State of California
AIR RESOURCES BOARD

Final Statement of Reasons for Rulemaking, Including Summary of Comments and Agency Response

PUBLIC HEARING TO CONSIDER THE ADOPTION OF AND AMENDMENTS TO REGULATIONS REGARDING REFORMULATED GASOLINE (PHASE 2 GASOLINE SPECIFICATIONS)

Public Hearing Date: November 21-22, 1991
Agenda Item No.: 91-11-1

Final Statement of Reasons
Phase 2 Reformulated Gasoline Rulemaking

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I. GENERAL

This rulemaking was initiated by the October 4, 1991, publication of a notice of a public hearing to consider the adoption of and amendments to regulations regarding specifications for Phase 2 reformulated gasoline (Phase 2 RFG), and the wintertime oxygen content of gasoline (the wintertime oxygenates regulations). At the same time the staff of the Air Resources Board (ARB or Board) issued a Staff Report: Initial Statement of Reasons, which consisted of two volumes. Volume 1 addressed the proposed regulations for Phase 2 RFG, and Volume 2 addressed the proposed wintertime oxygenates regulations.

On November 21-22, 1991, the Board conducted a hearing at which it received oral and written comment on the regulatory proposals. At the conclusion of the hearing the Board approved the adoption of Phase 2 RFG regulations, and continued the hearing on the wintertime oxygenate regulations to December 12, 1991. At the conclusion of the December 12, 1991 hearing, the Board approved the wintertime oxygenates regulations with various modifications to the original proposal.[1] The wintertime oxygenates regulation will require near-term compliance from November 1992 through February 1996.

This Final Statement of Reasons covers the regulatory actions pertaining to Phase 2 RFG: adoption of sections 2260 through 2272 and 2298, and amendments to sections 2250, 2251.5, 2252 and 2296 of Title 13, California Code of Regulations. The regulatory actions pertaining

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1. In preparing the rulemaking file for the Phase 2 RFG regulations, we have included all written comments submitted for the November 21-22, 1991 hearing, and the complete transcript from that hearing. We have summarized in this document only those comments pertaining to the Phase 2 RFG regulations. Comments pertaining to the wintertime oxygenates regulations are summarized and responded to in the Final Statement of Reasons for that rulemaking.

to the wintertime oxygenates regulations were separately transmitted to the Office of Administrative Law on September 9, 1992, with a separate Final Statement of Reasons.[2]

The Board approved the Phase 2 RFG regulations by adopting Resolution 91-54. As approved, the regulations included a number of modifications to the originally proposed text. Most of the modifications reflected suggestions made by the staff at the November 21-22 hearing. The Board directed the Executive Officer to incorporate the approved modifications into the originally proposed text with such other conforming modifications as may be appropriate. In accordance with Government Code section 11346.8(c), the Resolution directed the Executive Officer to make the modified regulatory text available to the public for a supplemental comment period of 15 days. He was then directed either to adopt the modified regulations with such additional modifications as may be appropriate in light of the comments received, or to present them to the Board for further consideration if he determined such an action was warranted by the comments.

The modified text of the regulations was made available on June 5, 1992, for a 15-day period for public comment. At the same time, additional documents and information were made available for public inspection pursuant to 1 C.C.R. section 45. During the 15-day comment period, the Board received numerous written comments. After considering these comments, the Executive Officer made minor additional modifications which were made available August 24, 1992, for a 15-day period for public comment on the additional modifications. On August 31, 1992, the Executive Officer made one subsection of regulatory text available for another 15-day comment period to correct an error that appeared in the August 24 notice. Five additional comments were received during these two supplemental 15-day comment periods. After considering the additional comments, the Executive Officer issued Executive Order G-770, adopting sections 2260 through 2272 and 2298, and amending sections 2250, 2251.5, 2252 and 2296, of Title 13, California Code of Regulations.

Volume 1 of the Staff Report: Initial Statement of Reasons for Rulemaking (Volume 1 will be referred to as the Staff Report) was made available for public inspection on October 4, 1991. On the same date,

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2. The wintertime oxygenates Final Regulation Order included amendments to Title 13, California Code of Regulations, section 2296 (renamed "Motor Fuel Sampling Procedures") and a new section 2298 ("Conversion of Volume Percent Oxygenate to Weight Percent Oxygen in Gasoline"). The amendments to section 2296 and adoption of section 2298 are also necessary to the Phase 2 reformulated gasoline regulations, and they are accordingly are shown in the Phase 2 RFG Final Regulation Order as well. Approval of the wintertime oxygenates regulations will eliminate the need for the section 2296 and 2298 actions in the Phase 2 RFG rulemaking.

the staff made available a Technical Support Document (TSD). The Staff Report and TSD included the text of the regulatory action as initially proposed by the staff, along with extensive descriptions of the rationale for the proposal. The Staff Report and TSD are incorporated by reference herein. This Final Statement of Reasons updates the Staff Report by identifying and explaining the modifications to the originally proposed text. The Final Statement of Reasons also contains a summary of the comments the Board received on the Phase 2 RFG regulations during the formal rulemaking process and the ARB's responses to the comments.

Newly adopted 13 C.C.R. section 2263 incorporates by reference a number of American Society of Testing and Materials (ASTM) test methods, as well as an ARB test method, ARB MLD 116. Newly adopted section 2266 incorporates by reference an ARB document entitled "California Test Procedures for Alternative Specifications for Gasoline." Each of these incorporated documents is readily available from the ARB upon request and was made available in the context of the subject rulemaking in the manner provided in Government Code section 11346.7(a). In addition, the first referenced ARB document was included as Appendix 5 of the TSD, and the second referenced ARB document was included as Appendix B to the Staff Report. The referenced ASTM test methods are also published by ASTM, a well-established and prominent organization in the sampling and analysis field, and is therefore reasonably available to the affected public from a commonly known source.

These documents are incorporated in the California Code of Regulations by reference because it would be cumbersome, unduly expensive and otherwise impractical to publish them in the Code. It has been a longstanding and accepted practice for the ARB to incorporate ARB and ASTM test methods into the Code by reference (see e.g., 13 C.C.R. §§ 2251, 2252, 2253.2, 2280-2282). As the interested audience for the method is small (most specially those persons who actually conduct the tests), distribution to all recipients of the Code is unnecessary.

The Board has determined that this regulatory action will not result in a mandate to any local agency or school district the costs of which are reimbursable by the state pursuant to Part 7 (commencing with § 17500), Division 4, Title 2 of the Government Code.

The Board has further determined that no alternative considered by the agency would be more effective in carrying out the purpose for which the regulatory action was proposed or would be as effective and less burdensome to affected private persons than the action taken by the Board. The summary of comments and agency responses in Section III. below identifies the basis for this determination.

II. MODIFICATIONS TO THE ORIGINALLY-PROPOSED REGULATIONS

A. SUMMARY OF THE ORIGINAL PROPOSAL

Existing ARB regulations impose various limitations on gasoline which are designed to reduce pollutant emissions from gasoline-powered motor vehicles. These include standards for Reid vapor pressure (RVP; a limit of 9 pounds per square inch (psi) through 1991 and 7.8 psi starting in 1992, applicable in varying months from March to October depending on the air basin); sulfur content of unleaded gasoline (maximum of 300 parts per million (ppm)); degree of unsaturation (maximum Bromine number of 30); lead content (restrictions on lead in leaded gasoline and gasoline represented as unleaded; starting in 1992 a general prohibition of leaded gasoline); manganese additive content (prohibition of adding manganese and manganese compounds to unleaded gasoline), and deposit control additives (gasoline must meet certification requirements pertaining to control of intake valve and port fuel injector deposits, starting in 1992). The more stringent RVP standards, the prohibition of leaded gasoline, and the deposit control additives requirements were approved by the Board in September 1990 as its "Phase 1 Reformulated Gasoline" specifications.

The Phase 2 RFG regulations establish a comprehensive set of gasoline specifications designed to achieve maximum reductions in the emissions of volatile organic compounds ("VOCs"), oxides of nitrogen ("NOx"), carbon monoxide, sulfur dioxide and toxic air pollutants from gasoline-fueled vehicles.

1. Overview of the Structure of the Regulations

As initially proposed, the Phase 2 RFG regulations would establish standards for eight gasoline characteristics--RVP, T90, T50, and sulfur, benzene, olefin, aromatic hydrocarbon and oxygen content--applicable starting January 1, 1996. The regulations would also provide for the certification of alternative gasoline formulations resulting in equivalent emissions reductions based on motor vehicle emission testing. The RVP standard would apply to all gasoline throughout the distribution system, including gasoline certified as an alternative formulation. The standards for oxygen content are set forth in the chart in the next paragraph. The standards for the six remaining characteristics would include at least two tiers--an absolute limit (cap) that would apply to gasoline throughout the distribution system (including alternative formulations), and a more stringent standard that would apply to gasoline when it is initially supplied from the producer or importer (gasoline qualifying as an alternative formulation would be exempt from this more stringent standard). In the case of the sulfur, benzene, and aromatic hydrocarbon limits, producers and importers would have an additional option in complying with the standards applicable to their gasoline when it is first supplied. They could choose either a flat limit or a more stringent limit that can be met on average through a "designated alternative limit" process.

2. The Standards

The proposed "caps" applicable throughout the distribution system, the flat limits for gasoline when it is first supplied by producers and importers, and the standard that would have to be met by producers and importers under the "designated alternative limit" (DAL) option would be as follows (references to producers include importers):

Property		"Cap"	Flat Limit for Producer	Standard for Producer Under DAL Option
RVP		7.0 psi*	NA	NA
Sulfur		80 ppm	40 ppm	30 ppm
Benzene		1.20% vol	1.00% vol	0.80% vol
Aromatic Hydrocarbons		30% vol	25% vol	20% vol
Olefins		10.0% vol	5.0% vol	NA
Distillation Temp.				
T90		330°F	300°F	NA
T50		220°F **	210°F	NA
Oxygen	(min)	1.8% wt	1.8% wt	NA
	(max)	2.7% wt	2.2% wt	NA

* Applicable during summertime control periods only.
** Applicable during wintertime control periods only.

The proposed RVP standard of 7.0 psi would apply to gasoline sold during the RVP control periods, which are identical to the periods in the existing RVP regulation for 1992 and subsequent years (13 C.C.R. § 2251.5; the only exception is that in both the new RVP regulation and § 2251.5, Ventura County would be treated the same as the South Coast Air Basin). Other aspects of the RVP standard would also be identical to section 2251.5, including imposition of the standard one month early for gasoline being transferred from a production or import facility.

In the case of the proposed oxygen content standards, the regulatory control periods for the 1.8 percent minimum requirement throughout the distribution system would be identical to the control periods for the proposed 1992-1996 wintertime oxygen content regulation: South Coast Air Basin: September 1 through February 29; San Diego, South Central Coast, and Southeast Desert Air Basins: November 1 through February 29; all other air basins: October 1 through January 31. Other provisions would be similar to those in the 1992-1996 regulation. In addition, persons would be prohibited from adding oxygenates to gasoline produced or imported by others, if the resulting blend has an oxygen content exceeding 2.2 percent by weight. (Special provisions would apply if the gasoline had been reported as an alternative formulation.)

The existing regulations for the degree of unsaturation (13 C.C.R. § 2250), RVP (§ 2251.5), and sulfur content of gasoline (§ 2252) would be amended to provide that they do not apply to gasoline sold

starting January 1, 1996. The RVP regulation would also be amended to change all references of 7.8 psi to 7.80 psi. The sulfur content regulation will be amended to change the test method from ASTM 2622-82 to 2622-87.

Gasoline sold or supplied on or after January 1, 1996, would continue to be subject to the existing regulations pertaining to lead, phosphorus, deposit control additives, and manganese additives.

3. **Designated Alternative Limits and Offsetting**

A producer (or importer) would be required to elect whether to be subject to the sulfur, benzene, and aromatic hydrocarbon designated alternative limit option on an annual basis. A producer electing the DAL option could transfer from its production facility a batch of gasoline with sulfur and aromatic hydrocarbon contents exceeding the DAL option standards listed above as long as the batch is reported to the ARB and the producer within 90 days before or after transfers sufficient quantities of gasoline with lower designated alternative limits to offset fully the exceedances over the standards. In the case of benzene, credit accounts would be set up for each production or import facility, and benzene credits would be deposited and withdrawn for gasoline batches reported with designated alternative limits above or below 0.80 percent. There would be a maximum allowable amount of benzene credit in any account. If the credit balance is insufficient to allow the necessary withdrawal for gasoline over 0.80 percent benzene, the high-benzene batch could not be lawfully supplied from the production facility.

Notification of assignment of a DAL to a batch of gasoline, and associated information, would have to be received by the Executive Officer within specified times before the start of physical transfer of the batch from the production or importation facility. Late notifications could be permitted by the Executive Officer upon specified findings. A producer or importer would be authorized to enter into a protocol with the Executive Officer to specify how the DAL notification requirements are applied to the producer's or importer's operations. The regulations would include various additional provisions designed to insure the integrity of the DAL option.

4. **Certified Alternative Gasoline Formulations**

A producer (or importer) could apply to have an alternative gasoline formulation certified by the Executive Officer if it is determined through vehicle testing to result in exhaust emissions equivalent to that achieved by gasoline meeting all of the flat limits described above applicable to producers and importers. A producer could notify the Executive Officer that a batch of gasoline was to be sold as a certified alternative formulation. This gasoline would not be subject to producer/importer limits listed in the table above; however, it would have to conform with all of the alternative specifications listed in the certification order.

The certification process would involve the testing of a fleet of at least 20 vehicles representative of categories prevalent in the on-road fleet. The alternative fuel would be certified if the difference in exhaust emissions of carbon monoxide, oxides of nitrogen, volatile organic compounds, potency-weighted toxic compounds, and the ozone-forming potential of volatile organic compounds between the alternative fuel and the Phase 2 reformulated gasoline does not exceed accepted statistical tolerance levels. This certification would be applicable for five years and would then be re-evaluated.

5. **Other Provisions**

The following test methods would apply to determining compliance with the standards (other methods found by the Executive Officer to yield equivalent results could also be used):

RVP	ASTM D 323-58 or 13 C.C.R. section 2297
Sulfur Content	ASTM D 2622-87
Benzene Content	ASTM D 3606-87 ARB MLD 116 (if ethanol is present)
Olefin Content	ASTM D 1319-88
Oxygen Content	ASTM D 4815-88
T90 and T50	ASTM D 86-82
Aromatic Hydrocarbons	ARB MLD 116

The specified sampling method would generally be the ARB's current procedures on sampling for RVP.

Variances from the standards would be authorized in essentially the same manner as in existing ARB regulations such as 13 C.C.R. section 2252.

To help assure the applicability of the Health and Safety Code section 43016 "per vehicle" penalties, the regulations would provide that each retail sale of gasoline for use in a motor vehicle, and each supply of gasoline into a motor vehicle fuel tank, is also deemed a sale by any person who previously sold the fuel in violation of the substantive standards.

Specified quantities of gasoline used in research program could be exempted from the standards. Producers would be required annually to submit plans showing their schedule for coming into compliance with the 1996 standards.

B. MODIFICATIONS

1. **Changes to the Standards Applicable to Some of the Gasoline Characteristics**

The Board modified the applicable standards for four of the regulated gasoline characteristics: aromatic hydrocarbon content, olefin content, T90, and T50. For the aromatic hydrocarbon content

specifications, the Board changed the DAL standard for averaging from 20 percent to 22 percent by volume. (§ 2262.7(c).) For the olefin content specifications, the Board added a DAL standard of 4.0 percent by volume, and revised the flat limit from 5.0 percent to 6.0 percent by volume. (§ 2262.4(b) and new (c) and (d).) For the T90 specifications, the Board added a DAL standard of 290°F, with a restriction that no designated alternative limit could exceed 310°F. (§ 2262.6(b), (c), and (d).) For the T50 specifications, the Board added a DAL standard of 200°F. (§ 2262.6(e), (f) and (g).) § 2264.

The following chart sets forth the standards as modified:

Property	"Cap"	Flat Limit for Producer	Standard for Producer Under DAL Option
RVP	7.0 psi*	NA	NA
Sulfur	80 ppm	40 ppm	30 ppm
Benzene	1.20% vol	1.00% vol	0.80% vol
Aromatic Hydrocarbons	30% vol	25% vol	22% vol
Olefins	10.0% vol	6.0% vol	4.0% vol
Distillation Temp.			
T90	330° F	300° F	290° F***
T50	220° F ***	210° F	200° F
Oxygen (min)	1.8% wt	1.8% wt	NA
(max)	2.7% wt	2.2% wt	NA

* Applicable during summertime control periods only.
** No DAL can exceed 310° F.
*** Applicable during wintertime control periods only.

The Board made the modifications to the standards because the modifications should afford refiners significantly greater flexibility and an opportunity to significantly reduce their compliance costs. The Board concluded that the benefits from these measured and limited revisions to the standards outweighed the relatively minor lessening of emission reductions.

2. **Treatment of Small Refiners**

(a) General Rationale

The Board modified the regulations to provide small refiners with a two-year extension for meeting the gasoline specifications for sulfur content, olefins, T90 and T50 until March 1, 1998, subject to a number of conditions. New section 2272 contains the basic small refiner provisions; associated conforming revisions have been made to various other sections, and three new definitions have been added to section 2260.

The decision treat small refiners differently than other refiners was based on an evaluation of the cost of compliance for small refiners, the economic status of small refineries in California, and the ability of small refiners to raise the capital needed to comply with the Phase 2 RFG requirements.

First, it appears that the cost of compliance for small refiners would be higher than the cost of compliance for either large or independent refiners. Small refiners operate facilities with significantly smaller size processes, and accordingly can take less advantage of the economies of scale. Because small refiners need to build smaller process units, the capital costs required on a per gallon of product basis would typically be higher than that for larger facilities. In addition, the cost of capital would typically be higher for small refiners. Small refiners, unlike large refiners, usually have little or no ability to finance the refinery modifications through equity or bond markets. They have to turn to high-cost sources of financing such as banks, private placement, and limited partnerships.

Second, small refiners tend to have substantially less assets and net worth than large refiners. The small refiners' debt is high as compared to their equity capital, which implies that short term suppliers and creditors might be cautious in providing additional credits to the refiners. Overall, small refiners were burdened with heavier debts than large or independent refiners.

Third, small refiners' highly leveraged balance sheets severely limit their ability to borrow. During these hard economic times characterized by slow economic growth, lenders have tightened their credit standards, and thus lenders are reluctant to provide additional credits to heavily leveraged companies. Because the financial condition of small refiners is not good, their ability to borrow is very limited. In addition, some small refiners have indicated that lenders are unwilling to provide the financing required for compliance with this regulation due to the uncertainty of the small refiners ability to recover capital expenditures through price increases. Because small refiners control only a small portion of the gasoline market, lenders would need to have more knowledge of other firms compliance to ascertain if the market would support gasoline price increases so the costs can be recovered. All these factors will impact a lender's or investor's decision to loan to or invest in small refiners. Overall, it appears that small refiners will be unable to raise the capital needed for compliance with the requirements of the Phase 2 RFG regulations.

Without some regulatory relief, in light of the small refiners' financial status and their limited ability to raise capital, the Phase 2 RFG regulations may cause some small refiners to go out of business. Elimination of the small refiner segment of the California refining industry would result in job losses and could have significant anti-competitive effects because small refiners contribute to competition in the petroleum industry. We have concluded that it is preferable to tailor our regulations in a way to minimize the likelihood that they

will put a number of companies out of business, especially when the regulatory economic costs are higher for these companies than for the rest of the industry. In light of all of these factors, the Board decided to allow a compliance delay for small refiners, and in the interim to require that they produce gasoline that is as clean as possible. The compliance delay as adopted by the Board will be limited to a two year period, from March 1996 to March 1998, and will apply to only four of the eight Phase 2 RFG specifications. During the delay, small refiners will be able to market only a limited volume of gasoline that meets four of the Phase 2 RFG specifications as well as all federal phase 1 gasoline specifications. Further, comprehensive conditions are imposed to help assure that the refiner is in fact taking the necessary steps to come into compliance by the end of the two-year extension period.

For further discussion on the rationale for the small refiner provisions, see the response to Comment 247 below.

(b) Definition of "Small Refiner"

Small refiners are defined in section 2260(a)(22) as follows:

> "Small refiner" means any refiner who owns or operates a refinery in California that:
> (A) Has and at all times had since January 1, 1978, a crude oil capacity of not more than 55,000 barrels per stream day;
> (B) Has not been at any time since September 1, 1988, owned or controlled by any refiner that at the same time owned or controlled refineries in California with a total combined crude oil capacity of more than 55,000 barrels per stream day; and
> (C) Has not been at any time since September 1, 1988, owned or controlled by any refiner that at the same time owned or controlled refineries in the United States with a total combined crude oil capacity of more than 137,500 barrels per stream day.

This definition is identical to the definitions of "small refiner" in the ARB's regulations governing the sulfur and aromatic hydrocarbon content of diesel fuel (13 C.C.R. §§ 2281(b)(9) and 2282(b)(19); former §§ 2255(b)(9) and 2256(b)(19)), except that the maximum refinery crude oil capacity is 55,000 bpsd instead of 50,000 bpsd.[3]

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3. The 55,000 bpsd value was previously used as the cutoff in the definition of "major gasoline supplier" in 13 C.C.R. § 2300(a)(18), added by the Board in its rulemaking on low-emission vehicles and clean fuels. In

(Footnote continues on next page)

The prior definitions of "small refiner" have proven to be appropriate during the administration of the recent diesel fuel regulations, and using essentially the same definitions provides predictability in the Board's motor vehicle fuels program. Refiners have been on notice since 1988 that they will not qualify as a small refiner under the Board's statewide diesel fuel regulations if they did not meet the definitions in the statewide diesel regulations. A prudent refiner would take this into account in its business planning. In addition, when the Board determines whether separate treatment under a fuels regulation is appropriate for small refiners, it considers the possible impacts of other regulations as well. Applying the same definition in our motor vehicle fuel regulations avoids the confusion that would result if refiners were "small refiners" for purposes of one regulation but "large refiners" for purposes of another regulation.

(c) Choice of Standards to Which the Extension Applies

Section 211(k) of the federal Clean Air Act as amended in 1990 (FCCA)[4] requires the U.S. Environmental Protection Agency (U.S. EPA) to promulgate reformulated gasoline regulations which would require compliance starting January 1, 1995 in nine high ozone areas in the nation, including the South Coast Air Basin, the San Diego Air Basin, and Ventura County. The federal requirements will apply in those California areas as well as the ARB's requirements. EPA conducted a negotiated rulemaking process to develop consensus rules, and has issued an initial notice of proposed rulemaking on July 9, 1991 (56 F.R. 31176), and a supplemental NPRM was issued on April 16, 1992 (57 F.R. 13416).

Although the U.S. EPA has not yet issued final rules (§ 211(k)(1)) required promulgation by November 15, 1991), the terms of the Act and the U.S. EPA's proposals indicate that the federal program will require compliance with standards for RVP, benzene, aromatic hydrocarbons and oxygen content that will be similar to the corresponding standards in the ARB's Phase 2 RFG regulations. Since small refiners will in any case have to meet these federal standards

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that rulemaking the Board concluded that refinery modifications necessitated by the diesel regulations could result in a small increase that could put one or more small refiners slightly over the 50,000 bpsd limit; the 55,000 bpsd value would assure that such refiners would still appropriately classified with small refiners.

4. Federal Clean Air Act section 211(k) is codified as 42 U.S.C. sec. 7575(m).

for most of the gasoline sold in the state, the Board determined it was appropriate to provide small refiners only with an extension for the standards that did not have a corresponding federal requirement (i.e. only for the sulfur, olefins, T90 and T50 standards.) As of January 1995 the majority of the gasoline sold in California will have to meet federal standards regardless of any ARB small refiner provisions.

(d) Procedure for Qualifying for the Small Refiner's Extension

The rationale for the small refiner extension is that small refiners are likely to need the additional two years to secure financing and complete the refinery modifications necessary to enable them to comply with the full Phase 2 RFG requirements. Accordingly the Board has structured the regulations to assure that small refiners only receive the extension if they are taking good faith and sufficient steps to assure compliance by the end of the extension.

The primary mechanism to assure that extensions are only provided where justified is a requirement that the small refiner be certified by the Executive Officer. (§ 2272(a), (b).) The small refiner will have to submit separate applications for the two 12-month periods between March 1, 1996 and February 28, 1998; this will assure careful scrutiny at the half-way point. The application will have to contain a compliance schedule identifying the sequence of all key dates in the process of planning and constructing the necessary modifications. Eight specific events (such as securing of financing and completion of plans and engineering drawings) must be included to assure that the schedule is comprehensive. To further assure that work is adequately progressing, the application for the first 12 month period must include evidence of capital commitments to make the refinery modifications, including copies of binding contracts for design and construction. The second application must also include evidence that on-site construction has begun. (§ 2272(b)(3).) In developing these requirements the ARB borrowed from requirements in the U.S. EPA's former small refiner extension provisions in its diesel fuel sulfur regulation. (former 40 C.F.R. § 80.29(c).)

To prevent the construction of only minimal refinery modifications, the construction plan must be sufficient to enable the small refiner to meet the full Phase 2 RFG standards in a volume equal to or greater than its historic volume. (§ 2272(b)(3).) Certification for a 12-month period will only be issued upon a finding by the Executive Officer that the small refiner's compliance schedule is reasonably likely to enable the small refiner to comply with the phase 2 reformulated gasoline specifications through refinery processing by March 1, 1998. (§ 2272(b)(4).)

The requirements are also designed to assure that the small refiner's progress is closely monitored once an extension is granted. The small refiner must notify the Executive Officer of any failure to meet an increment of progress in the compliance plan. (§ 2272(b)(5).) The Executive Officer may for good cause conduct a rescission hearing on 10-days notice, and rescind an extension order upon a determination

that the refiner is no longer reasonably likely to be able to comply with the Phase 2 RFG regulations by the end of the two year extension period. (§ 2272(b)(6). During the period of the extension, the small refiner will be required to submit monthly reports regarding its activities. (§ 2272(d).) These reports will further assist ARB staff in monitoring full compliance.

(e) Other Conditions for the Extension

To avoid the possibility that a small refiner will take advantage of the extension to increase production, the regulations provide that the extension will apply only to a volume of gasoline equivalent to the small refiner's typical historic production. This volume will be determined as the average of the three highest annual production volumes of motor vehicle gasoline reported by the small refiner for the period 1987-1991 to the California Energy Commission pursuant to Public Resources Code sections 25350 et seq. This approach was used in the Board's regulation of the aromatic content of diesel fuel. (see § 2280(b)(4).) The Board's staff has learned from experience that basing volume determinations on previously submitted reports help avoid the potential manipulation of data. To assure that the exemption is not primarily used for blending gasoline components, the regulation requires that in each quarter at least two-thirds of the gasoline supplied from the small refiner's refinery must have been refined at the small refiner from crude oil. (§ 2272(c)(2).) Other provisions are patterned after the small refiner provisons in sections 2281 and 2282.

3. **Postponement of Compliance Dates**

To provide refiners with a little more time to comply, the Board extended the compliance date for all of the cap standards until April 1, 1996, and for the remaining standards--those applicable at the refinery or import facility--until March 1, 1996. These implementation dates are the same as for the start of the RVP season, the modification will enable refiners to change over to the new Phase 2 RFG specifications at the same time they change from "winter" to "summer" RVP. The sunset dates of the preexisting standards were changed to correspond to the new Phase 2 RFG compliance dates.

4. **Modifications to the Test Procedures for Evaluating Alternative Specifications for Gasoline**

Several modifications were made to the "California Test Procedures for Alternative Specifications for Gasoline," which is incorporated by reference in section 2266. The deltas (tolerance level for the upper bound) were changed from 1 percent for all pollutants to the following:

NOx	2 percent
Mass NMOG	3 percent
g. Ozone/Mi	4 percent
Potency-Weighted Toxics	4 percent
CO	4 percent

(Test Procedure, sections IV., IX.A.) These changes were made to assure that every fuel that would not increase emissions will have at least a fifty percent chance of passing.

The relative potencies of toxic air contaminants were modified to reflect the latest recommended values developed by the Office of Environmental Health Hazard Assessment (OEHHA):

	Relative Potency	
	Original	Revised
1,3-butadiene	1.0	1.0
benzene	0.21	0.17
formaldehyde	0.17	0.035
acetaldehyde	0.016	0.016

(Test Procedures, section IX.B.3.)

Several changes were made to the reference fuel specifications. The maximum allowable T90 was changed from 300 °F to 330 °F, and the maximum allowable T50 was changed from 210 °F to 220 °F. Various other reference fuel specifications to reflect the revisions to the flat limits for aromatic hydrocarbons, olefins, T90 and T50. The specification for RVP was changed from "6.7 to 7.2" psi to "6.7 to 7.0" psi, making the upper value consistent with other specifications that are set at the flat limit standards for Phase 2 gasoline (Test Procedures § I.C.2.).

The T90 and T50 limits on the allowable specifications for an alternative gasoline formulation were changed from 300 °F to 330 °F, and from 210 °F to 220 °F respectively. (Test Procedures § I.A.3.)

5. **Sampling Procedures**

Originally proposed section 2263(a) referenced the gasoline sampling methodology in section 2296, with deletion of the identified cooling bath when sampling for other than RVP, T90, and T50. Preexisting section 2296 was characterized as the sampling procedures for determining RVP. In its modifications the Board revised the references in section 2296 to make it more generally applicable to taking samples of motor fuel, and blending components used to make motor fuel, for any purpose. The required use of an ice water bath and nozzle extension has been eliminated where fuel characteristics other than RVP or distillation temperature are being determined, since these precautions are not needed to assure the representativeness of the sample with regard to the other characteristics. Other modifications

to the sampling procedure have been made to enhance clarity. Section 2296 is closely patterned after ASTM sampling methodologies; the sampling method identified by EPA, contained in 40 C.F.R. part 80 appendix D (see 57 F.R. 4425 (February 5, 1992)), is essentially identical to the ARB sampling regulation. (52 F.R. 31305-6 (August 19, 1987).) As noted in footnote 2 above, these modifications were also made in the wintertime oxygenates regulations.

6. **Test Methods**

The Board made various modifications pertaining to the method for determining the oxygen content of gasoline. The test method reference in section 2263 was changed from ASTM D 4815-88 to ASTM D 4815-89 in order to identify the most up-to-date method. Language was added to clarify that the ASTM method is used to determine the volume percent of each oxygenate, rather than the weight percent oxygen content.

The modifications also identify the means by which the volume percentage of various oxygenates is to be converted to the weight percent oxygen content. The conversions are made by use of a new section 2298, "Conversion of Volume Percent Oxygenate to Weight Percent Oxygen in Gasoline." This section consists of a table identifying the weight percent oxygen in gasoline that corresponds to the measured weight of nine specified oxygenates (methanol, ethanol, propanol, butanols, pentanols, methyl tertiary-butyl ether (MTBE), ethyl tertiary-butyl ether (ETBE), tertiary amyl methyl ether (TAME), and hexanols). These are the same nine oxygenates that where included in the table based on EPA's draft proposed Guidelines for Oxygenated Gasoline Credit Programs (57 F.R. 4413 (February 5, 1992)) and set forth on p. 4 of Attachment B to the resolution. Effective application of the table in Attachment B would require application of formulas described by EPA in its preamble but not contained in EPA's draft Guidance text. Identification of the table in section 2298 should help clarify and ease the process of converting oxygenate content measurements to weight percent oxygen content. The values in the table were derived by applying the methodology in EPA's proposed Guidelines, using an assumed specific gravity of gasoline of 0.74 and a temperature of 60° Fahrenheit. As discussed in footnote 2 above, new section 2298 was also adopted in the wintertime oxygenates rulemaking.

The section 2263 reference to the olefin content test method was updated from ASTM D 1319-88 to D 1319-89. The reference to the T90 and T50 test method was updated from ASTM D 86-82 to D 86-90.

The version of the test method ARB MLD 116 referenced in the final version of section 2263 was updated to make various technical corrections and improvements.

7. **Modifications Regarding Benzene Averaging and the Generation and Use of Credits**

The special provisions for generation and use of benzene credits were deleted, and the regulations were modified to provide for

averaging of benzene to be done in the same way as averaging for other characteristics. (§ 2264.) This will make use of DALs less complicated.

Finally, the Board corrected various minor drafting errors in the regulations.

C. PREDICTIVE MODEL

As adopted, the regulations provide for a single way that an alternative gasoline can be certified--a procedure involving vehicle testing. The Staff Report discussed the staff's intent ultimately to present a supplemental regulatory proposal to add a second means of certification--the application of a predictive model. (Staff Report pp. 41-42.) The TSD discussed in more detail the statistical approach that was being considered by staff. (TSD pp. 105-109.) Section 2265 in the Phase 2 RFG regulations has been reserved so that it can be used to identify the procedure for certifying gasoline formulations resulting in equivalent emission reductions based on the predictive model. The staff expected to present the predictive model for consideration by the Board in early 1992. In Resolution 91-54 the Board directed the Executive Officer to continue work on the development of the predictive model and to schedule a rulemaking hearing in the spring of 1992 for the Board to consider adoption of the model.

Since the November 1991 hearing the staff has devoted considerable resources to development of the predictive model, and has worked closely with oil refiners and others in this project. The ARB has contracted with a statistician on the faculty of the University of California at Davis to help define the model. Because of the complexity of the task, staff has not yet completed development of the model. Staff now expects to present the model in regulatory form for consideration by the Board in the early part of next year. The current efforts of ARB staff, and similar efforts of U.S. EPA staff pertaining to the federal reformulated gasoline requirements in FCAA section 211(k), are the first time any regulatory agency has sought to use a predictive model to identify acceptable fuel formulations. The staff has collated data from all useful emission test programs, some on which were still in progress this year. Various significant issues regarding the analytical methodology have been addressed. Because of the extraordinary size of the data base and the complexity of the statistical analysis, the "supercomputer" at UCLA is being used to run the data.

III. SUMMARY OF PUBLIC COMMENTS AND AGENCY RESPONSES

The Board received numerous written and oral comments, both in connection with the November 21-22, 1991 Board hearing and during the subsequent three 15-day public comment periods. Set forth below is a summary of each objection or recommendation made regarding the specific regulatory actions proposed, together with an explanation of how the proposed action was changed to accommodate each objection or recommendation, or the reasons for making no change. The comments have been grouped by topic whenever possible. Comments not involving objections or recommendations specifically directed towards the proposal action or the procedures followed by the ARB regarding the rulemaking are not summarized below.[5]

Attachment A contains a list of all persons who presented comments that are summarized in this Final Statement of Reasons, including the date and form of each comment and the shorthand identification of the commenter as used in this document.

A number of commenters generally supported adoption of Phase 2 RFG gasoline regulations. These commenters included the Motor Vehicle Manufacturers Association (MVMA), Ford, GM, Chrysler, Toyota, the Bay Area Air Quality Management District (BAAQMD), McCuen Properties, the California Air Pollution Control Officers Association (CAPCOA), Blue Diamond Growers, ARCO Products Company, Manufacturers of Emission Controls Association (MEMA), the City of Santa Clarita, Norton Younglove (Supervisor of Riverside County), the Southern California Association of Governments (SCAG), the Lake County Air Quality Management District, the San Luis Obispo County Air Pollution Control District, the Ventura County Board of Supervisors, the San Diego County Air Pollution Control Board, and the San Joaquin Valley Unified Air Pollution Control District.

In addition, a number of commenters specifically supported the more stringent original regulatory proposal made available with the October 4, 1991 Staff Report rather than the less stringent modifications suggested by the staff at the November 21-22, 1991 hearing. These commenters included MVMA, Ford, GM, Chrysler, Toyota, the Union of Concerned Scientists, the Environmental Defense Fund (EDF), Citizens for a Better Environment (CBE), Association of International Automobile Manufacturers (AIAM), the Coalition for Clean

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5. The staff conducted an informal public workshop on October 14, 1991 to discuss the Phase 2 RFG regulatory proposal. Participants were advised that comments made at the workshop would not be considered part of the rulemaking record, and to assure formal consideration the participants should submit written comments or provide oral testimony at the November 21-22 public hearing. The record accordingly does not include comments presented at the October 15 workshop.

Air, Nissan, ARCO Products, the California Building Industry Association, the National Resources Defense Council (NRDC), the American Lung Association, the Los Angeles City Council, the Sacramento Metropolitan Air Quality Management District (Sacramento AQMD), the Ventura County Air Quality Pollution Control District, and the South Coast Air Quality Management District (SCAQMD).

A. THE STANDARDS

1. General

1. Comment: The ARB should provide reasonable averaging provisions for all parameters, not just sulfur, benzene, and aromatics, as this would provide additional flexibility and should improve the cost-effectiveness of the Phase 2 gasoline regulations. (WSPA, Chevron)

The inclusion of an averaging provision reduces the compliance costs and saves jobs. (DRI)

Agency Response: As discussed in Section II.B.1., the Board modified the regulations to allow averaging (the use of DALs) for all the Phase 2 parameters except RVP and oxygen content. Averaging provisions for RVP have not been included because such provisions would significantly reduce the evaporative emissions benefits from the regulations. This is due to the non-linear relationship between emissions and RVP. In addition, averaging provisions for RVP would be more difficult to enforce than averaging provisions for the other fuel parameters, because RVP is not linear when gasoline blends with different RVPs are blended. Averaging has not been permitted for the oxygen content standard because that standard establishes both minimum and a maximum requirements and averaging would not be practical in this context.

2. Comment: If the available emissions test data and analyses are inadequate to evaluate the effects of gasoline composition on emissions for a predictive model, the data and the analyses are also inadequate to set specifications. (WSPA)

Agency Response: The available emissions test data and analyses are not inadequate for the development of a predictive model or for the specification of gasoline parameter standards. The development of a predictive model that can be used to predict precisely the effects of fuel parameter changes on emissions is a major effort. It is for this reason that a predictive model was not available when the Phase 2 standards were adopted by the Board. Directionally, the emissions effects of fuel parameter changes are well enough established by the test data that fuel parameter standards can be adopted. The emissions test data described in Chapters II and III of the TSD demonstrate that reductions in various fuel parameter specifications will result in emissions reductions.

3. Comment: Sufficient data do not exist to justify the staff's regulatory proposal. (WSPA)

Agency Response: We believe that sufficient data to justify the Phase 2 RFG regulations were presented in the Staff Report and TSD. A number of different emissions test programs have been conducted specifically to investigate the effects of fuel properties on emissions. The results of these test programs were discussed in Chapter III of the TSD. The results of these tests clearly indicate that the fuel properties do affect emissions, and that emissions can be reduced through a careful combination of fuel modifications. To confirm the results of these emissions test programs, the ARB staff has conducted its own emissions test programs. The results of the emissions test programs conducted by the staff were presented at the public hearing and are consistent with the results of test programs conducted by others. On this basis we have concluded that the effect of fuel properties on emissions are well enough established to support its regulations.

4. Comment: The regulations adopted by the Board are structured so that they offer little or no benefit or they will not be available in time to be useful for the investment decisions. In particular, the proposal for averaging is so limited in its proposed scope, so highly structured and cumbersome, and so inflexible that it is of questionable benefit. The notification and the other procedural requirements are unnecessarily burdensome to the gasoline producers. (WSPA)

Agency Response: The Phase 2 RFG regulations will result in significant reductions in emissions. The balance of all the emissions test programs that have been conducted indicate that the gasoline parameter standards adopted by the Board will result in significant emissions reductions. The results of all the emissions test programs used by the staff in the development of its proposal are also discussed in Chapter III of the TSD.

The Board has provided gasoline producers a lead time of over five years from the date the Board approved the regulations to the time the regulations take effect. We believe this time period is sufficient to permit refiners and importers to make all investment decisions regarding the methods they will use to comply with the regulations.

The administrative requirements associated with the averaging provisions are necessary to enforce the regulation, as discussed on pages 36 and 39-41 of the Staff Report. We expect that the cost reductions that can be gained under the averaging provisions will significantly outweigh the associated administrative burden. Thus, on balance, the averaging provisions increase the flexibility to the gasoline producer.

5. Comment: There are alternative gasoline formulations that provide a more reasonable balance between costs and environmental

benefits and should be carefully considered by the Board. Mobil recommends that its proposed changes to the averaging provisions be adopted. (Mobil)

Agency Response: We believe that the adopted standards will result in the greatest amount of cost-effective emissions reductions. Mobil has not demonstrated that its proposal would achieve the same emissions reductions, at a comparable cost-effectiveness. In addition, Mobil's proposal would be significantly more difficult to enforce than the adopted Phase 2 RFG regulations.

6. Comment: The cap standards are unnecessary for reducing emissions and are an encumbrance. All alternative formulations would be required to yield emissions reductions equivalent to those of gasoline meeting the specifications. Thus sufficient assurance will be provided that emissions reductions will occur. (WSPA)

Agency Response: The cap standards serve two important purposes. The first is to ensure that emissions do not increase to unacceptably high levels when gasoline producers are utilizing the averaging provisions. High-emissions gasoline could negate the overall air quality benefits of the regulations if it was produced during times of poor air quality.

The second purpose for the cap standards is to ensure that the regulations can be enforced downstream of the refinery. The cap standards allow ARB inspectors to enforce the regulation at many different points in the distribution system. The ability to detect violations at many different points in the distribution system is a significant deterrent to intentional violations, and encourages more vigorous quality control programs. Further, by enforcing a cap through field testing, there is no need to require extensive recordkeeping on the part of the producers, or to conduct complicated audits. It should be noted that representatives of vehicle manufacturers presented comments to restrict the cap limits very close to the flat limits (see the following comment). The Board's decision represents a balanced approach that also satisfies the need to have an enforceable program.

7. Comment: Because the absolute limit, or cap, is very different from the producer flat limit, fuels in the marketplace could vary widely in quality, making it difficult for vehicle manufacturers to design and calibrate vehicles that optimize the benefits of Phase 2 gasoline and consistently reduce emissions in the field. Therefore, the cap limit should be as close to the flat limits as possible. (Toyota)

Agency Response: The staff expects that vehicle manufacturers will design and calibrate their vehicles to the specifications of Phase 2 RFG certification fuel, as approved by the Board at its August 14, 1992 hearing. These specifications are close to the flat limits, and reflect the levels that gasoline properties will meet most of the time.

A fuel producer that produces a fuel with a property very close to the cap will have to balance this volume with a volume of fuel at a level well below the average so that the average standard will be met. Any possible exceedances in emissions from the high property level fuel will be balanced out from the emissions of the lower level property fuel. It is necessary that the caps be sufficiently greater than the flat limits to provide a measure of flexibility to the gasoline producers. The adopted caps strike an appropriate balance between providing flexibility to the gasoline producing industry and ensuring that the needed emissions reductions are achieved.

8. Comment: The gasoline specifications proposed by MVMA should be adopted. The specifications proposed by MVMA will achieve greater emissions reductions and are technically feasible. (MVMA)

Agency Response: We believe that the Phase 2 RFG regulations will result in the greatest amount of cost-effective emissions reductions. While the MVMA proposal includes more stringent criteria for some gasoline properties and would achieve greater emissions reductions, it is sufficiently less cost-effective to make the proposed specifications not justified at this time.

9. Comment: Compared to specifications anywhere else in the world, the staff's specifications will be so unique in some respects that it will be impossible to bring gasoline into California from refineries either outside or within the U.S., unless the gasoline has been modified to meet these specifications. (Wickland)

Agency Response: By the staff's analysis California refiners will invest 3 to 6 billion dollars in refinery modifications to produce gasoline that meets the Phase 2 RFG standards. It is appropriate and fair that imported gasoline meets the same standards and that refiners outside California invest in similar refinery modifications to produce gasoline that meets the Phase 2 RFG standards if they want to market their fuels in California. We expect that the costs of meeting Phase 2 standards will ultimately be borne by the consumers of gasoline in California and therefore all gasoline imported and produced in the state should be treated equally.

We expect that there will be imported gasoline which meets the Phase 2 RFG standards, particularly in light of the characteristics of some crudes in Indonesia and elsewhere.

10. Comment: Any relaxation of the proposed Phase 2 specifications will jeopardize the success of the low-emission vehicle (sometimes referred to as LEV) program. The motor vehicle industry is depending on the reduction potential of reformulated gasoline in designing vehicles to comply with the low-emission vehicle requirements. (AIAM)

Agency Response: We believe that the adopted standards are sufficiently rigorous to provide vehicle manufacturers with an important margin of safety in meeting the low-emission vehicle standards, particularly the TLEV and LEV standards.

11. Comment: The flat limits should take effect on March 1, 1996, and the caps should take effect on April 1, 1996. (Unocal)

Agency Response: The regulations have been modified to reflect this recommendation.

12. Comment: A hybrid approach between flat limits and caps should be adopted. The hybrid approach would assume that refiners normally operate versus the flat limits. If a blend measured between a flat limit and a cap, the refiner would have the option of reblending it or declaring it a designated alternative limit blend. Each and every such blend would require an offsetting blend so that the average of the two equals the lower limit required by the averaging. (Unocal)

Agency Response: The concept proposed by Unocal would be difficult to enforce because the gasoline properties could continuously fluctuate between the average, the flat limits and the caps and there might be no advance knowledge as to what the property values are. Such an approach does not allow compliance sampling and does not facilitate enforcement. It is also likely that refiners would choose the hybrid option and only use averaging for batches over the flat limit, resulting in higher over-all specification values than would occur with the DAL approach or the flat limits.

13. Comment: The imposition of caps on individual gasoline properties limits the flexibility that will be available to the refiners. The limitation of the flexibility nullifies other aspects of the regulations designed to provide flexibility. (WSPA)

Agency Response: In adopting the Phase 2 RFG standards, the Board has provided refiners with maximum flexibility by allowing several compliance options. A refiner can comply with the regulations by following either the average or the flat standards or by creating its own formulation through the use of the vehicle testing. Once the predictive model is adopted it will provide another option. Although the cap standards do not provide unlimited flexibility to gasoline producers, they do provide some flexibility. It is necessary to have cap limits for each of the individual gasoline properties for each method of compliance in order to ensure that high emissions gasoline is not produced and used during the times of the year when it would have the greatest adverse effects on air quality. The cap limits are also necessary to ensure that the regulation is enforceable at all points in the distribution system.

14. Comment: The cap limits should be set at lower levels. The cap limits for sulfur, olefins, and T90 should be 60 ppm, 8 percent by volume, and 310 F. (GM)

Agency Response: We believe that gasoline producers need a measure of flexibility in complying with the regulations. The caps cannot be set too near the average standards without overly restricting the flexibility provided by the averaging and alternative gasoline formulation provisions. Also see response to Comment 13.

15. Comment: The gasoline specifications proposed by Ford should be adopted as the Phase 2 standards. (Ford)

Agency Response: We have concluded that the adopted Phase 2 RFG standards are at levels which will result in the most cost-effective emissions reductions, taking into consideration the amount of emissions reductions that are needed and the costs to achieve those emissions reductions. The additional emissions reductions that may be derived as a result of the specifications proposed by Ford are not cost-effective.

16. Comment: WSPA recommends that ARB refrain from controlling individual species in the gasoline as this could result in prohibitively costly changes with questionable benefits. (WSPA)

Agency Response: The adopted Phase 2 RFG regulations do not require control of individual species in gasoline. The only species controlled is benzene because this is the most efficient way of controlling benzene emissions from motor vehicles. We have sought to consider gasoline as a system in which all important fuel parameters are controlled in order to optimize the emissions reductions of the total fuel.

17. Comment: The staff cannot use the EPA model to claim to meet a year 2000 standard. Neither the standard nor the complex model has yet been proposed. (Unocal)

Agency Response: The staff did not use the EPA model to show that the Phase 2 RFG specifications meet the year 2000 standards. As discussed on page 63 of the Staff Report, the staff compared the Phase 2 RFG specifications to the EPA year 2000 performance standards as described in the Federal Clean Air Act. The comparison was done by the use of the regressions for the current vehicle fleet developed in the Auto/Oil Air Quality Improvement Program (Auto/Oil). We believe our analysis is appropriate.

2. RVP

18. Comment: The ARB staff has not provided any supporting documentation to demonstrate there will be no problems with

driveability under a variety of climatic conditions. (WSPA, Mobil) Nissan recommends a Driveability Index Standard of 1100. (Nissan)

Agency Response: The staff has seen no data which indicate that its proposal will result in any driveability problems with any vehicles. The index most frequently used to evaluate a gasoline's influence on vehicle performance (i.e., Driveability Index (DI)) was evaluated by the staff for fuels that have properties similar to Phase 2 RFG. The staff's evaluation indicated that the regulatory proposal will result in enhanced vehicle performance (see the discussion of this issue in the TSD, pp. 14 to 20). In addition, the issue of the need of a driveability index criterion was discussed with the oil and auto industry. We have concluded that such a limit on DI is not needed because the limits for RVP, T50, and T90 will have the same effects on driveability as a driveability index limit. It should be noted that the vehicle manufacturers have supported the staff's proposal and have not indicated that the proposed RVP standard would result in any adverse impact on vehicle performance.

19. Comment: The staff proposal does not address the safety implications of lower RVP gasoline. Lower RVP gasoline can potentially pose a flammability risk at lower temperatures. (WSPA, Unocal)

Agency Response: Based on an evaluation of the data from a study conducted by the National Institute for Petroleum and Energy Research (NIPER), the staff does not believe that ambient temperatures and gasoline RVPs will reach levels low enough to result in flammability hazards. A summary of the NIPER findings and the staff's conclusions are presented on page 82 of the Staff Report.

20. Comment: Refiners should be allowed to average RVP at 7.1 psi rather than meet a flat limit at this level or lower. A flat limit of 7.0 psi would require refiners to blend around 6.6 or 6.7 psi. (Mobil)

Agency Response: An RVP limit of 7.0 psi is needed to achieve the required hot soak, diurnal, and running loss emissions reductions. We do not believe that a limit of 7.0 psi will require refiners to blend their gasoline to levels of 6.6 or 6.7 psi. The new automated test instruments that are currently being used have greater precision than the older Reid method. The use of these instruments will enable refiners to blend gasoline closer to the actual regulatory limits.

The staff has not proposed that averaging be allowed in complying with the RVP standard because much of the emissions data analyzed by the staff indicates that the effect of RVP on emissions is non-linear. Because of the non-linear nature of the emissions response, allowing averaging in meeting the RVP standard will not result in averaging of the emissions. Overall, such an averaging could result in less emissions reductions than under the staff's proposal. Furthermore, allowing averaging for the RVP specification would reduce the ARB's ability to enforce the RVP standard.

21. Comment: The emissions benefits to be derived from the lower RVP standard are problematic. Little emissions test data are available that demonstrate that there will be actual emissions benefits. (Mobil)

Agency Response: The physical mechanism by which higher RVP gasolines result in increased emissions is well enough established that it is safe to base the emissions reductions estimates on the available data. The staff in the TSD presents an extensive discussion of the benefits of RVP reductions on evaporative VOC emissions from gasoline-powered motor vehicles. Furthermore, the TSD for the adoption of Phase 1 gasoline specifications (August, 1990), which is referenced in this rulemaking, discusses in more detail the emissions reductions that can be achieved by RVP reductions. The available emission reductions data are consistent with what one would expect from theory of how gasoline RVP affects emissions. These data demonstrate that the RVP standard adopted by the Board will reduce evaporative emissions. Because concerns were raised by refiners on the effects of RVP reductions on exhaust emissions, the staff worked together with oil and auto industry representatives and conducted a test program to research this issue. The results of this program are discussed in the TSD (pg. 14-20) and show that RVP reductions do not have adverse impacts on exhaust emissions.

22. Comment: In order to be able to supply low RVP gasoline in April, refiners will have to begin deliveries of low RVP gasoline well in advance of the beginning of April. Because of the lower temperatures during these times, the lower RVP gasoline can potentially cause vehicle driveability problems. (WSPA)

Agency Response: Based on its experience with the existing RVP regulation, the staff believes that low RVP gasoline can be phased in fast enough to obviate the need to begin the production and distribution of low RVP gasoline during the cool weather months. As a result, no driveability problems will result from the use of low RVP gasoline during the cooler months.

23. Comment: The staff does not provide a rationale for not providing any degree of flexibility in the RVP standard, and for not adopting the Reg-Neg agreement for RVP. (Unocal)

Agency Response: It is necessary that the RVP standard be a flat 7.0 psi limit with no averaging to ensure that the needed evaporative emissions reductions are achieved. Because the response of evaporative emissions to changes in RVP can be exponential, it is important that RVPs higher than the adopted standard not be allowed. The staff has not proposed that the Reg-Neg RVP level (the nationwide RVP level agreed upon during the negotiated rulemaking process) be adopted because the Reg-Neg RVP level would not achieve the magnitude of reductions in evaporative emissions that can be achieved by a flat 7.0 psi standard.

24. Comment: The RVP standard should be set at 7.1-7.2 psi. Safety concerns require that the RVP standard not be set below this level. (Texaco)

Agency Response: The RVP level proposed by Texaco at 7.1-7.2 psi would achieve less emissions reductions than the limit adopted by the Board at 7.0 psi. The available information indicates that a 7.0 psi standard will not result in any safety problems. See the response to Comment 19 and the discussion at page 82 of the Staff Report.

25. Comment: As a result of a 0.1 psi pipeline blending tolerance, a 0.3 psi test method reproducibility "error", and a 0.1 psi blending margin, the actual RVP of gasolines subject to the 7.0 flat limit will be 6.5. As a result of gasolines having RVPs this low, exhaust emissions will increase and flammability problems may result. To avoid these problems, the RVP standards should be as follows: flat limit of 7.2 psi, average limit at 7.1 psi, cap limit at 7.4 psi. (Unocal)

Agency Response: For the reasons discussed in the preceding several comments, we believe that it is not appropriate to have an averaging and cap standards for RVP. The ARB's Compliance Division will continue its practice of not taking enforcement action when an ARB test shows an exceedance of the standard within the range of reproducibility. We have not seen gasoline averaging a full 0.5 below the standard in the past, and we do not expect to in the future.

26. Comment: As a result of the RVP standard, the butane content of gasoline will be reduced. As a consequence of reducing the butane content, the concentrations of longer chain saturated hydrocarbons and olefins will increase. Tests have shown that, as a result of these concentration increases, unburned olefins will increase in the exhaust. (MECA)

Agency Response: The olefin content of the gasoline will not increase, rather it will be reduced as a result of the olefin standard in the Phase 2 RFG regulations. Therefore, the unburned olefins in the exhaust resulting from olefins in the fuel will be reduced contrary to the commenter's suggestion. The effects of the increased levels of long chain saturated hydrocarbons on the olefins in the exhaust are not certain. On the one hand, refiners have claimed that the result will be increases in the olefin levels. On the other hand, vehicle manufacturers have claimed that their analysis of the auto/oil data shows that this is not the case. The staff's review of the exhaust emissions data from formulations similar to Phase 2 reformulated gasoline with low RVP indicates an overall benefit in exhaust reactivity. Therefore, the staff believes that there are no adverse impacts of RVP reductions on exhaust reactivity.

27. Comment: Pertaining to Page 16, paragraph 1 of the TSD, the statement "The lower the gasoline DI, the better the engine will perform" is only true to a certain extent and only for warm-up performance. If the gasoline gets too volatile, the vehicle may experience driveability problems after it is fully warmed-up (e.g., vapor lock in hot weather). (WSPA)

Agency Response: We agree with this comment. However, within the range of gasoline DIs that are expected to occur in Phase 2 RFG, the statement in the TSD is correct--reduced DI should result in better engine performance under all conditions.

28. Comment: The RVP standard may require that gasoline producers maintain RVP levels at or near 7.0 psi year round to assure system-wide compliance with specifications during the RVP control period. This could have significant adverse impacts on wintertime safety and vehicle operation. (WSPA, Chevron)

Agency Response: The staff does not believe that this will be necessary. Under the current RVP regulation, which requires an RVP level of 7.8 psi for the RVP control period, the staff has not observed the production practices described by the commenters and a year around compliance with the 7.8 psi RVP standard. Higher-RVP gasoline has been marketed during wintertime and we expect that it will continue to be produced and marketed in the future years. Therefore, because we do not expect low RVP values during wintertime, we do not expect any problems with either driveability or safety during wintertime.

29. Comment: The Phase 2 RVP specification should be set at 7.0 psi without exception and inclusive of the testing tolerances. (General Motors)

Agency Response: The adopted RVP limit is 7.0 psi. The ARB's enforcement practice is described in the response to Comment 25. If the ARB required the producers to include all test method uncertainties into their production, it is possible that gasolines with RVPs significantly lower than the applicable limits would result. It is possible that such gasolines with very low RVPs could result in increased exhaust emissions, driveability problems, and flammability concerns.

30. Comment: The staff has not attempted to quantify the increase in emissions that will result from the transport of pentanes that are rejected as a result of compliance with the lower RVP standards. (WSPA)

Agency Response: We believes it is unlikely that gasoline producers will have to reject pentanes to comply with the lower RVP standard. If some pentanes are rejected, it may not be necessary to transport them. It is possible that they could be used as part of the refinery's fuel supply. If a refiner, for some reason, chooses to transport the pentanes, the emissions that will result from this

transport will be very small compared to the emissions reductions that will result from the lower RVP standard. Furthermore, the commenter did not provide any data to indicate that pentanes cannot be used in the refinery processes.

3. Sulfur Content

31. Comment: The staff has not conducted a sensitivity study on the effect of sulfur on exhaust emissions. (WSPA)

Agency Response: As discussed in the TSD, the staff accepted and used the conclusions of the Auto/Oil study on the effects of sulfur content on exhaust emissions. The Auto/Oil data as well as data from the ARCO and the ARB/GM confirmation studies clearly defined the appropriate levels of sulfur content for the Phase 2 reformulated gasoline standards. We do not believe it is necessary to conduct a sulfur sensitivity study. The sensitivity studies were performed for some of the other gasoline properties to provide an indication of the direction of the effects of fuel properties on emissions. The staff's analysis of the available emissions test results showed that the sulfur content standard combined with the other fuel property standards will produce significant cost-effective emissions reductions.

32. Comment: The Board should adopt a more stringent sulfur content standard. (GM)

Agency Response: The adopted sulfur content standard strikes a balance between the emissions reductions that are needed and the costs to produce the lower sulfur content gasoline. A more stringent standard would have achieved some additional emissions reductions but would have significantly increased the costs of producing Phase 2 reformulated gasoline.

33. Comment: In the discussion of sulfur (TSD p. 30-32), there is no indication as to how the staff supports its proposed specification of 30 ppm. As the staff notes, the minimum level tested in the Auto/Oil study was 49 ppm. In proposing the 30 ppm sulfur standard, the staff extrapolates the results of the Auto/Oil test results from 50 ppm down to 30 ppm. These extrapolations are expressly prohibited to the industry when attempting to certify fuels through the use of the predictive model or vehicle testing. In the discussion of the predictive model (TSD p. 106), the staff states ". . . the model should only be used within the range of the data; extrapolation in these circumstances would not be reliable". Why does the staff propose to limit the industry's ability to extrapolate, while the staff extrapolates outside of the limits of the data to set the sulfur specification? (Unocal)

Agency Response: The staff has not expressly prohibited oil refiners from the option of making extrapolations with the use of the

predictive model, as stated by the commenter. The staff has not yet proposed a policy regarding the implementation of the predictive model; it is currently developing this policy.

We agree that, generally, extrapolation can be dangerous and should be avoided. However, when the underlying physical or chemical mechanism responsible for the emissions change is known, the hazard associated with making extrapolations is greatly reduced. It is only in these cases that the staff makes extrapolations. The reason that reduced sulfur content results in reduced emissions is well known. The sulfur in the gasoline disables the vehicle's catalytic converter, resulting in increased emissions. As the sulfur content of the gasoline is decreased, fewer active sites on the catalyst are disabled and the performance of the catalyst will be improved, resulting in lower emissions. Because we understand the mechanism behind the effect of gasoline sulfur content on emissions, there is little doubt about the effect of reducing the sulfur below the levels tested in the experiments. Consequently, there is little danger in making extrapolations from the available emissions test results.

The staff in the Staff Report stated that extrapolations in the predictive model might not be appropriate because the predictive model will include all of the Phase 2 gasoline parameters. The precise physical or chemical mechanism behind the effects of most of these other parameters on emissions is not known, as it is with sulfur content and RVP. For this reason, it would be dangerous to use the predictive model to predict emissions from gasolines with properties that are outside the range of values tested. Thus the staff is hesitant to allow the use extrapolations when using the predictive model. The staff will continue to refine its policy regarding extrapolations as it develops the predictive model.

34. Comment: Because of the beneficial impact that sulfur reduction has on a vehicle's catalytic converter, the Board should consider requiring lower sulfur levels in diesel fuel. (MECA)

Agency Response: Such an action would be beyond the scope of this rulemaking, which pertains only to gasoline.

4. Olefin Content

35. Comment: Neither the Staff Report nor the TSD supports the necessity for control or reductions in olefins. (WSPA) We recommend the ARB revise the olefins standard to 7 percent. (Chevron)

Agency Response: Both the Staff Report and the TSD present the results of the emissions tests that demonstrate that the reduction in gasoline olefin content, in combination with other gasoline modifications, results in emissions reductions. The staff's detailed analysis of the emissions reductions that will be achieved from the initial proposal is presented in Chapter III of the TSD. The staff's

analysis of the available data as well as the emission test results of the ARCO and the GM/ARB confirmation studies indicates that the olefin limits adopted by the Board are appropriate. To reduce the costs of compliance, the Board relaxed the flat olefin standard from the originally proposed value of 5 percent to 6 percent, and adopted average provisions for olefins content that provide additional flexibility to fuel producers. Further increase of the olefin standard would result in inappropriate reductions of the emission benefits. The use of the testing option (or the predictive model once it is adopted) would allow a refiner to increase the olefins level to the cap limit of 10 percent if the fuel has equivalent emission performance as the Phase 2 RFG.

36. Comment: A standard for C5 and C6 olefins should be adopted. (Toyota)

Agency Response: The staff has not seen the results of any emissions test program which demonstrates that C5 and C6 olefins are the most important olefins from an emissions precursor standpoint. This is why a limit for total olefin content of gasoline was proposed rather than limits on the C5 and C6 olefin content. If C5 and C6 olefins are the main precursors to emissions, the total olefin content standard adopted by the Board will still result in emissions reductions because C5 and C6 olefins will be reduced in order to meet the total olefin content standard.

37. Comment: Emissions of exhaust olefins are not related to the presence of olefins in the gasoline. Exhaust olefin emissions are produced from both paraffins and olefins in the fuel. Neither the Staff Report nor the TSD supports the necessity for the control of olefins in the gasoline. (Chevron, WSPA)

Agency Response: Based on the results of the available emissions test programs, we have concluded that the reduction in gasoline olefin content, in combination with the other proposed gasoline standards, will result in reductions of both emissions and the ozone forming potential of the emissions. Also see the response to Comment 26.

5. Aromatic Hydrocarbons Content

38. Comment: Older and newer cars react oppositely to reduced gasoline aromatic content. In addition, reduced gasoline aromatic content affects NOx and VOC emissions oppositely. Based on the information presented, there is no support for the 25 percent level chosen. (WSPA)

Agency Response: Gasoline aromatic hydrocarbon content reduction does affect different cars differently and can have different effects on different pollutants. The staff has evaluated the effects of gasoline aromatic content reduction on emissions of all pollutants from

the total vehicle fleet. The staff concluded that, while gasoline aromatic hydrocarbon content reduction affects different cars differently, overall net air quality benefits will result from gasoline aromatic hydrocarbon content reduction in combination with the other Phase 2 standards. It should be noted that vehicle manufacturers urged that the standard for aromatic hydrocarbons should be more stringent than the staff's proposal. In light of all of the comments the Board adopted a relaxed average standard of 22 percent aromatic hydrocarbon as compared to the 20 percent level that was originally proposed.

39. Comment: In addition to a total gasoline aromatic content standard, standards should be adopted for individual aromatic compounds. Such standards would prevent a significant increase in exhaust emissions reactivity. (MVMA)

Agency Response: We do not believe that the available emissions data conclusively demonstrate that individual aromatic hydrocarbon compounds have separate effects on exhaust emissions and emissions reactivity. The available emissions data related to these effects are ambiguous. It is likely that the reason for the ambiguity is related to the limited amount of data and the limited scopes of the experiments that were conducted.

The available emissions data were obtained from experiments that were not designed to allow detection of the independent effects of individual aromatic hydrocarbons and other fuel variables such as T90 on emissions and on emissions reactivity. As a result, any emissions or emissions reactivity effect due to individual aromatic hydrocarbons may be confounded with the effects of other fuel parameters such as boiling point (or T90). Any observed effect attributed to a particular heavy aromatic hydrocarbon may in fact be due to that hydrocarbon's boiling point and not to the fact that it is an aromatic hydrocarbon. Also, the available emissions data is not sufficient to conclusively demonstrate that the gasoline compounds which would replace some of the individual aromatic hydrocarbons would not result in exhaust emissions or reactivities at least as high as the aromatic compounds they replace. For example, it has been suggested that the aromatic compounds that may be removed would be replaced with compounds that would result in increased olefin emissions that would increase the emissions reactivity.

Because the available data is insufficient to conclusively demonstrate the emissions and reactivity benefits, and because of the additional costs that would result to gasoline producers, we have not adopted an additional standard for individual aromatic hydrocarbons. If individual aromatic compounds have separate effects on emissions and reactivity, the total aromatic and T90 standards that have been adopted will achieve some of the benefits that would be achieved by a standard on individual aromatics. We expect that the total aromatic standard will result in reductions of all aromatic compounds, including the compounds that the commenter claims will have the greatest adverse impact on air quality. In addition, the adopted T90 standard will

result in additional reductions in the heavy aromatic compounds alleged to have the greatest adverse impact on air quality.

40. Comment: A standard for heavy aromatic compounds should be adopted. The heavy aromatic content standard should be equal to 20 percent of the total aromatic content standard. (MVMA, Chrysler, Toyota, General Motors)

A specific standard should be set for xylenes and other di- and tri-alkyl aromatic compounds in gasoline. Without such a standard, a significant increase in exhaust emissions reactivity could result. (MVMA, Toyota)

In the TSD one reason given for not adopting a limit on the di- and tri-alkyl aromatics is that further restrictions on aromatics would lead to increased levels of alkanes in the fuel. Concern was expressed that increased alkane levels would lead to formation of increased amounts of olefins in the exhaust gases with a resultant increase in ozone forming potential, thus offsetting some of the gain from limiting the di- and tri-alkyl aromatics in the fuel. An examination of data from the Auto/Oil program indicates that such a concern is unfounded. (GM)

Agency Response: Although the Auto/Oil data may show that alkanes do not affect olefins in the exhaust, some data presented by oil companies show that increased alkanes may result in increased olefin emissions. We believe that the ambiguity in the data arises from the fact that all the experiments have not been designed so that the independent effects of individual aromatic compounds and other fuel properties can be discerned.

Because the data are ambiguous, and in light of the costs involved in meeting a stringent standard for di- and tri-alkyl aromatics, the Board has decided not to establish standards for these compounds. The standards for T50, T90, and total aromatics will result in some reduction of the di- and tri-alkyl aromatic compounds in the fuel. Thus, some of the potential benefits of a di- and tri-alkyl aromatic standard as proposed by GM will be realized. Test programs are currently being conducted to better understand the effects of individual aromatic fuel components on exhaust emissions. The results of these test programs will be incorporated into the predictive model as they become available.

41. Comment: In addition to the adoption of a standard for di- and tri-alkyl aromatics, a more stringent standard for total aromatics should be adopted. (GM, MVMA) Nissan recommends a 20% aromatics standard. (Nissan)

Agency Response: We did not adopt a more stringent standard for total aromatic hydrocarbon content because we concluded the additional emissions reductions that would be achieved which would not be

sufficient to justify the significant increases in costs. The standards as adopted optimize emissions reductions at a cost-effectiveness level similar to the cost-effectiveness of other ARB or district regulations.

42. Comment: Aromatic hydrocarbons constitute a very small fraction of the evaporative emissions and any changes in aromatic content would have minimal impact on the reactivity of the evaporative emissions. (Chevron)

Agency Response: We agree with the commenter that the aromatic hydrocarbons in the fuel are small contributors to the reactivity of the evaporative emissions. However, the aromatic hydrocarbon standard was adopted primarily to reduce the mass exhaust emission rates and the ozone forming potential of the exhaust emissions.

43. Comment: The 30 percent aromatics cap is too restrictive. Research on ultra-low sulfur and ultra-low T90 fuels indicates that it is likely a 35 percent aromatic fuel that is low in these other properties will have emissions equal to or less than gasolines meeting the Phase 2 standards. Consequently, the aromatics cap should be set at 35 percent instead of 30 percent. (ARCO)

Agency Response: The 30 percent aromatics cap will ensure that emissions do not become too great at any given time. This is an important component of the Phase 2 RFG regulations. Emissions associated with any batch of gasoline should not be permitted to reach high levels because it is possible that such high emissions gasoline may be used during times air quality is the poorest. It is during these times that the high emissions gasoline would have the greatest adverse effect on air quality.

We want to make sure that the maximum emissions reductions occur as a result of the Phase 2 standards. Gasoline producers will be able to use the vehicle testing option (or, when adopted, the predictive model) to meet the same emissions reductions target by "trading" between the fuel parameters that are in the model.

6. Oxygen Content

44. Comment: The baseline fuel is based on data obtained from industry January through June 1991 for unleaded gasoline. It should be based on an annual set of analysis and include the leaded components as well. Also, the oxygen content even in 1991 is not zero; at a minimum both ARCO and Chevron are using some MTBE in their fuels. (Chevron)

Agency Response: The baseline fuel was based on the average properties derived from the voluntary gasoline reporting program. Although it is true that the data are for January through June, we believe the data are representative of the typical gasoline because

this period includes both winter and summer months. While the data base did not contain any leaded fuels, it would not be appropriate to include leaded fuel because lead was phased out on January 1, 1992. (13 C.C.R. § 2253.4.) We recognize that some gasoline is being blended with oxygen. However, the oxygenated gasoline constituted a minor portion of the gasoline pool. In 1987 about 0.26 percent of the gasoline pool contained MTBE.

45. Comment: Neither the Staff Report nor the TSD provides a clear air quality rationale for the establishment of a minimum oxygen content in the summer months. Staff justifies promulgating oxygen regulations as a tool to help dilute or replace other fuel parameters that would result in emissions benefits from their displacement. Page 37 of the TSD summarizes ". . . the addition of oxygenates in the fuel is needed to facilitate meeting the requirements of the reformulated gasoline." (Unocal)

Staff has suggested in workshops that oxygen content is being included because of the mandate in the federal Clean Air Act Amendments of 1990 for a minimum 2.0 percent oxygen content in federal reformulated gasoline during the summer (FCAA § 211(k)(2)(B). It is our opinion that by seeking waivers under Section 211 and 209 of the FCAA, California could opt out of the requirement for the purpose of having more stringent emission program with more flexible compliance. In any event, it appears that ARB is seeking a partial waiver with the 1.8 percent minimum oxygen level. (Unocal)

Agency Response: The federal requirements are only one of the reasons why we need to have an oxygen requirement. The TSD (p. 32) presents a detailed discussion of the emission impacts of oxygen content on CO, HC, and NOx. Addition of oxygenates generally reduce CO and HC exhaust emissions. The ambient air quality standards for ozone and PM10 are exceeded in most areas of California. Also several areas in the State have exceedances of the CO standard. The addition of oxygen to gasoline results in an air quality benefit because CO, and VOC emissions, both of which are precursors to ozone and PM10 are reduced. Establishing a minimum oxygen level will ensure that these air quality benefits are achieved. The RVP limits will ensure that the oxygen content will not result in increases in evaporative emissions.

In addition, oxygen content is an integral part of the Phase 2 reformulation and the benefits of oxygen cannot be disassociated from the overall benefits of Phase 2 reformulated gasoline. The optimum Phase 2 reformulated gasoline formulations that were tested and for which emissions reductions are maximized contain oxygen at the 2 weight percent level.

46. Comment: Staff suggested that California rules don't replace the federal rules, but merely overlay them. Industry must comply with both rules. Unless California cities (other than Los Angeles and San Diego) opt in, no federal rule for summertime would apply in northern

California. Staff has pledged to avoid all necessary overlap in order to ease the compliance burden. There appears to be no reason to opt into the federal reformulated gasoline requirements, and therefore, no reason for the oxygen minimum. (Unocal)

Agency Response: Most areas in the state are in violation of the ozone and PM10 standards. As discussed in response to the preceding comment, the addition of oxygen in the fuel reduces HC and CO emissions. Both CO and HC emissions are precursors to ozone and PM10. Adding oxygenates in those areas that are nonattainment for the ozone and PM10 standard will help to attain and maintain these standards because oxygen in the fuel reduces CO and VOC emissions. By making the Phase 2 regulations uniform throughout the state, compliance with the regulations has been simplified.

47. Comment: Even if the ARB does not adopt a summertime minimum, gasoline producers would still comply with the federal requirement in southern California, and retain flexibility to supply 2.2 percent oxygen content gasoline to northern California depending on economic considerations. This approach would provide flexibility for gasoline producers to develop more cost effective ways to reduce distillation temperatures or increase octane at the northern California refinery operations. The specific method of adding oxygen should not be dictated. (Unocal)

Agency Response: The Board adopted the minimum oxygen content requirement because of the air quality benefits associated with the presence of oxygen in the fuel. These benefits are needed throughout the state and not just in the areas subject to federal oxygenates requirements. The Phase 2 regulations do not dictate how oxygen should be added to gasoline. Only the minimum and maximum oxygen levels required are specified. We believe that the regulations are structured such that the maximum flexibility possible is afforded to the refiners while still achieving the desired air quality objectives. Furthermore, the ARB has incorporated in the regulations provisions to allow refiners the flexibility to create their own gasoline formulations through testing or the use of a predictive model. These options will allow a refiner to reduce the oxygen content level in the summertime if other fuel properties can be balanced so that the emissions behavior of the fuel is not changed.

48. Comment: Staff has suggested that oxygen could be reduced under alternative certification methods. Under the proposal, vehicle testing is not a viable alternative even with major modifications. The other alternative, the use of a predictive model, is merely a place holder in the regulation with no clear indication that it will be a viable alternative. At this time there is no viable alternative method and no timetable as to when one would be developed. However, industry planning must begin immediately. (Unocal)

Agency Response: We believe that the oxygen requirement in the regulation is justified. Compliance is feasible, thus the existence of an alternative is not necessary. However, in an effort to provide the maximum flexibility possible to industry, we have provided a mechanism for allowing alternative gasoline formulations with lower oxygen contents based on vehicle emission testing. The testing option is designed to ensure that only formulations with equivalent emissions behavior are approved. It should not be dismissed as unworkable when it has never been attempted. Additionally, several modifications were incorporated in the regulation to address some of industry's concerns regarding the motor vehicle testing option. See generally the responses to comments in Section III.H.2. The ARB staff is working on the predictive model, in a cooperative effort with industry and EPA, with the objective of adoption in time for it to be of practical use to industry. Both of these options were presented to and discussed with industry, including the timetable for developing the predictive model.

49. Comment: The requirement for summertime oxygen is further complicated for gasoline producers that prefer to blend oxygen downstream of the refinery. Page 102 of the TSD states that no producer would be able to take credit for the dilution effects of oxygen added downstream. This is in contrast to the pending federal rules that would specifically permit a producer to take credit. Moreover, there is no rationale for the requirement, even as a tool for control of other parameters, and the cost is entirely wasted. Proposed federal rules allow the production of shipments RBOB (Reformulated Blendstocks for Oxygenate Blending) from a refinery. California rules prohibit such shipments. This will further reduce the choice of oxygenates because ethanol blends cannot be shipped in pipelines due to the blend's affinity for water. If a refiner is unable to take credit for the eventual dilution effects of added oxygen, then that is one more reason to avoid blending with ethanol. (Unocal)

Agency Response: An allowance for credit for the dilution effects of oxygenates when added downstream of the refinery will significantly reduce the ARB's ability to enforce the Phase 2 RFG regulations. As stated on page 102 of the TSD, the proposed (and still not final) federal regulations allowing the sale of "RBOB" entail complex requirements for tracking and documenting transactions involving this product. We have yet to a practical mechanism that would allow a dilution credit to be applied to the standards without diminishing the ARB's ability to detect the production of non-complying fuel.

50. Comment: The original proposal for Phase 2 included a specification for oxygen which allowed up to 2.7 percent by weight of oxygen for MTBE. There was no public announcement of the change in oxygen specification between the August public consultation meeting and the October release of the TSD for the regulations. It is not clear from the estimated cost of compliance chart (Staff Report Table VI-1 p. 66) which assumptions regarding the oxygen level were used in the analyses presented. This is a key point because oxygen has beneficial

octane effects that can allow a refiner to maintain pool octane, while reducing aromatics, olefins, and T90. (Unocal)

Agency Response: The original proposal presented at the August workshop was based on analysis of some preliminary data. As more data became available and were analyzed, the potential adverse effects of high oxygen content on NOx became apparent. This prompted the proposal of a lower oxygen content than was discussed at the public consultation meeting. The data analyzed show that at 2 percent oxygen content, the adverse impacts on NOx are insignificant (these data were analyzed and discussed in the Staff Report for wintertime oxygenates, released in conjunction with the Phase 2 RFG Staff Report).

51. Comment: Extension of the concept of equal treatment has led us to recommend an oxygen content of 2.7 weight percent, independent of the oxygenate used to provide the oxygen level. We recognize that inclusion of oxygenates brings mixed benefits, when emissions of all criteria and other pollutants are considered. However, if 2.7 weight percent oxygen is acceptable for one oxygenate, it should be acceptable for all of them, considering the total impact of oxygenates on all organic emissions (including carbon monoxide and the carbonyls). (GM)

Agency Response: The regulations as adopted have the same oxygen requirement for all oxygenates (1.8 to 2.2 weight percent), and in this respect the regulations reflect the commenter's suggestion for "equal treatment." We have provided, in the provisions on alternative gasoline formulations certified on the basis of vehicle testing (and, when adopted, the predictive model) the option of using higher oxygen contents (up to 2.7 weight percent) if the gasoline formulation will achieve the same or better air quality benefits as the specified oxygen content limits.

52. Comment: We propose that the allowable oxygen content be 1.8 to 2.7 weight percent for MTBE containing fuels. Increasing the maximum allowable oxygen content for MTBE containing fuels from 2.2 weight percent to 2.7 weight percent oxygen would add significant flexibility to refinery operations. (ARCO)

Agency Response: We believe that increasing the maximum oxygen content could have an adverse impact on air quality. A significant number of studies indicate that NOx increases will occur at oxygen levels of 2.7 weight percent. Therefore the regulations do not specify a higher oxygen content limit for all gasoline containing MTBE. However, because the cap on oxygen content is 2.7 percent, a refiner may seek certification of an alternative gasoline formulation having an oxygen content of up to 2.7 percent.

7. T90

53. Comment: The staff's interpretation of Table II-12 (TSD, p. 30) is that the appropriate specification for T90 is 300°F, based on an understanding that refiners would need to produce at around 290°F. Based on Table II-12, gasoline with a T90 of 290°F results in both relative and absolute increases in NOx in current technology cars. Relative to a gasoline with a 300°F T90, 290°F results in a NOx increase of 0.9 percent. When compared to the base gasoline, a gasoline with a 290°F T90 results in an absolute increase in NOx emissions of 3.5 percent. We question why staff would choose a specification which by their own estimates results in increases in a major category of criteria pollutants. Based on review of this table the specification should be chosen which would result in refinery production not to exceed 300°F. (WSPA, Unocal)

Agency Response: Although Table II-12 shows that the T90 limit results in about a 3.5 percent increase in NOx, it also shows about 13 percent decrease in hydrocarbon (VOC) emissions in current vehicles. In older vehicles, hydrocarbon emissions are also reduced by about 4 percent, CO emissions are reduced by about 5 percent, but the increase in NOx is much smaller--about 1 percent. The T90 limit will also reduce toxic emissions. Thus a T90 limit of 300°F is associated with significant decreases of some pollutant emissions at a small expense of other pollutants. However, as we discussed in earlier responses in this Section III.A., the effects of a property on emissions should not be looked on isolation from the effects of other property changes. We believe that the Phase 2 RFG standard represent an optimum at which all properties change simultaneously so that the optimum emissions reductions are achieved.

54. Comment: Table II-12 in the TSD shows emission reductions based on the cumulative effects of controlling several parameters, including T90. If the sensitivities were calculated comparing a Phase 2 gasoline with a change in T90 to a standard Phase 2 gasoline with a T90 of 300°F, the change (or sensitivity) would be much smaller. (WSPA)

Agency Response: This is true, but as discussed in earlier responses in this Section III.A., it is inappropriate to focus on incremental effects of specific properties. We are examining the overall effects of the Phase 2 RFG standards.

55. Comment: Since additional data will be available on the T90 parameter from Auto/Oil research we urge ARB to adopt a flat 325°F and 320°F average for T90 until more data are available. (Mobil)

Agency Response: We believe there are sufficient data to conclude at this time that T90 affects emissions and specify the appropriate levels of T90 values. We have provided, in the provisions on alternative gasoline formulations certified on the basis of vehicle

testing (and, when adopted, the predictive model) the option of having a T90 value of up to 330°F if the gasoline formulation will achieve the same or better air quality benefits as the specified T90 flat limits.

56. Comment: Staff presents blending of heavy gasoline components into jet fuel as an option for reducing T90 (TSD, p. 130). Implicit in this discussion is an assumption that there is adequate incremental jet demand to allow blending, and thus, disposal of heavy gasoline components. Unless there is support for the assumption regarding incremental jet demand, this discussion presents an overly optimistic picture of the mechanics of T90 reduction. (Unocal)

Agency Response: This is just one option presented by the staff on page 130 of the TSD. Another option is to process the heavy gasoline components into lighter components. The options for T90 reductions are refinery/company specific and have to be based on their process configuration and economics. The discussion presented by the staff is for information purposes and does not affect the staff's conclusions since the costs of compliance were provided by refineries and include in it consideration of the appropriate compliance strategies.

57. Comment: The cap for T90 (330°F) is set near the average of gasolines now sold in California. We do not agree that fuel specifications set at current "averages" represent a "forcing" of technology, and we have recommended "caps" which are more appropriate in view of the mass and reactivity reductions available. The Board should establish a cap of 310°F for T90. (GM)

Agency Response: The 330°F cap for T90 serves mainly as a means to permit enforcement of the standard throughout the distribution system, and as the upper limit for the alternative gasoline formulation options. The Board established a 310°F cap for DALs; this is similar to the limit proposed by GM. We do not believe more stringent limits would be cost-effective in the context of the full spectrum of Phase 2 RFG standards.

58. Comment: Considerable pressure is being exerted to relax the specifications on T90. We urge that this not be changed. (ARCO)

Agency Response: The Board did not revise the T90 standards as much as urged by many refiners. The modifications we did make are designed to provide additional needed flexibility to refiners.

59. Comment: Mobil Research provided a statistical evaluation of the effects of T90 exhaust hydrocarbon emissions. This analysis indicated that decreasing T90 below 330°F clearly has no statistical effect on exhaust hydrocarbon emissions. (Mobil)

Agency Response: Mobil's statistical analysis was based on the results of several studies. Each study had evaluated a different parameter and some studies varied several variables at the same time. The Auto/Oil study was the only parametric study designed specifically to investigate the effect of changes in T90 on emissions. Therefore, the results of the Auto/Oil study are the most appropriate for statistically analyzing the effects of T90 and that is the study used by the staff in performing the T90 analysis. Pages 28-30 of the TSD contain a discussion of the benefits of reducing T90 (also see the response to Comment 129). All the emissions test data that the staff analyzed from studies which tested fuels with property values similar to Phase 2 RFG, including those for T90, indicate significant emission reductions from Phase 2 RFG.

60. Comment: For the T90 specification, staff had assumed a 10° compliance margin would be necessary to provide assurance of meeting the specification during production of gasoline. In our opinion, there is no way that 10° would work. There is 10° of lab test margin if you are using repeatability plus reproducibility or something even more accurate than the normal test and another 10° for blending variations, for a total of 20°. (Turner Mason)

Agency Response: We believe that a 10° production margin is sufficient to ensure refiners that their production gasoline complies with the T90 standard. If refinery processes are designed for more precise quality control, the refiner will not have to target the T90 specification 20° below the proposed limits in order to meet the requirements in the final product. In addition, we expect that improvements to the test procedures will occur prior to the implementation of the regulations, thereby further reducing test variability and correspondingly the need for a 20° production margin. The refiner also has an additional safeguard stemming from the fact that reproducibility of the test procedures is taken into account in the decision whether to initiate an enforcement action. Finally, the Board modified the T90 provisions to allow averaging (DALs); this should also lessen the need for producing blended gasoline to exact specifications.

8. T50

61. Comment: Figures II-14 and II-15 of the TSD show the change of HC and CO with T50 based on the Unocal predictive model. No actual test data were shown. The magnitudes of the emission reductions were much higher than any effects seen in other programs. There is no statistical information given to show the validity of the Unocal model. We plotted the HC and CO emissions versus the T50 from the Auto/Oil results. In one plot, the HC exhaust emission of fuels containing no MTBE decreases with T50 in a non-linear manner. When a low enough T50 (between 210°F and 220°F) is reached, any further decreases in T50 do not produce any further reduction in emissions. Fuels containing

MTBE show a similar trend. Another plot will show similar information about CO emissions. (WSPA)

Agency Response: Unocal tested an extensive fuel matrix which included T50 as one design variable. The tests were done on a number of post-1980 vehicles. The effects of MTBE are reflected in the emission results. The Auto/Oil study did not include T50 as a variable. It was designed to discern the effects of aromatics, MTBE, olefins and T90. Any attempt to discern an effect of T50 in the Auto/Oil data will be confounded by the effects of these four actual variables. Therefore, the Unocal work should provide a superior estimate of the effect of T50 on emissions. However, the point of diminishing emission reduction in the Auto/Oil data, 210° to 220°F, supports the choice of limits within that range.

62. Comment: The TSD for the T50 standard is weak. The ARB has misinterpreted the results of the ARB/WSPA/GM DI-RVP program. They have totally ignored the effect of MTBE on exhaust emissions. (WSPA)

Agency Response: We have not ignored the effects of MTBE on exhaust emissions in the ARB/WSPA/GM DI-RVP study. Some of the fuels tested in this study were MTBE-blended fuels because the ARB/WSPA/GM working group agreed that MTBE is a necessary component of the reformulated gasolines. Therefore, the emissions reported and the conclusions of the study include the effects of MTBE. Such an approach is appropriate because MTBE and T50 changes are interrelated.

63. Comment: We know of no way to independently control T50. Our ability to control this parameter is through other parameters and then only to a very limited extent. Consequently, this would be a very difficult and expensive parameter to control. Therefore, we recommend that this parameter not be individually specified. (Chevron)

We found that T50 is important to emission reductions; however, we don't see the specification for T50 as necessary. There are very limited things you can do to change T50. Also, we believe that the gasoline would probably meet the T50 specification if all the other specifications are met. (Unocal)

We recommend that the flat and average specification limit for T50 be eliminated as refiners have little or no ability to control this parameter independently. (Chevron, Turner Mason)

Agency Response: T50 does not have to be controlled independently. It can be controlled by meeting the T90, aromatics, and olefin specifications. If additional reductions are necessary, T50 could be reduced by reducing the proportion of heavy or full range reformate, heavy straight run naphtha, heavy or full range FCC gasoline and heavy or full range alkylate. Oxygenate addition, especially MTBE addition, will probably result in reductions of T50. If insufficient T50 reductions are achieved through oxygenate addition, the

fractionation of blendstocks would be required. The final gasoline blend specification will most likely involve blending of the necessary stocks with sufficiently low midrange temperatures to meet the T50 limit.

As discussed on page 28 of the TSD, Unocal and Toyota have both produced emission tests which indicate that reducing T50 results in a decrease of emissions of VOCs and CO, and would have no significant effect on emissions of oxides of nitrogen. The Unocal study indicates that by reducing T50 from 212°F to 202°F, a 9 percent reduction of VOC and a 5 percent reduction of CO emissions would result.

64. Comment: In Table II-11, page 28 of the TSD, Unocal's T50 effect on exhaust emissions seems to be inconsistent with previous work done on evaluating distillation impacts on exhaust emissions. For example, Driveability Index (DI) (which is dominated by the 50% point) studies indicate that the DI impact on emissions is non-linear. This difference needs to be explored. It is also not clear why the T50 analysis is done on a different basis than chosen for the other parameters such as T90, olefin content, and aromatic hydrocarbon content shown in Tables II-12, II-15, and II-16, respectively. (Chevron)

Agency Response: The Driveability Index is not dominated by T50. T10 and T90 together have almost as much effect on driveability. The T90, the olefin content, and the aromatic hydrocarbon content were based on the Auto/Oil studies. The limit on T50 was necessarily based on other work (Unocal) because the Auto/Oil work did not examine T50 as discussed in Comment 61.

65. Comment: Staff present various process options for T50 reduction (TSD p. 130). Staff states that the addition of oxygenates would probably result in reduction in T50. Although it is true that mid-distillates are affected by adding oxygenates, the proposed oxygen limit reduces flexibility for T50 reductions. Staff goes on to say that fractionation may be required. Staff does not state which stocks would be fractionated or the final dispositions of these stocks as they state options for other specifications. The only workable option for T50 reductions is the addition of oxygenates and this option has been limited by the staff's proposed limits. (Unocal)

Agency Response: Staff acknowledged in the TSD that meeting the T50 limit may require other process modifications besides the addition of oxygenates. The discussion at page 130 of the TSD also presented generic options for reducing T50. However, individual refineries will have to evaluate their operations with respect to the mid-distillates and may have to employ different techniques of reducing T50. A workable option for Unocal may not be workable for some other refinery. Since we do not have information on Unocal's mid-grade distillates we can not evaluate what process options are workable for Unocal. While higher oxygen levels may provide additional flexibility for reducing

T50, we believe there are valid air quality concerns that prevent us from setting a higher oxygen level.

66. Comment: Considerable pressure is being exerted to relax the specification for T50. We urge that this not be changed. (ARCO)

Agency Response: The adopted flat and cap T50 limits identical to the limits originally proposed. To provide additional flexibility to refiners, the Board added an optional DAL limit of 200°F. The Unocal and Toyota studies discussed in the TSD on page 23 both support the T50 limit as adopted.

67. Comment: Mobil Research provided a statistical evaluation of the effects of T50 on exhaust hydrocarbon emissions. The analysis indicates that decreasing T50 below 220°F has no "statistical effect" on exhaust hydrocarbon emissions. (Mobil Oil Corp.)

Agency Response: The statistical analysis was based on several studies. Each study had a specific purpose. Some studies varied several variables at the same time. The Unocal and Toyota studies were the only parametric studies designed specifically to investigate the effect of T50 on emissions. Therefore, these results would be most appropriate for statistically analyzing the effects of T50. Furthermore, all the test data that the staff evaluated which is based on Phase 2 parameters, including those for T50, indicate significant emissions reductions from current gasoline.

68. Comment: Toyota recommends that the T50 cap standard be expressed as a range, with that range being 185° to 210°F, and with 200°F being the flat limit standard. Furthermore, we recommend that the T50 averaging standard be set at 193°F. (Toyota) Nissan recommends a maximum T50 standard of 200°F. (Nissan)

Agency Response: The cap values represent absolute maximums and cannot be less than the flat and average limits. The T50 cap as adopted is 220°F and the flat limit is 210°F. If averaging is chosen, the DAL standard is 200°F. We believe that the flat standard of 200°F suggested by Toyota would make the front end of the gasoline more volatile, and would make it more difficult and more expensive for the refineries to meet the RVP limit. The average limit of 200°F was chosen because we believe that refiners meeting a flat limit of 210°F would produce gasoline averaging around 200°F.

69. Comment: The cap for T50 is set near the average of gasolines now sold in California. We do not agree that fuel specifications set at current "averages" represent a "forcing" of technology, and we have recommended "caps" which are more appropriate in view of the mass and reactivity reductions available. We recommend that the cap on the 50 percent distillation temperature be set at 210°F. (GM)

Agency Response: The cap is set mainly for enforcement purposes. For most gasoline, the effective limit is expected the flat limit, which is 210°F. A lower T50 limit might have adverse impacts on front end distillation and driveability.

9. Benzene Content

70. Comment: There is no justification for any regulation in the Phase 2 RFG specifications for toxics. (Chevron)

Agency Response: There is a high degree of justification for adopting Phase 2 RFG specifications which reduce emissions of toxics. Health and Safety Code section 43018(b) requires the Board to "take action to achieve the maximum feasible reductions in particulates, carbon monoxide, and toxic air contaminants from vehicular sources." In recognition of this requirement, the Board adopted specifications limiting the benzene content of Phase 2 RFG. Benzene emissions from gasoline are the single greatest source of toxic risk from air pollution in California. This risk will be reduced by about 40 percent through the combined effects of the benzene limit and other Phase 2 RFG specifications (see the TSD, pp. 90 and 96).

71. Comment: It is not clear why benzene is treated differently from other parameters under the averaging standard. Further, it is not clear why a benzene emission credit must be in place before the account is debited. Benzene should be treated no differently than the other parameters.(Unocal)

Agency Response: We have modified the averaging (DAL) provisions so that benzene is treated identically to other parameters. (13 C.C.R. § 2264(d).)

72. Comment: Benzene in the exhaust is not eliminated by removing all benzene in the fuel. (WSPA)

Agency Response: Since benzene is both a component of the fuel and a by-product of combustion, the elimination of benzene from gasoline may not eliminate all benzene in the exhaust. We do not expect that the benzene standard will remove all benzene in the exhaust. However, the benzene standard, in conjunction with the aromatic hydrocarbons standard, will significantly reduce benzene emissions from the vehicle. The objective of the Phase 2 RFG standards is to provide the greatest benzene reduction possible considering technical and economic feasibility.

73. Comment: It is suggested that benzene be limited to 0.8% by volume instead of the more complicated series of limits. (GM)

Agency Response: The adopted flat, DAL and cap limits for benzene are designed to provide gasoline producers with flexibility in meeting the standard. A single benzene limit of 0.8 percent by volume would likely result in an undue hardship for some producers.

B. EMISSIONS AND ENVIRONMENTAL IMPACTS

1. General

74. Comment: Emission reductions are calculated in the Staff Report and the TSD from a variety of unrelated sources of data, with no attempt to combine or reconcile data scientifically. Instead, staff has selectively used only that data which support movement toward the maximum emission reduction benefits. (WSPA)

Agency Response: ARB staff evaluated all of the available data in developing the Phase 2 RFG regulations and did not selectively use data, or inappropriately extrapolate data to achieve a desired end result. However, due to the extensive amount of emission test data generated, there is an opportunity to arrive at somewhat different conclusions as to the impacts different fuel parameters may have on emissions.

The staff used two methods to calculate the emission reductions to avoid biasing the estimated reductions by using only the results of one study. (see TSD pp. 53-62.) The first method used the Auto/Oil regression equations which were developed with results from an extensive study conducted in cooperation by the auto and oil industries. However, this study did not evaluate all of the proposed Phase 2 RFG specifications. But the Auto/Oil regression equations do provide a mechanism for estimating most of the emission benefits from Phase 2 RFG. The second method used the results of vehicle tests conducted with fuels that have properties similar to those of Phase 2 RFG. This method used the results from tests conducted by ARCO for current technology vehicles and the results from the ARB/GM confirmation study on vehicles representing a range of vehicle ages and technologies. The staff estimated the emissions reductions as the average of the emission reductions calculated with the Auto/Oil regression equations and those based on the ARCO and ARB/GM confirmation test results. We believe that the approach just described was appropriate.

75. Comment: The ARB has inflated the VOC and NOx emission benefits of Phase 2 RFG. While the ARB argues that the benefits might be higher due to the emissions inventory being underestimated, they omit mentioning that the benefits could also be lower because of non-linear emission effects which were not considered. (WSPA)

Agency Response: The emission benefits are based on two methods of analysis. (See the response to the preceding comment.) The first method used the Auto/Oil regression equations which do take into account interactions between the different fuel parameters, including non-linear effects. The second method used test results from studies conducted with fuels that have properties similar to the properties of Phase 2 reformulated gasoline. If non-linear effects are present, they would have influenced these test results and would also have been incorporated in the staff's analysis. In addition, it is not certain

that non-linearity will decrease emission benefits. Depending on the form of the non-linearity, emission benefits may well be higher due to non-linear emissions effects.

76. Comment: Staff comments on page 7 of the Staff Report that the emissions inventory may be understated by as much as 50 to 100 percent. The report states that reductions may be underestimated by that magnitude. In fact, emissions may be aggravated in the in-use fleet. Many assumptions have been made regarding certain vehicles when no test existed (e.g. sulfur reductions). Those assumptions could be incorrect, both in magnitude and direction of the emission effect. (Unocal)

Agency Response: No data have been provided by the commenter to dispute the staff's assumptions or to support the commenter's claim that emissions will be aggravated. Preliminary emission data from test programs being conducted by the ARB (using in-use vehicles) indicate the emission factors used to generate the emission inventory may be underestimated by 50 to 100 percent. However, the staff did not include this information in the analysis of the benefits of the Phase 2 RFG regulation. Therefore, the staff's estimated emission benefits are conservatively low.

77. Comment: Although the staff identifies the various vehicle categories (Staff Report p. 52), none of the testing upon which the staff relies covered all of these categories. Major studies on sulfur emissions covered only 1989 vehicles. It is not clear why the staff would average the predicted results for Auto/Oil regressions and the EC-X test results. The EC-X test fleet did not contain the vehicle matrix the ARB considers essential for certification through testing, and did not hold results subject to the rigorous statistical treatment. (Unocal)

Agency Response: See the response to Comment 74.

78. Comment: Although the California Clean Air Act requires ARB to take actions that are necessary, cost-effective, and technologically feasible to reduce emissions of volatile organic compounds by 55 percent and oxides of nitrogen by 15 percent for motor vehicles with respect to 1987 a baseline inventory (page 3 of Staff Report), no further action is necessary to achieve those reductions by December 31, 2000. Existing regulations will achieve reduction of 61 percent in VOCs and 42 percent in NOx by the end of that year. Reference: TSD, p. 3 (Table II-1) and p. 4 (Table II-2). (Unocal)

Agency Response: Both section 43018(a) and section 43018(b) impose mandates on the Board. Even if the regulations may not be necessary to meet the specific emission reductions identified in section 43018(b), the regulations would still be necessary to meet the requirement in section 43018(a) that the Board endeavor to achieve the

maximum degree of emission reduction possible from vehicular and other mobile sources in order to accomplish attainment of the state ambient air quality standards at the earliest practicable date.

Table II-1 in the TSD presents the statewide emissions from gasoline-powered vehicles in 1987, and Table II-2 presents the trends in emissions from gasoline-powered vehicles for the ozone nonattainment areas in 1996, 2000, 2005, and 2010. Because the ozone nonattainment areas represent about 90 percent of the statewide emissions, the emission reductions calculated by the commenter using the emissions presented in Table II-2 are overestimated.

79. Comment: We are concerned that the suggested modifications presented by staff at the hearing allow the overall NOx reduction to decrease from 50 tons per day to 44 tons per day. (Sacramento AQMD)

Agency Response: The proposal presented by the staff at the hearing was different than the original proposal discussed in the Staff Report and would result in a smaller reductions in NOx emissions. However, the Board adopted a revised version of this proposal in response to comments raised by refiners and other commenters on the cost and emission impacts of the regulations. The revised proposal is very close to the original proposal in terms of the expected emission reductions, and is designed to reduce the refiners' compliance costs. We estimate that the Phase 2 RFG regulations adopted by Board will achieve 95 percent of the emission benefits from the original proposal at 85 percent of its costs.

80. Comment: The ARB is ignoring the small percentage of cars that cause the vast majority of the vehicle emissions in the state and going after the industry that supplies these non-complying vehicles with fuel. (California Fuels)

Agency Response: The ARB has not ignored those cars that contribute the majority of the vehicle emissions. For instance the smog check program (biennial I&M) currently in effect throughout the state is designed to improve the emission performance and reduce emissions from existing cars. The ARB is also evaluating various other strategies to reduce emissions from gross-emitters. However, programs geared towards such vehicles will not eliminate the need for stringent Phase 2 RFG regulations.

81. Comment: On page 7, first paragraph of the Staff Report there is no information that any change in inventory estimates is due to fuel effects. This should be alluded to in the text. (Chevron)

Agency Response: The intent of the discussion in the referenced paragraph is to point out that the mobile vehicle portion of the emission inventory is underestimated. The reason for the underestimation is inaccurate estimates of vehicle emission rates and vehicle activity. The staff does not believe that "fuels effects" are

part of the cause of the underestimation of the inventory. In addition, as is pointed out in the Staff Report, studies to date have not been able to establish the error bands for specific categories of the inventory.

82. Comment: It is possible, with the reactivity data already used by the staff in the CF/LEV proposal plus speciated emissions data being provided by the Auto/Oil program and other programs, for the staff to convert both the baseline inventory and emission reductions of ROG into reductions of ozone forming potential. We recommend performing these estimates for potential Phase 2 reformulated gasolines to ensure the lowest possible reactivity for Phase 2 reformulated gasoline is obtained. (GM)

Agency Response: Staff has evaluated and determined the effects of the proposed Phase 2 RFG parameters on exhaust mass emission and exhaust reactivity. Chapter III, Section E of the TSD discusses the effects of Phase 2 RFG on the reactivity of vehicle exhaust emissions. Exhaust emission data collected by ARCO for a fuel that has specifications similar to the specifications of Phase 2 RFG showed a 39 percent reduction in the Carter Ozone Per Mile reactivity potential of the exhaust.

83. Comment: Page 45, Item d. of the TSD: The baseline emissions should be based on vehicles operating on the federal Clean Air Act reformulated gasoline, not California Phase 1 gasoline. (Chevron)

Agency Response: Traditionally, the evaluations of the emissions benefits from new regulations adopted by the ARB and other regulatory agencies are performed against baseline emissions which reflect the emissions based on current regulations. This is because the cost effectiveness of the proposed regulation is to be based on the additional costs to the affected industries to comply with the new regulation. Since the Phase 1 reformulated gasoline regulations became effective January 1992, refiners will have to design and modify their respective refinery to produce California Phase 2 RFG based on the configurations for producing Phase 1 reformulated gasoline. Therefore, the baseline emissions should be based on Phase 1 gasoline.

Although the federal program under section 211(k) of the FCAA will become effective one year prior to the California program, refiners will still configure their refineries to produce the more stringent California Phase 2 reformulated gasoline. It would not be prudent, nor is it possible, for a refiner to make the needed refinery modifications to produce federal reformulated gasoline, and then, within a period of a year, make the additional modifications needed to produce California Phase 2 RFG. A refiner would most likely make the process modifications needed by integrating the federal and California requirements. In addition, the federal program will not be required in all areas of the state, and some aspects are applicable only during the high ozone season. The California Phase 2 RFG specifications will

apply state-wide, and all but RVP and the minimum oxygen content "cap" will apply year round. Therefore, even if the baseline emissions were to be based on the federal program there would not be significant differences in the emission reductions.

84. Comment: Page 6, Item 3 of the Staff Report: The emission reductions quoted are based on the California Phase 1 gasoline. If ARB does not initiate any new gasoline regulation, the Federal Clean Air Act will require changes in fuel properties. This should be the basis for any analysis that is performed. The Table should also show reductions in criteria pollutants in the year 2010 for comparison to the low-emission vehicles/clean fuels (LEV/CF) program reductions in the same pollutants (LEV/CF Staff Report, Section IV, p. 60). (Chevron)

Agency Response: The fuel properties required to meet the federally required emission reductions by the year 2000 have not been defined by EPA. Therefore, these properties cannot be used as a basis for ARB's analysis. In addition, the emissions are based on California Phase 1 gasoline for those reasons specified in the response to the preceding comment.

As to the comment on the comparison of emission reductions from Phase 2 reformulated gasoline to those from the LEV/CF regulations, Tables V-1 and V-2 on pages 49 and 50 of the Staff Report present the benefits of the Phase 2 reformulated gasoline specifications for the year 2010. These emission reductions can be compared to those reductions from the LEV/CF regulations. Note that the emissions benefits of the use of Phase 2 RFG in low-emission vehicles is attributed to the low-emission vehicle program rather than the Phase 2 RFG regulations.

85. Comment: Page 46 of the TSD: It is not clear whether the ozone planning inventory is based on California Phase 1 gasoline. If it is not, the planning inventory needs to be revised to reflect this. (Chevron)

Agency Response: The ozone planning inventory is based on Phase 1 gasoline. This was indicated in both the TSD and Staff Report.

86. Comment: Staff assumes that the carbureted and fuel injected fractions can be applied to vehicle groups of any inventory calendar (TSD, Appendix 13, p. 13-6). If our interpretation regarding this sentence is correct, staff is taking the technology class as a group and assuming that there are no relative changes in carbureted and fuel injected fractions in each class. No allowance is made for the fact that there was a higher proportion of injected vehicles in the latter portion of each vehicle class period. This assumption simplifies the calculation, but it may overstate emissions reduction due to large emission reductions expected from carbureted cars. (Unocal, WSPA)

Agency Response: The composition of a vehicle group--carbureted and fuel-injected fractions--were determined by taking the average of the carbureted and fuel-injected vehicle fractions for each of the years that are included in the vehicle group. For example, for the "1975 - 1980" group, the fraction of carbureted vehicles in the group is the average of the carbureted vehicle fractions for each of the years from 1975 to 1980. Because this approach of estimating the vehicle fractions is based on actual data, we believe it does take into consideration that there are higher portions of injected vehicle at the end of the vehicle class periods.

87. Comment: All the emission reduction calculations are based on the typical properties shown in Table III-1 (Staff Report p. 26). Despite noting that this table does not necessarily reflect year-round typical values, the staff proceeds to base all estimates on these values as if they are typical. It is not clear whether the utilization of the table overstates or understates emission reductions. (Unocal)

The period used to determine the average summer composition (March through June) is not representative of summer operations. (p. 10, Paragraph 2 of the TSD). Half of this period is the transitional time between winter and summer. In addition, the summary data is based on six months of analysis of gasoline composition and it excludes the properties of leaded gasoline, which is usually high in olefins and sulfur. It is misleading to indicate that the properties obtained in the first six months of 1991 are representative of annual average California gasoline. (Chevron)

The base fuel properties presented in Table III-5 on page 54 of the TSD are based on data obtained from industry January-June 1991 for unleaded California gasoline. It should be based on an annual set of analyses and include the leaded components as well. (Chevron)

Agency Response: The staff has clearly stated that these properties are based on data that have been reported to the ARB by refiners during the period from January 1991 to June 1991. The staff recognizes that summer and winter gasoline often have somewhat different properties. However, the data reported by individual refineries for each fuel grade and the volume of gasoline produced (reported to the California Energy Commission) were used to calculated a weighted average of each property of interest. We believe this method of determining the average gasoline properties does take into consideration the variability of properties throughout the reporting period. This is the traditional method used by the ARB and other regulatory authorities to determine baseline properties of gasoline. Since gasoline properties vary from batch-to-batch, day-to-day, and company-to-company, it would be impractical to evaluate each batch individually. The staff's approach is appropriate because it takes into consideration these variabilities when the typical values were determined.

88. Comment: Staff substituted the ARCO data for confirmation test data in Table III-10 (TSD p. 59) for 1986-1995 technology cars. This appears to be an attempt at "stacking the deck" in favor of Phase 2 reformulated gasoline. Table III-8 indicates that no fuel tested in any program cited by staff achieved the results, particularly on NOx, that were achieved by ARCO. As discussed above, the Ford data in Table III-8 may be reflecting an olefin effect. Staff's own confirmation testing, using the same fuel, only achieved 42 percent of the NOx benefit achieved in ARCO's testing. (WSPA)

Agency Response: It is important to use data from the ARCO study and the GM/ARB confirmation tests because these studies were conducted with fuels that have properties similar to those of Phase 2 reformulated gasoline. The staff substituted the ARCO data for the confirmation test data for the 1986-1995 vehicle class because the ARCO tests included more cars in this vehicle class than the GM/ARB confirmation tests. The ARCO data were modified by using the predictive equations from the Auto/Oil regression analysis to reflect the differences between the properties of the ARCO test fuel and Phase 2 reformulated gasoline. The Ford data were only used by staff in determining the trend of the emission changes; they were not used to calculate the actual emission reductions. (Also see the response to Comment 74.)

89. Comment: Page 51 of the Staff Report: Figure V-3 should be accompanied by a chart which shows emission reductions in the year 2010. (Chevron)

Agency Response: Table V-1 and Table V-2 on pages 49 and 50 of the Staff Report present the benefits of the Phase 2 RFG in the year 2010.

90. Comment: Page 68, Item D, Paragraph 2 of the TSD: There is no basis for the assumption that actual emissions reductions are expected to be greater than those shown in the table. Just because the inventory is in error does not mean that fuels are the cause or will have any input. The paragraph should be revised accordingly. (Chevron)

Agency Response: The emission reductions are calculated by multiplying the baseline emissions with the percent changes in emissions that would result from the proposed Phase 2 reformulated gasoline specifications. It was pointed out by staff in the TSD that the inventory of motor vehicle emissions may be underestimated by substantial amounts. The reasons for the underestimation are inaccurate emission rates and vehicle activity. If the emission inventory is underestimated then the calculated emission reductions, being a percent of the inventory, are also underestimated.

91. Comment: Staff refer to Table 7 and 8 in Appendix 13. We are unable to find these tables and expect that they are mislabeled as Table 9 and 10. (WSPA)

Agency Response: The commenter is correct, Table 7 and Table 8 in Appendix 13 of the TSD were mislabeled as Table 9 and Table 10.

92. Comment: Table III-8 on page 57 of the TSD presents the changes in emissions from the various testing programs. It is not clear what type of technology classes are represented here. (WSPA)

Agency Response: The results shown in Table III-8 are for current model year vehicles. This is stated on page 56 of the TSD.

93. Comment: Table II-9 of the TSD presents the results of ARB's confirmation testing. There is an arithmetic error in the calculation of the data for the 1975-1980 average. Staff took an average based on two data points when there are actually three. This overstates the emission benefits for this class of vehicles by 55 percent over the actual average. (WSPA)

Agency Response: The commenter is correct that this number is in error; the staff added three data points but only divided the total by two. However, this error did not substantially affect the overall emission benefits estimated by staff since 1975-1980 model-year vehicles account for a relatively small percentage of the total fleet.

94. Comment: Page 59, Table III-10 of the TSD: It is not clear why the more recent vehicle classifications (1986-1990 and 1991-1995), which are supposed to have more sophisticated control systems, should show the biggest benefits for NOx and hydrocarbon benefits. Does this indicate that the control systems are poorly designed and what is observed is not a real fuel effect but poor calibration and computer technology application effects? This should be evaluated further before the Phase 2 RFG regulations are adopted. (Chevron)

Agency Response: The staff determined the emission benefits based on available test data. Regardless of the reasons as to why the recent vehicle classifications show greater emission benefits from fuel reformulation, these are real and valid benefits and must be included in the staff's analyses.

95. Comment: It is not clear how the data in Table III-10 were determined for technology classes other than 1985-1995. Staff presents data for testing programs and states that adjustments were made, but the mechanics of this process and a statement of which data used for each technology class are not presented. (WSPA, Unocal)

Agency Response: The adjustment referred to by staff is the modification of the test data to correct for the differences between the properties of the test fuels used in the various programs and Phase 2 reformulated gasoline. All of the test data were adjusted with the Auto/Oil predictive equations to reflect Phase 2 reformulated gasoline. The staff did not believe there was a need to discuss the arithmetics of the emission reduction calculations since the Auto/Oil predictive equations are included in Appendix 12 of the TSD.

96. Comment: Staff presents the opinion that Phase 2 reformulated gasoline will result in emission reductions from other gasoline-powered mobile sources including aircraft (sic) and trains (TSD p. 68). This raises two questions, 1) how are the changes required for Phase 2 RFG going to effect the quality of railroad diesel and 2) is the staff proposing that Phase 2 RFG specifications extend to aviation gasoline. If the staff is proposing either of these, there is no note of it in the documentation and there should be no indication by staff that there are any emission benefits from these sources. (WSPA, Unocal)

Page 68 of the TSD and page 48 of the Staff Report state that gasoline specifications will affect emissions from other gasoline/car mobile sources, such as off-road vehicles, trains, ships and aircraft. This statement is incorrect. Trains and ships do not use gasoline; and aircraft which are gasoline powered currently cannot use and may never be able to use the phase 2 gasoline because of physical constraints. Therefore, these shouldn't be listed as areas that may provide some additional benefits. (Chevron)

Agency Response: The staff did not intend to claim that Phase 2 reformulated gasoline will result in emission reductions from trains, ships, or aircraft. The staff did not include any emissions benefits from these sources when determining the emission reductions due to Phase 2 RFG.

97. Comment: Table III-4 in the TSD contains a typographical error. The olefin range in the Auto/Oil fuel matrix was 5-20 percent, not 0-5 percent as reported. (WSPA)

Agency Response: The commenter is correct. We note that this table was presented for informational purposes only, and does not affect the staff's analysis or conclusions.

98. Comment: Page 7, Figure I-1 in the Staff Report: This chart should be shown for the year 2010 to demonstrate the change in relative emission reductions over time. (Chevron)

Agency Response: This figure compares the reductions of VOCs from the Phase 2 reformulated gasoline to the reductions from other regulations recently adopted by the ARB. Emission reductions from

Phase 2 reformulated gasoline over time are shown in Tables 14, 21, and 22 of the TSD.

2. RVP

99. Comment: Page 45, Paragraph 1 of the TSD: The last sentence indicates that running losses can account for a significant portion of vehicle evaporative emissions. The Auto/Oil data does not support this. What is ARB's justification for indicating this? (Chevron)

Agency Response: The staff's estimate on running loss emissions is based on data from evaporative tests that used the new evaporative test procedures. The new evaporative test procedures which have been adopted by the ARB require that running loss tests be performed at an ambient temperature of 105°F because this higher temperature is more characteristic of the conditions inside the fuel tank. The running loss tests conducted as part of the Auto/Oil study were conducted using the old evaporative test procedures conducted at 85°F. Because running loss emissions are highly dependent on temperature, the results of the Auto/Oil are much lower than those used by staff and underestimate running losses for California conditions.

100. Comment: In Tables III-15 and III-16 (pp. 63 and 64) of the TSD the staff presents data from the ozone planning inventory for other gasoline-powered mobile sources. It appears that the inventory data presented in this table represents only exhaust data. There is no estimate of evaporative emissions in this data. The staff assumes that 50 percent of the value presented from the ozone planning inventory is evaporative. Staff then adjusts the assumed evaporative component of these data to claim some benefit from RVP reduction. Staff's assumption regarding an evaporative component equal to 50 percent of the ozone planning inventory is not supported with any data. (Unocal, WSPA)

Agency Response: The staff did not claim that 50 percent of the entire ozone planning inventory is evaporative. The staff only assumed that for gasoline-powered vehicles other than on-road vehicles 50 percent of the total VOC emissions would be evaporative emissions. As has been discussed at workshops conducted during the development of the Phase 2 RFG specifications, the staff's assumption is realistic because it is based on the fact that these vehicles tend to have long storage periods. Under these conditions much of the VOCs emitted by these vehicles are due to the evaporation of the gasoline in their fuel system. In addition, the commenter did not provide staff with any data or an alternative method for calculating the ratio of evaporative emissions to the total emissions from these sources.

101. Comment: In Table III-18 (TSD p. 66), staff presents the ozone planning inventory data for petroleum operations. It is our understanding that these data are based on 9.0 RVP assumptions. Staff

arrives at the reductions claimed in Table III-20 (TSD p. 67) by adjusting the data in Table III-19. The inventory for petroleum operations is larger for a 9.0 RVP assumption than a 7.8 RVP assumption. By taking a percent reduction from the inventory that assumes a 9.0 RVP base, staff overstates the benefits for RVP reductions in petroleum operations. (Unocal)

Agency Response: The emission data presented in Table III-18 are baseline inventories of VOC emissions from petroleum operations based on 7.8 psi RVP. Therefore the staff has not overstated the benefits for RVP reductions in petroleum operations.

102. Comment: Another area of concern is the magnitude of the calculated running losses. At 7.8 RVP, staff reports a calculated running loss of 3.7 grams per test. These data were based on the EPA running loss test which has a detection limit of 0.2 gram per test. Staff's initiative to take credit for the running loss reductions is inconsistent with the results presented in Auto/Oil Technical Bulletin No. 6. The fact that Auto/Oil could not find running losses in 19 of 20 cars, and given a detection of 0.2 grams per test, and that RVPs up to 10 were tested, staff's estimate of 3.7 grams per test for fuel cars at 7.8 RVP is extremely suspect. Taking a percentage reduction based on true vapor pressure from this base number would tend to over-estimate the benefits of RVP reduction on running losses. (Unocal, WSPA)

Agency Response: Running loss emissions result from the evaporation of gasoline during vehicle operations. The primary source of running loss emissions is the vehicle's fuel system, including the carburetor, on-board vapor recovery system (carbon canister), and fuel tank. If these items are in disrepair, they could cause increases in a vehicle's running loss emissions. Auto/Oil used vehicles that had been screened and were well maintained. Therefore the running loss emissions from the Auto/Oil study are not representative of in-use vehicles. The staff believes that the vehicles tested by EPA are more representative of in-use vehicles and therefore the EPA data are more representative of running loss emissions from the existing vehicle fleet.

The test temperature was also lower for the Auto/Oil testing program. See the response to Comment 112 for a discussion of temperature effect on running loss emissions.

103. Comment: There is no evidence that below 8 psi current vehicles have any measurable running losses and therefore the adjustment factor should be 1.0 not 0.52. (WSPA)

Agency Response: The commenter did not provide any data to contradict the staff's analysis or to support the fact that the running loss emission adjustment factor for current vehicles should be 1.0. Staff determined the running loss adjustment factors based on all

available test data and presented them in the TSD for the ARB's Phase 1 RFG specifications in 1990. Also see the response to Comment 99 for staff's response regarding temperature effect on running loss emissions.

104. Comment: Our review of the cited documents reveals that the gram/test numbers listed in Table 4 of Appendix 13 in the TSD for "pre 1978" are off by an order of magnitude when compared to the Phase 1 document. (WSPA)

Agency Response: We agree that the "gram/test" numbers for the "pre 1978" vehicles in Table 4 are incorrect. However, the control adjustment factor is the ratio of the gram/test values at 7.0 psi to gram/test values at 7.8 psi. Since the adjustment factors for 7.0 and 7.8 psi are both in error, their ratio is not affected by the error.

105. Comment: One area of concern regarding Appendix 13 of the TSD is the fact that staff used the extrapolation to determine the running loss effects. (WSPA) In estimating the reductions in running loss emissions, the staff relied on the use of extrapolations to best-fit curves. Such extrapolations can result in erroneous estimates. (Unocal)

Agency Response: We are aware that the staff has extended the earlier conclusion on the relationship between RVP and running loss emissions. However, there is no reason to believe that the extrapolations are inappropriate. The use of extrapolations is most dangerous when the underlying physical or chemical mechanisms responsible for the emissions changes are not known. In the case of evaporative running loss emissions, these mechanisms are known. Increased evaporative running loss emissions result from the increased vapor pressure of the gasoline. It is known that the generation of greater amounts of vapor will result in the increase in evaporative running loss emissions. Thus there is little danger in making extrapolations from the results of emissions-vapor pressure relationships. In addition, these were the only data available to the staff that quantify running loss emissions, and there have been no data provided by refiners or vehicle manufacturers to dispute the staff's calculations.

106. Comment: The fact that fuel-injected cars have a greater sensitivity to RVP than do carbureted cars is counter-intuitive. One would expect that the carburetor would be a significant source of running loss emissions. (WSPA)

Agency Response: The staff is aware that there are differences between the amount of running loss emissions emitted by carbureted and fuel-injected vehicles. However, as discussed in the response to Comment 99 there are many factors that affect vehicle running loss emissions. The staff cannot speculate why fuel-injected cars have a

greater sensitivity to RVP and can only determine the evaporative emissions based on existing data. Furthermore, the commenter did not provide any data to dispute the test results used by the staff or the staff's analysis.

107. Comment: Staff presented running loss adjustment factors of 0.66 for carbureted cars and 0.52 for fuel injected cars. These adjustment factors are higher than adjustment factors for other RVP-related emissions. It is not clear why the adjustment factors are higher for running losses.

No supporting documentation for the hot soak and diurnal emissions adjustment factors are presented in the TSD. As a result, it is difficult to reconcile the results of the emissions reductions analysis with the results of the emissions reductions analysis conducted during the Phase 1 RFG rulemaking. (Unocal)

Agency Response: As has been discussed in Appendix 13 of the TSD, the staff developed the adjustment factors for RVP-related emissions using all available data. For running losses, the staff used the carbureted and fuel-injected vehicle data and developed a correlation to estimate running losses as a function of true vapor pressure. Application of this correlation resulted in the RVP adjustment factors for carbureted and fuel-injected vehicles. The diurnal and hot soak adjustment factors were also developed by the use of data from studies conducted by the ARB, Automotive Testing Laboratory, and the American Petroleum Institute. The RVP (diurnal, hot soak, and running loss emissions) adjustment factors are ratios of the emissions determined at 7.0 psi RVP to those emissions determined at 7.8 psi RVP. The running loss adjustment factors for carbureted cars may be higher, but the actual reduction in mass emission are much lower.

108. Comment: On page 16, paragraph 3, line 7 of the TSD, the statement: "The results presented in these tables (II-10) indicate that there are significant reductions in VOC, CO and NOx exhaust emission when gasoline DI is lowered together with RVP" is not accurate. ARB was comparing gasolines (fuel 1-5) containing MTBE to baseline gasoline (fuel 0) which did not contain MTBE. (WSPA)

Agency Response: We believe the comparison is correct. The staff compared gasoline currently being produced in the state (Fuel 0) to gasolines that could be produced by a realistic refinery designed to meet the experimental values for RVP and DI (Fuels 1-5). WSPA participated in the design of the specifications and blending of these fuels so that it would be realistic and representative of fuels that could be produced by a refinery. Blending with MTBE is a realistic way to achieve gasolines with low DI and low RVP. Any other approach would have been less realistic.

109. Comment: Staff states on page 20 of the TSD that Figure II-8 & 9 show slight increases in emissions when RVP is lowered at a constant DI. In this case, none of the emissions changes presented in these figures show any statistically significant changes, based on the confidence intervals shown. (Unocal)

Agency Response: The staff stated in the TSD that these changes in exhaust emissions are not statistically significant, and that they will most likely be out-weighed by the evaporative emission benefits resulting from reducing RVP to 7.0 psi.

3. Sulfur Content

110. Comment: Auto/Oil Technical Bulletin No. 2 specifically states that ". . . it is not possible to draw any conclusions about the linearity or non-linearity of the response curve." Despite these conclusions linearity was assumed by staff, and the results extended to all vehicle classes from 1975 and on. (Unocal)

Agency Response: Auto/Oil Technical Bulletin No. 2 presented results from tests conducted to evaluate two fuels at different sulfur levels. Based on the Auto/Oil data, propriety data provided by ARCO, and the staff's evaluation of the effects on catalytic efficiency (TSD p. 31) the staff assumed that the reduction of fuel sulfur content will result in linear decreases in vehicle tailpipe emissions. Staff assumed that the Auto/Oil regression equation for the 1983-1985 model year vehicles, modified to include the sulfur effects, is applicable to the 1975-1980 vehicle class. Staff also assumed that the older vehicle regression, with the fuel sulfur factor removed, is applicable to non-catalyst vehicles. Finally, the Auto/Oil regression analysis for the current vehicles was assumed to apply to the 1991-1995 model year vehicles. For medium duty and heavy duty trucks, staff assumed that an average of the non-catalyst vehicles and the 1975-1980 model year vehicles would be representative of the benefits for these vehicles.

The staff was also aware that additional testing was being conducted by Auto/Oil to evaluate the effects of sulfur at levels ranging from 50 ppm to 450 ppm in increments of 100 ppm. The purpose of these tests was to determine the linearity of the effect of sulfur on vehicle emissions. Although results from these tests were not available to be included in the TSD when it was published, preliminary results were provided to staff prior to the November 21, 1991, Board hearing. The results supported the staff's assumption that the effect of reducing sulfur on emssions could be conservatively approximated as a linear function.

111. Comment: Page 29 of the Staff Report shows the lower Auto/Oil sulfur level is 46 ppm. Elsewhere, it is correctly identified as 49 ppm. Because of the lack of supporting calculations, it is unclear which number is being used as a baseline for further extrapolation. (Unocal)

Agency Response: The figure on page 29 was a typographical error. The baseline sulfur level of 49 ppm was appropriately used by staff in all of the calculations regarding the reduction in sulfur emission.

112. Comment: We question the validity of the data for older cars since the Auto/Oil sulfur work was performed only on current technology cars. (WSPA)

Agency Response: The behavior of sulfur on the catalyst in a catalytic converter is expected to be independent of the vehicle model year. As long as the catalysts in the catalytic converters are similar, the reductions in sulfur emissions should also be similar. A detailed discussion of catalyst deactivation is presented on pages 30-31 of the TSD. Catalytic converters have been in use since before 1980, and the catalysts used in older vehicles are similar to those used in current vehicles. Therefore, we believe it is valid to use the Auto/Oil data on sulfur level for older vehicles.

113. Comment: Staff assumes that the emission impacts on medium- and heavy-duty vehicles is the average of non-catalyst and 1975-1980 vehicles. There is no support presented for this assumption. By including a component of catalyst-equipped vehicles, staff is inflating the emission benefits over what they would be if only non-catalyst vehicles were included due to taking credit for a sulfur effect. (WSPA)

Agency Response: Because a portion of the medium- and heavy-duty vehicles are equipped with catalytic converters, it is appropriate to include in the analyses the effects of sulfur on emissions from these classes of vehicles. Due to the lack of data on the distribution of vehicles with and without catalytic converters, the staff in calculating the emission impacts used an average of the emission benefits for non-catalyst and 1975-1980 vehicles equipped with catalytic converters. We believe this is a realistic assumption. In addition, the emissions from these vehicles constitute only a small portion of the inventory, and their overall effect on the emission inventory is very minor.

114. Comment: No sensitivity study of the effect of sulfur on exhaust emissions was done. (WSPA)

Agency Response: The effects of sulfur on gasoline emissions were discussed in detail on pages 30-32 of the TSD. The TSD included results from the Auto/Oil findings on the effects of fuel sulfur content on tailpipe emissions.

115. Comment: Staff makes an assumption that the sulfur effects on criteria pollutants is linear (TSD p. 53), and proceeded to calculate emission effects on that basis (TSD p. 54). The presentation of the expected emission impact from sulfur reduction (TSD p. 54) contains an

error. The analogous data, prepared from review of the Auto/Oil Technical Bulletin cited by staff, is presented below:

Pollutant	% Change	%Change /ppm
VOC	-16.1	-.039
CO	-12.9	-.031
NOx	-9.0	-.022

We are concerned that staff presented incorrect data on this table (TSD p. 54), and are not sure that the correct data was used in the analysis of sulfur effects. (Unocal)

Agency Response: The data shown above are identical to those presented on page 54 (2nd and 3rd line) in the TSD. The staff used the correct data in the analysis of the sulfur effects.

116. Comment: Table III-6 in the TSD presents staff's assessment of the emission impacts of Phase 2 reformulated gasoline based on the Auto/Oil regression equations, modified to include sulfur (TSD p. 54). These results are based on an assumption of linearity and are based only on the first phase of the Auto/Oil emission program. Staff further states that the results of the second phase of the program were due in early October (TSD p. 53). Based on Unocal's review of the results of the Auto/Oil sulfur work, there are no statistical differences in NOx and CO when sulfur is reduced from 150 ppm to 50 ppm. The result of staff's assumptions is an overstatement of the predicted emission impacts for Phase 2 reformulated gasoline in Table III-6. If the effects of sulfur on NOx and CO are reduced to zero, as suggested by the Auto/Oil data, Table III-5 shows the following result:

Pollutant	Unocal Assessment Current Fleet	Staff Assessment Current Fleet
CO	-14.3%	-18.1%
NOx	3.8%	1.2%
VOC	-19.6%	-19.6%

The data presented above are only for current technology cars, because the Auto/Oil sulfur work was performed on ten of the twenty current technology cars used in the program. Based on this assessment, the NOx increase predicted from the staff's proposal is more the three times that predicted by staff using the assumption of linearity, due to the lack of sulfur effect on NOx. The CO benefits are also reduced by incorporation of the latest sulfur data. Staff's inclusion of the sulfur effect on CO and NOx significantly distorts the emission benefits and thus the cost-effectiveness calculations. (Unocal)

Agency Response: The Auto/Oil data do not suggest a zero effect on CO and NOx. The results of the Auto/Oil sulfur study published in Auto/Oil Bulletin No. 2 show that reducing the sulfur content of gasoline from 466 ppm to 49 ppm reduced NOx emissions by 9 percent and CO emissions by 16.1 percent. In calculating the emission benefits for Phase 2 reformulated gasoline, the staff assumed there are proportional

emission benefits when sulfur is reduced from 150 ppm to 30 ppm. Also see the response to Comment 109 for an additional discussion of the emission benefits due to reducing sulfur content.

It is not clear what assumptions and methodology Unocal used to arrive at the conclusion that there are zero NOx and CO benefits when the sulfur content is reduced from 150 ppm to 50 ppm. It is true that when additional data become available the emission benefits will be more precisely defined. However, we do not expect that new data will contradict the existing Auto/Oil sulfur data because it is known that sulfur adversely affects catalyst behavior. Lowering the sulfur content of gasoline will always reduce emissions and in no case should there be zero emission benefits as assumed by Unocal.

117. Comment: Staff assumes that 100 percent of fuel sulfur is converted to sulfur dioxide. No justification or references are provided to substantiate this assumption. (Unocal)

Agency Response: There are no data available which show that fuel sulfur is not converted to sulfur dioxide. The staff has used this assumption many times in the past in the development of other fuel regulations, and it has never challenged by oil industry. Its theoretical basis is sound.

118. Comment: The chart on page 60 of the TSD shows an increasing volume of gasoline from the years 1996 through 2010. This forecast is unsupported and ignores any potential impact from the ARB's own mandated LEV and ZEV program. It also ignores the fact that federal control programs (i.e. oxygen program) would lower sulfur levels even if sulfur was not controlled. (Unocal)

Agency Response: The staff did not ignore the impact of the LEV and ZEV programs. The impact of LEV penetration on gasoline consumption is discussed in Chapter VI-C of the TSD. The staff's projection is based on the assumption that Phase 2 RFG will be clean enough so that low-emission vehicles could meet the regulatory requirements by using Phase 2 RFG and that low-emission vehicle will be operated on Phase 2 reformulated gasoline. The projected gasoline volumes are based on projected vehicle miles traveled (VMT). VMT projections are part of the EMFAC emission model developed by the ARB's Technical Support Division. The anticipated impacts of the LEV/CF Regulations have been included in EMFAC.

As to the comment that the sulfur level will be lower even if sulfur content is not controlled, the staff based the emission benefit on Phase 1 gasoline and did not evaluate the benefits associated with the Federal programs. See the response to Comment 83 for staff's discussion on the reason for using Phase 1 gasoline as the emission baseline.

4. Olefins Content

119. Comment: The Ford and ARCO data seem to show similar NOx effects. A review of Table III-7 indicates that the Ford fuel had significantly lower olefin content than other fuels tested in programs cited by staff. Both Auto/oil and the Unocal program cited by staff indicated that olefins have a significant effect on NOx emissions. It is not clear if there was an adjustment made by staff to account for these differences. (WSPA)

Agency Response: Ford only tested one fuel on very few vehicles. Due to the small number of vehicles tested, the staff could not integrate the Ford data with data from the other studies. Although the staff did not include the Ford data in the emission reduction calculations, these data do support the staff's conclusion on the emission benefits.

120. Comment: Table II-15 and Table II-16 in the TSD showed the sensitivity of exhaust emissions to olefins and aromatics respectively. The reductions were calculated based on Phase 1 gasoline. Same comment as on Table II-12 apply to these two tables also. (WSPA)

Agency Response: The staff believes that the current production gasoline (Phase 1 gasoline) is the appropriate baseline fuel to use in calculating effects of further control strategies for vehicle emissions. The use of a fuel from the future as the baseline fuel in a sensitivity analysis is just a manipulation of numbers and will not affect the conclusion of the analysis. Also see the response to Comment 83.

121. Comment: By decreasing the butane content of gasoline, the concentration of longer chain saturated hydrocarbons and olefins will increase. Tests have shown that as a result unburned olefins will increase in the exhaust. (MECA)

Agency Response: It is true that increased olefin content in the fuel will increase unburned olefins in the exhaust. However, the Phase 2 RFG specifications include a limit on olefin content. This limit would result in a significant reduction from the current olefin content, thus resulting in an overall decrease in unburned olefin the exhaust. Although an oil company has argued that increases in longer chain saturated HC could result in increases of olefins in the exhaust, the Auto/Oil results do not support this conclusion. All of the data evaluated by staff show that the Phase 2 RFG specifications will result in an overall reduction in the reactivity potential of vehicle exhaust. Also see the response to Comment 26.

122. Comment: The text on the olefin specification in the Staff Report and TSD is inaccurate and the calculations are confusing and contradictory to the text. Unocal is neither able to determine from

staff documentation how any emissions reductions have been determined or attributed to olefin reductions, nor able to determine how any emission reductions from olefin reductions have been utilized as part of the overall total. Finally, staff has provided no rationale for allowing the increases in VOC that will occur in all cars from the reduction of olefins. (Unocal)

Agency Response: The staff proposed an olefin specification based on the belief that reductions in NOx emissions will occur from reducing the olefins content of gasoline. Table II-15 of the TSD shows the potential emissions impacts from the base case gasoline (Phase 1 gasoline) to gasoline fuels that, with the exception of their olefin content, have properties similar to those of Phase 2 RFG. The olefin content of these fuels ranged from 5 to 15 percent.

As discussed in the responses to comments on other specifications, the staff in calculating emission benefits did not look at individual parameters. Each parameter was evaluated as a part of the overall change to gasoline. Changes in the olefin content combined with changes in the aromatics content, T50, T90, sulfur content, oxygen content, benzene content and RVP resulted in the emission benefits that were discussed in Chapter II of the TSD. In addition to reducing the exhaust emissions of NOx, we also believe that by reducing the olefin content, we will be reducing what are referred to as light olefins--olefins that have carbon numbers of 3 to 5. Light olefins are very volatile and have very high reactivities.

5. Aromatic Hydrocarbons Content

123. Comment: Unocal questions the need for control of heavy aromatics, which is being considered by staff. Our analysis indicates that ARB's proposed specifications will reduce C8+ aromatics by over 60 percent, and C9+ aromatics by over 50 percent. We are concerned that greater reductions will require very costly reductions in aromatics and T90. (Unocal)

Agency Response: Staff had considered a limit for heavy aromatics because General Motors had provided data which showed that reductions in C8+ aromatics would result in reductions of vehicle emissions mass and reactivity. After considering the comments regarding heavier aromatics, we have not included a limit specifically for these aromatics in the adopted Phase 2 RFG specifications. We agree with the commenter that reductions in total aromatics and T90 will result in some reductions of the C8+ and C9+ fractions.

124. Comment: The staff notes that the data on Table II-16 (TSD p. 40) was arrived at ". . . by using the results of the Auto/Oil and the ARCO study on a combined emissions analysis. . . ." It is not clear from the description how these study results were combined. In fact, in the discussion of the aromatic hydrocarbon specification in the Staff Report (p. 30), there is no mention of the ARCO study. In the

interpretation by staff of Table II-16 (TSD p. 40), there is no description of the logic used in determining the level at which to set the (aromatics content) specification. Staff states that older and newer cars react to lower aromatics levels in opposite directions for VOC and NOx. Based on the information presented, there is no support for the 25 percent level chosen. (Unocal)

Agency Response: The staff based the proposed aromatic hydrocarbons limit for Phase 2 RFG on the optimum combination of properties that will achieve maximum reductions in emissions (VOC, NOx, SO_2, CO, and toxics) in a cost-effective manner. In its proposal the staff sought to optimize the behavior of the fuel as a whole. Emissions test data for the ARCO and the ARB/GM confirmation studies on fuels with properties similar to those of Phase 2 reformulated gasoline indicated the appropriate level of aromatics.

An optimized fuel formulation will balance out the effects of other fuel properties. Test results showed that at the aromatic hydrocarbons level of 25 percent, there will be significant reductions in VOC from in use vehicles and a minor reduction in NOx emissions. Reducing aromatic hydrocarbons will also reduce the reactivity of the fuel. This level will result in the maximum reduction in emissions at reasonable cost-effectiveness values.

125. Comment: A study conducted by Unocal that was mentioned in the analysis of setting the T50 specification is not mentioned when discussing aromatics. One of the conclusions of the Unocal study was that aromatic content of gasoline does not affect tailpipe emissions. (Unocal)

Agency Response: The commenter is correct that the Unocal study was not mentioned in the discussion of the aromatic hydrocarbons specification. During the development of the Phase 2 reformulated gasoline specifications, the staff considered all of available data, including the results from the Unocal Study. While the Unocal results showed that fuel aromatic hydrocarbons content does not affect vehicle exhaust emissions, other studies, including Auto/Oil, vehicle emission tests conducted by ARCO, and the ARB/GM confirmation tests showed that aromatic hydrocarbons do affect vehicle exhaust emissions. However, due to the fact that the Unocal data are neutral, it did not play a role in the calculation of the reductions of emissions due to changes in fuel aromatic hydrocarbon content. The results of the Unocal study and the effects of aromatics on emissions are shown in the correlations presented in Appendix 13 of the TSD.

6. Oxygen Content

126. Comment: Figure II-6 and II-7 in the TSD compared fuel 2 which contained MTBE, to fuel 0, which contained no MTBE. Just to make a point: Figure II-8 and II-9 compared fuel 2 to fuel 1, both

containing MTBE, and there were no significant differences in emissions. (WSPA)

Agency Response: These figures were generated with data from the GM/WSPA/ARB Volatility Study and were designed to illustrate the effects on vehicle emissions when RVP is lowered at different driveability indexes. Figures II-6 and II-7 present the difference in emissions when RVP is reduced from 7.8 to 6.8 psi while DI is lowered from 1199 to 1099. Figures II-8 and II-9 present the difference in emissions when RVP changes from 7.8 to 6.8 psi when DI is held constant at a value of 1096.

The comparisons of the fuel pairs are correct. The study was designed primarily to look at the effect of lowered RVP and driveability indexes. The fuel without MTBE was selected as a fuel representative of current in-use fuels.

127. Comment: Auto/Oil and Unocal independently varied oxygen content in parametric tests. Auto/Oil concluded that "The modeling results show no clear effect of total aromatic content or MTBE content on ozone levels." Similarly, Unocal found that MTBE, in itself, had no effect on hydrocarbon (HC) reductions. (Unocal)

Agency Response: Although the Unocal study found that MTBE content has no effect on emissions, it did find that T50 affects vehicle emissions. T50 is dependent on MTBE (an oxygenate) concentration because studies have shown that the addition of MTBE will affect a fuel's T50 value. Therefore, the addition of MTBE has an indirect effect on vehicle emissions. Test data evaluated by staff indicated that there are reductions in VOC emissions at the 2 percent fuel oxygen level. In addition to reductions in VOC emissions, oxygenates would result in substantial reductions in CO emissions.

128. Comment: The Staff Report states that oxygen effects vary, based on the type of oxygenate used and the vehicle type, and that certain oxygenates increase vapor pressure and specific toxics. A summer maximum level could be justifiable relative to its potential for NOx increases; but there is certainly much doubt and conflicting information regarding any ozone reduction benefits from a minimum standard. (Unocal)

Agency Response: The optimum fuel package that was determined by the staff to have the maximum emission benefits at cost effective levels included oxygenates at a 2 percent oxygen content level. In addition, the specified minimum limit on oxygenates in the summertime will help assure reductions in CO emissions during the summertime months. A refiner is also provided with flexibility in creating an alternative gasoline formulation tailored to its refinery configuration if it is proven through testing (or, upon adoption, by application of the predictive model) that such a formulation results in no greater emissions than gasoline meeting the Phase 2 RFG specifications. There

is no summertime minimum oxygen content cap for alternative gasoline formulations.

7. T90

129. Comment: We would like to emphasize that the ARB Staff Report provided little technical justification in terms of emission reductions for many of the more stringent and costly changes such as T90. (Mobil)

Agency Response: As stated in the Staff Report (Chapter V.A.) and the TSD (Chapter III-D), the emission reductions are based on data from several vehicle emission testing programs. Some of these test programs evaluated fuels which have parameters similar to those of Phase 2 RFG. T90 is one of the parameters that was evaluated as part of the Auto/Oil program. Results from Auto/Oil showed that T90 has a significant impact on vehicle emissions. Pages 28-30 of the TSD contain a detailed discussion of the effects of T90 on vehicle emissions and the technical justification for the proposed T90 limit.

130. Comment: On page 27 of the Staff Report, the staff has not addressed the impacts of incremental changes in the proposed specifications. This needs to be assessed in detail. Several of the proposed parameters (aromatics, olefins, T90) provide little or no incremental benefits and, in some cases, a negative benefits occurs. (Chevron)

Agency Response: The impacts of the various proposed parameters on vehicle emissions were discussed in the Staff Report (Chapter III-A). Emission reductions resulting from changes in the properties of gasoline vary among the vehicle groups. While some of the Phase 2 reformulated gasoline parameters may result in some emissions increases from one vehicle group, they could result in emission reductions from other vehicle groups. Therefore we believe that it would only be appropriate to look at the combined effect of the proposed parameters for all vehicle groups and technology classes. An incremental analysis as suggested by the commenter will not provide a complete picture of the emissions impacts.

131. Comment: The magnitudes of the reductions in Table II-12 in the TSD were quite high (over 20 percent for HC and CO for the current vehicles). These reductions represent the reduction of Phase 2 gasoline over Phase 1 gasolines, as a result of all the differences in fuel properties (not just T90). From Table IV-11 (page 91) of the TSD:

	Proposed Phase 2	Baseline Phase 1
Aromatics, %	20	32
Oxygen, wt%	2	0
Olefins, %	5	10
T90, F	300	330
Sulfur, ppm	30	150

If the sensitivities were calculated comparing a Phase 2 gasoline with a change in T90 to standard Phase 2 gasoline with a T90 of 300°F, the change (or sensitivity) would be much lower. (WSPA)

Agency Response: We believe that it is appropriate to use the information presented in Table II-12 to evaluate the effect of T90 on emissions. Table II-12 shows the reductions in emissions from a baseline gasoline which meets the Phase 1 gasoline specifications when compared to a gasoline that meets all Phase 2 reformulated gasoline properties with the exception of its T90 value, which varied from 330°F to 290°F.

We also believe that current production gasoline is the appropriate baseline when evaluating future emission control strategies. By holding other parameters constant when varying T90, emissions changes due to T90 can be determined. The emission changes presented in Table II-12 illustrate the sensitivity of the T90 effect on vehicle emissions. Because the staff evaluated the direction as well the magnitude of the emission changes, the commenter's suggestion to use a different baseline for calculating the sensitivity of T90 on emissions would not have changed the staff's conclusion.

132. Comment: WSPA questions why staff would choose a T90 specification which by their own estimates result in increases in a major category of a criteria pollutant (NOx). (WSPA)

Agency Response: The proposed T90 value was based on the combined effect of all the Phase 2 reformulated gasoline specifications. Although changes in T90 alone could increase NOx emissions from older vehicles, it can also produce substantial reductions in HC emissions. However, changes of the other fuel properties balance out the adverse impact on NOx from the T90 specification.

8. T50

133. Comment: Staff used the Auto/Oil regression equations as a basis for assessing the emissions from Phase 2 reformulated gasoline. Note that there are fuel parameters not controlled (specifically T50) in the Auto/Oil program, that are being proposed as control measures by staff. The regression analysis employed by the staff using the Auto/Oil equations does not provide a means of separating the emission impacts. (Unocal)

Agency Response: The staff based the proposed specification on results from a number of studies in addition to the results from the Auto/Oil program. Because the Auto/Oil regression equations do not take into consideration the effect of T50 on emissions, the use of the Auto/Oil regression equations alone would probably have resulted in an underestimate of the emission benefits. That is why staff used two methods, the Auto/Oil regression equations and vehicle emissions test results, to determine the emission benefits. In fact, Unocal has evaluated the effects of T50, and it is the results from this study that form the basis for the T50 specification.

134. Comment: The ARB was selective in using models in the sensitivity studies of change in emissions with fuel properties. Most of the studies used the Auto/Oil regression equations which are probably the most accurate equations available. Yet in the T50 sensitivity study, they used the Unocal regression equations. There are considerable differences between these two models; for example, no sulfur, MTBE or T90 effects were found in the Unocal program. The ARB did not address the question of which model is more accurate, but used one model for some fuel properties and another model for other properties. (WSPA)

Agency Response: The staff used different models in the technical discussion of the effects of fuel properties on emissions. (see the response to Comment 74 for a description of the staff's method of analysis.) However, this approach did not enter into the evaluation of emission benefits. Therefore there is no need to address the comparative accuracy of the models. The Auto/Oil test results did not reflect the effects of T50 on vehicle emissions because the study was not designed to evaluate the impact of T50. The Unocal study was used in the discussion of the effect of T50 on emissions because it is the only study that evaluated T50 and provided a statistical analysis.

9. Toxics

135. Comment: Benzene emissions in the later years are controlled to a large extent by off-road vehicles. This is not alluded to at any place in the text and should be addressed. (Chevron, WSPA)

Agency Response: By "off-road vehicles" we assume that the commenter means "other mobile sources." This category includes off-road vehicles, but those vehicles contribute only a minor share of benzene emissions from all other mobile sources. The "other mobile sources" category includes all self-propelled vehicles--including boats, trains, planes, farm equipment, and construction equipment--that are not used on public roads.)

We agree that other mobile sources contribute a significant proportion of benzene emissions in later years. Page 79 of the TSD shows that by the year 2010 other mobile sources may account for 50 percent of the benzene emissions from gasoline-powered vehicles.

Additional regulations are being considered to control benzene and hydrocarbon emissions from other mobile sources.

136. Comment: Why are the benefits for toxic air contaminants based on an aromatic hydrocarbon content of 20 percent by volume? The benefits for criteria pollutant emissions are not based on this value. (Chevron)

Agency Response: The estimated benefit was based on a 20 percent volume average aromatic hydrocarbon limit. It is unclear what the commenter means when referring to the Phase 2 RFG criteria emissions not being based on this value. Page 54 of the TSD shows that criteria emissions are also based on the 20 percent aromatic hydrocarbon value.

137. Comment: The estimate of benzene emissions are 50-60 percent higher than Radian estimated for WSPA last year using ARB's recommended procedures. It is not clear why and how the emissions have increased. (Chevron, WSPA)

Agency Response: The factors that make Radian's estimates of benzene lower than ARB's estimates include:

- Radian used EPA's Mobile 4 model to estimate vehicular emissions of hydrocarbons, while ARB used the "planning inventory" version of BURDEN. BURDEN, which is the more modern of the two models, produces considerably higher estimates.

- Radian used a lower baseline estimate of benzene as a fraction of exhaust hydrocarbon. At 2.0 percent benzene in gasoline, Radian used 4.5 percent of benzene as a fraction of exhaust hydrocarbon, while ARB used 5.3 percent. ARB's value was set to be consistent with data measured by ARB on emissions vs. benzene content of gasoline in 88 cars.

- Radian estimated that the low-emission vehicle standards will cause much greater reductions of hydrocarbon emissions than what the ARB estimates. In 2010, the difference is 63 percent reduction vs. 28 percent. Radian did not show the derivation of this estimate.

- Radian assumed that future emissions from off-road mobile sources will be reduced by 50 percent from what is predicted under current controls. ARB generally does not believe it proper to assume effects for control measures that have not been proposed in specific terms.

138. Comment: We take exception with the best value of unit risk that DHS has generated for benzene. The DHS's current risk assessment is very conservative. The effect on cost-per-cancer-case-avoided of using less conservative values should be investigated. (Chevron, WSPA)

Agency Response: The Office of Environmental Health Hazard Assessment (OEHHA, formerly DHS) originally proposed a unit risk range for benzene of 22 to 170 excess cancers per million and later recommended a "best value of 29 excess cancers per million." Issues concerning the appropriateness of the unit risk values for benzene were addressed in a separate rulemaking in 1985. We believe the "best value" most fairly portrays the cost-per-case-reduced.

139. Comment: There are no overriding reasons to prefer one version of reformulated gasoline over another from the standpoint of emission reductions of toxics. Selection of specifications for California Phase 2 RFG should therefore be based on factors other than toxics benefits. (Sierra Research)

Agency Response: The reduction of toxic emissions was only one of several factors considered in the selection of which version of Phase 2 specifications to adopt. Overall environmental impacts and cost-effectiveness were other factors considered in the selection of the Phase 2 specifications. We disagree that there are no overriding reasons to prefer one version of Phase 2 RFG over another from the standpoint of toxic emission reductions. The differences in the percentage reductions among various versions of reformulated gasoline may not appear to be significant, but when these differences are examined from a standpoint of mass emission reductions they become more pronounced. Also, from the standpoint of criteria pollutants, the Phase 2 RFG specifications proposed provide the greatest reductions in criteria pollutants taking technological feasibility, economic impacts, and environmental impacts into consideration.

140. Comment: With regard to toxics, page 56 of the Staff Report states that reducing the olefin content of gasoline reduces 1,3-butadiene but not the other three toxic pollutants. No data are provided that supports this claim. The only data presented are for the simultaneous reduction of aromatic hydrocarbons, olefins, T90, and the addition of oxygen. No individual olefin test data is shown. (Unocal)

Agency Response: The statement that reducing the olefin content reduces the emissions of 1,3-butadiene but not the other three pollutants is derived from the Auto/Oil model. Table IV-12 of the TSD shows how the Auto/Oil model predicts changes for the individual Phase 2 RFG specifications. The table shows that reducing the olefin content from 10 percent to 5 percent reduces the 1,3-butadiene emissions by 11 percent for 1989 vehicles and 13 percent for older vehicles.

141. Comment: The staff states on page 91 of the TSD that no effect on toxic emissions is expected from the RVP limit. This is counter to the findings of the EPA in the development of the "simple model" for reformulated gasoline certification. The simple model for toxics includes terms that relate toxic emissions to RVP. We are

surprised that the staff did not take account of this well known effect. (Unocal)

Agency Response: The statement on page 91 of the TSD that "no effect is expected from the RVP limit" might be better stated as "no toxic emission benefit is being claimed by lowering the RVP limit". The EPA simple model found that as RVP decreases, evaporative and running loss benzene emissions also decrease. However, the EPA concluded that the vast majority of toxic emissions are exhaust related and would be affected negligibly by ambient temperature or RVP. Furthermore, the EPA simple model did not account for Phase 2 vapor recovery systems being in place and thus the evaporative benzene emissions become even more inconsequential.

142. Comment: We are not able to recreate the percent change in emissions of toxic compounds from implementing Phase 2 RFG specifications that is presented in Table IV-12 of the TSD. Based on our review of Auto/Oil Technical Bulletin No. 5, and the staff's description of it is not clear regarding how the effects in the table were determined. (Unocal)

Agency Response: Table IV-12 of the TSD is a summary of the percent change in emissions of toxic compounds from implementing Phase 2 RFG specifications. The table was derived by using the Auto/Oil regression model. Emissions for the four toxics (benzene, 1,3-butadiene, formaldehyde, acetaldehyde) were determined using the Phase 1 RFG baseline parameters. The emissions were then determined for a fuel utilizing one of the Phase 2 RFG parameters with the rest of the parameters remaining at the Phase 1 RFG values. The emission increase or decrease was determined relative to emissions of the Phase 1 RFG baseline fuel. This procedure was repeated to determine the percent change in emissions for each of the four parameters.

143. Comment: It appears the staff is trying to hide the true number of cancer cases in the base case in Table II-2 page 21 of the Staff Report. It appears that the base case may be 70. The staff claims a reduction of 35 for a 50 percent reduction, even though potency is only being reduced by 25 percent. It is not clear how these calculations have been made. (Unocal)

Agency Response: The commenter has confused the situation portrayed in Table II-2 with the baseline for calculating the effects of the Phase 2 limits on the potential cancer incidence. Table II-2 provides estimates of the potential cancer incidence corresponding to emissions from gasoline vehicles in the late 1980's. The combined incidence from the pollutants in the table is 126 cases per year over a hypothetical 70 years of constant exposure to a constant population. However, during the period after the Phase 2 RFG limits will go into effect, the vehicular emission inventory will have declined considerably (because of vehicular controls), and the corresponding baseline (no Phase 2 regulation) for cancer incidence will be less

(despite a population increase). Therefore an annual average reduction of 35 cases over the period 2000 to 2010 (stated on page 60 of the Staff Report) cannot be divided by a fractional reduction (the commenter suggests 50 percent for an undetermined reason) to arrive at a baseline number (70) that could be compared to the numbers in Table II-2.

In addition, the 25 percent figure is the fractional change in the potency-weighted sum of toxic emissions, not the fractional change in cancer incidence--which is about 40 percent. (The two differ because different toxic compounds have different lifetimes in the atmosphere.) Therefore, the number that could be (mistakenly) compared to the sum of numbers in Table II-2 is actually about 35/.40 = 88, not 70, cases per year. This is approximately the baseline averaged over the period 1996 to 2010.

The staff did not actually calculate a baseline number corresponding to 88 potential cancer cases per year because it was not needed in the calculations. Therefore, there was no number to "hide", as the commenter suggests. A baseline for the late 1980's was shown in Table II-2 for consistency with the preceeding section of the Staff Report, which emphasized the emission inventory of criteria pollutants in 1987.

10. Miscellaneous

144. Comment: In Section VII A.3. of the Staff Report, no attempt is made to quantify increased emissions from potential transport of pentanes rejected as a result of compliance with the lower RVP specifications. (WSPA)

Agency Response: The Staff Report does address increases in emissions of air pollutants from refineries to comply with the Phase 2 reformulated gasoline regulations. (pp. 79-81.) The Staff Report indicates that increased VOC emissions may result due to increased fuel combustion at the refinery, production of MTBE, handling of volatile organic compounds to meet the RVP specifications, and storage of refinery products. Additional emissions of NOx, CO, and PM10 may result from increased fuel consumption and increased gasoline processing at the refiner. The magnitude of the possible emissions increases cannot be estimated until the actual changes to refinery processes are identified.

Increases in these pollutants are expected to be minimized by using advanced pollution control equipment or low-emitting equipment, and by employing good operating practices and frequent maintenance. The pollutant increases at the refinery will be offset either by on-site emission reductions or by regional reductions due to the Phase 2 reformulated gasoline regulations. (Also see the response to Comment 294 and the findings on pages 6 and 7 of Resolution 91-54.)

145. Comment: In the environmental impacts section of the Staff Report, under natural resources (p. 81), there was no mention that major processing changes will be required including a significant increase in fuel requirements. Also, we would like an explanation of the sentence "the refiners have the option of air cooling towers at additional expense." (Chevron)

Agency Response: Page 80 of the Staff Report noted that fuel consumption might increase at refineries because of the installation of new process equipment. However, as discussed in the response to Comment 146, we expect that refiners may take this opportunity to improve energy efficiency of existing process units which could result in significant energy and fuel savings. Under these circumstances the effect of the Phase 2 RFG regulations on refinery fuel usage would be about neutral.

The addition of new process equipment will most likely increase the number of water-cooled towers in a refinery. Therefore there will be an increased demand on water at the refinery. However, this additional demand for water cannot be quantified until the actual changes to the refinery process are identified. In the event that a refinery is unable to obtain an adequate supply of water to meet its demands, the refinery does have the option to use air-cooled towers. This would increase the costs to the refiners because both the capital and operating costs for air-cooled towers are greater that those of water-cooled towers.

146. Comment: No mention was made on page 83, item 7, of the Staff Report regarding the significant increase in carbon dioxide (CO_2) emissions from the refinery processing facility to meet the Phase 2 RFG regulations. This should be addressed. (Chevron)

Turner, Mason & Co. estimated an increase in total California refinery emissions to produce reformulated gasoline meeting the ARB staff October 4 proposal in tons per day as shown in the following Table:

	Flat Limits	Average Limits
SOx	0	(5)
NOx	5	1
CO	7	1
PM	3	0
CO_2	22,000	8,600

(TM)

Agency Response: The Staff Report (pp. 80 and 82) identifies increases in refinery emissions that will occur due to increased fuel consumption at the refinery. Since CO_2 emissions result from fuel combustion, increased fuel combustion would increase carbon dioxide emissions. However, the staff believes that increases in carbon dioxide emissions cannot be easily quantified.

The Turner Mason analysis indicates that for the scenario approved by the Board (with the expanded availability of averaging) there would be increases in CO_2 emissions of 8,600 tons/day. However, Turner Mason did not take into consideration the significant fuel efficiency improvements that refiners are likely to implement as a result of the Phase 2 RFG regulations. Refiners are expected to modernize their processes and improve performance of existing process units in the process on modifying their refineries to comply with Phase 2 RFG requirements. That will result in improvements to the refineries' energy efficiency with accompanying reductions in fuel consumption and CO_2 emissions.

C. ECONOMIC IMPACTS

1. Cost of Compliance

147. Comment: The staff's cost estimates are based on very limited information obtained from a small number of refiners which are not representative of California's refining industry. (WSPA, Texaco)

The cost of the new gasoline will be 23 cents per gallon, not 16 cents per gallon as estimated by staff. (WSPA)

Agency Response: In performing the cost calculations in the Staff Report and the TSD, staff utilized all data available. The staff requested data from all refineries in California, but only six refineries provided data. The information received covered small, independent, and large refiners. We believe these data are representative of the California refining industry, and provide a clear indication of the impact of staff's proposal on a cross-section of California's refining industry. The information submitted by industry depicts differences in cost due to economy of scale and processing capability. The costs to other individual refineries would, on average, be expected to be similar to the costs presented by staff with the exception of those refineries which may need to make investments in order to become more efficient and competitive even in the absence of Phase 2 RFG requirements.

In some cases, the information provided by individual refiners corroborated the trends indicated by the study prepared by Turner, Mason and Company (Turner Mason) for the oil industry. However, staff believes the data received from the refiners in the staff's survey depicts the most realistic likely effects of the regulations. This is because the data were provided by refiners themselves and are based on real refinery configurations rather than on the composite hypothetical linear programming refinery model that was used in the Turner Mason study. Turner Mason sought to use the linear programming model as the basis for assessing the aggregate costs of the Phase 2 RFG regulations on the entire California refining industry. This approach, while widely accepted as appropriate at the refinery level, is generally not as accurate at the composite/aggregate level because of the assumptions in creating a composite model. A composite model which reflects an entire industry masks the differences in terms of costs from refinery to refinery, and will inherently have more error when assessing future scenarios. Industry's use of an LP model desensitized the analysis to the small and independent segments of the refining industry.

It should also be noted that the cost data supplied by refiners did not include any optimization of refinery modifications to minimize capital expenses. Thus the staff believes these costs to be conservative (i.e., higher than actual), and more refined cost projections would be expected to support a lower cost estimate. Lower costs would improve the cost-effectiveness of Phase 2 RFG and would provide further support for the Phase 2 RFG regulations.

A discussion of the staff's analysis of increased production costs (for the staff's original proposal) is shown on pages 132 to 137 of the TSD. From this discussion, it is clear that increased costs vary from refiner to refiner, but will in general be in the range of 12 to 17 cents per gallon. Also included in the discussion is the effect of LEV penetration on production costs.

The set of specifications in the regulations approved by the Board at the public hearing will provide, in comparison to the staff's original proposal, 95 percent of the emissions benefits at 85 percent of the cost.

148. Comment: Our California refining industry model with seventeen conversion refineries could over-optimize relative to individual refinery models. (Turner Mason, WSPA)

Agency Response: While the comment is not explicit, the commenter is implying that because the linear program models may over-optimize relative to some individual refinery models, the end result when calculating the effects of staff's proposed specifications will be a lower cost impact. In other words, the model will underestimate the costs of the regulations with respect to some individual refineries.

The Turner Mason LP model is claimed to be designed to be representative of an "average" California refinery. Moreover, within California, there is great variability among individual refineries. On the one hand, newer refineries, such as Arco's, may provide for reduced compliance investment requirements due to the synergism found relative to the efficiency associated with newer technology equipment. On the other hand, older refineries would require increased investment requirements due to the limitations associated with older process units. The commenter is stating that because the LP model is supposed to be an average refinery, the model could over-optimize relative to a straight comparison with an older refinery, which would tend to require increased capital investment.

We do not agree with the commenter for several reasons. We believe that Turner Mason incorporated very conservative assumptions into the LP model which would tend to increase the result and cost of compliance. For example, the Turner Mason model incorporates the assumption that MTBE costs are dictated by investment into Middle East world-scale MBTE production facilities. Along with insufficient justification for this assumption, it also precludes the very real possibility of in-house production of oxygenates. The end affect is that the model results will be skewed towards a higher cost. Also, Turner Mason assumes that pentanes will be added to the petrochemical market at a conservative (lower) cost, while intermediate blendstocks will be purchased at a higher cost. Based on information received from refiners, this is not the case. Some refiners have indicated that while some pentane rejection may occur (due to low RVPs), choices are available to make the best use of the rejected pentanes. For example, rejected pentanes could be isomized for TAME production, or sent to a

cogeneration facility for electricity generation. These alternative scenarios will yield lower cost of compliance that the Turner Mason assumption will suggest.

149. Comment: We recommend that staff use a capital cost factor of 0.242, based on: 15 percent rate of return, 15 year project life, two-year construction delay, 34 percent Federal tax, 5 percent state tax, and 10 year DDB tax life. (Chevron)

Agency Response: Staff's analysis of the cost of compliance contained in the Staff Report and the TSD did utilize some of the suggested economic assumptions. For example, staff used a 34 percent federal tax rate and a 15 year return on investment (TSD, pp. 132-135). However, staff does not agree with the suggested 15 percent interest rate; the cost of capital used by staff was based on current interest rates. It is not appropriate to base the cost analysis on a 15 percent return when the prime lending rate is 7 percent. Also, the inclusion of a two year construction delay is not appropriate since all refiners (other than small refiners) currently producing gasoline will be required to comply on the same date. If the two year construction delay is assumed to result in interest expenses for construction financing, such expenses would be inappropriate. Financing typically occurs at the time permits are issued, when there is essentially no risk of delay.

150. Comment: In calculating costs of compliance, ARB staff used the highest cost scenario when assuming M-85 penetration into fuels market, which is predicated on all TLEVs, LEVs and ULEVs utilizing M-85. This approach conflicts with staff's previous approach of minimizing capital investment requirements for Phase 2 RFG refinery modifications. (WSPA)

Agency Response: WSPA has not provided a clear comment on the subject of cost-of-compliance determination. For example, it is unclear what the "highest cost scenario" represents and it is unclear what WSPA means when it characterizes staff's analysis as an approach of minimizing capital investment requirements for the Phase 2 RFG regulations. However, our interpretation of the comment is that WSPA is interested in the justification for the apparent contradiction in the cost analysis methodology, which assumed lowest investment costs to determine cost of compliance, and then utilized a higher cost scenario of determining increased production costs of reformulated gasoline. (TSD, pp. 135 to 137). Based on this assumption, we believe that WSPA contends that the higher cost scenario is based on the assumption that M85 will displace gasoline demand because future TLEVs, LEVs and ULEVs will require M85 exclusively. By reducing the gasoline demand, the overall investment costs for the refiners will be recovered by marketing a smaller volume, thereby increasing the price per gallon and causing a contradiction with the previous approach of minimizing cost.

In the context of this characterization of the comment, the methodology was consistent with previous approaches, and not

contradictory as claimed by WSPA. When calculating cost-effectiveness, staff attempted to be conservative whenever accurate information was not available. With respect to the cost of compliance, staff has confidence in the estimated investment costs requirements provided by refiners because these estimates represent actual impacts on the specific refineries, not hypothetical projections provided by the linear programming model developed by Turner Mason for the oil industry cost study.

In calculating increased production costs, staff provided two separate scenarios. These scenarios are shown graphically in Figure VI-2, page 136 of the TSD. In one scenario, staff assumed 100 percent usage of gasoline in the LEV fleet. This establishes a lower limit for the cost per gallon, based on increased production cost. In the other scenario, staff assumed that 50 percent of the LEVs will utilize gasoline and 50 percent will operate on alternative fuels. Because the level of M85 penetration is uncertain at this time, the staff performed the multi-scenario analysis of the increased production cost analysis. This scenario is provided for comparison purposes only, but accounts for a more realistic scenario where the gasoline demand will be offset by TLEV and LEV fleets designed to operate on M85. As indicated by staff on page 135 of the TSD, the actual case will likely be somewhere between the two scenarios.

151. Comment: The economic approach used to determine the cost of complying with the benzene limit is incorrect. Ten percent value for money is not adequate, tax rates are not additive, capital depreciation is not an annual outlay, and operating costs cannot be prorated on the volume of gasoline produced. (WSPA)

Agency Response: With the dramatic decline in interest rates and inflation in recent years, the cost of capital has fallen sharply, thereby justifying a ten percent value for money. Interest rates have dropped to the lowest level in 29 years. Tax rates are not considered by the staff to be additive. The effective corporate tax rate is considered to be about 40 percent, considering the state and federal tax rates of 9.6 and 34 percent, respectively. Capital depreciation is not considered to be an annual outlay. However, staff considers that annual tax payments will be lowered as a result of the expenses (including depreciation of new equipment) associated with the Phase 2 RFG regulations.

Operating costs or periodic costs are only prorated on the volume of gasoline produced for the hypothetical case in which gasoline demands decline after 1996 as low-emission vehicles are introduced and use alternative fuels rather than gasoline. For this case, it is necessary to reduce the estimate of operating costs from the values corresponding to meeting the declining gasoline demand. Lower production would entail lower uses of energy and utilities, which are major cost components. It may true that some elements of operating costs (for example, property insurance on process equipment) would not decline as less gasoline is made. Thus, if the operating cost portion

of the overall cost of Phase 2 RFG was well known, there would be reason to isolate the components of operating cost that depend on the volume of production from the components that do not depend on volume and to treat the two components separately. However, except for the benzene limit, the operating cost portion of the overall cost was not well known. Thus a more precise adjustment of operating cost according to volume was not justified.

152. Comment: No mention was made of the impact of off-road vehicles on the benzene regulations and cost-effectiveness. This needs to be corrected. These vehicles have a significant impact in the latter years on total benzene emissions yet they consume only a minor portion (approx. 2 percent) of the total gasoline used in California. (Chevron)

Agency Response: We do not understand the meaning of "the impact of off-road vehicles on the benzene regulation". The regulation does not address particular types of vehicles; it applies to all motor gasoline offered for sale, without reference to what kind of motor vehicle may use the gasoline.

The phrase "impact of off-road vehicles on...cost-effectiveness" also is not clear. Perhaps the commenter is referring to the emission reductions from off-road vehicles, due to the benzene limit, and the cost of meeting the benzene limit in the gasoline used by those vehicles. Under this assumption, the assertion that "no mention was made" is misleading. The estimates of the reductions of benzene emissions and of the attendant risk include elements from off-road vehicles (as well as from other classes in the "other mobile" vehicle category). These elements are explicitly shown in Appendix 1 of the TSD. The cost of the benzene regulation applies to all gasoline, including whatever portion is used in off-road vehicles. Therefore, our estimate of the cost-effectiveness (cost per unit or reduced emission or cancer incidence) contains both the cost of gasoline destined for the off-road vehicles and the emission reductions from those vehicles.

153. Comment: Off-road vehicles provide a disproportionate share of any reduction in benzene emission in later years. It is not shown or explained that this has a major impact on the whole rulemaking process. It should also be addressed in the regulations how the dominance by off-road vehicle of benzene emissions impacts the overall cost to initiate this regulation. Off-road vehicles consume only about 2 percent of the total gasoline that is used in California. (Chevron, WSPA)

Agency Response: By "off-road vehicles" we assume that the commenter may mean "other mobile sources." The latter includes off-road vehicles, but those vehicles contribute only a minor share of benzene emissions from all other-mobile sources. ("Other mobile" includes all self-propelled vehicles--including boats, trains, planes,

farm equipment, and construction equipment--that are not used on public roads.)

It is not clear what the commenter refers to by "disproportionate share". By "disproportionate share", the commenter may be referring to the much greater benzene emission reductions per vehicle among the other-mobile sources than among the on-road vehicles. The relative contributions of the on-road vehicles and the other-mobile sources to reductions of the potential cancer incidence due to benzene are shown on pages 1-26 to 1-29 of Appendix 1 of the TSD. The relative emission reductions are in the same proportions.

The commenter does not suggest how the matter of other-mobile source emissions (whatever the meaning) could be "addressed in the regulations". Also, the meaning of "cost to initiate this regulation" is not clear, nor is the asserted relationship between emissions and costs. The commenter may be alluding to a much lower cost if only the gasoline used in "other-mobile sources" had to meet the Phase 2 RFG limit on benzene content. Such a restricted regulation would produce only about one-third the emission reduction of the adopted regulation.

The staff evaluated the idea of limiting the benzene content of only the gasoline used by other-mobile sources and found no way to ensure that such special gasoline would be directed to the other-mobile sources. There could be no assurance that the much more plentiful unregulated gasoline would not be used in such sources. Therefore, the idea does not provide a reasonable alternative to the adopted benzene limit for all gasoline.

154. Comment: Page 64 of the Staff Report states that the Federal Clean Air Act requirements can be met by just changing refinery operating conditions. We do not agree with staff's assessment that meeting the proposed benzene limit will not require additional investment beyond what is required for meeting the requirements of the federal reformulated gasoline program. This is based on the fact that due to other ARB specifications, additional benzene will be created in other processing units and will have to be further processed to comply with the standards. Facilities will have to be added to remove benzene at a minimum, and other facilities may be required to produce oxygenates. The paragraph should be corrected accordingly. (Chevron)

Agency Response: The discussion in the Staff Report was intended to provide information on the effects of the implementation of the FCCA requirements on the costs of Phase 2 RFG. The staff's conclusions are that implementation of the FCCA requirements can be done in such a way so as to be consistent with the implementation of the Phase 2 RFG standards. For some refiners, benzene levels are low and therefore the needed benzene reductions might be achieved through process changes and without significant capital investments. However, the Staff Report does not claim that additional capital investment is not needed. On page 64 of the Staff Report, the staff stated: "Capital costs may be incurred for reducing benzene; however, we believe this can be done to

be consistent with our proposal. Therefore, no additional costs will be necessary to meet the California Phase 2 specification for benzene." With regard to oxygenates, the EPA oxygen content standards can be met during 1995 by purchasing oxygenates in the spot market and therefore no capital investment will be required. This should allow compliance with the federal 1995 requirements with little, if any, duplicative efforts in complying with the 1996 California requirements.

155. Comment: The fraction of gasoline assumed for calculation of future gasoline prices seems to be quite high. (Chevron)

Agency Response: This comment pertains to the assumption staff utilized in calculating future price scenarios based on gasoline demand reduction caused by clean fuel penetration into the transportation fuels market as a result of the Low-Emission Vehicle/Clean Fuel regulations. The values used for this analysis were obtained from the ARB's ozone planning inventory and from the TSD for the Low-Emission Vehicle/Clean Fuel regulations (Appendix 6, p. 6-12, Table 6-6) and are the result of extensive computer modeling. These estimates have been reviewed internally by ARB staff as well as by industry representatives. We believe these projections are sound estimates of future gasoline demand scenarios.

156. Comment: There is no support for the assumption that one half of the total capital spent would be operating expenses. (Unocal)

Agency Response: The assumption used by staff regarding operating costs is based on analysis of actual data received from refiners (see TSD, p. 133, Table VI-4). The staff analyzed the operating costs provided by the six refiners and determined that 50 percent represented an appropriate value. The staff recognizes that the operating costs may vary from refinery to refinery. However, during the development of staff's proposal, this was the best information available and represented a conservative estimate.

157. Comment: Staff's use of a 10 percent recovery factor for large refiners and 13 percent for small refiners is inconsistent with past regulatory cost analyses performed for the low aromatic hydrocarbons diesel and Phase 1 RFG regulations. Use of lower factors significantly reduces the cost of compliance and, correspondingly, cost-effectiveness. (Unocal, WSPA)

Agency Response: Lower interest rates and inflation in recent years have sharply reduced the cost of borrowing, thus justifying the use of a 10 to 13 percent recovery factor for the current regulations, compared to 15 to 18 percent used for the previous regulations. Staff utilized interest rates which were current at the time of publication of the Staff Report. The prime lending rate was 7 percent and the corresponding recovery factors for large and small refiners were adjusted to reflect the difference in their costs of capital. Since

late 1990, interest rates have been on a downward spiral and have recently reached their lowest levels in 29 years.

158. Comment: For reformulated gas, more of it will be made outside of the state, which will result in a loss of income for refiners in California. (WSPA)

Agency Response: Currently, only a minor amount of gasoline is produced out-of-state and imported into California. This situation is not expected to change due to the Phase 2 RFG regulations, so any loss of income for California refiners due to imports should be minimal. Discussions with refiners indicate that they intend to maintain their refinery capacity and throughputs.

Although the importation of gasoline into California may tend to reduce refiners' profits to a slight degree, it would also increase competition among gasoline suppliers, which would tend to reduce gasoline prices and benefit consumers.

2. Cost-Effectiveness

159. Comment: Staff's proposed specifications for Phase 2 RFG are not cost-effective. (Unocal, WSPA, Chevron, Mobil, CIOMA, Morgan)

We are strongly opposed to measures which are not cost-effective. (Unocal, WSPA, CIOMA, Chevron)

We recommend that the ARB revise the proposed regulations to provide for a more cost-effective plan which is economically attainable and acceptable. (CA Cattlemen's Assoc., Mobil, Calif. Truckers Assoc., Chevron)

Agency Response: The cost-effectiveness calculation procedures utilized by staff were consistent with procedures used in other cost studies performed for previously adopted regulations. The methods of analysis used by the staff are methods used by industry and other regulating agencies. The economic parameters utilized in the study, such as interest rates and life of equipment, were based on current rates or widely accepted factors used in previous cost studies by regulating agencies or industry.

In addressing the cost-effectiveness of the regulations, the staff performed extensive cost analyses. Two perspectives on regulation costs were included in the Staff Report and TSD showing impacts to industry and the public. In one case, cost-effectiveness was calculated including the increased production cost at the refinery (TSD, pp. 138-140). The other case was based on the cost to the consumer (TSD, pp. 141). The cost-effectiveness analysis was performed using current emissions data combined with the most current cost of compliance data received by six individual refiners. These six

refiners, comprised of small, independent, and large refineries of varying complexity, provide a representative cross section of California's refining industry. Because the cost data were received from a diverse group of refiners, staff had the ability to assess the impacts of the regulation on all segments of the industry. The cost data received by refiners assessed the impacts of the limits on individual properties and were used by staff to determine the cumulative cost-effectiveness of the regulation.

For these costs, the use of Phase 2 RFG will substantially reduce virtually every pollutant currently emitted by motor vehicles that affects an ambient air quality standard. As discussed in the response to Comment 74, the staff used two methods in calculating emissions reductions. The first method used results of the Auto/Oil studies; the second method used results of vehicle tests conducted with fuels having properties similar to the Phase 2 RFG properties. The staff calculated the emissions reductions as the average of the results of the two methods of analysis. For the year 1996, staff estimated that ozone precursors (i.e., NOx and VOC) will be reduced by 180 tons per day, carbon monoxide by 1300 tons per day, and sulfur dioxide by 36 tons per day. In addition, benzene emissions will be substantially reduced, which will lower the risk of cancers related to motor vehicle emissions by about 25 percent.

To calculate the cost-effectiveness of the Phase 2 RFG regulations, the staff used an estimated cost of production of about 12 cents to 17 cents per gallon to calculate the cost of compliance. (see TSD, p. 139.) Two cost-effectiveness scenarios were analyzed: (i) Scenario A, in which 80 percent of the costs of compliance were attributed to reductions in criteria pollutants and 20 percent were attributed to toxic air contaminants, and (ii) Scenario B, in which 50 percent of the costs were attributed to criteria pollutants and 50 percent to toxic emission reductions. For both scenarios the staff incorporated the fuel penalty and calculated the cost-effectiveness when considering consumer costs. In addition, the staff calculated a cost-effectiveness for only 1996, and the cost-effectiveness when the emissions benefits are averaged for the period 1996-2005. For details of the results of staff's analysis for each scenario see pages 138-144 of the TSD. Pages 70-71 of the Staff Report present the results of the staff's analysis for Scenario B. The staff projected the cost-effectiveness of the regulations to be $8,000-$12,000 per ton if the benefits are averaged for 1996-2005 and costs to the consumer are incorporated. (Staff Report, pp. 8 and 70.)

At the hearing, the staff presented modifications to the proposal involving the addition of optional averaging (DAL) provisions for more pollutants, and a loosening of some of the specification standards. Several motor vehicle manufacturers, environmental groups and one refiner (ARCO, the largest retailer of gasoline in the state) urged that standards stricter than those in the staff's proposed modifications were necessary and would be cost-effective. On the other hand, most oil refiners claimed that even with the staff's modifications the proposed standards were too stringent and were not

cost-effective. Some refiners suggested specifications which they claimed would provide 80 percent of the benefits of the original proposal at 50 percent of the costs.

After considering the extensive comments, the Board approved a set of standards that had a level of stringency in-between the staff's original proposal and the modifications suggested by staff at the hearing. As discussed in Section II.B.1, the modifications included adding averaging as an option for complying with the standards for olefins, T90, and T50, and making the numerical standard for olefins less stringent.

With these modifications, we expect that the adopted Phase 2 RFG regulations will achieve about 95 percent of the benefits that would have resulted from the staff's original proposal, at 85 percent of the cost. The expected costs resulting from the regulations represent an increase of about 12 to 17 cents per gallon. We project that the cost-effectiveness of the regulations as adopted is about $7,000-$11,000 per ton.

In the early years of implementation, the Phase 2 RFG regulations will reduce motor vehicle emissions more than any measure recently adopted by the ARB. Furthermore, the approved Phase 2 RFG specifications will provide a rigorous reformulation of gasoline which will allow motor vehicle manufacturers to certify future low-emission vehicles more easily using less sophisticated pollution control devices than would be needed if conventional gasoline was the fuel. This will help reduce the cost of producing low-emission vehicles, and should provide an economic benefit to the consumer.

We have compared the cost-effectiveness of the Phase 2 RFG regulations to other measures recently adopted by the Board or air pollution control districts. (see TSD, p. 145, and the responses to comments in Section III.C.4.) We have concluded that the cost-effectiveness of the regulations will be comparable to these other measures, which have had cost-effectiveness values ranging from 1,300 to 32,000 ($/ton). The projected cost-effectiveness of the Phase 2 RFG regulations is comparable to the LEV/CF regulations and is better than that of the diesel fuels/aromatic hydrocarbons content regulation (13 C.C.R. § 2282), which also impacts the refining industry. (Staff Report, p. 73). The cost-effectiveness is also better than that of SCAQMD Rule 1135 for power plants.

It should also be noted that the Phase 2 RFG cost-effectiveness figures found in the Staff Report are probably underestimated. Recent evidence indicates that hydrocarbon emissions from gasoline vehicles may be underestimated, and thus Phase 2 RFG is likely to reduce more emissions per gallon of gasoline than is estimated in the Staff Report. In addition, several aspects of the regulations (namely, the averaging and alternative formulation provisions) provide opportunities for refiners to reduce their costs to levels below those estimated in the Staff Report.

160. Comment: - The Phase 2 RFG specifications will raise the cost of fuel for California motorists by 14-28 cents per gallon without a corresponding air quality benefit. (Wickland, Sierra Research, Diepenbrock, Wulff, Plant & Hannegan)

Phase 2 RFG is the most costly regulation ever considered for the refinery industry. (WSPA)

Agency Response: We believe that the cost of producing Phase 2 RFG will be substantially less than 14-28 cents per gallon. We estimate that the adopted regulations will result in a 12 to 17 cent increase in the cost of gasoline. See the discussion in the response to the preceding comment and the responses in Section III.C.1.

Phase 2 RFG is necessary to help us in our efforts to achieve ambient air quality standards and to satisfy the mandate of Health and Safety Code section 43018, which directs the Board to endeavor to reduce emissions from vehicular sources to attain the state ambient air quality standards by the earliest practicable date, and to reduce emissions of toxic air contaminants.

Although the Phase 2 RFG regulations will undoubtedly be costly, the emissions reductions associated with it are quite large. The use of Phase 2 RFG gasoline will substantially reduce virtually every ambient pollutant currently emitted by motor vehicles. In the year 1996, staff estimates that ozone precursors (i.e., NOx and VOC) will be reduced by 180 tons per day, carbon monoxide by 1300 tons per day, and sulfur dioxide by 36 tons per day. In addition, benzene emissions will be substantially reduced, which will lower the risk of cancers related to motor vehicle emissions by 25 percent. These emissions benefits are with respect to staff's original proposals. The staff estimates that the adopted regulations will achieve about 95 percent of the benefits of the original proposal.

In the early years of implementation, the Phase 2 RFG regulations will reduce motor vehicle emissions more than any measure recently adopted by the ARB. For example, ozone precursor reductions due to the Phase 2 RFG regulations in the year 2000 are projected to be 150 tons per day. In comparison, such reductions are projected to be 35 tons per day for Phase 1 RFG, 50 tons per day for the diesel fuels/aromatic hydrocarbons ~~content~~ measure, and 65 tons per day for the low emission vehicles/clean fuels regulations. (Staff Report, p. 7.)

161. Comment: By fine-tuning the specifications, about 80 percent of the emissions reductions can be achieved for 50 percent of the costs. California cannot afford to ignore cost-effectiveness in view of the need to improve California's competitiveness in expanding U.S. and world markets. (WSPA)

We recommend that the ARB revise the proposed regulations to provide for a more cost-effective plan which is economically attainable

and acceptable. (CA Cattlemen's Assoc, Calif. Truckers Assoc, Mobil, Chevron)

The Independent Oil Producers' Agency (IOPA) urges you to reconsider requiring the current purchasers of our produced crude oil to make the capital investment for a marginal additional incremental benefit. (IOPA)

We challenge the ARB to revise the proposed specifications such that the increased cost will not exceed 10 cents per gallon. (CIOMA)

The ARB should consider alternate gasoline formulations that provide a more reasonable balance between cost and environmental benefits. (Mobil)

We hope that ARB will consider a more cost-effective approach during a time when our economy appears to be struggling. (CIPA, WSPA, Morgan)

We do not feel enough emphasis was placed on thoroughly assessing the adverse socio-economic impacts these regulations will cause; as such, we support WSPA's proposed specifications. (OCAW)

There must be an approach that will improve our air quality and at the same time be more cost-effective. (SCBA)

Agency Response: See the responses to the previous two comments.

The Board has considered the economic impacts of the Phase 2 RFG regulations. We have sought to temper the impacts in several ways. We have afforded some measure of flexibility with the averaging (DAL) provisions and the mechanism allowing refiners to certify an alternative fuel formulation through vehicle testing. At the hearing, the Board made modifications allowing averaging as an option for complying with the standards for olefins, T90, and T50, and making the numerical standard for olefins less stringent.

While we have considered the economic impacts, we must also be responsive to the mandates in Health and Safety Code section 43018, enacted by the California Clean Air Act of 1988. Section 43018(a) directs 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 standards at the earliest practicable date. Section 43018(d) 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, including but not limited to four specified areas of measures, one of which is specification of vehicular fuel composition. We believe that the economic impacts are justified by the considerable emission reductions that will result from the regulations. Moreover, adoption and implementation of one comprehensive set of requirements should be less costly than the piecemeal adoption of progressively more stringent requirements.

Finally, the regulations should result in some shorter-term economic benefits. It is expected that the impact of the refinery modifications, totaling over 3 billion dollars, will provide a boost to the state economy by creating new jobs over the next several years and adding to the local tax base.

162. Comment: Mobil requests that the Board adopt either of the two formulations studied by Sierra Research as part of the cost-effectiveness study performed for WSPA. One set of specifications represents the specifications associated with Phase 1 federal reformulated gasoline. The other proposal represents a set of specifications set at the point where the cost of the specification raises sharply in relation to projected emission reductions. (Mobil)

Agency Response: See the responses to the previous three comments.

The commenter's suggestion of adopting the Phase 1 federal reformulated gasoline requirements in lieu of the staff proposal is not realistic because the California Clean Air Act mandates very substantial reductions in ozone forming compounds at the earliest practical date. The emissions reductions resulting from the federal reformulated gasoline do not achieve the same emission reductions as staff's proposals. (See the Staff Report, pp. 9-11.) In fact, the specifications ultimately adopted by the Board achieve approximately 26-28 percent more reductions in VOC than do the Federal Clean Air Act reformulated gasoline, which is expected to contain 2.0 percent oxygen, 7.2 psi RVP, and 25 volume percent aromatic hydrocarbons.

163. Comment: Though the reductions from staff's proposal are important, they are costly when compared to potential reductions from other larger sources of California's emissions inventory, which consists of approximately 6,500 tons per day of organics and NOx alone in 1991. (WSPA)

Agency Response: In order to achieve the mandates set forth by the California Clean Air Act, all possible control measures must be considered. Phase 2 RFG represents a significant mechanism for the control of exhaust emissions from the current fleet of vehicles and is cost-effective when compared to other recently adopted control measures. We know of no other measures that will reduce emissions from gasoline-powered motor vehicles in the latter part of this decade nearly as much as the Phase 2 RFG regulations.

164. Comment: If refiners are required to meet average standards that are equivalent to the minimum specifications of Phase 2 RFG, economic costs can be reduced significantly. (WSPA)

Agency Response: We agree that relaxing the specifications or standards will reduce costs, but such changes will also reduce air quality benefits. The Board considered a variety of different

specifications prior to and during the hearing, in an attempt to balance costs with benefits. The Phase 2 RFG specifications adopted by the Board were, in some cases, a relaxation of the recommendations found in the October 4, 1991 Staff Report. The adopted specifications also incorporate average standards for all but one specification. The adopted specifications will achieve about 95 percent of the benefits of the Staff Report's proposal for only 85 percent of the cost. (see Board Hearing transcript for November 22, 1991, pp. 240-243.)

165. Comment: Staff's proposal does not adequately assess the cost-effectiveness of the proposed regulations. (WSPA, Unocal)

Agency Response: In addressing the cost-effectiveness of the regulations, the staff performed extensive cost analyses. Two perspectives on regulation costs were included in the Staff Report and TSD showing impacts to industry and the public. In one case, cost-effectiveness was calculated including the increased production cost at the refinery (TSD, p. 138-140). The other case was based on the cost to the consumer (TSD, p. 141). The cost-effectiveness analysis was performed using current emissions data combined with the most current cost of compliance data received by six individual refiners. These six refiners, comprised of small, independent, and large refineries of varying complexity, provide a representative cross section of California's refining industry. Because the cost data were received from a diverse group of refiners, staff had the ability to assess the impacts of the regulation on all segments of the industry. The cost data received by refiners assessed the impacts of the limits on individual properties and were used by staff to determine the cumulative cost-effectiveness of the regulation.

During the development of the Staff Report and TSD, staff conducted several meetings and three workshops to solicit data from both the automotive and oil industries. Due to the information received, staff included additional provisions in an effort to add flexibility for refinery operations and to reduce cost of compliance. Averaging (DAL) provisions were included which allow refiners to meet most the individual specifications on an average basis. These provisions will allow refiners more flexibility in final product blending operations by allowing refiners to blend closer to the limits. Also, provisions were incluced to allow refiners to comply with an alternative formulation based on certification through vehicle testing.

The cost-effectiveness calculation procedures utilized by staff were consistent with procedures used in other cost studies performed for previously adopted regulations. The methods of analysis used by the staff are methods used by industry and other regulating agencies. The economic parameters utilized in the study, such as interest rates and life of equipment, were based on current rates or widely accepted factors used in previous cost studies by regulating agencies or industry. Staff has also compared the cost-effectiveness of the regulation to other measures recently adopted by the Board or air

pollution control districts, and found the Phase 2 RFG-regulations will be comparable to these other measures.

166. Comment: Page 8, Staff Report: The cost-effectiveness numbers shown are significantly lower than we believe are correct. ARB's cost estimate is based on undocumented estimates from a few individual refiners. The Turner Mason estimates prepared for WSPA are clearly based on a more rigorous analysis and are more likely to be accurate. ARB's emissions estimates also appear to selectively use data in order to claim the greater possible benefits. (Chevron)

Agency Response: To address the portion of the comment related to "undocumented estimates from a few individual refiners," see the response to the preceding comment. The estimates provided have been documented, but the refiners have requested that these data remain confidential and we therefore have not placed the confidential data in the record and are not relying on the data to support the final action. Others have also commented that the staff's cost estimates are based on limited information; the justification for our cost-estimates are outlined in the responses to Comments 147 and 159.

We do not agree that Turner Mason's cost analysis is more accurate than the analysis prepared by staff. Staff's cost-effectiveness calculations are based on data resulting from studies produced by refineries specific to their facilities. We believe that this information provides a better indication of the fiscal impacts of the Phase 2 RFG regulations to specific refineries. Turner Mason calculated cost impacts through the use of a LP model which simulates a hypothetical composite refinery, which was to represent the entire California refining industry.

Upon inspection, staff found that some of the assumptions built into the Turner Mason model inherently raise the costs associated with the proposed specifications. For instance, a major assumption built into the model which affects oxygenate cost is the presumption that California refiners will be investing in Middle East production of MTBE and importing it to California. By using this assumption in a model, the effect is to limit the effect of potential cost savings from those refiners which realistically plan to produce oxygenates in-house. This assumption would force additional oxygenate costs into the model, which would increase projections of the overall cost of the regulations. Another assumption which Turner Mason makes is a projection of high-cost resulting from the rejection of pentanes because of the stringent RVP specification. Turner Mason assumes that pentanes will be sold at a low cost and shifted to petrochemical markets in the gulf coast. While this may result for a few refineries, in general, several other options are available. Pentanes could be added to the plantfuel system, or used as a feedstock for a cogeneration plant. The bottom line is that individual refineries will have specific strategies to deal with pentane rejection. However, by assuring exports of pentane in the LP model, the cost impact is biased toward higher cost of compliance for an entire refining industry. Basing costs on a generic

composite refinery model will naturally increase some portion of the costs for smaller refiners and when projecting into the future will introduce greater error.

167. Comment: The assumption in the Staff Report that between 28 and 40 million dollars per cancer case avoided is a number that is reasonable and acceptable is questionable and should be explicitly addressed by the Board. If this figure were applied on a universal scale to eliminate all suspected environmental cancers, then all environmentally-induced cancers in California could be eliminated for 56 trillion dollars ($64,000 per household), which is an amount that exceeds the state of California budget by three orders of magnitude. We do not believe that it is the intent of the Legislature, nor good public policy, for regulatory agencies to impose on the state these levels of cost to address the toxics problem. (WSPA, Sierra Research)

Agency Response: The commenter asserts that the cost per case avoided is excessive according to two criteria: 1) the intent of the Legislature regarding the cost of controlling toxic emissions and 2) the total cost if all cancer cases due to environmental pollution were avoided at the same cost per case.

Regarding the first assertion: The intent of the Legislature concerning the control of toxic emissions is expressed in section 39650 of the Health and Safety Code (enacted by Stats. 1983, ch.1047; AB 1807, Tanner) and section 1 of Stats. 1988, ch. 940; AB 4392, Brown and Tanner.) Neither passage mentions a limit on cost per case avoided or on the overall cost of reducing toxic air pollution. Although the Board is required by section 39665 to consider cost of control measures, the statutes state that the primary consideration of the Board shall be the reduction of emissions and the attendant protection of the public health.

One additional point to keep in mind is that the cost per case avoided is based on numerous assumptions. The main use of the value is to compare the relative cost of various control measures or control options.

Regarding the second assertion: The cost of the situation hypothesized in the comment is not a valid criterion by which to judge an individual regulation. Of all the cancer incidence that may be related to environmental pollution, only a small fraction can be avoided through air pollution emission controls that are now identifiable. Therefore, the total expenditure cannot approach the value calculated in the comment.

If the foreseeable total cost of the current control program for toxic pollutants is not shown to be excessive, the best criterion for acceptable cost of a proposed addition to the program (i.e. a new regulation) must be whether or not society places at least an equal value on the increment in benefit. In light of the cost-per-case of other control measures for toxic pollutants and the emphasis in state

law on reducing emissions, the Board considered the benefit of the Phase 2 RFG regulations to be worth the cost.

168. Comment: It is not clear how the 50/50 split of costs between toxics and criteria pollutants was arrived at other than arbitrary decision. However, if 50 percent of the costs were assigned to toxics, then according to ARB's risk reduction assessment, the costs would be $40 million for potential cancer cases avoided. (Chevron)

Agency Response: The 50/50 allocation in costs for criteria and toxic pollutants gives equal value to toxic and criteria pollutant benefits. Equal weighting is premised on the fact that emission reductions are achieved from all the Phase 2 RFG specifications other than the benzene limit alone and the cost-effectiveness must be adjusted to reflect this.

For comparison purposes, staff also calculated a scenario where 20 percent of the costs are allocated to toxics, as suggested in the comment (TSD, p. 140, Table VI-9). The 50/50 split was based on the apportioned benefits derived from all the specifications versus the benefits of the benzene limits alone. This relationship is shown in the TSD on page 96, Table IV-15, which shows cancer cases avoided in the year 2000 for benzene limit alone versus for all Phase 2 RFG specifications. In the case where all specifications are considered, approximately 50 percent of the cancer cases avoided can be attributed to the benzene limit alone, and the other 50 percent attributed to the rest of the Phase 2 RFG specifications.

169. Comment: Staff calculated $8-$12 thousand per ton (M/ton) for NOx, VOC, 1/7 CO and SO2. Based on the analysis by Turner Mason and a more reasonable allocation of costs to toxic pollutants (20 percent), a much less attractive composite cost-effectiveness of $80 M/ton is calculated for ozone precursors (VOC and NOx). (WSPA)

Page 70, Item C in the Staff Report: We recommend this whole section be revised. The benefits have been overstated and the costs understated. There is no justification for the arbitrary split between toxic air contaminants and criteria pollutants nor is there a basis for taking credit for CO emissions. (WSPA, Chevron)

Agency Response: The Turner Mason estimates of the cost of compliance for the refining industry are overstated. The composite Turner Mason LP model, which is supposed to represent the entire industry, increases overall costs by aggregating small, medium, and large refiners into one model. Based on the data received from six different refiners, staff calculated the costs affecting the three segments of the refining industry (small, independent, and large) and found the fiscal impact to vary among the groups. The Turner Mason model is insensitive to the effect of the smaller refiners in the overall results. For a more detailed response on the issue of cost-effectiveness, see the response to Comment 159.

With regard to the allocation of costs to toxic pollutants, staff prepared cost-effectiveness analyses based on two scenarios which included a 50/50 split and an 80/20 split in cost between criteria and toxic pollutants (TSD, p. 140, Table VI-9). In the calculation of cost-effectiveness, the ARB policy has been to consider all emission reduction benefits directly associated with a proposed regulation. In this case, substantial reductions in NOx, VOC, CO and SO2 will be achieved through gasoline reformulation, and it is therefore appropriate to include these pollutants in the cost-effectiveness calculations. Also see the response to the preceding comment.

170. Comment: We do not understand the rationale for splitting the costs between toxics and criteria pollutants; it seems to be arbitrary. (Chevron, WSPA, Texaco)

Agency Response: To present various cases, the allocation of investment cost to criteria and toxic pollutants were based on two scenarios. One scenario results from a previous benzene cost study which found a compliance cost equal to 3 to 4 cents per gallon. This cost represents 20 percent of the total costs of refinery modifications to meet all Phase 2 RFG specifications. The other scenario was based on the distribution of criteria and toxic emissions benefits associated with all of the specifications. The ratio of toxic pollutants reduced through benzene alone versus total toxic reductions from all Phase 2 RFG specifications was calculated to be about 50 percent. Therefore, the cost distribution of criteria pollutants to toxic air contaminants is 50/50, based on the fact that additional toxic emission reductions will be achieved through implementation of specifications other than just the benzene limit. The resultant cost-effectiveness for both scenarios are presented by staff (TSD, p. 140, Table VI-9), and are shown to be in the range of cost-effectiveness approved for other measures in the past (TSD, p. 145, Table VI-13).

171. Comment: The ARB allocated 50 percent of their cost estimate to toxic air contaminants for the base case comparison, not the 20 percent used in their optional case which WSPA believes is the more appropriate and fairer case based on analysis of the cost that shows a 2-3 cpg cost for meeting the benzene limit alone. Even though the ARB argued that about 20 percent of the Phase 2 cost can be attributed to reduction in toxic air contaminants, they selected a 50/50 split as the base cost on the basis that it is consistent with some past regulations. (WSPA)

Agency Response: ARB staff presented two scenarios for allocating the cost estimates between toxics and criteria pollutants. The first scenario allocated 80 percent of the cost to criteria pollutants and 20 percent to toxics and was derived from previous surveys. The second scenario split costs 50/50 evenly between toxics and criteria pollutants and was based on past analyses. The allocation of costs is particularly difficult because reductions of hydrocarbons result in reductions of toxics. The 50/50 split between toxics and criteria

pollutants was selected as the base cost because historically costs have been split this way in past regulations (such as the LEV/Clean Fuel Regulations).

172. Comment: We believe that in order to maintain consistency in rulemaking, staff should calculate cost-effectiveness the same as was done for the LEV/CF regulations. In the LEV regulations, the total cost of compliance was divided 50/50 between criteria and toxic pollutants. (GM)

Agency Response: In staff's cost-effectiveness analysis, two scenarios were presented (TSD, p. 140, Table VI-9). One scenario indicates a distribution of compliance costs of 80/20 to criteria and toxic pollutants, respectively. The other scenario is based on a 50/50 split in costs between criteria and toxic pollutants--the same split that was used in the LEV/CF regulations.

173. Comment: Cost-effectiveness for ozone control is made to appear unduly favorable by understating the ozone control costs and taking credit for non-ozone-related emission reductions in the calculations. Historically, taking credit for non-ozone related reductions has not been done. Also, emission benefits for ozone and CO occur at different times of the year, most CO benefit is derived through oxygenate addition, and an incremental analysis was not performed. (WSPA, Texaco)

Agency Response: The commenter states that the cost-effectiveness for ozone control is understated because the ozone control costs are understated. Staff's cost-effectiveness analysis was based on the cost of compliance data supplied by refiners. These costs are not overstated since they represent realistic fiscal impacts projected by the individual refiners.

With regard to the criticism of taking credit for non-ozone related reductions, it is ARB policy to consider all air quality benefits--regardless of time of year the benefits occur--as well as the associated costs in the determination of cost-effectiveness. Because the Phase 2 RFG specifications will reduce emissions of ozone precursors (VOG and NOx), other pollutants such as CO, and SO2, and various toxic air contaminants (including benzene and 1,3 butadiene), the cost-effectiveness calculations compare all emission reductions to the total costs associated with those reductions. This approach is consistent with previous analyses prepared for other control measures which result in multi-pollutant benefits.

174. Comment: When analyzing cost-effectiveness, you have to look at the cost-effectiveness ratio of total cost of the Phase 2 RFG regulations per household in California and apply the same ratio to further controls you say we need to achieve state attainment. (Sierra Research)

Agency Response: Over the past several years, the Board and the local air pollution control districts have adopted regulations that are more cost-effective than the Phase 2 RFG regulations, and they have also adopted regulations that are less cost-effective then Phase 2 RFG. It is not appropriate to single out the cost-effectiveness of Phase 2 RFG as the bench mark for future or past rulemakings. The ARB policy has been to achieve the maximum emission reductions possible by adopting regulations which have proven to be cost-effective with respect to other measures approved by the Board or local air districts. In this case, the Phase 2 RFG specifications can provide major reductions in emissions and can provide a significant stride toward cleaner air with a cost-effectiveness comparable to other recently adopted regulations.

175. Comment: ARB staff incorrectly indicates that the cost-effectiveness cited for the LEV program includes carbon monoxide. The LEV Program analysis was based on ozone precursors (NOx and VOC) only. (WSPA)

Agency Response: The commenter is correct in stating that the LEV program analysis does not include CO. Staff inadvertently included CO as a pollutant reduced through the LEV regulations (TSD, page 145, Table VI-13). The intent of the table is to show the relative comparison between proposed Phase 2 RFG regulations and other regulations previously adopted by the Board or the air quality management districts. As shown in Table VI-13, several measures are crafted to achieve reductions in several pollutants, not just one specific pollutant. Cost-effectiveness is based on total emission reductions and costs related to those pollutants which are directly affected. The apparent oversight by staff reflected in Table VI-13 does not change the basic message of the table and certainly does not change the overall cost-effectiveness of the Phase 2 RFG regulations.

176. Comment: It is not clear what the justification is for using 1/7 of CO for determining cost-effectiveness. (Chevron)

Agency Response: Staff discounted the CO benefit when calculating cost-effectiveness by utilizing the 1/7 ratio as recommended by the ARB's guidance document entitled, "California Clean Air Act Cost-Effectiveness Guidance", published September, 1990. In this guidance document, the rationale for discounting CO stems from the fact that the emission reductions arising from motor vehicle control measures typically tend to produce a ratio of 7 to 1 comparing CO to other pollutants.

177. Comment: It is inappropriate to include CO nonattainment areas into the cost-effectiveness calculations for programs targeted at non-attainment areas. (Unocal)

Agency Response: The Phase 2 RFG regulations are a statewide program affecting attainment and nonattainment areas. In calculating the cost-effectiveness of the regulations, it is appropriate to consider all the benefits of the regulations as well as the total costs associated with those benefits. Also see the response to Comment 173.

178. Comment: During the analysis for cost-effectiveness, staff did not consider the emissions from mobile sources transporting MTBE into California. Staff assumed pipeline emissions for the transport of oxygenates. However, no pipelines are available for MTBE and ethanol so staff should delete this option and utilize the mobile emissions in the cost-effectiveness calculations. (Chevron, WSPA)

Agency Response: At this time it is uncertain what percent of the needed oxygenates will be produced in the refineries and how much will be transported. The emissions due to transportation resulting from MTBE shipments into California will have a negligible effect on the overall emissions reductions associated with reformulated gasoline. Staff expects some MTBE to be produced here and the major portion being brought in by marine transportation. The increased emissions due to increased transportation into the refinery will be addressed in the environmental review process associated with the refinery modification projects. Also, in-house MTBE production will result in less emissions related to transportation of MTBE.

179. Comment: Staff's assumption of a 10 year capital recovery has a significant impact in the cost-effectiveness calculations. By calculating a 1996-2010 average, the cost-effectiveness appears worse than calculated by staff. The impact of staff's 10 year life assumption is a reduction in the cost-effectiveness by 36 percent on average. (Unocal)

Agency Response: The 10 year capital recovery assumption made by staff is consistent with previous cost analyses and is appropriate for these regulations. An equipment lifetime of 10 years has been used in past economic analyses by the ARB, other regulatory agencies, and industry. The reason that the cost-effectiveness appears worse in the 1996-2010 average is not because Phase 2 RFG regulations will achieve less emission reductions in the future, but because these emission reductions in the future will be attributed to the low-emission vehicle regulations. When low-emission vehicles are operated on reformulated gasoline, we are crediting the emissions reductions to the vehicles and not to the fuel and the Phase 2 RFG regulations.

180. Comment: The ARB averaged the cost-effectiveness over ten years (1996-2005) rather than 15 years which is the normal economic life for this type of project. The 10 year average substantially improves cost-effectiveness presented since emission benefits of Phase 2 RFG diminish significantly with time. (WSPA)

Agency Response: The staff's economic analysis assumed a ten-year lifetime for equipment related to the low aromatic hydrocarbons diesel regulation (Title 13, Calif. Code of Regulations, § 2282). The equipment involved in production of Phase 2 RFG is also assumed to have a ten-year life. This approach has been suggested by industry and used in previous rulemakings of the Board and in other air pollution control districts. If a 15 year life of equipment were to be used, then annual costs will go down and improve the average cost-effectiveness of the regulations.

181. Comment: (Page 23, Staff Report) Staff should have developed charts showing changing cost-effectiveness between the years 1996-2010. These charts should accompany those charts found on page 23 of the Staff Report, which show declining emission reductions from 1996-2010. (WSPA, Chevron)

Agency Response: In the TSD (Table VI-9, p. 140 and Table VI-10, p. 141), staff shows cost-effectiveness of the proposed regulations for two scenarios. One scenario is based on the first year of implementation. The second scenario is based on a 10 year average. If cost-effectiveness were to be averaged over a 15 year span as suggested, the average annual costs would be lower, but so will the average benefits. Result of the analysis are not significantly different for a 15 year span. Our approach is appropriate and is consistent with the cost analyses of previous rulemakings.

182. Comment: Why does staff present cost-effectiveness for criteria pollutants through 2005, but present benzene risk reduction values through 2010? (Unocal)

Agency Response: The reason for different analysis periods for the benzene regulation and the Phase 2 RFG regulations is that the two analyses were prepared at different times. The rulemaking analysis for benzene was prepared initially for a rulemaking scheduled for 1989. However, a decision was made to delay the benzene regulation until all gasoline properties could be addressed in order to account for emission and cost interrelationships. The benzene cost-effectiveness was based on implementing the benzene regulation alone and provided only one scenario. The analysis contained within the TSD for criteria pollutants corroborates the estimated emission reductions found in the benzene cost analysis. The only difference is the time period of the analysis, and this does not constitute any policy change by the ARB regarding toxic versus criteria pollutant control measures.

183. Comment: Staff's cost-effectiveness approach masks significant differences that exist in some specification changes versus others. An incremental analysis must be performed on a property-by-property basis. (WSPA, Chevron, Texaco). The T90 and olefins specifications are still not cost-effective when evaluated on an incremental basis. (Chevron)

Since the ARB will be considering what may be California's most costly regulation ever, it will be immensely important to carefully balance the cost and the benefit of changing each of the gasoline properties and avoid squeezing the limits beyond a point of diminishing returns. (Mobil)

(Page 40, Table II-16, Staff Report) Staff should perform an incremental cost-effectiveness analysis for all specifications. Only by minimizing the incremental cost-benefit ratio for each specification can the public be assured of an overall cost-effective proposal. (WSPA, Chevron, Mobil, Texaco)

Agency Response: The staff does not agree that incremental analysis on a property-by-property basis is appropriate. Health and Safety Code section 43018 requires the ARB to adopt technologically feasible measures which cost-effectively achieve the maximum degree of emissions reductions possible from motor vehicles at the earliest practicable date. Given this requirement, the staff proposed a set of specifications which would maximize criteria and toxic emission reductions while simultaneously minimizing costs. To do this, gasoline had to be considered as a system where all individual properties are considered together. Since individual properties affect emissions differently, and because all properties are interrelated, all properties needed to be considered together in order to optimize the overall emissions performance of the fuel.

Investment requirements for control of all proposed properties are reduced since, in some cases, processing equipment designed for one specific property control will inherently control other properties as well. For instance, it is noted that T90, aromatic hydrocarbons content and benzene content are related. In fact, by processing gasoline blendstocks to reduce T90, some degree of control of benzene and aromatic hydrocarbons will automatically occur. Another case in point relates to the apparent trend among some refiners which have indicated they intend to operate their reformers in a less severe mode, thereby reducing aromatic hydrocarbons and benzene production.

Because of the emissions and cost interrelationships discussed above, staff believes that an incremental (limit-by-limit) analysis is not appropriate. Gasoline needs to be viewed as a system where emissions performance and costs can be optimized. Moreover, incremental analysis has typically not been considered in past rulemakings. The ARB document entitled, "California Clean Air Act Cost-Effectiveness Guidance", published September 1990, states that cost-effectiveness should be based on total costs and emission reduction benefits, especially when considering the cost-effectiveness of measures which have multi-pollutant benefits.

184. Comment: The aromatic hydrocarbon, T90 and olefin specifications are not cost-effective. (Chevron)

Agency Response: The commenter implies that the incremental cost-effectiveness of those specifications are not cost-effective. As stated in the response to the previous comment, it is not ARB policy to perform incremental cost analyses. We are approaching reformulated gasoline as a system to take advantage of the independent emissions effects of properties such that the formulation can best optimize the overall emissions performance.

185. Comment: We recommend that ARB revise the T90 average specifications to 310°F. (WSPA, Chevron)

If we move T90 from an average of 300°F to 310°F, we could save nearly 200 million dollars per year in the California economy. If olefins were to be moved from an average of 5 percent to 7 percent, the savings would total a couple of hundred million dollars a year. (WSPA)

(Page 30, Table II-12, Staff Report) There is minimal benefit from reducing T90 from 310°F to 290°F. It is questionable whether this reduction will be cost-effective. (Chevron)

Agency Response: These comments express in a different way the recommendation that the ARB perform an incremental analysis on each of the proposed specifications. The commenters suggest that the incremental cost caused by the range of properties shown above (ie. T90 from 300°F to 310°F and olefins from 5 to 7 percent), will translate into additional costs to consumers for controlling the properties at the more stringent level (300°F for T90 and 5 volume percent for olefins). For the reasons set forth in the response to Comment 183, we do not feel it is appropriate to consider the incremental cost-effectiveness of individual properties such as T90.

It should be noted that refiners have the option of using either a testing program to certify alternative fuels that do not meet the Phase 2 RFG specifications, so long as equal or greater emission reductions result from the replacement of Phase 2 RFG with the alternative fuel. We plan in the near future to consider amendments which will also allow certification through use of a predictive model. If emissions differences are as small as claimed by Chevron and WSPA for incremental differences in the Phase 2 RFG specifications, then it is likely that an alternative formulation can readily be easily certified. If incremental costs are as great as claimed by Chevron and WSPA, then it is likely that an alternative formulation can be developed that will significantly reduce the cost of producing complying gasoline.

It should also be noted that the Board in its deliberations considered a variety of options before making a decision on Phase 2 RFG specifications. Taking into account costs and emissions benefits, the Board chose specifications that in some cases are less stringent than those originally proposed in conjunction with the Staff Report. The olefins flat limit was increased from 5.0 percent to 6.0 percent.

186. Comment: (Page 38, Table II-15, Staff Report) Cost-effectiveness of olefin changes has to be justified. The justification of lowering olefin levels to improve NOx emissions is very questionable. (Chevron)

Agency Response: For a discussion on the emissions effects of olefin content, see responses to Comments 119-122. For the reasons discussed above, we do not believe it is appropriate to consider the cost-effectiveness of individual properties.

187. Comment: The benefits from the olefin content standard do not justify the costs. That is, the olefin standard is not cost-effective when evaluated on an incremental basis. (WSPA, Chevron)

The olefin content should be set at seven percent. The olefin standard proposed by the staff is not cost-effective. (WSPA)

Agency Response: The Board has found that, in combination with the other Phase 2 standards, the emissions reductions that will result from the olefin standard justify the costs to comply with the standards. See generally the responses to the several preceding comments.

188. Comment: (Page 40, Table II-16, Staff Report) Staff should perform an incremental analysis for the cost-effectiveness of the aromatic hydrocarbons specification. (Chevron)

Agency Response: Staff does not feel it is appropriate to consider the cost-effectiveness of individual properties for the reasons described in the responses to the several preceding responses.

189. Comment: No incremental analysis has been done on toxic emissions to justify that the proposed regulations are cost-effective. This should be done. (Chevron)

Agency Response: Staff does not feel it is appropriate to consider the cost-effectiveness of individual properties for the reasons described in the responses to the several preceding responses.

190. Comment: The shadow price for benzene control to meet the ARB regulation is very high (5 cents/gallon). (Chevron)

Agency Response: The commenter does not explain the term "shadow price." Therefore, the staff cannot respond directly to the contention that the value five cents per gallon is "very high". Also, the commenter does not support the value in any way, so its accuracy cannot be determined.

If "shadow price" refers to the cost of meeting the benzene limit alone, it does not appear inconsistent with the cost estimates presented on page 76 of the Staff Report. The estimated cost of meeting the limit on the average benzene content at 0.8 volume percent is 2.8 cents per gallon. Also meeting the 1.2 volume percent "cap" on each batch of gasoline brings the total estimate to 3.5 cents per gallon. These values represent the average cost over all gasoline from all refineries. Because the actual costs will differ among refineries, an estimate of five cents for some (undescribed) situation is not inconsistent.

If "shadow price" refers to the difference in the costs of meeting the entire set of Phase 2 limits with and without the benzene limit, the value of five cents per gallon seems unreasonably high. Meeting the limit on the aromatic hydrocarbon content will, by itself, substantially reduce the benzene content of gasoline. Therefore, one would not expect the cost of meeting the benzene limit as a part of the overall regulation to exceed the cost (3.5 cents per gallon) of meeting the benzene limit alone.

Whatever the meaning of "shadow price," the cost of meeting the benzene limit is included in the refiners' estimates of their costs for meeting the entire set of Phase 2 limits, including benzene. These estimates were the basis of the staff's estimates of the overall compliance cost. Therefore, any issue over the "shadow cost" for benzene does not affect the cost presented in the record for meeting the approved regulation.

191. Comment: (Page 70, Item C, Staff Report) SOx should be assessed against only one parameter, sulfur. (WSPA)

Agency Response: We do not agree. Sulfur has been shown to affect VOC, NOx, and SOx emissions due to the chemical interactions within the catalytic converter. Furthermore, the costs associated with sulfur removal also reduce the costs of meeting other Phase 2 RFG specifications such as olefin content and the distillation requirements. Staff studied the impacts of the regulations by considering gasoline as a system and performed the cost-effectiveness analysis including the total costs of meeting all the specifications along with the total emission benefits. This approach is appropriate because this allows the gasoline to be optimized in terms of its emissions performance taking into account all the emission and cost interrelationships that occur with the individual properties. See our responses to the several preceding comments.

192. Comment: Refiners should be allowed to average at reasonable "flat limits" that are cost-effective. In particular, the ARB should allow an average RVP at 7.1 psi. Otherwise, refiners will comply with the more costly "flat limits". Turner Mason estimates an additional ten cent per gallon increase due to tighter compliance margins. (Mobil)

Agency Response: The reasons for not allowing averaging at the flat limits are explained in the responses to the comments in Section III.E. We have determined that the regulatory standards maximize benefits in a cost-effective manner and we do not believe that a relaxation of the standards is appropriate.

With regard to the RVP specification, we believe that RVP plays an essential role in the reduction of hydrocarbon emissions. Any relaxation of the RVP will result in substantial increases in evaporative emissions due to the non-linear relationship between RVP and emissions. In addition, motor vehicle manufacturers need an RVP at 7.0 in order to design evaporative emission control equipment to reach the the ARB's stringent vehicle evaporative emission standards.

193. Comment: Over a number of years, drivers will adjust their driving patterns so that the actual number of gallons purchased will drop below the Base Case. (WSPA)

Agency Response: As indicated in the Staff Report (p. 67), past experience with price increases has not shown a correlation between gasoline prices and gasoline consumption. Such consumption is a much stronger function of (1) growth, (2) the replacement of the existing vehicular fleet with newer, more economical vehicles, and (3) general economic conditions. Since California is expected to grow rapidly over the next ten years, gasoline consumption is also expected to increase, with or without the implementation of Phase 2 RFG regulations.

If gasoline consumption was to decline from levels estimated in the Staff Report, then the staff's projection of the cost per gallon of gasoline will increase, since refineries would have to increase the price of gasoline to recover the cost of Phase 2 RFG refinery modifications. The overall projected costs to consumers, however, would remain unchanged. That is, consumers would be paying more per gallon of gasoline but would be purchasing fewer gallons. A reduction in gasoline consumption will result in a larger emissions reduction than anticipated by staff for the same cost, which would result in an improved cost-effectiveness for Phase 2 RFG.

194. Comment: Staff members have indicated they are considering winter average temperatures for CO, plus two temperature scenarios for summer: a "75°" scenario and a "planning inventory" temperature scenario. The "75°" scenario typically uses a diurnal (minimum to maximum) temperature range of 60-84°F. The planning inventory scenario typically uses the temperatures from the ten highest ozone days in a given area, and according to staff is 10-15 percent warmer on average than the "75°" scenario.

Our concern is that neither summer temperature scenario adequately reflects the more extreme temperatures experienced in the many areas of southern California. Indeed, such temperatures were considered when the Board set the diurnal temperature specification of 65-105°F for

the new evaporative emission test procedure. On such days the benefits of Phase 2 gasoline controls, particularly the evaporative benefits, will be much greater than the benefits estimated at the lower planning inventory and 75° temperature scenarios. While we agree with staff that it is probably not appropriate to multiply benefits estimated on extreme days by the number of days per year to get yearly average benefits, we nonetheless believe these extreme days should be taken into account at least qualitatively, inasmuch as they greatly improve program cost-effectiveness. Any other approach would be inconsistent with the analysis used by the Board and the staff last year to support the diurnal temperature specification in the new evaporative test procedure. (GM)

Agency Response: We believe that the methodology used by the staff in estimating benefits by the use of the ozone planning inventory is appropriate and consistent with the methodology used in adopting other regulations. As the commenter has stated above, it would not be appropriate to multiply benefits estimated for extreme days by the number of days per year to get yearly average benefits. This method of calculation of benefits will overestimate the benefits of the Phase 2 RFG regulations. Although the ozone planning inventory temperatures may not reflect some of the higher summertime temperatures in certain parts of the state, they are also higher than most of the temperatures during the year. Because the planning inventory temperatures are higher than the annual average temperature in many areas of California, and lower than the extreme days temperatures, we believe that evaporative emission benefits based on the ozone planning inventory temperatures are representative of the average benefits.

195. Comment: Staff's use of the cost-effectiveness for Rule 1146 for comparison to the Phase 2 RFG proposal is misleading. Staff based the cost-effectiveness of Rule 1146 on high price selective catalyst reduction control technology which most likely will not be applied. Also, the cost-effectiveness of the rule was based on a 16 year recovery, while the Phase 2 RFG proposal cost-effectiveness was based on a ten year recovery. (WSPA)

Agency Response: The cost analysis used by the South Coast Air Quality Management District (SCAQMD) in adopting Rule 1146 was based on the cost of best available control technology at the time of the rulemaking. This approach is consistent with previous rulemakings of the SCAQMD. Cost-effectiveness for Rule 1146 was included for comparison purposes only.

The commenter is correct in stating that the cost analysis basis for Rule 1146 was based on an investment recovery period of 16 years. If Rule 1146 cost-effectiveness were to be based on a 10 year investment recovery period, then the cost-effectiveness of Rule 1146 would decline, which would make Phase 2 RFG appear to be more cost-effective in comparison.

196. Comment: (Page 41, Staff Report) Staff should utilize the Federal Clean Air Act reformulated gasoline as the baseline for determination of Phase 2 RFG cost-effectiveness instead of Phase 1 RFG. (WSPA, Chevron)

Agency Response: We believe that the cost-effectiveness analysis should be conducted using current gasoline production as the baseline. Federal reformulated gasoline is not appropriate as the baseline because refiners will design their respective refinery modifications relative to current configurations, which have the ability to produce currently marketed gasoline. Moreover, the requirements for reformulated gasoline in FCAA Section 211(k) will not apply in all areas of the state.

197. Comment: Staff's proposed specifications are definitely not cost-effective, particularly when being enacted before other more cost-effective measures, such as enhanced I&M and/or a vehicle scraping program. (Texaco)

There are more cost-effective ways to get people to reduce emissions of the vehicles they drive or the modes they choose than the proposal presented by staff. (DRI)

Agency Response: The probable adoption of additional control measures does not affect the cost-effectiveness of Phase 2 RFG. The cost-effectiveness of the measures suggested by the commenter were not provided and are yet to be determined. There is no requirement that control measures be adopted in the precise order of their respective cost-effectivenesses. In Resolution 91-54 the Board found that the cost-effectiveness of the Phase 2 RFG regulations is within the range of other measures that are expected to be implemented during the same timeframe in order to attain and maintain the state ambient air quality standards. In adopting control measures the Board considers other factors along with relative cost-effectiveness values. For instance, the Board also considers other factors such as emissions benefits, federal and state mandates, potential safety issues and enforceability.

We recognize that there are several viable strategies for reducing emissions in addition to the Phase 2 RFG regulations. Currently, the ARB is actively developing other regulations affecting industry and the public to help ensure healthy air for all Californians. At this time, the Phase 2 RFG regulations provide the opportunity for a significant stride in progressing towards meeting the state air quality standards, but additional measures will be required.

198. Comment: Based on evidence I have seen, the ARB Phase 2 RFG proposal is incomplete and does not comply with provisions of the California Clean Air Act requiring cost-effective regulations. Therefore, I request that the ARB consider other proposals in which the state's citizen can receive more "bang for the buck". (Polanco)

Agency Response: See the responses to the previous comment and the first three comments in this Section III.C.2.

199. Comment: Staff did not consider other cost-effective options such as an enhanced I&M program and an in-use vehicle buy-back program in staff's analysis of alternatives. (Unocal, WSPA)

Agency Response: No other measures can provide the dramatic emissions benefits provided by Phase 2 RFG. Staff also described other measures which are being considered as possible strategies for reducing emissions in the effort to reach attainment of the state ambient air quality standards. The measures described were not meant to be viewed as alternatives to the need for Phase 2 RFG, since all measures are needed to address California's severe air pollution problem. In addressing these, staff recognized the statutory mandate to achieve the maximum degree of emission reductions possible and ARB's legal authority to impose the control measures. We do not believe that the measures discussed on pages 160-162 of the TSD can serve as replacements for the Phase 2 RFG regulations.

3. Economic Impacts to Other Businesses and Consumers

200. Comment: The Phase 2 RFG regulations will cause the following economic impacts:

> The stimulus of new refinery construction will fade due to higher gasoline prices for businesses and consumers; employment will decrease from 46,000 to 82,000; construction and local service will bear the brunt of the job losses; state and local government revenues will decrease by $900 million to $1.6 billion; and gross state product will be reduced by over $5 billion. (WSPA)
>
> The additional cost to consumers will be $2.8 billion a year, which will cause recession and high unemployment. (California Fuels)
>
> Some studies indicate job losses could exceed 100,000 persons in the state by the end of the decade. (CIOMA)
>
> On page 158 of the TSD, the report only considers the impact on jobbers. The increased cost of gasoline will cause consumers to redirect over $2.5 billion per year, which will have significant impacts on small trade and service related businesses, and the report should mention this fact. (Unocal)
>
> Investment to modify refinery operations so that Phase 2 RFG can be produced in-state results in an immediate but temporary boost to the state's economy. Due to the higher price of gasoline, there will be a decline in economic performance in the late 1990s. (WSPA)

The curently proposed Phase 2 RFG specifications will significantly increase the costs of doing business here, and when that happens more and more businesses will permanently close their doors. (OCAW)

Agency Response: These comments on the impacts of the Phase 2 RFG regulations are primarily based on a DRI/McGraw Hill (DRI) study performed for WSPA. DRI estimated that there will be about 46,000 to 82,000 less jobs created in California by the end of the decade as a result of the regulation, not 100,000 as CIOMA indicates. DRI based these impacts on a number of questionable assumptions. Any change in those assumptions will yield different results. For example, DRI assumes the demand for in-state refining will decline as a result of the shift towards higher value added imports (i.e., ethers). It is not clear that this shift will actually occur. DRI also assumes that over half of the purchases during the construction phase (i.e., about $2.5 billion) will be from out-of-state suppliers, but does not take into account the fact that similar regulations have been adopted by the U.S. EPA, and may also be adopted by other states, increasing the demand for California suppliers of goods and services for refinery modifications. To the extent that DRI's assumptions are relaxed, its impact assessment of job losses and other detrimental attributes in California will be lowered.

It should also be noted that the DRI study did not do a comprehensive analysis of the benefits of the proposed regulations. The Phase 2 RFG regulations will require California refiners to spend three to seven billion dollars in construction between now and 1996. These sizeable investments will stimulate the California economy and generate jobs. DRI failed to include all the effects of these investments on the California job market. Furthermore, it ignored the benefits of technology development for the California refinery modification industry.

DRI also failed to note that the job increases come during a time when the California economy is in a depressed state and in need of stimulus in the form of added spending. As noted by DRI, nearly 350,000 jobs have been lost in California since mid-1990. These job losses have resulted mostly from the national recession, defense spending cuts, and the decline in construction. The recovery in the national economy is already underway and the California economy is expected to soon follow suit. During these tough economic times, DRI actually estimates over 20,000 jobs will be created in California as a result of the stimulus of new refinery investment due to implementation of Phase 2 RFG.

DRI's estimates of job losses will occur after the regulations have become effective in 1996, and cannot be added to the job losses that have occurred since 1990. In fact, DRI's job losses are expected to occur during a time when projections are that there will be strong economic growth and a sizeable increase in the number of jobs in California. Thus, it is more appropriate to view DRI's "job losses" from Phase 2 RFG as a reduction in the growth rate for new jobs.

As reported by staff at the November 22, 1991 Board Hearing, Phase 2 RFG will cost the consumer about 12 to 17 cents more per gallon. As indicated in our response to Comment 206, price fluctuations of 15 to 20 cents per gallon have occurred frequently in recent years without significant economic impacts. This price increase is equivalent to about 0.3 to 0.4 percent of California personal income in 1991, a negligible amount which certainly will not cause recession and high unemployment.

The ARB has carefully considered the costs and benefits of the Phase 2 RFG regulations. It was cost considerations that led the staff and Board to include in the regulations a number of provisions intended to provide flexibility to the gasoline producers. These provisions include allowing averaging (DALs) to meet the sulfur, aromatic hydrocarbons, and benzene specifications. The regulations also allow gasoline producers to produce alternative gasoline formulations that result in equivalent emissions reductions. The flexibility that these provisions provide should have a dampening effect on the increased costs to produce gasoline, and on the resulting gasoline price of gasoline to consumers.

201. Comment: Staff has not seriously considered the economic impacts of the proposed regulations. A respected economic consulting firm estimates loss of disposable income due to higher gasoline prices and a loss of over 80,000 jobs. (Jones)

Agency Response: See the response to the preceding comment. Staff estimated that the cost of the originally proposed regulations to industry would range from $4 to $7 billion. The annual cost to consumers would range from $1.9 to $2.6 billion, representing an increase of about 14 to 20 cents per gallon in the price of gasoline. This is about 0.3 to 0.4 percent of California personal income in 1991.

The industry's estimate of its investment needs ranges from $6 to $9.7 billion. This higher estimate of the cost was based on the assumption that the initially proposed flat limits on gasoline properties would be adopted. The regulation approved by the Board, however, allows average limits on some gasoline properties, which will significantly reduce the cost to refiners. Using this higher estimate, DRI in a study for WSPA estimates that the Phase 2 RFG specifications will result in the loss of about 46,000 to 82,000 jobs and the loss of about $2.2 to $3.8 billion in household discretionary income by the year 2000. The staff believes DRI's estimates are based on a number of questionable assumptions, as described in the response to the preceding comment.

202. Comment: Staff's estimated cost of compliance ($4-$7 billion) is grossly underestimated and it is likely that gasoline prices would increase by 23 cents per gallon. Seventy percent of the lumber produced in California is used in our state. Such a huge increase in the price of gasoline would result in an economic disadvantage for

California which could not be passed on to the consumer. (Calif. Forestry Assoc.)

Agency Response: We do not agree with the price increase suggested by the commenter, for the reasons set forth to the responses to comments in Section III.C.1. We estimate increased fuel costs to be 12 to 17 cents per gallon for the specifications approved by the Board (see the response to Comment 147 and TSD pp. 132-137 for a discussion of the regulation's impact on gasoline prices). Furthermore, other provisions have been included in the regulation which will provide refiners less costly compliance options, such as the alternative fuel formulation certification. It is expected that these provisions will provide a less costly approach to reformulating gasoline by allowing refiners to adjust their day-to-day operations, and also reduce the need for new processes. Also, see the response to Comment 206 for a discussion of the regulations' effect on another transportation-related activity.

203. Comment: The Phase 2 RFG regulations will impose a huge burden of costs on businesses and the public which will equate to another tax. With as much as 23 cents per gallon (20 cents for reformulated gasoline and 3 cents for the wintertime oxygenate program) increased cost, there is not even the slightest guarantee of achieving the air quality goals that we all need and desire. (CIOMA)

Agency Response: The commenter is incorrect in assuming that the costs of the Phase 2 RFG and wintertime oxygenates regulations are additive. The wintertime oxygenate program will sunset as Phase 2 RFG requirements start in March 1996. The staff's cost estimates for Phase 2 RFG include the costs of meeting the oxygen content requirements in 13 C.C.R. section 2262.5. As discussed in the responses to the preceding comments, we believe that the gasoline cost increases resulting from the adopted Phase 2 RFG regulations will be in a range from 12 to 17 cents per gallon. As discussed in the responses to comments in Section III.B. and III.C.2, we believe the regulations will result in very substantial emission reductions, which justify the very considerable costs of the program.

204. Comment: The Phase 2 RFG regulations will have a major economic impact on the food distribution process that will be reflected in the form of higher consumer food prices. (SCGA)

Agency Response: The staff expects that the Phase 2 RFG regulations will not result in a significant increase in food prices. As indicated in the Staff Report (pp. 71-72), Phase 2 RFG will increase the overall cost of operating a vehicle by about two percent. The cost of gasoline is only a small fraction of the cost of food distribution, and an even smaller fraction of the cost of food to the consumer. The food distribution process relies mainly on diesel-engine vehicles, not gasoline-engine vehicles, and Phase 2 RFG will have no direct impact on the price of diesel.

205. Comment: Phase 2 RFG price increases could give agricultural competitors from other states and foreign countries a significant price advantage, which could devastate California's local and state economics. California's agricultural industry cannot accept regulations which will stifle the ability to produce and compete in today's domestic and international markets. (CCA)

The increased cost of gasoline associated with Phase 2 RFG is too much of a burden for agriculture to absorb, especially with current economic conditions. (WGA)

Agency Response: The cost of operating gasoline vehicles is a very minor component in the cost of agricultural production. DRI in their study for WSPA, estimated household income, in the year 2000, would decrease by 0.5 to 0.3 percent due to Phase 2 RFG, while the corresponding figures for farmers is 0.4 to 0.2 percent. Thus, the impact of Phase 2 RFG on farmers should be less than the impact on the average California consumer.

It should be noted that, in several other states, federal specifications for fuel will apply in 1995, and more stringent standards will apply in 2000. These federal specifications should increase the cost of gasoline in other states and partially mitigate any impacts from Phase 2 RFG price differentials. It should also be noted that Phase 2 RFG will improve air quality, which can tend to increase crop yields and improve California farmers' competitive position.

206. Comment: The increased cost of gasoline associated with Phase 2 RFG will severely increase the cost of school transportation services for school districts, affecting the Association members' ability to perform traditional services (CSBCA).

Agency Response: We do not believe that the Phase 2 RFG regulations will severely increase the cost of school transportation services. As indicated in the Staff Report (p. 67), gasoline price increases of 15 to 20 cents per gallon have occurred in the recent past. These increases have not had a significant impact on gasoline consumption (Staff Report, p. 67). Therefore, we do not expect Phase 2 RFG price increases (which will be less than this level) to cause severe disruption to school transportation. If the commenter's analysis was correct, then these previous increases should have also severely affected the members' ability to perform traditional services.

It should also be noted that the date when gasoline will increase in price is known under the Phase 2 RFG regulations. Thus, the price increase can be calculated into contracts, which could mitigate any impacts experienced by members. Prior increases, however, have occurred without warning.

As stated in the Staff Report (pp. 71-72), the cost of operating a gasoline vehicle will increase by about two percent. While the

distribution of the individual costs (e.g., maintenance, insurance, registration, license, and fuel cost) may differ from vehicle to vehicle, we believe the fuel costs will still be a relatively low percentage of the overall cost of operating a bus.

In fact, the increase in the cost of operating a school bus may be less than two percent, since other fixed costs, such as driver's salaries, will not change. In addition, not all school buses use gasoline. Some use diesel fuel, while a few use methanol and compressed natural gas. Use of fuels other than gasoline will tend to reduce the impact of gasoline price increases associated with Phase 2 RFG.

207. Comment: The construction industry is highly sensitive to the price of gasoline, due to the high number of miles driven by members of the industry. Many contracts are fixed price, with no way of recouping increased costs. The economic effect on the construction industry should be considered. (CABCI)

Agency Response: As stated in the Staff Report (pages 71-72), the cost of operating a gasoline vehicle will increase by about two percent due to the implementation of Phase 2 RFG specifications. The cost of operating gasoline vehicles is generally only a small part of the overall costs of construction. Impacts on the construction industry will be reduced to the extent that these increased costs are reflected in increases in prices charged by the construction industry. Phase 2 RFG regulations will not take effect until 1996, which should be sufficient time to reflect the Phase 2 RFG price increases in fixed price contracts. Phase 2 RFG should provide a substantial benefit to the construction industry, since there will be a sizeable increase in construction jobs for refinery modifications.

208. Comment: Most of the oil production of independent oil producers in California is heavy crude oil, which sells for $12.50 per barrel. Tax and regulatory costs are currently $10 to $12 per barrel for this crude, so that the smallest increase in cost can have a severe impact on independents' profits. (CIOPA)

The refinery modifications required by Phase 2 RFG will tend to reduce the price refiners will pay for crude oil, and will reduce the already thin profit margins of the smaller crude oil producers in California. In addition, refiners may relocate their refineries outside of California, and thus use non-California crudes. (IOPA)

Agency Response: We do not anticipate any significant impacts on crude oil prices or the cost of producing crude oil from the implementation of Phase 2 RFG. The price of crude oil is a function of international market conditions, and Phase 2 RFG is not expected to impact these conditions. Independent oil producers are not heavy users of gasoline, and the staff does not expect the increased cost of gasoline to have a significant impact on them.

There may be some link between the consumption of gasoline and the price of crude oil; however, no significant changes in gasoline consumption have been found from price increases similar to the maximum increases expected from the implementation of Phase 2 RFG (see the Staff Report, p. 67).

Although it is true that some refiners may reduce or stop production of gasoline due at least partially to Phase 2 RFG requirements, it is generally more economical to produce gasoline in California for the state's inhabitants to use than to import Phase 2 RFG from some distant refinery. This is especially true when looking at the cost of transportation for gasoline and the existing value of California refineries. Thus, we do not expect refineries to move out of California to produce Phase 2 RFG.

It should also be noted that some California refineries already use non-California crudes. If a refinery is relocated, the result may be that less crude oil but more gasoline would be imported into California, and production of California crude oil would remain unchanged.

209. Comment: The increased cost of gasoline due to Phase 2 RFG will lower real household income. (WSPA)

Agency Response: This income change per household should be minimal. The TSD (p. 144) calculated an average increase in fuel costs of $71 per year per vehicle, or about $142 for a two car household. DRI in their cost analysis for WSPA (where they used a cost of about 23 cents per gallon) estimated household income to be affected by 0.5 to 0.3 percent. If this cost effect is based on the ARB's analysis, the effect would be reduced to about 0.3 to 0.2 percent. Balancing this reduction in income will be other, positive impacts such as improvements in air quality and reduced health costs.

210. Comment: Gasoline imports play an important role in mitigating price increases during short-term market shortages. These imports would not be available under Phase 2 RFG, so that gasoline prices would go up much higher during seasonal shortages. The Phase 2 RFG specifications would turn California into a fuel "island", unable to receive shipments from other parts of the U.S. or the world. (Wickland)

The tight Phase 2 RFG specifications will close out importers and those now selling into California. (AIRA)

Agency Response: The importation of gasoline into California would still be allowed under the Phase 2 RFG regulations, as long as the Phase 2 RFG specifications are met. California has had specifications that are different than the rest of the world for years, yet this has not stopped the importation of gasoline into California.

California refineries will have to make sizeable investments to produce Phase 2 RFG, and it would put California refineries in a severe competitive disadvantage if non-complying gasoline were allowed to be imported. Moreover, allowing the importation of non-complying gasoline would negate the air quality improvements projected from the implementation of Phase 2 RFG.

As reported by staff at the November hearing (November 22, 1991, oral testimony, p. 111), surveys indicate that refiners outside of California, without major capital investments, can meet Phase 2 RFG specifications for about 20 percent of their throughput. With the adoption of Federal gasoline specifications in 1995 and 2000, refineries outside of California will undergo modifications which will improve their ability to produce Phase 2 RFG. This situation should handle production shortfalls without further relief. If there were to be a shortage for some unforeseen reason, however, there is no reason to favor the importation of non-complying gasoline over the production of such gasoline by California refineries.

211. Comment: Phase 2 RFG will increase gasoline prices in California but not anywhere else. This will cause a competitive challenge to California from states that have decided not to tackle the environmental problems this State has. (WSPA)

Agency Response: The increased cost of gasoline due to the Phase 2 RFG regulations is expected to represent only a two percent increase in the operating cost of a gasoline vehicle (Staff Report, pp. 71-72) and, in most cases, substantially less than a two percent increase in the cost of doing business. Thus, changes in competitiveness should not be substantial.

In addition, new federal gasoline specifications will go into effect in 1995, and more stringent specifications will go into effect in the year 2000. The federal regulations require gasoline to be reformulated, which will result in price increases due to the capital investment needed to modify refineries to make the reformulated gasoline. Due to the new federal gasoline specifications, the gasoline price differential between California and other states would not be as great as if no changes were made in the other states.

212. Comment: In the Staff Report, page 8, Item 4, paragraph 3, the statement that the regulations will only increase vehicle unit operating cost two percent is misleading. The average consumer only is concerned with how much it costs to fill the gas tank, and this issue should be addressed on this basis. In the Staff Report, page 71, last paragraph, the percent change in cost per mile is meaningless for most consumers. The consumer is only interested in the cost of the fuel. (Chevron)

Agency Response: It is not clear whether this assertion (i.e., that the average consumer is only concerned with the cost of filling a

gas tank) is true. However, the "hidden" costs of operating a vehicle are just as real as the cost of gasoline. The ARB is required to address the actual (and, in many cases, hidden) costs of regulations, not just the consumers' perception of cost. The more important economic measure should be how an increase in the cost of gasoline will impact vehicle operating costs, consumer habits, and the overall impact on the consumer's standard of living. Thus the proper comparison is with the overall cost of operating the vehicle. Balancing these costs will be benefits such as an increase in construction jobs and improved health and air quality.

213. Comment: Staff must note that sustained changes in gasoline prices have reduced demand in the past. This is apparent by the effects of the embargo related price increases of the 1970s. A reduction in demand would result in higher unit costs since a refiner would have to recover costs over a smaller volume. (Unocal)

Agency Response: The staff presented data on pages 137-138 of the TSD which suggest that gasoline demand is not always impacted by higher gasoline prices. In the discussion in the TSD, the costs shown in figure VI-3 were higher than those costs expected from Phase 2 RFG regulations and yet did not affect consumption. Gasoline prices have undergone dramatic increases in the past which have not reduced gasoline demand. Large fully integrated refining companies have the ability to absorb some costs by shifting those costs to other aspects of the business, such as crude production or retail convenience store outlets located at the service stations. While these costs will be passed on indirectly, the mitigating effect will be to reduce the increased production costs to the consumer and therefore will not impact demand.

214. Comment: When calculating future gasoline prices based on LEV penetration, staff assumed that operating costs are proportional to throughput. In fact, only variable operating costs are proportionate and fixed operating costs cannot be adjusted. (Chevron)

Agency Response: Staff agrees with the commenter that only variable costs are proportional to throughput. However, the only instance when fixed operating costs are important is when operating throughput is reduced to low levels for long periods of time. When staff prepared its analysis, staff took the conservative approach of attributing an operating cost representative of high estimates based on data received from refiners. Staff also assumed that refiners would not operate their facilities at low capacity throughout the year, but would rather operate processing equipment at high capacity for shorter time periods in order to produce enough blendstocks for the year. In this case, the largest portion of the operating costs is the annualized cost of capital. Thus, when staff calculated future gasoline prices based on lower gasoline production forced by clean fuel dominance in the transportation fuels market, staff ratioed future prices with

operating costs (based on a higher operating capacity) versus annualized capital cost.

215. Comment: The estimates for the percentage impact on total annual vehicle costs are low and misleading because the AAA costs cited apply for the first three years only, not for the ten year average life of the vehicle. (WSPA)

Agency Response: We do not agree that the estimates for the percentage increase in total vehicle costs are low. While it is true that the AAA costs are based on operating a new vehicle for the first three years of its life, these numbers were used by staff in an effort to be conservative. The reason for this is the fact that if a ten year analysis of vehicle operation was to be conducted, then in the latter years of the vehicle life, the maintenance costs would increase with respect to fuel cost and result in even lower fuel costs on a percentage basis.

4. Comparison to Other Measures

216. Comment: The ARB should reconsider the necessity of adopting Phase 2 RFG standards in light of the 1994 introduction of low-emission vehicles. (Wright)

Agency Response: In order to meet the state and federal ambient air quality standards, all feasible controls need to be adopted, including both Phase 2 RFG specifications and the low emission vehicles program. Both programs are needed to combat the state's air quality problem.

Phase 2 RFG is a regulation primarily designed to reduce emissions from existing vehicles and new vehicles built before 1996; the low-emission vehicle requirements will have no impact on emissions from these vehicles except for the very limited number of low-emission vehicles introduced in the 1993-1995 model years.

The use of Phase 2 RFG is expected to be one method that vehicle manufacturers will use to meet low emission vehicle standards at a lower cost than if Phase 2 RFG were not available. In that sense the Phase 2 RFG is an integral component of our low-emission vehicle program. However, since we have allocated the emissions reductions of low-emission vehicles operating on Phase 2 gasoline to the low-emission vehicle program, the analysis in the Staff Report does not credit the Phase 2 RFG regulations with any of the emissions reductions from 1996 and later model vehicles operating on Phase 2 gasoline.

Although the emissions reductions we are crediting to Phase 2 RFG decline over time as the vehicular fleet changes to low emission vehicles and post-1995 vehicles, Phase 2 RFG is still needed to achieve ambient air quality standards and to meet the requirements of Section 43018 of the Health and Safety Code, which requires the ARB to adopt

the maximum feasible and cost-effective specifications for gasoline, and to endeavor to attain state ambient air quality standards by the earliest practicable date. The impact of Phase 2 RFG will be immediate, beginning in 1996. On the other hand, it will take twenty years (i.e., the year 2014) to see the full impact of low emission vehicles, since it takes about twenty years to replace existing vehicles. Phase 2 RFG is one of the few measures available that can significantly reduce ambient concentrations in the near term from existing vehicles.

217. Comment: The low-emissions vehicle standards will adversely impact the cost-effectiveness of Phase 2 RFG, and Phase 2 RFG is not needed to meet LEV standards. Phase 2 RFG is thus uneconomical. (Texaco)

Agency Response: See our response to the preceding comment. We also note that since Phase 2 RFG will allow vehicles to meet the low-emission vehicle standards using less costly controls, the likely result will be lower new vehicle prices, which will help reduce the impact on the consumer from increased gasoline prices. These benefits were not included in the cost-effectiveness calculations in the TSD (pp. 139 to 145) or the Staff Report (pp. 70 to 73). These documents indicate Phase 2 RFG is about as cost-effective as (or more cost-effective than) the low-emission vehicle standards.

218. Comment: ARB omitted comparing the cost-effectiveness of Phase 2 RFG with the wintertime oxygenate program (costing $1000/ton for CO) and enhanced I&M (costing less than $1000/ton for CO). (WSPA, Unocal)

Agency Response: In the Staff Report, the cost-effectiveness of the Phase 2 RFG proposal was compared to regulations which have already been adopted and are in place in the California Code of Regulations. Neither the wintertime oxygenate program nor the enhanced I&M program had been adopted at that time, and thus cost-effectiveness figures for these programs were not presented in the staff's comparison. The Staff Report indicates that some adopted measures are higher in cost, while others are lower in cost. In order to meet the mandates of state and federal law and achieve the ambient air quality standards, all feasible measures must be adopted, including Phase 2 RFG, the wintertime oxygenate program, and an enhanced I&M program.

It should be noted that the commenter only cites the cost-effectiveness for CO, while Phase 2 RFG will also reduce emissions of hydrocarbons, oxides of nitrogen, sulfur oxides, and toxic compounds. Although the Staff Report did not calculate the cost-effectiveness for CO reductions, this Report (p. 70) did calculate a cost-effectiveness figure for several pollutants combined, assuming CO reductions were worth one-seventh as much as NOx or volatile organic compound reductions. If the CO cost-effectiveness is separated from this combined figure, a cost-effectiveness value of $844 per ton is derived.

This value is comparable to the $1000 per ton figure cited in the comment.

In addition, the Phase 2 RFG regulations adopted by the Board include provisions that increase refinery flexibility by allowing averaging, and use of either a predictive model or testing for approval of alternative gasoline formulations. This increased flexibility and the allowance for alternative formulations will tend to reduce the cost of Phase 2 RFG and improve its cost-effectiveness.

219. Comment: Phase 2 RFG will cost $100,000 per ton of ROG+NOx removed. ARB is required by law to adopt cost-effective measures, and Phase 2 RFG is not cost-effective in comparison to ARB's own clean fuels and low-emission vehicle programs which cost $3,000 to $7,000 per ton of ROG+NOx removed. (Polanco)

Agency Response: We do not agree that the cost of Phase 2 RFG will be $100,000 per ton of ROG+NOx removed. The cost-effectiveness of Phase 2 RFG is comparable to the clean fuels/low emission vehicles programs and recently adopted district rules (Staff Report, p. 73). The Staff Report lists the cost of Phase 2 RFG as $8,000 to $12,000 per ton, while the cost of low-emission vehicles/clean fuels is listed as $10,000 to $32,000 per ton. It should be noted that the cost of Phase 2 RFG is expected to be lower than the levels found in the Staff Report due to the Board's modifications allowing expanded averaging and a less stringent olefin limit.

In addition, recent emissions testing data indicate emissions from gasoline vehicles have been substantially underestimated. Using corrected emissions inventory values would improve the cost-effectiveness figures for Phase 2 RFG significantly.

220. Comment: ARB's analysis for Phase 2 RFG should have discussed the acceptable range of costs Californians are willing to spend for clean air, based on other large scale programs such as I&M. (Wickland)

Agency Response: In order to add this analysis, one would require an accurate quantification of the cost of dirty air, the benefits of clean air, and the associated health expenses. These costs are difficult to accurately determine. Moreover, a monetary value cannot be placed on some air quality benefits.

The Staff Report did not include any speculation on what is considered an acceptable cost to Californians. Instead, page 8 of the Staff Report and Section E of the TSD contain a comparison of the cost-effectiveness of the Phase 2 RFG regulations with other recently-adopted control measures. The overall cost-effectiveness of the proposed Phase 2 RFG regulations is estimated to be around $8,000 per ton ($4.00/pound) to $12,000 per ton ($6.00/pound) for criteria pollutants and $35 million per cancer case avoided for toxic air contaminants. These estimates are well within the range of other

measures adopted recently by the Board or the districts. The cost-effectiveness of other recently-adopted control measures ranges from $1,300/ton to $32,000/ton for criteria pollutants, and from $1 million to $50 million per cancer case avoided for toxic air contaminants.

221. Comment: Phase 2 RFG cost-effectiveness should be compared to ranges for measures recently adopted by the Board. (Texaco)

Agency Response: A comparison to other measures recently adopted by the Board and the South Coast Air Quality Management District was provided on page 145 of the TSD. This comparison indicates the cost-effectiveness of Phase 2 RFG is within the range of other recently adopted measures.

222. Comment: Use of enhanced I&M programs, an old vehicle scrap program, and future research on low-emission vehicles will likely show reformulated gasoline beyond federal requirements is not cost-effective and may not be needed to meet future emission reduction requirements. (Texaco)

Agency Response: We do not agree with this statement. The Staff Report indicates that Phase 2 RFG is cost-effective compared to recently adopted measures (p. 73), while section 43018 of the Health and Safety Code requires the ARB to adopt the maximum feasible and cost-effective specifications for gasoline within a limited timeframe. All feasible and cost-effective means available will be needed to meet the state and federal ambient air quality standards, and no program should be dropped and replaced by another if both are cost-effective.

The Phase 2 RFG regulations, as we discussed in the Staff Report (pp. 9-11 and 62-69), are expected to bring about substantially greater emission reductions than the federal gasoline standards. Compared to the federal emission reductions, the initially proposed Phase 2 RFG reductions are 70 percent greater for volatile organic compounds, 300 percent greater for oxides of nitrogen, and 15 percent greater for carbon monoxide. (Staff Report, p. 61). The reductions from the adopted program will be relatively close to these values.

Phase 2 RFG will make a sizeable reduction in emissions in 1996, and these reductions will continue into the future. On the other hand, it may take many years for the Board to effectuate reductions from some of the suggested programs such as future research on low-emission vehicles. Other programs such as old vehicle scrapping may result in temporary reductions.

223. Comment: The method of extrapolation which staff intends to follow in their cost analysis is not industry common practice. (Chevron)

Agency Response: This comment is not germane to this rulemaking, because extrapolation was to be used with results of the ARB's effort to develop linear programming models to independently determine the costs of the regulation. However, since staff did not complete the models in time for the public hearing, staff conducted another cost analysis based on realistic cost of compliance data received from six California refiners of varying size and capability. Furthermore, several studies have been conducted utilizing this cost analysis methodology. For example, the 1988 report prepared by Arthur D. Little in support of the low aromatics diesel regulation (13 C.C.R. § 2282) followed the same approach.

224. Comment: Phase 2 RFG will cost $2 billion per year, and there are a number of other, more cost-effective programs available. For example, the funds could be used for a centralized, free I&M program, with replacement of carbon canisters on evaporative control systems that fail inspection. (Wickland)

Agency Response: One measure alone cannot achieve the emissions reductions necessary to attain the ambient air quality standards. It is likely that both Phase 2 RFG and an improved I&M program will be required. Although a "free" I&M program may be more cost-effective than Phase 2 RFG, funds would have to come from somewhere to operate such a program (i.e., a tax increase would be required), and the ARB does not have the authority to impose taxes.

225. Comment: The federal Enhanced Inspection/Maintenance (I/M) Program will reduce VOC and CO by as much as 30 percent, and NOx by as much as 10 percent. What impact would an enhanced I/M program have on mobile source emissions in California, and how would the cost-effectiveness of California Phase 2 RFG gasoline be impacted? (WSPA)

Agency Response: An enhanced I/M program has not been adopted, and it is speculative at this time to discuss what this program would entail and what the benefits would be. Until all elements of an enhanced I/M program are described in detail, it is not clear what the precise impact and cost-effectiveness of such a program may be.

Although it is unclear what reductions will occur from an enhanced I/M program, based on WSPA's analysis we do not believe such a program will result in reductions as great as 30 percent. The current emissions inventory for gasoline vehicles is believed to be lower than actual, and a larger, corrected inventory has been postulated. The WSPA claim that emission reductions for an enhanced I/M would be as great as 30 percent were calculated by determining the reductions in tons per day from the larger, corrected inventory. These reductions were then compared to the current, smaller inventory to determine a percentage reduction in emissions. The correct comparison should have been with the larger, corrected inventory. If the correct comparison were made, reductions from an enhanced I/M program would be less than 30 percent.

If an enhanced I/M program as effective as that envisioned by WSPA were implemented before the effective date of Phase 2 RFG regulations, and the cost-effectiveness of Phase 2 RFG were recalculated taking into account the impact of the enhanced I/M program, the cost-effectiveness of Phase 2 RFG would be degraded by less than 30 percent. Thus, Phase 2 RFG would still be comparable in cost-effectiveness to other recently adopted measures (see page 73 of the Staff Report). In order to achieve the ambient air quality standards in California, all feasible measures must be adopted, including Phase 2 RFG and an enhanced I/M program.

5. Linear Programming

226. Comment: Staff should consider the Unocal refinery at Los Angeles as a deep conversion refinery instead of a conversion refinery. Grouping Unocal's refinery in the conversion group will skew the resultant compliance cost for that group. Conversion and deep conversion refineries will have different levels of flexibility and thus, different compliance costs. (Unocal)

Agency Response: Since Unocal did not provide any cost data affecting their refinery, the grouping of this refinery will not impact staff's analysis. The main concern for grouping Unocal in one group or the other would have been if the LP analysis had been completed. Since staff did not complete the LP analysis, grouping Unocal in a particular group had no bearing on the overall costs presented by staff. Furthermore, some data were provided by another member of the deep refining group. Therefore, this group was represented independently of the cost impacts to other refining industry segments.

227. Comment: (Page 146, Paragraph 1, next to last sentence) It is not certain that the use of linear programs would result in lower cost than projected by ARB's cost-effectiveness analysis. (Chevron)

Agency Response: The linear programs described in the TSD were not completed in time for the public hearing because of the lack of resources on the part of the contractor hired to produce the models. Staff's cost analysis was not based on refinery models, but on data provided by refiners for the cost of modifications needed to produce Phase 2 RFG. Since these costs did not reflect refinery optimization (while linear programs would), the same (or, more likely, lower) costs would result by using linear programs. Since results from the use of linear programs were not available, the Board's actions were not based on these results.

228. Comment: In the discussion of linear programs (TSD, p. 147), staff assumes that production of reformulated gasoline would be at the same levels as today. According to experts, this assumption is not correct and is contradictory to the assumption by staff presented in

Table II-1 (TSD, p. 60). This table shows gasoline consumption increasing from 1996 through 2010. (Unocal)

Agency Response: The linear programming models were not fully developed for the staff's cost study and were not used in any way.

229. Comment: Page 148 of the TSD refers to a survey included as attachment 1. This survey was not included, and thus we cannot comment on the robustness of the staff's linear programming. (Unocal)

Agency Response: Page 148 of the TSD discusses the staff's efforts on linear programming, and states that attachment 1 is included. This statement is in error since attachment 1 was inadvertently left out of the TSD. However, linear programming is discussed in the TSD for informational purposes only. The staff did not use linear programming to develop cost-effectiveness values or to support adoption of the Phase 2 RFG regulations. Thus, this error is of no consequence.

230. Comment: Pertaining to Page 148 of the TSD, it is not clear how the staff will get its models to adequately simulate refinery operation for Phase 2 gasoline. It does not appear that the staff has sufficient processing alternatives to adequately assess the impact of the proposed specifications. In addition, once the base refineries are assessed, it is not clear how the results could be extrapolated to other refineries in the state. (Chevron)

Agency Response: The staff was not able to model the refineries on time. Therefore, the cost analysis that served as the basis for the Phase 2 RFG regulations is based on the actual cost data which were provided to the staff by six California refiners.

231. Comment: Hydrotreating FCC gasoline for sulfur reduces the octane of the C8 portion of the gasoline by over 9 numbers. The octane of heavier components is reduced less, but their presence in the gasoline pool is limited by the proposed T90 standard. The octane of lighter components is impacted more, and these must be reformed to recover octane to the limit of the aromatic hydrocarbons specification. Hydrotreated FCC gasoline will have a negative impact on pool octane, as opposed to the neutral or positive impact it currently imparts. The staff should address this fact in the development of their Linear Program Model. (Unocal)

Agency Response: The Linear Program Model was never used, so there is no need to address the reduction in octane from some of the processes used to produce Phase 2 RFG in the development of the Linear Program Model. Although it is true that some processes used to make Phase 2 RFG will tend to reduce octane, others will increase it (such as the addition of oxygenates and other blendstocks such as isomerate and alkylate). The data on costs of modifying six refineries to

produce Phase 2 RFG took into account all parameters that would need to be satisfied while producing Phase 2 RFG, including impacts on octane.

232. Comment: In the discussion of LP validation (TSD p. 148) the staff states that "Since not enough time or data was available for rigorous refinement of the model, LP validation primarily focused on maintaining representative material balance". It is questionable whether the staff's model was validated against internal unit-by-unit material balances or just overall refinery material balances. On the same page, the staff states "Bechtel validated the LP models to the extent possible given the time constraints presented and limitations with the data utilized from the study. Overall, the LP models depicted real refinery material balance sufficiently accurate for the cost determinations of this study." The staff does not quantify what constitutes "sufficiently accurate". We are concerned about these issues because our experience indicated that very small model errors can have significant impacts on cost determination. In addition, we are concerned that reduced accuracy was accepted due to "strict time constraints". (Unocal)

Agency Response: This comment is moot. The staff did not finalize the modeling of individual refineries because of time constraints.

6. Miscellaneous

233. Comment: Table IV-1 on page 125 of the TSD used the first quarter of 1990 for gasoline production, which is always the lowest production period of the year. The average of 1990 should have been used. (Chevron)

Agency Response: This table actually uses production figures for the first quarter of 1991, not 1990. The purpose of the table is to show the percentage of all gasoline produced by each refinery group, and not total average gasoline production. The first quarter of 1991 was used rather than the average for all of 1990 so that the most recent information would be displayed.

234. Comment: Section B, page 126 of the TSD contains a discussion of refineries and process options that is very simplistic and needs to be completely revised. (Chevron)

Agency Response: This discussion only contains general information, and its purpose is to assist the reader in understanding refineries and refinery modifications. Revising the discussion to provide more detail would not impact information used to determine the appropriateness of the Phase 2 RFG specifications.

235. Comment: (Staff Report, Section VII, subsection B) In the section of the Staff Report relating to obtaining permits, we agree that the major concern is providing offset emissions for the projects. Staff states that the SCAQMD has an exemption for offsets if offsets are not available. WSPA is concerned that if this policy is not uniform across state, then some refiners will be unfairly impacted through compliance with these regulations. (WSPA)

Agency Response: Staff's discussion of obtaining permits is presented as an indicator of the situation facing refiners in undergoing their respective modernization construction projects. Since the districts were still developing their respective policies at the time of the Staff Report publication, the discussion presented by staff basically framed the main issues facing refiners.

The Staff Report indicates that each district is addressing the issue of refinery modifications differently. The SCAQMD has adopted a rule which would exempt the need for offsets for state and federal reformulated gasoline projects, with the condition that there will be no increase in the maximum rating of the facility. The BAAQMD has stated that there are ample credits available to refiners to meet offset requirements. Since the ARB has no permitting authority over the districts on these projects, it is the district's responsibility to adopt rules consistent with state and federal law when developing new and modified source review policies.

236. Comment: Our analyses of ARB's Phase 2 RFG proposal indicates that the proposed specifications will be very expensive to implement and will restrict our ability to make gasoline. The difficulty in meeting the multiple specifications simultaneously, combined with the inaccuracies of the physical test methods will greatly increase costs and reduce flexibility to produce gasoline. (Chevron)

Agency Response: While we recognize that the costs for Phase 2 RFG regulations will be high, we do not agree that refiners will be unduly restricted in their gasoline production. The comment may hold true for current refinery configurations because of the limited blendstocks going into the gasoline pool. However, in the future, refiners will need to invest in additional processing units, thereby increasing the number of blendstocks used for blending gasoline. The increase in the number of potential blendstocks entering the gasoline pool will inherently provide flexibility. In addition, as described in other responses, the adopted Phase 2 RFG regulations contain a variety of elements designed to provide refiners with flexibility in developing and implementing their compliance strategies.

We believe that the test methods referenced by the regulations represent the most accurate methods available at this time. The staff is currently committed to work with industry to further improve the accuracies in analytical methods. Future improvements will reduce variability and should provide additional relief to gasoline blenders

by allowing blending margins to be adjusted down to reflect the more accurate test methods and precise blending practices.

237. Comment: Adoption of regulations beyond the federal requirements will require California's refining industry to maintain dual compliance records and incur other unnecessary costs for little added benefit. (Morgan)

Agency Response: The U.S. EPA has not yet issued final reformulated gasoline regulations. The regulatory texts that have been proposed to date contain considerable more recordkeeping requirements than the ARB's regulations because of the complex federal averaging provisions. We have encouraged EPA to minimize reporting requirements for refiners that are meeting the more stringent California standards.

We believe that the Phase 2 RFG regulations will result in considerable emission benefits when compared to the federal requirements. (see pp. 9-11 of the Staff Report.)

238. Comment: With regard to page 152, Item 2 of the TSD, a refiner needs to make a profit, or he will eventually go out of business. (Chevron)

Agency Response: The referenced document describes how large an increase in the price of gasoline would have to be in order for refiners to maintain existing profits. The pertinence of the comment is not clear. All for-profit businesses need to make a profit, or they will eventually go out of business. As a for-profit business, a refiner will likely increase the price of gasoline to recover increases in the cost of producing gasoline. To the extent that refineries recover Phase 2 RFG costs, the economic attractiveness of refineries will be unchanged. As pointed out in the Staff Report (p. 67), recent price increases and declines of 15 to 20 cents per gallon have not had any apparent impact on gasoline sales.

239. Comment: ARB should work with the small business community rather than against it. CIOMA, with the Underground Storage Tank Cleanup Fund, has shown that goals can be achieved and an even better job done with greater cooperation in a less costly and more effective manner. (CIOMA)

Agency Response: Staff, in developing the Phase 2 RFG regulations, has sought to work with independent oil marketers. CIOMA representatives have been invited to all workshops conducted during the development of the Phase 2 RFG regulations. The staff also held several meetings with the independent marketers at which their concerns were voiced.

240. Comment: The Phase 2 RFG specifications will give ARCO and perhaps one or two other major refiners a substantial competitive advantage. ARCO's oil comes primarily from Alaska, and gasoline made from Alaskan crude can meet the specifications with less expensive modifications to refineries. (Wickland)

Agency Response: We do not believe that the use of Alaskan crude oil will provide any competitive advantage to a particular refiner such as ARCO. A large number of refineries use Alaskan crude. In fact, nearly half the crude oil used in California refineries is from Alaska. If there is an advantage to using Alaskan crude, refineries have until 1996 to revamp their crude oil supply contracts to run more Alaskan crude. Currently, there is a surplus of Alaskan crude in California. Thus, refiners should not have difficulty in purchasing this crude.

241. Comment: On page 158 of the TSD, it is stated that the options to small refiners are limited to either installing capital facilities to meet the regulations or withdraw from the California gasoline market. These are the only options available to large refiners as well. (Unocal)

Agency Response: We agree, but that does not change the appropriateness of the treatment of small refiners in the regulations.

D. APPROPRIATENESS OF DIFFERENT TREATMENT OF SPECIFIC SEGMENTS OF THE OIL INDUSTRY

1. Small Refiners

242. Comment: Small refiners cannot afford to comply with the reformulated fuels specifications and cannot obtain financing to cover these costs (AIRA oral testimony, p. 200; comment letter, p. 178). Small refiners are unable to obtain the necessary amount of capital to finance the necessary modifications to comply with Phase 2 RFG regulations. (AIRA) We urge ARB to provide an exemption for small refiners from the Phase 2 RFG requirements until the year 2000. This short extension for small refiners would achieve substantially all the air quality benefits without eliminating small refiners from the reformulated gasoline market. In addition, small refiners would not be competitively disadvantaged if granted an exemption in comparison to larger refineries. (AIRA) ARB should recognize small refiners' inability to meet the 1996 Phase 2 RFG deadlines and exempt them from the requirements until the year 2000. (AIRA)

Powerine requires an extension on the Phase 2 RFG compliance date. No bank or investor will loan enough money for the required refinery modifications until the marketplace accepts the higher price for reformulated gasoline necessary for Powerine to pay back the loan. As a minimum, the ARB needs to adopt the proposed two year extension for small refiners that Staff has recommended at the hearing. Even more time should be granted to small refiners, along with less stringent specifications. (Powerine)

We believe that four additional years will be required for small refiners to meet the Phase 2 gasoline limits. We believe that it will take 18 months to two years for financial institutions to see the proven gasoline margin results to finance our construction, and another two to two and a half years for us to safely construct these process units. Small refiners cannot obtain capital to make the refinery modifications required by Phase 2 RFG. Bankers have written to the ARB stating they will not provide funds to small refineries until it is verified that refinery margins have improved. (Fletcher Oil)

Agency Response: As discussed in the response to Comment 247, the Board has concluded that some degree of special treatment is appropriate for small refiners. We recognize, though, that a permanent exemption or set of tiered standards, or a relatively long term extension, could decrease the emission reductions attributable to the Phase 2 RFG regulations to an unacceptable degree. We also recognize that a log term extension or an exemption could have substantial destabilizing impacts on the gasoline market. Large refiners have very strongly urged that any special treatment of small refiners would result in a host of adverse impacts.

In light of these factors, we have modified the original proposal to allow the limited special treatment for small refiners described in

Section II.B.2. above. Small refiners are allowed a two-year extension for meeting the Phase 2 RFG specifications for the four properties that will not be covered by the federal reformulated requirements that have to apply in most of southern California starting in 1995. (FCAA § 211(k).) We believe such an extension is justified by the small refiners' greater difficulty in obtaining financing for the refinery modifications that will be necessary to comply with the full set of Phase 2 RFG specifications. However, we have narrowly defined the extension so that it will only be available to a small refiner that demonstrates that it is making the necessary modifications to comply with the Phase 2 RFG regulations starting March 1998. We have limited the amount of gasoline subject to the extension to the refiner's historic production levels, to assure that small refiners do not take advantage of the extension to increase production of gasoline that does not fully conform to the Phase 2 RFG specifications.

243. Comment: We support Powerine's request for a delay in compliance with the California reformulated gasoline standards, since Powerine will need the additional time to obtain the necessary financing and construct the new facilities to produce this reformulated gasoline. I would hope that the ARB takes into consideration that a small refiner like Powerine does not have the financial resources of the major oil companies to make the kind of investments that will be required to comply with California's reformulated gasoline regulations. Powerine has an extremely limited ability to borrow money in today's business environment, and, at this time, MG (one of the few firms still providing financing to independent refiners) would not lend Powerine the money necessary to comply with California's reformulated gasoline standards. (MG Trade Finance Corp.)

Agency Response: See the response to the preceding comment.

244. Comment: As stated in ARB's proposed regulation, 16 of the 30 refineries in California produce 97 percent of the gasoline sold in California. Because small and independent refiners represent a relatively small portion of the industry, allowing delayed compliance will not make a significant difference in air quality and, therefore, will not adversely affect the environment. (AIRA)

Agency Response: The regulation does not state what portion of gasoline is produced by a given number of refineries. Small refiners produce about seven percent of the gasoline in California. While the Board has provided a two-year extension for compliance with four of the eight regulated properties, we recognize that the small refiners' market share is significant and the emissions resulting from gasoline produced by small refiners cannot be ignored.

245. Comment: We're only asking for a short four-year extension, and to prioritize what you were hearing earlier from a variety of

members. I think it's safe to say that the longer the extension, the better off we are. If you can only see yourself clear to providing a two-year extension, such as that recommended by your staff, then we would ask that, for the additional two years--for the incremental two-year period, 1998-1999, that we have the caps as our absolute limit. This will enhance enforceability, and certainly also further improve air quality. (AIRA)

We want small refiners to be limited to the caps during 1998-1999 only. This minor deviation would offer additional help to small refiners in two important respects. One, a small portion of Phase 2 investments could be deferred for up to an additional two years by certain small refiners. Two, small refiners would be afforded the opportunity to generate some additional cash to help fund the Phase 2 investments. (Golden West)

Agency Response: The two-year extension approved by the Board is conditioned on construction of the necessary refinery modifications during the two-year period. These modifications should be designed to enable full compliance with the Phase 2 RFG regulations starting March 1998. Setting what would in effect be a temporary limit for the following two years would not make sense because it is more practical for the small refiners to effect all of the refinery modifications at one time than to attempt some sort of staged modification. Particularly in light of these considerations, the adverse emissions impact of an additional two-year extension to meet the flat or average limits would not be justified. Also see the response to the first comment in this Section.

246. Comment: Staff recommended a delayed compliance schedule for small refineries, but did not recommend any changes in gasoline specifications. Powerine urges the adoption of a cap limit as a flat limit standard for the small refiners. This would allow small refiners to remain competitive with the larger refiners. (Powerine)

Agency Response: It is not appropriate to relax the specifications permanently for small refiners or to allow a compliance delay for all specifications. The Board's decision to allow a two year compliance delay for four of the eight Phase 2 RFG specifications strikes a balance between the need to provide some relief to refiners that intend to comply with the Phase 2 RFG standards but do not have the financial means to do so, and the need to achieve the maximum practicable emissions reductions. The delay in compliance will allow small refiners time to demonstrate that the rate of return for Phase 2 RFG refinery modifications is sufficient to encourage lenders to make financing available.

Allowing small refiners to use the large refiners' cap limit as the small refiners' flat limit will create a permanent difference in gasoline specifications between small and large refineries. We do not believe that giving small refiners a permanent advantage in complying

with the standards justifies the emissions impacts that would accompany such an approach.

247. Comment: We strongly believe that there should be no exemption for small refiners and that the Phase 2 RFG specifications should apply equally to all refiners and importers. We take exception to staff's proposal to allow small refiners an extension in meeting the Phase 2 RFG specifications. This would be equivalent to a two year exemption. Any such provision would place an economic burden on any firm required to meet the original deadline. Exemption provisions would add significant, if not impossible, enforcement complications due to commingling and exchanges of gasoline. (Chevron)

We believe there should not be an exemption for small refiners. There is no justification for such an exemption, and the same requirements should apply to all refiners. (Mobil)

We are opposed to granting an exemption to small refiners. Such an exemption would create a serious competitive imbalance in the marketplace, and this issue has not been adequately studied. In addition, exemptions would complicate enforcement and reduce environmental benefits. (Shell)

We are opposed to small refiner exemptions. Exemptions would distort the marketplace, complicate enforcement, and reduce the environmental benefits of the regulations. (Exxon)

We strongly oppose the small refiner exemption. We would not be able to recover our costs during the two year program because small refiners would maintain low prices. (Unocal)

We feel very strongly that an exemption for small refiners, or any other group, would not be appropriate. An exemption would defeat the clean air objective of this regulation, and would seriously disadvantage firms not exempted. The cost of compliance for all participants will be enormous (although still less than the cost of other alternative fuels), and the prospect of any exemption will be chilling to all. (ARCO)

We oppose the inclusion of special exemptions for small refiners. Regulations should treat all refiners equally and provide sufficient flexibility to optimize each refinery. Granting compliance delays for small refiners amounts to granting big benefits subsidized by California consumers. (Texaco)

I am deeply concerned that this proposed regulation will treat companies differently solely because of size. I see little rationale to disrupting the marketplace by introducing arbitrary, competitive advantages to a single element of the refining industry. The current proposal will unfairly disrupt the competitive balance of the industry by the sheer magnitude of the investments which will be required of

some companies only marginally larger in size than those that would receive special treatment. (Morgan)

Agency Response: We initially note that it is inappropriate to refer to the small refiner provisions as an "exemption." Small refiners are subject to four of the eight Phase 2 RFG gasoline specifications in exactly the same manner as other refiners. The compliance extension for the other four specifications is for two years only, and small refiners qualify for the compliance extension only if they meet stringent conditions designed to assure that they are making the expenditures necessary to enable them to come into full compliance by the end of the two-year extension period.

As is fully discussed in the responses in Section III.I.2.(b), before the Board adopts motor vehicle fuel regulations it is required to consider the impacts of the standards on the economy of the state. (Health and Safety Code §§ 43013(e), 43018(e).) In evaluating the impact of the proposed Phase 2 RFG regulations on small refiners in California, the ARB has evaluated the following issues: (a) the cost of compliance for small refiners, (b) the financial status of small refineries in California, and (c) the ability of small refiners to raise the capital needed to comply with the Phase 2 RFG requirements. As part of this evaluation the staff held a number of individual meetings with small, independent, and large refiners, evaluated the existing data, and performed a comparative evaluation of the financial status of various segments of the California refining industry.

First, as is discussed on page 77 of the Staff Report, it appears that the cost of compliance for small refiners would be higher than the cost of compliance for either large or independent refiners. Small refiners operate facilities with significantly smaller size processes, and accordingly can take less advantage of economies of scale. Because small refiners need to build smaller process units, the capital costs required on a per gallon of product basis would typically be higher than that for larger facilities. In addition, small refiners typically face a higher cost of capital than large refiners due to their highly leveraged balance sheets, their size, and their limited access to capital markets. Because increasing leverage poses increasing risk of loss for lenders, small refiners are required to pay a higher rate of return. Also, because the per unit cost of overseeing loans is more costly for the small refiners, lenders require a higher rate of return. Finally, because small refiners have limited or no access to bond and equity markets, they have to turn to higher-cost sources of financing such as banks, private placement, and limited partnerships. It appears that the overall cost of compliance for small refiners would be in the high end of the range of compliance costs indicated by the Staff Report.

Second, Appendix 6 of the TSD (particularly pp. 6-21 to 6-24) contained an evaluation prepared by staff of the financial status of small and large refiners in California. 21-24). This evaluation indicates that California small refiners operate on a lower profit

margin than large refiners. They are also more highly leveraged than large refiners. Two small refiners actually had total debts in excess of their total assets, indicating they were bankrupt. Small refiners' heavy debt load indicates that suppliers and creditors would be very cautious in providing additional credits to those refiners. Overall, the evaluation indicated that small refiners are in a much weaker financial condition than independent and large refiners.

Third, staff evaluated the small refiners' ability to raise capital (TSD, p. 158). This evaluation and various comments submitted during the rulemaking show that small refiners would have difficulty raising capital due to their overly leveraged balance sheets, their limited access to capital markets, and the uncertainty in their ability to recover costs. Small refiners' highly leveraged balance sheets severely limit their ability to borrow. During these hard economic times characterized by slow economic growth, lenders have tightened their credit standards, and thus are reluctant to provide additional credit to heavily leveraged companies (June 22, 1992 15-day comment letter from Fletcher). At the same time, small refiners' access to capital is restricted to high-cost sources. This is because small refiners, unlike independent and large refiners, have little or no ability to raise capital through equity or bond markets. In addition, some small refiners have indicated that even high-cost sources are unwilling to provide the financing required for compliance with this regulation due to uncertainty regarding the small refiners' ability to recover capital expenditures through price increases (November 7, 1991 comment letter from MG Trade Finance Corp.; June 22, 1992 15-day letter from Powerine). Because small refiners control only a small portion of the gasoline market, lenders would need to have more knowledge about other firms compliance to ascertain if the market would support gasoline price increases so the costs can be recovered. All these factors will impact a lender's or investor's decision to loan or to invest in small refiners. Overall, it appears that small refiners will be unable to raise the capital needed for compliance with the requirements of the Phase 2 RFG regulations unless some special treatment is provided.

We have considered a number of different options for small refiners, such as not providing any special treatment, making use of the current or modified variance provisions, allowing a compliance delay, or allowing permanent, less stringent standards. Without some regulatory relief, the Phase 2 RFG regulations may cause some small refiners to go out of business. (See Comment 242.) Elimination of the small refiner segment of the California refining industry would result in job losses and would likely have anti-competitive effects because small refiners provide some degree of competition in the gasoline market. We have concluded that it is preferable to tailor our regulations in a way that minimizes the likelihood that some firms will be put out of business, especially when the costs of compliance are higher for these companies than for the rest of the industry.

Our evaluation of the use of variance provisions indicates that such an approach would not be helpful to small refiners because it lacks the predictability of the adopted small refiner provisions. The approach of a permanently less-stringent standard for small refiners was rejected because of the lessening of the air quality benefits and the potential unfairness to other refiners. With an extension rather than permanently less stringent standards, small refiners will ultimately have to incur the same range of costs as other refiners.

In light of the above factors, the Board decided to allow a compliance delay for small refiners, and in the interim to require that they produce gasoline that is as clean as possible. The compliance delay as adopted by the Board will be limited to a two-year period, from March 1996 to March 1998, and will apply to only four of the eight Phase 2 RFG specifications. During the delay, small refiners will be able to market only a limited volume of gasoline that meets four of the Phase 2 RFG specifications as well as all federal phase 1 gasoline specifications. Further, as described in more detail in Section II.B.2.(d) above, comprehensive conditions are imposed to help assure that the refiner is in fact taking the necessary steps to come into compliance by the end of the two-year extension period. The detail of these conditions is unprecedented in the Board's motor vehicle fuels regulations.

A compliance delay has been deemed necessary to help facilitate the efforts of qualifying small refiners to raise the financing required for the capital improvements associated with full compliance with the Phase 2 RFG specifications. The compliance delay would not change the financial requirements that small refiners have to meet, but it would allow them to spread out their capital expenditures over more years. In addition, this delay tends to reduce lenders' uncertainty in the ability of small refiners to recover their capital expenditures through gasoline price increases.

We recognize that many large refiners have asserted that the two-year compliance delay will give small refiners a competitive advantage over larger refiners, and will result in "windfall profits." Since the costs of compliance are higher for small refiners and since small refiners' qualifying gasoline will cost more to produce than current gasoline (because it must meet four of the Phase 2 RFG specifications, and all federal Phase 1 gasoline specifications in most of southern California), the small refiners' cost of production for qualifying gasoline will be higher than the cost of producing today's gasoline, and the cost disparity between the small and large refiners will be tempered. This should substantially restrict a small refiner's ability to make "windfall profits", and should not have significant adverse economic impacts on independent and larger refiners. The competitive advantage would be further restricted because the adopted regulations limit small refiners' production of qualifying gasoline (i.e., gasoline required to meet only four of the eight Phase 2 RFG specifications) to historic production levels. This requirement in effect eliminates the small refiners' ability to expand their market share during the

extension period. Therefore, there is no incentive for the small refiners to undercut market prices with the accompanying adverse impact on the ability of large refiners to recover costs. In any case, the small refiners' ability to influence the market is limited because of the small market share that they control, and their limited ability to expand production (due to refinery size and refinery configuration limitations). Finally, since any qualifying small refiner will have to be making the necessary refinery modifications during all or much of the two-year extension periods, the refiner will need sufficient revenue to meet the financial demands associated with the modifications.

248. Comment: Staff may propose regulatory modifications for small refiners (p. 8 of Staff Report). Any program that would benefit a company that has all its refineries in California should apply to all such refiners that meet the criteria. Volume should not be the criteria. (Unocal)

Agency Response: The rationale for the treatment of small refiners is set forth in the response to the preceding comments. The rationale for the definition of small refiner is set forth in Section II.B.2.(b) and the responses to Comments 373-377.

249. Comment: We are very distressed to learn the ARB is considering some type of exemption/waiver from the Phase 2 reformulated gasoline program for small refiners. Granting a waiver/exemption would not solve the perceived greater burden on small refiners, compared with the large, integrated oil companies, to produce reformulated gasoline. Instead, it subsidizes inefficient, highly polluting processes and products to the detriment of clean air. It is very important that all refiners, regardless of size, meet the same reformulation standards. We strongly oppose any exemption from the Phase 2 reformulated gasoline program based upon size of refining facilities. (Ultramar)

Agency Response: See generally the responses to the preceding two comments. The commenter has not provided data supporting the implied claim that small refiners' processes are inefficient or highly polluting.

250. Comment: The variance procedure proposed for Phase 2 already provides an avenue for relief if a company experiences serious problems complying with the regulation. This procedure is open to all regulated parties (including majors) and allows ARB the ability to decide relief based on individual circumstances. Rather than providing a special provision only for small refiners (which only includes less than a handful of gasoline producers), ARB should utilize the variance procedure to consider any request for relief. (Tosco)

Agency Response: Making the variance process the only avenue for relief for small refiners would not be adequate because a case-by-case review lacks the predictability of the adopted small refiner provisions. Having the extension process detailed in the regulation provides a better understanding of what the applicable requirements will be, and lets the small refiner engage in more meaningful planning.

251. Comment: If an extension or exemptions are adopted, we suggest that, at a minimum, the caps proposed in the Phase 2 standards apply. Without these caps, enforcement would be impossible. (Tosco)

Agency Response: Small refiners will have to comply with the limits (including caps) for four out of the eight properties specified in Phase 2 RFG regulations. Immediate imposition of the caps would make it harder for the small refiners to plan an orderly refinery modification program geared towards compliance in March 1998. We recognize that the small refiner provisions will result in greater enforcement challenges, but the extension is only for two years and the same sorts of problems would also occur to the extent that there are outstanding variances.

252. Comment: We recommend that the staff proposal be amended to add the following two provisions. First of all, the gasoline sales during that two-year interim period should be limited to the historical sales within each applicable air basin. That would prevent a refiner from targeting their sales into critical nonattainment areas that may also be attractive markets for dumping their cheaper gasoline. Secondly, the refiners should have to meet the ARB cap values during that extension period. That ensures that the refiner will take some action prior to the 1998 final compliance deadline, and it will allow for reasonable enforcement of the Phase 2 specifications. (Ultramar)

Agency Response: It is impossible to determine in which air basin sales have occurred historically. Instead the Board adopted provisions that have limited the volume of small refiners gasoline to total historical sales. In regards to meeting cap values during the 2 year delay, see the response to the previous comment.

253. Comment: In Section VI, page 66, last paragraph, there is no justification for a different rate of return for small and large refineries in establishing cost impacts. (Chevron)

Agency Response: Small refiners face a higher cost of capital than large refiners due to their highly leveraged balance sheets and their size. Because increasing leverage poses increasing risk of loss for lenders, small refiners are required to pay a higher rate of return. This gap in rate of return is made even wider to compensate lenders for greater costs involved in monitoring small refineries. In addition, the cost of capital is higher for small refiners due to their

limited access to capital markets. Most small refiners have no access to equity and bond markets because of their poor financial status, while most large refineries have access to these markets.

2. Others

254. Comment: Additional time for compliance should be given to independent refiners. Such relief should be given to all independent refiners, not just small refiners. If relief is only given to small refiners, it would be even worse by creating significant competitive disadvantages for those independent refiners not included in the relief provisions.

Independent refiners typically are only involved in the refining of crude oil into finished products and thus have little or no involvement from crude oil production or retail sales of petroleum products. Because of the heavy emphasis on refining, independent refiners are disproportionately affected by the historical volatility in refining profitability. This results in a limitation on the ability to internally generate the funds necessary to make the modifications required for Phase 2. (Tosco)

Agency Response: The term "independent refiner" has frequently been used to describe an entity that owns or controls a refinery of any size, but does not supply substantial amounts of crude oil and does not distribute substantial amounts of the refined product through affiliated retailers. In other words, an independent refiner would be contrasted to an "integrated" oil company that controls sources of crude and retail facilities. The commenter is one of three entities in California but do not meet the definition of "small refiner." The commenter's refinery has about two and a half times the crude capacity of the maximum capacity of a small refiner.

We do not believe it is appropriate to provide any special treatment under the Phase 2 RFG regulations at this time for independent refiners. There typically are not significant differences between large refiners and independent refiners in the type of processes that must be installed or in the technical feasibility of complying with the Phase 2 reformulated gasoline regulations. Therefore the cost of compliance for the independent refiners, unlike that for small refiners, would be expected to be similar to the costs for large refiners. In addition, independent refiners have a substantially greater share of the California gasoline market than do the small refiners, so a special treatment for independent refiners would likely have a greater impact on overall emissions than does the two-year extension for small refiners. Finally, the commenter has not demonstrated that the financial challenges it may face in coming into compliance with the Phase 2 RFG regulations are substantially different from that faced by large refiners, or that its ability to recover necessary capital investment through price increases is substantially different.

255. Comment: The ARB staff has had some discomfort with providing special treatment to independents. A suggestion would be that for the larger independents, during this two-year period, all the caps would apply. They would not get relief from sulfur, olefins, T90, T50 entirely, but would have to meet the caps. (Tosco)

Agency Response: The rationale for generally not providing for special treatment of independent refiners applies to this suggestion. Also see the response to Comment 246.

256. Comment: We object to consideration of special treatment for small importers which would amount to special treatment of foreign gasoline suppliers, all or most of whom may be very large integrated companies or state-owned petroleum companies. These companies do not have to comply with the same strict environmental and safety regulations as California (or other U.S.) refiners. Special treatment for importers would put California and U.S. refiners at a further disadvantage vis-a-vis foreign refiners. (Tosco)

Agency Response: The Board has not provided for any special treatment for importers. Imported gasoline must fully comply with all of the Phase 2 RFG specifications.

257. Comment: Wickland and small refineries unable to meet the capital cost of producing Phase 2 RFG will not be able to do business in California. To continue the historical role of importers and small refiners, the ARB regulations should allow for the refining and importing of limited quantities of gasoline which meet federal but not California specifications. If relief is granted, volumes should be limited to long-term historic levels. Limits should be waived when the price of California gasoline is unrealistically high compared to other U.S. markets. (Wickland)

Agency Response: The partial compliance extension for small refiners has been included in the regulations because of the difficulties small refiners face in raising capital to make the refinery modifications needed to meet Phase 2 RFG specifications. Wickland is not a small refiner, but an importer/blender, and as such, should not have any significant capital expenses associated with complying with Phase 2 RFG specifications. We do not believe that special treatment is appropriate for importers/blenders. Granting an allowance or exemption to importers or blenders would give these firms and their suppliers outside of California an unfair economic advantage in comparison to California refineries, and there would be little or no corresponding benefit. If there were to be a shortage of Phase 2 RFG for some unforeseen reason, there is no reason to favor the importation of noncomplying gasoline over the production of such gasoline by California refiners.

258. Comment: No imported gasoline is now expected to meet the proposed ARB specifications and, therefore, unless an exception is carved out for Wickland and those small refineries unable to meet the capital cost of producing the new gasoline, their ability to continue to do business in California will be destroyed. As set forth in the Sierra Research letter, this will adversely affect market conditions generally. (Diepenbrock, Wulff, Plant & Hannegan)

Agency Response: See the response to Comment 210.

E. DESIGNATED ALTERNATIVE LIMITS (DALs)

259. Comment: It is not explicitly clear whether the DAL protocol allows the full banking of credits over time for blends that are under the average limits. Also, other features of the DAL protocol (pre-selection and notification requirements) may prevent refiners from realizing the full cost-savings from averaging. To correct these problems, we recommend that the DAL option be replaced with the averaging protocol outlined below.

Average limits - The regulation should clearly stipulate that producers or importers have the option of complying with reasonable specified limits averaged over a set period of time. At the end of each period, the producer/importer should be required to demonstrate that the weighted average result of each property for all gasoline produced during the period complied with the specified average limit. However, any given batch during the period could be above or below the specified average limits (but within specified min/max limits as discussed below).

Flexibility - The producer/importer should have full flexibility in selecting each final blend as either a "flat limits" or "average limits" blend and, for average limits blends, specifying any or all parameters to be averaged.

Averaging period - The averaging period for benzene and aromatics should be one calendar year and, for all other parameters, the averaging period should be quarterly.

Reporting - The producer/importer should submit quarterly reports summarizing the results of each final blend of gasoline, whether each blend was designated a "flat limits" blend or an "average limits" blend, and the weighted average property results for all blends designated as "average limits" blends.

Enforcement - In addition to enforcement of the average limits or flat limits at the source (i.e. producer/importer), each final blend of gasoline should be subject to enforcement of prescribed min/max limits. Also, the accuracy/integrity of all test instruments and test methods used to determine the properties of each final blend and/or the weighted average properties of all blends within the appropriate period should be subject to enforcement.

Rationale - We believe that this averaging option provides significant advantages versus the ARB DAL option. First, the notification requirements for each final blend would be eliminated. Secondly, the requirement to pre-select the flat limits or averaging options would be eliminated. Any requirement to pre-select flat limits versus averaging would not allow a refiner that has selected the flat limits option to offset a blend that was inadvertently produced over the flat limits (but under the caps). Finally, our averaging proposal is applicable to

in-line blending operation and, as a result, final blend properties are not known until the blend has been completed. The notification requirements included with the DAL option would preclude in-line blending.

We believe it is preferable to have the averaging option clearly defined in the regulation in order to allow the full cost savings from averaging to be realized. (Mobil)

Agency Response: The rationale for the DAL approach proposed by the staff is set forth on pages 36 and 39-41 of the Staff Report. The commenter's suggested alternative approach does not satisfy the needs identified in the Staff Report. The reason for the notification requirements is to enable ARB enforcement personnel to sample batches of gasoline at the refinery or import facility and to determine whether the gasoline complies with a known standard--the "designated alternative limit." If there is no previously assigned limit, the enforcement personnel will be unable to sample a batch of gasoline and determine whether it is or is not in compliance. Our experience in administering motor vehicle fuels regulations for over 20 years indicates that the existence of an aggressive program of field sampling by ARB inspectors is a powerful deterrent against the shipment of fuel exceeding ARB fuel standards. We do not believe an auditing program would provide as much of a deterrent effect.

There are also sound reasons for not allowing refiners who have selected the flat limit option to use averaging for specific batches produced over the flat limit. As explained on pages 35-36 of the Staff Report, refiners electing to be subject to a flat limit have a somewhat less stringent standard than producers electing to use the DAL averaging approach. To use an example, the flat limit for benzene is 1.00% vol., and the standard under the DAL option is 0.80 % vol. If the commenter's suggestion was used, a refiner choosing the flat limit for benzene would never have to offset batches between 0.80 percent and 1.00 percent--although these batches would have to be offset by a refiner choosing averaging. Thus the commenter's suggestion would end up allowing the aggregated benzene content to be significantly higher than will occur with the adopted DAL approach.

The notification requirements do not preclude in-line blending if the refiner knows the full blendstock properties; meeting a DAL limit for in-line blending should be no more burdensome than meeting a flat limit. To the extent that in-line blending may result in additional challenges, section 2264(a)(4) allows the refiner to enter into a protocol with the Executive Officer to specify how the notification requirements will be applied to the refiner's operations.

Finally, the commenter has not provided an explanation as to why a longer averaging period is desired for benzene and aromatic hydrocarbons. We believe that the allowance of offsetting with batches supplied 90 days before or after the batch needing offsets is supplied provides adequate flexibility. An averaging period of one year for

benzene and aromatic hydrocarbons would allow gasoline producers to produce gasoline with higher levels of these compounds for extended durations. As a result, there could be extended periods of times for which the expected emissions reductions would not be achieved. If these periods occurred during times of poor air quality, the purpose of the regulations could be compromised. A one year averaging time for these properties could also be more difficult to enforce.

260. Comment: The compliance system proposed for the averaged standards is far too complex and time-consuming for both refiners and for ARB, and is unnecessary. ARB staff appears to have concern about abuse if compliance with averaged standards is based on self-reporting. However, there are adequate safeguards to prevent abuse of the standards by refiners. There are only a few refiners in the state and it would appear much more cost-effective to establish protocols with each refiner regarding use of averaging and to perform periodic audits of refiners' records along with field testing.

Requiring reporting of each batch prior to shipment places a restraint on the gasoline refiner and on ARB. If ARB never utilizes its authority to come and inspect the batch prior to shipment, the system will degenerate into simply a reporting requirement. But ARB could accomplish the same objective by simply carrying out regular inspections. If need be, field testing at refineries could be performed by third parties under contract to ARB to lessen the burden on ARB staff. (WSPA)

Agency Response: We believe the adopted approach is appropriate for the reasons described on pages 36 and 39-41 of the Staff Report and in the response to the previous comment.

We do not believe that requiring reporting of each batch prior to shipment places an undue restraint on refiners electing the DAL option. The refiner is not being asked to store the gasoline for compliance checks. As stated on page 39 of the Staff Report, the reporting of a DAL for each batch involved in averaging prior to shipment is necessary to enable ARB staff to conduct compliance testing, particularly since the designated alternative limit provision makes effective field testing more difficult than in the case of flat limits.

261. Comment: The staff has been asked to change some or all of the proposed compliance limits in the original October 4 proposal into average requirements. We question whether the ARB has been able to assess adequately the impact of averaging and the resources to manage or enforce a program that uses average compliance rules of the type apparently recommended on the benefits of the October 4 proposal. (MVMA)

Agency Response: The addition of a DAL option for the olefin, T90 and T50 standards in the modified regulations will pose additional

challenges in enforcement, but we believe the program as adopted is manageable and enforceable. We believe that the additional flexibility these modifications provide refiners justifies the impacts on enforcement.

262. Comment: Pages 40-41 of the Staff Report state that the regulations would prohibit selling vehicular diesel fuel in a blend with a designated alternative limit below a basic standard if the total volume of the blend sold is less than the volume reported. This provision would protect against misreporting volumes of diesel fuel to which a designated alternative limit has been assigned. This reference to diesel fuel is confusing and appears to be out of place. (Chevron)

Agency Response: The text was worded incorrectly. The references to diesel fuel were intended to be references to gasoline.

F. TEST METHODS

263. Comment: The ARB staff has stated that industry and ARB staff would work together to improve the precision and accuracy of the test methods. (TSD, p. 118) We are concerned that this statement by staff may serve to give a false sense of security to the Board regarding the impact of test variability on compliance cost. A similar commitment to improving the test method was made regarding the test method for diesel aromatics in 1988. (Technical Support Document for Proposed Adoption of Regulations Limiting the Sulfur Content and Aromatic Hydrocarbon Content of Motor Vehicle Diesel Fuel, October 1988, p. 126). As of October 1991, three years following adoption of the diesel aromatics rule, staff has not proposed any changes to the test method. (Unocal)

Agency Response: Section 2263 of the adopted regulations identifies the test methods that are to be used in determining compliance with the various specifications. Wherever appropriate we have identified the applicable test method established by the American Society of Testing and Materials (ASTM). The ASTM methods undergo a vigorous and extensive review and are widely accepted. In the few cases where there is not an appropriate ASTM method we have identified methods developed or adapted by ARB staff. We believe that the referenced test methods are the most accurate and reliable methods available at this time.

We are committed to the cooperative development and identification of improved test methods. The staff has formed a committee with industry to work together to improve the accuracy and precision of the test methods. The staff intends to recommend appropriate changes to the Board concerning test methods prior to the 1996 implementation date of the regulations.

As is the case with the regulation on the aromatic hydrocarbon content of diesel fuel (13 C.C.R, § 2282(c)), section 2263(c) allows the use of alternative test methods that are determined by the executive officer to be equivalent to the specified methods. Since this comment was made, the Executive Officer has at the request of a refiner certified an equivalent test method (ASTM D5186 with a conversion factor) for determining compliance with the limits on the aromatic hydrocarbon content of diesel fuel. If Unocal feels that the joint efforts on improving the Phase 2 RFG test methods is not progressing fast enough, it has the option of submitting alternative test procedures for equivalency consideration.

Finally, the ARB's Compliance Division plans to continue its longstanding policy of pursuing an enforcement action only when tests on samples taken by ARB inspectors show a violation after accounting for the reproducibility of the method. Thus the comparative inaccuracy of a method will be recognized in enforcement of the standards.

264. Comment: Several of the proposed test methods have poor reproducibility. The testing uncertainties of the analytical procedures have a significant impact on costs and the industry's flexibility to provide gasoline. The whole test procedures section should be reviewed in depth with industry to ensure the best analytical procedures are specified and used correctly. To determine the best analytical procedures and expected test reproducibility, we recommend that a joint industry-agency task force be formed to address this question. This information is needed by industry as soon as possible in order to design its facilities to meet the new regulation. ARB has indicated that they plan to do this. We recommend that this be initiated as soon as possible so industry knows what test procedures will apply when they initiate their facility designs. (Chevron)

Agency Response: See the response to the previous comment.

265. Comment: ARB's proposed test method for oxygen content is ASTM D 4815-88. This is a gas chromatographic method. This method is not very precise and reproducibility values are close to 40 percent. Several oil companies are investigating the use of neutron activation to determine oxygen levels in gasoline. Preliminary studies indicate much more precise results than by GC. A disadvantage is that neutron generators are not readily available and there may be some reluctance for workers to use this technique. (WSPA)

Agency Response: It is important for the regulations to identify a specific test method at this time so that there is a clear methodology for measuring compliance with the oxygen content standard. There is insufficient data at this time to identify a specific neutron activation method. One of the modifications made to the original proposal was to update the oxygenates method to ASTM D4815-89.

We note that published reproducibilities can be poor indicators of the inherent precision of a method when the participating laboratories are not closely monitored during the round robin testing that is used as the basis of the reproducibility determination. An updated version of ASTM D4815 has been recently subjected to round robin testing and better reproducibility values were obtained (approximately 26 percent for total oxygen). Additional refinements to the method are being implemented by the ASTM committee on fuels and a new round robin study is being planned. We believe that with careful interlaboratory testing the reproducibility of the method will be shown to be improved even further. We ~~intend~~ consider updating the method referenced in the regulation when ASTM's revisions are complete. The ARB staff is also evaluating a number of alternate techniques for oxygenates determination including those based on spectroscopy.

266. Comment: ARB has proposed ASTM D 4815-88 for determination of oxygen content. It is assumed in this technique that all oxygen containing compounds are diluted and detected by the GC method used.

This may not necessarily be the case. ASTM D 4815 can be calibrated for the mass percent oxygen, but the calibration will change when the relative density of the unknown sample is different from that of the calibration fluid.
(WSPA,)

Agency Response: Discussions with industry representatives indicate that ASTM D4815 detects all oxygenates that are likely to be added to gasoline. Since compliance with the regulations will not be required until 1996, there will be adequate time to make the necessary amendments if it appears that other oxygenates will be used. In addition, the ASTM committee is currently revising D 4815 in a number of respects including expanding the list of oxygenates analyzed and changing the method to report mass percent rather than volume percent. When the revisions are complete we anticipate proposing adoption of the revised method.

267. Comment: ASTM D 2622-87 is proposed by ARB for sulfur determination. This is an X-ray method to determine sulfur in petroleum products. The relative repeatability for sulfur contents less than 50 ppm is 60 percent and for sulfur contents between 50-150, 40 percent. This method requires a WDXRF spectrometer, which is not inexpensive. Some WSPA members may propose to use ASTM D 3120-87, which appears to have a better precision than D 2622, but D 3120 is difficult to perform well. The unit requires much more operator maintenance and support than the D 2622 method.

If a chemical test method is needed, a better approach would be to use the ASTM Test Method D 4045. Experience with the instrument reliability used in this method is good and the stated precision shows that, for a 5 ppm sample, the reproducibility is probably around 10 percent. The main drawback of the test method is that the sample would have to be diluted. (WSPA)

Agency Response: The commenter has identified significant drawbacks associated with each of the methods that could be used as alternatives to ASTM D 2622-87. In light of these drawbacks it is not appropriate to substitute one of the other methods at this time. We intend to work with industry to identify or develop improved methods as described to the response to the first comment in this Section III.F.

268. Comment: ARB has proposed the FIAM, D 1319-88 Test Method for determination of olefin content. The precision of this method depends to a great extent on the product being analyzed. Clean, low RVP gasolines should give precision values better than the values cited. When oxygenates are added to gasoline, ASTM D 1319 does not provide the correct hydrocarbon composition analysis results.

Another possible choice for olefin determination is via Bromine Addition, ASTM Test Method D 1159-89. However, the bromine number

gives only the quantity of bromine-reactive constituents in the sample. It does not identify these constituents as olefins. Some sulfur and nitrogen compounds will give large positive interferences. In clean gasolines, these elements may not be present in high enough levels to create problems. There is also a problem determining olefins content of gasoline-oxygenate blends using this method. The Bromine Number results do not fully respond to the dilution effect of adding oxygenates and thus the Bromine Number is not reduced as expected. There is no direct relation between the bromine index and the volume percent unsaturates.

For clean, low RVP gasoline, both D 1319 and D 1159 should give good, precise results. The results by these two methods are, however, not directly comparable. (WSPA)

Agency Response: The commenter discusses D 1319 and D 1159, and identifies drawbacks with both methods. At this time identification of D1159 would not be preferable to D 1319. We intend to work with industry to identify or develop improved methods as described to the response to the first comment in this Section III.F.

269. Comment: ARB has proposed ASTM Test Method D 86 for determination of distillation temperature. ASTM Test Method D 86 has recently been reapproved. The proposed ARB test method should preferably read ASTM D 86-90. (WSPA)

Agency Response: We have modified the section 2263(b)(1) reference to identify ASTM method D 86-90.

270. Comment: Calibration and/or calculation of total aromatics in the aromatic test method is incorrect. The calibration uses a v/v mixture of C6-C9 aromatics in isooctane. However, the fuel sample is then diluted 1:10 with isooctane. In the calculation for total aromatics, the dilution factor is not included in the calculation. This means that a fuel with 100 percent aromatics would easily pass the 25 percent specification with a determined value of 10 percent aromatics! (Mobil)

Agency Response: It is standard lab practice to treat the calibration standard in the same way as the sample (including dilution). However, for the sake of clarity MLD 116 has been modified to specify that the sample and the calibration standards are to be diluted to the same extent.

271. Comment: The calibration stops at C9 aromatics using 1,2,4-trimethylbenzene. Additional higher aromatics standards should be included. A boiling point linearity check should also be conducted using n-paraffins to insure that no high boiling components are lost in the chromatographic system. (Mobil)

Agency Response: MLD 116 has been subjected to a number of crosschecks with industry methods that totally speciate the gasoline. Good agreement has been found for total aromatics determined by MLD 116 and total speciation methods. MLD 116 will be subjected to round robin testing for further evaluation and possible refinements.

272. Comment: The precision of MLD 116 can be improved by using an internal standard. (WSPA)

Agency Response: See the response to the preceding comment.

273. Comment: MLD 116 does not specify what lamp energy is to be used or whether it is to act as a line source or a continuum source. (WSPA, Mobil)

Agency Response: MLD 116 has been modified to specify a PID lamp energy of 10.0 ev.

274. Comment: The equation in section 6.1.3 of MLD 116 which reads:

Concentration(Aromatic) = Area(FID) * Response Factor(FID)

is incorrect and should read:

Concentration(Aromatic)= Area(FID) * Response Factor(FID) * 100 percent / Total Area(FID)

The term "100%" to convert fraction to percent is also missing. (WSPA)

Agency Response: The equation in section 6.1.3 of MLD 116 is correct as written. The term "100%" is not required because the equation already gives the concentration in terms of percentage.

275. Comment: From section 6.2.2 of MLD 116, it is implied that equations in sections 6.1.3 and 6.2.1 can be combined. However, the equation as shown in section 6.2.2 is then incomplete and a denominator is needed. The denominator is either Total Area(FID) or Total Area(PID). (WSPA)

Agency Response: Section 6.2.2 was not intended to imply that the equations in sections 6.1.3 and 6.2.1 can be combined. The equation in section 6.1.3 refers to the response factor for the flame ionization detector while the equation in section 6.2.1 refers to the response factor for the photoionization detector. MLD 116 has been modified to clarify the usage of these equations.

presence of these alcohols should not affect the precision with which the benzene peak can be quantified.

282. Comment: Benzene will be the aromatic hydrocarbon component that has the greatest amount of error in analysis. (WSPA)

Agency Response: See the responses to the preceding several comments. Also, it is difficult to counter problems that may arise from the reformulations of gasoline. ARB staff will continue to work in cooperation with WSPA and the ASTM subcommittee on fuels to identify opportunities to improve MLD 116. If improvements are identified we will propose appropriate amendments to the test method.

283. Comment: ARB has proposed two RVP test methods, ASTM D 323-58 or 13 C.C.R. section 2297. In a major study last year, the ARB worked with WSPA to develop the test methods described in section 2297. This study established the equivalency of the methods in this section with data from D 323-58. The methods in section 2297 have an advantage over ASTM D 323-58 as they can be used with oxygenated fuels. The D 323-58 method is not always applicable as oxygenates can be leached out of the fuel by the water present in the D 323-58 test. Since the equivalency between D 323-58 and the test methods in section 2297 have been established, and since D 323-58 may yield erroneous results due to the leaching of oxygenates out of the fuel by the water, we propose that the ASTM D 323-58 Test Method be deleted.
(WSPA)

Agency Response: When section 2297 (prior § 2262) was enacted in the Phase 1 RFG rulemaking, we concluded that ASTM D 323-58 should remain as an optional method since it was used as the reference point for establishing the automated methods in section 2297. For the same reason we believe it is appropriate to keep ASTM D323-58 as an option at this time. The staff will continue to evaluate the long-term performance of the automated instruments identified in section 2297 and may recommend deletion of ASTM D323-58 at some point in the future.

284. Comment: The definition for ethanol in (b)(4) refers to Health and Safety Code section 43830, which describes ethanol as denatured ethanol with no more than 5 vol. percent denaturant. Fuel-grade ethanol is almost always denatured with gasoline. Hence, once this ethanol is blended into gasoline, there is no practical way to determine how much denaturant was originally present.

As gasoline is less expensive than ethanol, purveyors of fuel-grade ethanol would tend to denature ethanol with as much gasoline as allowed, i.e., 5 vol. percent. For this reason, we believe it is more technically correct to define ethanol as the pure chemical and to set the limit nominally at 9.5 vol. percent, with this level to be determined by Test Method D 4815-88. (WSPA)

Agency Response: This comment pertains to section 2251.5(b). This rulemaking is not making any changes to that part of the pre-1996 RVP regulation.

285. Comment: An earlier draft of section 2251.5 (a)(3)(A) did not state whether the ethanol limit is 10 percent by weight or 10 percent by volume. We presume the latter is the intent as ASTM D 4815 is specified. This test method conventionally reports the result in volume percent. (WSPA)

Agency Response: We are making no amendments to section 2251.5(a)(3)(A); it already specifically refers to "at least 10 percent ethanol by volume."

G. LEGAL ISSUES

286. Comment: We believe that the ARB lacks the authority to provide any kind of exemption for small refiners. (Chevron) The ARB's legal authority for a small refiner exemption is highly questionable. (Mobil)

Agency Response: See the response to Comment 346.

287. Comment: We believe that inclusion of a small refiner exemption would be discriminatory, arbitrary, capricious, and lacking in evidentiary support. (Chevron)

Agency Response: The analyses in Sections II.B.2., III.D.1. and III.I.2.(a) demonstrate the rational basis and justification for the small refiner provisions adopted by the Board.

288. Comment: Health and Safety Code section 43018 requires the Board to conduct a cost-effectiveness analysis to support this rulemaking. The requirement is analogous to federal requirements mandating the most cost-efficient alternative. The term "cost-effective" is a more stringent requirement than merely requiring a cost-benefit analysis, and fairly implies a legislative intent that the agency undertake a formal analysis to determine the most efficient means for attaining its goal, and not merely that the cost of the program is reasonable by some objective standard. However, there is no analysis in the Staff Report which would enable one to conclude that the Phase 2 gasoline proposal is the most efficient way for the ARB to achieve its air quality goals.

The staff's proposal does not include an independent cost-effectiveness analysis of the Phase 2 RFG regulations. The staff's cost-effectiveness information must be available in advance of the hearing, and the numbers that have been stated by staff appear far too conservative when compared to the cost information generated by WSPA's independent technical consultants, Turner Mason. For example, the staff estimates that the regulations will cost between 14 and 20 cents per gallon--a range based on the estimates of a very few refiners and not supported by any documentation. By contrast, Turner Mason used state-of-the-art modeling techniques to provide a well-documented analysis showing an actual cost of between 20 and 28 cents per gallon. Similarly, WSPA's independent consultant, Sierra Research, has completed an extensive analysis which shows that the ARB's emission reduction figures are exaggerated. WSPA's consultants have presented a cost-effectiveness analysis that shows that more than 80 percent of the air quality benefit projected by the ARB could be achieved for about 50 percent of the cost. This analysis should be examined by the ARB and, if the approach is not accepted, valid reasons for that decision should be given. (WSPA)

Agency Response: Health and Safety Code section 43018(a) directs 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 standards at the earliest practicable date. Section 43018(c) 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, including but not limited to four specified areas of measures. In Resolution 91-54, the Board made the following findings:

> The overall average cost-effectiveness of the Phase 2 regulations approved herein in reducing the emissions of criteria pollutants during the period from 1996 through 2005, assigning one-half of the program costs to reductions of criteria air pollutants and one-half to reductions of toxic air contaminants, is expected to range from $7,000 per ton to $11,000 per ton; these cost-effectiveness values are within the range of other measures that are expected to be implemented during the same time period in order to attain and maintain the state ambient air quality standards;
>
> The overall average cost-effectiveness of the regulations approved herein in reducing emissions of toxic pollutants in the period from 1996 through 2005, assigning one-half of the program costs to reductions of criteria air pollutants and one-half to reductions of toxic air contaminants, is expected to range from $19 million to $26 million per potential cancer case avoided;

The estimated cost-effectiveness values of the Phase 2 RFG regulations are discussed in the response to Comment 159. The comparison of the Phase 2 RFG regulations to other measures is discussed in the responses to the comments in Section III.C.4. The estimated cost-effectiveness of the low emission vehicle/clean fuels program was well within the range of the other control measures adopted by the ARB and the local air pollution control districts. The federal ambient air quality standard for ozone, which is less stringent than the state standard, is exceeded far more days per year in the South Coast than in any other area of the country. Numerous ambitious new control measures will be necessary to meet the state and federal ambient standards throughout the state. These measures would typically become increasingly more costly, since the more cost-effectiveness measures tend to be adopted earlier. There is thus little doubt that the regulations adopted in this rulemaking will be part of the most cost-effective combination of control measures that lead to attainment of the state ambient standards.

289. Comment: Health and Safety Code section 43018 requires that the regulations be "necessary." The APA also requires that all regulations meet the criterion of "necessity." (Gov. Code § 11349.1) The dictionary defines "necessity" as "compulsory," "inescapable" and "logically unavoidable." We strongly urge that there is no showing of

"necessity" for the extremely tight specifications proposed by the ARB on the various fuel parameters. In fact, rather than improving air quality, certain of the specifications proposed may lead to increased emissions of some pollutants. For example, research conducted in connection with the Auto/Oil program suggests that reducing aromatics and olefins to the levels proposed by the ARB would increase hydrocarbon emissions, while reducing T90 as proposed by the ARB would increase emissions of both CO and NOx.

Agency Response: The "necessity" criterion is more appropriately defined in the context of 1 C.C.R. section 10 than by dictionary terms such as "inescapable." In any case, we believe that the Staff Report, the TSD, and this Final Statement of Reasons provide an ample demonstration of the necessity of the regulations. See particularly the discussion of need on pages 2-4 and pages 13-25 of the Staff Report.

The Board is required by Health and Safety Code section 43018(a) to endeavor to achieve the maximum degree of emission reduction possible from mobile sources in order to attain the state standards for ozone and other pollutants at the earliest practicable date. Even with these regulations and other planned measures, statewide attainment of the state ozone standard cannot be projected. The regulations are therefore necessary.

290. Comment: Health and Safety Code section 43018 requires that the regulations be "technologically feasible." There is no showing that it would be possible to meet the proposed specifications. The problem centers around the number of parameters controlled, the stringency of the specifications and the fact that, as controls become tighter, a gasoline blender has limited physical components to work with. Further, the vehicle testing and predictive model options, as written, provide infeasible alternatives and add no flexibility at all. Under these circumstances, the statutory requirement of technological feasibility cannot be satisfied. See Natural Resources Defense Council v. United States EPA, 655 F.2d 318,328 (D.C. Cir.), cert. denied 454 U.S. 1017 (1981) (EPA must provide a reasoned explanation of its basis for believing the protections regarding a standard's feasibility); International Harvester Co. v. Ruckelshaus, 478 F. 2d 615, 629 (D.C. Cir. 1973). (WSPA)

Agency Response: Chapter VI.B of the TSD, pages 126-131 identified and discussed the process options that refiners are likely to use in complying with the regulations. The fact that ARCO--the largest gasoline retailer in California--supported standards more stringent than those adopted by the Board provides a clear demonstration that the regulations are technologically feasible.

291. Comment: The proposed regulations do not meet the statutory requirement of "clarity." (Gov. Code § 11349.1.) A regulation is "presumed" not to comply with the clarity standard when it includes

terms which do not have meanings generally familiar to those "directly affected" by the regulation, or presents information in a format that is not readily understandable. (1 C.C.R. § 16(a)(3),(5).) The proposed regulations appear to violate this standard in various respects. For example, there is confusion within the section addressing the timing of the required notice when transferring Designated Alternative Limit gasoline. At one point, the regulations require notice to be given to the Executive Officer before the start of physical transfer, while in the same sentence, the notice is required to be given within 12 hours before the transfer is completed. (See proposed 13 C.C.R. § 2264(a)(2). In addition, the regulations authorize the Executive Officer to enter into various protocols with producers and importers for certain notification and reporting requirements. The end result is that the actual requirements for notification and recordkeeping are confusing and difficult to follow. (WSPA)

Agency Response: The commenter has identified only two provisions that the commenter specifically claims lack clarity. We believe that these provisions are clear.

There should be no confusion regarding section 2264(a)(2). This provision requires that the producer or importer provide the Executive Officer with specified information regarding a final blend to which a DAL has been assigned. The text then states,

> This notification shall be received by the executive officer before the start of physical transfer of the gasoline from the production or import facility, and in no case less than 12 hours before the producer or importer either completes physical transfer or commingles the final blend.

This language is identical to language in 13 C.C.R. section 2282(d)(2), which has previously been approved by OAL. The language means just what it says. Final blends of gasoline can contain small quantities of gasoline or very large quantities. Where the physical transfer takes only a few moments, the producer must in effect provide the notification 12 hours before the transfer. Where a transfer will take 8 hours, the producer must provide the notification 12 hours before completion of the transfer, which will be 4 hours before start of the transfer. Where the transfer will take 16 hours, the refiner must provide the notification at the start of physical transfer. The rationale is to assure that ARB inspectors will always have at least 12 hours to sample the gasoline after notification. Since the producer should always know the pertinent information by the time it starts shipping the gasoline, the producer always must notify by the start of transfer, even if the transfer will take more than 12 hours.

Section 2264(a)(4) allows a producer to enter into a protocol with the Executive Officer to specify how the reporting requirements will be applied to a producer's particular operations. Again, the language is essentially identical to language in two earlier ARB fuels regulations: 13 C.C.R. sections 2253.2(c)(4) (lead in gasoline sold before January

1, 1992) and 2282(d)(5) (aromatic hydrocarbon content of diesel fuel.) The purpose of this provision is to allow the development of a reporting mechanism that is tailored to a particular practice such as in-line blending. No producer is ever required to enter into a protocol if the producer chooses not to. We do not see how this provision renders the actual requirements for notification and recordkeeping confusing and difficult to follow.

292. Comment: The regulations do not meet the statutory "consistency" criterion. It is inconsistent of the regulations to claim that the vehicle testing option or a predictive model are available, but then to describe them in such a way that they in fact do not exist at all.

Further, the proposed regulations are inconsistent with the ARB's regulation of other similarly situated parties. For example, the ARB has not dictated to the auto manufacturers that they must install a particular technology, such as electrically heated catalysts (EHCs), to meet their emission reduction goals. nor does the agency dictate to the consumer products industry the exact formulation of those products. It is inconsistent to single out the petroleum industry by requiring overly stringent specifications, in lieu of the more flexible performance standards approach that is applied to the ARB to the auto companies and which is available as an option to both the oil and auto companies under the federal Clean Air Act. (WSPA)

Agency Response: This comment is premised on a misconception of the meaning of the "consistency" criterion. Government Code section 11349(d) defines "consistency" as "being in harmony with, and not in conflict with or contradictory to, existing statutes, court decisions, or other provisions of law. The regulations speak for themselves. The regulations do not "claim" one thing regarding alternative fuels specifications and then "describe" another.

With regard to the approach of establishing specifications for gasoline, the "consistency" criterion does not require that all of an agency's regulations take precisely the same approach. In any case, the reason the ARB has historically structured its motor vehicle emissions regulations differently from its fuels regulations is that fuels do not directly emit air contaminants in the way that vehicles do. Accordingly, the ARB has sought to regulate specifications which have been found to affect emissions that occur when the fuel is burned. Every fuels regulation promulgated by the ARB and EPA to date has established specifications for fuels. In allowing the certification of "alternative fuel specifications," first in the regulation on the aromatic hydrocarbon of diesel fuel (C.C.R. § 2282) and then in the Phase 2 RFG regulations, the ARB has been the first agency to actually adopt fuels regulations that allow compliance through meeting a "performance standard." Further, it is not accurate to imply that the ARB is dictating the "exact formulation" of gasoline. The Division of Measurement Standards has, pursuant to Business and Professions Code section 13440 adopted regulations requiring that all gasoline in the

state meet ASTM specifications. ASTM has a number of specifications for characteristics that are not regulated by the ARB's fuels regulations (e.g. octane, vapor/liquid ratio, oxidation stability, and existent gum).

293. Comment: The 1990 amendments to the federal Clean Air Act require the U.S. EPA to adopt regulations regarding reformulated gasoline. [§ 211(k)]. Some requirements are to be effective January 1, 1995, and will apply in the South Coast Air Basin, Ventura County, and the San Diego Air Basin. EPA is planning to issue a proposed rule by November 30, 1992, which will address the year 2000 performance standards.

While the ARB has its own statutory requirements in terms of improving air quality, and is not directly constrained by the federal program, it would made a good deal of sense to await the 1993 federal rulemaking before promulgating standards for the ARB's Phase 2 gasoline in order to avoid potential conflict and inconsistencies between the federal and state programs. Inconsistent and potentially conflicting federal and state programs are to be avoided wherever possible. (42 U.S.C. § 7401(c), 7402 federal Clean Air Act §§ 101(c), 102].) Accordingly, the ARB program should await determination of the EPA year 2000 program in order to eliminate the possibility of duplicative and conflicting regulations. (WSPA)

Agency Response: Both the federal and the state fuels regulations apply in California, as they have since the 1970s. (See, e.g., EPA's discussion of the relationship between EPA and California motor vehicle fuels regulations at 52 F.R. 31311.) There is no requirement that the two programs be identical, or should not be "duplicative." The ARB has in the past maintained motor vehicle fuels programs that paralleled the federal requirements in many respects because maintenance of a state program assures that it will be enforced to the satisfaction of state officials. For instance, the California and federal regulations governing the lead content of gasoline in some respects have been identical but in other respects have differed over the years. (compare 40 C.F.R. § 80.20 with 13 C.C.R. §§ 2253.2, 2253.4, and former § 2253.)

Unfortunately, the U.S. EPA's efforts to adopt reformulated gasoline regulations has taken longer than expected. Although EPA was required by the federal Clean Air Act to promulgate the 1995 reformulated gasoline regulations by November 15, 1991 (FCAA § 211(k)(1), the agency has yet to issue final regulations. It appears unlikely EPA will meet it's schedule for the year 2000 regulations. It is thus apparent that waiting for the federal regulations would result in unwarranted delays of the state program. The only actual conflict that could occur would be where a refiner could not simultaneously satisfy the federal and state requirements; we are not aware of any instance where this will, or is likely to, occur.

294. Comment: The California Environmental Quality Act (CEQA) mandates environmental review of governmental actions in California. (Cal. Pub. Res. Code §§ 21000-21177.) While the proposed Phase 2 RFG regulations appear to be exempt from the requirements of CEQA for preparing Environmental Impact Reports (EIRs) and negative declarations, the CEQA Guidelines make clear that they remain subject to all other provisions of CEQA "such as the policy of avoiding significant adverse effects on the environment where feasible." 14 C.C.R. section 15250.

The Guidelines also spell out what must be contained in the document used by an agency under its certified programs as a substitute for an EIR or negative declaration. At a minimum, the substitute document shall include a description of the proposed activity and one of the following: (1) alternatives to the activity and mitigation measures to avoid or reduce any significant or potentially significant effects of the environment, or (2) a statement that the agency's review of the project showed that the project would not have any significant or potentially significant effects on the environment and therefore no alternative or mitigation measures are proposed to avoid or reduce any significant effects on the environment. If a statement as described in (2) is prepared, it shall be supported by a checklist or other documentation to show the possible effects that the agency examined in reaching this conclusion. 14 C.C.R. section 15252.

Although the Staff Report concludes that the regulations would not result in any substantial, adverse environmental impact, the proposal does not include any documentation of effects examined by the agency in reaching its conclusion, as required by the CEQA Guidelines. Further, ARB regulations provide that where an action contemplated "may have a significant effect on the environment," a staff report is to be prepared in a manner consistent with the "environmental protection purposes of the state board's regulatory program and with the goals and policies of [CEQA]." 17 C.C.R. section 60005. The regulations also provide for the consideration of feasible mitigation measures and feasible alternatives, and of comments received which raise significant environmental issues. 17 C.C.R. sections 60006-60007.

In fact, there may well be significant environmental impacts resulting from implementation of the Phase 2 RFG regulations. For example, assuming the proposed standards for Phase 2 RFG are unchanged and favor the use of other clean fuels, then there is potential for increased pollution of the water table through the use of methanol, toxicity risks to both consumers and service station personnel in connection with methanol, and increased air pollution as a result of the distillation processes involved in the creation of methanol, to name a few. The use of CNG and LPG also carries known safety risks. None of these potential impacts was examined in detail in the staff proposal. In order to comply with CEQA, a thorough examination of these impacts and others must be undertaken prior to adoption of the clean fuels regulations. Numerous courts have invalidated state regulatory programs for failure to adequately evaluate environmental impacts. (WSPA)

Agency Response: We believe that the ARB has complied with CEQA in this rulemaking. Potential adverse environmental impacts were considered, and appropriate findings were made, in the Staff Report, the TSD, the Resolution, and/or the Response to Significant Environmental Issues.

The Staff Report identified the potential significant adverse environmental impacts in Chapter VII, pp. 79-83. Chapter VII of the TSD, pp. 160-162, set forth an analysis of other methods for reducing emissions, and identified some of the technical problems associated with those methods. Appendix 2 of the TSD provided emission estimates resulting from transportation of oxygenates.

Resolution 91-54 contained findings regarding the adverse environmental impacts that may result from the Phase 2 RFG regulations. (pp. 6-7.) These impacts may include: increases in refinery emissions and emissions related to increased use of transportation systems (the Board determined that permit requirements of the air pollution control districts are expected substantially to mitigate impacts from increased refinery emissions); temporary emissions from heavy-duty equipment and disruption of the soil, including the generation of dust, due to the construction of refinery equipment; and impacts on waterborne and rail traffic due to increased shipments of MTBE and ethanol. The Board concluded in the resolution that there are no feasible mitigation measures or alternatives available to the Board which would further substantially reduce the potential adverse impacts of the regulations while at the same time providing the substantial overall public health benefit from the significant reductions in the emissions of the ozone precursors VOC and NOx, CO, sulfur dioxide, and toxic air contaminants including benzene and 1,3-butadiene. Finally, this Final Statement of Reasons summarized and responded to all comments identifying potential environmental impacts, and the Final Statement of Reasons is incorporated by reference in the Response to Environmental Issues.

We did not address any of the claimed environmental impacts identified by the commenter in this comment, because it is extremely unlikely that any of the impacts would actually occur as a result of the Phase 2 RFG regulations. All of the claimed impacts stemming from increased use of alternative clean fuels allegedly would occur because the Phase 2 RFG regulations "favor the use of other clean fuels." We do not see how the regulations could result in increased use of other clean fuels in the existing vehicle fleet, since retrofitting existing gasoline-powered cars so that they will run on other fuels would be relatively expensive. We also do not expect the regulations to result in an increase in the production of new alternative clean fuel vehicles by vehicle manufacturers. Under the Board's low-emission vehicle regulations, manufacturers can choose whatever vehicle/fuel combination they want in meeting the stringent low-emission vehicle standards. On August 12, 1992, the Board approved regulations allowing the use of Phase 2 RFG regulations in certifying new motor vehicles. To the extent that cleaner gasoline is allowed as a certification fuel, one would expect that the availability of such gasoline would if anything encourage the production of gasoline vehicles because the cleaner

gasoline would make it easier for vehicle manufacturers to meet the low-emission vehicle standards. The commenter has provided no foundation or basis for the claim that these regulations will result in an increased use of fuels other than gasoline.

295. Comment: Government Code section 11346.53 requires the ARB to determine whether the Phase 2 RFG regulations will have a significant adverse economic impact on small business. In making its determination that the Phase 2 RFG regulations will not have such an impact, the staff did not refer to any data or studies, but merely concluded that adverse impacts would be difficult to estimate and, therefore that none were foreseen. Staff Report, p.78. WSPA submits that the proposed regulations will have a potentially adverse economic impact on small business, and that these potential adverse impacts should have been recognized and fully analyzed in the support documents for the proposed regulations.

By focusing solely on retailers and jobbers, the staff report completely overlooks the economic impact on other small business. WSPA's consultant, DRI/McGraw-Hill, has evaluated the economic impacts of the Phase 2 regulations on the California economy. DRI/McGraw-Hill's report states that by the year 2000, 82,000 jobs will be lost as a result of the proposed regulations, and further, that 79 percent of the job losses will occur in the construction and local service and trade sectors. These sectors typically include a large number of small businesses. Moreover, the report indicates that the 14 to 27 percent increase in the wholesale price of gasoline will adversely impact California's competitive position in manufacturing. The hardest hit in such a competitive slump is the small business, which is usually ill-suited to such difficult economic conditions.

For these reasons, we believe the staff should reconsider its determination that the Phase 2 regulations will not have a significant adverse economic impact on small business. (WSPA)

We disagree with the statement in the public hearing notice that "The Executive Officer has determined that the proposed regulations will not require small businesses, as defined in Government Code Section 11342(e), to necessarily incur any costs in reasonable compliance with the regulations." Does this person know the relationships between various businesses in our state? Do they know what happens when energy costs go up, when the sales of small businesses drop, or when major suppliers decide that small business is to expensive to deal with? When the energy costs of state employees goes up, they will ask for a pay raise that will be passed on to consumers. Businesses outside the state with lower costs will have an unfair advantage against California businesses. (CIOMA)

Nowhere in Section VI of the Staff Report was an attempt made to address the impacts on small businesses which use large volumes of gasoline. This needs to be addressed because there are obviously some

industries that will be impacted significantly--taxi companies, farmers, etc. (Chevron)

Agency Response: All of the potential impacts on small businesses identified by the commenters stem either from the general effect that an increase in the price of gasoline may have on all businesses, or from ripple effects on business generally that result from the activities of oil refiners in complying the new regulatory requirements.

When an agency makes its determination whether there are "small business impacts," Government Code section 11346.53 has not required the agency to consider every possible impact of the proposed regulatory action on small business. Rather, the APA has been concerned with the potential adverse economic impacts of increased costs of compliance with administrative regulations, particularly insofar as compliance costs represent a greater relative impact on small business as contrasted with larger business concerns. The statements required by Gov. Code section 11346.53 where significant adverse economic impacts to small business are identified make clear that the focus is limited to costs of compliance. Section 11346.53(a)(2) refers to a description of the "reporting, recordkeeping and other compliance requirements that would result from the proposed action." All of the potential alternatives listed in section 11346.53(a)(3) speak to lessening the burden of compliance that the proposed regulation may have on small businesses.[6]

The Phase 2 RFG regulations will without doubt result in higher prices of gasoline, and possibly other fuels. The higher fuel costs will affect both large and small businesses. However, where a small business is affected in one way or another by higher fuel costs, the business does not incur costs in reasonable compliance with the regulations in the way such compliance costs are incurred by businesses that refine or import gasoline and have to comply with the regulations.

Accordingly, we believe that the findings made regarding small businesses in this rulemaking have been appropriate. This is not to say, however, that the Board in its decision-making process should or

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6. The public hearing notice and the Staff Report were issued before Stats. 1991 ch. 794 (AB 2061, Polanco) was either signed into law on October 9, 1991, or became effective on January 1, 1992. This bill made various changes to Gov. Code section 11346.53 and other sections of the APA. Particularly since AB 2061 added language stating that it is not the intent of section 11346.53(a) to impose additional criteria on agencies, above that which exist in current law, in assessing adverse economic impact on California small business enterprises (§ 11346.53(a)(1)(B)), we do not believe that the new legislation changed the nature of small business impacts that must be addressed by an agency in a rulemaking.

has ignored the broader impacts that the regulations may have on businesses in the state. The potential economic impacts of the proposed regulations were discussed in Chapter VI of the Staff Report and in Chapter VI of the TSD. The Board heard and considered the testimony on the potential economic impacts of the regulations. The Board's evaluation of the comments pertaining to economic impacts and effects on business are addressed in Sections III.C.3. and III.I.1. of this Final Statement of Reasons. In Resolution 91-54 the Board found that the Phase 2 RFG regulations are expected to result in an increase of the cost of gasoline between 12 cents and 17 cents per gallon, and to result in capital investments from $3 billion to $6 billion; the Board further found that the economic impacts of the regulations are warranted in light of the public health benefits associated with the regulations.

We believe that the Board has complied with Government Code Section 11346.53.

296. Comment: The public hearing notice contains a statement on page 8 relating to the Board's authority to modify regulatory language in so far as a modification is sufficiently related to the originally proposed text. The notice further states that one of the modifications that may be considered is "modifications to the regulation to ensure that small refiners do note incur a disproportionate cost." A modification of this type would, in our opinion, constitute a "substantial" change and full justification for its need should have been documented in the Staff Report. Moreover, specific regulatory language should have been made available to the public for written and verbal comment prior to it being adopted by the Board. (Shell)

Agency Response: Title 1, C.C.R. section 42, provides that:

> Changes to the original text of a regulation shall be deemed to be "sufficiently related," as that term is used in Government Code section 11346.8, if a reasonable member of the directly affected public could have determined from the notice that these changes to the regulation could have resulted.

Since the notice clearly stated that modifications relating to small refiners might be adopted, the subsequent modifications clearly fell within statutory notice requirements.

297. Comment: We understand that the staff has been asked to change some or all of the proposed compliance limits in the October 4 proposal into average requirements. We believe that the Board is precluded from adopting the proposed modifications.

One of the principal purposes of the California Administrative Procedure Act (APA) is to ensure that the public participates fully in preparation of rules as important as the Phase 2 RFG regulations. The

initial statement of reasons for a proposed regulation like the Phase 2 RFG rules must therefore include, among other things, the following:

> An identification of each technical, theoretical, and empirical study, report, or similar document, if any, on which the agency is relying in proposing the adoption, amendment or repeal of a regulation.

Gov. Code Sec. 11346.7(a)(3). Until immediately before the Board meeting, MVMA and its members had no knowledge of the "averaging" proposal with higher limits that has apparently been presented to the staff. Because there has been no public opportunity to examine any aspect of the proposal under the relevant criteria of sections 33 and 34 of the California Clean Air Act [Health and Safety Code §§ 43013 and 43018], the Board and the staff can not rely upon, much less support, an unreviewed analysis to support relaxation of the October 4 proposal. Given the substantial nature of the proposed change to the October 4 proposal, the 15-day procedure contained in section 11346.8(c) will not be adequate to cure the notice problem presented by the petroleum industry's proposed changes. (MVMA)

Agency Response: The Board has fully complied with the APA in making the modifications to the text originally proposed by the staff. The core reason for conducting a hearing on proposed regulations is to assure that the decision-maker considers public comment and modifies the originally proposed text where appropriate in light of the comments received. The Board is not prohibited from considering information beyond what was identified in the Staff Report and TSD. The Board clearly can consider information submitted by commenters prior to or at the hearing. Government Code section 11346.7(b)(3) requires the agency to summarize in the Final Statement of Reasons each objection or recommendation made regarding the specific proposed action, and to state how the agency has changed the proposed regulation to accommodate each objection or recommendation, or the reasons for making no change. Implicit in this requirement is the fact that the agency has the authority to consider the comments and use information in the comment as a basis for modifying the regulations.

The modifications made by the Board were clearly the sort that may be made in conjunction with the 15-day notice provisions of Government Code section 11346.8(c). The public hearing notice specifically stated on pages 8-9 that the Board may consider modifications including provisions ensuring that small refiners do not incur a disproportionate cost, changes to the specified limits as necessary pending the receipt of additional emissions test or cost data, and modifications to the DAL averaging provisions, reporting requirements, or banking provisions. As discussed in the preceding comment, 1 C.C.R. sec. 42 makes clear that modifications of the type described in the notice could be made.

298. Comment: One reason why full public comment on the "averaging" plan is so important is that the plan would probably lead the Board into violation of the 1988 Clean Air Act and of underlying

principles of consistency in agency rulemaking. The benefits of the October 4 proposal would, for example, be reduced by averaging, even though section 34 of the 1988 Clean Air Act [Health and Safety Code § 43018] requires the maximum feasible reductions at the earliest possible date.

The proponents will undoubtedly respond that its proposal will improve the staff proposal's overall cost-effectiveness. Similar arguments were presented to the staff and the Board in the Clean Fuels/Low Emissions Vehicles (CF/LEV) rulemaking last year. In the Final Statement of Reasons (FSOR) for the CF/LEV rule released in July 1991, the staff held that, given the state's current air quality need, any control measure that is feasible is also necessary under the 1988 Clean Air Act:

> The Board is required by Health and Safety Code section 43018(a) to endeavor to achieve the maximum degree of emission reduction possible from mobile sources in order to attain the state standards for ozone and other pollutants at the earliest practicable date. Even with these (CF/LEV) regulations and other planned measures, statewide attainment of the state ozone standard cannot be predicted. The regulations are therefore necessary.

FSOR at 153 (emphasis added). In light of the current air quality needs of the State and the range of programs needed by the districts, the staff concluded that anything that is necessary is also, by definition, cost-effective. As the staff explained:

> The federal ambient air quality standard for ozone, which is less stringent than the state standard, is exceeded far more days per year in the South Coast than in any other area of the country. Numerous ambitious new control measures will be necessary to meet the state and federal ambient standards throughout the state. These measures would typically become increasingly more costly, since the more cost-effective measures tend to be adopted earlier. There is thus little doubt that the (CF/LEV) regulations adopted in this rulemaking will be part of the most cost-effective combination of control measure that leads to attainment of the state ambient standards.

FSOR at 148 (emphasis added). The Board and the staff thus have already addressed the same concerns about costs that are being raised again. While MVMA may substantively disagree with the Board's position, consistency requires that the Board and the staff take the same position on these very basic issues about cost-effectiveness under the 1988 Act as they took earlier this year in the CF/LEV rulemaking.

Agency Response: The Phase 2 RFG regulations represent the single most expense set of regulations ever adopted by the Board--more expensive even than the recently adopted low-emission vehicle/clean fuel regulations that were opposed by the commenter. Even if more

stringent standards can under appropriate circumstances be considered "necessary" under Health and Safety Code section 43018, this does not make the adopted Phase 2 RFG regulations "in violation of" or "inconsistent with" section 43018.

H. MISCELLANEOUS

1. Alternative Formulations--Predictive Model

299. Comment: The Phase 2 regulations should include a complete proposal for the predictive model before any of the Phase 2 regulations are adopted. In fact, WSPA strongly supports the use of a predictive model as the primary basis for the regulation rather than the list of fuel specifications. (WSPA)

Agency Response: It is not necessary that a predictive model be developed before the Phase 2 RFG regulations are adopted. Directionally, the effects of fuel property changes on emissions are well enough established that a predictive model is not necessary to determine which specifications should be adopted. Because the effects of the various fuel parameters on emissions is adequately understood, it is sufficient to propose the Phase 2 regulations in the form of fuel parameter specifications.

As demonstrated in the Staff Report and the TSD, the approved specifications will reduce emissions substantially. Compliance with the specifications is feasible at a cost that puts the cost-effectiveness of the regulation at a reasonable level. The regulations are appropriate by the criteria normally used in adopting regulations, and no further elements, such as a predictive model, are essential prior to adoption.

The staff is developing the proposed predictive model as an adjunct that may provide refiners with an alternative (but not necessary) means of compliance. The model is expected to provide a mechanism under which a gasoline producer may show that an alternative set of specifications creates a gasoline at least as good as Phase 2 RFG in its emissions properties. The development of the model involves complex statistical analyses to produce estimates of precision (uncertainty) in the model's predictions. The estimate of precision is necessary to apply the model to its task--ensuring that an alternative gasoline will be as good as Phase 2 RFG, despite the uncertainty--but it is not a necessary pre-condition to a determination that the basic regulations are technologically feasible, are cost-effective, and will result in needed emission reductions. That such emission reductions will occur is demonstrated by the less complex analysis in the Staff Report of the same data being analyzed for the model. That analysis relies on the consistency of efforts seen in multiple studies rather than a numerical precision value from the complex statistical treatment in the model of the "lumped" data from all studies.

The predictive model will provide gasoline producers with additional flexibility by providing an alternative means of complying with the Phase 2 RFG regulations. The predictive model will allow gasoline producers to trade-off the reductions in the fuel property specifications. The staff is developing the predictive model and plans to propose it for formal consideration in regulatory form in the first part of 1993. We expect that the model will be in place in time for

the gasoline producers to use as an alternative means of complying with the Phase 2 RFG regulations.

300. Comment: A predictive model is not yet defined and there is no assurance as to when it will be finalized. The predictive model must be available at the time industry investment decisions are made in order to achieve its full utility. Since a minimum of four years lead time is required to plan and bring refinery facilities on-stream, the regulations should not take effect less than four years after all compliance options, including the predictive model, are finalized. (WSPA)

The compliance date for the Phase 2 regulations should be linked to the development of the predictive model. For every month delay in the adoption of a predictive model after January 1992, there should be a corresponding one month delay on the effective date of the Phase 2 regulations. (Unocal)

Agency Response: We do not believe that the absence of the predictive model is a sufficient reason to delay implementation of the Phase 2 RFG regulations. The presence of the average and flat standards, together with the caps, provide refiners with sufficient information to plan for refinery modifications. Because of the implementation of the cap standards there is a limit to the amount of flexibility that will be allowed under the use of the predictive model when it is adopted. We anticipate that the availability of the predictive model will not create great changes to the refinery configurations. Upon adoption the predictive model will help refiners reduce costs by providing them with more operational flexibility rather than by affecting their refinery modifications. Also see the response to the preceding comment.

301. Comment: The proposal for periodic revision of the predictive model by the Board raises questions of how often a refiner will have to modify its facilities to comply with the Phase 2 regulations. Refiners will need a more clear understanding of when and why the predictive model might be altered by the Board. If refiners are constructing facilities to meet a set of specifications encompassed by the model, changing the model could require facilities to be altered. This type of uncertainty in the long-term applicability of the model makes it difficult for refiners to plan. Furthermore, a change in the model requiring alteration of facilities could easily take more than two years to complete. (WSPA)

Agency Response: The Board has not yet adopted the regulatory provisions pertaining to the predictive model, including how it will be implemented and on how frequently it will be revised. When the proposed predictive model is developed and presented to the Board for consideration and adoption in the early part of 1993, there will be a full opportunity for public comment and participation.

302. Comment: If the staff can propose Phase 2 RFG gasoline standards at this time, why can't a predictive model be proposed at this time? (Unocal)

Agency Response: The available emissions test data and analyses are not inadequate for the development of a predictive model or for the specification of gasoline parameter standards. The development of a predictive model that can be used to predict precisely the effects of fuel parameter changes on emissions is a major effort. It is for this reason that a predictive model was not available when the Phase 2 standards were adopted by the Board. Directionally, the emissions effects of fuel parameter changes are well enough established by the test data that fuel parameter standards can be adopted. The emissions test data demonstrate that reductions in various fuel parameter specifications will result in emissions reductions. It is not necessary that a predictive model be available at the same time that standards for the gasoline properties are adopted. It is sufficient that the model be available reasonably soon after the standards are adopted.

303. Comment: As currently proposed, the regulations do not provide any flexibility for the refiner. The vehicle testing provisions, as currently outlined, have no value and a predictive model has not yet been developed. It is possible, if properly designed, that both options could provide needed flexibility to the refiner. However, if these options are not provided within the next couple of months, their usefulness will be greatly diminished. (Chevron)

Agency Response: See the responses to the preceding comments and the first comment in Section III.H.2.

304. Comment: It appears the staff is using the analysis presented in Table IV-12 (TSD p.93) to check the toxic effect of the specifications chosen on the basis of criteria pollutant effects. We believe that the staff should also take this approach when considering how to incorporate toxics into the predictive model. (Unocal)

Agency Response: The staff plans to incorporate appropriate provisions for toxics in the predictive model.

2. Alternative Formulations--Testing Option

305. Comment: As currently proposed, the vehicle testing option does not provide adequate flexibility. (Unocal, WSPA, Chevron)

Agency Response: Under the vehicle testing option for setting alternative gasoline specifications, a refiner has substantial flexibility to change specifications from the Phase 2 RFG values. The only restriction on the alternative specifications is that the gasoline properties addressed in the Phase 2 RFG regulations shall not exceed

their "cap" values. This restriction is necessary to avoid seriously compromising the ARB's ability to enforce the Phase 2 RFG regulations "downstream" of the refinery. Other than the above restriction, a refiner can attempt to qualify any set of specifications, on any properties, as valid alternatives to the Phase 2 RFG regulations.

306. Comment: The statistical treatment as proposed by the staff results in a non-workable option and does not provide an economically feasible chance of passing a truly equivalent fuel. (Unocal, WSPA, Chevron)

Agency Response: The statistical treatment of the data required by the testing procedure has been modified from the original proposal by increasing the tolerance fraction for the four pollutants from one percent to between two and four percent. This change should reduce the number of tests required to approve a fuel that has superior emission characteristics. Therefore, to the extent that the commenters are asserting that it would be infeasible to conduct emission tests on enough cars (a logistical problem), there is no basis for such a conclusion. The staff estimates that at most 120 cars would be needed (in many cases, fewer cars would suffice) to provide a high probability of an equivalent fuel passing. With two tests per vehicle (one with the candidate gasoline and one with Phase 2 gasoline), at most 240 tests would be run. This would be a large test program, but larger ones have been carried out. For example, the "Auto/Oil" program involves over 40 cars, most tested with at least 17 fuels, with most tests duplicated.

The commenters present no cost analysis to substantiate the claim of economic infeasibility. However, the staff estimates that testing 100 vehicles would cost about $1 million. If only one average sized refiner sponsored the tests and if it were able to market an alternative gasoline for only seven years (the minimum assured period), this cost would be about 0.02 cents per gallon. This figure should be minor compared to a financial benefit of producing gasoline to alternative standards, which is apt to be measured in pennies per gallon.

307. Comment: Under the vehicle testing option, the number of cars to be tested to get a reasonable probability of passing should be lower than 120. (WSPA)

Agency Response: The minimum number of cars that must be tested is 40. The figure 120 cars is the staff's estimate of the largest sample size that should be needed to ensure at least a 50 percent chance of passing a gasoline that is exactly equivalent to Phase 2 RFG gasoline in its emission properties. A superior fuel would have a lesser requirement for vehicles, at the same level of assurance. As discussed in the response to the previous comment, the cost of testing 120 cars should be minor in comparison to the potential savings from making gasoline to alternative standards.

Because testing more cars would cost more money, it is obvious that refiners would like to test as few cars as possible. However, the smaller the sample of cars tested, the less likely the test results will represent adequately the emission effect of substituting an alternative gasoline in the entire on-road vehicle fleet. The staff does not know how the requirements of the test procedure could be relaxed so as to reduce the need for testing, without undue compromise of the basic objective of the emission testing. That objective is to assure and alternative gasoline formulations will not be approved unless an increase in emissions is unlikely for any regulated pollutant.

308. Comment: The small delta values (tolerance fractions) proposed will not allow as much as one percent probability of passing a truly equivalent fuel. The number of vehicles necessary to improve the chances of passing to fifty percent would generate a test program of hundreds of vehicles. In order to have a more reasonable and practical test program, ten to twenty vehicles should have a fifty percent chance of passing. (Unocal, Texaco)

Agency Response: In response to these concerns the Board has modified the approach regarding the "deltas" (tolerance fractions). According to data analyzed by the staff, the modified deltas should give at least a 50 percent chance of passing a gasoline formulation that is equivalent to Phase 2 RFG. The deltas originally proposed would have given a substantially lesser chance of passing, but the validity of the claim of a one percent probability has not been assessed.

A test sample of 20 or fewer cars would be inadequate to represent the dozens of engine families and the range of age of vehicles that are on the road. In addition, the statistical uncertainty (standard error) in the result from a 20 car sample would be greater than that from a substantially larger sample. To provide a 50 percent chance of passing despite the increased uncertainty would require a substantial relaxation of the criterion for passing. That criterion allows up to 15 percent chance of a two or four percent emission increase (depending on the pollutant). We believe that a relaxation would be undesirable.

3. Certification Fuels

309. Comment: The Board should adopt specifications for fuels used on new vehicle certification and in-use testing. (Ford, GM)

The Board should adopt the certification fuel within the Phase 2 gasoline limits. (MVMA)

Agency Response: At an August 14, 1992 hearing in Ventura, the Board approved specifications for a Phase 2 RFG that can be used in certification testing of new motor vehicles. Fuel with the same

specifications would be used in in-use testing to determine compliance with the certification standards.

310. Comment: The ARB should adopt a reference fuel to be used for certification of alternative fuel formulations and in-use compliance testing. (Ford, MVMA)

Agency Response: The reference fuel for alternative fuel formulations is specified in Section I.C.2. of the "California Test Procedures for Evaluating Alternative Specifications for Gasoline," adopted as part of this rulemaking. As noted above, at an August 14, 1992 hearing the Board approved Phase 2 RFG specifications for motor vehicle certification testing.

4. Reactivity

311. Comment: There is minimal basis at best that exhaust reactivity will be affected by reductions in olefins, aromatics, and T90. With a balanced gasoline that meets all specifications, including the proposed Phase 2 RFG specifications, there may be a slight reduction in exhaust reactivity (grams of ozone per gram of exhaust hydrocarbon). The bulk of any reactivity benefit will be directly related to the reduction in exhaust mass emissions. (Chevron)

Agency Response: The adopted Phase 2 RFG standards will result in air quality improvements by reducing both the mass emissions rate (expressed in grams of hydrocarbon per mile) and the specific reactivity (expressed in grams of ozone per gram of hydrocarbon). These reductions are discussed on pages 70 through 73 of the TSD. The relative proportions of these two quantities in the overall effect is not important. The relevant result of the regulations is that the combination of the two reductions will reduce the formation of ozone.

312. Comment: Regarding page 71, paragraph 3, of the TSD, the statement regarding the "significant reactivity benefits" over the base fuel is incorrect. In general, too much emphasis is being placed on reactivity benefits of gasolines which meet the Phase 2 RFG standards. Reactivity is only an indication of how fast a material will react to form ozone in a single day. Multiple-day events are impacted by slow reacting compounds. (Chevron)

Agency Response: The analysis of the effects of the different reaction rates of the various hydrocarbon emission species on air quality is a science that is still developing and improving. By attributing air quality benefits to the reduction in the overall reaction rate of emissions, the staff is following past ARB practices.

The commenter appears to be asserting that the ARB's measure of reactivity of emissions--the ozone-forming potential as calculated by the Carter MIR factors--is an incomplete measure of the effects of

emissions on ozone concentrations. This may be true. However, this measure of reactivity is regarded as state-of-art and is consistent with the method used in support of other ARB programs.

313. Comment: If reactivity adjustment factors (RAFs) were adopted under a set of guidelines such as the following, the program could move forward together with scientific development without risking expected air quality benefits:

(a) Adopt RAFs now to avoid delays in the LEV program.
(b) Use the 95 percent confidence limit when setting RAFs.
(c) Require that the NMOG standard be changed to a standard that includes methane and CO.
(d) Require that all RAFs be in effect for three years.
(e) Require a procedure for qualifying alternative RAFs that is based on a strict statistical analysis. (ARCO)

Agency Response: When the Board approved the Low Emission Vehicle/Clean Fuels regulations in September 1990, the regulations included a protocol for developing RAFs. After the September 1990 hearing, the staff took another year to carry out additional research and testing to ensure that RAFs, when established, would have the firmest possible scientific and technical foundation. During that time, additional emission test data were gathered and a number of improvements in chemical mechanisms were incorporated in the computer-based models we use to calculate RAFs. In addition, the ARB arranged an International Conference on Photochemical Reactivity and established the ad hoc Reactivity Advisory Panel. At a November 1991 hearing the Board approved the first RAF, for TLEVs operating on M85. Since then the staff has continued its program of research and testing, and a hearing has been scheduled for November 1992 to consider the establishment of RAFs for additional fuels. This ongoing process has taken place with the fullest possible participation of both disinterested scientific experts and technical experts representing all of the stakeholders in this rulemaking.

314. Comment: On page 7, last paragraph of the Staff Report, the comments on reducing reactivity by changing formulation are incorrect. If anything, there will be only a minor impact on reactivity as defined as grams of ozone per gram of hydrocarbon emissions. Blended gasolines are required to meet a number of specifications. When some components are removed from gasoline, other components will have to be added to the gasoline to ensure that it meets all the required specifications. The removing of a high reactivity component might reduce the exhaust reactivity. However, the materials added back to the gasoline tend to increase the exhaust reactivity since they produce very reactive byproducts. The net effect is only a minor change in reactivity. Therefore, the word "drastically" on page 71, paragraph 1, line 7 of the TSD, is incorrect. There may be a change in exhaust reactivity in grams ozone per gram of exhaust hydrocarbon, but it will very likely be minor. (Chevron)

Agency Response: Olefins and high molecular weight aromatic hydrocarbons have significantly higher reactivity potential than paraffins (alkanes). Because aromatic hydrocarbons and olefins in the fuel are related to aromatic hydrocarbons and olefins in the exhaust and because the Phase 2 gasoline specifications would reduce aromatic hydrocarbons and olefinic species in the fuel, Phase 2 RFG is expected to result in some reduction of the ozone-forming potential of the exhaust emissions. Oil industry representatives have focused on data which indicate the possibility of increases in exhaust olefins because of increases in the alkanes content of the fuel. However, vehicle manufacturers have presented analyses of the Auto/Oil data which indicates that this is not the case. Because of the ambiguity of these data on this issue the staff relied on the results of studies that had Phase 2 RFG-like properties.

Exhaust emissions data collected by ARCO for a fuel that has specifications similar to the specifications of Phase 2 RFG show a 39 percent reduction in the Carter Ozone Per Mile (COPM) reactivity potential of the exhaust. This reduction of reactivity includes the benefits of reductions in mass emissions and represents a reduction of about eight percent in grams of ozone per gram of hydrocarbon emission in the exhaust. This reduction was from the industry average fuel. The reactivity reductions can be compared to a 31 percent reduction in the mass hydrocarbon emissions in the exhaust.

The reference to the word "drastically" refers to exhaust species composition, not reactivity. By changing fuel composition, exhaust composition would also change. For example, lowering aromatics would increase alkanes and alkane emissions and lowering T50 would shift the blend to lighter gasoline components and lighter emissions components.

5. Other

315. Comment: We strongly recommend that ARB institute an implementation date for the regulation of spring 1996 in order to coincide with the start of the RVP season, as well as to allow a four year time window between the adoption of the predictive model (projected for April/May 1992 hearing) and the start of the regulation. (WSPA)

Agency Response: The regulations have been modified so refiners and importers have to start meeting the Phase 2 RFG requirements at the same time (March and April, 1996) that they have to meet the RVP requirements.

Although the predictive model has not yet been completed, the Phase 2 RFG regulations as adopted provide sufficient enough information to refiners to plan their refinery modifications. See generally the response to the first comment in Section III.H.1. above.

316. Comment: Page 8, item 4, paragraph 2 of the TSD states that reformate as well as FCC and coker gasoline will be less desirable blendstocks in reformulated gasoline. Reformate as well as FCC and coker gasoline will still be blendstocks in reformulated gasoline. This paragraph needs to be revised. (Chevron)

Agency Response: The TSD text states that these blendstocks are less desirable but will still be used, however, in lesser proportion. We believe that the statement is not inaccurate.

317. Comment: We are informed that the ARB specifications substantially enact those proposed by ARCO for its EC-X gasoline and that other California refiners (including, but not limited to Chevron) have objected strenuously to this seeming favoritism. (Diepenbrock, Wulff, Plant & Hannegan)

Agency Response: The specifications adopted by the Board are similar to the ARCO specifications for EC-X gasoline. However, the ARB specifications are based on staff's independent analyses of studies performed by ARCO, Auto/Oil and others, as well as comments presented during the rulemaking process. The staff's studies indicate that the ARB specifications are appropriate to provide significant reductions of VOC, CO, and NOx. We not believe that ARCO has received special treatment in this rulemaking.

318. Comment: Instead of these costly specifications, we urge the Board to simply direct statewide application of the federal reformulated gasoline required under the U.S. Clean Air Act and EPA negotiated rule making. (Wickland)

Agency Response: Because California has the worst air pollution problem in the U.S., the ARB has historically set standards for which there are no federal counterparts or has set more stringent standards than equivalent federal regulations. The Board has concluded that the federal reformulated gasoline regulations are not sufficient to meet the requirements of the California Clean Air Act.

Implementation of only the federal gasoline standards would leave the state far short of obtaining the emissions reductions needed to meet the either the federal or state ambient air quality standards. The result would be a far greater likelihood of sanctions on transportation funds and new source growth, and an imposition of a greater burden onto other California industries to reduce emissions. Also, the federal gasoline regulations are not completely defined. Given the technical feasibility of better control, the ARB has decided that more effective, albeit more expensive, requirements are appropriate.

319. Comment: We would like the staff to look into establishing a relief valve for California, a relief valve that would allow imports to

come in under specified conditions to make sure that we keep a lid on gasoline prices. The relief valve is open to all refiners and importers. The relief valve should be opened only when California prices exceed some other benchmark such as Gulf Coast California prices, by an amount which is greater than the cost of the refiner's cost to meet the California specifications, because they are entitled to recover that investment less the cost of transportation. In addition, the imported gasoline must meet the Federal reformulated gasoline specifications. The purpose of the mechanism is to prevent excessive short-term price increases while maximizing the sales of California reformulated gasoline, whatever formulation you have to select. (Sierra Research)

Agency Response: Determining the refiners' strategies to distribute the costs of compliance on product prices and to determine the impact of these strategies on gasoline prices is a difficult and controversial undertaking. Furthermore, the Board does not have the authority to regulate gasoline prices. We expect market mechanisms will provide some moderating influence on major short-term price swings. To the extent that the commenter may be suggesting that the "relief valve" should be limited to the importation of noncomplying gasoline, we see no reason for excluding noncomplying gasoline refined in California.

320. Comment: If air quality benefits are not measurable, then they're not likely to affect a person's decision to stay in California. (DRI)

Agency Response: The emissions reductions that will result from the adopted regulations are undoubtedly significant and measurable. See the responses in Section III.B. We believe that the regulations will, with other air pollution control measures, have a positive impact on the quality of life in California.

321. Comment: There are no variance provisions for the installation and operation of additive facilities required under Phase 1 RFG regulations. Variance provisions similar to those proposed for Phase 2 RFG should be incorporated into the Phase 1 RFG regulations. (SFPP) We recommend that a variance procedure be adopted for Phase 1 RFG additives to cover unforeseen mechanical problems that might occur. (Tosco)

Agency Response: Phase 1 RFG variance issues are not within the scope of this Phase 2 RFG proceeding, and should be dealt with separately.

322. Comment: We estimated the amount of new tankage that would be required for the staff's initial regulatory proposal. We considered the number of new blending components required, the difficulty a refiner would have blending to meet the constraints of the flat limits

case, the refiner's need to isolate and test components before blending, and to provide for fluctuations in component qualities. We estimated that meeting the initially proposed reformulation using averaging would increase gasoline tankage requirements 50 percent above the base case. Using flat limits would increase gasoline tankage requirements to double that of the base case. (Turner Mason)

Agency Response: The adopted regulations allow averaging (DALs), which, as the commenter says, would reduce the cost for extra tankage. The Staff Report did recognize that an increased storage of products could result in increased emissions and addressed how those emissions cam be mitigated.

323. Comment: All blenders should 1) be registered with the ARB, 2) be prohibited from degrading finished gasoline, and 3) be required to demonstrate that all batches are on grade. (Unocal)

Agency Response: Health and Safety Code section 43021 requires all motor vehicle fuel distributors (including those that are blenders) to register with the ARB. The purpose of the registration is to ensure the quality of the gasoline which is sold at the retail outlets. A blanket prohibition of "degrading finished gasoline" would be extremely difficult to enforce. The function of the "cap" limits in the regulations is to assure that gasoline throughout the distribution system meets specified limits. Finally, the regulations do not require refiners or blenders to demonstrate that all batches are "on grade"; it would be unfair to require this of blenders only. In any case the Division of Measurement Standards administers a program designed to assure that gasoline in California meets all applicable ASTM specifications.

I. COMMENTS MADE DURING THE FIRST 15-DAY COMMENT PERIOD

1. **Economic Impacts Other Than Those Associated with the Small Refiner Provisions**

324. Comment: The gasoline specifications do not produce a reasonable balance between benefits and costs. (Mobil)

Agency Response: The ARB expended considerable resources and effort in this rulemaking to consider both the underlying technical questions and the important policy issues. The Board evaluated the potential emission benefits and the economic impacts. Although this evaluation was not limited to an examination of the cost-effectiveness of the Phase 2 RFG regulations, cost-effectiveness played an important role in the Board's decision. Generally see the discussion in the response to Comment 159 and the referenced discussions in the Staff Report and TSD. We have concluded that the Phase 2 RFG regulations do reflect a reasonable balance of benefits and costs, in light of the statutory mandates of Health and Safety Code section 43018.

325. Comment: Phase 2 RFG will pose a severe economic burden on the California economy. (Exxon) We take exception to the statement in Resolution 91-54 that the Board considered the impact of the proposed regulations on the state economy. Several Board members stated they were only interested in obtaining maximum air benefits and costs. (Chevron)

Agency Response: The Resolution speaks for itself. The Board heard extensive testimony on the potential economic as well as emissions impacts of the regulations. The comments were considered and taken seriously. We have also seriously considered the comments submitted during the 15-day comment periods. Generally see the responses to Comments 159 and 324, and the referenced discussions in the Staff Report and TSD.

326. Comment: Exxon believes the proposed regulations are much less cost-effective than the claims of the ARB staff. The last increment of emissions reduction is severely understated.

The WSPA proposal would have achieved the majority of the currently projected emissions reduction at about one-half the cost. An analysis of the incremental cost-effectiveness of the proposed regulations with the WSPA proposal would show that costs likely exceed $25,000 per ton and are well beyond the cost of other controls. (Exxon)

The ARB staff has not performed an incremental analysis to assess whether other formulations can achieve comparable reductions at substantially lower costs. (Mobil)

When analyzed on an incremental basis, these specifications are not cost-effective. Phase 2 RFG specifications should be analyzed on an incremental basis and modified accordingly. (Chevron)

Agency Response: We believe it is inappropriate to base the rulemaking decision on an incremental cost-effectiveness analysis for the reasons stated in the response to Comment 183.

For most air pollution controls, costs increase if the control is redesigned to reduce emissions more efficiently, and cost-effectiveness tends to decrease with greater efficiencies. This is also true of the Phase 2 RFG specifications. However, it is inappropriate to compare incremental cost-effectiveness with the cost-effectiveness of an entire regulation. The Board has not used incremental analyses to determine cost-effectiveness, but instead looks at the costs and emission reductions associated with an entire regulation relative to the existing situation. The Staff Report (pp. 70-73) and TSD (pp. 139-145) contain an analysis showing that the Phase 2 RFG cost-effectiveness is comparable to other controls and regulations that have been recently adopted. None of the cost-effectiveness values for the other measures were calculated on an incremental basis. It would be inappropriate to compare the cost-effectiveness of the Phase 2 RFG regulations calculated on an incremental basis to the other cost-effectiveness values that are not calculated on an incremental basis. In addition, for the reasons set forth in the response to Comment 159, the cost-effectiveness of the Phase 2 RFG regulations is probably more favorable than indicated by the staff's calculations.

327. Comment: ARB staff should have compared the incremental cost of the more stringent Phase 2 RFG standards with the Federal Clean Air Act reformulated gasoline. (Exxon)

Agency Response: See the responses to Comments 162 and 196.

328. Comment: The flat limit and average provisions for aromatic hydrocarbons, T90, and olefins should be increased to cost-effective levels. (Chevron)

Agency Response: See the responses to Comments 183, 185, and 186.

329. Comment: For the cost-effectiveness methodology used in the Phase 2 RFG Staff Report, it is not clear how the 50/50 split of costs between toxics and criteria pollutants was arrived at, other than by an arbitrary decision. (Chevron)

Agency Response: See the response to Comment 168.

330. Comment: The risks of airborne toxics are probably overstated. For example, EPA's risk assessment and the recent update

of the Goodyear Pilofilm cohort indicate the benzene risk used in the Staff Report could easily be an order of magnitude too high. Recent information would also indicate that OEHHA's risk assessment for 1,3-butadiene may also be high by one to four orders of magnitude. (Chevron)

Agency Response: With reference to the benzene risk factor, see the response to Comment 138. With reference to 1,3 butadiene, the staff used a risk factor of 1.4×10^{-4} per $\mu g/m^3$. (TSD, Appendix 7, p. 7-2.) At a July 9, 1992 public hearing the Board adopted a regulation identifying 1,3 butadiene as a toxic air contaminant, and identified a risk factor of 1.7×10^{-4} per $\mu g/m^3$. Compared to this value, the staff underestimated estimated the risk factor for 1,3-butadiene in the Phase 2 RFG rulemaking. The commenter did not identify any of the "recent information" it says indicate the risk factor staff used was one to four orders of magnitude too high.

331. Comment: If the cost-effectiveness of emission reductions of toxics must be addressed, a more reasonable and defensible value for each potential cancer case avoided should be assigned (such as $1 million), the total value should be determined for all cancer cases avoided, this total value should be subtracted from the total cost of all emission reductions, and the remainder should be allocated to the criteria pollutants. (Chevron)

Agency Response: This procedure appears to have some merit, but the proper value per cancer case avoided must be a policy, rather than technical, decision. There is probably a large variation in the proper value, depending on who is asked to assign this value. The analysis done in the Staff Report (pp. 70-73) and TSD (pp. 139-145) is defensible, since the cost-effectiveness values for toxics and criteria pollutants are comparable with the corresponding values for recently adopted regulations.

332. Comment: CO reductions should not receive credit in determining the cost-effectiveness of the Phase 2 RFG regulations, as CO exceedances occur in winter and ozone exceedances occur in the summer. If CO reductions receive credit, a method we suggested for toxics should be used. The oxygenate wintertime control cost for CO was estimated to be $1000/ton by ARB, and we suggest this value be used. (Chevron)

Agency Response: The Phase 2 RFG regulations apply to gasoline all year long, and not just during the summer. Since Phase 2 RFG reduces CO in the winter months, when violations occur, it is appropriate to assign some of the costs of Phase 2 RFG to CO reductions in determining cost-effectiveness.

When a regulation reduces multiple criteria pollutants, we do not believe it appropriate to artificially assign a cost-effectiveness value for reductions in one criteria pollutant. Doing so can seriously

distort the cost-effectiveness calculations for the other pollutants. For the Phase 2 RFG CO reductions, the Staff Report (p. 70) reported a cost-effectiveness value equivalent to $844 per ton for 1996. This value is not significantly different from the suggested value of $1000 per ton. Use of the higher value would tend to improve the cost-effectiveness for other pollutants.

Also see the responses to Comments 175, 176 and 177.

333. Comment: If exempt refineries only increase the price of gasoline enough to recover their own expenses, prices of gasoline will have to increase even more after the exemption expires. The impact of this greater increase is an increase in the cost of Phase 2 RFG from $16,000/ton to $20,000/ton, based on cost estimates developed by Unocal. (Unocal)

Agency Response: The likelihood of this scenario occurring is unsupported by Unocal. As we indicated in our response to Comment 247, small refineries are in poor financial shape, and will very likely charge the highest price for gasoline that the market will accept. This would be a price comparable to that charged by major refiners. Thus major refiners should not find the price of their products impacted by the small refiner compliance delay.

Unocal did not indicate how their cost per ton figures were calculated. Even if Unocal's assumption is correct that their gasoline prices will be adversely affected by the compliance delay were correct, we believe it unlikely that Unocal's cost per ton figures are accurate. Although detail is lacking, we believe it likely that Unocal used the refinery industry figures (i.e., an increase of 23 cents per gallon to produce Phase 2 RFG) to calculate their cost per ton figures. Staff's corresponding cost estimate is 12 to 17 cents per gallon. If the added cost of producing small refiner qualifying gasoline (as opposed to today's gasoline) is factored into this calculation, the price differential between small refiner qualifying gasoline and Phase 2 RFG would be less than 12 to 17 cents per gallon. This would reduce Unocal's cost per ton figures substantially.

It should also be noted that, even if the cost-effectiveness of Phase 2 RFG is changed by 25 percent as suggested by Unocal, the Phase 2 RFG cost-effectiveness would still be comparable to recently adopted regulations (see the Staff Report, pp. 70-73, and the TSD, pp. 139-145).

2. Treatment of Small Refiners

(a) Appropriateness of Separate Treatment of Small Refiners

334. Comment: We strongly oppose the proposed small refiner exemption. We believe it will unfairly create significant economic and competitive advantages for small refiners, and will place an

unacceptable economic burden on the refiners who do not receive the exemption. (Exxon, Mobil, Unocal, Shell, Ultramar and Tosco)

Agency Response: We have carefully considered the supplemental comments submitted by the several refiners who strongly oppose the small refiner provisions. We remain satisfied that the small refiner provisions are justified. The rationale for the provisions is set forth in Section II.B.2. and in the response to Comment 247.

335. Comment: The ARB staff's conclusion that small refiners would have greater difficulty securing capital financing is founded on insufficient financial data and cannot be applied to the group as a whole (Exxon).

The proposed exemption is offered without adequate justification. ARB proposes an exemption to small refiners solely because of their size and ownership by persons or companies without other substantial refinery investments, although these owners may otherwise have substantial financial resources. Certain of the exempt refiners have sufficient capability to raise capital without the need of a two-year blanket delay. (Mobil)

Agency Response: The staff's evaluation of the financial condition of the refining industry in California indicates that small refiners are in a much weaker financial condition than large refiners (TSD, Appendix 6, pp. 21-24). Small refiners' highly leveraged balance sheets severely limited their ability to borrow. Lenders are reluctant to provide additional credit to heavily leveraged companies, especially during this period of slow economic growth. Small refiners, unlike large refiners, have little or no ability to finance the refinery modifications through equity or bond markets. They have to turn to high-cost sources of financing such as banks, private placement, and limited partnerships. Some small refiners indicated that even these sources are unwilling to provide the financing required for compliance with this regulation due to uncertainty in their ability to recover capital expenditures (MG Trade Finance Corp. comment letter, November 7, 1991; Powerine 15-day comment letter, June 22, 1992). As a result, the Board decided to grant a two-year extension for compliance to small refiners so that they have additional time to raise the financing required for the capital improvements need to produce gasoline complying with all of the Phase 2 RFG specifications.

336. Comment: The short-term exemption proposed for small refiners will not have an impact on financing for the capital improvements needed to meet Phase 2 RFG specifications. Lenders do not base financing decisions on short-term conditions, but on the overall long-term financial health of a company. (Exxon)

The small refiners exemption does not facilitate financing capital improvements. Lenders do not base financing decisions on short-term market conditions, but instead look at the overall financial health of

a company. ARB's primary justification advanced for the small refiner exemption is negated by its own analysis of the independent refiners' request for exemption. ARB in the independent refiner Status Report concluded that lenders would necessarily rely more on a company's financial history and strength than on showing the ability to recover costs. (Mobil)

Agency Response: The two-year compliance delay is intended to provide additional time for small refiners to comply with the regulation. During these hard economic times, lenders have tightened their credit standards, making it difficult for small refiners to raise capital to make the necessary modifications. Small refiners' difficulty in raising capital stems from overly leveraged balance sheets, limited access to capital markets, and uncertainty in their ability to recover costs. All these factors will impact a lender's or investor's decision to loan or invest. The compliance delay may not change the financial requirements that small refiners have to meet, but it would allow them additional time to improve their credit rating by reducing their debt and to spread out their capital expenditures over more years.

It should also be noted that these comments tend to support a permanent small refiner exemption rather than a two year compliance delay. A permanent exemption would result in permanent air quality impacts without a commensurate benefit. It is more appropriate to follow the strategy reflected in the Phase 2 RFG regulations. That is, taking into account the financial constraints small refiners must operate under, require such refineries to make gasoline that is as clean as possible in the shortest timeframe possible.

337. Comment: The small refiners exemption provides windfall profits to exempt refiners while imposing economic disadvantages on non-exempt refiners. The exemption would allow exempt refiners to artificially depress retail prices down to a level that would prevent non-exempt refiners from recovering their capital improvement costs, which would adversely impact the millions of people who hold shares in the non-exempt companies. At the same time, the exempt refiners could receive a windfall by keeping prices higher (but below the level required to recover the costs of Phase 2 RFG) during the two year exemption period. The windfall may be as much as $92 million for a single refinery. (Mobil)

The small refiners exemption merely provides a two year economic windfall to exempt companies while they continue to produce gasoline with higher emissions. (Exxon)

We are strongly opposed to the granting of a waiver to small refiners. Such an exemption creates windfall profits for inefficient and otherwise nonviable refiners at the expense of both public health and other refiners that have made the substantial capital expenditures necessary to meet the rule requirements. (Ultramar)

It is likely that small refiners will receive an economic windfall as a result of the exemption. (Unocal)

Agency Response: The compliance delay might provide small refiners with a two-year "economic windfall" if market gasoline prices rise as expected. However, the "economic windfall" will not be substantial because the delay applies only to four of the eight Phase 2 RFG specifications and is limited to small refiners who are making bona fide efforts to modify their refineries to produce Phase 2 gasoline in a timely fashion. Small refiners are financially weak and would have difficulty raising the capital needed to finance the modifications necessary for compliance with the regulations. (Staff Report, p. 77, TSD, pp. 157 and Appendix 6.) The delay is intended to provide additional time for small refiners to comply fully with the Phase 2 RFG regulations. Without the regulatory delay, some small refiners might not be able to stay in business, particularly in light of the current recession. Such closures would reduce competition in the gasoline market and might result in an ultimate increase in gasoline prices. We concluded it was appropriate to incorporate reasonable and measured provisions to reduce the possibility of closures.

The delay is not expected to have much impact on gasoline prices. This is because small refiners must still make a commitment to meet certain construction milestones for the refinery modifications in order to obtain approval for a compliance delay. Moreover, the amount of "qualifying" gasoline produced is limited to historical volumes. This qualifying gasoline will be subject to federal reformulated gasoline specifications (in southern California) and four of the eight Phase 2 RFG specifications. As a result, the cost disparity between gasoline produced by small refiners and others will be tempered. Given the fact that small refiners control only 7 percent of the gasoline market and their market shares will be restricted by their historical sales during the two-year deferral period, small refiners will not have an overpowering influence on the gasoline market. Since gasoline prices are not likely to be substantially affected by the compliance delay for small refiners, the delay is not expected to depress gasoline prices to a level that would defer the recovery of capital improvement costs by other refiners. Thus, there will be no material impact on refiner shareholders. It should also be noted that California refining operations account only for a small portion of worldwide business operations of large refiners. A small reduction in large refiners' profitability from their California refining operations will not have much impact on refiner shareholders.

338. Comment: The small refiner exemption would place an economic burden on any refinery which is required to meet the original deadline by providing direct financial support to exempt refineries. (Chevron)

The exemption would create potentially significant economic and competitive disadvantages to the marketplace for non-exempt refiners. Exempt refiners would either reap windfall profits due to the

exemption, or would cause economic hardship for non-exempt refiners at the expense of public health. (Shell)

We are opposed to the exemption for small refineries. Gasoline produced under an exemption will have a lower production cost, and could result in market dislocations, severely hampering the recovery of capital by major refiners. (Unocal)

Agency Response: See the responses to Comments 247 and 337.

339. Comment: Each exempt refinery has annual sales of at least $70 million and up to as much as $500 million. Most, if not all, appear to be owned by wealthy individuals or companies with substantial holdings. (Mobil)

Agency Response: The Board's decision to grant a two-year compliance delay for small refiners was based on overall financial conditions of small refiners rather than the size of their annual sales. While the annual sales of small refiners may seem large, they are dwarfed by the sales of the other refiners. With regard to the potential wealth of the individuals or entities owning small refiners, we have not been able to identify a fair and appropriate way to classify refiners based on such criteria. As discussed in Section II.B.2.(b) and the responses to Comments 373-373, the general approach taken in our classification of small refiners has been used in the past both by the ARB and by the U.S. EPA.

Small refiners have limited access to the capital that is required to finance the refinery modifications that are necessary to produce complying gasoline. (See the MG Trade Finance Corp. comment letter, November 7, 1991.) The major refiners do not have the same limitations in raising the needed capital.

340. Comment: Small refiners have claimed that a two year delay in compliance would give assurance to lenders that prices would rise, yet ARB rejected this very same argument in refusing to grant a two year delay to independent refiners. ARB stated that capital would have to be raised to begin partial compliance with Phase 2 RFG before information on price increases would possibly be available. In addition, the exemption regulations require evidence of capital commitments in the application for the exemption. (Mobil)

Agency Response: The prospect for capital recovery is only one of many factors that lenders consider in their financing decision. Lenders also give a great deal of considerations to the overall financial condition of a company. The staff's analysis shows that independent refiners are in a far better financial condition than small refiners are. In 1990, for example, their debt load was far lower than that of small refiners and their profitability was higher than that of small refiners. Lenders are very reluctant to loan to heavily leveraged companies, especially during this recessionary period.

Furthermore, some independent refiners have shown the ability to raise capital in the bond and equity markets. Such sources of financing are not usually available to small refiners.

As indicated in the responses to Comments 337 and 338, small refineries that are granted a compliance delay will still have to produce gasoline that meets all of the federal reformulated gasoline requirements in southern California by 1995, four of the eight Phase 2 RFG specifications by 1996, and all eight Phase 2 RFG specifications by 1998. Thus, modifications will have to be made to these small refineries before 1996 if they are to continue producing gasoline. These modifications, however, are less costly than the full Phase 2 RFG modifications, and small refineries should have less trouble finding the necessary financing for these less costly modifications. Thus it is not inconsistent to make a finding that small refineries cannot obtain financing for modifications required to produce Phase 2 RFG, while requiring these same refineries, without assistance, to finance the modifications required to produce federal reformulated gasoline and and four of the eight Phase 2 RFG specifications.

341. Comment: A blanket exemption such as that proposed is inappropriate and unnecessary because ARB already has provided for a variance process available to any refiner who believes it is subjected to unreasonable economic hardship. In addition, the variance procedure has much better safeguards than the exemption process. In a variance, the applicant must show need for the requested relief and that the need results from a cause beyond its reasonable control. Showings are also required that there is an extraordinary economic hardship, that on balance the public interest is served, and that compliance can be achieved expeditiously. A bond, subject to forfeiture, must also be posted to assure performance. The variance should be structured such that the small refiner does not obtain a windfall. In addition, the delayed compliance date associated with any variance should not exceed one year. (Mobil)

Agency Response: The Board has determined that a compliance delay specified in the regulations is more appropriate than having small refiners rely solely on a variance process. The compliance delay provisions do not result in as much uncertainty as the variance process, and thus will allow small refiners to obtain capital for refinery modifications more easily. Also see the response to Comment 250.

342. Comment: The small refiners exemption will result in a black market for noncomplying gasoline, increasing adverse air quality impacts. ARB has argued the cap limits represent the main enforcement tool within the distribution system, yet ARB failed to include this safeguard in the small refiner exemption. (Mobil) The small refiners exemption provisions should require compliance with the proposed caps for non-exempt refiners, otherwise Phase 2 RFG would be unenforceable. (Tosco) The small refiner exemption would add significantly to

enforcement complications due to commingling and exchanges of gasoline. (Chevron)

Agency Response: The small refiners provisions as proposed require small refiners' gasoline to comply with four of the eight Phase 2 RFG gasoline specifications. As discussed in Section II.B.2., we have included substantial safeguards against abuse by small refiners. Also see the response to Comment 251.

343. Comment: The small refiners exemption constitutes a subsidy by the state, and ARB has already acknowledged that the state should not subsidize refinery owners who are simply unwilling to make investments required to meet their obligations. (Mobil)

Agency Response: For the reasons expressed in Comments 337 and 338, we do not believe the small refiners compliance delay constitutes a subsidy. We agree with Mobil's comment that, if a company is unwilling to make investments to meet regulations, they should not be granted a compliance delay or be subsidized. However, we have structured the compliance delay so that it is available only to those small refiners that are engaged in making the necessary investments to come into full compliance with the Phase 2 RFG regulations.

344. Comment: The Staff Report inadequately analyzes the economic and air quality impacts of the exemption for small refiners. (Ultramar)

Agency Response: We believe that the Staff Report, the TSD, and this Final Statement of Reasons, taken together, provide an adequate justification for the small refiner provisions, and the economic and air quality impacts.

345. Comment: The Staff Report did not assume use of large volumes of noncomplying gasoline as a blending stock for small refiners. Thus the air quality impacts of the small refiners exemption have likely been understated to a significant degree. (Ultramar)

Agency Response: As discussed in the response to Comment 361, we have modified the regulations to limit substantially the percentage of product not refined by the small refiner that can be used in the small refiner's gasoline. In light of the many safeguards provided in the small refiner provisions, we do not expect that our estimates of the air quality impacts have been substantially understated.

(b) Legal Authority to Adopt the Small Refiner Provisions

346. Comment: The ARB lacks the statutory authority to adopt the small refiner exemption. The ARB does not have the power under existing California law to promulgate regulations which provide a favorable compliance schedule to one segment of the refining industry

in California. To do so would discriminate arbitrarily against the non-exempt segment of the refining industry. (Shell)

We believe the ARB's action in providing any exemption such as the small refiner provisions is outside the ARB's authority under the California Clean Air Act of 1988. The Act directs the ARB to address the air quality problem in California without regard for the economic impact on certain segments of the industry in so doing. (Chevron)

The small refiner exemption exceeds the ARB's delegated authority because the exemption is not permitted under either the cost-effective or effect-on-the-economy-of-the-state standards. The proposed exemption is inconsistent with the California Clean Air Act objectives because it allows continuing, if not increased, pollution. (Mobil)

The California Clean Air Act requires the ARB to implement "across-the-board reductions" in emissions, while considering the effect of reductions "on the economy of the state." Nowhere is the ARB directed to assess the Phase 2 RFG regulatory impact on different segments of the industry, and ARB's attempt to exercise this authority is unfounded. When the California legislature intends for the ARB to grant exemptions, the legislature has done so explicitly (see Health and Safety Code §§ 43656 and 43657).

The plain language and legislative history of the relevant sections of the California Clean Air Act show that the Legislature did not delegate power to the ARB to grant special treatment to any oil refiners. The 1990 addition of Health and Safety Code sections 43013(e) and (f), and 43018(e) and (f), which were contained in AB 3555 (Sher), was made during the last few days of the legislative session without debate or committee hearing. These amendments dilute the anti-pollution objectives of the California Clean Air Act, by way of a late-session maneuver that effectively eliminated thorough analysis of the proposed changed. There was no notice to opposing parties and no opportunity to contest the legislation.

The AB 3555 amendments were requested by ARB Chairperson Jananne Sharpless in a July 26, 1991 letter [sic; the correct date was July 26, 1990] to Assemblyman Sher. The letter admits the amendment was requested to circumvent a decision of the Sacramento Superior Court in Exxon v. ARB, No. 362842, but contains a one-sided summary of the court's ruling and the issues at stake. In the Exxon case, the Superior Court set aside exemptions granted by the ARB to small and independent refiners from an aromatic hydrocarbon specification adopted by the ARB for diesel fuel. The Sharpless memo failed to make clear the scope and significance of the Superior Court decision, since it failed to note that the Superior Court found that section 43101 was not controlling. Instead, relying on the established principle of statutory construction that a specific statue controls over a general statute, the Court found that the specific provisions in sections 43013 and 43018, authorizing the ARB to adopt fuel content standards, controlled over the more general provisions of section 43101, regulating new car emissions. Unlike section 43101, which permits the

ARB to consider the "effect on the economy of the state" when it adopts regulations for new car emissions, neither sections 43013 [n]or 43018 authorized the ARB to consider economic impact in adopting fuel content standards.

Moreover, the legislative history and purpose of the amendments do not support the Board's asserted authority to grant special treatment to small refiners. The language "effect . . . on the economy of the State" was taken from section 43101 of the Health and Safety Code, which authorizes the ARB to adopt emission standards for new motor vehicles. As enacted in 1975, section 43101 directed the ARB to adopt new vehicle emission standards it "found to be necessary and technologically feasible." The economic effect language was added to section 43101 in 1976 by A.B. 3764 (Ass. Torres). The language was suggested by Ford Motor Company to ensure that the ARB considered factors other than environmental needs, including fuel economy and impacts on the state's economy, when setting new vehicle emission standards. This language in section 43101, and the identical language added to sections 43013 and 43018 by AB 3555 in 1990, must be interpreted in a way that is consistent with its plain language. The language plainly refers to the state as a whole, not to different segments of a particular industry.

The authority to consider the "effect" of regulations "on the economy of the state" did not replace existing criteria but was added as an additional one. Thus the Board is not free to ignore cost-effectiveness but must consider effect on the economy as an additional means of choosing among alternative pollution control standards and strategies that satisfy the three other criteria in sections 43013 and 43108--"necessary, cost-effective and technologically feasible." None of these criteria authorize the ARB to grant exemptions or other special treatment.

It would be contrary to the plain language of the Clean Air Act for the ARB to rely on the language "effect . . . on the economy of the state" as implied authorization to exempt or grant special treatment to so-called "small refiners." Under the Act, when exemptions are intended, the legislature speaks expressly, not by implication. It has not authorized the ARB to grant special treatment or exemptions from its fuel regulations. Similarly, in the federal Clean Air Act, when Congress intends to grant exemptions or provide special treatment to a segment of an industry, it has done so explicitly. For example, in the former version of 42 U.S.C. § 7545(g) [former section 211(g) of the federal Clean Air Act], Congress expressly authorized the U.S. EPA to provide special treatment to "small refineries" with respect to the regulation of the lead content of gasoline. That special provision for small refineries was deleted from the statute by the 1990 federal Clean Air Act Amendments. There are no exemptions for small refiners from the current federal gasoline standards. (Exxon)

Agency Response: The commenters' claim that the ARB lacks the authority to differentiate among different classes of refiners in our

motor vehicle fuels regulations rests almost entirely on the arguments made by Exxon in Exxon v. ARB, and the Superior Court decision in favor of Exxon in that case. On September 8, 1992, the Court of Appeal for the Third Appellate District reversed the trial court.[7] The Court of Appeal held that "prior to the adoption of the Clean Air Act of 1988, the Board was authorized by section 43101 to consider the effect its proposed fuel content regulations would have on the ability of small and independent refiners to compete in the fuel industry" (Slip. Op. at 21), and that the ARB's "power under section 43101 to consider the economic effect of proposed fuel standards prior to adopting regulations governing fuel content was not repealed impliedly by the Clean Air Act of 1988." (Slip. Op. at 27.)

The ARB's legal counsel have extensively analyzed the issue of the ARB's authority to differentiate among different classes of refiners in our motor vehicle fuels regulations. Prior to issuance of the Exxon decision in the Court of Appeal, we had concluded that the Board's authority in this area should be without serious question. Since the Court of Appeal's Exxon decision is currently not certified for publication, and in light of the lengths that some of the commenters have gone in attempting to show that the ARB lacks authority in this area, we believe it is still appropriate to provide in our agency response a complete discussion of the basis for our conclusion that the Board is authorized to treat small refiners as a separate class.

We initially note that, as discussed in the response to Comment 247, it is inappropriate to refer to the small refiner provisions as an exemption. Rather the small refiner provisions allow a two-year delay in compliance with four of the eight gasoline specifications, and then only if the small refiners meet stringent specified conditions. We also emphasize that there are two very different legal issues regarding the ARB's authority to adopt the small refiner provisions in section 2272. The first question is whether the ARB ever has the authority to provide for delayed compliance by a class of refiners. That is the issue identified in this comment, and answered affirmatively by the Court of Appeal in the Exxon decision. Once it is determined that the ARB does have the general authority to treat classes of refiners differently, the second legal question becomes relevant--whether the specific treatment of small refiners in the Phase 2 RFG regulations represents an abuse of discretion or is without a rational basis. That issue is identified in Comment 348 below.

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7. Exxon Corporation v. California Air Resources Board, 3 Civ. C009485, Sept. 8, 1992. A copy of the opinion is available on request from the ARB's Office of Legal Affairs. The court did not certify the opinion for publication, but publication may be requested.

[a] **Prior to the enactment of the California Clean Air Act of 1988, the ARB was not precluded from treating different classes of refiners differently in the ARB's fuels regulations.**

Prior to 1989, there were no statutes explicitly authorizing ARB to regulate motor vehicle fuel, other than statutes authorizing control of gasoline RVP and the degree of saturation. (Health and Safety Code §§ 42830 and 43831.) However, the California Supreme Court held in 1975 that ARB's authority to control pollution from motor vehicles includes the authority to regulate motor vehicle fuel content in order to reduce vehicular pollution. (Western Oil and Gas Ass'n v. Orange County Air Pollution Control District (1975) 14 Cal.3d 411.) The key statutes then authorizing the ARB to control vehicle pollution were former Health and Safety Code sections 39052.5 and 39052.6 (14 Cal.3d at 418-419). In 1975 these statutes were recodified as Health and Safety Code sections 43013 and 43101.

Until it was amended by the California Clean Air Act of 1988, section 43013 provided that, "The state board may adopt and implement motor vehicle emission standards for the control of air contaminants and sources of air pollution which the state board has found to be necessary and technologically feasible to carry out the purposes of this division." Section 43101 had essentially identical language which was directory rather than permissive. Since 1976, Section 43101 has further provided that, "Prior to adopting such standards, the state board shall consider the impact of such standards on the economy of the state, including, but not limited to, their effect on motor vehicle fuel efficiency."

In accordance with the 1975 WOGA case and sections 43013 and 43101, between 1976 and 1988 the ARB adopted regulations on the lead content of gasoline, the sulfur content of unleaded gasoline, the sulfur content of diesel fuel in parts of southern California, and manganese in gasoline additives. (13 C.C.R. §§ 2252, 2253, 2253.2, and 2254.) In each instance the ARB considered the economic impact of the standards. In light of the potentially disparate economic impacts, the 1975 regulation on gasoline lead content and the 1981 regulation on diesel fuel sulfur content contained fuel standards with less stringent limits for small refiners. (Former 13 C.C.R. §§ 2253(b) and 2252(d),(h),(n).)

There should be no doubt that in adopting its motor vehicle fuel regulations the Board had the authority to adopt tiered standards or delayed compliance provisions in consideration of the potentially disparate economic impacts. Section 43101 gave the ARB not only the authority but the responsibility to consider the effects of these standards on the economy. Similarly, section 43013 provided the ARB with sufficient latitude and discretion to permit the adoption of tiered standards and delayed compliance schedules.

After the two-tiered gasoline lead content regulation was adopted by the ARB in 1976, the Legislature amended section 43013 by adding

language not pertinent to the issues here addressed. (Stats 1976 ch. 1063.) Similarly, the Legislature enacted section 43016 (Stats 1976 ch. 1206), which establishes penalties applicable to violations of the ARB's motor vehicle fuels regulations. (see People v. Mobil Oil Co. (1983) 143 Cal.App.3d 261.) Such subsequent legislative action is entitled to consideration as legislative approval of the prior administrative action to establish tiered gasoline lead content standards. (See Mission Pak Co. v. State Bd. of Equalization (1972) 23 Cal.App.3d 120, 125-126; Richfield Oil Corp. v. Crawford (1952) 39 Cal.2d 729, 736.)

[b] **The California Clean Air Act of 1988 did not repeal the ARB's authority to differentiate among classes of refiners when establishing fuels standards**

In 1988 the legislature passed the California Clean Air Act (Stats 1988, ch 1568). This was the most significant air quality legislation in the state in at least 15 years, and made major changes regarding the control of both stationary and mobile sources of air pollution by state and local authorities. Among other things, it amended Health and Safety Code section 43013 and enacted section 43018 to expand and clarify the ARB's authority to regulate motor vehicle fuels. (§ 43000.5.) It did not change section 43101.

The amendments to section 43013(a) added language expressly authorizing the ARB to adopt motor vehicle fuel specifications and in-use performance standards as well as vehicle emission standards. The amendments also added a requirement that ARB find that its regulations are cost-effective as well as necessary and technologically feasible.

In new section 43018 the Legislature provided the ARB with substantial new goals and responsibilities for its programs controlling pollution from motor vehicles. Section 43018(a) directs the ARB to endeavor to achieve the maximum degree of emission reduction possible from vehicular and other mobile sources in order to accomplish attainment of the state ambient air quality standards at the earliest practicable date. Section 43018(b) directed the ARB to take, by January 1, 1992, whatever actions are necessary, cost-effective, and technologically feasible in order to achieve specified emissions reductions by the year 2000. Section 43018(c) provides that, in carrying out section 43108, the Board must adopt regulations which result in the most cost-effective combination of control measures on all classes of motor vehicles, including specification of vehicular fuel composition. Section 43018(d) directs the ARB to adopt a schedule under which it conducts workshops and rulemaking hearings on a wide variety of motor vehicle and motor vehicle fuels regulations in accordance with a specified timetable.

There is nothing in the 1988 Clean Air Act to indicate that the Legislature intended to repeal the ARB's previous authority to consider the economic impacts of its fuels regulations. The only pertinent change to section 43013(a) was to require a finding of cost-effectiveness as well as necessity and technological feasibility.

Certainly such a change cannot be reasonably viewed as removing the authority to consider economic impacts. If anything, the additional reference to cost-effective standards indicated a legislative concern that economic impacts not be ignored.

In enacting section 43018, the Legislature provided the ARB with the basic charge to adopt fuels standards that are "necessary, cost-effective and technologically feasible" to meet the specified goals, and delegated to the ARB the responsibility to fashion the specific regulatory approach. These basic standards and the section 43018(d) timetable under which ARB must consider regulation of vehicular fuel specifications are the extent of the statutory direction. The statutes do not mandate what specific fuel characteristics must be controlled, how stringent those controls should be, what the compliance dates should be, to whom the controls should apply, whether the limits should be statewide or limited to areas with substantial air pollution problems, whether the limits should apply year-round or only during seasons with bad air quality, whether all batches of fuel should be subject to the same limit or an "averaging" program of some sort should be instituted, how the controls should be enforced, and whether there should be provisions granting temporary "variances" based on unforeseen unique events. The ARB does not need explicit statutory language to implement any of these approaches. With appropriate findings, the ARB has the clear authority to require that oil refiners comply with the eight Phase 2 RFG gasoline specifications by March 1996. With appropriate findings the ARB could require that oil refiners comply with the eight Phase 2 RFG gasoline specifications by March 1998. Certainly nothing in the statutes precludes the ARB from adopting a two-year delay for qualifying small refiners to comply with four of the eight Phase 2 RFG specifications.

In developing its fuels regulations, it is obvious that the ARB is to consider the economic impact of potential controls. There is no other way the ARB could assure that its chosen approach is cost-effective. Once the ARB has considered the relative economic impacts for various segments of the regulated public, it certainly is within the ARB's authority to establish a tiered compliance schedule to obtain the most stringent mix of controls as is practicable and feasible. Without the authority to differentiate among classes within the regulated industry, the ARB could end up in some circumstances adopting less stringent standards than otherwise appropriate in order to accommodate the "lowest common denominator" among the regulated

firms.[8]

[c] The 1990 enactment of AB 3555 amending sections 43013 and 43018 eliminated any remaining possibility that those sections prohibit the ARB from postponing the compliance date for some classes of refiners

Assembly Bill 3555, which was enacted in 1990 (Stats 1990 ch. 932), amended sections 43013 and 43018 to add new subsections (e) and (f), identical in language, stating:

> "(e) Prior to adopting standards and regulations pursuant to this section, the state board shall consider the effect of the standards and regulations on the economy of the state, including but not limited to, motor vehicle fuel efficiency.
>
> (f) The amendment of this section made at the 1989-90 regular session of the Legislature does not constitute a change in, but is declaratory of, the existing law."

We believe that, to the extent that any ambiguity regarding the Board's authority existed before enactment of AB 3555, the amendments made clear that the ARB is authorized in adopting fuels regulations to consider the economic effects of its standards and to adopt tiered standards or delayed compliance schedules where justified by the economic impacts.

Exxon goes on at length claiming that the amendments to sections 43013 and 43018 in AB 3555 were enacted during the last few days of the legislative session without debate or committee hearing. Exxon further notes that the amendments were requested by ARB Chairwoman Jananne Sharpless in a July 26, 1990 letter in order to overcome the effect of the trial court's decision in the Exxon case, and claims that the letter contained a "one-sided summary of the court's ruling and the

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8. It is just for this reason that the ARB has on occasion established separate or delayed standards for smaller entities. See the small refiner provisions in former 13 C.C.R. Sec. 2253 (lead content of gasoline) and 13 C.C.R. Sec. 2252(d), (h) (sulfur content of diesel fuel in south coast air basin); 17 C.C.R. Section 93101(b)(2) (requirement for vapor recovery systems at service stations to reduce exposure to benzene; requirements inapplicable to service stations with annual throughput less than 480,000 gallons per year), and the various vehicle emission control regulations providing for delayed compliance by "small volume manufacturers." (e.g., 13 C.C.R. Sec. 1960.1(d)(1)&(2),(e), (k) (two year delay for basic 1988 and subsequent light-duty vehicle emission standards); 13 C.C.R. Sec. 1960.1.5(a)(2) (delayed implementation of more stringent NOx standards for small volume manufacturers); 13 C.C.R. Sec. 1958(f)(1) (delayed implementation of motorcycle evaporative emission standards.)

issues at stake." Exxon attaches the July 26 letter, and it is thus part of this rulemaking record.

We make three observations regarding the July 26 letter. First, we believe that Chairwoman Sharpless's letter accurately described and portrayed the trial court's Exxon decision; this view is affirmed by the Court of Appeal's reversal of the trial court. Second, Exxon identifies no authority, and ARB counsel know of none, for the proposition that the process by which a legislative bill may have been amended late in a session has any effect whatsoever on the applicability and legitimacy of a law duly passed by the legislature and signed by the Governor.[9] Third, the existence of the Sharpless letter clearly establishes that the intent of the 1991 legislation was to overcome the effect of the trial court's decision in the Exxon case. The cardinal rule of statutory construction is that the intent of the legislature should be ascertained and statutes should be given a reasonable construction which conforms to the ascertained intent. (Select Base Materials, Inc. v. Board of Equalization, 51 Cal.2d 640 (1959).) Accordingly, AB 3555 should be construed as allowing the ARB to adopt provisions of the sort challenged in the Exxon case.[10]

[d] Consistency of small refiner provisions with the purpose of the enabling legislation.

The Court of Appeal in the Exxon case held that the tiered standards in the ARB's regulation on the aromatic hydrocarbon content of diesel fuel was not inconsistent with the purposes of the California Clean Air Act of 1988. The court noted that the consistency determination must be made with respect to the entire legislative mandate, not just portions of the mandate in isolation. "Because section 43101 was a part of the legislative mandate governing the Board's adoption of fuel content regulations, the Board's consideration of economic effects was not inconsistent with its mandate." (Slip. Op. at 31.)

On the assertions regarding comparisons of the state and federal legislative schemes, see the response to the next comment.

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9. We also note that since AB 3555 was carried by Assemblyman Byron Sher, the author or the California Clean Air Act of 1988, this clearly was not the case of a legislator seeking to circumvent the effect of legislation carried by another; rather Assemblyman Sher clearly was seeking to further the original intent of the earlier legislation he himself had carried.

10. The 1990 legislation of course goes to the statutory authority issue only, and does not affect any evaluation of whether the small revisions challenged in the Exxon case or in this rulemaking are supported by substantial evidence.

347. Comment: E. Donald Elliot, now a professor at Yale Law School and from July 1989 to August 1991 the General Counsel of the U.S. EPA, is of the opinion that the "effect . . . on the economy of the state" clause in Health and Safety Code 43018(e) provides no support for extending special treatment in the Phase 2 RFG regulations to one group of refiners as opposed to another. He asserts in an affidavit submitted by Exxon that, among environmental lawyers familiar with the terminology in common use in the field, this statutory language means consideration of the effects of the regulation on the economy as a whole, as opposed to the effects of the regulation on particular sub-segments or groups.

He further believes that where legislatures have wished agencies to consider the feasibility or effects of regulations on particular sub-groups, such as small businesses, specific language directing consideration of the financial effects on these segments has been provided. He cites federal Clean Air Act section 206(a)(1)(special testing requirements for small automobile manufacturers), section 111(b)(2)(authority to distinguish among "classes, types and sizes" of new sources), section 507 (special assistance for small businesses to comply with permitting requirements), and 410(h) (additional sulfur dioxide for small diesel refineries). He further indicates that no statutory language authorizing special treatment of particular segments is cited in support of the ARB's modified regulatory text, and he has been unable to find any language that would plausibly support treatment for particular industry segments in relevant sections in the California Health and Safety Code. (Exxon)

Agency Response: Professor Elliot's affidavit, prepared on behalf of Exxon, focuses almost entirely on the question of whether the "effect . . . on the economy of the state" language in Health and Safety Code section 43018(e) (and section 43013(e)) has the effect of authorizing the ARB to treat different categories of refiners differently in a motor vehicle fuels regulation. It is useful to note initially that the ARB's legal analysis is not and has not been dependent on the existence and effect of the "effect . . . on the economy of the state" statutory language. Rather ARB legal counsel have long expressed the opinion that the broad authority provided the ARB to regulate motor vehicle fuels includes in it an authority to establish different compliance schedules for different categories of refiners; see the discussion in the response to the preceding comment.

The ARB's broad statutory authority to regulate motor vehicle fuels is analogous to the authority of the U.S. EPA to regulate fuels under section 211 of the federal Clean Air Act. Section 211(c) generally authorizes EPA to issue regulations controlling motor vehicle fuels if emissions resulting from the use of the fuel may reasonably be anticipated to endanger the public health and welfare. There is nothing in section 211(c) that expressly authorizes EPA to treat one segment of the refining industry differently than another segment, and in Professor Elliot's recitation of provisions in the federal Clean Air Act which direct consideration of the financial effects of regulations

on sub-groups such as small businesses, he has not mentioned section 211.

It is thus indeed surprising that Professor Elliot has apparently forgotten that, during his tenure as General Counsel of EPA, EPA issued regulations on the sulfur content of motor vehicle diesel fuel that contained a two-year compliance extension for "small refiners." (55 F.R. 34120 (August 21, 1990), promulgating 40 C.F.R. § 80.29, including § 80.29(c) "Small refiner compliance.") In adopting the small refiner extension, the agency of which Professor Elliot was General Counsel stated: ". . . section 211(c) of the CAA provides clear authority for the small refiner exemption, as well as for the other provisions included in the final rule." (55 F.R. at 34128.)[11]

On the question of the meaning of the phrase "effects . . . on the economy of the state", we note only the recent expression by Judge Scotland in the Court of Appeal's Exxon decision (after noting that Exxon had waived the argument that the "effects . . . on the economy of the state" language is insufficient to permit consideration of the effect of fuels regulations on competition in the fuel industry, because Exxon had failed to make this argument in its brief):

> "In any event, it is axiomatic that, if the adoption of certain fuel content standards would be so costly to the fuel industry that it would drive small refiners out of the diesel fuel marketplace and preclude independent refiners from obtaining financing necessary to immediately comply with the new standards, such regulatory action would have an 'impact . . . on the economy of the state' within the meaning of section 43101."

(Slip. Op. at 20.)

348. Comment: The ARB's claimed authority to grant special treatment to small refiners is contradicted by the California Administrative Procedure Act (APA). There the Legislature requires state agencies, including the ARB, to "assess the potential for adverse economic impact on California small business enterprises" of all

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11. Since the federal Clean Air Act Amendments of 1990 (enacted November 15, 1990) directed EPA to promulgate regulations providing that "no person" shall sell motor vehicle diesel fuel having a sulfur content exceeding the level previously set by EPA (§ 211(i)), EPA concluded that the small refiner provision was no longer authorized. EPA eliminated the provision this year. (57 F.R. 19535 (May 7, 1992).) This recent action of course was in no way inconsistent with the position that EPA was authorized to have a compliance delay for small refiners in the absence of a Congressional directive to control all motor vehicle diesel fuel.

proposed regulations. (Gov. Code § 11346.53(a)(1).) If a "significant adverse economic impact" on small business is found, the agency is authorized to adopt "differing compliance or reporting requirements or timetables which take into account the resources available to small businesses." (Gov. Code § 11340.53(a)(2)(C)(i). Significantly, "All petroleum and natural gas producers, refiners and pipelines" are expressly excluded form the definition of "small business" under the Act. (Gov. Code § 11342(e)(2)(H).) Thus the small refiner provisions are directly at odds with the intent of the Legislature as expressed in the APA. (Exxon)

Agency Response: The commenter's analysis is fundamentally flawed. The cited APA provisions solely pertain to certain procedures that must be followed in the adoption of regulations. They do not grant any substantive authority to an agency that does not exist in the agencies enabling legislation, and they certainly do not have any effect on the discretion the ARB has in structuring its regulations to avoid unnecessarily severe adverse economic impacts on segments of industry.

349. Comment: There is no substantial evidence that the proposed small refiner exemption meets the statutory standards of necessity, cost-effectiveness, technological feasibility and effect on the economy of the state. (Mobil)

We believe that a small refiner provision would be discriminatory, arbitrary, capricious and lacking in evidentiary support. (Chevron)

Agency Response: The underlying rationale and basis for the small refiner provisions is set forth in Section II.B.2. and in the responses to comments in Sections III.D.1. and III.I.2.. We believe that the reasoned basis for the approach we are taking has been well established.

350. Comment: The small refiner provisions are contrary to, and under the Supremacy Clause of the U.S. Constitution preempted by, the federal Clean Air Act. Section 211(c)(4)(B) of the Act [42 U.S.C. § 7545(c)(4)(B)] excludes from preemption only California laws imposing "a control or prohibition respecting any fuel or fuel additive." (emphasis added) However, the proposed exemption relates to a source of fuel, not a fuel or fuel additive. The Act does not authorize California to distinguish between fuels of the same type based solely on their source. This conclusion is underscored by the fact that where the Act intended exceptions on a source basis, it did so by clear and express provisions. (See, e.g., former sections 211(g) and current Section 410(h).) The exemption is also inconsistent with the opt-in, anti-dumping and motor vehicle emissions control provisions of the Act. (See §§ 211(k), 211(k)(8) and 209(b)(1).) In addition, granting of a blanket exemption is inconsistent with, and a violation of the spirit of, the Reg/Neg process under the federal Clean Air Act with respect to which the ARB was a participant. Under the Reg/Neg Agreement, no

allowances are made for blanket exemptions, only narrowly drawn variances with prescribed safeguards are available. (See Reg/Neg Agreement, Article IV.) (Mobil)

Agency Response: There is no merit to any of the commenter's points.

(i) Section 211(c)(4)(A) states a general rule of federal preemption of efforts of states to prescribe or enforce, "for purposes of motor vehicle emission control, any control or prohibition respecting any characteristic or component of a fuel or fuel additive in a motor vehicle or motor vehicle engine" if the EPA Administrator has taken specified actions pertaining to the characteristic or component. Section 211(c)(4)(B) establishes a blanket exemption for "any State for which application of section 209(a) has at any time been waived under section 209(b)"; such a State "may at any time prescribe and enforce, for the purpose of motor vehicle emission control, a control or prohibition respecting any fuel or fuel additive. Section 211(c)(4)(B) applies only to the State of California, and provides California with a blanket exemption from preemption under section 211(c)(4). (See, e.g., EPA's discussion of the relationship between EPA and California motor vehicle fuels regulations at 52 F.R. 31311.)

Mobil's section 211(c)(4) preemption argument has two basic flaws. First, the Phase 2 RFG regulations without question impose controls and prohibitions on motor vehicle fuels. Although fuel produced by small refiners is in some respects and for a limited time treated differently than fuel produced by other refiners, the limits and prohibitions in all respects pertain to motor vehicle fuel, not to the source of the fuel. Fuel produced by small refiners is treated differently, but it is the fuel that is regulated. Second, what section 211(c)(4)(B) does is establish an exception from the preemption provisions of section 211(c)(4)(A). Everything that is initially preempted in section 211(c)(4)(A) is exempted from preemption by section 211(c)(4)(B). Thus if the small refiner provisions for some reason are not covered by section 211(c)(4)(B), then it necessarily follows that the provisions were not initially preempted by section 211(c)(4)(A). (See the analogous discussion of federal Clean Air Act sections 209(a) and 209(b) in Motor and Equipment Manufacturers Ass'n [MEMA] v. EPA (D.C. Cir. 1979) 627 F.2d 1095, 1106-1111.)

(ii) The federal Clean Air Act does not need to authorize California to "distinguish between fuels of the same type based solely on their source." The ARB gains its authority from state law, not federal law. The only effect the federal Clean Air Act can have is to preempt California's authority in some respect. The only federal preemption provision pertaining to fuels regulations is section 211(c)(4)(A) and, as discussed above, section 211(c)(4)(B) completely exempts California from the 211(c)(4)(A) preemption. Thus it is irrelevant whether in some respects the federal Clean Air Act restricts the U.S. EPA from treating fuels differently depending on the source of the fuel. (Note, however, that the commenter is wrong in claiming that

the U.S. EPA cannot distinguish fuels based on the source of the fuel; see the response to Comment 347.)

(iii) It is irrelevant whether the Phase 2 RFG regulations are in all respects parallel to the federal fuels regulations. Both the federal and the state fuels regulations apply in California, as they have since the 1970's. For instance, the California and federal regulations governing the lead content of gasoline have differed for many years. (compare 40 C.F.R. § 80.20 with 13 C.C.R. §§ 2252, 2253.2, 2253.4, and former § 2253.) The only possible problem that could arise would be where a refiner could not simultaneously satisfy the federal and state requirements; this is not the case with the Phase 2 RFG regulations and there has been no claim to the contrary.

(iv) Finally, it is irrelevant whether the approach taken by the Phase 2 RFG regulations is in all respects identical to the agreement reached by the participants, including ARB representatives, in the Reg/Neg process pertaining to implementation of the reformulated gasoline and wintertime oxygenates provisions in sections 211(k) and (m) of the federal Clean Air Act. (The Reg/Neg is described in the Notice of Proposed Rulemaking at 56 F.R. 31176.) There is no requirement that the approaches be identical. Moreover, since the ARB regulations are considerably more stringent that the federal regulations, it is not unreasonable to take somewhat different approaches to the treatment of small refiners.

351. Comment: The proposed small refiner provisions violate equal protection principles under the Fourteenth amendment to the U.S. Constitution. These principles require that the exemption bear some rational relationship to a legitimate state purpose and that there be rationality to the basis of any discrimination or classification. Under the California Clean Air Act, the ARB must promulgate regulations which, among other things, must achieve maximum emission reductions. Clearly, the exemption bears no relationship to this fundamental objective of the Act. (Mobil)

Agency Response: The commenter confuses constitutional principles with the question of statutory authority. We agree that under the Equal Protection clause there must be a rational basis for the classification between small refiners and other refiners. The rational basis for treating the two classes of refiners differently is their differing abilities to come into compliance, as is discussed in the response to comment 247. The relationship of the classifications to the objects of the California Clean Air Act pertains to the question of statutory authority, which is discussed in the response to Comment 346.

352. Comment: The proposed small refiner provisions constitute a taking of private property without just compensation under the United States Constitution. In determining whether a taking has occurred, there must be a balancing of the small refiner exemption's adverse economic impact on non-exempt refiners against the public policy being

served. To avoid a taking, there must also be a legitimate state interest which is served by the regulatory action. Here the adverse impact outweighs the tenuous public policy considerations articulated in support of the exemption, and the exemption does not serve the ARB's stated objective. (Mobil)

Agency Response: There is clearly no Fifth Amendment "taking" resulting from the small refiner provisions, and the commenter has cited no cases supporting its conclusory claims. The commenter has identified no property that could legitimately be claimed to be "taken" the state or the ARB. Moreover, when a government action is challenged "on its face," it does not constitute a taking unless it denies an owner economically viable use of his or her property. (Keystone Bituminous Coal Ass'n v. DeBenedictis, 480 U.S. 470, 494-495 (1987).) The commenter has not shown anything approaching such a denial of use.

(c) Procedures Followed in Adopting the Small Refiner Provisions

353. Comment: The small refiners exemption was developed without sufficient study or deliberation. There was no written analysis or evaluation of the impact of the exemption, its justification, or its necessity provided prior to the November 21-22 Board hearing. The October 4, 1991 Staff Report, in a one page analysis, indicated that the ARB staff had conducted only an incomplete "preliminary evaluation" of the proposed exemption and that "if changes warranted", they would be proposed at the November Board hearing. The first indication of the ARB staff's position was contained in a brief document entitled "Suggested Changes to the Original Regulatory Text" (Attachment C to Resolution 91-54), which was distributed only three days prior to the November Board meeting. No further analysis or justification has been provided in connection with the modified text made available with the 15-day Notice. It is contrary to sound public policy and established procedural requirements to adopt a major environmental regulation, such as the Phase 2 RFG regulations, without adequate study and justification. (Mobil)

The small refiner exemption provisions should be reconsidered, as there was inadequate opportunity for public input. (Tosco)

Agency Response: The commenters have identified no specific procedural requirement that the ARB has not followed in this rulemaking, and we believe that we have fully complied with the California APA. We have provided a full opportunity during the 15-day comment process to comment both on the small refiner provisions and on the additional documents and information added to the rulemaking record. The extensive comments submitted in response to the 15-day notice demonstrate that the public has had a meaningful opportunity to provide input on the small refiner provisions. The Executive Officer considered these comments, and in fact made various modifications to the small refiner provisions in direct response to the public comments.

The ARB has also provided in this Final Statement of Reasons a complete and satisfactory justification for the small refiner provisions.

354. Comment: The ARB has not complied with the California Environmental Quality Act (CEQA) in proposing the exemption for small refiners. Under section 21080.5 of the Public Resources Code, certain regulatory programs may be certified as exempt from CEQA's requirement to prepare an environmental impact report (EIR). The ARB has received such a certification. However, the legislature was careful to ensure that, in permitting EIR exemptions for certified regulatory programs, the other substantive policies and requirements of CEQA would be carried out.

The CEQA Guidelines expressly state that a certified program remains subject to other provisions in CEQA such as the policy of avoiding significant effects on the environment where feasible. (14 C.C.R. § 15250.) The document substituting for the EIR must either identify alternatives to the activity and mitigation measures to avoid or reduce any significant or potentially significant effects that the project might have on the environment, or a statement that the agency's review of the project showed that the project would not have any significant or potentially significant effects on the environment and therefore no alternatives or mitigation measures are proposed to avoid or reduce any significant effects on the environment. (14 C.C.R. § 15252.)

The ARB has failed these requirements by deciding to adopt the small refiner exemption without any analysis of alternatives or mitigation measures and without any statement that such alternatives or mitigation measures were not required. In failing to include the small refiner exemption in its description of the proposed activity, the ARB has not addressed a component of the regulation that will result in substantial emissions increase beyond those estimated in the proposed rule. The small refiner exemption is expected to result in an additional 7,300 tons per year of air pollutants statewide and 5,110 tons per year within the boundaries of the South Coast Air Quality Management District, an area that currently has the worst air quality in the United States.

In providing the exemption for the small refiners, the ARB may not rely on potential air quality benefits attributable to the remainder of the regulations. Trial courts in Los Angeles and San Francisco have recently invalidated regulations proposed by local air districts to reduce air emissions where certain aspects of the regulation had not been analyzed under CEQA and could have resulted in emissions increases. (See Dunn-Edwards v. South Coast Air Quality Management District, No. BS 004655 (L.A. Super. Ct. July 30, 1991) and Dunn-Edwards v. Bay Area Air Quality Management District, No. 930626 (S.F. Super. Ct. Aug. 16, 1991.) The Los Angeles superior court held that the South Coast District had failed to analyze the regulation's

potentially adverse environmental impacts as required by CEQA and invalidated the rule.

The ARB also failed to analyze any alternatives to the exemption for small refiners, and failed to consider any possible mitigation measures for the adverse environmental impacts that would be caused by the exemption. Finally, the ARB failed to satisfy the requirement that it consider the cumulative impacts of its small refiner provisions in the Phase 2 RFG regulations and the small refiner provisions in the diesel fuel regulations adopted August 22, 1989. (Exxon, Texaco)

Agency Response: This comment is based on a fundamental misconception of the purpose and requirements of CEQA. We wholeheartedly agree that CEQA and the Board's regulations (17 C.C.R. §§ 60005-60007) require the ARB to consider the potential adverse environmental impacts of its new regulations, which constitute a "project" under CEQA. In the case of this rulemaking, the project is the Phase 2 RFG regulations. It is the Board's responsibility to identify and seek to mitigate the potential adverse environmental impacts that may result from these regulations. In identifying those impacts, the Board identifies the "baseline" of environmental characteristics prior to adoption of the Phase 2 RFG regulations, and then determines the impacts that may occur as a result the regulations.

Prior to adoption of the Phase 2 RFG regulations, gasoline produced in 1996 and thereafter by large and small refiners alike would be subject the federal reformulated gasoline requirements (in southern California) and the other gasoline limits described in the first paragraph of Section II.A. above. Adoption of the Phase 2 RFG regulations will impose new or more stringent requirements for eight gasoline characteristics on large refiners starting March, 1996. For small refiners qualifying for the two-year extension, the regulations will impose new or more stringent requirements for four of the gasoline characteristics. It will also place limits on the amount of gasoline a small refiner may produce without complying with the other four requirements. Further, during the two-year extension period, the small refiners will still be subject to the preexisting limits for sulfur content and degree of unsaturation. At the end of the two-year extension small refiners will be required to comply with all of the requirements applicable to other refiners. It should thus be clear that when viewed either in conjunction with the rest of the Phase 2 RFG regulations or separately, the small refiner provisions will not result in any emissions increase compared to the emissions that would occur if the Phase 2 regulations had not been adopted.

The Dunn-Edwards cases cited by the commenter are clearly not on point. In those cases the plaintiff claimed that the regulations adopted by the districts--imposing more stringent requirements on the amount of solvents that various kinds of "architectural coatings" could contain--would result in potential adverse impacts compared to what would occur in the absence of adoption of the regulations. The courts in those decisions (appended to Attachment 4 of Exxon's 15-day comments) held, for instance, that the districts had not sufficiently

analyzed the increases in emissions that could occur due to decreased coverage, increased thinning, failures due to sticking, increased frequency of repainting, and increased reactivity. In contrast, the commenter has only compared the Phase 2 RFG regulations without the small refiner extension to the Phase 2 RFG regulations with the small refiner exemption. It has made no claim that the regulations with the small refiner extension will result in increased emissions compared to what would happen if the Board did not adopt the regulations and the existing regulatory framework remained in effect.

(d) Specific Provisions Pertaining to Small Refiners

355. Comment: The criteria proposed for qualifying for the small refiner exemption fail to provide adequate safeguards to ensure compliance and avoid a windfall to exempt refiners. A mechanism should be added requiring application of any windfall revenues against compliance costs. A feasible approach would be to establish an escrow fund to be administered by the Executive Officer. Exempt refiners would pay windfall amounts into the fund and, upon proper demonstration, be entitled to withdraw money from the fund to reimburse themselves for compliance costs. Any excess funds would be paid into the Air Pollution Control. (Mobil)

The ARB should monitor the financial condition of exempt refineries, and require that any additional cash flow accumulated during the exemption period be applied to capital investment aimed at compliance with Phase 2 RFG in 1998. The ARB should monitor exempt refineries' progress in meeting Phase 2 RFG requirements more frequently than once a year. (Tosco)

Agency Response: With the modifications made available with the second 15-day notice, we believe that the regulations contain sufficient safeguards to ensure compliance by small refiners. Small refiners are required to submit comprehensive compliance plans identifying a number of specific milestones. The certifications for treatment as a small refiner are only good for one year, and the small refiner must promptly notify the ARB of failure to meet any of the milestones. In appropriate circumstances the small refiner certification may be rescinded pursuant to section 2272(b)(5). Thus compliance will be monitored on an ongoing basis, not just once a year. The suggested escrow fund approach would be difficult to implement and administer. Given the substantial safeguards in the regulations, an escrow fund is not necessary to assure compliance.

356. Comment: The proposed small refiner exemption language fails to specify what steps the small refiner will have to take to demonstrate adequate progress toward meeting the Phase 2 RFG specifications by 1998. This absence of clear compliance milestones invites widespread abuse of the exemption provision. (Ultramar)

Agency Response: The commenter's characterization of the small refiner provisions is not accurate. Section 2272(b)(3) requires each small refiner to submit a compliance schedule containing "all key events in the construction process" including nine specifically enumerated events. Under section 2272(b)(4), the order certifying a small refiner must set forth the compliance schedule found to be reasonably likely to enable compliance. Section 2272(b)(5) requires the small refiner to notify the ARB of a failure to meet any increment of progress in the compliance schedule identified in the certification order. Section 2272(b)(6) authorizes the Executive Officer, after a hearing, to rescind small refiner status if the small refiner is no longer reasonably likely to be able to meet the March 1, 1998 compliance deadline.

357. Comment: The small refiner procedures do not give the ARB the necessary investigation and enforcement powers. There are no provisions for the ARB to conduct an on-site inspection or otherwise independently investigate an exempt refiner's actual compliance. (Mobil)

Agency Response: Such provisions are unnecessary. Health and Safety Code section 41510 provides the Executive Officer with adequate investigative authority.

358. Comment: Section 2272 contains no provision for the ARB to convene a public hearing or take any other steps to initiate the rescission process on its own finding of noncompliance. (Mobil)

Agency Response: the commenter's point is well taken. We have modified section 2272(b)(5) and (6) to make clear that the Executive Officer may initiate a rescission hearing without first receiving the small refiner's report of failure to meet an increment of progress. This modification was made available with the second 15-day notice.

359. Comment: In determining an exempt refiner's "qualifying volume", the ARB should not allow a refiner to use the highest three years of production. Instead, the average of all five production years from 1987 to 1991 should be used, which would more accurately reflect their actual historical market share. (Mobil)

Agency Response: The purpose of the "qualifying volume" approach is to allow small refineries to continue to produce gasoline at roughly historical volumes. The volume of gasoline produced tends to change from year to year due to market conditions, variations in scheduled maintenance on refinery units, and unscheduled outages of refinery units. For one or two years in a given five year period, throughput may be substantially lower than the other years due to one or more of these factors. On the other hand, the refinery configuration has the effect of imposing a cap on the maximum production in any one year. Since the qualifying volume will apply to each of the two 12- month

periods of March 1996-February 1997 and March 1997-February 1998, it is appropriate to exclude the two lowest-throughput years of the past five.

360. Comment: Small refineries may virtually shut down or operate at very low levels during the next several years, and then increase operations significantly during the exemption period. The limitation on the volume of gasoline supplied under the exemption should be based on production during 1987-1991 and during 1992-1995. An exempt refiner should be required to submit its PIRA forms for the 1992-1995 period and to provide an explanation to ARB of any significant reductions in operations or periods when the facility was shut down. (Tosco)

Agency Response: In order to obtain a compliance delay, small refiners must submit their applications no later than 1995, at which time they must report their annual production volumes needed to determine their "qualifying volume." Since 1995's production will not be known until after 1995, Tosco's suggested reporting requirement could not be met if "qualifying volume" is changed to include production data from 1995. Small refineries need to make a decision on applying for a compliance delay well in advance of 1996, and the size of their "qualifying volume" will be a major consideration in this decision. Thus it is appropriate to have an averaging period ending some years prior to 1996.

If a refinery substantially reduces or ceases production, the causes are generally production problems or economic problems. It appears unfair to penalize a refinery for having production problems. If a small refinery is facing economic problems so severe it cannot maintain historic production levels, it is unlikely that financing will be available. Without evidence of capital commitments, a small refinery will not be able to take advantage of the delay in compliance.

It is unlikely that a small refinery would be intentionally shut down or operated at a reduced level for the sole purpose of waiting until it can obtain a compliance delay in 1996. Section 2272 does not allow a delay to be granted to a refinery unless there is a firm commitment to invest the necessary funds to meet Phase 2 RFG regulations. In addition, modifications would have to be made to the refinery even if it produces exempt gasoline, since federal reformulated gasoline specifications (southern California) and four of the eight Phase 2 RFG specifications will apply to small refiner gasoline. Financing these federal reformulated gasoline/partial Phase 2 RFG modifications would be very difficult for refineries that are shut down or operating at reduced levels due to financial problems.

If the qualifying volume is based on production from 1992 through 1995, this would encourage small refiners to artificially boost production to higher levels than normal, so that their "exempt" volume would be maximized. Such a scenario would defeat the purpose of the small refiner compliance delay, which is to allow small refiners to

continue gasoline production at normal levels while modifications are made to produce Phase 2 RFG.

361. Comment: The requirements for a small refiner to produce at least 25 percent of the gasoline from crude distillation (§ 2272(c)(2)) should be increased to 100 percent. Otherwise, refiners will be able to act as a dumping ground for dirty components, which will further encourage the production of noncomplying gasoline during the delay period. (Mobil)

The requirement to refine at least 25 percent of the gasoline supplied should be raised to 50 percent. Otherwise, the exemption would be used by a business that is primarily a blender, not a refiner. (Tosco)

Small refiners may remain in business solely to take advantage of the large price advantage they would realize over the two year waiver period, with no intent of ever producing a compliant product. The section 2272(c) provision that only 25 percent of the gasoline supplied by a small refiner need be produced from crude oil processed at that refinery would allow a small refiner to operate primarily as a gasoline blender who imports low-cost noncomplying gasoline to use as the major blending stock. This would undercut refiners making a good faith effort to comply with Phase 2 RFG requirements. Therefore we recommend that the 25 percent volume standard be increased to at least 75 percent. (Ultramar)

Agency Response: We have concluded that the commenters raise a legitimate concern, and section 2272(c)(2) has therefore been modified to require that two-thirds (rather than 25 percent) or more of the gasoline supplied from the refinery was refined at the small refinery from crude oil." This change was included in the modified text made available during the second 15-day comment period. The two-thirds figure should reasonably assure that small refiners will not be able to operate what would primarily be a blending operation, while at the same time recognizing that the unsophisticated refinery configurations of at least some small refineries has historically required some modest degree of blending.

362. Comment: Section 2272(c) requires, for each quarter, 25 percent or more of the gasoline supplied from an exempt refinery to be produced by the distillation of crude oil at the refinery. A narrow interpretation of this language would exclude gasoline produced by other operations such as catalytic cracking and reforming. This section should be modified to refer to gasoline produced by the refining or distillation of crude oil at the refinery (AIRA), or to gasoline produced at the refinery by refining intermediate naphtha from distillation of crude oil. (Fletcher)

Agency Response: In response to these comments we have modified the language in section 2272(c)(2) to refer to a specified proportion

(changed to two-thirds as discussed in the response to the preceding comment) or more of the gasoline supplied from the refinery being "refined at the small refinery from crude oil." This modification will assure that petroleum-based components produced by means other than distillation are counted towards meeting the minimum production limit.

363. Comment: Section 2272(b)(3) requires that a small refiner's compliance schedule include a showing of how the small refiner will modify its refineries to meet the specifications of the regulations to enable the production of gasoline "in a volume equal to or greater than the small refiner's qualifying volume." Because there is a natural volume reduction associated with lowering RVP and reducing T50 and T90 distillation, this language would effectively eliminate the secondary treatment of gasoline products as a means of meeting the Phase 2 RFG specifications. We believe that requiring small refiners to upgrade their facilities to, in essence, increase their gasoline production capacity will increase the capital requirements associated with making Phase 2 RFG and therefore nullify the effects of delayed compliance. Accordingly, this language should be modified to require small refineries to produce similar, but not exact, volumes of reformulated gasoline to the qualifying volume, as approved by the Executive Officer. (AIRA, Fletcher)

Agency Response: The reason for the section 2272(b)(3) requirement is to avoid a situation where a small refiner reaps the benefit of being able to sell for two years gasoline that does not meet four of the Phase 2 RFG specifications, while making only modest refinery modifications. Requiring the modifications to result in the capability of producing at least as much gasoline as the refiner has historically produced eliminates this potential abuse. The volume reductions associated with meeting the Phase 2 RFG specifications should be relatively minor, and the capital expense of adding this nominal increase in throughput is expected to be minimal. The proposed approach provides a more predictable result that a requirement for "similar" volumes.

364. Comment: Various gasoline specifications, set forth in sections 2262.2(d), 2262.4(d), and 2262.6(g), which include olefins, sulfur, T50 and T90, require that the refiner disclose its intentions to either comply with a flat limit or averaging limit by November 1, 1995. Because small refiners have delayed compliance on meeting these specifications they should also receive delayed compliance on the deadline to disclose the decision whether to comply with a flat or average limit on these parameters until November 1, 1997. (AIRA, Fletcher)

Agency Response: This aspect of the regulation is appropriate as written. A small refiner operating under a delayed compliance plan will still have to meet four of the eight Phase 2 RFG specifications during the first two years, and there will still be a need to select the averaging or flat limit option for benzene and aromatic

hydrocarbons during the first two years. In addition, for volumes of gasoline produced during the first two years in excess of the small refiner's qualifying volume, the small refiner will have to meet the average or flat limits for T90, T50, sulfur and olefins. Thus it is appropriate to require an election of either the averaging or flat option for the first year by November 1, 1995.

365. Comment: We understand that ARB is working with WSPA to develop a predictive model as an alternative compliance mechanism to the flat and averaging limits. Should they apply to small refiner specifications during the period of delayed compliance, small refiners should be able to use these same correlations to demonstrate compliance during and after the small refiner's period of delayed compliance. (Fletcher, AIRA) Specifically, if the predictive model allows refiners to increase aromatic hydrocarbons if benzene is reduced below the specified limit, small refiners would like to have the opportunity to meet emission limits using these correlations. (AIRA)

Agency Response: This issue can be most appropriately addressed when the Board adopts the predictive model and associated provisions. It is premature at this time to address the question of small refiners and the predictive model.

366. Comment: The Staff Report claims that the small refiner exemption is consistent with that given to small refiners in the diesel aromatics fuel specifications. However, the diesel specification exemption differs from the Phase 2 RFG proposal differs in an important regard. Although it is assumed that small refiners will blend to achieved the required results, the diesel regulation gives them a specific performance target. (Ultramar)

Agency Response: We recognize that the diesel regulation (13 C.C.R. § 2282) imposes a separate less stringent standard on small refiner diesel, while this is not the case for the four Phase 2 RFG specifications that do not apply to qualifying small refiners until March 1998. However, section 2282 established a permanent less stringent standard for small refiners, while the Phase 2 RFG regulations require small refiners to meet all of the specifications after two years. On balance we believe the approach we have taken is appropriately stringent.

367. Comment: The November emission reduction estimates did not assume use of large volumes of noncomplying gasoline as a blending stock for the small refiners. Therefore the air quality cost of the exemption is likely understated to a significant degree. We recommend that the proposed exemption language be modified to require that all gasoline or blending stocks used in the production of a refiner's qualifying volume must meet the 1996 specifications for major refiners. (Ultramar)

Agency Response: The refinery configurations of at least some small refiners are sufficiently unsophisticated that the refiners will need to use gasoline blending stocks refined by others to meet the interim requirements for small refiners. The blending components obtained by large refiners do not need to meet the Phase 2 RFG specifications, and it would be inappropriate to impose such a requirement on small refiners. The fact that small refiners will have to meet four of the eight Phase 2 RFG specifications starting in 1996 will limit the overall air quality impacts from small refiner gasoline.

368. Comment: We recommend that the small refiner provisions be changed to require that all gasoline sold by small refiners must meet the caps by January 1, 1996. (Ultramar)

Agency Response: We believe that the imposition of four of the eight Phase 2 RFG specifications during the 1996-8 period imposes sufficient constraints on small refiners.

369. Comment: We object to any provision that would allow nonstandard gasoline to be produced or imported into the state and to providing the small refiners a volume credit for oxygenate addition to their historical gasoline products. (Chevron)

Agency Response: The small refiner exemption applies only to gasoline supplied from small refineries in California; imported gasoline is not exempt from the requirements of Phase 2 RFG regulations. On the general appropriateness of the small refiner provisions, see the response to Comment 247.

Section 2260(a)(19) provides that in calculating "qualifying volume" the small refiner is to exclude the volume of oxygenates in the gasoline produced in 1987-1991. Section 2272(c)(3) provides that in counting the small refiner's 1996-1998 production against the qualifying volume, the volume of the 1996-1998 gasoline attributable to oxygenates is not counted. We believe it is appropriate to have a parallel treatment in which the volume attributable to oxygenates is excluded from both components of the comparison. If, as the commenter may be suggesting, oxygenates are not counted in the small refiner's historical volume but are counted as part of the refiner's 1996-1998 production, refiners that have historically included oxygenates in their gasoline would be at a disadvantage.

We do not expect that the approach we are taking will result in any significant increase in the total amount of gasoline that is subject to only four of the eight Phase 2 RFG specifications during the 1996-1998 period. Although the regulations would not count oxygenates added to gasoline when calculating a refinery's qualifying gasoline production level, oxygenates are relatively expensive, and a refiner would lose money if oxygenates were added to gasoline merely to increase the volume of "exempt" gasoline the refiner can produce.

Thus, the only reason refiners have to add oxygenates is to meet minimum product specifications.

370. Comment: We are opposed to the exclusion of oxygenates from small refiner qualifying volume. The exemption allows an increase of about 12 percent in production if MTBE is used. Oxygenates blended by small refiners should be included both in initial determination of the qualifying volume and in enforcement of production against qualifying volume. (Unocal)

Agency Response: As noted in the response to the previous comment, the regulations exclude the volume of oxygenates from both the determination of qualifying volume, and the 1996-1998 production volume that is counted against the qualifying volume. Since most small refineries do not currently add oxygenates or add less oxygenates than they would under Phase 2 RFG, including oxygenates in both qualifying volume and the 1996-1998 production volume would prevent small refineries from being able to produce under the small refiner provisions an volume of gasoline equivalent to their historical production. This would defeat the purpose of the compliance delay, which is to allow small refineries to operate at historic levels while obtaining financing to modify their refineries to produce Phase 2 RFG.

371. Comment: In the event that the ARB continues to deem the small refiner treatment appropriate, the ARB should consider language to require payment of the amount of any economic benefit to the State air pollution control fund. The ARB requires this type of payment in the "inability of produce conforming gasoline" section of the wintertime oxygenated gasoline regulation (§ 2258(d)(5)). Small refiners stated they had to demonstrate to creditors that investments to produce Phase 2 RFG would yield a return, but did not mention a need for this benefit to finance such projects. (Unocal)

Agency Response: The purpose of the small refiners compliance delay is to allow small refineries additional time to demonstrate that they can obtain the necessary rate of return for Phase 2 RFG to encourage lenders to finance Phase 2 RFG refinery modifications. Any increase in profits small refiners may experience during the compliance delay period will reduce the amount of borrowing required, and will make financing easier to obtain. If small refiners were forced to forego all economic benefits that may be related to their compliance delay, the effectiveness of the delay would be reduced, as small refiners may not be able to obtain financing.

372. Comment: It is unclear how the qualifying volume from multi-refinery companies will be applied. Can qualifying volumes from multiple refineries be applicable to a single refinery operated by the same company? If this is the case, it would allow a company to shutdown a refinery and increase gasoline production at another, resulting in a lower per-barrel operating cost. We suggest the ARB

include language that prevents application of qualifying volumes from multiple refineries to a single refinery. (Unocal)

Agency Response: The commenter is correct that under the regulation the qualifying volumes from multiple refineries of a small refiner may be applied to production from a single refinery of the refiner. We do not believe this is inappropriate. The important limitation is that a small refiner can have multiple refineries in the state only if the combined crude throughput capacity does not exceed 55,000 bpsd. Therefore the combined qualifying volume will never be that large. Moreover, the remaining refinery in the commenter's example would have to be undergoing modification to enable it to produce the combined qualifying volume. It is not the board's intent to as a matter of principle prohibit refiners from lowering their operating costs where they can. Finally, we note that at the present time no small refiner that produces gasoline in California owns more than a single refinery in the state.

373. Comment: The modified regulations contain a definition of small refiner (§ 2260(22)) which is identical to the definition in the regulation on diesel fuel aromatic hydrocarbon content (13 C.C.R. § 2282(b)(19)), except that the maximum crude capacity is 55,000 bpsd instead of 50,000 bpsd. We agree with the 55,000 bpsd limitation as opposed to 50,000 bpsd. However, we believe that portions of the definition of "small refiner" which appear in the diesel sulfur regulations (13 C.C.R. § 2280(g)) would be more appropriate. The diesel sulfur regulations define small refiner as any refiner who owns or operates a refinery (or refineries) located in the south coast control area that:

> (1) Has and at all times since January 1, 1978, [had], a total combined crude capacity of not more than 50,000 bpsd; and
>
> (2) Was used at some time during 1978, 1979, or 1980, to produce diesel fuel which was reasonably likely dispensed into motor vehicle fuel tanks; and
>
> (3) During the time for which an exemption . . . is sought or used, is not owned or controlled by any refiner that owns or controls refineries in the United States with a total combined crude oil capacity of more than 137,500 barrels per day.

Sections (1) and (3) of this definition would be easier to apply and less confusing than the definition in the modified regulations. The proposed ARB definition is similar, but includes a requirement that a small refiner, since September 1, 1988, has not been owned or controlled by any refiner who at the same time also owned or controlled refineries in California with a total combined crude oil capacity of more than 55,000 bpsd. Such a restriction is not necessary. The combination of small California refineries does not change the fact

that they are small and face the accompanying economic difficulties. The 137,500 bpsd restriction is sufficient to ensure that the ARB's size and economic strength concerns are taken care of. (AIRA)

Agency Response: Under the commenter's suggestion, the 137,000 bpsd combined U.S. capacity limit would only apply during the extension period, and there would be no requirement that the combined California capacity not exceed 55,000 bpsd. Changing the definition in accordance with the suggestion may allow an independent or large refiner to shut down or sell other refineries, or split a single refinery into two or more refineries before the compliance delay period (1996), thereby becoming a "small" refiner who is able to take advantage of the small refiners compliance delay. Further, the existence of multiple California refineries with a combined capacity exceeding 55,000 bpsd could result in various economies that would not exist for a refiner with a smaller total capacity.

374. Comment: The definition of small refiner in section 2260(a)(2) excludes refineries owned owned or controlled by any refiner that at the same time owned or controlled refineries in California with a total combined crude oil capacity of more than 55,000 bpsd. In contrast, section 2272(b)(2) requires that small refiners certify the crude oil capacities of all refineries in California and the United States which are owned or controlled by, or under common ownership or control with, that small refiner since September 1, 1988. The reference to common ownership in section 2272 is in contrast to the definition of small refiner, which addresses only other refineries which are owned or controlled by that small refiner. The reference to common ownership which appears in section 2272 should therefore be dropped. (AIRA)

Agency Response: The provisions are not inconsistent. The commenter is apparently assuming that a refinery can only be owned or controlled by the entity that immediately operates the refinery. This is not the case. If Entity A owns 100 percent of Entity B, which in turn owns 100 percent of Entity C, and Entity C operates a refinery, the refinery is obviously "owned or controlled" not only by Entity C but also by Entity A and Entity B. If Entity A itself operated another refinery, both Entity A's refinery and Entity C's refinery would be owned or controlled by Entity A, and they would also be under "common ownership."

375. Comment: We object to the definition of "small refiner" contained in the Phase 2 RFG regulations as written. This definition, in section 2260(a)(22), is as follows:

> (22) "Small refiner" means any refiner who owns or operates a refinery in California that:
> (A) Has and at all times had since January 1, 1978, a crude oil capacity of not more than 55,000 barrels per stream day;

(B) Has not been at any time since September 1, 1988, owned or controlled by any refiner that at the same time owned or controlled refineries in California with a total combined crude oil capacity of more than 55,000 barrels per stream day; and

(C) Has not been at any time since September 1, 1988, owned or controlled by any refiner that at the same time owned or controlled refineries in the United States with a total combined crude oil capacity of more than 137,500 barrels per stream day.

First, the terms "owned" and "controlled" need to be clarified. These two terms are so vague that they are not readily understandable to affected parties. The term "owned" is not defined in the proposed regulations, and the Board has not indicated in this rulemaking what the term means. To determine the Board's intent, we have reviewed past rulemakings concerning similar small refiner extensions. The proposed definition is the same as the small refiner definition adopted by the Board in 1989 pertaining to aromatic hydrocarbon content in diesel fuel. (13 C.C.R. § 2282, former § 2256.) In addition, the term "small refiner" is found in the Board's regulation pertaining to the sulfur content of diesel fuel. (See 13 C.C.R. § 2280, former § 2252.) Although now amended, that definition originally excluded only those refiners with a crude capacity greater that 50,000 bpsd which owned or operated refineries in the U.S. with a combined crude capacity of greater than 137,000 bpsd.

In the Staff Report for the 1985 rulemaking on amendments to rules regarding the sulfur content of diesel fuel, the Board stated that "the ownership provisions . . . are triggered only by ownership greater than 50 percent." (emphasis added.) We agree that a refiner should not be considered a "small refiner" in a large refiner owns more that 50 percent of the refiner, and request that the Board reaffirm this position.

Although the Phase 2 RFG regulations do not define the term "controlled," the Board has discussed the meaning of this term during previous rulemakings in 1985 and 1988. Those discussions indicate that the purpose for including a "control" limitation is to eliminate those refiners which, although not technically "owned" by a large refiner, nonetheless enjoy the economic, technological and competitive benefits of their relationships with a large refiner. Determining whether these "control" factors are present is highly fact specific, and we request that the Board reaffirm as applicable for this definition the factors it previously has stated are appropriately used in making these findings. We believe that in previous rulemakings the Board has associated "control" with the small refiner's access to a large refiner's refinery-related assistance, and has indicated that the Board considered that a refiner was not "owned or controlled" by a large refinery if the two companies were "functionally independent."

We believe that Pacific satisfies the "functional independence/ability to integrate" test. However, a June 8, 1992

letter from Peter D. Venturini, Chief of the ARB's Stationary Source Division, to Counsel for Pacific rejected the use of the functional independence test for determining if a refinery is "controlled" by a large refiner. The letter stated that the test is not determinative "because an entity may through choice be operated in a functionally independent manner even when the parent has unquestioned power to direct the operations of the subsidiary." The letter indicates that the staff takes the view that "control" for purposes of the definition is a factual inquiry as to "whether the potentially controlling entity has the power to direct or control the management and policies of the other entity," and that the power to direct or control "can be reflected by the power to select management or a requirement for direct approval." This interpretation is unreasonable for two reasons. First, it ignores the Board's previous interpretations and thus violates the statutory procedure for the adoption of regulations. (Gov. Code §§ 11346.5, 11347.5.) Second, because the staff's proposed "ability to control" test addresses the same issue as the "ownership" component of the definition, it is merely duplicative.

Since the 15-day notice states that small refiners would be defined as they were in the regulation on diesel fuel aromatic hydrocarbon content (13 C.C.R. § 2282), the Board is bound to its interpretations in the 1985 and 1988 rulemakings.

The June 8, 1992 letter also refers to language from California Corporations Code section 160 which defines "control" as the power "to direct the management and policies of the corporation," including the power to elect directors and to manage the affairs of the corporation. Since the ARB never referred to this definition before, they cannot rely on it without proper notice. Further, this approach does not effectuate the policy objective for providing the small refiner extension.

In any event, Pacific is not "controlled" by Coastal even under the Board's excessively broad "ability to control test." (Pacific)

Agency Response: We are satisfied that the terms "owned or controlled" in the definition of small refiner are not unclear or ambiguous. These terms have appeared in the small refiner definitions in three ARB fuels regulations that have been approved by OAL as meeting the statutory criteria, including the standard of clarity. (13 C.C.R. §§ 2280(g), 2281(b)(9), and 2282(b)(19).) The terms should be no less clear when used in the Phase 2 RFG regulations.

We agree with the commenter's characterization of the termed "owned" as meaning a more than 50 percent ownership interest, and accordingly there appears to be no dispute or ambiguity regarding the meaning of that term.

We agree with the commenter's characterization of the term "controlled" as being highly fact-specific. Each factual situation needs to be evaluated to determine whether "control" by another entity exists. "Control" will be found when the facts show that the

potentially controlling entity has the power to direct or control the management and policies of the other entity.

We do not believe that the ARB has ever articulated a different interpretation of the term "control." In particular, the Board has never identified the "functional independence/ability to integrate" test as claimed by the commenter. In the Final Statement of Reasons for the 1985 amendments to former 13 C.C.R. section 2252 (present § 2280), the Board responded to various comments requesting that additional requirements be added to the small refiner definition, such as requirements that the refinery could not be owned in ten percent or greater part by a large refiner, or that the refinery could not be owned by a person who had a sibling, grandparent, or grandchild who owned a large refinery. The Board rejected these additional provisions, in part because two entities excluded by the relationship could in fact be wholly independent from each other. However, the Board has never expressed the view that the requirement that is in the regulation--that the refinery cannot be "controlled" by a large refiner--will never apply as long as there is "functional independence." Indeed, such a construction would be contrary to the plain meaning of the term "control." Any time a parent owns 100 percent of a subsidiary, that parent necessarily "controls" the subsidiary even if it chooses to have the subsidiary operate in a "functionally independent" manner.

We also cannot agree that viewing the term "control" as posing a factual question of the power to direct the management makes it merely duplicative of the "ownership" component. The reality of modern corporate relationships is that an entity may clearly "control" another even though the first entity does not own a greater than 50 percent interest in the second.

Finally, we believe it is not appropriate in this Final Statement of Reasons to engage in the factual inquiry whether a particular refiner such as Pacific meets the definition of "small refiner."

376. Comment: The Board has shown no necessity for excluding from the definition of small refiner those refiners who have been "owned or controlled" by a large refiner at any time after September 1, 1988. The rationale for this requirement ostensibly is to prevent a large refiner from "spinning off" smaller subsidiaries in order to take advantage of the small refiner exemption. The Board, however, can effectuate this policy without reference to the 1988 date. Indeed, the 1988 date appears to have been used in the definition merely because it was the date included in the 1989 regulations regarding the aromatic hydrocarbon content of diesel fuel, and not for any reason related to the small refiner extension.

Given that the rationale behind the cut-off date is to prevent large refiners from circumventing the Phase 2 RFG regulations, the Board should establish a date that focuses on a refiner's (i) current ownership status, and (ii) its ownership status at the time the Board

provided notice of the proposed small refiner extension. A strict application of an arbitrary September 1, 1988 cut-off date substantially disadvantages Pacific in relation to other small refiners. Indeed, the Board previously has granted extensions to companies (Golden West Refining Company and Paramount Petroleum Corporation) which did not meet the strict language of the 1985 small refiner extension, but whose exclusion from the small refiner definition would have been inequitable. (See p. 113 of the TSD for the 1985 rulemaking.) We ask that the Board do the same here. (Pacific)

Agency Response: We believe that the September 1988 cut-off date is appropriate. As the commenter points out, this treatment of small refiners is identical to the treatment in the Board's regulation limiting the aromatic hydrocarbon content of diesel fuel. (13 C.C.R. § 2282(b)(19).) It is also identical to the treatment in the Board's regulation limiting the sulfur content of diesel fuel statewide (13 C.C.R. § 2281(b)(9).) Refiners have been on notice since 1988 that they will not qualify as small refiners under the Board's statewide diesel fuel regulations if the refinery was owned or controlled at any time prior to September 1, 1988 by a large refiner. A prudent refiner would take this into account in its business planning. In addition, when the Board determines whether a separate treatment under a fuels regulation is appropriate for small refiners, it considers the possible impacts of other regulations as well. Applying the same definition in other fuels regulations avoids the confusion that would result if refiners were "small refiners" for purposes of one regulation but "large refiners" for purposes of another.

We do not agree that Golden West and Paramount did not meet the terms of the small refiner extension in the 1985 amendments to 13 C.C.R. section 2253(d) et seq, governing the sulfur content of diesel fuel in the South Coast Air Basin. Page 113 of the TSD indicates that, after careful consideration of the affected companies' position, the existing regulation was interpreted in a way that treated the refiners as qualifying as small refiners.

377. Comment: The Board has shown no necessity for excluding from the definition of small refiner those refiners whose crude oil capacity has exceeding 55,000 bpsd at any time since January 1, 1978. This has even less relation to a regulation issued in 1992, and again is not necessary to effectuate the policy reasons for using a cut-off date. During its previous rulemakings, the Board indicated that a crude capacity cut-off date prevents refineries from "downsizing" in order to meet the capacity limitations and thereby to qualify as a small refiner. The Board can prevent "downsizing" by using the date it provided notice to refineries of the proposed Phase 2 RFG regulations as the capacity cut-off date.

A June 8, 1992 letter from Peter Venturini, Chief of the ARB's Stationary Source Division, indicates that Pacific's use of an extra furnace and preflash column a limited number of times during the early 1980s (which temporarily increased Pacific's capacity to 75,000 bpsd)

would disqualify it under the small refiner definition, despite the fact that Pacific's design capacity has been limited to 55,000 bpsd for nearly 10 years. Pacific considers its exclusion to be arbitrary as Pacific currently is a small refiner (with a capacity below 55,000 bpsd) that faces the same economic difficulty in complying with the Phase 2 RFG regulations. (Pacific)

Agency Response: As is the case for the September 1, 1988 cut-off date discussed in the previous comment, the provision excluding refiners from small refiner status if their crude oil capacity exceeded 55,000 pbsd (formerly 50,000 pbsd) at any time prior to January 1, 1978 is identical to the provisions in the Board's statewide regulations governing diesel fuel. (13 C.C.R. §§ 2281(b)(9) and 2282(b)(19).) Moreover, the January 1, 1978 cut-off date also appeared in the Board's regulation governing the sulfur content of diesel fuel as amended in 1985 (former 13 C.C.R. § 2252(g)(1)) and the Board's gasoline lead content regulation (former 13 C.C.R. § 2253). As was discussed in the response to the previous comment, a prudent refiner would take these longstanding "small refiner" definitions into account in its business planning. In addition, when the Board determines whether a separate treatment under a fuels regulation is appropriate for small refiners, it considers the possible impacts of other regulations as well. Applying the same definition in other fuels regulations avoids the confusion that would result if refiners were "small refiners" for purposes of one regulation but "large refiners" for purposes of another.

Finally, as we have indicated previously, it is not appropriate in this Final Statement of Reasons to engage in the factual inquiry whether a particular refiner such as Pacific meets the definition of "small refiner."

(e) Expanding the Coverage of the Small Refiner Provisions

378. Comment: If the small refiner provision is not eliminated, it should be expanded to include all independent refiners. The small refiners exemption should apply not only to those who otherwise may go out of business due to Phase 2 RFG, but also to that particular segment of the industry that would be disproportionately affected. Tosco should be included in the category of refiners that need some relief since Tosco is much more like a small refiner than like a major oil company. (Tosco)

Agency Response: See the response to Comment 254. With regard to the question of whether Tosco will have sufficient funds to make the refinery modifications necessary to produce gasoline meeting the Phase 2 RFG regulations, we note that p. 4 of Tosco's 1990 Annual Report (which was submitted as part of Tosco's 15-day comments) states that:

> Tosco Refining will commence in 1991 a major long term capital investment program, totaling approximately

> $250,000,000 over the next five years. This program, which is expected to be financed from internal sources, is in addition to our normal debottlenecking and turnaround programs. . . We believe this program will be sufficient to produce the new clean fuels which will be needed in the nineties and to keep Tosco Refining in compliance with tighter environmental regulations. We further believe that, over time, these investments will be justified by increased margins.

From this statement, it appears that Tosco agrees with staff's conclusion that Tosco will have sufficient funds to finance all required Phase 2 RFG refinery modifications.

379. Comment: Tosco has only one refinery, which means that per barrel costs will be higher, while Tosco will have no ability to spread out the costs. In addition, Tosco is not integrated, and thus is much more vulnerable to a downturn in the refining industry. Phase 2 RFG investment would be about 70 percent of Tosco's net income and 40 percent of its cash flow, but only about 12 percent of the majors' net income and 5 percent of their cash flow. (Tosco)

380. [dk46] Comment: Granting Tosco relief will not permanently or significantly change the emissions benefits of the regulation, and will not result in any "windfall" profits or depressed prices -- relief will simply spread out expenditures. Relief will also help preserve the independent refining and marketing sector of California's gasoline market. (Tosco)

Agency Response: See the responses to Comments 254 and 378.

3. Comments on Specific Provisions Not Pertaining to Small Refiners

381. Comment: We recommend that the ARB allow refiners to delay their selection of either the averaging option or gallon-by-gallon compliance until March 31, 1996 rather than the November 1, 1995 date as proposed. Otherwise, refiners will be forced to make their selection without the benefit of actual operating experience in producing and blending Phase 2 gasoline. The ability to use the initial operating data will substantially increase operational flexibility. (Mobil)

Agency Response: Under the original proposal, compliance was required starting January 1, 1996, and the initial elections were due by September 1, 1995. (e.g. § 2262.2(d).) When the Board delayed the compliance date for the flat or optional averaging limits by two months to March 1, 1996, we also delayed the election deadline two months to November 1, 1995. The elections need to be made with sufficient lead time to enable the ARB to properly structure its enforcement efforts.

Refiners would necessarily be deciding which approach they will elect some time before the compliance date in order to make adequate plans. Allowing refiners to operate under the regulatory requirements for the month of March without first having made an election would make effective enforcement impossible because enforcement personnel would not know which standard the gasoline was subject to. In any event, there is no guarantee that refineries will have "actual operating experience" unless they voluntarily began producing Phase 2 RFG earlier than the compliance date. If some refiners believe that operational flexibility is extremely important, then these refiners could begin producing Phase 2 RFG early enough so that the selection process is made with actual operating experience.

382. Comment: The averaging period should be increased from 90 days to six months. Ninety days is too short an averaging period to handle negative balances during normal refinery turnarounds. (Mobil)

Agency Response: The proposed averaging period is actually six months already, as non-complying gasoline can be offset by gasoline physically transferred 90 days before or 90 days after the non-complying gasoline is transferred. (see § 2264(d),(e),(f),(g) and (h).)

383. Comment: The regulatory language should be modified to clearly state that positive balances from previous averaging periods can be carried over. (Mobil)

Agency Response: The regulations do not allow such a carry-over. If a carry-over were allowed, it would be possible to build up a large positive balance and then use it up in a short time--possibly resulting in an unacceptable degradation of air quality.

384. Comment: All information submitted by non-exempt refiners should be kept confidential. (Mobil)

Agency Response: The California Public Records Act (Gov. Code §§ 6250 et seq.) and ARB regulations (17 C.C.R. §§ 91000-91022) adequately address the handling of information claimed to be confidential.

385. Comment: The two-year record keeping period should be decreased to one year, as a two-year period appears to be excessive. (Mobil)

Agency Response: The commenter has not identified any specific way in which the two-year recordkeeping requirement in section 2270 is excessive. Since the statute of limitations for enforcement of the ARB's fuels regulations is now three years (Code of Civ. Proc. §

338(k)), requiring two year retention of records which may necessary to establish a violation is certainly not inappropriate.

386. Comment: The effective date of March, 1996 for Phase 2 RFG was based on the assumption that the predictive model would be promulgated in April, 1992, and thus refineries would have four years to use the predictive model as a capital planning tool. It now appears that the predictive model will not be available until 1993. We request that the implementation date for Phase 2 RFG be delayed a month for every month beyond April, 1992 that promulgation of the predictive model is delayed. (Unocal)

Agency Response: Refiners are not required to use the predictive model. Use of the predictive may allow refiners to meet Phase 2 RFG requirements at a lower cost, but it would be unreasonable to delay implementation of Phase 2 RFG merely because refiners will not have a full four years to use the predictive model. It is also appears that application of a predictive model will have a greater impact on operational parameters than on capital planning and capital expenditures. Therefore the lead time for installing or modifying equipment does not need to be delayed until promulgation of the predictive model.

387. Comment: Unocal opposes the vehicle testing option unless it is changed to reduce the number of vehicle tests required for a reasonable probability of passing. (Unocal)

Agency Response: There is no requirement to use the section 2266 option pertaining to certified gasoline formulations resulting in equivalent emission reductions based on motor vehicle emission testing. The number of vehicle tests was chosen to assure that inferior fuels will be rejected. This number should not be reduced merely to minimize costs to refineries, without consideration of the potential adverse air quality impacts from this reduction.

388. Comment: There are several areas where the modified language of the regulation is unclear or in error. Section 2264(d) should refer to volume of benzene rather than mass of sulfur. Section 2270(a)(4) should refer to a violation of the standards. Section 2270(a)(4) should be renumbered 2270(a)(5). (Unocal)

Agency Response: We agree with these comments, and have corrected the text of these sections in conjunction with the second 15-day notice.

389. Comment: The oxygen content standards in section 2262.5 limit to oxygen content 2.2 percent, and alternate formulations can only be approved through vehicle testing pursuant to section 2266(c). Higher oxygen levels should be approved if certified by either ARB's

predictive model (§ 2265) or by U.S. EPA's Complex Model. (ARCO Chemical)

Agency Response: Since the ARB's predictive model has not been established yet, it would be inappropriate to include the requested language at the present time. We expect that the ARB predictive model will allow higher oxygen levels, up to 2.7 percent. EPA's complex model cannot be used, since it currently does not exist.

390. Comment: Phase 2 RFG regulations should place specific limitations on the allowed combined total of the di- and tri-alkyl aromatic hydrocarbons. The cost of reducing these species may be relatively high. However, reducing emissions of these species is very cost-effective if the reduced reactivity of the resulting hydrocarbon emissions is considered. Evidence presented prior to and during the November hearing show that partial control of the multi-alkyl aromatic hydrocarbons is feasible, at a cost comparable to other elements of the Clean Fuels/Low Emission Vehicle program, and is therefore necessary to meet the requirements of the 1988 Clean Air Act. (GM)

Agency Response: See the response to Comment 40.

391. Comment: The density of individual isomers of the various oxygenates should be considered when determining the mass concentration of oxygen in Phase 2 RFG. Although EPA does not consider these differences in density, we suggest ARB regulations be updated when, and if, EPA adopts more detailed calculation procedures. (GM)

Agency Response: As the commenter indicates, the U.S. EPA has not yet adopted more detailed calculation procedures. Therefore it is appropriate to wait for EPA to act first.

392. Comment: We disagree with the staff's assertion that there is no need to further modify the oxygenate content conversion provision in Section 2298. While we agree that a revision to ASTM Method D 4815 should be forthcoming, it could be delayed. Since the wintertime oxygenate program commences this fall, we recommend that the conversion table be revised along with new density information on various oxygenates.

We disagree with the staff's assertion that new densities recently reported for alcohols by ASTM will not result in changes to the conversion table. There is no significant difference for methyl alcohol and ethyl alcohol, but substantial differences for the other oxygenates. One major difference is that the staff used generic specific gravities for propanols and butanols, while ASTM lists the value for specific compounds. While no difference is more than 0.1 wt. percent oxygen, there are many cases where there is a 0.1 wt. percent difference. This could be the difference between being cited for noncompliance or not.

In addition, in preparing the section 2298 conversion table, the staff assumed a gasoline specific gravity of 0.74. This average specific gravity is typical of today's gasoline; however, when Phase 2 gasoline limits become effective, the average gasoline specific gravity will be reduced. It is estimated that the changes will reduce the average specific gravity about 3.5 percent. Differences between staff and ASTM values will increase, and in some cases the actual oxygen content will be 0.2 wt. percent higher than the staff table [section 2298] would indicate. Overall, this means that more oxygenate would have to be used with a resulting increase in manufacturing cost.

We recommend that a procedure be provided to allow the calculation of the actual O_2 wt. percent for a given gasoline (batch) using measured specific gravities as an option to using the table provided in Section 2298. The use of actual gasoline specific gravities will provide a more accurate determination of the gasoline oxygen content.

The staff claims that the proper mass fraction oxygen (0.1566) for ethyl tertiary-butyl ether was used in the development of the conversion table (section 2298), but the wrong value (0.1569) is still shown on page 8 of Staff's Attachment C. This error should be corrected. (Chevron)

Agency Response: We preliminarily note that the conversion table in section 2298 was first adopted as part of the wintertime oxygenates rulemaking which was submitted to OAL September 9. (See footnote 2.) The comments identified above were not presented by the commenter in that rulemaking.

We agree that the use of the revised alcohol densities identified by the ASTM committee would result in some differences in the oxygenate content values as reported in the section 2298 table. However, we do not believe that these changes will affect compliance significantly at the 1.8 to 2.2 oxygen weight percent level. In the region of interest (1.8 to 2.2 percent) the commenter cites only two cases where using the new ASTM alcohol densities would change the estimated oxygen content values. The first case is for TAME at 12 vol percent where the new alcohol densities would result in changing the oxygen values in the table from 1.94 to 1.95 weight percent. Because of rounding, the difference appears larger, i.e. 1.9 vs 2.0 weight percent. Similarly for ETBE at 13 vol percent the results in the table would change oxygen from 2.04 to 2.07 weight percent but because of rounding the change appears to be from 2.0 to 2.1 weight percent. Because ARB Compliance Division personnel do not initiate action until a violation is demonstrated beyond the reproducibility range for the oxygenates test method, these small differences are not significant. In any case, we plan to conduct a rulemaking hearing to revise the identified method when the ASTM revisions are final.

The commenter also suggests that the specific gravity being used be changed from a value representing today's gasoline to a value representing reformulated gasoline. The commenter indicates that such a revision would result in a density of 0.718 (representing typical

reformulated gasoline) compared to 0.742 which is typical of today's gasoline. We believe that there are not enough data at this time to determine the typical specific gravity for gasoline produced in 1996. However, we agree that such a change will be appropriate when more information becomes available.

With regard to the commenter's last point, the identified error for ETBE does not affect the results presented in the conversion table.

4. Provisions Pertaining to Alternative Gasoline Specifications

393. Comment: We disagree with the 1 percent liquid volume limit for C3 to C5 olefins. The Phase 2 gasoline regulation has no C3-C5 olefin spec. Therefore, there is no justification for setting this specification for an alternative formulation. (Chevron)

Agency Response: The limit on light olefins for an alternative to Phase 2 gasoline replaces the requirement in the originally proposed test procedure to measure and compare evaporative emissions from the alternative gasoline and Phase 2 gasoline. This replacement is made to avoid the high cost of evaporative testing under the new California test procedure. The primary purpose for comparing evaporative emissions was to avoid an increase in reactivity (ozone forming potential) of the evaporative emissions. Because the main cause of an increase in reactivity would likely be an increase in the light olefinic content of the gasoline, the limit on that content should serve the same purpose adequately.

394. Comment: The reference fuel specification (page 2) should be revised to be consistent with the Phase 2 gasoline certification specification. (Chevron)

Agency Response: At the time of publication the 15-day notice of revisions, the Board had not established specifications for the vehicle certification fuel corresponding to Phase 2 gasoline. If, when such specifications are set, they are inconsistent with the specifications for the reference fuel in the test procedure, the latter can be changed. However, any such changes, if needed, should be minor. The reference fuel specifications are consistent with the flat limits in the Phase 2 regulation and, thus, should be very similar to the eventual specifications for certification gasoline.

395. Comment: The relative toxic potencies are inconsistent with the latest risk assessment given in Proposed Identification of 1,3-Butadiene as a Toxic Air Contaminant--Staff Report/Executive Summary. The corrected values should be:

1,3-butadiene	1.0
benzene	0.25
formaldehyde	0.019
acetaldehyde	N/A

(Chevron).

Agency Response: The values of relative potency proposed by the commenter are not correct. To calculate them, the commenter has incorrectly used unit risk values expressed on the per-ppb (molar) basis. The relative potencies must be calculated with unit risks expressed on the per-unit-mass basis. Furthermore, the list of unit risks in the report cited in the comment is not current.

However, in checking the values of relative potency in the test procedure, we have discovered minor errors in calculation. Correcting them changes slightly the relative potency values of formaldehyde and acetaldehyde. The changes will have very little effect on the comparison of toxic emissions between gasolines. That comparison will be dominated by the potency-weighted emissions of benzene and 1,3-butadiene, for which the original values of relative potency are correct. The corrected set of values is shown below, and was included in the modifications made available with the second 15-day notice.

	Original	Corrected
1,3-butadiene	1.0	1.0
benzene	.17	.17
formaldehyde	.041	.035
acetaldehyde	.013	.016

5. Miscellaneous

396. Comment: The ARB has failed generally to consider the requirements of CEQA. Certified programs under CEQA must still comply with its substantive requirements, including the need to identify mitigation measures and alternatives. In the course of only five pages of the October 4, 1991 Staff Report, the ARB provided only a cursory review of the environmental issues related to the proposed regulations. We maintain that this discussion was inadequate. The ARB was required to include not only a description of the proposed activity and mitigation measures but also "alternatives to the activity" to minimize any significant adverse environmental impact. (14 C.C.R. §§ 15120 to 15132.) The Staff Report did not discuss alternatives to the proposed regulatory activity. The ARB is not permitted under CEQA to choose between an alternatives analysis and a discussion of mitigation measures.

By failing to include any discussion of alternatives to the Phase 2 RFG regulations, the ARB staff have peremptorily decided that no other alternatives could produce the same or perhaps even superior environmental benefits without the adverse environmental impacts identified in the Staff Report. In so doing, the ARB staff have

violated CEQA by depriving the public of the opportunity to comment on such alternatives and depriving the agency decision makers of adequate information that they are entitled to under the statute. For instance, alternative vehicular emissions reduction strategies, such as accelerated vehicle scrappage, enhanced vehicle inspection and maintenance programs, vehicle use reduction incentives, etc., can achieve comparable or greater emission reductions either separately or in conjunction with fuel standards. (Texaco)

Agency Response: Generally see the responses to Comments 294 and 354.

On the issue of alternatives, we initially note that the TSD contained a Chapter VII, entitled "Analysis of Alternatives." In addition, we believe the commenter's characterization of the "project" to which alternatives should be addressed is incorrect. The kinds of relevant alternatives are those that could feasibly attain the project's basic objectives. (See 14 C.C.R. § 15126(d).) The "project" that the proposed regulations represented was a program with the objective of requiring the reformulation of gasoline in a way that reduces emissions from gasoline-powered motor vehicles. CEQA does not require comparisons to programs such as vehicle scrappage, enhanced I/M, or vehicle use-reduction strategies when the Board considers a motor vehicle fuels regulation because the these programs do not have the same objective as the fuels regulation.

The Board's fundamental motivation for establishing reformulated gasoline regulations is to improve the environment by reducing emissions of pollutants from gasoline-powered motor vehicles. As discussed in the response to Comment 294, compliance with the regulations would result in some negative environmental impacts along with the beneficial impacts from the reduction in emissions from gasoline-powered motor vehicles. The overall environmental benefits from the regulations will greatly outweigh the adverse environmental impacts that will remain after the application of the expected mitigation. The "no-project alternative" of not adopting reformulated gasoline regulations would undoubtedly result in a substantial net adverse environmental impact compared to the adoption of regulations. Moreover, the "alternatives" requirement is "applicable only to the project as a whole, not to the various facets thereof." (Big Rock Mesas Property Owners Association v. Board of Supervisors, 73 Cal.App. 218, 227 (1977). In this context, there are no other alternatives that would result in the reformulation of gasoline and therefore that needed

to be considered.[12]

The commenter's claims pertaining to the evaluation of alternatives would have serious policy implications. There is no doubt that the Board must consider the possible adverse environmental impacts that may be associated with implementation of the regulations, and the ARB did so in the Staff Report, the Resolution, and in this Final Statement of Reasons. However, we know of no requirement that before an environmental agency may adopt a regulation to protect the environment it must identify and evaluate every other measure it or sister agencies might adopt to address the same sort of environmental concern.

As recognized in the California Clean Air Act Amendments of 1988, air pollution problems are sufficiently chronic, particularly in the South Coast Air Basin, that a whole panoply of measures will have to be adopted before the state and federal ambient air quality standards are achieved statewide. The Legislature clearly did not expect or require a comprehensive identification and comparison of every possible measure before an air quality agency could adopt <u>any</u> air quality measure.

397. <u>Comment</u>: Mobil Research test results and other available industry data show no emission reduction benefits for decreasing T90 below 320 degrees Fahrenheit. ARB data on T90 provides little justification for a stringent T90 standard. Until additional data on this parameter are available from the Auto/Oil research, the ARB should adopt a flat 325 degree and 320 degree average. (Mobil)

<u>Agency Response</u>: See the responses to Comments 129-132.

398. <u>Comment</u>: Several of the specifications (aromatic hydrocarbons, T90, and olefins in particular) will provide little, if any, benefit. (Chevron)

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12. Because the enviromental benefits of reformulating gasoline at the general levels considered by the Board and staff substantially outweigh the adverse environmental impacts associated with activities such as refinery construction and operation, the overall environmental impact of Phase 2 RFG controls would always be benefical and will ulitmately be a function of the degree to which emissions from gasoline-powered vehicles are reduced by the cleaner gasoline. It follows that, to the extent the staff and Board needed to evaluate the overall environmental impacts of the "alternatives" of various levels of limits for gasoline, the Board's central deliberations on the appropriate level of controls--and the emissions reductions resulting from the controls--served the function of consideration of the environmental impacts such alternatives.

Agency Response: We believe that each of the Phase 2 RFG specifications will provide a benefit. See the responses to Comments 183, 185, and 186.

399. Comment: The ARB should adopt specifications for a Phase 2 RFG certification fuel (for use in certification and in-use compliance testing of motor vehicles) at the earliest possible time. (Ford)

Agency Response: In a separate rulemaking, the Board approved specifications for Phase 2 RFG certification fuel at an August 14, 1992 public hearing.

400. Comment: The ARB should establish a Reactivity Adjustment Factor (RAF) for Phase 2 RFG as soon as possible. In order for the Low-Emission Vehicle Regulation to be "fuel neutral", all fuels, including reformulated gasoline, should have their RAFs established. (Ford)

Agency Response: The ARB is making every effort to establish a RAF as soon as possible. We plan to conduct a rulemaking hearing on this subject before the end of 1992.

401. Comment: The Board rejected General Motors' proposal for limitations on di/tri-alkyl aromatic hydrocarbons, citing a study prepared by the refinery industry which identified the increased cost to be 20 or more cents per gallon of gasoline produced. General Motors did not have access to this study, and could not address this study in comments or testimony. Unless General Motors' proposed limitations are adopted, the Board must identify the studies used in its decision making, and afford an adequate public opportunity to consider and comment on these studies. Government Code section 11346.7(b)(1) provides that if the Final Statement of Reasons identifies any data "which was not identified or made available for public review prior to the close of the public comment period, the agency shall comply with subdivision (d) of Section 11346.8." The effect of this provision is therefore to require, at a minimum, an adequate opportunity to consider and comment upon the unpublished cost study identified at the hearing. (GM).

Agency Response: There is no legal requirement prohibiting the Board from considering information presented at the hearing. See the response to Comment 297.

J. COMMENTS MADE DURING THE SECOND AND THIRD 15-DAY COMMENT PERIODS

The two notices of supplemental 15-day comment periods, issued August 24, 1992 and August 31, 1992, indicated that only comments relating to the limited additional modifications accompanying the notices would be considered by the Executive Officer (see Gov. Code §

11346.8(c)). We summarize below only those comments which pertained to the comments made available.

402. Comment: We are still confused about the basis of the revised potency values given in the proposed supplemental modifications to the California Test Procedures for Evaluating Alternative Specifications for Gasoline. Based on the potency factor contained in the Executive Summary of the Proposed Identification of Acetaldehyde as a Toxic Air Contaminant dated August 1992, we calculate the following relative potencies:

1-3 Butadiene	1.0
Benzene	0.25
Formaldehyde	0.019
Acetaldehyde	0.016

We recommend the above potencies be used for the evaluation of alternative specifications for gasolines. (Chevron)

Agency Response: See the response to Comment 398. The relative potencies proposed by the commenter are incorrectly calculated from the unit risk values of the four toxic compounds expressed in terms of volume concentrations (per ppb). The correct relative potencies, as presented in the modified text made available with the second 15-day notice, are calculated from unit risks expressed on the mass concentration basis (per l/m^3).

403. Comment: The proposed changes to the small refiners exemption do not address our concerns about the treatment of small refiners. Provisions still allow the small refiner to produce significantly cheaper gasoline for two years. Moreover, they only are required to produce two-thirds of the sales by actual refining; the remaining one-third of their sales could be from nonstandard gasoline imported into California. We believe this disregards the intent of the California Clean Air Act and of the Phase 2 gasoline regulations. In addition, the provisions of 2272(c)(2) are inconsistent with section 2272(a)(2) and 2272(d)(1)(D). (Chevron)

Agency Response: We recognize that the supplemental modifications do not address all of the concerns raised in opposition to the small refiner provisions. The intent of the modification to section 2272(c)(2) was to minimize the extent to which a small refiner could during the extension period produce gasoline by blending substandard blending components. Several comments regarding the first set of modifications pointed out that the original requirement of 25 percent was too low. It would not be practical to require that all of the gasoline be produced by refining at the refinery because some some small refiners are incapable of producing their historic volumes entirely by refining.

We do not believe section 2272 or the other small refiner provisions disregard the intent of the California Clean Air Act or the Phase 2 RFG regulations for the reasons set forth in the response to Comment 346.

We appreciate the commenter's identification of the need to update the reference in section 2272(d)(1)(D) to parallel the language in section 2272(a)(2), and we have made this modification in the final regulatory order. This is a nonsubstantial change since section 2272(a)(2) establishes the substantive requirement and the function of section 2272(d)(1)(D) is merely to assure the small refiner reports whether it has satisfied the section 2272(a)(2) requirement. We do not see any inconsistency between section 2272(c)(2) and section 2272a)(2).

404. Comment: The revised text provides that gasoline supplied by an exempt small refiner must be two-thirds or more from the distillation of crude. While this represents some tightening from the original 25 percent requirement, it still allows the exempt refiner to produce one-third of the gasoline from higher emitting blending components. We again recommend that this requirement be increased further to 100 percent with appropriate allowance for oxygenate blending. (Mobil)

Agency Response: See the response to the previous comment.

405. Comment: Although we agree that the 25 percent minimum in the initially proposed section 2272(c) must be raised, we are very concerned that the two-thirds requirement, without an adjustment for the oxygenates and butane that must be purchased for blending, could severely restrict the ability of small refiners to achieve the reformulated gasoline requirements from which small refiners are exempt.

The Phase 2 RFG regulations require the use of oxygenates, and all of the oxygenate required for AIRA's Phase 2 RFG must be brought in from outside their respective refineries. Further, in the winter season, some AIRA members typically blend 10-12 percent butane into their gasolines to meet the ASTM winter grade volatile specifications. Kern has conducted computer studies that show that if butane and oxygenate are considered in calculating the percentage of gasoline that is refined from crude oil at its own refinery, only between 55 and 60 percent of its gasoline will be derived from crude oil refined at its own refinery during the winter season. If MTBE is excluded from the calculation, between 63 and 68 percent will be from crude oil that Kern refines, and if both MTBE and butane are excluded, between 67 and 76 percent of Kern's gasoline will be from crude oil it refines. Thus eliminating oxygenates and butane form the calculation will allow Kern to barely meet the two-third requirement during the winter season.

Accordingly, we request that the ARB modify section 2272(c)(2) by adding the following provision: "In calculating the portion of the

gasoline supplied from a small refiner's California that was refined at the small refinery from crude oil, the volume of oxygenates and butane in the gasoline shall not be counted." Alternatively, oxygenates should be excluded from the calculation. (AIRA, Kern)

Agency Response: The modifications to section 2272(c)(2) were made in response to comments from large and independent refiners that the 25 percent figure in the original requirement needed to be increased to keep small refiners from acting as a dumping ground for dirty components during the extension period. (See Comment 361). The three commenters requested that the value be increased to 50 percent, 75 percent, or 100 percent respectively. The Executive Officer determined that a two-thirds requirement was appropriate.

It has not been very common to date for oxygenates to be added to gasoline in California; the staff has estimated that in 1991 approximately 6 percent of the gasoline sold in the state has contained oxygenates. This will change dramatically as a result of the wintertime oxygenates program (scheduled to start November 1, 1992) and the oxygen content requirements of the Phase 2 RFG regulations. Further, oxygenates are not typically derived from crude oil--the two most common oxygenates are an alcohol (ethanol) and an ether derived from methanol (MTBE). It is also unlikely that the commenters urging increases in the percentage requirements in section 2272(c)(2) intended oxygenates to be counted in the "nonrefined" portion. This is particularly true in the case of Mobil's comment, since a 100 percent requirement where oxygenates are counted would effectively disqualify all small refiners. In light of these factors, it is clear that in modifying section 2272(c)(2) to increase the percentage requirement to two-thirds, the ARB did not intend that the volume attributable to oxygenates would be counted in the non-refined one third. Accordingly, we plan to interpret section 2272(c)(2) as not including oxygenates in the requirement that two-thirds or more of the gasoline supplied from the small refiner's California refinery was refined each quarter at the small refinery from crude oil.

Butane, on the other hand, is typically derived from crude oil and has historically been in widespread use in gasoline in California. We do not believe it is appropriate to exclude butane from the section 2272(c)(2) calculation.

406. Comment: We question the change in the definition of "Final Distribution Facility." This definition is contained in subarticle 2, which deals with standards for gasoline sold after March 1, 1996. Section 2258 defines the winter oxygenates program, which sunsets on February 29, 1996, per section 2258(f). The changes, as written, will not allow splash blending. We believe that the proposed change should refer to section 2262.5. We request that this change be made to the proposed regulatory language. (Unocal)

Agency Response: The commenter is correct. The appropriate language changes were made in the third 15-day notice released August 31, 1992.

407. Comment: We have serious concerns that the proposed regulatory language will not allow splash blending of oxygenates downstream of the refinery. In EPA's Proposed reformulated gasoline regulation (57 F.R. 13415), the concept of RBOB (reformulated blendstock for oxygenate blending) is used. RBOB is a product that, when blended with the proper type and amount of oxygenate, will comply with the reformulated gasoline requirements. The concept of RBOB was developed specifically to facilitate downstream blending of oxygenates, particularly ethanol. The ARB's proposed changes to the Phase 2 gasoline regulations allow a potential defense only from the oxygen content requirements. By not allowing such defenses for the other aspects of Phase 2 RFG, the ARB is eliminating the potential for downstream blenders to take advantage of the dilution provided by oxygenates as well as the effect of oxygenates for distillation, particularly T50. The inability to take advantage of the effects of oxygenates on T50 will likely, in and of itself, render downstream blending infeasible, because it is unlikely that a refiner can produce an oxygenate-free gasoline with a T50 that complies with the Phase 2 RFG specifications for oxygenate blending downstream.

Based on a limited review, we believe that these concerns can be addressed by (i) making the definition of "final distribution facility" refer to section 2262 in total, rather than only the oxygen content section, and (ii) by adding language analogous to that contained in section 2262.2(e)(1) and (e)(2) to the other subsections of section 2262. (Unocal)

Agency Response: It is not appropriate to make such a major change to the regulations at the very end of this rulemaking. On page 36 of the Staff Report released October 4, 1991, the staff expressly raised the issue of the RBOB approach. We noted that the federal requirements in this area are quite complex, and that the staff had not yet identified a practical mechanism under which the producer limits could be enforced at the production facility level while accounting for the dilution effects of downstream oxygenate blending. Although Unocal requested in its 45-day comments that we follow EPA lead in using the RBOB approach, it did not show how the approach could be implemented without compromising enforcement of the regulation. Unocal's comment during the second 15-day comment period does not provide assistance in this area either.

Attachment A

LIST OF COMMENTERS WHOSE COMMENTS ARE SUMMARIZED
IN THE FINAL STATEMENT OF REASONS

Code	Commenter and Date
AIRA	CRAIG MOYER American Independent Refiners Association Oral Testimony: November 22, 1991 Written Testimony: November 15, 1991 June 22, 1992 September 8, 1992
ARCO Chemical	WILLIAM J. PIEL ARCO Chemical Company Written Testimony: June 19, 1992
ARCO Products	GEORGE BABIKIAN, ROBERT J. TRUNEK, KENNETH G. RILEY, TIMOTHY J. CLOSSEY ARCO Products Company Oral Testimony: November 21, 1991 Written Testimony: October 31, 1991, October 10, 1991, November 12, 1991, October 30, 1991, December 12, 1991
CABCI	ROBERT C. CLINE California Associated Builders and Contractors, Inc. Written Testimony: November 20, 1991
Calif. Cattleman's Assoc.	JAMES G. JELKS California Cattleman's Association Written Testimony: November 21, 1991
Calif. Forestry Assoc.	WILLIAM N. DENNISON California Forestry Association Written Testimony: November 21, 1991
California Fuels	DAVID B. ATWATER California Fuels Written Testimony: (2) October 10, 1991
Calif. Trucking Assoc.	KAREN RASMUSSEN California Trucking Association Written Testimony: November 21, 1991

Code	Commenter and Date
Chevron	DIXON SMITH, K.C. BISHOP III, D.B. SMITH Chevron U.S.A., Inc. Written Testimony: November 19, 1991 June 10, 1992 June 22, 1992 September 8, 1992 Oral Testimony: November 21, 1991
Chrysler	FREDERICK C. MALONEY, G.E. ALLARDYCE Chrysler Corporation Oral Testimony: November 22, 1991 Written Testimony: October 11, 1991
CIOMA	DAVID B. ATWATER, J.J. GIGOUX California Independent Oil Marketers Association Written Testimony: November 19, 1991, November 21, 1991
CIPA	THOMAS R. HUNT, II California Independent Petroleum Association Written Testimony: November 20, 1991
CSBCA	ROBERT C. CLINE California School Bus Contractors Association Written Testimony: November 20, 1991
Diepenbrock, Wulff, Plant & Hannigan (Wickland)	JOHN V. DIEPENBROCK Diepenbrock, Wulff, Plant & Hannigan Written Testimony: October 28, 1991 November 4, 1991
DRI (WSPA)	DON WALLS DRI McGraw-Hill Oral Testimony: November 21, 1991 Written Testimony: November 11, 1991
Exxon	R.W. UPCHURCH, JR. Exxon Company, U.S.A. Written Testimony: November 14, 1991 June 19, 1992
Fletcher	BYRON GEE Fletcher Oil and Refining Company Written Testimony: June 22, 1992 Oral Testimony: November 22, 1991

Code	Commenter and Date
Ford	WALTER KREUCHER, DONALD R. BUIST Ford Motor Company Oral Testimony: November 22, 1991 Written Testimony: November 20, 1991 June 15, 1992
GM	JOE CALHOUN, DR. SCOTT JORGENSEN, SAMUEL A. LEONARD General Motors Corporation Written Testimony: November 12, 1991 October 28, 1991 June 22, 1992 Oral Testimony: November 22, 1991
Golden West	JACK ELGIN Golden West Refining Company Oral Testimony: November 22, 1991
IOPA	BILL NORTHROP Independent Oil Producers Association Written Testimony: November 19, 1991
Jones	ASSEMBLYMAN BILL JONES, 32nd DISTRICT Written Testimony: November 15, 1991
Kern	THOMAS EVELAND Kern Oil and Refining Co. Written Testimony: June 22, 1992
L.A. County Federation of Labor	WILLIAM R. ROBERTSON Los Angeles County Federation of Labor Written Testimony: November 21, 1991
MECA	BRUCE I. BERTELSEN Manufacturers of Emission Controls Association Written Testimony: November 14, 1991
MG Trade Finance Corp.	JOSEPH M. RINALDI MG Trade Finance Corporation Written testimony: November 7, 1991
Mobil	F.P. DI SANZO, C.R. MORGAN, MICHAEL J. HAGE Mobil Oil Corporation Written Testimony: October 9, 1991 (2) November 20, 1991 June 19, 1992 September 4, 1992

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Morgan	SENATOR REBECCA MORGAN, 11th DISTRICT Written Testimony: November 19, 1991
MVMA	THOMAS J. CARR, HAROLD M. HASKEW Motor Vehicle Manufacturers Association Written Testimony: November 19, 1991 November 22, 1991
Nissan	JOHN SCHUTZ Nissan Research & Development, Inc. Written Testimony: November 20, 1991
OCAW Union	J.F. FOLEY Oil, Chemical & Atomic Workers International Written Testimony: November 21, 1991
Pacific	WALTER RUSINEK Pacific Refining Written Testimony: June 22, 1992
Polanco	ASSEMBLYMAN RICHARD POLANCO, 55th DISTRICT Written Testimony: November 20, 1991
Powerine	AL GUALTIERI Powerine Oil Company Oral Testimony: November 21, 1991 Written Testimony: November 14, 1991 June 22, 1992
Sacramento AQMD	KEN SMITH Sacramento Metropolitan Air Quality Management District Oral Testimony: November 21, 1991
SCBA	LES BENSON Southern California Business Association Written Testimony: November 21, 1991
SCGA	STEVEN KOFF Southern California Grocers Association Written Testimony: November 21, 1991
SFPP	RON KEISNER Santa Fe Pacific Pipelines Oral Testimony: November 22, 1991

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Shell	Q.P. GRAVES, M.G. BROOKSHIER Shell Refining and Marketing Company Written Testimony: November 21, 1991 June 19, 1992
Sierra Research (Wickland)	GARY RUBENSTEIN Sierra Research Oral Testimony: November 22, 1991 Written Testimony: October 28, 1991
Sierra Research (WSPA)	TOM AUSTIN, JAMES M. LYONS Sierra Research Oral Testimony: November 21, 1991
Texaco	DOUG YOUNGBLOOD, ROBERT OELKERS Texaco Refining & Marketing Company Oral Testimony: November 21, 1991 June 19, 1992
Tosco	DUANE BORVICK, JAMES CLEARY, ANN FARNER Tosco Refining Company Oral Testimony: November 22, 1991 Written Testimony: November 8, 1991, (2) November 14, 1991 June 22, 1992
Toyota	JONATHAN HAINES Toyota Technical Center Oral Testimony: November 22, 1991
Turner Mason (WSPA)	ROBERT E. CUNNINGHAM Turner, Mason and Company Oral Testimony: November 21, 1991 Written Testimony: November 11, 1991
Ultramar	CAROLYN GREEN, M.J. HILEMAN, STEVEN O. EPPERSON Ultramar, Inc. Oral Testimony: November 22, 1991 Written Testimony: November 14, 1991 November 15, 1991
Unocal	DENNIS LAMB, ROGER BEACH, RICHARD J. STEGMEIER Unocal Refining & Marketing Oral Testimony: November 22, 1991 Written Testimony: November 21, 1991 June 19, 1992 September 4, 1992

Code	Commenter and Date
WGA	JASPER E. HEMPEL Western Growers Association Written Testimony: November 20, 1991
Wickland	ROY L. WICKLAND, JOHN M. MARGOWSKI Wickland Oil Company Written Testimony: November 13, 1991 November 11, 1991
Wright	ASSEMBLYWOMAN CATHIE WRIGHT, 37th DISTRICT Written Testimony: November 15, 1991
WSPA	DOUGLAS F. HENDERSON, MICHAEL REDEMER, AL CACCAMO, GINA NELHAMS Western States Petroleum Association Written Testimony: (2) November 11, 1991, November 15, 1991 Oral Testimony: November 21, 1991 November 22, 1991