State of California
AIR RESOURCES BOARD

Resolution 99-39

December 9, 1999

Agenda Item No.: 99-10-3

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 Heath 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, following a hearing in November, 1991, the Board adopted regulations for Phase 2 California reformulated gasoline (CaRFG2), applicable beginning March 1, 1996; these regulations include a comprehensive set of specifications affecting eight different gasoline properties which result in significant reductions in emissions of ozone precursors and toxic air contaminants;

WHEREAS, the current CaRFG2 regulations 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; and

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.%;

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 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 are expected to also apply in the San Joaquin Valley area starting some time in 2001;

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, "The MTBE Public Health and Environmental Protection Act of 1997" (Stats. 1997 Ch. 816; S.B. 521, Mountjoy) required the University of California to conduct a study of the health and environmental risks and benefits of MTBE in gasoline compared to other oxygenates;

WHEREAS, the University of California prepared a report on the "Health and Environmental Assessment of Methyl Tertiary Butyl Ether (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;

WHEREAS, Executive Order D-5-99 also included a direction to the ARB, by December, 1999, 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, Senate Bill 529 (Bowen), also signed by the Governor on October 10, 1999 (Stats. 1999, Ch. 812), establishes a mechanism for conducting environmental assessments for amendments to the ARB's CaRFG standards proposed prior to January 1, 2000, and adopted prior to July 1, 2000; under this mechanism, the California Environmental Policy Council – consisting of the Secretary for Environmental Protection, the Chairpersons of the ARB, the State Water Resources Control Board

(State Water Board) and the California Integrated Waste Management Board, and the Directors of the Office of Environmental Health Hazard Assessment (OEHHA), the Department of Toxic Substances Control, and the Department of Pesticide Regulation – reviews the environmental assessment for the amendments and determines whether there will 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 amended CaRFG requirements;

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, the ARB staff has initially proposed amendments to the CaRFG2 regulations which would establish new CaRFG3 standards, prohibit the use of MTBE in California gasoline starting December 31, 2002, establish a CaRFG3 Predictive Model and make various other changes; these amendments were designed to eliminate the use of MTBE while providing refiner flexibility, preserving the existing air quality benefits of the CaRFG2 program, and the most significant elements are:

> A prohibition of the use of MTBE in gasoline starting December 31, 2002, and limits on the residual levels of MTBE in gasoline of 0.3 percent by volume (vol.%) starting December 31, 2002, 0.15 vol.% starting December 31, 2003, and 0.05 vol.% starting December 31, 2004;
>
> A phase-in of the MTBE prohibition and residual limits, so that they apply to gasoline being supplied from a production or import facility starting on the specified date, to gasoline being supplied from terminals starting 45 days after the specified date, and generally throughout the distribution system starting 90 days after the specified date;

The following modifications to the CaRFG flat, averaging and cap limits:

Property	***Flat Limits***		***Averaging Limits***		***Cap Limits***	
	CaRFG Phase 2	***CaRFG Phase 3***	***CaRFG Phase 2***	***CaRFG Phase 3***	***CaRFG Phase 2***	***CaRFG Phase 3***
Reid Vapor Pressure (pounds per square inch; warmer months only)	7.00	7.00 or 6.90 w/ evap PM	Not Available	Not Available	7.00	6.40 – 7.20
Sulfur Content (parts per million by weight)	40	20	30	15	80	60 30 (12/31/04)
Benzene Content (percent by volume)	1.0	0.8	0.8	0.7	1.2	1.1
Aromatics Content (percent by volume)	25.0	25.0	22.0	22.0	30.0	35.0
Olefins Content (percent by volume)	6.0	6.0	4.0	4.0	10.0	10.0
T50 (degrees Fahrenheit)	210	211	200	201	220	225
T90 (degrees Fahrenheit)	300	305	290 (max. 310)	295	330	335
Oxygen Content (percent by weight)	1.8 - 2.2	1.8 - 2.2	Not Available	Not Available	1.8 - 3.5 winter areas 0 - 3.5	1.8 - 3.7 winter areas 0 – 3.7

A new requirement imposing a maximum Driveability Index (DI) standard of 1225 on California gasoline when it is supplied from its production or import facility; DI would be equal to 1.5 xT10+3xT50+T90+20x(weight percent oxygen);

A new CaRFG3 Predictive Model, reflecting three major changes from the current CaRFG2 Predictive Model:

Adding 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;

Allowing a hydrocarbon credit for gasoline that provides CO emissions reductions associated with an oxygen content greater than 2.0 wt.%; the credit is based on the relative reactivity of CO emissions compared to the reactivity of the various hydrocarbon species; and

Updating the models to reflect recent vehicle emissions test data and changes in the current and future vehicle fleet;

For producers and importers supplying California reformulated blendstock for oxygenate blending (CARBOB) to be oxygenated downstream of the production or import facility, elimination of quality audit requirements, elimination of an oxygenate "representativeness" requirement, and adoption of specifications for denatured ethanol intended for use in motor vehicles; and

Eliminating the month of October from the wintertime oxygen season in the South Coast Area (the counties of Los Angeles, Orange, Riverside, San Bernardino and Ventura), starting in 2003, to eliminate the overlap with the RVP season without preventing or interfering with attainment of the state and federal CO ambient air quality standards;

WHEREAS, section 57004 of the Health and Safety Code requires an external peer review of the scientific portions of ARB regulations establishing a regulatory level, standard, or other requirement for the protection of public health or the environment;

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, the Board finds that:

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 and pipelines; even upgraded storage tanks are not leak-proof and future leaks from a small percentage of the thousands of gasoline storage tanks in the state will continue in the future; MTBE has been detected in the public drinking water supplies in South Lake Tahoe, Santa Monica, Los Angeles, San Francisco, Santa Clara, and other locations;

Along with toxicological concerns, low levels of MTBE in drinking water can be tasted and smelled by susceptible individuals with the taste characterized as solvent-like, bitter, and objectionable; the people of California will not accept drinking water in which they can taste MTBE;

Accordingly, the threat posed by MTBE to California's potential drinking water supplies, and the high estimated costs for the continuing costs of cleaning up MTBE groundwater contamination, make it necessary to prohibit the use of MTBE in California gasoline being supplied from production and import facilities on or after December 31, 2002 – the appropriate deadline identified by the CEC;

The three-phase reduction of limits on the small residual levels of MTBE in California gasoline in the approved amendments is necessary to minimize the presence of MTBE in California gasoline while also minimizing potential supply disruptions, particularly for imported gasoline and blending components;

The downstream implementation mechanism for the MTBE prohibitions is similar to the mechanism successfully used in the phase-in of CaRFG2 in 1996, and is necessary to avoid potential disruptions to the gasoline distribution system;

Since other ethers have similar characteristics as MTBE and could pose similar risks to the environment if used in significant volume, and since ethanol will have been the only alcohol to have been subject to a full environmental assessment as a potential gasoline oxygenate, it is appropriate to prohibit – effective December 31, 2002 – the use of any gasoline oxygenate other than ethanol unless a multimedia evaluation of use of the oxygenate in California gasoline has been conducted and the Environmental Policy Council has determined its use will not cause a significant risk to the public health or the environment;

The proposed reductions in the sulfur limits for CaRFG3 are necessary to preserve the existing benefits of CARFG2; moreover, research has shown that reducing sulfur is more effective in lowering emissions than originally estimated and is also one of the most cost-effective changes that can be made to CaRFG2;

Benzene is a known human carcinogen, and the reductions in the proposed CaRFG3 flat, averaging and cap limits for benzene in CaRFG3 will reduce public exposure to this carcinogen; the tightening of the benzene limits will also help ensure that toxic emissions do not increase under the CaRFG3 program;

Removing MTBE from CaRFG will significantly reduce the available volume of gasoline and will increase the T50; with the approved modifications to the original proposal, the increase in the CaRFG3 flat and averaging limits for T50 to 213^{o}F and 203^{o}F respectively, and the increase in the CaRFG3 flat and averaging limits for T90 to 305^{o}F and 295^{o}F respectively, will substantially mitigate the loss in volume and give refiners significant relief in the middle distillation range;

Increases in the cap limits for T50 and T90 are not necessary to achieve the objectives of this rulemaking; with the CaRFG3 cap limits for T50 and T90 unchanged from the CaRFG2 cap limits, the proposed CaRFG3 specification for DI is not needed to maintain existing fuel performance and accordingly is not included in the approved regulations;

The proposed increase in the aromatic hydrocarbon cap from 30% to 35% will increase refiners' flexibility to produce complying gasoline; refiners using higher aromatics would still be required to offset any increase in emissions by changing other fuel properties;

The approved amendments on RVP limits and the evaporative element of the CaRFG3 Predictive Model will allow a refiner using ethanol to produce a complying gasoline with an RVP of up to 7.2 psi provided that the increase in evaporative emissions is offset by reductions in exhaust emissions; the amendments will also allow refiners to produce a low RVP gasoline and use the reduction in evaporative emissions to provide more flexibility in setting other fuel parameters;

The proposed amendment allowing a CO credit for gasoline having an oxygen content greater than 2.0 wt.% appropriately recognizes the ozone-forming potential of CO and the impact of the CO emissions reductions that result from increasing oxygen content on ozone formation; this amendment will provide additional incentives to use ethanol as a blending component;

The updates reflected in the proposed CaRFG3 Predictive Model will more accurately reflect changes in the vehicle fleet, account for changes in new vehicles' response to changes in fuel properties, and increase the robustness of the data set that is used to create the model;

An air quality analysis shows that elimination of the CaRFG wintertime oxygen requirement in October in the Los Angeles-South Coast Air Basin starting October 2003 will not prevent or interfere with attainment of the federal ambient CO standard;

When approved by the Board in the early part of 2000, the new EMFAC 2000 On-Road Emissions Inventory Estimation Model will provide more accurate data for the exhaust, evaporative, and CO weightings and the Tech Group weightings in the CaRFG3 Predictive Model;

While the proposed amendments eliminating CARBOB quality audit requirements appropriately provide additional flexibility, additional CARBOB issues still need to be addressed to assure a smooth transition to an increased use of ethanol in California gasoline;

It is appropriate for the ARB to adopt specifications for denatured ethanol intended for use as an additive in California gasoline, but further data and analysis are needed before they are adopted;

The approved regulations will allow refiners and importers to supply gasoline meeting the CaRFG3 standards, including the prohibition of MTBE use and the

CaRFG3 Predictive model, prior to December 31, 2002 in order to encourage the phase-out of MTBE in California gasoline as early as possible;

For the one California small refiner that has taken the necessary compliance steps and produced CaRFG2 in 1998 and 1999 – Kern Oil & Refining Co. – the cost of compliance with the CaRFG3 standards approved herein, and the additional capital expenditures, would be substantially greater on a per-gallon basis than the costs for large California refiners; because of this it is likely that it would not be economically feasible for Kern to produce gasoline meeting the CaRFG3 standards;

Given these disparate costs, and preexisting investments made to comply with the CaRFG2 standards, it is appropriate to incorporate staff's suggested modification allowing such a small refiner to meet all CaRFG3 requirements with adjusted flat limits for aromatics at 35 vol.%, benzene at 1.0 vol.%, T50 at 220^{o}F, and T90 at 312^{o}F – as long as any increased hydrocarbon, NOx, and potency-weighted toxics emissions associated with these alternative specifications are fully mitigated through a mechanism to be added to the small refiner diesel regulations, the refiner also complies with applicable federal RFG standards, and the refiner is subject to a CaRFG3 volume cap;

The CaRFG3 regulatory proposal, including the CaRFG3 Predictive Model, have been peer reviewed in accordance with section 57004 of the Health and Safety Code; on balance the reviewers found the proposed regulations to meet the objectives of eliminating the use of MTBE while preserving the air quality benefits of the CaRFG2 program; the reviewers also provided useful technical comments and perspectives – some of which are reflected in the approved modifications to the originally proposed regulations – that will help in future assessments of fuels regulations;

WHEREAS, the Board further finds that:

Despite substantial improvements in California's air quality, the state and federal health-based ambient air quality standards for ozone and PM10 are regularly and significantly exceeded in many areas of the state;

On-road gasoline-fueled motor vehicles account for about 70% of ozone precursors statewide and the SIP calls for additional motor vehicle emission reductions in the South Coast Air Basin of approximately 75 tons per day reactive organic gases (ROG) plus NOx;

A variety of toxic air contaminants and potentially toxic air contaminants are emitted by motor vehicles; the pollutants posing the majority of the potential toxic risk are benzene and 1,3-butadiene, and to a lesser extent formaldehyde, acetaldehyde, and diesel particulate;

The CaRFG3 standards approved by the Board are based on the objectives of preserving the air quality benefits from the CaRFG2 program while phasing out the use of MTBE as quickly as possible and providing additional flexibility to reduce or remove oxygen from CaRFG3;

In determining whether the CaRFG3 standards preserve the benefits of the CaRFG2 program, the staff has appropriately determined average properties of CaRFG2 marketed in the state in 1998, determined the emission benefits achieved from the 1998 in-use gasoline, identified CaRFG3 specifications that will result in future in-use CaRFG3 that achieves equivalent or better in-use emissions as the 1998 in-use gasoline; and verified that, when the CaRFG2 and approved CaRFG3 specifications are compared using the CaRFG3 Predictive Model, the CaRFG3 specifications result in no greater emissions of hydrocarbons, NOx and potency-weighted toxics than the CaRFG2 specifications;

Using the above analysis, the approved CaRFG3 standards are expected to preserve the 1998 emission benefits of the CaRFG2 regulations, by reducing emissions of hydrocarbons, NOx, and potency-weighted toxics by 0.1%, 1.2%, and 1.8% respectively;

Because as little as 2 vol.% ethanol in gasoline will raise the RVP by about 1 psi, commingling ethanol blends with non-ethanol containing gasoline in a motor vehicle fuel tank will raise the RVP of the hydrocarbons that had not previously been blended with ethanol, resulting in increases in evaporative emissions;

The extent of commingling and its effect on evaporative emissions depends on several factors, including whether the federal RFG year-round 2% oxygen requirement will continue to apply in California, refiner choices regarding the mix of gasolines in a given area, and customer choices regarding brand and grade loyalty;

The staff estimates that commingling in California could increase average RVP by between 0.03 psi and 0.2 psi, with a best estimate of about 0.1 psi; the 6.9 psi RVP limit when the evaporative model is used and the approved T50 and T90 specifications offset these emission increases associated with commingling while maintaining real-world benefits;

WHEREAS, the Board further finds that:

The regulations approved herein will maintain the substantial reductions in emissions from motor vehicles of the ozone precursors ROG and NOx, and potency weighted toxics while removing MTBE from gasoline; the regulations approved herein may result in adverse environmental impacts due to increases in refinery emissions and emissions related to increased use of transportation

systems; the permit requirements of air pollution control districts are expected to substantially mitigate impacts from increased refinery emissions;

Construction of refinery equipment needed for compliance with regulations approved herein could result in temporary emissions from heavy-duty equipment and disruption of the soil, including the generation of dust;

The regulations approved herein are expected to result in increased shipments of ethanol, with concomitant impacts on waterborne, truck and rail traffic;

There are no feasible mitigation measures or alternatives available to the Board which would further substantially reduce the above potential adverse impacts of the proposed regulations while at the same time providing the substantial overall public health benefit from the emissions reductions noted herein and the removal of MTBE from California gasoline;

None of the above potential adverse environmental benefits are associated with the actual use of the gasoline expected to be produced in compliance with the CaRFG3 regulations approved herein;

WHEREAS, the Board further finds that:

On December 9, 1999, the Board approved a report by staff entitled “Analysis of the Air Quality Impacts of the Use of Ethanol in Gasoline,” prepared in response to the Governor’s Executive Order D-5-99; on the basis of this report, which includes analyses of air impacts of gasoline formulations that reflect the expected components of CaRFG3, there will be no significant adverse environmental or public heath air impacts that are likely to result from the change in motor vehicle fuel that is expected to be implemented to meet the regulations approved herein;

In response to the Governor’s Executive Order D-5-99, the State Water Board is conducting an evaluation of fate and transport issues associated with the use of ethanol as a gasoline oxygenate; this evaluation includes a study of water issues of gasoline formulations that reflect the expected components of CaRFG3; the evaluation is to be completed by December 31, 1999, and will be included in the record of this CaRFG3 rulemaking and reviewed by the Environmental Policy Council;

The greenhouse gas emissions impact from the approved regulations is expected to be neutral; if the production of biomass ethanol increases in California, there could be reductions in global warming emissions;

WHEREAS, the Board further finds that:

ARB staff estimated that production costs during the first year (2003) of implementing the original CaRFG3 proposal would be 4 to 7 cents per gallon, and that costs during the second year and beyond would be 2 to 6 cents per gallon; these cost estimates included capital improvement costs at refineries of about 1 billion dollars, capital expenditures at pipeline terminals and ethanol off-loading sites for the handling, storage, and blending of ethanol of about $60 million, and increased costs, beyond those currently experienced for MTBE, to import ethanol, gasoline, and gasoline blendstocks;

In light of the recovery of gasoline production volume that would result from the modifications to the originally proposed CaRFG3 flat and averaging standards for T50 and T90, the industry's capital costs associated with the approved regulations will be about $500 million without U.S. EPA's waiver of the federal RFG year-round 2.0 wt.% oxygen mandate and about $350 million with the waiver; the ongoing costs would be somewhat less than the cost estimates for the original proposal; with a waiver of the federal RFG oxygen mandate, the cost could be 1 to 2 cents per gallon lower; depending on the ultimate costs of ethanol and other gasoline blendstocks, the ultimate incremental production costs could be zero;

Because gasoline blended with ethanol has a slightly lower energy content than gasoline produced with MTBE, there is a fuel economy penalty for gasoline blended with ethanol in place of MTBE of approximately 0.6%;

The regulations approved herein will have a minor, if any, impact on the creation or elimination of jobs within the State of California, the creation of new businesses or elimination of existing businesses with California, or the expansion of businesses currently doing business within California;

Most of the amendments approved herein and associated costs are designed to eliminate MTBE from CaRFG to protect ground and drinking water; the NOx emission benefits of the approved CaRFG3 standards compared to the CaRFG2 standards result primarily from the reduction in sulfur content, and the cost-effectiveness of the NOx reductions are estimated to be about $4 per pound.

NOW, THEREFORE, BE IT RESOLVED that the Board hereby approves the amendments to sections 2260, 2261, 2262.1, 2262.5, 2263, 2264, 2264.2, 2265, 2266, 2266.5, 2269, 2270, 2271, and 2272 the repeal of sections 2262.2, 2262.3, 2262.4, 2262.6, 2262.7 and 2264.4, and adoption of sections 2262, 2262.3, 2262.6, and 2262.9, 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 hereby approves the adoption of the "California Procedures for Evaluating Alternative Specifications for Phase 3

Reformulated Gasoline Using the California Predictive Model," as set forth in Attachment A hereto, with the modifications to those Procedures set forth in Attachment B hereto, and with further modifications on the weighting of evaporative, exhaust, and CO emissions, and the balancing of Tech Groups, necessary to reflect the EMFAC 2000 emissions inventory once those elements of the inventory are approved by the Board.

BE IT FURTHER RESOLVED that the Board directs the Executive Officer: (1) to incorporate into the approved regulations and incorporated document the modifications described in Attachment B hereto and such other conforming modifications as may be appropriate; (2) to make the modified regulations and incorporated document, 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) 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.

BE IT FURTHER RESOLVED, that the Board directs the Executive Officer to transmit the regulations approved herein and incorporated document to the Environmental Policy Council with the recommendation that the Council determine that there will be no significant adverse impact on public health or the environment, including any impact on air, water or soil, that is likely to result from the change in motor gasoline that is expected to be implemented to meet the CaRFG3 regulations approved herein; if the Council does not make such a determination, the Executive Officer shall schedule a hearing for the Board to further consider the regulations approved herein prior to final adoption.

BE IT FURTHER RESOLVED, that the Board directs the Executive Officer to include in the rulemaking file for this rulemaking the environmental assessments presented to the Environmental Policy Council regarding ethanol and CaRFG3 gasoline.

BE IT FURTHER RESOLVED, that the Board directs 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 small refiners to fully mitigate any increased emissions associated with the CaRFG3 small refiner provisions approved herein; the proposed amendments shall not include changes to the CaRFG3 flat, averaging or cap limits or the Predictive Model.

BE IT FURTHER RESOLVED, that the Board directs the Executive Officer to provide the Board in October 2000 an update on potential increases in hydrocarbon emissions

from materials permeability associated with the use of ethanol in gasoline, and to report to the Board on the results of permeability testing by December 2001;

BE IT FURTHER RESOLVED, that the Board directs the Executive Officer to further evaluate the expected real-world emissions impact in 2003 and beyond of the commingling of CaRFG3 containing ethanol with CaRFG3 not containing ethanol – considering the ultimate decision of the U.S. EPA Administrator or Congress to waive or otherwise eliminate the year-round minimum oxygen requirement for federal RFG under Clean Air Act section 211(k)(2)(B), the expected prevalence of CaRFG3 containing ethanol and CaRFG3 not containing ethanol in 2003 by supplier, grade and geographic area, other pertinent available data, and any new studies deemed necessary on factors such as refueling patterns and customer brand and grade loyalty – and to report his findings to the Board with any appropriate recommendations by December 2001.

BE IT FURTHER RESOLVED, that the Board directs 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 by July 2002 with a recommendation on whether the limit should be revised.

BE IT FURTHER RESOLVED, that the Board directs the Executive Officer, upon implementation of the CaRFG3 regulations in 2003, to evaluate whether the regulations actually maintain or improve upon emissions and air quality benefits achieved by CaRFG2 as of January 1, 1999 – including emissions reductions for all pollutants, including precursors, identified in the California SIP for ozone, and emission reductions in potency-weighted air toxics – and to report to the Board by 2004 on the results of the evaluation along with any appropriate recommendations.

BE IT FURTHER RESOLVED, that the Board directs the Executive Officer to evaluate the DI of in-use CaRFG3 to determine whether the in-use DI levels are adequate to minimize any adverse impacts of the DI levels on the in-use emissions performance of motor vehicles and to report back to the Board by 2004 with the results and any appropriate recommendations.

BE IT FURTHER RESOLVED, that the Board directs the Executive Officer to transmit to the U.S. EPA Administrator the Board's recommendation that U.S. EPA adopt a nationwide gasoline DI standard to assure the adequate emissions performance of existing and advanced technology motor vehicles.

BE IT FURTHER RESOLVED, that the Board directs the Executive Officer to work with the CEC staff to evaluate the sulfur levels of gasoline produced to comply with the CaRFG3 regulations, and the expected impacts of an ultra-low-sulfur flat or cap limit for California gasoline on California gasoline supplies, production and import volumes, production costs, and the ability of refiners to produce complying California gasoline on a consistent basis, and to report back to the Board by July 2002.

BE IT FURTHER RESOLVED, that the Board directs the Executive Officer to transmit the regulations approved herein to U.S. EPA, and to reaffirm the need for the U.S. EPA Administrator to promptly grant California's request for a waiver from the federal RFG year-round 2.0 wt.% minimum oxygen requirement for California gasoline; such a waiver would result in greater NOx emissions reductions and would reduce the costs of producing CaRFG3 gasoline.

BE IT FURTHER RESOLVED, that the Executive Officer is directed to request that the U.S. EPA Administrator determine, pursuant to Clean Air Act section 211(m)(2), that, starting in 2003, the period in which Los Angeles-South Coast Air Basin is prone to high ambient concentrations of CO is November through February rather than October through February.

BE IT FURTHER RESOLVED, that the Board directs the Executive Officer to monitor refiner progress towards compliance with the CaRFG3 regulations and to report to the Board semiannually on this progress and on implementation of the directives in this resolution. As part of this process, gasoline samples should be obtained and fully specified and analyzed.

BE IT FURTHER RESOLVED, that the Board directs the Executive Officer to work with local air quality management districts and local communities to address potential impacts from an increased use of cargo tank trucks to transport ethanol to gasoline refineries, terminals and bulk plants.

BE IT FURTHER RESOLVED, that the Board directs the Executive Officer to submit the ultimately adopted amendments to the U.S. EPA as a revision to the California SIP.

I hereby certify that the above is a true and correct copy of Resolution 99-39, as adopted by the Air Resources Board

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Pat Hutchens, Clerk of the Board

Resolution 99-39

December 9, 1999

IDENTIFICATION OF ATTACHMENTS TO THE RESOLUTION

Attachment A: Proposed Amendments to title 13, California Code of Regulations, sections 2260-2272, and the proposed "California Procedures for Evaluating Specifications for Phase 3 Reformulated Gasoline Using the California Predictive Model," as set forth in Appendix A to the Staff Report: Initial Statement of Reasons released October 22, 1999.

Attachment B: Staff's Suggested Changes to the Original Proposal, dated December 9, 1999 and distributed at the December 9, 1999 hearing.

Attachment B

California Environmental Protection Agency
AIR RESOURCES BOARD

PUBLIC HEARING TO CONSIDER AMENDMENTS TO THE CALIFORNIA REFORMULATED GASOLINE REGULAITONS, 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

December 9, 1999

Staff's Suggested Changes to the Original Regulatory Proposal

1. Reduce the Phase 3 California reformulated gasoline (CaRFG3) cap limits for T50 and T90 to 220^{o}F and 330^{o}F respectively, making them identical to the current CaRFG2 cap limits for these properties. Because of this change the proposed specification for Driveability Index (DI) is no longer needed to maintain existing fuel performance. Therefore, the proposed DI specification would be deleted.

   Sections Affected: Modifications to title 13, California Code of Regulations, section 2262 as shown in the attached table; deletion of proposed section 2262.3(b)(2).

2. Revise the proposed CaRFG3 T50 flat limit specification from 211^{o}F to 213^{o}F, and the CaRFG3 T50 averaging specification from 201^{o}F to 203^{o}F. Based upon improved data on the average in-use fuel in 1998 this revision can be made while still preserving the full benefits of the current program. This change provides additional flexibility to refiners and allows greater production of complying gasoline in California refineries. The improved data on 1998 in-use fuel became available after the preparation of the Staff Report.

   Section Affected: Modifications to title 13, California Code of Regulations, section 2262 as shown in the attached table.

3. Allow refiners and importers to supply gasoline meeting the CaRFG3 standards, including the prohibition of MTBE use and the CaRFG3 Predictive Model, prior to December 31, 2002. This change will enable refiners to take advantage of the CaRFG3 rules to phase out MTBE use early. Because early use of the CaRFG3 standards will include application of the less stringent CaRFG3 cap limits for RVP and aromatics for all California gasoline, early use would only be available if at least one refiner demonstrates it will be producing a significant portion of its California gasoline as CaRFG3.

   Section Affected: Add new subsection to section 2261.

4. Include alternative CaRFG3 standards for small refiners that have produced CaRFG2 during 1998 and 1999. A small refiner would need to meet all CaRFG3 requirements with the following adjusted flat limits: aromatics at 35 vol.%, benzene at 1.0 vol.%, T50 at 220^{o}F, and T90 at 312^{o}F. Further, such refiners would be required to comply with applicable federal RFG standards. Any increased emissions of hydrocarbons, oxides of nitrogen (NOx) and

potency-weighted toxics associated with these alternative specifications, as shown by the CaRFG3 Predictive Model, would have to be fully mitigated through a mechanism to be added to the diesel regulations in a subsequent rulemaking to be considered by the Board by October 2000. A volume cap on the amount of CaRFG that could be produced by the small refiner using the adjusted limits would be derived from crude oil capacity as reported to the CEC for March 1999, a recent statewide refinery utilization rate, and highest monthly ratio of produced gasoline to crude oil throughput in 1998-1999; the regulation would provide that the volume cap for the refinery operated by Kern Oil & Refining Co. could not exceed an average of 8000 barrels per day.

Sections Affected: Modifications to section 2272 and/or addition of a new section 2272.2.

5. Delete the proposed specifications for denatured ethanol, and establish specifications for denatured ethanol in concert with the subsequent rulemaking for the CARBOB amendments, which will be scheduled for a hearing by October 2000. The preexisting provision on the representativeness of oxygenates used in CARBOB testing would be retained pending the subsequent rulemaking.

   Section affected: Deletion of proposed new section 2262.9 and reinstatement of section 2266.5(a)(2)(B).

6. Expand the prohibition of ethers other than MTBE to include any oxygenate other than MTBE or ethanol unless a multimedia evaluation of 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 the public health or the environment. The originally proposed regulatory language inadvertently failed to reflect staff's intent, expressed on page 23 of the Staff Report, that the prohibition apply to alcohols other than ethanol; and this should appropriately be extended to any other oxygenates such as esters.

   Section Affected: Modifications to proposed section 2262.6(c).

7. Suggest the Board direct the Executive Officer, as part of this rulemaking, to revise the exhaust, evaporative and carbon monoxide (CO) weightings and the vehicle weightings in the CaRFG3 Predictive Model to reflect the EMFAC 2000 emissions inventory after EMFAC 2000 is approved by the Board.

8. Suggest the Board direct the staff to return to the Board for a hearing by October 2000 on further amendments to the CARBOB provisions, proposed specifications for denatured ethanol, and amendments to the diesel regulations to implement the mitigation required of small refiners.

9. Propose a reanalysis of the impact of commingling by the end of 2001, and, if this assessment indicates that emissions will increase beyond the level mitigated by the CARFG3 rule, commit staff to proposing revisions to the regulation to provide the needed additional reductions.

ATTACHMENT

(Modifications to the original proposal are shown in underline to indicate additions and strikeout to show deletions)

The California Reformulated Gasoline Phase 2 and Phase 3 Standards

Property	***Flat Limits***		***Averaging Limits***		***Cap Limits***	
	CaRFG Phase 2	***CaRFG Phase 3***	***CaRFG Phase 2***	***CaRFG Phase 3***	***CaRFG Phase 2***	***CaRFG Phase 3***
Reid Vapor Pressure[1] (pounds per square inch; warmer months only)	7.00	7.00 or 6.90[2]	Not Applicable	Not Applicable	7.00	6.40 –7.20
Sulfur Content (parts per million by weight)	40	20	30	15	80	60[3] 30[3]
Benzene Content (percent by volume)	1.0	0.8	0.8	0.7	1.2	1.1
Aromatics Content (percent by volume)	25.0	25.0	22.0	22.0	30.0	35.0
Olefins Content (percent by volume)	6.0	6.0	4.0	4.0	10.0	10.0
T50 (degrees Fahrenheit)	210	~~211~~ 213	200	~~201~~ 203	220	~~225~~ 220
T90 (degrees Fahrenheit)	300	305	290[4]	295	330	~~335~~ 330
Oxygen Content (percent by weight)	1.8 - 2.2	1.8 - 2.2	Not Available	Not Available	1.8 - 3.5[5] 0 - 3.5[5]	1.8 - 3.7[5,6] 0 – 3.7[5,6]
~~Driveability Index (DI)~~[7]	~~None~~	~~1225~~	~~Not Applicable~~	~~Not Applicable~~	~~None~~	~~None~~

* * * *

~~[7] DI equals 1.5 x T10 + 3 x T50 + T90 + 20 x (wt.% oxygen). The DI standard applies only during the Reid vapor pressure control periods identified in section 2262.4(b)(2).~~