Updated Informative Digest

FOLLOW-UP AMENDMENTS TO THE CALIFORNIA PHASE 3 REFORMULATED GASOLINE REGULATIONS

Sections Affected: Amendments to sections 2260, 2261, 2262.3, 2262.5, 2263, 2264, 2265, 2266, 2266.5, 2270, 2272, 2273, 2282, 2296 and 2297, and adoption of section 2262.9, title 13, California Code of Regulations (CCR). Adoption of the "Procedures for Using the California Model for California Reformulated Blendstock for Oxygenate Blending (CARBOB)" (hereafter the CARBOB Model Procedures), incorporated by reference in section 2266.5(a)(2)(B)1., title 13, CCR. Amendments to "California Procedures for Evaluating Alternative Specifications for Phase 3 Reformulated Gasoline Using the California Predictive Model" (hereafter the CaRFG3 Predictive Model Procedures"), which is incorporated by reference in section 2265(a), title 13, CCR, and the "California Test Procedures for Evaluating Alternative Specifications for Gasoline" (Renamed as the "California Procedures for Evaluating Alternative Specifications for Gasoline Using Vehicle Emissions Testing"), which is incorporated by reference in section 2266(a), title 13, CCR.

Background

The preexisting CaRFG regulations. The Phase 2 California reformulated gasoline (CaRFG2) regulations were adopted by the Board following a hearing in November 1991, and became applicable in the spring of 1996. The regulations established a comprehensive set of standards for gasoline designed to achieve the maximum feasible reductions in emissions of criteria pollutants and toxic air contaminants from gasoline-powered motor vehicles. The standards cover sulfur, benzene, olefin, oxygen, and aromatic hydrocarbon contents, the 50-percent and 90-percent distillation temperatures (T50 and T90), and summertime Reid vapor pressure (RVP).

At a December 9, 1999, hearing, the Board approved standards for Phase 3 CaRFG (CaRFG3), which gasoline producers and importers must meet starting December 31, 2002. The most prominent feature of the CaRFG3 standards was the prohibition of gasoline containing methyl tertiary-butyl ether (MTBE) – an oxygenate used in most California gasoline since 1996. Following an extensive study by University of California researchers, Governor Gray Davis had made a finding in March 1999, that there are significant risks and costs associated with water contamination from MTBE in the state's gasoline. MTBE is highly soluble in water and will transfer faster and travel farther and more easily than other gasoline constituents such as benzene when gasoline leaks from underground storage tanks or pipelines; it also degrades more slowly. The CaRFG3 standards also reflected changes from the CaRFG2 standards for several of the regulated gasoline properties. These changes were designed to maintain the emission and air quality benefits of the CaRFG2 standards while increasing refinery flexibility in producing complying gasoline without the use of MTBE.

The primary elements of both the CaRFG2 and CaRFG3 standards are sets of limits – referred to here as refiner limits – that apply to gasoline when it is first supplied from the production facility (typically a refinery) or import facility. These standards also include sets of "cap limits" that apply throughout the gasoline distribution system and are less stringent than the refiner limits.

With the exception of RVP and oxygen content, the regulations provide three compliance options for meeting the refiner limits. One option is to have the gasoline subject to either a "flat limit," set forth in the regulations which must be met by every gallon of gasoline leaving the refinery, or a specified "averaging limit." The averaging limits for each of the six properties are numerically more stringent than the comparable flat limits. Under averaging, a batch of gasoline with a designated alternative limit above the averaging limit must be offset by other batches with designated alternative limits below the averaging limit.

The CaRFG regulations also contain a second compliance mechanism under which a refiner may use a Phase 2 or 3 CaRFG "Predictive Model" to identify alternative flat and averaging limits applicable when gasoline is supplied from the refinery. The Predictive Model consists of mathematical equations which predict the changes in exhaust emissions of hydrocarbons, oxides of nitrogen (NOx), and potency weighted toxics for four toxic air contaminants in the exhaust of gasoline-powered vehicles. An alternative gasoline formulation is acceptable if there will be essentially no increase in emissions of hydrocarbons, NOx, and potency-weighted toxics under the Predictive Model. Currently, most of the gasoline sold in California complies with the CaRFG2 regulations through the use of the Predictive Model. The third compliance option in the CaRFG regulations allows for certification of alternative gasoline formulations based on the results of vehicle emission testing.

Gasoline oxygen content is regulated somewhat differently from the other properties in that there are both minimum and maximum oxygen content standards. Oxygen is added to gasoline by blending in an oxygenate such as MTBE or ethanol. While the CaRFG2 oxygen standard is 1.8 to 2.2 percent by weight, producers and importers may use the Predictive Model to vary the applicable limit. The oxygen content may be as low as zero percent or as high as 3.5 wt. percent when the Predictive Model is used. Since adding oxygen to gasoline will reduce emissions of carbon monoxide (CO) from most vehicles now on the road, the CaRFG regulations require a minimum oxygen content of 1.8 wt. percent in the Los Angeles, Orange, Ventura, San Bernardino, Riverside and Imperial Counties in the winter months when the highest CO concentrations are experienced. California is conditionally mandated by section 211(m) of the federal Clean Air Act (FCAA) to maintain a wintertime oxygen requirement in all of these counties except Imperial.

Comparable Federal Regulations. Pursuant to the 1990 amendments to the FCAA, the U. S. Environmental Protection Agency (U.S. EPA) has adopted federal RFG regulations that apply in San Diego County, the greater Los Angeles area (Los Angeles,

Orange and Ventura Counties, and parts of Riverside and San Bernardino Counties), and the greater Sacramento area (Sacramento County and parts of Yolo, Solano, Sutter, Placer, and El Dorado Counties). Together, these areas make up about 70 percent of the state's gasoline market. Both the federal and state RFG regulations apply in those areas. To avoid unnecessary duplication of the enforcement requirements, in 40 C.F.R. section 80.81, the U.S. EPA exempted California producers from many of the federal enforcement requirements.

The oxygen requirements in the federal RFG and CaRFG programs differ considerably. The FCAA requires a minimum 2.0 wt. percent oxygen requirement year-round, even when it is not needed to avoid exceedances of the ambient CO standards and formulations with less or no oxygen can achieve equivalent reductions in emissions of hydrocarbons and toxics. Thus because of federal law, California refiners must comply with the federal minimum oxygenate requirement in 70 percent of California's gasoline. For the remaining 30 percent of the state's gasoline, refiners have the flexibility to produce gasoline without oxygen if they choose, as long as minimum emissions performance required by the CaRFG regulations are met. In April 1999, Governor Davis asked the U.S. EPA to issue a waiver of the oxygenate requirement under a waiver provision in the federal law, and the ARB has furnished U.S. EPA with substantial analyses supporting the waiver. Nevertheless, U.S. EPA has to date failed to act on the request.

The CaRFG3 Follow-Up Amendments

Although the Board was able to address most CaRFG3 issues at the December 1999 hearing, a few had to be deferred and have been addressed in this CaRFG3 follow-up rulemaking.

Specifications for denatured ethanol. With the elimination of MTBE in California gasoline, the use of ethanol will become much more widespread, particularly if the federal government does not eliminate the mandate that 70 percent of California's gasoline contain at least 2.0 wt. percent oxygen. However, even with relief from the federal requirement, refiners are expected to use substantial amounts of ethanol both to meet the state requirement for oxygen in wintertime gasoline in much of Southern California and to increase octane. In the original CaRFG3 rulemaking, staff proposed specifications for denatured ethanol intended for use in California gasoline. The specifications were designed to assure a more uniform product with blending characteristics that would assist refiners in the challenging task of meeting the CaRFG3 standards and to help enable the ethanol blending requirements be streamlined. Since ethanol producers commented that some of the proposed specifications were too stringent in light of ethanol production processes and the characteristics of denaturants being used, the Board directed staff to work with interested parties and come back with a proposal for consideration at a later date.

In this rulemaking, the Board has adopted the following limits for denatured ethanol intended for use in California gasoline starting December 31, 2002: a sulfur content not exceeding 10 parts per million, benzene content not exceeding 0.06 volume percent, olefin content not exceeding 0.5 volume percent, and aromatic hydrocarbon content not exceeding 1.7 volume percent. Sulfur content is to be determined by ASTM D 5453-93. The benzene, olefin, and aromatic hydrocarbon content would be determined by analyzing the concentration of those compounds in the denaturant and then multiplying the result by 0.0476. The Board also adopted benzene, olefin and aromatic hydrocarbon limits for denaturants equal to the CaRFG3 cap limits. Starting December 31, 2002, persons transferring denatured ethanol intended for use in California gasoline will be required to provide documentation stating that it complies with the applicable standards, and providing the name of the transferor, the facility where the ethanol was produced, and the person who produced the ethanol and added the denaturant.

Provisions pertaining to "CARBOB." When gasoline is oxygenated with ethanol, certain characteristics of the resulting blend make it generally infeasible to be transported through pipeline systems. Because of this, ethanol is typically added to gasoline at the terminal or in the delivery truck. The CaRFG regulations allow a refiner to ship non-oxygenated gasoline from the refinery without complying with the CaRFG standards if it is specially formulated to be combined with oxygenate "downstream" from the refinery and the resulting blend will meet all of the CaRFG standards. This allows entities adding oxygen downstream from the refinery to take advantage of the contribution the oxygenate can make to complying with the CaRFG standards, particularly by diluting the concentration of compounds like benzene. The nonoxygenated blend is called "California reformulated gasoline blendstock for oxygenate blending," or "CARBOB."

Under the existing regulations, compliance of CARBOB with the CaRFG standards is determined by adding the appropriate level of oxygenate to a sample of CARBOB and comparing the results to the applicable CaRFG limits. A producer is required to conduct such tests and notify the ARB prior to supplying a final blend of CARBOB from the refinery. Whenever the CARBOB is transferred, it must be accompanied by a document identifying the oxygenate type or types and amount or range of amounts that must be added before the CARBOB is supplied from the final distribution facility.

The amendments establish a new "CARBOB Model" which can be used in connection with limits directly applicable to the CARBOB. The CARBOB model will serve as a preprocessor for the Predictive Model. The properties of the CARBOB are used to calculate the expected properties of the finished blend. These finished blend properties are then entered into the Predictive Model to see if the CARBOB properties result in a qualifying fuel. A refiner will have the option to use the CARBOB Model mechanism, in which case the refiner would be able to simply sample and analyze the CARBOB before it is supplied from the refinery, without having to hand-blend the ethanol into the CARBOB before analyzing the properties. However, ARB inspectors will have the option of hand-blending the CARBOB with ethanol and testing the blend.

Normally, in determining compliance the properties of the denatured ethanol will be assumed to be in the expected range reflecting the proposed specifications for denatured ethanol. But producers and imports will have the option of specifying a different range of ethanol properties, in which case the range would have to be included in product transfer documentation and the ultimate oxygen blender would be responsible to use denatured ethanol with the specified properties.

The amendments also add cap limits for downstream CARBOB that has been supplied from its production or import facility. These cap limits can be enforced by sampling and testing the CARBOB without the need for hand-blending ethanol into the CARBOB.

The amendments also change the current prohibition of combining CARBOB that has been shipped from the refinery with any other CARBOB, gasoline, blendstock or oxygenate, except for the oxygenate for which the CARBOB was designed, or other CARBOB for which the refiner has designated the same type and amount or range of oxygenate. First, the prohibition would apply to blending CARBOBs with different oxygen ranges rather than different amounts of oxygenate to be added; this should allow increased fungibility. Second, combining CARBOBs designed for different ethanol levels in a storage tank at a terminal or bulk plant will be permitted if it is part of a transition to a new type of CARBOB and certain criteria are met, including a requirement that the batch of the new CARBOB being added has a reduced sulfur content. Combining CARBOB with California gasoline in a storage tank at a terminal or bulk plant will also be permitted if specified conditions are met. One condition is that the resulting blend of product in the tank could only be supplied from the terminal or bulk plant when it was not subject to the RVP standards.

Providing offsets for excess emissions from small refiner CaRFG3. In the CaRFG3 rulemaking, the Board included small refiner CaRFG3 standards with less stringent flat limits for benzene and aromatics content, T50, and T90. A small refiner may only use the small refiner CaRFG3 standards, however, if it offsets the excess emissions with changes to its diesel fuel produced pursuant the ARB's regulation limiting the aromatic hydrocarbon content. The CaRFG3 regulations identify the excess emissions of hydrocarbons, NOx, and potency-weighted toxics on a per-barrel basis that must be offset, but the Board deferred establishment of the diesel fuel offset provisions until this rulemaking. A small refiner may only use the small refiner CaRFG3 standards if it produced gasoline meeting CaRFG2 standards in 1998 and 1999; Kern Oil and Refining Co. (Kern Oil) is the only refiner to meet this criterion.

The diesel aromatics regulation has included a basic aromatic hydrocarbon standard of 10 vol. percent, with a 20 vol. percent standard for small refiners, applicable to the small refiner's annual "exempt volume" (additional diesel fuel produced by the small refiner in the year is subject to the 10 percent aromatics standard). The regulation also includes a mechanism under which a refiner may certify an "alternative formulation" shown by

an engine test program to achieve emissions reductions equivalent to a 10 percent aromatics diesel fuel (20 percent for small refiners).

The amendments now adopted by the Board provide a small refiner with three options in producing diesel fuel in a manner that offsets the excess emissions from gasoline subject to the small refiner CaRFG3 standards in a particular year. First, the small refiner can accept a smaller annual exempt volume of diesel fuel subject to the 20 percent aromatics standard – in the case of Kern Oil, the equivalent of 2,263 barrels per day in place of 6,405 barrels per day. Second, the refiner can produce up to its annual exempt volume of diesel fuel, but subject to standards more stringent than a 20 percent aromatics standard. Third, the small refiner could opt for an exempt volume augmented by 25 percent, if emissions are reduced enough to offset emissions from the small refiner's gasoline and the augmentation of the volume. The small refiner also has the option to use these mechanisms prior to December 31, 2002.

Other amendments. Other amendments in the rulemaking make various minor changes to the CaRFG regulations, including reducing the applied reproducibility of automated RVP test methods, clarifying the method for sampling gasoline, correcting provisions on transitions to the winter oxygenates season for low-throughput stations, and clarifying that racing gasoline is not subject to the detergent additives requirements.