.5 in California's federal RFG areas.

Because California faces the most intractable air pollution problems in the nation, the ARB has designed the California RFG (CaRFG) program to achieve significantly greater overall emission reductions than those resulting from the federal RFG program. ARB is now developing its Phase 3 CaRFG rules. This is being done to eliminate the State's reliance on MTBE — which has been found to present an unacceptable threat to water supplies — and to enhance the emission reductions that the CaRFG program contributes to the State Implementation Plan (SIP). ARB's assessment shows that revised California rules accommodating a federal RFG requirement for 2.0 wt.% oxygen in the fuel year-round will necessarily be less effective in reducing vehicular emissions than would be the case if the rules could be based on oxygen-content flexibility. This loss of additional potential emission reductions from CaRFG would delay attainment of the ozone standards in all three of California's federal RFG areas, and threaten eventual attainment of the ozone and PM2.5 standard in the Los Angeles region.

The CAA § 211(k)(2)(B) waiver provision. CAA § 211(k)(2)(B) expressly authorizes U.S. EPA to waive the federal RFG year-round 2.0 wt.% minimum oxygen requirement, in whole or in part,

> ". . . upon a determination by the Administrator that compliance with such requirement would prevent or interfere with the attainment by the area of a national ambient air quality standard."

California's need for additional emission reductions in its three federal RFG areas. The emission reductions from the CaRFG program are critical to attainment of the national ozone standards, and are essential to compliance with the PM10 and PM2.5 standards. California needs to add measures to its ozone SIP to assure attainment, and any loss of reductions of NOx or ozone-forming hydrocarbons will interfere with the timely attainment of both the ozone standards.

Additional emission reductions achieved by the CaRFG rules. The current CaRFG rules, which have been applicable since 1996, require reductions in emissions of NOx and toxics that are substantially greater than the emissions reductions that will be required by the federal RFG Phase II rules that apply starting January 2000. Attachment 1 provides a comparison of the emission benefits of the two sets of rules, based on application of U.S. EPA's Complex Model. The NOx emissions reductions from the California program are more than twice the reductions required by federal RFG Phase II — the CaRFG rules achieve an *additional* overall NOx reduction of 8 percent. The toxics emissions reductions from the California program, on a potency-weighted basis, are about 20% greater than the corresponding emissions reductions from federal RFG Phase II. The VOC emission reductions required by the two programs are roughly equal.

Alternative Scenarios for Phase 3 CaRFG

On March 26, 1999, Governor Davis issued Executive Order D-5-99, which outlines California's action plan for removing MTBE from all California gasoline by December 31, 2002 at the latest. California is phasing out MTBE because of the threat it presents to the State's groundwater, surface water, and drinking water systems. ARB has initiated its Phase 3 CaRFG rulemaking with two fundamental objectives in mind — to make the total removal of MTBE from the State's gasoline feasible and practical, and to preserve or enhance the emission reductions achieved by the existing program after the phase-out of MTBE.

The Phase 3 CaRFG regulations will ultimately be implemented in one of two distinctly different regulatory environments. In one, the year-round 2.0 wt.% oxygen requirement would continue to be mandated by the federal RFG regulations, applicable to about 70% of all of California's gasoline. In the other regulatory environment, affirmative action on California's waiver request by U.S. EPA — and/or action by Congress — would allow for oxygen flexibility. ARB technical staff have analyzed likely scenarios for a Phase 3 CaRFG program under the two environments and the results of this analysis are contained in Attachment 2.

If the federal RFG 2.0 wt.% oxygen mandate is maintained after the phase-out of MTBE, it is clear that ethanol would be the only practical oxygenate. Three scenarios have been identified: (1) No use of MTBE and federal oxygen flexibility; (2) No use of MTBE and a federal RFG 2.0 wt.% oxygen mandate met by 5.7 vol.% ethanol; and (3) No use of MTBE and a federal RFG 2.0 wt.% oxygen mandate met by 10 vol.% ethanol. For each scenario, staff started with a hypothetical gasoline meeting all of the "flat" limits in the current CaRFG regulations. The staff next identified the changes in gasoline properties that refiners would necessarily have to make under the scenario, and identified the emissions impact of these changes. The staff then identified potential changes to the CaRFG standards that could be made to preserve the emissions benefits of the current program and to enhance those benefits to the extent feasible. Staff evaluated the feasibility of these changes to the CaRFG standards and their

overall emissions impact. The underlying details supporting the analyses are attached.[1]

The analyses of the scenarios demonstrate that California's ability to have oxygen flexibility should result in technologically feasible *increased* reductions of NOx of 1.5% and toxics of 2.5% for CaRFG after the phase-out of MTBE. The scenarios for using ethanol to meet a federal RFG 2.0 wt.% year-round oxygen mandate show that essentially all pentanes would have to be removed from gasoline just to preserve the existing hydrocarbon benefits. Also, taking sulfur down to zero — compared to 10 ppm for the oxygen flexibility scenario — still does not achieve the same NOx or toxics reductions. Additional changes to other CaRFG specifications would have to be made to provide these benefits. For 10% ethanol, it simply may not be possible at any cost to achieve the same benefits as the oxygen flexibility scenario. Finally, the zero sulfur requirement in both of the ethanol scenarios will make imports difficult if not possible.

The loss of NOx benefits that would result from maintenance of the federal RFG 2.0 wt.% oxygen mandate would prevent or interfere with attainment of the federal ozone, PM10 and PM2.5 ambient standards in California's federal RFG areas. There is accordingly a sound technical and legal basis for U.S. EPA to waive the federal RFG year-round 2.0 wt.% oxygen requirement for California's federal RFG areas. However, because the use of oxygen during the winter months does not threaten ozone attainment, it may be possible to retain a lesser oxygen averaging requirement. A waiver that retains an oxygen requirement of 2 wt.% for the four winter months which is approximately 0.6 wt.%, averaged over a year, and which allows any given fuel to contain zero and 3.5 wt.% oxygen, would therefore be appropriate.

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[1] The California Predictive Model was used for projecting exhaust emissions impacts and the Complex Model was used for evaporative emissions. The Predictive Model is the tool in the CaRFG regulations for allowing alternative CaRFG formulations that achieve equivalent exhaust emissions reductions. It is more useful than the federal Complex Model in determining the future emissions impacts of California gasoline for purposes of CAA §211(k)(2)(B) waiver analysis, because the underlying fleet more closely represents the future California fleet. As required under CAA §211(k)(10)(A), the Complex Model is based on representative 1990 vehicle technology. This limitation is not present in the oxygen waiver provision. The Predictive Model does not have an evaporative emissions element because the CaRFG limit for RVP — the parameter affecting evaporative emissions — is not allowed to vary.

SUMMARY OF ARB PREDICTIVE MODEL PREDICTIONS

Model Predictions are Computed for the Following Fuel Property Values

Fuel Property	Actual 1996 Mean CA Fuel Properties	EPA Phase II RFG
RVP	6.8	6.7
E200/T50	51/197	49/202
E300/T90	89/302	87/311
Aromatics	23	25
Olefins	3.9	11
Oxygen	2.07	2.1
Sulfur	20	150
Benzene	0.55	0.95

Comparison of California and Federal Phase 2 Reformulated Gasolines
(Predicted Percent Emissions Changes Relative to U.S. Clean Air Act Baseline Fuel Properties)

Criteria Pollutants

Pollutant	Actual 1996 Mean CA Fuel Properties	EPA Phase II RFG
Total VOC	-38	-34
NOx	-12	-5

Toxics Pollutants

Pollutant	Actual 1996 Mean CA Fuel Properties	EPA Phase II RFG
Exhaust Benzene	-55	-39
Evap. Benzene	-64	-38
Acetaldehyde	5	7
Formaldehyde	47	35
1,3-Butadiene	-36	-8
Potency Weighted Toxics	-44	-27

note: The above predicted emissions changes are from the ARB's predictive model.

Scenario 1: No use of MTBE and no federal year-round 2.0 wt.% oxygen mandate

Step 1. Initial impact

(a) *Variations from current flat specifications*

Reduce oxygen content from 2.0 to 0.0 (due to removal of MTBE)

(b) *Initial impact, emissions and other*

NOx	-0.5%
THC	+3%
CO	+10%
Toxics	-0.5%

Loss of 11% volume

Step 2. Changes to CaRFG standards

Reduce RVP standard by 0.2 psi, from 7.0 to 6.8 psi.

Reduce sulfur standard by 30 ppm, from 40 ppm to 10 ppm.

Step 3. Feasibility

Requires some capital investment and an increase in operating costs to reduce RVP by 0.2 psi and reduce sulfur to 10 ppm, but both are feasible.

The 11% lost volume will have to be made up by importing or increasing production of alkylates (blendstocks), or importing fully complying gasoline.

Step 4. Cumulative emissions impact

NOx	-1.5%	
THC	-0.3%	(includes loss of reduction in ozone-forming potential from loss of CO emission reductions from 2.0 wt% oxygen)
CO	+10%	(doesn't apply when in CO winter nonattainment area)
Toxics	-2.5%	

Winter oxygenates where required, using ethanol at 2.0 wt.% oxygen:

CO	-0%
RVP	Summertime limits not applicable

Scenario 2: No use of MTBE but federal year-round 2.0 wt.% oxygen mandate met with 5.7 vol% ethanol

Step 1. Initial impact

(a) *Variations from current flat specifications*

RVP increases 1 psi from 7.0 to 8.0 psi (due to ethanol effect)

(b) *Initial impact, emissions and other*

NOx	neutral
THC	+13% (from 1.0 psi increase in RVP)
CO	neutral
Toxics	+5.7%

Loss of 6% volume

Step 2.A. Changes to CaRFG standards *equivalent* to changes for no oxygen mandate (Scenario 1)

Reduce RVP standard by 0.2 psi, from 8.0 to 7.8 psi.

Reduce sulfur standard by 30 ppm, from 40 ppm to 10 ppm.

Step 2.B. Changes to CaRFG standards *to achieve same benefits* as the no oxygen mandate (Scenario 1)

Further reduce RVP by 0.8 psi, from 7.8 to 7.0 psi

Further reduce sulfur by 10 ppm, from 10 ppm to zero

Step 3. Feasibility

A. Feasibility of Step 2.A. changes is same as in Scenario 1

B. Reduction of RVP would necessitate removal of all pentanes. This is more expensive than in Scenario 1 and results in a loss of volume of about 4%. Reducing sulfur to zero is technically very difficult and would effectively preclude gasoline imports, as little or none available with zero sulfur. The overall 10% lost volume will have to be made up by importing or increasing production of alkylates (blendstocks), or importing fully complying gasoline.

Step 4. Cumulative emissions impact

Step 2.A		Step 2.B	
NOx	-1%	NOx	-1.3%
THC	+8.8%	THC	-1%
CO	neutral	CO	neutral
Toxics	+3.3	Toxics	-1%

Winter oxygenates where required, using ethanol:

CO	-0%
RVP	Summertime limits not applicable

Scenario 3: No use of MTBE but federal year-round 2.0 wt.% oxygen mandate met with 10 vol% ethanol

Step 1. Initial impact

(a) *Variations from current flat specifications*

RVP increases 1 psi from 7.0 to 8.0 psi (due to ethanol effect)

(b) *Initial impact, emissions and other*

NOx	+2.6%
THC	+12% (from 1.0 psi increase in RVP)
CO	-5%
Toxics	+6.7%

Loss of 1% volume

Step 2.A. Changes to CaRFG standards *equivalent* to changes for no oxygen mandate (Scenario 1)

Reduce RVP standard by 0.1 psi, from 7.9 to 7.8 psi (after allowing a 0.1 psi credit for impact of CO reduction on ozone)

Reduce sulfur standard by 30 ppm, from 40 ppm to 10 ppm.

Step 2.B. Changes to CaRFG standards *to achieve same benefits* as the no oxygen mandate (Scenario 1)

Further reduce RVP by 0.6 psi, from 7.8 to 7.2 psi

Further reduce sulfur by 10 ppm, from 10 ppm to zero

Step 3. Feasibility

A. Feasibility of Step 2.A. changes is same as in Scenario 1

B. Reduction of RVP by 0.7 psi would necessitate removal of all pentanes. This is more expensive than in Scenario 1 and results in a loss of volume of about 5%. Reducing sulfur to zero is technically difficult and would effectively preclude all gasoline imports, as little or none available with zero sulfur.

Step 4. Cumulative emissions impact

Step 2.A	
NOx	+1.6%
THC	+7.2%
CO	-5%
Toxics	+4.4%

Step 2.B	
NOx	+1.3%
THC	neutral
CO	-5%
Toxics	+1.2%

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Gray Davis
Governor

September 20, 1999

Ms. Margo T. Oge
Director
Office of Mobile Sources
United States Environmental Protection Agency
Washington, D.C. 20460

Dear Ms. Oge:

This is in response to your August 6, 1999, letter posing several follow-up questions to my July 9, 1999, submission of supplemental data regarding our request for a waiver from the oxygen requirement of the federal RFG program.

The response provided below fully addresses each of your questions. We are hopeful that this supplemental information will allow you to expeditiously provide California the waiver it needs to remove methyl tertiary butyl ether (MTBE) from gasoline without impeding our ability to expeditiously attain federal national ambient air quality standards. For ease of reference, I am providing your original questions followed by our response.

Question 1. Based on our review we understand that the federal requirement of 2.0-wt% oxygen can be met with 5.7-vol% ethanol (your Scenario 2). For Scenario 2 you state that the reductions in NOx for this level of ethanol fall short of your NOx reduction goal of 1.5% by 0.2% even with reduction of sulfur to 0 ppm. Have you considered the potential impacts of other fuel parameters, such as aromatics and olefins?

Response: *Our analysis demonstrated that maintaining the oxygen mandate reduced potential additional NOx emissions reductions that might otherwise be achieved in a cost-effective manner that preserved essential flexibility in meeting California reformulated gasoline regulations. We recognized that compliance with the specifications could be met by changing other properties. The demonstration was to show that the oxygen mandate restricts our ability to achieve the greatest possible NOx emissions reductions.*

If the 2.0-wt% average were required, with no minimum, a significant percentage of the summer gasoline would still require oxygen. If the oxygen level for the four winter months were at the 3.5% level, then to average 2.0%, the oxygen content in RFG for the remaining months would still have to average about 1.25% oxygen. In reality, given the California gasoline distribution system, such an approach would provide very little flexibility to produce non-oxygenated RFG. Thus, it would still be very difficult to achieve additional cost/effective NOx reductions during the summer.

Question 4: Your July 9 letter frequently cites concerns that the 2.0 wt% oxygen mandate will create barriers to implementation of "Phase 3 CaRFG regulations". Please clarify, in light of the fact the ARB has not yet finalized the Phase 3 regulations, what assumptions were made about the Phase 3 fuel in the analysis.

Response: *There was no need to assume anything for Phase 3 CaRFG other than there still exists a need for further reductions in emissions. The only assumptions in the analysis were that reductions of sulfur and RVP could provide additional emissions benefits in complying with our current or future regulations. No matter which scenario you consider, or which properties you vary, the ability to reduce NOx and evaporative hydrocarbon emissions or maintain the existing emissions benefits is greater without oxygen.*

Question 5: Please provide information of how CO and THC changes were calculated.

Response: *The changes were calculated using the existing Predictive Model for exhaust, and the proposed evaporative model which is being developed as part of a revised Predictive Model. Both the current Predictive Model and the initial draft model for public comment are available on the ARB Cleaner Burning Gasoline web page. The evaporative hydrocarbon results from the evaporative portion of the initial draft model and the exhaust hydrocarbon results from the current Predictive Model were combined by using the ARB EMFAC7G inventory weightings of exhaust and evaporative emissions. Weights were calculated for the inventory years; 1996, 2000, and 2005. The weights were averaged to provide a composite weight. The NOx portion of the analysis was generated using the current Predictive Model.*

For CO, we used the relationship that increasing fuel oxygen by 2% results in approximately a 10% reduction in exhaust CO. This is consistent with the estimates from the Auto/Oil research program. This is also consistent with estimates of the effectiveness in reducing ambient concentrations of CO for the wintertime oxygen program. The analyses of the ambient data for sites primarily impacted by motor vehicles emissions estimated the reductions in CO to be between 7% and 12%.

Question 6: Has ARB considered the effect on ozone associated with reduction in CO emissions associated with oxygen levels above 2.0 wt%? If so, please provide information on how such reductions were accounted for.

Response: *We accounted for reductions in CO by converting tons of CO into tons of equivalent evaporative hydrocarbons emissions. We used the Maximum Incremental Reactivity (MIR) factors to adjust the ozone reactivity differences for CO and evaporative emissions to be on the same basis. The MIR factor for CO was 0.07 and the average MIR for evaporative emissions was about 2.2. This yields a conversion factor of approximately 31.4 to 1. Or, it takes about a reduction of 31.4 tons of CO to offset an increase of 1 ton of evaporative emissions. We used a revision of the Predictive Model, discussed in the response to Comment 5, that includes an evaporative emissions component to estimate the fuel property effects on THC. We then compared the reactivity weighted CO and THC to adjust the THC emissions accordingly.*

If you have any further questions or wish to discuss these issues in more detail, please call me at (916) 445-4383 or Michael H. Scheible, Deputy Executive Officer, at (916) 322-2890.

Sincerely,

Michael P. Kenny
Executive Officer

cc: Michael H. Scheible
Deputy Executive Officer

bcc: Nancy Sutley, Cal/EPA

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