

**State of California
Environmental Protection Agency
AIR RESOURCES BOARD**

**AMENDMENTS TO THE CALIFORNIA
ZERO EMISSION VEHICLE PROGRAM REGULATIONS**

FINAL STATEMENT OF REASONS

December 2001

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ATTACHMENT A: California Air Resources Board, ARB Staff Review of Report Entitled “Impacts of Alternative ZEV Sales Mandates on California Motor Vehicle Emissions: A Comprehensive Study”, October 31, 2001

Table of Acronyms Used

AAM	Alliance of Automotive Manufacturers
ACP	AC Propulsion
AIR	Air Improvement Resource, Inc.
ALA	American Lung Association
APA	Administrative Procedures Act
APCD	Air Pollution Control District
APU	Auxiliary Power Unit
AQMD	Air Quality Management District
ATPZEV	Advanced Technology Partial Zero-Emission Vehicle
BAAQMD	Bay Area Air Quality Management District
BMW	Bavarian Motor Works
CAFE	Corporate Average Fuel Economy
CALPIRG	California Public Interest Research Group
(C)ARB	California Air Resources Board
CAPCOA	California Air Pollution Control Officers Association
CBE	Citizens for a Better Environment
CCR	California Code of Regulations
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CETC	California Electric Transportation Coalition
CEV	City Electric Vehicles
CMPEG	California Miles Per Equivalent Gallon
CNG	Compressed Natural Gas
CO ₂	Carbon Dioxide
DMV	Department of Motor Vehicles
DOE	Department of Energy
DOT	Department of Transportation
ECD	Energy Conversion Devices, Inc. (Ovonic)
EIR	Environmental Impact Report
EMFAC	ARB's mobile emissions inventory modeling program
EPRI	Electric Power Research Institute
EV	Electric Vehicle
FCEV	Fuel Cell Electric Vehicle
FMT	Fair Market Test
FMVSS	Federal Motor Vehicle Safety Standards
FSOR	Final Statement of Reasons
GM	General Motors
GSP	Gross State Product
GVWR	Gross Vehicle Weight Rating
HEV	Hybrid-Electric Vehicle

ICE	Internal Combustion Engine
ILEV	Inherently Low Emission Vehicle
ISO	International Organization for Standardization
ISOR	Initial Statement of Reasons
LDT1	Light Duty Truck with a loaded vehicle weight of 0-3750 pounds.
LDT2	Light Duty Truck with a loaded vehicle weight of 3751 pounds to a gross vehicle weight of 8500 pounds, or a "LEV I" light-duty truck with a loaded vehicle weight of 3751-5750 pounds.
LEV I	Low Emission Vehicle, pre-1998 regulations
LEV II	Low Emission Vehicle, post-1998 regulations
LSV	Low Speed Vehicle
LVW	Loaded Vehicle Weight
MDV	Medium-Duty Vehicle
MIL	Malfunction Indicator Light
MOA	Memoranda of Agreement
MTBE	Methyl Tertiary Butyl Ether
MVISCA	Motor Vehicle Information and Cost Savings Act
MY	Model Year
NERA	National Economic Research Association
NEV	Neighborhood Electric Vehicle
NHTSA	National Highway Transportation Safety Association
NiMH	Nickel Metal-Hydride
NLEV	National Low Emission Vehicle
NMOG	Non-Methane Organic Gases
NOx	Oxides of Nitrogen
NRDC	National Resource Defense Council
OAL	Office of Administrative Law
OBC	Ovonics Battery Company
OBD	On-Board Diagnostic
OEM	Original Equipment Manufacturer
PAH	Polycyclic Aromatic Hydrocarbons
PC	Passenger Car
PCL	Planning and Conservation League
PEVDC	Production Electric Vehicle Drivers Coalition
PHEV	Plug-in Hybrid Electric Vehicle
PUC	Public Utilities Commission
PZEV	Partial Zero Emission Vehicle
R&D	Research and Development
REMI	Regional Economic Models, Inc.
ROG	Reactive Organic Gases
SCAQMD	South Coast Air Quality Management District
SULEV	Super Ultra-Low Emission Vehicle

SUV	Super Utility Vehicle
Tier 2	Tier 2 (Federal Requirement)
UC	University of California
UCS	Union of Concerned Scientists
ULEV I	Ultra-Low Emission Vehicle, pre-1998 regulations
ULEV II	Ultra-Low Emission Vehicle, post-1998 regulations
USC	United States Code
(US)EPA	United States Environmental Protection Agency
VMT	Vehicle Miles Traveled
ZEV	Zero-Emission Vehicle
ZLSV	Zero-Emission Low Speed Vehicle

State of California
Environmental Protection Agency
AIR RESOURCES BOARD

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

**PROPOSED AMENDMENTS TO THE CALIFORNIA
ZERO EMISSION VEHICLE PROGRAM REGULATIONS**

Public Hearing Date: January 25, 2001
Agenda Item No.: 01-01-1

I. GENERAL

In this rulemaking, the Air Resources Board (ARB or Board) is adopting major amendments to the California Zero Emission Vehicle (ZEV) program regulations. The amendments are designed to maintain progress towards commercialization of zero emission vehicles while recognizing near term constraints due to cost, lead time, and technical challenges. The amendments maintain a core ZEV component, but significantly reduce the cost of the program primarily through a reduction in vehicles required in the near-term, and the broadening in scope of vehicle technologies allowed.

The rulemaking was initiated by the December 8, 2000 publication of a Notice of a January 25, 2001 public hearing to consider ZEV program amendments as initially proposed by the staff. A Staff Report: Initial Statement of Reasons (the Staff Report) was also made available for public review and comment starting December 8, 2000. The Staff Report, which is incorporated by reference herein, contained an extensive description of the rationale for the proposed amendments. The text of the proposed amendments was included as appendices to the Staff Report. These documents were also posted by December 8, 2000 on the ARB's Internet site for the ZEV program rulemaking at <http://www.arb.ca.gov/regact/zev2001/zev2001.htm>, as was the text of the proposed amendments to the Standards and Test Procedures document which is incorporated by reference by the regulation being amended.

The proposed regulatory action consisted primarily of amendments to section 1962, title 13, California Code of Regulations (CCR), and to the "California Exhaust Emission Standards and Test Procedures for 2003 and Subsequent Model Zero-Emission Vehicles, and 2001 and Subsequent Model Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes" (the ZEV Standards and Test Procedures), which is incorporated by reference in section 1962. Staff also proposed related amendments to section 1900 (Definitions), title 13, CCR, and to references to the Standards and Test Procedures document in section 1961, title 13, CCR.

On January 25, 2001, the Board conducted the public hearing, at which the staff presented suggested modifications to the originally proposed amendments, developed in response to comments received subsequent to release of the Notice and Staff Report. The Board received written and oral comments at the hearing. At the conclusion of the hearing, the Board adopted Resolution 01-01, in which it approved the originally proposed amendments with a number of significant modifications. Many of the modifications were reflected in the suggested modifications staff had presented at the hearing (“Staff’s Suggested Modifications to the Original Proposal,” Attachment C to the Resolution). Other modifications were initiated by the Board itself and were described on pages 7-8 of the Resolution. In accordance with section 11346.8 of the Government Code, the Board’s Resolution directed the Executive Officer to make the text of the modified amendments, with appropriate additional conforming modifications, available to the public for a supplemental written comment period of at least 15 days. He was then directed either to adopt the amendments with such additional modifications as may be appropriate in light of the comments received, or to present the regulations to the Board for further consideration if warranted.

In preparing the modified regulatory language after the hearing, the staff identified various additional modifications that were appropriate to best reflect the intent of the Board at the hearing. The staff has also identified several additional revisions – mostly technical – that are appropriate in order to make the amended regulations work as effectively as possible. These supplemental modifications were incorporated into the text of the proposed amendments, along with the modifications specifically approved at the hearing.

The text of the proposed modifications to the amendments was made available for a supplemental 15-day comment period ending November 15, 2001 by issuance of a Notice of Public Availability of Modified Text and Supporting Documents (the “first 15-day notice”). This Notice and its three attachments were mailed on October 31, 2001 to all parties identified in section 44(a), title 1, CCR, along with various other interested parties. They were also posted October 31, 2001 on the ARB’s Internet site for the rulemaking. Resolution 01-01 was appended to the 15-day notice as Attachment I. Attachment II contained the proposed title 13, CCR regulatory text showing the proposed modifications, along with commentaries explaining the modified language and its rationale. Modifications developed after the hearing were specifically identified. Most of the amendments to the incorporated ZEV Standards and Test Procedures document were identical to the amendments to section 1962, and were therefore not separately shown in Attachment II. However, Attachment II did show the proposed amendments to the incorporated document that were supplemental to the section 1962 language. The complete text of the incorporated document with the proposed modifications clearly shown was available online at the ARB’s Internet site for the rulemaking. The Notice’s Attachment III listed for comment additional documents that the ARB was adding to the rulemaking record in accordance with Government Code section 11347.1. The most significant additional document was a staff response to a study entitled “Impacts of Alternative ZEV Sales Mandates on California Motor Vehicle Emissions” submitted by General Motors Corp. during the comment period just prior to

the January hearing. Forty-one comments were received during the October 31 - November 15, 2001 supplemental comment period.

In light of the supplemental comments received, the Executive Officer determined that additional modifications were appropriate. A Second Notice of Public Availability of Modified Text (the “second 15-day notice”) and an attachment identifying the additional modifications were mailed on November 19, 2001 to all parties identified in section 44(a), title 1, CCR, along with various other interested parties and posted on the Internet. The comment period ended December 4, 2001, by which time 9 comments had been received.¹

One of the commenters during the first 15-day comment period urged that the deadline for comment on the additional material added to the record be extended until at least November 30, 2001, because some of the material was premised on use of the emissions inventory model EMFAC 2001; this model had not been available to the public on October 31. In response, the ARB issued a Second Notice of Public Availability of Supporting Documents and Information, announcing that EMFAC 2001 ver. 2.07 was being added to the rulemaking file, along with relevant source codes and a fleet implementation schedule, and identifying a November 30 deadline for comment on the newly identified material. On November 15 the supplemental notice was posted on the Internet – along with electronic files containing the newly added materials – and was mailed to some of the parties identified in section 44(a), title 1, CCR; it was mailed to the remaining parties November 19. The supplemental notice announced a November 30 deadline for comment on the newly identified material. Three sets of additional comments pertaining to the materials were received during the supplemental comment period.

After considering all of the comments received, the Executive Officer issued Executive Order G-01-58, adopting the amendments to title 13, CCR, and the incorporated ZEV Standards and Test Procedures.²

Incorporated Documents

The ZEV Standards and Test Procedures are incorporated by reference in relettered section 1962(h), title 13, CCR. The ZEV Standards and Test Procedures in turn incorporate certification test procedures adopted by the U.S. Environmental Protection Agency (U.S. EPA) and contained in 40 Code of Federal Regulations (CFR) Part 86.

¹ Two of the comments, each two pages long, were from automobile manufacturers who designated the contents confidential business information. These are not included in the rulemaking file transmitted to the Office of Administrative Law, and are not summarized in this FSOR, to avoid disclosure.

² The adopted amendments contained a few nonsubstantial modifications to the text made available for supplemental comment. In the Final Regulation Order, in section 1962(d)(3)(C)3. (p. 12), the reference to section 1962(e)(4) was corrected to 1962(e)(6); in section 1962(c)(4)(B), the extra period after the first sentence was deleted; and the title of the table in section 1962(e)(6)(A) (p. 16) was italicized. Comparable changes were made to the Test Procedures, and in the second line of section C.4.4 (p. C-11) an extraneous “and” was omitted.

Relettered section 1962(h), title 13, CCR identifies the incorporated ZEV Standards and Test Procedures by title and date. The ARB document is readily available from the ARB upon request and was made available in the context of this rulemaking in the manner specified in Government Code section 11346.5(b). The CFR is published by the Office of the Federal Registrar, National Archives and Records Administration, and is therefore reasonably available to the affected public from a commonly known source.

The ZEV Standards and Test Procedures are incorporated by reference because it would be impractical to print them in the CCR. Existing ARB administrative practice has been to have the motor vehicle emissions test procedures incorporated by reference rather than printed in the CCR as these procedures are highly technical and complex. They include the “nuts and bolts” engineering protocols required for certification of motor vehicles and have a very limited audience. Because the ARB has never printed complete test procedures in the CCR, the affected public is accustomed to the incorporation format. The ARB’s test procedures as a whole are extensive and it would be both cumbersome and expensive to print these lengthy, technically complex procedures with a limited audience in the CCR. Printing portions of the ARB’s test procedures that are incorporated by reference would be unnecessarily confusing to the affected public.

The test procedures incorporate portions of the CFR because some of the ARB requirements are substantially based on the federal emission regulations. Manufacturers typically certify vehicles and engines to a version of the federal emission standards and test procedures which has been modified by state requirements. Incorporation of the federal regulations by reference makes it easier for manufacturers to know when the two sets of requirements are identical and when they differ. Each of the incorporated CFR provisions are identified by date in the ARB test procedure documents.

Fiscal Impacts

The ARB has determined that this regulatory action will not create costs or savings, as defined in Government Code section 11346.5(a)(6), to any state agency or in federal funding to the state, costs or mandate to any local agency or school district whether or not reimbursable by the state pursuant to Part 7 (commencing with section 17500), Division 4, Title 2 of the Government Code, or other non-discretionary costs or savings to local agencies.

Consideration of Alternatives

The amendments proposed in this rulemaking were the result of extensive discussions and meetings involving ARB staff and motor vehicle manufacturers, environmental groups, and others. The Staff Report, released and made available to the public on December 8, 2000, identified two potential alternatives to the staff proposal: 1) do not amend the program and 2) delay program implementation until such time as the Board believes that improved ZEV technology will be available. The alternative of not

amending the ZEV program was rejected as posing too great a cost burden on manufacturers. The adopted amendments offer substantially increased flexibility to manufacturers, which reduces their compliance burden while continuing to further the goals of the program – namely air quality improvement and automotive technology advancement. The alternative of delaying program implementation was not chosen because it would remove all regulatory pressure to improve ZEV technology and slow the pace of commercialization of a variety of advanced vehicle technologies. Staff's biennial review of the program showed that zero emission vehicle technology has been demonstrated and is feasible. The primary difficulty is cost. In that environment, continuing the regulation, in a modified form creates the necessary market forces to push technology improvement and reductions in cost.

The Alliance of Automobile Manufacturers (the Alliance) and various manufacturers urged that the Board suspend the ZEV program in favor of a "Fair Market Test" the Alliance had proposed. It would be implemented through a limited liability corporation that would obtain contributions of electric vehicles and funds from large and intermediate volume automobile manufacturers. It would then sell to the public the EVs it had obtained through these manufacturer contributions. The goal of the Fair Market Test would be to assess whether there is any realistic prospect for a mass market in battery-powered EVs, by comparing the price customers are willing to pay for vehicles sold during the program to the cost of producing and selling a higher volume of EVs under a ZEV mandate. These would be determined by a blue-ribbon panel. The program would last for three years and involve 2500 EVs per year (500 full function EVs, 750 city vehicles and 1250 NEVs.)

We believe that the Fair Market Test proposal is based on a false premise – that high volume cost at this early stage of technology development is relevant to the long-term cost of battery electric vehicles. Industry has stated that volume should not be increased until several evolutions of technology occur. Yet the fair market test proposes to determine the fate of ZEVs based on the cost of producing today's vehicles in volume. This approach does not allow for or take into consideration cost reductions due to improvements in technology. Moreover, by its structure the fair market test would remove any incentive for manufacturers to pursue such technological improvements. Also, the manufacturers' proposed alternative would suspend not only the ZEV requirements for pure ZEVs, but also the requirements for PZEVs and AT PZEVs. There is no need for a market test of these technologies because they are being sold now. As proposed, the test would severely limit the size and scope of the ZEV program, create additional uncertainty, fail to encourage further technical progress, and limit the Board's authority.

General Motors (GM) urged that as an alternative means of obtaining the emission reductions attributed to the ZEV requirements by staff, the Board should consider adopting amendments that extend the useful life of several specific types of conventional vehicles (LEV I, ULEV I, LEV II and ULEV II vehicles), and vehicles meeting the enhanced and "near-zero" evaporative emissions standards, to 150,000 miles. GM asserted that this alternative was also far more cost-effective than the ZEV

requirements. However, such an approach would not achieve the long-term goals that are at the foundation of the ZEV program. It is questionable, given California's vehicle population and vehicle mile traveled per year, whether air quality standards can be met without zero emission vehicles in our future vehicle fleet mix. As such, it would be inappropriate to allow manufacturers to substitute alternative emission reduction programs for the ZEV requirement that moves the vehicle fleet so significantly in the direction it needs to go in order to meet our goals for vehicle emissions.

Other alternatives raised by manufacturers are addressed in the comments and responses section of this Final Statement. The ARB has accordingly determined that none of the alternatives considered by the ARB would be more effective in carrying out the purpose for which this regulatory action is designed, or would be as effective and less burdensome to affected private parties than the action taken.

II. MODIFICATIONS TO THE ORIGINAL PROPOSAL

A. AN OVERVIEW OF THE ORIGINAL PROPOSAL

1. The Preexisting ZEV Regulation

The California ZEV regulation was originally adopted in 1990, as part of the first ARB Low-Emission Vehicle (LEV I) regulations. The ZEV program is an integral part of California's mobile source control efforts, and is intended to encourage the development of advanced technologies that will secure increasing air quality benefits for California now and into the future.

As originally adopted, the ZEV regulation required that specified percentages of the passenger cars and lightest light-duty trucks produced by each of the seven largest auto manufacturers be ZEVs, starting in 1998. The percentages were 2 percent for the 1998-2000 model years and 5 percent for the 2001-2002 model years. A requirement of 10 percent ZEVs applied to all but small-volume manufacturers starting in model-year 2003. The ZEV program also includes a marketable credits system.

In 1996 the ARB modified the regulations to allow additional time for the technology to develop. The requirement for 10 percent ZEVs in model years 2003 and beyond was maintained, but the sales requirement for model years 1998 through 2002 was eliminated. At that same time, the ARB entered into Memoranda of Agreement (MOAs) with the seven largest auto manufacturers. Under the MOAs the manufacturers agreed to place more than 1,800 advanced-battery electric vehicles (EVs) in California in the years 1998 through 2000, and the ARB agreed to work with state and local governments to help develop ZEV infrastructure and remove barriers to ZEV introduction.

As part of the 1998 "LEV II" rulemaking, the ARB provided additional flexibility in the ZEV program by allowing additional types of vehicles to be used to meet program requirements. Under the 1998 amendments, manufacturers may use partial credits of 0.2 or more

generated from vehicles with extremely low emissions (referred to as partial ZEV allowance vehicles or PZEVs) to meet the 10 percent ZEV requirement. However, large-volume manufacturers must, at a minimum, have 4 percent of their California fleet of passenger cars and lightest trucks be vehicles classified as “full” ZEVs.

Other aspects of the program provide additional options to manufacturers. Auto companies can earn extra ZEV allowances by introducing vehicles before the 2003 model year, thereby reducing their total ZEV obligation. Extra allowance is also available for battery electric vehicles with more than a 100-mile range per charge. Manufacturers may also delay compliance by one year provided they produce two years’ worth of ZEVs by the end of the 2004 model year.

If no change were made to the preexisting ZEV regulation, ARB staff estimates that approximately 22,000 full function electric vehicles would need to be offered for sale in 2003 to meet a four percent ZEV requirement. However, this total could change significantly, up or down, based on each manufacturer’s actual production decisions and their chosen compliance path. As noted above, early ZEV introduction or the use of additional vehicles with extended range would decrease the 2003 obligation. Reduced reliance on PZEVs, on the other hand, would increase the number of ZEVs needed. Widespread use of City EVs or Neighborhood Electric Vehicles (NEVs) also would increase the required number of EVs, because such vehicles earn fewer credits per vehicle than the full function EVs that are the basis of the 22,000 estimate. Staff estimates that, if the current regulation continued to apply, ZEV production of full function vehicles at the 4 percent level would reach 31,000 in the 2006 model year, and 39,000 in 2008 and beyond.

2. The 2000 Biennial Review

When the Board adopted the LEV I regulations in 1990, it directed staff to report biennially on the status of technological progress towards meeting the LEV and ZEV requirements. As part of the 2000 Biennial Review, in August 2000 the staff released a Staff Report assessing the technical and economic issues related to ZEVs.

In the 2000 Biennial Review, the staff presented to the Board its assessment of the current status of ZEV technology and the prospects for improvement in the near- and long-term. To help assess the current status of technology and environmental impact of the program, ARB funded two research projects, one to examine the performance, cost and availability of advanced batteries, and the other to examine fuel cycle emissions from various automotive fuels. ARB also jointly funded, with the California Energy Commission, an analysis of the fuel-cycle energy conversion efficiency for various fuel types.

The findings of these research efforts indicated that several battery technologies have demonstrated promise to meet the power requirements for electric vehicle propulsion. However, the cost of these batteries will likely be high, even in volume production. This finding, when incorporated into per vehicle cost analysis and lifecycle cost analysis, shows electric vehicles to be significantly more costly than conventional vehicles in the 2003

timeframe. The Battery Panel study also found that energy density, which impacts vehicle range, remains an issue. Significant improvements in energy density were not forecasted with currently available battery chemistries. Consequently, significant improvements in vehicle range are not expected of near-term electric vehicles. While current electric vehicle consumers have not found range to be an issue, manufacturers are concerned about wider market acceptance of vehicles with limited range.

The marginal fuel cycle emissions of nonmethane organic gases (NMOG), oxides of nitrogen (NOx), and toxics are significantly lower in California for electricity than for the other fuels considered. When considering both upstream and tailpipe emissions, battery EVs contribute less CO₂ emissions compared to other vehicle technologies.

As electric vehicle technology has advanced and vehicle makers have adapted to current circumstances, it appears that EVs in a wide range of vehicle types could be available in 2003. Staff identified several potential applications in which these vehicles could be employed. However, manufacturers expressed concern that adequate market interest does not exist to absorb the required volume of EVs in 2003 and beyond for reasons related to cost, range, and recharging time.

On September 7-8, 2000, the Board met to consider the Staff Report and to hear public comment on the status of the ZEV program and whether changes to the regulations were needed. After receiving extensive oral and written comments, the Board adopted a resolution affirming that the ZEV program is an essential component of the State's long-term air quality strategy and resolving that the basic ZEV requirements be retained and implemented in California. At the same time, the Board directed staff to develop and propose regulatory modifications and other steps that address the challenges associated with the successful long-term implementation of the ZEV program, and that result in a sustainable market for ZEVs. In particular, the Board identified the need for near-term product availability and market stability, the need to greatly enhance public education regarding the attributes and benefits of ZEV technologies, and the need to reduce or mitigate the high initial costs of vehicles and batteries in low-volume production.

3. The Originally Proposed Amendments Released December 8, 2000

In preparing proposed amendments in response to the Board's directions, the staff pursued the following objectives:

- Provide incentives for ongoing technology advancement, across a wide variety of vehicle types (both ZEVs and PZEVs),
- Maintain the visibility and momentum of the ZEV program during this period of further development,
- Ensure that an adequate number of battery EVs is available in the near term to explore many different possible market applications,
- Take advantage of the air quality benefits afforded by available PZEV technology,

- Adjust the near term production requirements to better correspond to PZEV availability and the emerging market for ZEVs.

The staff proposed two basic types of amendments. The first was adjustments to the rate and timing of ZEV and PZEV introduction to better reflect the near-term realities of cost and availability. The second was adjustments to the credit and allowance calculation mechanism and the incentives that it provides. The staff also proposed several miscellaneous administrative and cleanup changes. The principal proposed amendments were as follows.

(a) Adjustments to the Rate and Timing of ZEV and PZEV Introduction

Introduction of PZEVs. The staff proposed the establishment of multipliers for the introduction of PZEVs that would provide extra allowances for PZEVs in the early years. The proposed phase-in level is 25 percent of the current requirement in 2003, 50 percent in 2004, 75 percent in 2005, and 100 percent in 2006. In addition, the existing SULEV intermediate compliance standards would apply to all 2005 and earlier model-year PZEVs. Manufacturers would also be provided two years to make up a PZEV shortfall rather than one year allowed under the current regulation.

Introduction of ZEVs. Several proposed changes would have the overall effect of reducing the number of ZEVs required, especially in the early years of the program. First, the range and phase-in multipliers would be decoupled; the replacement range multiplier is discussed below. ZEVs introduced before the 2006 model year would receive the following multipliers: 2.0 for the 1999-2001 model year, 1.5 for the 2002 model year, and 1.25 for the 2003-2005 model years. This would incentivize early vehicle placements and create a smoother volume ramp-up to alleviate the compliance cost burden.

The credits earned by NEVs, which have a top speed of no more than 25 miles per hour, would be reduced to 0.625 for the 2004-2005 model years. For 2006 and subsequent years the credit would be further reduced to 0.15. The staff concluded it was inappropriate for NEVs to receive the same credits as other ZEVs, given their lesser functionality and cost.

Staff also proposed that the 10 percent ZEV requirement for large and medium volume manufacturers be ramped up to 11 percent for the 2009-2011 model years, 12 percent for the 2012-2014 model years, 14 percent for the 2015-2017 model years, and 16 percent for 2018 and subsequent model years. This ramp up will further encourage the commercialization of a number of emerging zero emission and near zero emission technologies now under development.

(b) Modifications to the Incentive Structure

Classifying hybrid-electric vehicles (HEVs) with an all-electric range of 20 miles or more as ZEVs. Staff proposed that “extended range HEVs” – which must have an all electric

range of 20 miles or more and also meet the basic PZEV requirements – be allowed to satisfy the 4 percent ZEV requirement. The credits earned by such vehicles would be calculated according to their zero emission range, adjusted to reflect the fact that the effective range of such vehicles is greater than that of pure battery electric vehicles due to their hybrid power train. This proposal was made in order to create incentive for manufacturers to develop this type of vehicle which has significant market acceptance and zero emission miles traveled (and therefore air quality benefit) potential.

Allowing advanced technologies to satisfy part of the 4 percent ZEV requirement. Staff proposed that certain other advanced technologies that are not ZEVs be allowed to satisfy up to one half of the 4 percent portion of the ZEV requirement. The advanced technologies would be any PZEV qualifying for an allowance of 0.4 or more (before any multipliers), and allowances earned by manufacturers due to placing vehicles as part of an innovative “transportation system.” Since other proposed amendments would enable a power-assist HEV to earn an allowance of 0.45, this type of vehicle would be eligible to take advantage of the “transportation system” option. The preexistent mechanism under which a PZEV earning a score of 1.0 is considered a full ZEV allowance vehicle, not subject to the 60 percent limit for PZEV allowances, would be eliminated. As implementation of the ZEV requirements approached, it became clear that little incentive existed in the preexisting mandate to produce PZEVs other than gasoline PZEVs. In order to distinguish more between gasoline PZEVs and other advanced technology PZEVs (hybrids, alternative fuel vehicles and fuel cells running on a carbon-based fuel) while also providing a further option to reduce the pure ZEV obligation, this strategy of creating the AT PZEV category was proposed.

Staff also proposed that manufacturers that meet an accelerated PZEV phase-in schedule (50 percent of the preexisting requirement in 2003 and 100 percent of the preexisting requirement in 2004) be granted an additional 2 years to make up any shortfall in their use of the advanced technology PZEV option in 2003 and 2004. This would reward manufacturers who over-comply with the regulation by providing them with an element of compliance flexibility in return.

As the ZEV requirement increases over time starting in the 2009 model year, staff proposed that the portion that can be satisfied by 0.2 allowance PZEVs be held at 6 percent. Thus the “ZEV” portion would gradually increase from 4 percent in the 2003 through 2008 model years to 10 percent by 2018. Staff proposed that up to one half of this ZEV portion could be satisfied by advanced technologies. Thus the amount that could be offset would be 2 percent in the 2003 model year, increasing to 5 percent in 2018. This element would help grow the pure ZEV technology and increase the emissions benefit of the program over time, thus making up any short term emissions benefit losses by decreasing the number of required vehicles in the early years of the program.

Modifying the ZEV range credit. The proposal would modify the ZEV range credit to reduce the minimum range needed for multiple credits to 50 miles. As range increases from 50 miles to 275 miles the credit would increase from 1 to 10. Because vehicles

with a refueling time of less than 10 minutes earn the maximum credit regardless of range, a hydrogen fuel cell vehicle would earn 10 credits, not including any phase-in multiplier. A longer sliding scale for range multiplier provides appropriate relative credit for the full range of vehicles expected to meet market needs.

Additional credits for a vehicle in California service for more than three years with an extended battery/fuel cell stack warranty. Under the proposal a manufacturer would receive a credit of 0.1 times the original credit value of the vehicle for each year that a vehicle remains in service in California past three years with extended warranty coverage on the battery or fuel cell stack. The credit would be earned at the end of the year of service, and would be available for use in the following year. This was designed to encourage long term placement of vehicles in California, thus increasing the air quality benefit of the vehicles. Additionally, the inclusion of a warranty offers consumers with economic certainty over an unfamiliar technology.

Increasing the Advanced ZEV Componentry Allowance for PZEVs. The preexisting regulation provided an allowance of 0.1 for vehicles that do not qualify for a zero-emission VMT allowance but are equipped with advanced ZEV componentry. The proposal would increase the advanced ZEV componentry allowance to 0.25. Thus a PZEV power assist hybrid vehicle would earn an allowance of 0.45, before any phase-in multipliers. This would encourage the production of these clean-air, highly efficient vehicles over gasoline PZEVs, thus rewarding reductions in not only ozone precursor emissions, but also green house gas emissions and dependence on carbon-based fuels.

Credit multiplier based on vehicle efficiency, phased in beginning in 2005. The preexisting regulation did not address vehicle energy efficiency directly, but did so indirectly with the range multiplier. The staff's original proposal would establish an efficiency multiplier that would partially replace the range multiplier on a phased-in basis beginning in 2005. The efficiency multiplier would be limited to ZEVs and advanced technology PZEVs (PZEVs qualifying for an allowance of 0.4 or more, before any multipliers). All vehicle efficiencies (gasoline, CNG, electric) would be converted into the common units of miles per gallon equivalent (mpege). In order to earn any credit, a vehicle would have to have an efficiency that is at greater than a baseline level. The multiplier earned would be the larger of 1.0 or the vehicle mpege divided by the baseline. For ZEVs, as the efficiency multiplier is phased in, the range multiplier would be reduced to one half of its initial value. For PZEVs, the efficiency multiplier would be in addition to the current scores earned. Similar to the immediately preceding amendment, this change would reward vehicles that achieve high efficiency.

Allowances for vehicles placed in an approved demonstration program. Staff proposed that vehicles placed in advanced technology demonstration programs (e.g. Fuel Cell Partnership vehicles) earn ZEV allowances even if they are not "delivered for sale". This would provide a mechanism for recognizing early demonstration vehicles used in California that further the development of ZEVs.

ZEV credits for innovative transportation systems. The original staff proposal provided additional credit for ZEVs used as part of an innovative transportation system that effectively links homes, transit systems and cars (e.g. a station car). The credits could be used in the same manner as credits from advanced technology PZEVs.

Requiring vehicle placement in order to earn multiple allowances. Under the original proposal, vehicles that are “delivered for sale” but not actually placed in service would earn only one allowance. Multiple allowances would only be available to vehicles that are actually placed in service in California. To earn multiple allowances, manufacturers would be required to certify to the Executive Officer the number of vehicles placed in service during the course of the model year. This approach ensures maximum air quality benefit by only awarding multiple credits to vehicles in service, actually replacing polluting vehicle miles traveled and it protects against ZEVs being produced but parked or not actively marketed.

Sales volume number used to determine the ZEV obligation. Under the preexisting regulation, the ZEV obligation for a manufacturer in a given model year is based upon the number of passenger cars and light duty trucks sold by the manufacturer in that same model year. As a result the exact obligation is not known in advance, which complicates compliance planning. In order to provide greater certainty, the proposed amendments would make the sales volume used to determine manufacturers’ ZEV obligation in a given year a function of vehicle sales in a prior year, and freeze the volume number for three years at a time. This change would be limited only to the determination of the sales volume against which the ZEV percentage requirements are assessed in a given year. It would not affect the determination of manufacturer status (large vs. intermediate vs. small), which is handled separately. It would provide increased certainty to manufacturers for compliance planning purposes.

Amendments pertaining to manufacturer categories. The original proposal would increase the maximum size cut-off for an intermediate volume manufacturer from 35,000 to 60,000 new light- and medium-duty vehicles per model year. When a manufacturer transitions from intermediate to large volume manufacturer, there would be no “pure” ZEV obligation for the manufacturer until the sixth model year after three consecutive model years over the large manufacturer threshold. An independently owned manufacturer with California sales of light- and medium-duty vehicles not exceeding 10,000 per year would not be subject to the ZEV requirement. Since the industry as a whole has grown over the last ten years, yet the relative size between manufacturers has remained fairly stable, it was appropriate to adjust the manufacturer size definitions to affect the manufacturers according to their size as intended when the regulation was initially adopted.

4. Expected Impacts of the Original Staff Proposal

Under the preexisting regulation, for model year 2003 roughly 22,000 ZEVs would have to be produced assuming 100 percent full function vehicles, and about 38,600 ZEVs would have to be produced if the manufacturers built 100 percent City EVs or NEVs. In

addition, large manufacturers would produce about 290,000 PZEVs, and intermediate manufacturers would produce another 90,000 PZEVs.

The total near-term incremental cost for full function ZEVs was estimated to range between \$13,000 and \$24,000, depending on the type of vehicle and the battery employed. For City EVs the estimated near term incremental cost ranges from \$7,500 to \$10,000. PZEV SULEVs were estimated at \$500 incremental cost (the estimate has subsequently been revised), and PZEV HEVs at \$3,300. In analyzing the cost impact of the proposed amendments, staff assumed an incremental cost of \$17,000 for full function EVs (between the low and high staff estimates), \$8,000 for City EVs, \$1,000 for NEVs, \$500 for PZEV SULEVs, and \$3,300 for PZEV HEVs. Using these estimates and assumptions, the total cost of the preexisting regulation for model-year 2003 was estimated to be roughly \$39 million to \$374 million for the 4 percent ZEV component (100 percent NEVs at the low end and 100 percent full function EVs at the high end), and roughly \$190 million for the 6 percent PZEV component.

Staff estimated the number of vehicles that would be required by the originally proposed amendments under two alternative scenarios. The first assumed full 4 percent ZEV production (no use of the 2 percent advanced technology PZEV option). Under this scenario, the number of ZEVs in 2003 would be roughly 9,300 for full-function EVs, 23,500 for City EVs, or 77,200 for NEVs. The number of PZEVs in 2003 is roughly 72,000 for large manufacturers plus 22,500 for intermediate manufacturers. These vehicle totals result in a 2003 cost for 4 percent ZEV production of \$78 million assuming NEVs, \$188 million assuming City EVs, and \$158 million assuming full function EVs. The cost of PZEV production was estimated at approximately \$47 million.

The second alternative scenario assumed that manufacturers take full advantage of the option to offset 2 percent of the ZEV requirement using advanced technology PZEVs. For purposes of this scenario it was assumed that the advanced technology PZEVs offered for sale in 2003 would primarily be PZEV versions of power-assist hybrid-electric vehicles such as the Prius or Insight. Under this scenario the number of ZEVs is 4,650 assuming full function, 11,750 assuming City EVs, and 38,600 assuming NEVs. It assumes 0.2 allowance PZEV production of about 72,000 for large manufacturers plus 22,500 for intermediate manufacturers. Finally, it assumes production of 10,700 advanced technology PZEVs. These vehicle totals result in a 2003 cost for ZEV production of \$39 million for NEVs, \$94 million for City EVs, or \$79 million for full function EVs. The cost for regular (0.2 allowance) PZEVs was estimated to be about \$47 million, and the cost for advanced technology PZEVs about \$35 million.

Adding up the total cost of the program (ZEV, PZEV and advanced-technology PZEV production), the savings resulting from the originally proposed amendments in model year 2003 was estimated to range from about \$107 million (for a manufacturer that meets its ZEV obligation with 100 percent NEVs under both the current and amended regulation) to more than \$400 million (for a manufacturer that meets its ZEV obligation with 100 percent full function EVs under both scenarios). The savings in model year

2004 would be less than in 2003, due to the increased volume of PZEV production required as the PZEV phase-in multiplier is reduced.

B. MODIFICATIONS TO THE ORIGINAL PROPOSAL

1. Description of and Rationale for Modifications

As finally adopted, the amendments in this rulemaking reflect a number of significant modifications to the originally proposed regulatory text. The regulatory language made available by the Notice of Availability of Modified Text identified all of the modifications and provided the rationale for each. The document showing the modified regulatory text is appended hereto as Attachment 2. The most significant modifications are described below.

(a) Making Light-duty Trucks in the "LDT2" Class Subject to the Percentage ZEV Requirements

The only light-duty trucks that are subject to the percentage ZEV requirements in the preexisting ZEV regulation are those with a loaded vehicle weight of 0-3750 pounds – often referred to as the "LDT1" class and including small trucks such as the Ford Ranger. This limitation was criticized by a number of commenters – Natural Resources Defense Council, Planning and Conservation League, American Lung Association, Kirsch Foundation, CALPIRG, Coalition for Clean Air, Union of Concerned Scientists, California Electric Transportation Coalition and Sierra Club – who argued that the requirements should apply to sport-utility vehicles (SUVs), minivans, and other heavier light trucks as well.

In response to these comments, one of the principal modifications made by the Board was to expand the percentage ZEV requirement to apply to the "LDT2" class as well – a "LEV I" light-duty truck with a loaded vehicle weight of 3751-5750 pounds, and a "LEV II" light-duty truck with a loaded vehicle weight of 3751 pounds to a gross vehicle weight of 8500 pounds. Application to the LDT2 category is phased in over the 2007 to 2012 model years, with the inclusion of an additional 17 percent of these vehicles each year until the last 15 percent is added in 2012. Based on current sales figures, adding LDT2 vehicles to the base will increase the base by about 70 percent when the phase-in is complete.

The Board was motivated by two primary considerations. First, while a large percentage of vehicles in the LDT2 category have traditionally been used for work purposes, it is now very common for the SUVs, pick-up trucks and minivans making up the category to be used primarily for personal transportation, i.e. as passenger cars. In recognition of this phenomenon, a key element of the LEV II rulemaking in 1998 was to make these vehicles subject to the same exhaust emission standards as passenger cars. This requirement is being phased in during the 2004 – 2007 model years. For the same reason it is appropriate for these vehicles to trigger the same ZEV obligations as passenger cars. Secondly, the current regulation encourages a

manufacturer to sell more large, inefficient vehicles in order to reduce the number of zero and near zero emission vehicles it must produce.

(b) Doubling the Number of ZEVs Required by the 2012 Model Year Compared to the Modified Staff Proposal, With the Ramp up Beginning in the 2007 Model Year

At the conclusion of the January 25, 2001 hearing, the Board directed staff to make further adjustments to increase the number of ZEVs to about twice the level called for under the original staff proposal. The modified amendments revise some of the internal calculation factors to achieve this result. This change applies to ZEVs only, and does not affect the required number of AT PZEVs or PZEVs. The increase in the number of ZEVs required as a result of including the LDT2 category in the base was included in determining the necessary modifications to result in the overall increase directed by the Board. As part of this modification, staff revised its assumptions regarding the typical efficiency of ZEVs in 2007 and beyond, in a manner that slightly increases the required number of vehicles. Overall, this increase is designed to preserve the technology-forcing nature of the ZEV regulation, spur more rapid investment in ZEV technologies and development of fuel cell technologies, and maintain sufficient volumes to achieve cost reductions.

(c) Not Allowing Extended Range HEVs to Be Counted Towards the Core 20 Percent of a Large Volume Manufacturer's Percentage ZEV Requirement, With Other Compensating Modifications

At the hearing the Board concluded it was inappropriate to adopt the element of the staff proposal that would allow extended range HEVs to be counted towards the requirement that at least 20 percent of a large volume manufacturer's percentage ZEV requirement be actual ZEVs. The fundamental distinctions between a true ZEV and an HEV with an all-electric range of 20 miles or more are sufficiently great – particularly with regard to the potential for emissions degradation – that a large volume manufacturer should not be allowed meet its core 20 percent ZEV requirement with extended range HEVs. In order to provide substitute incentives for extended-range HEVs, the modifications allow these vehicles to earn a zero-emission VMT PZEV allowance beginning with 10 miles of electric range rather than 20 miles (§ 1962(c)(3)(A)), and provide additional phase-in credit for vehicles introduced through 2011 (§ 1962(c)(7)(C)).

(d) Revising the Credit Relationship Between Fuel Cell Vehicles and Battery Electric Vehicles in the Later Implementation Years

The original proposal provided permanent additional credits for fast refueling. We have concluded that while these provisions are appropriate in the early years, in later years they would result in too few vehicles being required under compliance scenarios that rely on hydrogen fuel cell vehicles. This would be counter to the Board's objective of equalizing in the long term the credits earned by battery EVs and hydrogen fuel cell

EVs. Accordingly, we have sunsetted the fast fueling multipliers in section 1962(d)(3)(C)2 after the 2008 model year.

(e) Identifying More Specific Criteria For Determining Qualification For an “Advanced Componentry” Allowance and Providing for Graduated Allowances

Under the original proposal, all PZEVs qualifying for an advanced ZEV componentry allowance would receive an allowance of 0.25. However, this approach made no distinction between different kinds of advanced ZEV componentry that made varying kinds of contributions towards ZEV technologies. The modifications provide an advanced ZEV componentry allowance of 0.1 for high-pressure gaseous fuel or hydrogen storage systems, which may not have qualified at all under the original proposal. This expressly recognizes that such storage systems can help provide a pathway towards hydrogen fuel cell vehicles. For other componentry, we have replaced the uniform 0.25 allowance with three alternative means of calculating the allowance, the last of which is available through the 2007 model year only. Providing these options recognizes that manufacturers might use a variety of approaches in incorporating advanced ZEV componentry on PZEVs.

The first option – the CO₂ reduction method -- is based on the CO₂ savings that a vehicle achieves versus the average for its class. This metric was chosen because of the effect of global warming on ground level ozone production, and the emerging importance of CO₂ savings as a vehicle technology goal. The second option – the efficiency method – is based on “best in class” efficiency performance within each size and weight classification. Since energy storage and range present the greatest challenges for today’s ZEVs, efficiency is a useful measure of the extent to which new technologies will contribute towards a zero emission future. The near-term third alternative bases the allowance on the percentage of maximum available power from electric storage. This characteristic is beneficial as a transition to pure ZEVs.

(f) Expanding the Provisions on ZEV Credits for “Transportation Systems”

The original staff proposal provided additional credit for vehicles placed in innovative transportation systems that will effectively link home, transit, and work. Such systems have the potential to reduce emissions, encourage transit use, reduce vehicle miles traveled and congestion, and relieve parking problems. At the public hearing, the Board directed staff to pursue an implementation partnership and other measures to further encourage the introduction of such innovative transportation systems in California. In following up on the Board’s directive, staff prepared modifications to section 1962(g)(5) intended to encourage the development of a few such systems, which then can be evaluated in terms of their air quality and transportation impact.

Under the original staff proposal, this credit was only available to ZEVs and range extended hybrid vehicles; was capped at twice the base value of the vehicle excluding any early introduction multipliers; and could only be used within the middle two percent.

In order to provide additional incentives for such projects, the following modifications were made.

Allowing other vehicle types to earn transportation system credit. AT PZEVs and PZEVs will be able to earn additional credit if placed in transportation system programs. NEVs are excluded from qualification for such credits, reflecting the Board's intent that NEVs not earn additional credit other than the early introduction multiplier.

Allowing transportation system credit earned by ZEVs to satisfy the top 2 percent. The transportation system credit earned by a vehicle will be available for use in the same manner as other credits earned by that vehicle. For example, transportation system credit earned by a ZEV can be used to satisfy the top 2 percent, credit earned by AT PZEVs can be used towards the middle 2 percent, and credit earned by PZEVs can be used towards the 6 percent.

Increasing the transportation system credits available. The additional credits available for vehicles placed in a transportation system are increased to a maximum of 9 for a ZEV, 6 for an AT PZEV, or 3 for a PZEV.

Capping the maximum allowable use of such credits in any given year. Credits earned by ZEVs, AT PZEVs, or PZEVs, including the credits earned by the vehicle itself, can only be used to satisfy a portion of the manufacturers obligation (one tenth each for ZEVs, one twentieth for AT PZEVs, and one fiftieth for PZEVs), and could only be used in the same manner as credits earned by other vehicles of that category.

Incorporating a credit allocation process. It is likely that many transportation system projects will involve more than one vehicle manufacturer. In such projects, manufacturers may make different contributions – for instance, one may provide vehicles only, while another may provide vehicles, system software, and technical assistance. To accommodate the variety of possible approaches and provide maximum flexibility, the “generation” of credits is separated from the “allocation” of credits:

- Credits will be “generated” by vehicles placed in a project, according to the characteristics of the project. For example, a hypothetical project may involve 50 ZEVs (25 from manufacturer A and 25 from Manufacturer B). If the project meets all criteria, then all ZEVs placed in the project would earn the maximum credit level available (9 per vehicle), resulting in a total of 450 credits. These credits would be assigned to the project manager.
- Credits will be “allocated” by the project manager, in keeping with the contributions of each manufacturer. Using the example given above, if Manufacturer A provided software and in-kind contributions, and Manufacturer B only provided vehicles, the project manager could decide to award 300 credits to Manufacturer A and 150 to Manufacturer B. Alternatively, the project manager and manufacturers could agree to allocate 400 credits to participating manufacturers and reserve 50 credits to be marketed by the project manager. All parties to the project would need to agree on

the proposed allocation. ARB then would assign credits to individual manufacturers based upon a written proposed allocation from the project manager, signed by the manufacturers involved.

Sunsetting the credit mechanism after the 2007 model year. The modifications are designed to encourage experimentation with transportation system projects. The modifications sunset the enhanced credits after the 2007 model year, such that a future Board action will be needed to continue them at the appropriate level. This makes clear that the near-term credit levels are not intended to continue indefinitely, but rather should be reviewed when we have real-world data regarding VMT, trip reduction, transit substitution patterns, and other relevant factors.

(g) Allowing a Manufacturer the Option of Basing its Percentage ZEV Requirements on Current Rather Than Prior-Year Sales

Under the original staff proposal, sales from prior years are used to determine the base against which the ZEV percentage requirement is assessed. This was done in order to provide manufacturers with a firm target. Manufacturers pointed out, however, that if sales decline they could have trouble meeting an obligation based on higher past year sales. In response to this concern section 1962(b)(1)(B) has been revised to give a manufacturer the option to base its ZEV obligation on current rather than prior sales.

(h) Limiting the Use of ZEV Credits Earned from 2001-2005 Model Year NEVs

Throughout the Biennial Review process and the consideration of the ZEV regulation, one fundamental underlying objective of the Board has been to encourage a smooth, orderly progression in ZEV development and availability. That philosophy accounts for many features of the modified regulation, which in general provides considerable flexibility and aggressive incentives in the early years, many of which are phased out in the 2007-2012 timeframe as the technology matures.

The Board recognized that NEVs could play a role in this overall progression, providing a low-cost alternative to manufacturers in the near term while introducing the public to electric transportation and satisfying various specialized applications. Thus the Board adopted the staff recommendation that NEVs be granted early introduction credits, which then phased down to the 0.15 level by model year 2006.

Public comments on the October 31, 2001 staff proposed modifications pointed out, however, that the NEV early introduction incentives could in some scenarios jeopardize the attainment of the "red line" as directed by the Board. Specifically, the introduction of large numbers of NEVs in the 2001-2002 model years could allow manufacturers to earn sufficient credits to completely "walk away" from the ZEV program for a number of years; plausibly through 2008 and beyond.

The possibility of such a significant blackout period in ZEV availability is of concern and is contrary to the overall objectives of this rulemaking. At the same time, we recognize

that manufacturers have made product planning decisions based on the regulatory structure as proposed. Therefore it is necessary to provide sufficient lead-time prior to any changes. Accordingly, the final amendments provide that credits earned from NEVs offered for sale or placed in service in model years 2001-2005 cannot be used for more than 75% of any program category (ZEV, AT PZEV and PZEV) in the 2006 model year, or 50 percent of any program category in the 2007 and subsequent model years. This should not affect any strategy that is based on an ongoing, sustainable introduction of ZEV and near ZEV vehicles. Rather, it only constrains approaches that would use large numbers of banked NEV credits to avoid any meaningful participation in the ZEV and near-ZEV market in the 2006 model years and beyond.

2. Projected ZEV Volumes For the 2003 Model Year Resulting From the Adopted Amendments

Given the significant differences between the initial staff proposal and the adopted amendments, the staff has prepared revised projections of the 2003 model year ZEV volumes resulting from the final amendments.

California sales of passenger cars plus light duty trucks by the large automobile manufacturers total approximately one million vehicles per year. As a rule of thumb, therefore, each one percent of PC plus LDT1 vehicle sales equals about ten thousand vehicles per year. At current sales levels, LDT2 sales in California are about 700,000 per year. Thus when LDT2 vehicles are fully phased in, each one percent of sales will be about 17,000 vehicles per year.

The calculation of the actual number of vehicles needed to meet the ZEV requirement in any given year is considerably more complex, however, due to several factors:

- Different vehicle types (full function EVs, City EVs, Neighborhood Electric Vehicles, hydrogen fuel cell vehicles) earn different credit levels.
- Manufacturers earn “multipliers” for vehicles with extended range, with additional allowances for vehicles delivered prior to 2003. Taken together these two factors can result in some 20 allowances per vehicle for full function electric vehicles delivered in MY 2000 and 2001, or up to 40 allowances per vehicle for hydrogen fuel cell vehicles delivered in those years. These credits can be saved for use in subsequent years.
- In addition to the multipliers discussed above, ZEV credits “banked” in a prior year have greater value when “cashed” in a subsequent year, based on the relative values for the NMOG fleet average for the years in question. Under this provision, for example, ZEV credits earned in 1999 are multiplied by 1.82 if used in 2003, and credits earned in 2000, 2001 and 2002 are multiplied by 1.18, 1.13, and 1.1 respectively.
- Manufacturers are given one additional model year to make up any shortfall in ZEV production. Thus, a manufacturer could choose to satisfy both its 2003 and 2004 obligation with vehicles delivered in 2004.

- In order to meet their obligation, large manufacturers must offer for sale a minimum of 2 percent pure ZEVs. They may, however, choose to meet the entire 10 percent requirement using pure ZEVs.
- Overall vehicle sales will vary according to external economic conditions.

To provide a context for adoption of the final amendments, staff have developed a "base case" estimate of the number of ZEVs that the large manufacturers must produce in order to satisfy a 2 percent ZEV requirement. This base case is not a prediction of actual production, but rather an estimate based on a consistent set of assumptions that can be used to track the effect of various program changes. Due to trade secret considerations this estimate does not rely on any confidential information provided in the manufacturer product plans. Instead, it is calculated using publicly available information, with the following assumptions:

- The vehicles offered for sale in 2003 through 2007 are identical in performance to the vehicles currently or most recently offered by the manufacturers. Full function EVs offered for sale in 2008 and beyond have the performance characteristics of today's RAV4 EV.
- Manufacturers do not take advantage of the multipliers available for early introduction; the entire obligation is met with vehicles produced in 2003 and beyond.
- Each manufacturer's obligation for 2003 through 2006 is based on its average production volume for 1997-1999. The obligation for 2007 and beyond is based on production volume for 2000.
- Manufacturers meet 60 percent of their ZEV obligation using partial ZEV allowances, 20 percent of their obligation using AT PZEVs, and 20 percent of their obligation using pure ZEVs.

With these assumptions, and further assuming that manufacturers rely upon full function EVs to meet the ZEV portion of the requirement, vehicle production would be as follows:

Model Year	Number of New Vehicles, by Technology Type		
	PZEV	ATPZEV	ZEV
2003	94015	10073	4477
2004	193706	22171	4668
2005	302267	26494	4817
2006	393788	35799	5966
2007	442658	40787	7198
2008	497196	46082	7276
2009	551380	63857	11052
2010	609895	69702	12447
2011	662305	76084	12473
2012	708932	97697	17535
2013	716056	98679	17712
2014	724792	99883	17928
2015	736281	133751	24673
2016	735538	133616	24648
2017	747522	135793	25049
2018	760848	173103	32205
2019	772728	175806	32708
2020	785145	178631	33234

As noted above, however, actual production may vary significantly from these totals.

3. Cost-Effectiveness

State law requires that the motor vehicle emission standards adopted by the ARB be “cost-effective.” (Health & Safety Code §§ 43013 and 43018.) Cost-effectiveness is typically expressed as the cost in dollars for each pound or ton of emissions reduced for a particular pollutant or pollutants. In this way the “cost-effectiveness” of various emissions control measures can be compared.

Calculated in this traditional way, the “cost-effectiveness” value of the ZEV program as amended in this rulemaking is very costly compared to other adopted measures. Analyses conducted by the private firm Air Improvement Resource, Inc. has identified cost effectiveness values ranging from \$405,000 per ton initially to \$115,000 per ton in later years. Using AIR’s cost assumptions (with one modification), but calculating cost effectiveness on an annual basis, staff has estimated values ranging from \$227,000 per ton initially, to \$58,200 per ton in later years. Emission control measures implemented in the state have typically not exceeded \$20,000 per ton.

But the ZEV program is not a traditional emission control measure, and the traditional way of comparing cost-effectiveness is not appropriate for this program. Typically, any

given pound of emissions reduced for a pollutant is seen as just as “valuable” as any other pound of emissions reduced, at least where the time and place are comparable. However, we believe that the value of a pound of emissions reduced from 2003 model year vehicles on account of the ZEV program is substantially greater than the value of a pound of emissions reduced by other control measures applicable to 2003 model year vehicles.

The Board seeks to achieve not only the maximum feasible emission reductions from on-road and off-road mobile sources in the near term, but also to take a quantum step forward in introducing zero-emission technologies for the long term. In that sense, the ZEV program reflects the Board’s vision of the future consisting of zero and near zero-emission vehicles. Conventional technologies and fuels are not enough. If we are to meet regional, state, and global environmental goals, we must drastically depart from today’s vehicle designs. The costs for zero emission technologies will be higher than other less dramatic departures, but the ultimate long-term pay-off is worth those greater costs.

Quite simply, the Board has concluded that zero-emission technology *is necessary* to achieve the State’s public health protection goals. Health-based state and federal air quality standards continue to be exceeded in regions throughout California. California’s burgeoning population and robust economy mean continued upward pressure on statewide emissions. The number of vehicle miles traveled each day continues to grow even faster than population. Manufacturing, power generation, petroleum refining, goods transport, home heating and cooling, personal mobility and a wide range of human activities all have direct air pollution consequences. Accomplishing zero emissions in any of these source categories (or portion thereof) mitigates their adverse impacts and protects human health.

The ZEV program is a cornerstone of the Board’s long-term vision. It is not just another control program that makes incremental improvements to some small segment of the inventory. Rather, the ZEV program involves a transformation of our vehicle pollution control strategy, towards vehicles with lifetime durability. This has implications not just for ozone but for air toxics, global warming, energy supply, water pollution, and other issues.

The Board pursues zero-emission technologies so aggressively because they transcend some of the persistent problems with conventional air pollution sources. Combustion-based engines are inherently higher emitting and prone to deterioration over time. Catastrophic failures are also a concern. Older gasoline-powered vehicles, for example, become gross emitters if their emission control systems fail. Combustible fuels also have significant “upstream” impacts. Refining, fuel storage and delivery all have associated emissions from both routine operations, accidents (breakdowns, fuel spills), and ongoing compliance problems (e.g., leaking underground tanks). Apart from upset conditions that may occur during electric power generation, zero emission vehicles have none of these vulnerabilities. Battery powered electric vehicles, and hydrogen fueled fuel cell vehicles, will remain emission-free throughout their useful

lives. And the Board needs to maintain a core zero emission requirement to provide an incentive for further development. The tremendous progress in vehicle pollution control technology that has been seen over the past decade can at least in part be attributed to the existence of the ZEV requirement. This technological innovation has in many respects outstripped expectations, resulting in emissions reductions at lower costs than had previously been anticipated. This may well occur in the future as well.

The Board views the cost-effectiveness of the ZEV program in the context of its long term vision, and accordingly places substantially greater value on the nearer term emission reductions achieved by the ZEV program. It is with this view that we find the ZEV program as amended in this rulemaking to be cost-effective.

III. SUMMARY OF PUBLIC COMMENTS AND AGENCY RESPONSES

The Board received numerous written and oral comments, in connection with January 25, 2001 hearing and during the two subsequent 15-day comment periods. Set forth below is a summary of each objection or recommendation specifically directed at the proposed amendments or to the procedures followed by the ARB in proposing or adopting the amendments, together with an agency response. The comments have been grouped by topic whenever possible. Comments not involving objections or recommendations specifically directed towards the rulemaking are not summarized below.

A. COMMENTS PRESENTED PRIOR TO, OR AT THE HEARING

(a) Comments that the Staff Proposal Reduces the ZEV Requirements Too Much

1. Comment: Do not make any changes to the current mandate, keep the mandate strong, as currently written. (103 individuals, Wedaa, Joffe, Kirsch Foundation, Clean Air Now, Hodge, Dunlap, Huestis, Pohorsky, Hastrup)

Agency Response: The Air Resources Board continues to believe in a strong ZEV mandate and remains committed to achieving zero emissions from vehicles. At its September 7 and 8, 2000 hearing, the Board directed staff to develop and propose regulatory modifications and other steps to address the challenges associated with the successful long-term implementation of the ZEV program. One of the Board's concerns in particular was to address near-term constraints due to cost, lead-time and technical challenges.

The alternative to not modify the ZEV mandate poses a great cost burden on manufacturers. Batteries are the single most expensive component of electric vehicles. For that reason, affordable battery packs—both today and when produced in volume—are crucial to achieving a sustainable electric vehicle market. ARB established an independent battery panel that concluded battery costs are indeed high and will not

meet cost-competitive targets for some time. Although volume production will help, a breakthrough is needed to achieve truly affordable batteries for electric vehicles. ARB staff believes a more gradual ramp of ZEV requirements is necessary to adjust for the realities of high cost and the development of battery technology. At the hearing in January, the Board proposed a scenario that increases the number of ZEVs from Staff's proposal. In addition, it is important to note that the Board's proposal when compared with the current mandate will eventually surpass the number of ZEVs required under a scenario where half the vehicles are full function EVs and half are city EVs. The ARB believes that allowing a more gradual ramp of the ZEV requirements along with the Board's increase of ZEVs will ensure the long-term success of a sustainable market for ZEVs.

2. Comment: The staff proposal is a significant weakening of the ZEV mandate. It would dramatically reduce the number of ZEVs in both the near-term and long-term. It is unfair to public agencies that have invested significant money and time into electric vehicle programs. Maintain the current mandate, which is balanced and fair, and gives generous credit for an array of advanced technology vehicles. (City of San Francisco)

Agency Response: The rationale for reducing the number of vehicles in the near-term is described in the response to the comment above. At the Board's direction, the number of required vehicles will double beginning in 2007. The Board is committed to the ZEV program and placement of vehicles and infrastructure. State agencies including the ARB have also invested funds into the program along with other public agencies. These funds have helped, and will continue to aid in the development of ZEVs.

3. Comment: We recommend that we make a smaller decrease in the number of short-term pure ZEV targets so that people can use the available incentive packages. (CAPCOA, BAAQMD, SCAQMD)

Agency Response: Please see response to Comment (a) 1.

4. Comment: Continue to maintain your strong support of an aggressive ZEV program in California. (The cities of Santa Clarita, Twenty Nine Palms, Palm Springs, Chino, Coachella, Fontana, Montclair, Calabasas, El Segundo, Davis, San Bernardino, Redlands, and the Western Riverside Council of Governments).

Agency Response: Please see response to Comment (a) 1.

5. Comment: If the ARB compromises the numbers any more there will not be any credits left for ZEVs and the mandate will become ineffective. The ZEV numbers should be kept at the current 4% or increased. Starting now build ZEVs in the specified numbers to fulfill the mandate by 2003, deliver enough cars to fill the back log of orders, and offer more of these cars to the public as leases and purchase so there is no back log. Open up sales to the rest of the United States. Leave the numbers the same and get automakers to fill the back orders. (Chapman)

Agency Response: Please see response (a) 1.

6. Comment: Reinstate the 6 percent ZEV standard. (Coffin)

Agency Response: In 1998, one of the amendments to the ZEV regulation was to decrease the number of battery electric vehicles from 10% to 4%. Battery electric vehicle technology had not progressed as much as hoped then, nor has it now. Thus, in 1998 an adjustment was made to allow partial ZEV (PZEV) credit for extremely clean vehicles that are not pure ZEVs. In addition, there are other promising low emitting vehicle technologies on the horizon that ARB wants to encourage such as compressed natural gas, hybrid-electrics, and methanol fuel cells. These vehicles are included in the staff proposal and can be used to satisfy up to half of the 4% ZEV requirement. ARB staff believes that both of these adjustments in 1998 and now to the pure ZEV requirement are in keeping with the state of the technology development. Please see also response (a) 1.

7. Comment: The Board should require even larger fractions to meet the ZEV standards (e.g. 50% ZEV in 2010, 75 % in 2015) (Withycombe)

Agency Response: The Board doubled the number of required ZEVs in the out years. However, this increase is modest compared to the levels proposed by the commenter. ARB staff believes that larger volumes of ZEVs than adopted by the Board are not technologically or economically feasible. Please see also response (a) 1.

8. Comment: Thank you for taking strong action in your September 2000 Board hearing to uphold the Zero-Emission Vehicle (ZEV) program and to affirm its importance for achieving California's air quality goals. Now that you will be considering regulatory changes later this month, I am writing to urge you to demonstrate this same level of support for ZEVs by strengthening the program included in the staff proposal. ZEVs are a proven and viable technology, and are essential to meet our air quality goals. I believe that CARB must do everything possible to promote this technology instead of cutting back the program before it has a chance to succeed.

In order to keep the ZEV program strong, your leadership is needed to dramatically increase the numbers of zero-pollution vehicles required to be produced by auto makers in the staff proposal, as well as to ensure that the number of zero-pollution vehicles grows significantly over the next ten years. Taking these actions will put the ZEV program back on track for 2003 and beyond. Maintaining a strong ZEV program is critical to improving air quality and public health in my community, and other communities throughout California. (96 individuals)

Agency Response: Per the Board's directive at the January 2001 hearing, ARB staff is strengthening the original staff proposal by doubling the number of ZEVs required beginning in 2007. The Board proposal also includes, beginning in 2007, the addition of sport utility vehicles, larger pickup trucks and vans in the sales figures used to calculate

each manufacturers ZEV requirement. The Board believes that these changes will strengthen the ZEV program.

9. Comment: Increase the percentage requirement for pure ZEVs to a larger percentage in 2006 and increase this through 2010 and beyond. (ZEV Alliance, ALA, NRDC, Finney, Slawson)

Agency Response: ARB staff believes that increasing the percentage requirement for pure ZEVs to a larger percentage is not technologically or economically feasible. Please see responses to (a) 1 and (a) 8.

10. Comment: The number of pure ZEVs should be increased over time to ensure a successful commercial market. Ways to increase the long-term number of pure ZEVs include reducing the multipliers. (Joffe, Avestor, ALA, CBE, Environmental Health Coalition, ZEV Alliance, NRDC, Cal ETC, Korthof, L'Amoureux, Slawson, PCL Johnson, Shapin, Zaitlin)

Agency Response: Please see responses to (a) 8. Staff achieved a doubling in the ZEV requirement by including light-duty trucks 2 (LDT2s) and by reducing multipliers as suggested.

11. Comment: Increase number of vehicles in out years. (Joffe)

Agency Response: Please see response (a) 8.

12. Comment: Make changes to the ARB staff proposal to increase the total number of ZEVs yearly through 2008. (Yolo-Solano AQMD)

The Board should increase the number of fuel cell vehicles, hybrid vehicles as well as other better electrical system vehicles. (Denneen, Gurdin, Gausling, LaFleur, Weisz)

Agency Response: Please see response (a) 8.

13. Comment: Too much of the mandate can be met with PZEVs and non-vehicle ZEV credits. (International Fuel Cells)

Agency Response: ARB staff believes it is important to allow vehicle manufacturers flexibility in meeting the ZEV regulation with vehicles such as PZEVs and non-vehicle ZEV credits. Allowing partial credits for PZEVs which are extremely clean vehicles that are not pure ZEVs will give manufacturers flexibility while still decreasing emissions and meeting ARB's clean air goals. In addition, ARB staff believes that it is important to encourage other non-vehicle developments such as shared use, application of "intelligent" new technologies and linkage to transit. ARB staff believes that the amount of credit given to PZEVs and other non-vehicle developments is appropriate when compared to the "gold standard" of pure ZEVs.

14. Comment: We would like to see an increase in the number of zero-emission vehicles recommended in the staff proposal and see a much steeper ramp of pure ZEVs in the 2006 to 2010 timeframe. We urge a goal of at least 40,000 full-function vehicles by 2010 through the phase out of credit multipliers allowed in the staff proposal by 2010 or by the increase in percentage requirements for pure ZEVs between 2006 and 2010. (Bonnie Holmes-Gen, ZEV, UCS)

Agency Response: In response to such comments, the Board directed staff to double the requirement for ZEVs beginning in 2007. See the response to comment (a) 8.

15. Comment: The ARB should dramatically reduce the amount of credits that serve to reduce the number of clean vehicles automakers must produce. The ZEV requirements should be increased significantly over time starting in 2005. (Wright, Matousek, Khalsa, Askren, Renzetti, Kohr, Dearborn, Markwith, Brinkman)

Agency Response: The ZEV mandate includes several multipliers, which have the effect of reducing the number of ZEVs that manufacturers are required to produce. These multipliers include: a Phase-In to encourage vehicle production in earlier years, a Range multiplier to encourage increased range of vehicles and rapid refueling, an Efficiency multiplier to increase vehicle efficiency and a Neighborhood Electric Vehicle (NEV) multiplier. Further, the regulation also includes credits for transportation developments such as shared use, application of “intelligent” new technologies and linkage to transit, and lastly a battery warranty credit. ARB staff believes that is important to encourage all of these aspects in order to achieve the long-term sustainability of ZEVs. The majority of the multipliers is phased out by 2012 to one or a fraction thereof. This reflects ARB’s commitment to increase the actual number of ZEVs in the long term when the market is established.

16. Comment: Phase-out credit multipliers so that by the end of the decade there is a one-to-one ratio between each ZEV produced and the credit it receives (ZEV Alliance, NRDC, Cal ETC, ALA)

Agency Response: Please see response (a) 16.

17. Comment: We urge you to get as close to the real four percent in the 2010 timeframe and start in 2006 to preserve a path to zero emissions. (UCS)

Agency Response: Please see response (a) 16 and (a) 8.

18. Comment: The reduction in the number of ZEVs due to the combined phase-in multipliers is unacceptable. Over the almost 20 year time period annual ZEV volumes need to be achieved that are consistent with competitive life cycle costs of conventional vehicles. The staff proposal is unacceptable in that it does not exceed 20,000 true ZEVs until 2015. The proposal delays the original ZEV vision by 15 years. If the ZEV volume is cut to 4600-9300 ZEVs in the near-term, there is a danger that the fleet demand will overwhelm available supply, as has already happened during the MOA

period (1998-2000); this is especially true if some automakers would continue to not make their EVs available to the public. Retail customers would find it very difficult, if not impossible, to lease or buy an EV. (Mason)

Agency Response: Please see response (a) 16 and (a) 1.

(b) Need to Increase ZEV Volumes to Reduce Per-Vehicle Cost

19. Comment: According to proposed requirements, the number of battery packs needed is about 5,000 per year. This is too low to sustain battery business and needs to be at least doubled. (Avestor, Joffe, ECD, PEVDC, Mason, AAM, BMW)

Agency Response: In response to public input both prior to, and at the Board hearing, the Board directed that the number of ZEVs be doubled by 2012 with a ramp beginning in 2007, in comparison to the modified staff proposal. This change is intended to help reduce cost through greater volume and continue a steady increase in vehicles to full commercialization in the future years. More time is needed for battery makers to develop, refine, and reduce the cost of advanced batteries. Thus, the number of vehicles prior to 2007 will remain as proposed.

20. Comment: We urge you to require the use of ZEVs in sufficient volume both to drive down their production cost as well as to have a significant impact on California's air quality. We also support the sale of HEVs that offer significant all-electric ranges. (Warden)

Agency Response: Batteries are the single most expensive component of electric vehicles. For that reason, affordable battery packs--both today and when produced in volume--are crucial to achieving a sustainable electric vehicle market. ARB contracted with a team of outside experts to obtain the best available information on battery advances, costs and future trends. The Battery Panel concluded that nickel metal hydride batteries were the most promising advanced technology, having both high performance and the longest useful life. Unfortunately, the Panel also concluded that battery costs are high and will not meet cost-competitive targets for some time. Although volume production will help somewhat, a breakthrough is needed to achieve truly affordable NiMH packs. The amendments reflect these findings and provide for a limited market in the near term as battery makers continue research into the development of cost-effective advanced batteries.

21. Comment: Battery leasing should be incorporated to reduce costs. (Avestor)

Agency Response: The ARB does not regulate sales or lease terms of motor vehicles. While battery leasing may be an attractive tool to help with the high initial capital costs of advanced batteries, the overall cost of current advanced batteries will still severely limit the market for the technology.

22. Comment: The regulation is becoming way too complex. We need a massive ZEV deployment to bring down costs and to make a big impact on air quality. (Pohorsky)

Agency Response: The regulation has become more complex as staff has tried to provide flexibility to automakers in meeting the ZEV program requirements. Given the wide variety of technologies and vehicle designs being pursued, it is not possible to adequately acknowledge and incentivize the various technologies being developed with a simple regulation. The number of pure ZEVs required is limited in the near term to allow the needed time for continued development of these vehicles. The number of AT PZEVs and PZEVs is much greater and represents the initial market necessary for broad commercialization.

(c) Cost-Effectiveness Issues Related to the ZEV program

23. Comment: State law also requires the ARB to implement regulations in a cost-effective manner and to fully consider alternatives. The ZEV program is far more expensive than any other air quality improvement regulation previously adopted by the ARB and is clearly not cost-effective. This rule is not cost-effective and should be made optional. The ARB process should be changed to review old cost-effectiveness calculations in the presence of new data. (Toyota)

Each of the three ZEV program elements (AEV, AT PZEV and PZEV) far exceeds any previous regulation on a cost-effectiveness basis. This conclusion is based on staff's data for both costs and benefits. Using staff's \$5 per pound criterion for vehicle control measures, the least expensive ZEV program element, PZEV, is more than 20 times more expensive than the criterion. The most expensive ZEV program element, battery electric vehicles, is about 140 times more expensive than the criterion. Since the [LEV II] proposed zero fuel evaporative emission requirement was much less expensive on a cost-effectiveness basis than any of the proposed ZEV program elements, it is not clear why staff is pursuing the ZEV requirements apparently without that same regard to cost. Clearly the ZEV program elements should be made optional for the same valid reasons that the zero fuel evaporative emissions standards were made optional. With more cost-effective measures available, technical feasibility alone does not justify the ZEV program. (Toyota)

California law also requires that the ARB adopt regulations that are cost-effective and to fully consider alternatives. In fact, cost-effectiveness is conscientiously ignored in the December ARB Staff Report, which states "...near term cost-effectiveness is not a deciding factor in the Board's consideration of the ZEV program and staff's proposed changes". The December ARB Staff Report acknowledges, however, at least in the early years of the program the dollars spent per ton of pollutant reduced under the ZEV program will be much higher than for any other ARB regulatory measure. (AAM)

At the September 7-8 Meeting, the Alliance and automakers presented an analysis that estimated that near-term cost effectiveness for the ZEV mandate is well in excess of a

million dollars per ton. Significantly, this fact is not disputed in the December ARB Staff Report. (AAM)

Neither the August ARB Staff Report nor the December ARB Staff Report contains any estimate of the long-term cost effectiveness of the ZEV mandate. The August report did contain a comparison of potential long-term total operating costs for both ZEVs and PZEVs, which showed similar total operating costs when maintenance and fuel costs were included. However, the fact that long-term cost may be similar between PZEVs and ZEVs does not mean either of these technologies are “cost effective”. Cost effectiveness estimation requires the estimate of incremental costs and incremental emission reductions, and the division of the two. (AAM)

The ZEV program is very different than most mobile source regulations, in that it is clear to everyone that short-term incremental costs are extremely high, and there is widespread debate about whether these costs will be significantly lower under volume production scenarios. Therefore, at the outset it is inappropriate to estimate per vehicle cost effectiveness for either the short term or the long term, since the short term cost effectiveness figures ignore the cost reductions that could hypothetically be achieved in the long run, and the long term cost effectiveness figures will ignore the very high short term cost. What is needed is an approach that takes both the short and long term into consideration simultaneously. (AAM)

[F]or the proposal in the December ARB Staff Report with either FFEVs and CEVs, cost effectiveness starts at \$700,000 per ton, increases to almost 1.6 million dollars per ton, and declines to about \$150,000 per ton. ... [W]hen the cost effectiveness values ... are discounted to the net present value (NPV) in 2003, the cost effectiveness of the staff proposal with either the full function ZEVs or CEVs is between \$263,000 and \$283,000 per ton of ROG + NO_x—well over 10 times the cost effectiveness of any regulation previously adopted by the ARB. ... The ARB staff uses an internal guideline of \$11.00 per pound (\$22,000 per ton) of ROG and NO_x reduced as an upper limit for implementing control strategies. On average, the staff proposal is 13-15 times greater than this internal guideline. (AAM)

The EV portion of the ZEV mandate is projected to cost over \$1.7 million per ton of hydrocarbon and oxides of nitrogen, using ARB staff’s assumptions regarding the emission benefits. That’s more than 100 times more expensive than almost all other control measures adopted by ARB. (Sierra Research)

The results of this analysis show that over the 27-year period from 2003-2020, the cost effectiveness of the ZEV mandate as modified by ARB’s recently proposed changes is between \$263,000 and \$283,000 per ton of ozone precursor. This is in the range of \$132 - \$142 per pound. To compare the cost effectiveness levels above to other measures adopted by the ARB, AIR examined information on the cost effectiveness of other measures using available ARB estimates for cost-effectiveness. The cost effectiveness of the ZEV mandate is on the order of 25 to 27 times as expensive on a

cost per pound basis as the most expensive mobile source control measure adopted in the 1990s by ARB. (Darlington)

Agency Response: Resolution 01-01, adopted by the Board at the January 25, 2001 hearing, specifically noted that the ZEV requirements “will result in a higher cost per ton of pollution reduced than any other ARB regulatory measure; nevertheless, the amended ZEV regulations remain an essential component of the State’s long-term air quality strategy because of the promise and ultimate necessity of zero-emission technologies.” Throughout the regulatory process the Board has looked towards the long-term potential of zero- and near-zero technologies. The August 7, 2000 Staff Report noted that with volume production and improved technology, battery electric vehicles could ultimately become competitive on a lifecycle cost basis. In addition, the significant resources devoted to fuel cell development indicate that manufacturers believe that there is a business case that fuel cell vehicles could be competitive with conventional vehicles.

Thus, the Board views this regulation in a different light, not directly comparable to the other regulations that it adopts. Unlike other regulations, the ZEV program is seen as a way to bring about a transformation of our vehicle pollution control strategy. This transformation is an essential component of the Board’s vision of zero- and near-zero technologies applied wherever possible.

With regard to the specific estimates provided by commenters, staff believes that they do not, for the most part, adequately take into account likely future cost reductions. They generally are based on cost estimates derived from the ARB August 7, 2000 Staff Report. These Staff Report cost estimates were near-term in nature, and were not intended to be used as a projection of costs over a 20 year timeframe. Using them in that fashion essentially assumes that there will be no technical improvement in ZEV and near-ZEV technology over the next 20 years. Staff believes that this is an extreme assumption not supported by the history of vehicle pollution controls. This point was discussed in detail in the October 31, 2001 ARB Staff Review of Report Entitled “Impacts of Alternative ZEV Sales Mandates on California Motor Vehicle Emissions: A Comprehensive Study (NERA-Sierra). In that review, staff noted that:

- Staff’s estimate of the incremental cost for PZEVs has been reduced from \$500 to \$200. The revised cost reflects a reevaluation of the likely technology to be used by PZEVs and the durability of that technology in use. In addition, the PZEV extended warranty (15 years or 150,000 miles) has additional value to the customer above and beyond the normal emission warranty.
- The NERA-Sierra report, by using a \$2,500 estimated incremental cost for AT PZEVs throughout the 2020 study period, in essence assumes that there will be no technical improvement in future years that will reduce the cost of HEV production.
- Although AT PZEVs will carry an increased initial purchase price, because of their fuel efficiency they will recoup a savings over the life of the vehicle in terms of reduced fuel expenditures. This benefit can be substantial. Using the methodology outlined in the August 7 Staff Report, the net present value of the fuel savings for

HEVs was estimated to be about \$1,600 per vehicle using an after-tax gasoline price of \$1.75.

- With regard to future ZEV costs, the NERA-Sierra study takes the ARB near term estimates and assumes that these cost levels will continue on in perpetuity, except for changes due to increased production volume. Specifically, the NERA-Sierra Report estimates that the incremental cost for a ZEV decreases gradually over time from \$45,715 in 2003 to \$32,215 in 2020. It is important to note, however, that this cost decrease is related solely to increased production volume, and does not include any allowance for technical improvement over time.
- To provide a more reasonable view of long term ZEV costs, staff reviewed recent published studies. The most recent and comprehensive analysis that staff was able to identify was prepared by Arthur D. Little for the California Energy Commission (Projected Automotive Fuel Cell Use in California, Arthur D. Little Inc., October 2001). This report looks at the status of fuel cell technology and projects cost trends and market penetration scenarios. With regard to cost, the A.D. Little study concluded that, “[T]otal incremental vehicle prices above current average mid-size vehicle costs (\$18,900) are estimated to be about \$9,300 higher for a direct hydrogen mid-size FCV, \$10,000 for a steam reformed methanol mid-size FCV and around \$11,200 higher for a gasoline or ethanol autothermal reformer-based mid-size FCV in the near-term (2010 to 2020). For aggressive hybridization strategies, incremental costs of \$9,000 for a direct hydrogen FCV, \$9,700 for a steam reformed methanol FCV and \$10,400 for an autothermal reformer gasoline or ethanol FCV are calculated. Further cost reductions are possible as fuel cells become more reliable and warranty issues are less of a concern to automobile manufacturers. Additional savings could occur from larger production volumes through the learning curve phenomena.”

The effect of these modifications on the assumed long-term cost of the ZEV program is substantial. For example, the Toyota comments, using near term ARB numbers, derived a cost effectiveness of \$111 per pound for PZEVs, \$412 per pound for AT PZEVs, and \$698 per pound for ZEVs. Using the modified ARB cost assumptions discussed above, these totals are reduced to \$44 per pound for PZEVs, \$136 per pound for AT PZEVs, and \$297 per pound for ZEVs—reductions of roughly 60 percent from the Toyota estimates. Additional discussion of the long-term cost-effectiveness using the most recent ARB cost assumptions is provided in the agency responses to Comment 292.

24. Comment: As currently written, it is difficult to see how the proposed amendments effectuate the purposes of the Health and Safety Code and other applicable environmental statutes, which require actual emission reductions without substantial adverse economic impact to California businesses or its economy. (Honda)

Moreover, the combination of this lack of demand with the high costs of producing qualifying battery electric vehicles has resulted, and will continue to result, in substantial economic losses for the California automotive industry and corresponding adverse effects on the California economy. (Honda)

The Staff Proposal Mandate would result in negative impacts on the California economy in terms of employment, gross state product, and personal income according to the results of the regional economic analysis. The results show that over time, the net negative impacts become larger. The Staff Proposal Mandate would result in a loss of about 10,000 jobs, about \$854 million in GSP, and about \$1.1 billion in personal income by 2020 relative to the baseline forecast for California. (Pekelney)

The proposed amendments would impose substantial costs on the regulated community for little or no corresponding environmental benefit. The combination of insufficient consumer demand with mandatory levels of production at substantial cost will continue to result in guaranteed economic loss in the production of battery electric vehicles. Moreover, by forcing the California automotive industry to produce thousands of high-cost battery electric vehicles without corresponding market demand to offset those costs, the ZEV regulation and the proposed amendments have and will continue to substantially injure the economic well-being of the California automobile industry. (Honda)

Agency Response: The commenters inappropriately refer to the impact of the entire ZEV program on manufacturers, as opposed to the effect of the proposed modifications. In fact, the proposed modifications significantly reduce the impact of the ZEV program on California businesses. Staff prepared an estimate of these savings as part of the December 8, 2000 Initial Statement of Reasons. Adding up the total cost of the program (ZEV, PZEV and advanced technology PZEV production), the estimated savings due to the December 2000 staff proposal in model year 2003 were estimated to range from about \$130 million (for a manufacturer that meets its ZEV obligation with 100 percent NEVs under both the current and the amended regulation) to more than \$400 million (for a manufacturer that meets its ZEV obligation with 100 percent full function EVs under both scenarios.). The distribution of such savings among manufacturers, dealerships, vehicle purchasers and subsidy providers was not estimated.

The savings due to the staff proposal would continue on in future years. The savings in 2004 would be less than in 2003, due to the increased volume of PZEV production required as the PZEV phase-in multiplier is reduced.

Although the impact of the overall program is not relevant for this rulemaking, as part of the October 31, 2001 ARB Staff Review of the NERA-Sierra report staff collected data on manufacturers' annual net income. This was done in order to place in context the manufacturers' ability to absorb a cost increase within their own operations. For the five most recent fiscal years for which data was available (2000-1996 for domestic automakers and 2001-1997 for Japanese automakers), the average annual combined net income for the six large manufacturers subject to the ZEV requirement was about \$26 billion. In the December 7, 2000 Staff Report staff estimated that the incremental cost of the ZEV program for 2006, when the PZEV option is fully phased in, would be

about \$450 million. This amount represents about 1.7 percent of the annual average net income for the six large automakers over the recent five-year period reviewed.

Staff recognizes that automaker net income fluctuates over time, and that current trends are negative relative to the most recent five years. Over the long term, however, such fluctuations will average out.

25.Comment: Emissions estimates ignore the economic reality of decreased sales due to higher costs and the resultant increase in fleet age and emissions. The modest benefit calculated by staff assumes no change in sales. The most likely result will be an air quality disbenefit. (Toyota, Salisbury, Dunbar)

[W]e strongly believe, and have conclusive data to indicate, that the ZEV mandate will increase emissions in California for many years to come. (AAM)

This “disbenefit” occurs because the cost of compliance with the ZEV mandate will drive up the cost of new non-electric cars throughout California. The resulting price jump will lead to motorists keeping their older, higher-polluting vehicles longer. Even under the revisions proposed in the December ARB Staff Report, this effect would result in a net increase in air pollution over the next 20 years. The Alliance commissioned Sierra Research and National Economic Research Associates (NERA) to conduct a study to investigate the possible environmental impacts due to the changes proposed in the December ARB Staff Report. (AAM)

The impact of these higher costs is more specifically detailed in a study commissioned by the Alliance and conducted by Sierra Research and NERA. This report concludes that it is unreasonable to assume that auto manufacturers will simply absorb the increased costs of regulatory compliance in California. Sierra Research and NERA conclude that it is more rational to assume that increased costs will be passed on to California new vehicle purchasers. A total incremental cost of several hundred million dollars each year will drive up the cost of a new California vehicle by several hundred dollars. (AAM)

Using the approach utilized in the December ARB Staff Report, the direct benefit of pure ZEVs is very small. When market effects are properly accounted for, there is a net disbenefit associated with the ZEV mandate. (AAM)

The evidence demonstrates that implementation of the ZEV mandate beginning in the 2003 MY will increase fleet wide emissions substantially and for a long period of time, and thus set back the State’s efforts to reduce air pollution. (AAM)

Of course any notion that the mandate is “necessary” for the control of vehicle emissions is indefensible if, in fact, the mandate actually has the effect of increasing overall emissions from the California motor vehicle fleet. There is substantial evidence that, contrary to the estimates in the December ARB Staff Report, either form of the mandate would be counterproductive to the objectives of the law, resulting in increases

in vehicle emission over the next 20 years or more. The promulgation of regulations that would have this effect is not consistent with ARB's statutory authority. The NERA-Sierra analysis reveals the mandate's negative impacts on air quality and confirms that the mandate should not be considered valid or effective under California law. (AAM)

Instead of addressing and analyzing these issues, the ISOR's brief "Environmental Impacts" section adopts the erroneous assumption that 100% of cars produced will be purchased by the market and placed into service, then estimates emission reductions based on that false assumption. The ISOR completely fails to address or analyze the potential for higher net emissions or other environmental issues which may arise as a result of the adoption of the amendment in their current form, and Honda has serious concerns that this failure may amount to a violation of Section 60005. Moreover, the ISOR has not addressed feasible alternatives to the amendments which would reduce these potential adverse impacts to the environment, and Honda believes that such alternatives must be analyzed and explored to ensure compliance with Section 60005. (Honda)

The staff's emission reduction estimates are based on two assumptions that are clearly wrong. First, the staff assumes that the increased cost associated with the ZEV mandate will have absolutely no effect on the sale of new vehicles in California. Second, the staff assumes that every EV will fully replace a conventional gasoline vehicle. (Sierra Research)

The slight loss in new car sales, which results in older vehicles staying on the road longer, combined with the fact that EVs can't fully replace gasoline vehicles, results in an increase in emissions due to the mandate. By 2010, instead of a 1.3 ton per day reduction in hydrocarbon and oxides of nitrogen calculated using the ARB staff assumptions, there is a 4.3 tons per day increase. (Sierra Research)

Even though the ARB staff's estimate of the emissions benefits of the ZEV mandate are modest, the estimates still grossly overestimate the emission reductions that will result from the ZEV mandate. There are three problems with ARB's analysis of the benefits of the ZEV mandate. First, ARB fails to account for the impact of limited vehicle range of ZEVs and its effect on the resulting emission s performance. Second, ARB fails to account for the impact of increased new car prices resulting from the ZEV mandate and the resultant slowdown in vehicle fleet turnover. Lastly, ARB ignores non-fuel background emissions from ZEVs. (Darlington)

This declaration ... highlights two major issues that CARB staff has not accounted for in evaluating the impact of the ZEV mandate. The first issue concerns the limited range and relatively long recharging times of battery electric vehicles. Battery electric vehicles will not, in general be capable of satisfying all of their owners' travel needs. By failing to recognize and account for this fact, CARB has overestimated the emission benefits of ZEVs. The second issue relates to the delay s and decreases in new vehicle sales resulting form the increased cost of vehicles under the ZEV mandate. This will lead to

greater numbers and usage older vehicles, thereby increasing emissions of air pollutants. (Lyons)

As recently as 1996, ARB expected the mandate to reduce vehicle emissions by 14 tons per day in 2010. Today, those reductions—under the current mandate or the December ARB Staff Report—are less than 1.5 tons per day. Furthermore, this figure does not account for the higher emissions that will result as motorists, faced with new vehicle price increases, keep their older, higher-polluting vehicles on the road longer. (Toyota)

Honda believes that the proposed amendments do not suggest a “necessary and technologically feasible” way to reduce vehicular air emissions in California, but instead would require the production of battery electric vehicles that, while zero-emitting, would not be purchased by California consumers on a statewide basis, promoting the continued use of California’s older, higher-polluting vehicles. (Honda)

The mandate’s requirement that manufacturers produce and offer for sale ZEVs will result in significant increases in the prices of new PCs and LDT1s in California. The price increases will reduce the number of new PCs and LDT1s sold in California and increase somewhat the number of other new vehicles sold. More importantly, the price increase for new vehicles will lead vehicle owners to keep their existing vehicles longer. The net effect will be a decrease in the scrappage rates for existing vehicles due to the ZEV mandate. Because many existing vehicles have significantly greater emissions than new vehicles, these changes in the turnover of the existing fleet will have the unintended effect of increasing overall fleetwide emissions compared to the levels that would prevail in the absence of the ZEV mandate. (Harrison)

Agency Response: The above arguments are set forth in detailed fashion in a report entitled “Impacts of Alternative ZEV Sales Mandates on California Motor Vehicle Emissions: A Comprehensive Study”. This report was prepared by National Economic Research Associates (NERA) and Sierra Research, and was submitted as part of written comments filed by General Motors Corporation on January 23, 2001.

On October 31, 2001 ARB staff released for public comment a comprehensive review of the NERA-Sierra report. In that review, ARB staff concluded that the NERA-Sierra report significantly overstates the impact of the California ZEV program on vehicle prices, vehicle sales, and fleet turnover-related changes to vehicle emissions. Major considerations include:

- The cost increases assumed by NERA-Sierra are overstated.
- Manufacturers will not necessarily be able to pass along all increased costs.
- Small price increases can be addressed by a variety of manufacturer marketing practices and will not necessarily reduce sales.
- The NERA-Sierra emission modeling failed to take into account recent changes to the LEV II program.

Using reasonable ARB staff assumptions, rather than the assumptions used by NERA-Sierra, the NERA-Sierra model predicts a “ZEV tax” of only \$36 in 2007 and \$26 in 2020, even if the entire increased cost is spread only to vehicles sold in California. When the Board’s January expansion of the ZEV program is taken into account, the estimated “ZEV tax” is about \$50. Staff concludes that at these modest levels, such cost increases, if they occur at all, will have an insignificant effect on vehicle sales.

Although staff does not accept the purported effect on vehicle sales, in order to fully investigate the NERA-Sierra arguments staff conducted additional analyses, using to the extent possible the NERA-Sierra methodology. Staff has determined that the significant reductions in the “ZEV tax” noted above lead to equally significant reductions in the effect on vehicle sales. Looking at passenger car sales, the NERA-Sierra base case predicts a reduction in new vehicle sales in 2012 of 25,735 vehicles as compared to the sales level used in the ARB Staff Report emission analysis. Using more realistic ARB assumptions, the sales decrease in 2012 is 4,824 vehicles, a reduction of 81 percent from the NERA-Sierra base case.

Finally, the reduced impact on vehicle sales results in a reduced impact on vehicle emissions. Rather than the emission increase reported in the NERA-Sierra base case, staff estimates that the ZEV program results in an emission decrease of 0.32 tons per day in 2010 and 1.57 tons per day in 2020 using the NERA-Sierra methodology with more reasonable ARB assumptions.

Thus the basic conclusion of the NERA-Sierra report—that the ZEV program results in an emission increase due to reduced fleet turnover—does not hold.

26. Comment: The ZEV regulations and the proposed amendments would increasingly divert automobile manufacturers’ resources away from the production of workable, low-emission vehicles such as ULEVs, SULEVs and HEVs, and toward the production of technologically limited battery electric vehicles which will not be purchased by the general public and will not end up on California’s roads. In the long run, this would almost certainly impede the efforts of Honda and other manufacturers to develop and market currently available, ultra- and super ultra-low emitting vehicles and replacements for older, higher polluting cars, denying the public of emission reductions. (Honda)

Honda respectfully disagrees with the staff’s assessment, and submits that its experience developing emission control technologies and the research regarding the consumer market suggests the contrary—that the premature imposition of mandated BEV production levels without any evidence of market demand and in the face of substantial technological limitation will itself slow the pace of commercialization of a variety of advanced vehicle technologies. (Honda)

If, on the other hand, automakers can free up the resources required by the mandate to focus on the areas that promise future breakthroughs—such as fuel cells and other advanced technologies—automakers can develop new vehicles that will deliver even cleaner air while meeting consumer needs. But they cannot achieve these goals if

automakers are obligated to devote research and development efforts to a technology that has already been shown to have considerable shortcomings. (AAM)

There is no substantial factual basis for ARB's conclusion that the mandate is an appropriate means to provide incentives for technology development. To the contrary, the ZEV mandate has caused and is causing limited resources to be diverted to wasteful uses; namely, to the development of EV technology for which there is no reasonable prospect of market success. (Austin)

Agency Response: At the September 7, 2000 Biennial Review, the Board recognized the difficulty manufacturers face in meeting the program requirements, particularly in the early years. The Board directed staff to develop regulatory modifications and other steps that address the challenges associated with the successful long-term implementation of the ZEV program, including the need to reduce or mitigate the high initial costs of vehicles and batteries in low-volume production.

In response to the Board's directive, the proposed staff modifications include a number of significant measures that reduce the impact of the program on manufacturers in the early years:

- The number of ZEVs needed to comply is reduced by roughly 50 percent.
- A further 50 percent reduction in the number of ZEVs is possible if manufacturers backfill with advanced technology PZEVs.
- Fuel cell vehicles receive aggressive incentives of up to 40 credits each in the early years.
- Vehicles placed in demonstration programs such as the California Fuel Cell Partnership earn credit even if they are not certified for sale or placed in service.
- Significant additional credits are allowed for vehicles placed in innovative transportation system programs.
- Neighborhood electric vehicles earn significant early introduction credits.
- Additional credits are provided for vehicles in service beyond three years.
- Specialty versions of vehicles, such as U.S. Postal Service ZEVs, can earn the same credits as the base vehicle would earn, even if they have reduced range.

The impact of the program in the early years thus has been significantly reduced. Moreover, although staff recognizes that battery vehicles are the only production ZEVs available in the near term, the program does not require manufacturers to pursue any particular technology. As noted above, large incentives are provided for fuel cell vehicle development.

The manufacturers argue that complete elimination of the program would free up additional resources that could be applied to more promising areas. Staff believes, to the contrary, that retention of some level of pure ZEV requirement is essential in order to provide an incentive for ongoing technology development. Many ARB regulations are "technology forcing" in that they lead manufacturers to find less expensive ways to provide the necessary technology. Elimination of the pure ZEV requirement would reduce the pressure on manufacturers to achieve cost-effective ZEV solutions and in

staff's view, based on the long history of ARB mobile source controls, would slow the pace of research and development.

27. Comment: The Staff Proposal Mandate has an increasingly negative impact on the California economy. Relative to the baseline forecast for 2020, the Staff Proposal Mandate is projected to result in an employment decrease of over 10,000 jobs, a decrease in Gross State product ("GSP") of about \$854 million, and a decrease in personal income of about \$1.1 billion. (All results are in second quarter 2000 dollars.) (NERA)

Agency Response: The above economic impacts are estimated based on the incremental cost of the ZEV program provided by the NERA-Sierra report. The report estimates that the ZEV program will increase cost to manufacturers, resulting in an increase in prices of new vehicles in California. The increase in an average vehicle price is estimated to be \$247 in 2002, rising to \$411 in 2020. As indicated in ARB Staff review of the NERA/ Sierra report, the cost and resulting price increases are significantly overstated in the report. To the extent the incremental cost of the ZEV program, especially in the long run, is overstated, the resulting economic impacts on the California economy are also overstated.

The economic impacts are also overstated because it fails to account for the secondary benefits of the ZEV mandate. In a recent study by the University of California at Davis, the investigators concluded that the ZEV mandate has stimulated significant technological advances resulting from increased R&D efforts and from automakers' efforts to develop EVs and alternatives to EVs. These advancements not only contribute significantly to the California economy, but also promote emission prevention beyond what is expected from the ZEV mandate. Since these positive effects of the ZEV mandate were not considered by NERA, the overall impact of the ZEV program on the California economy was overstated.

The NERA economic impact estimates represent a negligible change in the California economy even if we accept the NERA analysis as reported. According to the REMI Forecast, California real gross state product (GSP) and personal income are expected to reach \$3 and \$2.5 trillion in 2020, respectively. In 2020, California would have about 23.5 million jobs. Even if we accept the NERA's results as reported, the ZEV mandate would reduce California GSP by 0.03 percent and personal income and employment by 0.04 percent in 2020. These changes would have only a negligible impact on the California economy.

28. Comment: The Staff Proposal Mandate would lead to a reduction in new vehicle dealer profits that would grow somewhat over time. By 2020, the ZEV Mandate would lead to profit losses of about \$48 million for California dealers. (NERA)

Agency Response: The NERA estimated the potential dealer losses by multiplying its estimate of the decrease in total new vehicle sales by an average dealer gross profit of 8 percent. As indicated in ARB Staff review of the NERA/ Sierra report, the price

increases of new vehicles are significantly overstated, resulting in an overestimation of the decrease in total new vehicle sales. This in turn has led to an overestimation of the potential losses to dealers.

The NERA report also does not account for the potential dealer gains resulting from the increase sales of ZEVs. Furthermore, the NERA argues the ZEV mandate will result in an increase in average age of motor vehicle fleets in California, leading to an increase in repair costs. This implies that the motor vehicle dealers would potentially experience an increase in demand for their repair businesses, resulting in an increase in profitability of their businesses. The increase in the repair business profitability is not accounted for in the NERA analysis. As a result, ARB staff believes that the NERA has significantly overstated the potential dealer losses.

(d) Fiscal Impacts to Local Government

29. Comment: Significant costs of supporting the ZEV mandate, including the installation and maintenance of charging stations, the costs of supporting electric vehicle fleets, and increased costs of conventional vehicles and other unforeseen costs, will fall upon cities as unfunded mandates. (City of Santa Ana)

Agency Response: ARB took a significant step earlier this year to reduce these infrastructure costs by standardizing BEV charging stations. The recent proliferation of multiple types of charge connection standards was dramatically increasing the costs of charging infrastructure deployment. This action to standardize on one charge connection type will result in a significant long-term reduction in charging station installation and maintenance costs.

The benefits accrued from a city's EV fleet will eventually outweigh the cost to deploy charging stations. Existing gasoline and diesel vehicles and their distribution, spillage, emissions, and health-related consequences also have a cost impact on communities as unfunded mandates. It is more appropriate to consider ZEV-associated costs against the existing-but-hidden costs of gasoline and other fuel types. ARB has incentive programs in place to help with costs. Furthermore, the Board committed staff to work on implementation issues such as infrastructure.

30. Comment: CARB should further study the costs to local government of the ZEV mandate, and work cooperatively with local governments on how to reduce any fiscal impacts that might result from the mandate. (City of Santa Ana)

Agency Response: ARB has formed Infrastructure, Incentive and Outreach Working Groups to address these infrastructure deployment issues. We invite communities with concerns to join this group and help take on the challenges associated with developing and maintaining ZEV infrastructure and implementation.

(e) Treatment of Hybrid Electric Vehicles

31. Comment: Do not allow extended-range hybrids to qualify in the top two percent because these vehicles will not provide the necessary air quality benefits. (ALA, Bonnie Holmes-Gen, ZEV Alliance, NRDC, UCS, Ballard, Cal ETC, Hekeroth, Joffe)

Grid-rechargeable hybrids should not be included in the four percent. (Thompson, Pohorsky)

Disallow credit for extended-range (or plug-in) hybrids in the full 4% ZEV requirement. These vehicles are already primed for the market with price, range, and fuel economy without additional manufacturer incentives being needed. (Yolo-Solano AQMD)

The credit for plug-in hybrids should not come from the top 2 percent. (CAPCOA, BAAQMD, SCAQMD)

HEVs should qualify for PZEV credits not ZEV credits. (Chapman,Navas)

Agency Response: The proposed regulation has removed extended-range hybrid electric vehicles from the top two percent ZEV category and moved them to the ATPZEV category.

32. Comment: Decrease the credit for grid-connected hybrids. (Borys)

Agency Response: Hybrid electric vehicles with part-time ZEV capability have large potential emissions reduction benefits since many miles will be driven exclusively in ZEV mode. Although the Board has chosen to distinguish between extended-range hybrid EVs and full-time ZEVs by restricting the top 2% to full-time ZEVs, the benefits of extended-range hybrids still merit substantial ZEV allowance credit relative to other ATPZEVs.

33. Comment: Less credit should be given for HEVs with conventional emission control equipment and lead-acid batteries. (ECD)

Agency Response: ARB believes that it is important to maintain flexibility in the ZEV regulation, particularly with regard to specific ZEV-related technology choices. Although some battery electric vehicles may be equipped with more conventional electric drive technologies such as lead-acid batteries, these are still important steps in building a component supplier base in the electric-drive industry. It should also be noted that recent advances in lead-acid battery technology that enable their use in hybrid electric vehicles are not yet considered to be conventional.

The proposed regulation does increase credit allowance for hybrids with higher power-ratio systems or bottom-line vehicle fuel economy. If alternative technology hybrid-electric componentry such as nickel-metal hydride batteries result in improved vehicle

performance, then they will earn increased credit allowance under our performance-based regulation.

34. Comment: Extended-range hybrid electric vehicles should be included in the top two percent category. (Grahm, Frank, UC Davis HEV Center)

Agency Response: Although the potential emission-reduction benefits of extended-range HEVs are impressive, the Board believes that there should be an important distinction between full-time ZEVs in the top 2% category which have no tailpipe emissions, and vehicles that do produce emissions. Board directed staff to increase credit allowance to extended-range hybrid EVs to better recognize their large benefits, but to move them to the AT PZEV category.

35. Comment: Extended-range hybrids can produce enough energy to take care of any rolling blackouts that we have had in the past. If they are equipped with a bi-directional charger, each vehicle has a minimum of ten-kilowatt hours stored in the car, and ten percent of all the vehicles are extended-range hybrids. This would result under utility company control after five years with a million cars out there. Use HEVs to address vehicle to grid issues (Brooks, UC Davis HEV Center, Frank)

Agency Response: Both extended-range hybrids and battery EVs have the potential to augment the electric power grid, and ARB has funded 3 research projects to further investigate the electric-grid related benefits of electric-drive vehicles. In June 2001, the Board chose to standardize on the conductive connection protocol for electric vehicles, in part, because the conductive standard was better suited to this prospective vehicle-to-grid application. The regulation increases the credit allowance for extended-range hybrid EVs in order to incentivize their introduction, but many challenges remain before vehicle-to-grid concepts can be implemented on a wide scale. Therefore, the regulation does not require this capability.

36. Comment: Charger installation with the plug-in hybrids ought to be included specifically in the mandate. (Casner)

The chargers and their installation need to be included with grid chargeable hybrids at the time of purchase. (Thompson)

There needs to be language that states that extended range hybrids need to be designed with and should in fact have a charger that is included with the purchase of the car. If no charger is included, then the charger should be built into the car. (Proudfoot)

Agency Response: Amendments to the ZEV regulation (Section 1962.1) approved in June to standardize charging infrastructure also apply to extended range HEVs. These amendments now require battery EVs and extended range HEVs to be equipped with an on-board charger. For either type, the regulation requires an on-board charger of at

least 3.3 kW power capability unless the vehicle model exclusively uses Level I (1.44 kW) charging.

One of the advantages of extended-range hybrid EVs is that their smaller battery packs will not require higher-power Level II charging for most users, so it is not necessary to require manufacturers to provide and install Level II chargers with this class of vehicles. According to a recent ARB-sponsored EPRI study of extended-range hybrid EVs, most of these proposed hybrids will be able to accumulate significant zero emission mileage by plugging into a standard 120 VAC outlet when not in use.

37. Comment: Regarding including extended range hybrids in the four percent--there is a problem. This problem is that there is a loophole in the current definition of all electric range, and it is not sufficient for defining extended range hybrids. The proper definition for an extended range hybrid should be that when it is operated in a normal mode, the range is calculated when the APU kicks in. Right now, the emissions requirement is that the APU is turned off when the test is run. This can result in a vehicle with a larger battery pack like the Prius would test like any advanced technology PZEV. (Proudfoot)

Agency Response: Since extended-range hybrids are still under development, it is very difficult to develop and finalize test procedures that can accommodate all possible variations of hybrids that are under consideration by hybrid researchers. ARB will work with interested vehicle manufactures and consider appropriate changes in our test procedures as these hybrids get closer to market introduction.

There are several proposed and prototype extended-range hybrid EVs that make use of a strategy that allows the engine to start under some operating conditions even though battery state-of-charge remains high. Range-extended HEVs can be driven many more ZEV miles between charges than the commenter's proposed test procedure would indicate. It is difficult to determine what a "proper definition" for test procedures should be until we receive further input from manufacturers and can begin to examine actual prototype extended-range hybrid EVs.

38. Comment: We should include SUVs in the grid-connected hybrid category. (Frank)

Agency Response: The regulatory changes in Section 1963 (g) (3) now allow PC/ LDT1 ZEV credit to be earned by PZEVs in a wider range of vehicle size classes that now includes MDVs and LDTs other than LDT1. This means that large extended-range SUVs which meet all ATPZEV requirements can now earn ZEV credit.

(f) Treatment of Advanced Technology PZEVs

39. Comment: I object to any modifications that would allow automakers to receive credits for "advanced technology" vehicles such as those powered by natural gas, hybrid electric, or fuel cell engines. (Hopkins)

Agency Response: The commenter is opposed to allowing automakers to meet up to half their pure 4 percent obligation with AT PZEVs. The AT PZEV category was established to provide incentives for the continued development and commercialization of technologies that not only produce extremely low ozone precursor emissions, but also significantly reduce global greenhouse gas emissions. The category also provides incentives to gaseous fuels and key components that are necessary for the widespread commercialization of pure ZEV technologies. The Board believes that the reduction in numbers of pure ZEVs in the near-term will be more than offset by the increased long-term benefits that result from the development of technologies and alternative fuels used as AT PZEVs to meet a portion of the pure ZEV requirement.

40. Comment: The proposal to permit up to half the 4 percent to be met with AT PZEVs is unacceptable. If they are to be incentivized, they should be included in the 6 percent ZEV side. (Mason, Slawson)

Agency Response: The rationale for allowing this category to meet up to one-half of the ZEV program is discussed in the comment above. If these technologies were included in the 6 percent side of the ZEV requirement as suggest by the commenter, automakers would have no incentive for producing these vehicles. Instead, to reduce cost and maximize profit, they would choose to produce more gasoline SULEVs to meet the ZEV requirements. These vehicles are already being commercialized and will be placed in large numbers, and while important to our clean air goals, do not lead to zero-emitting technologies.

41. Comment: I support having extended-range hybrids in the four percent, but advanced technology PZEVs do not belong there. There is a fundamental difference between the two types of vehicles. A range-extended HEV results in true electric miles. (Proudfoot)

Agency Response: The rationale for allowing AT PZEVs to meet half of the pure ZEV requirement is discussed in the responses to the two previous questions.

42. Comment: Do not allow vehicles in the next two percent of the mandate that do not influence the development of alternative fuels infrastructure. This can be done by either excluding vehicles using gasoline or diesel fuel, or by raising the requirement to 0.5 credits from 0.45 credits for vehicles to be counted in this two percent (Ballard)

Agency Response: The AT PZEV category provides incentives for technologies that will lead to true zero-emission vehicles while improving the overall efficiency and global impacts from the vehicle fleet. Current HEVs using gasoline employ electronics and advanced batteries that will lead to improvements in future pure ZEV technologies. Excluding the use of gasoline in this category would compromise the tremendous research and development of advanced components and eliminate the incentives for automakers to make more efficient vehicles.

43. Comment: Allow AT PZEVs to meet the entire 4 percent pure requirement. Make all elements optional. (Toyota)

Agency Response: At a review of the program in September 2000 and again at the January 25, 2001 Board hearing, the Board clearly articulated the need to maintain a core zero emission requirement to provide an incentive for further development. The rationale for the Board's commitment is simple. Over the long term, zero emission technology is necessary to achieve the State's public health protection goals. If AT PZEVs are allowed to meet the entire 4 percent pure requirement, the continued research and development of pure ZEV technologies would be seriously compromised.

44. Comment: Delete the zero evaporative emissions requirement from the PZEV requirement. (Toyota)

Agency Response: To receive PZEV credit, an automaker must certify the vehicle to the 150,000-mile SULEV exhaust emission standards for PCs and LDTs; certify the vehicle to the "zero" evaporative emission standards; certify that the vehicle will meet the applicable on-board diagnostic requirements, and extend the performance and defects warranty period for 15 years or 150,000 miles, whichever occurs first. These requirements are strict and necessary to ensure that the environmental benefits of a vehicle receiving ZEV credit provides close to the same environmental benefits as pure ZEVs. A significant advantage of pure ZEVs is that they have no evaporative emissions. Evaporative emissions from conventional technologies account for an increasing percentage of the total vehicle emissions as tailpipe emissions are reduced. Thus, requiring zero evaporative emissions is critical to achieving the necessary environmental benefits.

45. Comment: The amount of ZEV credit should be variable for hybrid electric vehicles depending on the amount of advanced electronics and batteries used in the vehicle. (Toyota)

Agency Response: The adopted regulations provide that the ZEV credit earned by HEVs varies according to the characteristics of the vehicle. Under the proposed modifications one long-term advanced componentry scoring method is based on the CO₂ savings that a vehicle achieves versus the average for its class. This metric was chosen because of the effect of global warming on ground level ozone production, and the emerging importance of CO₂ savings as a vehicle technology goal. A second long-term method provides incentives based on vehicle efficiency performance within each size and weight classification. A third method provides, as requested by the commenter, a credit that varies according to the degree to which electric drive is used. This credit is based on the percentage of the maximum system power output available from the electrical storage device divided by the sum of the power from the electrical storage device and the net power of the heat engine. In more simple terms, this credit is based on the amount of advanced electronics and batteries used in the vehicle.

46. Comment: The ZEV program should phase out the 0.25 credit bonus for vehicles displaying advanced technology componentry between 2006 and 2008, as it is not necessary to encourage the development of such components after that date. (Ballard)

Agency Response: As noted in the response to the comment above, ZEV credit based strictly on advanced electronics and componentry is phased out after 2007 per changes in the 15-day notice. The remaining methods are performance-based.

47. Comment: The regulations should phase out the entire AT PZEV category beginning in 2008 to increase the number of pure ZEVs. (Ballard)

Agency Response: The AT PZEV category provides incentives for technologies that will lead to true zero-emission vehicles. At this same time, the long-term purpose of this category is to continue the push for the cleanest vehicles that also have the greatest positive impact on global emissions. The number of pure ZEVs will increase in the future as various credit schemes are phased out and the overall ZEV requirement increases beginning in 2009.

48. Comment: The definition of advanced technology componentry needs to be clarified to include only components that will lead to true zero emission vehicles. (Ballard)

Agency Response: Staff believes that the current requirements for AT PZEV provide incentives for technologies that will lead to true zero-emission vehicles. Hybrid vehicles using gasoline employ electronics and advanced batteries that will lead to improvements in future pure ZEV technologies. The gaseous storage and distribution of natural gas for vehicle use will lead to improvements in technology for hydrogen fuel cell vehicles.

(g) Treatment of Neighborhood and City Electric Vehicles

49. Comment: We have real concerns about neighborhood electric vehicles being in this program and especially being able to qualify for four times credit in the early years. These are clearly the cheapest technology to make in order to comply with the mandate. Therefore, we urge you to eliminate the multipliers for NEVs and to phase out all the ZEV program credits for neighborhood electric vehicles by 2005. We are worried that NEVs distort the credit system, because they are cheaper than continuing with a full-function battery electric technology program, or a fuel cell technology program, which is what we really need for the state. We don't believe these types of low-speed vehicles were intended to play a major role in the program and giving them multiple credits in especially in the early years seems really inconsistent with the goals of the ZEV program in our minds. (ALA, UCS, ZEV, ZEV Alliance, NRDC)

I urge the ARB to maintain pure 4% requirement and ensure automakers produce full-size, full function electric vehicles in 2003 by capping number of City EVs and NEVs

they produce. (Wright, Matousek, Khalsa, Askren, Renzetti, Kohr, Dearborn, Markwith, Brinkman, Slawson)

Agency Response: Neighborhood electric vehicles are electric low speed vehicles (LSVs). A LSV is a legal classification adopted by the National Highway Transportation Safety Association (NHTSA) to refer to highway approved vehicles with a top speed of 25 miles per hour. These vehicles are permitted on roads where the posted speed limit is 35 miles per hour or less. NEVs were not anticipated when the ZEV regulation was first crafted so under current state law and ARB regulation, LSVs and City EVs qualify as “passenger cars” and therefore are eligible to earn full ZEV allowances.

Under the amendments, any ZEV introduced before the 2006 model year receives a multiplier of 4.0 credits for the 2001 and 2002 model years and 1.25 for the 2003-2005 model years. Some companies are relying on this credit scheme to put together their compliance plans for the ZEV mandate. With only two years away from the commercial introduction, it would be unfair to the automakers to change the credit scheme. The placement of NEVs are a legal compliance strategy given the regulation as it exists, and they do offer the potential to displace conventional vehicle trips.

Staff understands the concern that a large number of NEVs may be produced to meet the ZEV mandate. Given this, the credits earned by NEVs, will be reduced to 0.5 for the 2004 and 2005 model years and 0.15 in 2006 and beyond. The final value of 0.15 could be adjusted in the future based on additional information regarding how such vehicles are used, the number of trips they replace, and the number of zero emission miles that they accumulate. This credit scheme should encourage manufacturers to produce a variety of vehicle types, rather than all NEVs or all City EVs. This is because, by 2006 the credit value of City EVs and full function EVs as compared to NEVs would increase greatly.

50. Comment: The flexibility provided so far by the staff could result in a very disastrous picture. Let me point out that it could end up that there are only two percent neighborhood EVs, two percent hybrids and six percent gasoline, SULEVs. If that's allowed in the staff proposal and turns out being the case, then that is really short of what we want to achieve. There's actually nothing there to promote technology advancement, which is originally the purpose, one of major reason for the ZEV programs. Therefore, we want to decrease or totally eliminate early introduction credit for low-speed neighborhood vehicles. (SCAQMD)

Agency Response: The ARB wants to encourage a diverse production of electric vehicles that meet all segments and niches in the market while encouraging advances in technology. Therefore, as stated in the previous comment, the credits earned by NEVs will be reduced to 0.5 for the 2004 and 2005 model years. For 2006 and subsequent years the credit would be further reduced to 0.15. The final value of 0.15 could be adjusted in the future based on additional information regarding how such vehicles are used, the number of trips they replace, and the number of zero emission

miles that they accumulate. This credit scheme should encourage manufacturers to produce more full function electric vehicles in the long term.

51. Comment: I'm concerned that there will be too many neighborhood electric vehicles. They may have a role to play, but I'd really like to see more full-function electric vehicles over the next few years. Part of the reason is, that they project the wrong image to the public. It's taken us so many years to get away from the golf cart low-power image that it would be shame to go back to that. They truly would reinforce the impression -- the misimpression that many people have that electric vehicles are nothing more than golf carts, because these truly are golf carts. In addition, these would not be safe because on most streets people do not only go at 30 miles per hour. For many applications they will simply not suffice as an alternative to gasoline transportation. (Chestnut, NRDC)

Agency Response: See response to Comment 50. The ARB recognizes that there are a wide range of potential applications that are well suited to NEVs and CEVs. These vehicles meet safety standards established by NHTSA when they are driven on roads with posted speed limits under 35 miles per hour and are therefore passenger cars, not golf carts.

52. Comment: We would like you to promote more diversity in available pure ZEVs, to ensure adequate production of full-function EVs by either, one, adjusting the multiplier for full-function EVs, or by capping the credit that is available for neighborhood and city EVs. We recommend that you make a smaller decrease in the short-term pure ZEV targets so consumers will be able to take advantage of the many incentive packages that are available today. (CAPCOA, BAAQMD, SCAQMD Northern Sonoma APCD)

Agency Response: In order to promote more diversity in available pure ZEVs, the ARB created a discount multiplier for NEVs in order to bring down their value starting in 2004 and 2005 to 0.5 credits and then to 0.15 in 2006 and beyond. City EVs can not be given a separate credit scheme from full function EVs, because these vehicles are not distinguishable from full function EVs. They have very similar characteristics and may have similar air quality benefits as well. However, the air quality benefits of CEVs and NEVs will be further assessed once there are more CEVs and NEVs in the market.

53. Comment: My concern about neighborhood vehicles is that there's an unspoken strategy of the auto manufacturers to put out only neighborhood vehicles in the early years, to have those not be successful in the market, and then to use legislative or legal means to try to overturn this mandate. So my concern is that we should include full-function vehicles as a requirement, not just through credits. (Casner)

Agency Response: The discount multiplier for NEVs should encourage production of full function ZEVs for meeting the ZEV mandate in the long term because in 2004 and 2005 NEVs are only worth 0.5 ZEV credits and then in 2006 and beyond, they are only worth 0.15 credits. In the near-term, it would be unfair to manufacturers to change the credit

scheme for 2003 since most have already developed compliance plans for the 2003 timeframe. The ARB will continue to pursue zero emission transportation technologies. NEVs are a specific type of vehicle that may fulfill a certain niche in the market. The ZEV mandate encourages the production of a variety of vehicle types by awarding significantly more credit to vehicles with increased functionality and efficiency.

54. Comment: I oppose including ZEVs that cannot be driven on freeways in the number of ZEV and hybrid cars that must be sold in California in 2003. (Dunning)

Agency Response: The ZEV regulation encourages a variety of electric vehicle types. NEVs will not take the place or be mistaken for vehicles that can go on the freeway and do not fill the same consumer needs that full function and City EVs fill. However, to the extent that NEVs are used to make zero emission trips, they benefit air quality and are an appropriate participant in the ZEV program. In addition, the NEV credit system will be further evaluated once the Board has additional information regarding how NEVs are used, the number of trips they replace, and the number of zero emission miles that they accumulate.

55. Comment: Regarding neighborhood electric vehicles, I think they should be completely phased out of the program no later than 2005, and don't see any reason why they should get multiple credits in the near-term. (Finney)

Agency Response: The Board agrees with this comment, however it would be unfair to change the credit scheme at this time without providing appropriate lead-time. Although they may not serve the same function as full function or City EVs, they are still ZEVs that may fill a niche market. Once these vehicles are in the market, the ARB will evaluate their air quality benefits and may reevaluate the current credit scheme.

56. Comment: I have concerns with the mix of vehicles being proposed. Why do we think we are going to find markets for 10,000-30,000 smaller electric vehicles like City or Neighborhood Electric Vehicles? (Joffe)

Agency Response: The ARB's approach provides manufacturers with the flexibility to produce a variety of vehicle types. Therefore, manufacturers can choose different options that they believe will be successful.

57. Comment: City and neighborhood electric vehicles should receive less than a full credit after the multipliers are phased out (ZEV Alliance, ALA)

Agency Response: NEVs do receive less than a full credit after the multipliers are phased out. As stated above, in 2005 and 2006, NEVs receive 0.5 credits and in 2006 and beyond they receive 0.15 credits. This comment also refers to City EVs which should not be given less credits than full function EVs because there is no way to distinguish between the two types of vehicles; they all are in one category with same credits and requirements. In addition, CEVs may be a valuable part of the ZEV

program. Staff will know more about their air quality and transportation benefits once they are released into the market.

58. Comment: Sparrows should get ZEV credit. (Sweet, Bierman)

Agency Response: Although the Corbin Sparrow, a three-wheeled, enclosed electric motorcycle, may fill an important niche in the transportation market, they are not included in section 1962, title 13, California Code of Regulations. This is because the Corbin Sparrow is certified with the ARB as a zero emission motorcycle, not a passenger car. Currently, motorcycles are subject to different, less stringent, emission standards and are not required to meet more stringent passenger car and truck safety standards. If the Sparrow were to be certified as a passenger car, it would immediately qualify in ARB's ZEV program.

59. Comment: Fully enclosed, three-wheel, single passenger, freeway worthy vehicles should be included in the ZEV program. So that on page one of the proposed regulation, zero emission standards section A would say that the Executive Officer shall certify new 2003 and subsequent model passenger cars, light duty trucks, medium duty vehicles, and fully enclosed three wheel single passenger freeway worthy vehicles as EVs. (Corbin Motors)

Agency Response: See agency response to the previous comment.

60. Comment: NEVs don't receive enough credit (Rush)

Agency Response: Under the current regulation, the credit value for NEVs, given their cost and functionality, is high relative to that for other vehicle categories. In order to correct the disparity it is necessary to reduce the credit earned by NEVs. To allow for a transition period, while moving towards a lower credit value for NEVs, the Board established a ZEV discount multiplier for NEVs. Thus the credit value for a NEV (not including the phase-in multipliers) would be 1.0 through 2003, 0.5 in 2004-2005, and 0.15 in 2006 and beyond. With the phase-in multiplier a NEV can receive 4 credits through 2003. The final value of 0.15 could be adjusted in the future based on additional information regarding how such vehicles are used, the number of trips they replace, and the number of zero emission miles that they accumulate.

61. Comment: The regulations should distinguish between NEVs placed in service and offered for sale. (Rush)

Agency Response: The ARB agrees with this comment. Therefore, in the near term, NEVs do not receive any advanced credit multipliers unless the car is placed in service.

62. Comment: The regulations should incorporate range and efficiency multipliers with NEVs, just as it does with full function electric vehicles. (Rush)

Agency Response: The range and efficiency multipliers are intended to encourage extended range and increased efficiency in ZEVs. NEVs are not eligible for these multipliers because these vehicles serve a small niche in the market where range and efficiency do not play a significant role and would not enhance the use of these vehicles in any way.

63. Comment: By reducing NEV credits too early in the ZEV program, we are reducing a reliable mode incentive. NEVs need to be a mainstay for a pedestrian-friendly area where they are most accepted. They also represent a potential for significant use in transportation hubs, inter-modal facilities, and car sharing applications. Therefore, we are opposed to the NEV discount multiplier (Dynasty Motor Cars)

Agency Response: NEVs receive multiple credits for model years 2003 and 2004. This is a sufficient amount of time to test the market with these vehicles. In addition, these vehicles fill a niche. NEV credits will be further evaluated once additional information is available regarding how such vehicles are used, the number of trips they replace, and the number of zero emission miles that they accumulate.

64. Comment: City EVs and NEVs should be counted as AT PZEVs, not pure ZEVs (Clean Fuel Connection (Joffe))

Agency Response: CEVs and NEVs are ZEVs because they have no tailpipe emissions, no gasoline refueling emissions and they share the same air quality advantages as full function EVs. Therefore they deserve to be in the same category with ZEVs. However, we realize that NEVs do not have the same air quality benefits as full function ZEVs, therefore, they have a discounted multiplier over time. CEVs are not distinguishable from full function ZEVs, so they must remain in the same category with the same credit scheme.

65. Comment: The proposal will result in a dramatic reduction in the number of vehicles required. It seems risky to allow City EVs and NEVs to meet the ZEV requirements. We should not ignore the investment made into public charging. I urge the ARB to raise the number of full sized EVs to at least 2%. Until market potential is known, City EVs and NEVs should not be part of top 2% (Clean Fuel Connection)

Agency Response: As stated in the response to the previous comment, CEVs and NEVs are ZEVs because they have no tailpipe emissions, no gasoline refueling emissions and they share the same air quality advantages as full function EVs. Therefore they deserve to be in the same category with ZEVs. However, we realize that NEVs may not have the same air quality benefits as full function EVs, therefore, over time a discount multiplier is applied to these vehicles. CEVs are not distinguishable from full function ZEVs, so they must remain in the same category with the same credit scheme.

In addition, CEVs also need public charging. The use of these vehicles does not ignore the investment made in public charging. Also, NEVs too may need public charging

infrastructure although it may be level 1 charging rather than level 2 required by for full function EVs and CEVs.

66. Comment: The regulations should change NEV terminology to Zero Emission Low Speed Vehicle or ZLSV. (Rush)

Agency Response: The term NEV refers to a zero emission LSV. This terminology is already in common use in the industry to describe a zero emission LSV and any change in this terminology would be confusing.

(h) Inclusion of Sport Utility Vehicles and Light Duty Trucks 2 Within the Scope of the ZEV Program

67. Comment: Recognize the reality of the marketplace in California and include all SUVs and other light trucks up to 8500 pounds in the total number of vehicles from which percentages are calculated. Unfortunately, the current program encourages manufacturers to sell more large, inefficient vehicles in order to reduce the number of zero and near-zero emission vehicles it must produce. (ALA, Coalition for Clean Air, UCS, Cal ETC, ZEV Alliance, NRDC, Heckerth, Pohorsky and Thompson)

Agency Response: The Board agreed with this recommendation and directed staff to address this in the modifications issued for 15-day comment. Resolution 01-01 states “Add light-duty trucks with a loaded vehicle weight of 3750 pounds or more (the LDT2 class, which includes most sport utility vehicles) to the current passenger car and LDT1 classes that form the baseline of vehicles against which the ZEV percentage requirements are applied, phasing in this additional element during the 2007 through 2012 model years.”

The modifications issued October 31, 2001 for public comment add LDT2 vehicles to the base against which the ZEV requirement is assessed. As directed by the Board the inclusion of LDT2 vehicles is phased in beginning in MY 2007 and concluded in 2012. While these vehicles were traditionally used primarily for work purposes, it is now very common for pick-up trucks and sport utility vehicles (SUVs) to be used primarily for personal transportation, i.e. as passenger cars. As such, it is appropriate for LDT2 vehicles to ultimately trigger the same ZEV obligations as passenger cars – just as they will be subject to the same emission standards under the LEV II program. One million seven hundred thousand vehicles are sold in California each year of which almost half are SUVs and LDT2s trucks. It is important to avoid situations in which a manufacturer increases its proportional production of LDT2 vehicles in order to reduce its potential ZEV obligations.

68. Comment: Inclusion of SUVs and large trucks in the baseline in combination with a phase out of the credit multipliers will come close to the volume ramp-up needed for a successful program. (Cal ETC, ALA, UCS, NRDC, Anuvu)

Agency Response: This comment was addressed by two actions by the Board described in Resolution 01-1. The first addressed the need for increased total volume of ZEVs in later years of the program and the second addressed the relationship between credits earned by different ZEV types, effectively dropping the credit multipliers as requested. Resolution 01-1 states “Compared to the modified staff proposal and accounting for increased numbers of ZEVs resulting from other modifications listed below, approximately double the number of ZEVs required by the 2012 model year, with the ramp up beginning in the 2007 model year;” and “ Revise the credit relationship between fuel cell vehicles and battery electric vehicles in the later implementation years, to address the current disparity under which a manufacturer could comply with far fewer fuel cell vehicles than would be the case with battery electric vehicles.”

One of the Board’s directives at the January 25 hearing was to double, by 2012, the number of ZEVs required as compared to the original staff proposal. In implementing this directive, staff has accounted for the increased number of required ZEVs that results from phasing in the LDT2 category. Thus the LDT2 phase-in does not increase the number of required ZEVs beyond the number needed to achieve a doubling of the original staff proposal. However, the LDT2 phase-in will increase the overall number of PZEVs or AT PZEVs needed to take full advantage of those options.

The original staff proposal provided permanent additional credits for fast refueling. Upon further consideration staff concluded that while these provisions are appropriate in the early years, in later years they would result in too few vehicles being required under compliance scenarios that rely on hydrogen fuel cell vehicles. This would be counter to the Board’s directive to equalize in the long term the credits earned by battery EVs and hydrogen fuel cell EVs.

In order to accomplish the remainder of the necessary increase in the number of vehicles required, the modifications now reflect further adjustments to the phasing of the efficiency and range multipliers. The MY 2008 values for these multipliers are 0.3 for range and 0.600 for efficiency, compared to 0.5 and 1.0 respectively in the 2008 and subsequent model years under the original proposal. The modifications also incrementally adjust the phase-in factors after MY 2008 until they reach 0.15 and 0.825 for range and efficiency respectively in the 2012 and subsequent model years.

While developing these modifications, staff also made an internal calculation change with respect to the assumed efficiency of future ZEVs. In order to have a consistent basis for estimating vehicle totals, throughout the biennial review process staff assumed that the future vehicle fleet would be identical to the current (MOA) vehicles offered by manufacturers. Using this methodology, future increases in vehicle efficiency will result in reduced numbers of vehicles required. In order to provide a greater likelihood that the actual number of vehicles produced will hit the target established by the Board at the January 25 hearing (2 times the staff proposal), staff assumed that for 2008 and beyond the average full function vehicle has range and efficiency characteristics identical to today’s RAV 4 EV. For City EVs staff assumed that future vehicles have the same performance as the e-Com. Introducing these revised assumptions reduces the

likelihood that future range or efficiency gains will result in a shortfall of vehicles as compared to the board's target.

These modified phase-in values result in estimated vehicle totals for 2012 and beyond that are roughly equal to 2 times the original staff proposal. Staff notes that due to the effect of the efficiency multiplier, the relationship between the number of vehicles required and the "red line" (2 times the staff proposal) differs for a 100 percent full function vehicle scenario as compared to a 50/50 mix of full function and City EVs. Staff has chosen factors that result in a full function total that is about 106 percent of the red line, and a 50/50 mix total that is about 93 percent of the red line. Thus these two scenarios evenly "bracket" the red line target.

69. Comment: We should include a factor now such that SUVs are included in the baseline for calculation of ZEV requirements, however the factor should be scaled such that the total number of ZEVs required would remain the same (AAM).

Agency Response: Staff has presented modified language to include LDT2 vehicles in the baseline used to calculate ZEV requirements, however staff has determined that it is more appropriate to phase in this requirement over several years starting in 2007. This has been done for several reasons. First, starting in 2007 allows manufacturers to plan for increased ZEV volume requirements and to integrate their LDT2 production into their planning process while accounting for increased ZEV requirements. To apply a ZEV requirement immediately dependent on LDT production would unfairly impact some manufacturers over others because of their product mix. Additionally, the phase in of the LDT2 volumes has provided a clear and measurable mechanism for attaining the Board's goal of doubling the ZEV requirement by 2012 with a smooth ramp-up starting in 2007.

(i) Warranty Issues

70. Comment: The warranty on vehicles should all be the same, for fuel cells, electric, or range-extended hybrids. And the warranty should not start at 15 years, because some of the technologies haven't even been around for 15 years. I suggest that the warranty start as a three-year warranty, and then evaluate yearly to how you might increase it as time goes on. (Frank)

Agency Response: The ZEV regulation requires warranties on PZEV components because the failure of emissions-related systems on these vehicles could rapidly offset the emissions reduction benefits of their SULEV or better performance. While incorporating present-day battery technologies, vehicle manufacturers may choose to retain ownership of near-term extended-range hybrid EVs and lease them to customers instead of selling them. Unless the vehicle is sold, the warranty would only be necessary for the duration of the lease, which is the same situation as with most near-term battery EVs. In the longer term, it may be possible for vehicle manufacturers to secure other entities that will assume responsibility for the battery portion of the

warranty obligation. In this eventuality, the auto manufacturer could sell extended-range hybrid EVs with rented or leased batteries that are covered under a 15 year/ 150,000 mile warranty by the battery owner.

71. Comment: The goal is to have equivalence in investment and running costs. There is a possibility to resolve the cost problem for electric vehicles if we return the battery costs and the running costs. We have done this in Switzerland by having a renting system for batteries, which made the cost structure exactly the same as for conventionally fueled vehicles. Please try to do it also in California. (Piffaretti)

Agency Response: In California, most BEV customers lease their battery packs along with the rest of their vehicle while in Europe, customers frequently purchase their vehicle and lease their batteries. In Europe, higher gasoline costs allow battery costs to be shifted to the customer fuel cost. In any event, such a program would be initiated by the automaker and is not an appropriate subject of regulation.

72. Comment: We are, in conjunction with partners in Europe, pursuing battery rental. We see this as a vital addition that will remove the up-front burden costs from the auto manufacturers. This will hopefully be the key to solving some of the cost problems for electric vehicles and the warranty issues for the batteries of electric vehicles. With this system, we would not want special credits beyond three or four years that would ultimately diminish the volume of vehicles because this would all be covered between the battery rental company and the battery manufacturers. (Production Electric Vehicle Drivers Coalition)

Agency Response: ARB is hopeful that similar battery rental programs can begin in California. ARB does not believe the proposed regulation hinders the formation of the partnerships necessary for such a battery rental program. ARB incorporated the in-service/ under-warranty feature of the proposed regulation not only to encourage manufacturers of leased battery electric vehicles to extend their lease periods, but also to incentivize battery rental in California.

(j) Miscellaneous Issues

73. Comment: Consider recasting the ZEV mandate in terms of a) the air pollution eliminated by a ZEV and b) the permanence of the solution to air pollution that is based on an entirely new technology rather than on old technologies and fuels. The first steps are to break down the walls between vehicles so that there can be a free flow of ZEV technology across all modes and sizes and insist on achieving emission reductions equal to what would have been produced by the original ZEV mandate from the ZEV technology. (Moore)

Agency Response: The ZEV program is an integral part of California's mobile source emission control efforts, and is intended to encourage the development of advanced technologies that will secure increasing air quality benefits for California now and in the future. It has led to many technological advances that have a permanent positive

impact on air quality in California. These advanced technologies have not only impacted electric vehicles but have had positive impacts on conventional vehicles as well. In addition, the ZEV program rewards vehicles based on their air quality benefits. Therefore, the Board believes that the ZEV mandate is already working to achieve the goals suggested in this comment.

74. Comment: Europe depends on the California program. We would appreciate it if you would have a clear figure for 2016 that would be part of the staff proposal. (Piffaretti)

Agency Response: The ZEV program offers manufacturers a great deal of flexibility for meeting the ZEV requirement. Due to this flexibility, manufacturers can use a variety of vehicle types to meet their requirement. Therefore, it is difficult to know the types and numbers of vehicles that the different manufacturers will produce in the future.

75. Comment: If each of the seven automakers produced a thousand ZEVs a year starting now, we could have 21,000 ZEVs by the end of 2003. They don't need more research and development time. They could simply produce more of the cars they made under the MOA. All of the people on the waiting lists could stop waiting and drive a smog-free car. The MOA ZEVs will work for most commuters. (Pororsky)

Agency Response: Due to near-term costs and limited availability of EVs, the ARB adjusted the rate and timing of the ZEV introduction in the near-term while increasing the overall ZEV percentage requirement in the longer term. The proposed schedule ramps up beginning in 2007 and results in a 16 percent overall requirement in 2018. This ramp up will further encourage the commercialization of a number of emerging zero emission and near-zero emission technologies now under development.

The ARB is also encouraging the production of EVs in the near-term by providing ZEV phase-in multipliers for early introduction of EVs. An EV placed in service in 2001-2002 receives 4 credits and an EV placed in 2003-2005 receive 1.25 credits. This should encourage manufacturers to produce and place their EVs sooner rather than later and thus provide vehicles to consumers now on the waiting lists for electric vehicles.

76. Comment: The use of gasoline should be banned from the ZEV program. (Rhodes)

Agency Response: The ARB has remained "fuel neutral" in developing regulations. All regulations are based on emissions performance regardless of fuel used. Vehicles using gasoline must meet a very strict set of emission standards to receive credit toward the ZEV program. The ZEV regulation has spurred advances in motor vehicle technology that has significantly reduced emissions from all motor vehicles, including conventional gasoline-powered vehicles. The gasoline vehicles included in the ZEV mandate must meet the PZEV or AT PZEV requirements. Vehicles that meet these requirements have ZEV-like characteristics, such as zero evaporative emissions, and when they are mass marketed, they achieve significant emission reductions. In

addition, these vehicles must achieve their ZEV-like emission characteristics throughout their lifetime. To ensure that this is the case, manufacturers must provide an extended warranty on these vehicles for 15 years or 150,000 miles.

77. Comment: Section 2A should be based on miles per minute or miles per unit time, rather than just percentage fill over ten minutes. There should be another section 2 B that's based on a 60-mile range. (Casner)

Agency Response: Section 2B regarding fast fueling, does base credits on miles per unit time as the comment suggests.

78. Comment: The mandate should ensure that those that do not have a charger in their garage will have easy access to one. The regulations should require that one ZEV be placed for each diesel in 2003 and beyond. (Pohorsky)

Agency Response: ARB staff is working with the infrastructure stakeholders to assess infrastructure needs and to develop policies and incentives to encourage ZEV infrastructure development and maintenance. In addition, ARB has regulations to address sources of diesel exhaust. It is not feasible to use ZEVs to offset diesel vehicles. They have different air quality impacts and require different strategies to achieve emission reductions.

79. Comment: There should be an infrastructure multiplier on any fuel that's being used. The way to figure that is an infrastructure factor should be the ZEV credit times the number of stations divided by the number of gas stations. So this infrastructure credit will even the playing field for all technologies. (Frank)

Agency Response: As stated in the response to the previous comment, ARB staff is working with the infrastructure stakeholders to assess infrastructure needs and to develop policies and incentives to encourage ZEV infrastructure development and maintenance. ZEV credits need to be based on vehicle technology and introduction timing. Providing more credits for things like infrastructure would further reduce the number of ZEVs required by manufacturers.

80. Comment: The ARB should pressure the automakers to pay a penalty for every SUV that achieves less than 20 miles per gallon and use that money to further ZEVs. (Carter)

Agency Response: The ARB does not have the legal authority to fine companies based on fuel economy. Although the Board will not be assessing a penalty for the sale of SUVs, the Board is adding SUVs to the base against which the ZEV requirement is assessed. The inclusion of LDT2 vehicles is phased in beginning in 2007 and concluding in 2012. While these vehicles were traditionally used primarily for work purposes, it is now very common for pick-up trucks and SUVs to be used primarily for personal transportation, i.e. as passenger cars. As such, it is appropriate for LDT2 vehicles to ultimately trigger the same ZEV obligations

as passenger cars – just as they will be subject to the same emission standards under the LEV II program. Moreover, it is important to avoid situations in which a manufacturer increases its proportional production of LDT2 vehicles in order to reduce its potential ZEV obligations.

81. Comment: Is it not the case that a larger impact is felt in the early years from fuel cell demonstration programs when fewer ZEV vehicles are required? I think there is a real deficiency in the way fuel cell vehicles are being incorporated into the mix of the ZEV program. Unlike battery electric vehicles, no rigorous analysis has been performed to quantify the total emissions from fuel cell vehicles. Overall vehicle efficiency must be measured well to wheels. Not doing so unfairly provides excessive credits to expensive technologies while leaving affordable technologies under-valued. Cleaner vehicles ought to have larger, not smaller, credit multipliers. Additionally, vehicles that are affordable will contribute more to cleaning the air, as they are more likely to be purchased. Several sliding scale credit multipliers seem to work against these common-sense principles. I urge you to reconsider them. (Navas)

Agency Response: The ARB funded a report, Status report on the Fuel Cycle Energy Conversion Efficiency Analysis - May 25, 2000 that assessed the well to wheel impacts of a variety of fuels, including those fuels that will be used in fuel cell vehicles. Based on this analysis, these fuels look promising for our future air quality goals. In addition, the California Fuel Cell Partnership is further analyzing the different fuels that may be used by fuel cell vehicles. As fuel cell vehicles are demonstrated further the ARB will continue to analyze and assess their air quality impacts. Fuel cell vehicles may be an important part of the future in transportation and the ARB wants to encourage a variety of technologies and give manufacturers flexibility for meeting the ZEV requirements.

82. Comment: Create categories for every vehicle type and every product that pollutes. Make a ten-percent mandate for each one of those categories (Hekeroth)

Agency Response: The ARB, federal government and local air pollution control districts in California have imposed regulations on most sources of air pollution where it was economically and technologically feasible to do so.

83. Comment: Stop the biennial reviews and major changes, because it's stalling the whole process. Every time there are changes the automakers or suppliers have to readjust their plans (Schoen)

Agency Response: The Board agrees with this suggestion and the biennial reviews have been eliminated.

84. Comment: Eliminate the exemption for small and intermediate automakers. (Bierman)

Agency Response: Small-volume manufacturers produce less than 4,500 vehicles per year and are not required to meet the percentage ZEV requirements. Intermediate-

volume manufacturers produce between 4,501 and 60,000 vehicles per year and can meet up to 100 percent of their requirement with PZEVs. The exemption from the ZEV requirements for small- and intermediate -volume manufacturers was part of the original ZEV requirement adopted in 1990. Any change to this requirement at this time would have a significant economic impact on both small and intermediate manufacturers. The small number of vehicles that both the small- and intermediate- volume manufacturers would have to produce would be too costly and not provide meaningful air quality benefits.

85. Comment: Employ moving averages instead of freezing every 3 years. (Bierman)

Agency Response: In calculating the number of vehicles to which the ZEV requirement is applied, language has been added to the 15-day changes made available October 31, 2001 to provide manufacturers with this flexibility. Manufacturers may chose to use the three-year averaging of prior years or they may choose to use the same model year. If a manufacturer chooses to use the same model year method it must be used each year of the three-year period. Although, this doesn't offer a moving average, it does reflect a method that uses more current vehicle sales as the basis of determining ZEV requirements.

86. Comment: The regulations should provide ZEV credit to automakers that provide gliders to small companies who then convert them to electric drive. A glider is a car without an engine that can be converted to an electric vehicle by a conversion company. (Bierman)

Agency Response: Under the current ZEV regulation and credit scheme, there is no reason why the transfer of credits cannot take place between an automaker and a small conversion company. For example, a conversion company could sell their ZEV credits to an automaker making their product more valuable.

87. Comment: We need some way to give them credits for the externalities of improved public health. The Mendrisio idea of basing credits in terms of CO2 production was very interesting. (Thompson)

Agency Response: The goal of the ZEV program is to reduce motor vehicle emissions to zero which in effect significantly improves public health.

88. Comment: I propose that the efficiency credits could be taken from the CO2 emissions, what the car emits, instead of just on fuel consumption. (Schoen)

Agency Response: The primary goal of the program is to reduce ozone forming emissions. While the regulation is designed to maximize ozone reductions, it also rewards reductions in carbon dioxide emissions. It is important to consider the CO2 emissions upstream as well as from the vehicle itself. Therefore, the ARB uses other factors for efficiency credits. In addition, a vehicle whose operation results in reduced

CO2 emissions as compared to the average vehicle in its class may qualify for additional ZEV credit.

89. Comment: Make changes to the ARB staff proposal to require that full performance ZEVs be available in the marketplace as rapidly as possible. (Yolo-Solano AQMD)

Agency Response: The credit system incorporated into the ZEV program is designed to encourage the development of advanced technologies and the early introduction of ZEVs. A ZEV placed in service between 2001 and 2002 receives a 4-credit multiplier. A ZEV placed in service between 2003 and 2005 receives a 1.5 credit multiplier. This credit scheme should encourage manufacturers to make ZEVs available in the marketplace as rapidly as possible.

90. Comment: There are no full performance ZEVs available now and yet there are people waiting for and wanting electric vehicles. We need vehicles available in the marketplace. (Yolo-Solano AQMD, City of San Francisco, City of Davis)

Agency Response: As stated in the response to the previous comment, an EV placed in service in 2001-2002 receives a 4-credit multiplier and an EV placed in 2003-2005 receives a 1.25 credit multiplier. This should encourage manufacturers to produce and place their EVs sooner rather than later and provide people on the EV waiting lists with a vehicle.

91. Comment: The existing regulation does not address vehicle energy efficiency directly, but does so indirectly with the range multiplier. Staff proposed that the Board define an efficiency multiplier that would replace the range multiplier on a phased-in basis beginning in 2005. The Regulation Order specifies a 2005 start date. If efficiency is a good thing, it is certainly a better thing earlier than later. This multiplier should be fully available starting in 2003 for PZEVs and AT PZEVs. (Toyota)

Agency Response: This recommendation was incorporated in the October 31, 2001 staff modifications. The effective date of the efficiency multiplier for PZEVs and AT PZEVs was moved up from 2005 to 2002.

92. Comment: The proposed regulation contains no provision for expert public review of the potential of advanced technologies. (Toyota)

Agency Response: Resolution 01-1, adopted by the Board at its January 25, 2001 hearing, states "Be it further resolved that the staff shall no longer routinely report to the Board at least every two years regarding the status of the implementation of the LEV and ZEV programs; however, staff shall continue to monitor implementation progress and report to the Board when appropriate." Thus staff has been directed to update the Board as necessary on technology developments. Staff has used outside experts, such as the Battery Technical Advisory Panel and the Fuel Cell Technical Advisory Panel, in the past, and will retain the services of such experts as needed in the future.

93. Comment: Additional credits should be provided for natural gas vehicles. (Honda)

Agency Response: This recommendation was incorporated in the October 31, 2001 staff modifications. An additional credit of 0.1 was provided for vehicles that use gaseous fuel storage. This credit applies to natural gas vehicles.

94. Comment: [T]he ARB has the obligation to determine that any emission standards it seeks to adopt are “necessary” for the control of vehicle emissions. The term “necessary” is commonly understood to mean “essential” or “indispensable” to the accomplishment of a particular objective. Taking the December ARB Staff Report at face value, the contention that either the current mandate or the amended mandate is “essential” or “indispensable” for California to accomplish its air quality objectives is unpersuasive. The estimates of the emission benefits from either version of the mandate are extremely modest and are out of line with the enormous costs of the mandate. Any number of alternatives could be developed which would achieve these modest estimated benefits, and more, at considerably lower cost (e.g. the Fair Market Test, delaying the mandate but achieving the emission benefits using performance standards that do not require a specific technology). (AAM)

Agency Response: As discussed above, the ZEV program is an essential component of the Board’s long-term vision of zero- and near-zero technologies applied wherever possible. The Board’s aggressive pursuit of this strategy is consistent with its responsibility to achieve the maximum degree of emission reduction possible from vehicle and other mobile sources in order to accomplish the attainment of state ambient air quality standards at the earliest practicable date. ZEVs represent the cleanest, most advanced technologies available, and the commercialization of ZEVs through regulatory requirements and other incentives is critical to the long-term success of California’s clean air program.

95. Comment: Non-air quality rationales for implementation of the mandate—such as obtaining significant reductions in dependence on foreign oil and reducing global warming---are not quantified or supported by substantial evidence. (AAM)

Agency Response: In the August 7, 2000 Staff Report for the Zero Emission Vehicle Program Biennial Review, staff identified a number of ZEV program ancillary benefits above and beyond its direct effect on smog forming emissions. Staff noted, however, that the Board’s consideration of the ZEV regulation is firmly rooted in its air quality mandate and authority. Thus no attempt was made to use such benefits as justification for ARB action. Rather, such considerations were discussed to provide information for the Board regarding the multi-faceted effects of its policy choices. With regard to the specific benefits cited, staff discussed the following:

- The fuel distribution system in California is tightly regulated. Nevertheless, given the enormous quantities of fuel involved (roughly 40 million gallons of gasoline sold per day

in California) it is inevitable that leakage occurs. The impact of such leaks can be significant. One example is the contamination of groundwater by leaking underground storage tanks. Certainly the most well known recent case involves the contamination of drinking water supplies by MTBE. It is important to bear in mind, however, that in addition to MTBE gasoline contains numerous other toxic compounds, including benzene, toluene, and 1,3 butadiene. Therefore the removal of MTBE from gasoline will not eliminate the danger of water pollution from fuel leakage.

- In addition to the threat posed by leaking storage tanks, the fuel distribution system also introduces water pollution in the form of point source discharges from refineries. According to figures reported by industry as part of the annual Toxic Release Inventory (TRI) program, there are 22 facilities in California that fall under Standard Industrial Classification Code 2911, petroleum refining. For the 1998 reporting year, 10 of these 22 facilities reported discharges to surface water, totaling more than 7.3 million pounds. Chemicals released included nitrate compounds, MTBE, and methanol. In that same reporting year, 13 of the 22 facilities reported releases to publicly owned treatment works (wastewater treatment facilities). Chemicals released included phenol, MTBE and methanol, and total releases were almost 1.5 million pounds.
- The fuel production and distribution system also results in the generation of hazardous waste. According to manifest data from the Department of Toxic Substances Control, the 22 refineries noted above generated more than 103,000 tons of hazardous waste in 1998.
- Although not directly related to the fuel distribution system, motor oil from internal combustion engine vehicles is also a significant source of water pollution. Motor oil contains polycyclic aromatic hydrocarbons (PAHs), which are a major water toxicity problem in urban areas. Motor oil is released to the environment during the normal operation of internal combustion engine vehicles, and also when used motor oil is improperly disposed. Electric vehicles do not need motor oil and therefore do not contribute to this problem.
- Reducing demand for gasoline can have important benefits for California. First, a reduction in demand could help eliminate shortages of cleaner-burning California gasoline that have lead to rapid price increases. Second, a successful effort to reduce gasoline demand also would reduce the need for additional refining, transportation and distribution facilities, thus reducing air and water pollution as noted above. Gasoline demand can be reduced by increasing the efficiency with which gasoline is used, and by the use of alternative fuels. Advanced vehicle design, lightweight components, aerodynamic advances and the use of electric drivetrains all result in increased vehicle efficiency. EVs and hybrid electric vehicles typically take advantage of such measures and, as a result, achieve higher efficiencies. Battery EVs, which use electricity as a fuel, provide significant alternative fuel benefits because electricity can be produced from a variety of non-petroleum energy resources. Moreover, because both electricity and hydrogen can be produced from renewable resources such as solar, wind or hydropower, or biomass feedstocks, these technologies can help pave the way towards a sustainable energy future.
- To quantify the relative efficiencies of current and future technologies, the ARB and the Energy Commission contracted with A.D. Little to perform an analysis of the full fuel cycle energy efficiency of various vehicle technologies. This work also served to

quantify the relative global greenhouse gas benefits of each technology by quantifying total carbon dioxide emissions. Energy conversion efficiency of a fuel was determined for the fuel production and energy conversion portions of the fuel cycle, including fuel acquisition and refining, distribution, refueling, and in-vehicle consumption. The A.D. Little study determined that, at the vehicle level, battery electric vehicles had the highest “miles per equivalent gallon” energy efficiency of all vehicle types analyzed, followed by hydrogen fuel cell and methanol fuel cell vehicles and hybrid electric vehicles. On a total fuel-cycle energy use basis, diesel internal combustion engine vehicles and gasoline hybrid electric vehicles used the least energy per mile, followed by electric vehicles. When compared to conventional vehicles, electric vehicles consume approximately 25 percent less energy on a full fuel cycle basis. Electric vehicles have the lowest carbon dioxide emissions of the technologies evaluated.

96. Comment: First, in order to achieve the full credits offered in this proposal, manufacturers must “sell” battery electric vehicles, not just “offer them for sale”. Toyota doubts the marketability of battery electric vehicles. (Toyota)

Agency Response: Under the modified regulation, ZEVs must be “placed in service” in order to earn the early introduction multiplier and the extended range multiplier. This requirement was adopted in response to public comment in order to encourage manufacturers to actively market vehicles rather than produce them but leave them on dealer lots. During the Biennial Review workshops and the September 2000 and January 2001 Board meetings staff received testimony and written submittals from individuals indicating that in their view they had to overcome unusual barriers in order to lease an EV. Examples included sales staff who are unfamiliar with the vehicles, long delays in getting information, ambiguous or contradictory information regarding “waiting lists” to obtain vehicles, and long delays in getting vehicles once orders had been placed. Some EV drivers also stated they have more recently stopped encouraging potential customers to visit EV dealers, because test drive opportunities are difficult to arrange and the dealers are uncertain regarding when EVs would be available. To mitigate these issues the regulation provides that certain enhanced credits are only available when a vehicle is placed in service.

97. Comment: As Honda has discussed in prior submittals to the Board, California’s definition of “passenger car which includes most mini EVs and NEVs, conflicts with the federal definition, which has specifically excluded those vehicles. Honda believes the proposed amendments do not acknowledge this conflict and count mini EVs and NEVs as creditable ZEVs without addressing the issue of these vehicles’ required crashworthiness. (Honda)

Agency Response: The crashworthiness of vehicles is overseen by the federal government. Although Low Speed Vehicles (LSVs) are not considered “passenger cars” under federal law, they can legally be driven on roads with posted speed limits of under 35 mph. Thus all vehicles included within the ZEV program are street legal under federal law and meet all federal safety standards.

More specifically, production City EVs sold in the United States in quantities greater than 2,000 will be required to meet all existing federal DOT/Federal Motor Vehicle Safety Standards (FMVSS) requirements for equipment and crash protection. All are equipped with dual air bags, and many offer anti-lock braking systems. Even City EVs sold in quantities less than 2,000 have to be reviewed by NHTSA and granted a waiver.

Neighborhood electric vehicles (NEVs) are separately regulated as “low speed vehicles” (LSVs). Low speed vehicles have a curb weight of under 1800 lbs., are equipped with speed limiting devices that limit maximum speed to 25 mph, and are restricted to use on roads with posted speed limits of under 35 mph.

The National Highway Traffic Safety Administration (NHTSA) has excluded LSVs from the category of “passenger car” and defined a new Federal Low-Speed Vehicle class to establish minimum safety and equipment standards for these vehicles (49 CFR Parts 531.3 and 571.500). These regulations define a LSV as “a 4-wheeled vehicle, other than a truck, whose speed attainable in 1.6 km (1 mile) is more than 32 kph (20 mph) and not more than 40 kph (25 mph) on a paved level surface”. The California vehicle code was modified under Senate Bill 186 to accommodate this new federal classification, and these vehicles have been legal for use on public roads statewide since January 2000. Under California law and ARB regulation, LSVs qualify as “passenger cars” even though they are subject to different crash test requirements. Thus, federal and state law differ on this point.

Although these vehicles appear to be similar to golf carts, they offer substantially more performance, better safety features, and are much more road worthy. LSVs are generally capable of much better acceleration than golf carts and can achieve 25 mph quite rapidly. Golf cart performance is restricted in accordance to cooperative industry standards to 13-15 mph, due to safety and turf maintenance concerns on golf courses. LSVs are usually equipped with higher-pressure road tires that might damage turf if used on a golf course, and LSVs must also be equipped with much better brakes than would be needed on a golf course. At the present time, all LSVs on the market are purpose-built designs intended for use as LSVs and are not derivatives of existing golf-cart designs.

98. Comment: Battery electric vehicles and range extended HEVs already receive a range credit. The phase-in/phase-out scheme proposed is both awkward and results in variable credits over time for the same vehicle. Drop the efficiency credit for BEV and grid-HEV. (Toyota)

Agency Response: Efficiency is important for battery electric vehicles because it enables the vehicle to travel further on a given battery charge. This also results in lower “upstream” emissions (due to power plant emissions) per mile traveled. Therefore staff believes it is important to continue to offer incentives for increased vehicle efficiency. In the October 31, 2001 modifications, however, staff included two changes that somewhat reduce the relative importance of efficiency within the credit calculation methodology:

- The baseline against which battery electric vehicles and grid HEVs vehicle efficiency is measured is increased in 2012 to 2 times the class average rather than 1.5 time the class average.
- The final phase-in factor for efficiency is reduced from 1.0 to 0.825.

99. Comment: Staff's new proposal uses a 1.5 x EPA class average fuel economy baseline for earning the efficiency credit. Although keying the baseline to size class is reasonable, the 1.5 threshold is too high. A 1.25 threshold is more appropriate. (Toyota)

Agency Response: The October 31, 2001 staff modifications establish an "efficiency" method to determine the advanced componentry credit earned by a vehicle. This method uses a baseline of 1.3 times the class average, similar to the recommended level.

The class average baseline for the overall efficiency multiplier was retained in order to ensure that vehicles earning an efficiency multiplier achieve meaningful performance gains. Production vehicles available today, such as the Toyota Prius and Honda Insight, achieve efficiency gains well in excess of the baseline. Staff expects that future hybrid vehicles will have similar performance levels.

100. Comment: Retroactive application of this efficiency multiplier [for early introduction of PZEVs] is sound policy. It rewards those willing to enter the market early. Unfortunately, this improved credit multiplier is not retroactive to previously placed EVs. By the same logic, it is good policy to reward the early introduction of EVs. The revised regulation with respect to the credit weighting for the early introduction of EVs should be corrected to be consistent with the PZEV policy. (Toyota)

Agency Response: Under the December 8, 2000 staff proposal, the early introduction multiplier for ZEVs took effect in the 2001 model year and the early introduction multiplier for PZEVs took effect in the 2000 model year. This distinction was made because the ZEV early introduction incentive was intended to encourage additional vehicle placements, using already developed technology, while the PZEV early introduction multiplier was intended to recognize that for most manufacturers, additional time was needed to develop the necessary technology. Thus it seemed appropriate to limit the ZEV multiplier to newly placed vehicles, but allow the PZEV multiplier to reward manufacturers who were the first to market vehicles meeting the stringent PZEV requirements.

On January 19, 2001 staff released additional modifications. One such modification, in response to public comment, would have made the ZEV early introduction multiplier retroactive to the 2000 model year in order to conform to the treatment of PZEVs. This proposal was rejected by the Board, on the grounds that the extra incentives for ZEVs should be limited to newly introduced vehicles, as had been the original staff proposal.

101. Comment: I strongly urge you not to include gas-electric hybrids as part of the ZEV program. (Nelakuditi)

Agency Response: In the regulation, gasoline-powered hybrid electric vehicles can no longer qualify for (gold) portion of the ZEV regulation, and only those that meet stringent PZEV requirements can qualify for PZEV or ATPZEV credit. ARB feels that hybrid electric vehicles are important technologies as they promote the development and cost reduction of electric drive technologies that are used in pure ZEVs. In addition, the ARB has a policy of being “fuel neutral” in developing regulations. That is, all regulations are based on emissions performance and environmental impacts, regardless of the fuel or technology used.

102. Comment: PZEVs should not be included as ZEV credit substitutes, unless they can be fully ILEV, meaning if you took out all of the emission controls they could actually be an ILEV and also be a SULEV (Korhtof)

Agency Response: To receive PZEV credit, a vehicle must meet a series of very stringent emission related requirements including extended durability and on-board diagnostic requirements. By requiring all PZEVs to be covered with 15 year/ 150,000 mile emission warranties, ARB believes much of the risk associated with malfunctioning non-ILEVs can be kept very low. The only vehicles that qualify for the federal ILEV program are compressed gas fueled vehicles and pure ZEVs.

103. Comment: Don't start with credits to build the number of vehicles the regulation will produce, instead, start with the total number of ZEVs you would like to see and work backwards and then arrange your credits. If that number is 100,000, then the auto makers can decide how to apportion the numbers between fuel cells, electric vehicles, etc. (Frank)

Agency Response: The amendments reflect the Board's assessment of the state of battery and vehicle technology. The actual number of ZEVs, AT PZEVs, and PZEVs required by the amended regulation represent what the Board believes is reasonable and possible in the given timeframe. The amendments are crafted to provide incentives for a variety of technologies based on each technology's state of development and environmental benefits. Manufacturers are provided substantial flexibility to build the most effective vehicle types to comply.

104. Comment: Commit to a larger volume of vehicles and stick to the commitment. Eliminate the PZEV option from the ZEV program. Encourage companies to develop one or two models that all will sell. Provide ZEV credits for very clean transit buses. Promote the removal of gross polluters from the fleet right now and have the automakers use the windfall to offset the costs of ZEV introduction. The mandate should be implemented on a target-oriented approach – via limited, high profile and high problem air basins. We need to investigate the benefits of having large energy storage capability in stabilizing our power grid. (Dunning)

Agency Response: The ZEV program is one part of a comprehensive motor vehicle control program that includes many of the elements mentioned by the commenter.

105. Comment: Definition of ZEV should be changed to allow more ZEVs to qualify. (Bierman)

Agency Response: Since the program's inception in 1990, a number of modifications have been made designed to increase the flexibility and provide additional options for automakers. Three distinct categories, ZEV, AT PZEV, and PZEV now provide a range of compliance options for automakers. The ARB believes that the definition is broad enough and does not require additional changes.

106. Comment: A requirement should be included that ensures that vehicles will be available to the public, as well as to fleets. (Casner)

Agency Response: A mature, successful, commercial market for ZEVs will include sales and leases to both the public as well as fleets. While the ARB has worked with automakers to place vehicles with consumers in the past, and will continue to do so, it is inappropriate to place such a requirement within the regulations.

107. Comment: Take the long-term view and make the program a 20-year program. To address the issue of using electric vehicles to provide benefits to the grid, form a multi-agency working group that would include the ARB, CEC, the Fuel Cell Alliance, the ISO, the PUC, the infrastructure Working Group and various stakeholders in the private sector. (A Brooks)

Agency Response: The ARB has taken the long-term view in its approach to the regulatory changes by including an increase in the percentage requirements through 2018. The amendments also reflect the expected development of technologies such as fuel cell vehicles that are still several years away from commercial introduction. To address the issue of using electric vehicles to provide benefits to the grid, the ARB has already funded research to evaluate this potential and will continue to work with appropriate stakeholders to see how to best develop this concept in the future.

(k) General Opposition to the ZEV Program

108. Comment: We are concerned that the ZEV mandate will not do enough to further California's mission for clean air and better health, particularly for those in the most heavily populated, low-income communities. We are also concerned that the ARB is in violation of the Environmental Justice Act by not reaching out to all communities during the regulation development process. As a result, we request that you delay the vote before you for several months (3 to 4) and support a review of the program by the combined interests of the ARB, environmental justice groups and industry. (Seven Assemblymembers)

Agency Response: This comment should be responded to in two parts. The first part being the effectiveness of the ZEV mandate at furthering the mission of meeting air quality standards throughout California, particularly in disproportionately impacted communities and second, ARB's adherence to the Environmental Justice Act.

Part 1: The Board did not delay the decision on the ZEV regulation because staff is confident that the ZEV mandate furthers the mission of meeting air quality standards for all California citizens because it furthers advancement in automotive emission reduction technology. The ZEV regulations have already resulted in the development of a variety of automotive emissions control advancements such as: vehicles meeting super-ultra-low emission vehicle standards, retail available hybrid electric vehicles, electric vehicles in daily use by both consumers and fleets. These vehicles are operated throughout California including the most highly impacted neighborhoods.

Often the most appropriate uses for electric vehicles are fleet applications, particularly postal delivery and electric or gas utility meter reading and maintenance. These driving cycles take place in all neighborhoods in California and are marked by frequent starts, stops and idle; arguably a high emission driving cycle. Using an electric vehicle can eliminate this locally high emission source from neighborhoods heavily impacted by mobile sources.

The argument is also made that because electric vehicles are currently expensive to own, lower income Californian's will not be able to benefit from driving these vehicles. As was stated by an electric vehicle driver at the January 25th hearing, it is not the driver of the EV who benefits, but the person following the EV or the region through which the vehicle is driven that benefits from its zero emissions. Additionally, as all of these zero and near zero emission vehicles age, their prices on the used car market will decrease making them affordable to people with lower incomes. The inclusion of a 15-year/150,000 mile warranty on the PZEV vehicles actually adds a financial advantage to such vehicles, establishing a used car market with reliable emissions performance.

Part 2: The Environmental Justice Act states:

Section 2 part 3, "The California Environmental Protection Agency shall conduct its programs, policies and activities that substantially affect human health or the environment in the manner that ensures the fair treatment of people of all races, cultures and income levels including minority populations and low-income populations of the state." Part 3(c) also reads, "...to ensure greater public participation in the Agency's development, adoption and implementation of environmental regulations and policies."

In preparing the staff proposal to modify the ZEV regulations, staff embarked on a thorough and coordinated effort to solicit input from stakeholders and interested parties. Throughout the existence of the ZEV program, staff has consistently sought to involve stakeholders.

Since the ZEV program was adopted in 1990, the Board has been extremely committed with ensuring that the technology would be available to meet the ZEV requirements. In addition, the Board has ensured that an extensive public process was in place to provide proper outreach and public awareness to all citizens.

A major component of this public process has been a series of public workshops and Board meetings, held in both southern and northern California, in which the Board has deliberated essentially all issues related to the ZEV program. In conjunction with this effort, ARB staff has also developed and implemented new programs designed to demonstrate and educate the public about ZEV technology.

Educational and outreach programs include ARB's vehicle demonstration programs, that have resulted in providing opportunities to over 200 schools, cities, counties, parks, and other public agencies to get "hands-on" experience and exposure to ZEV technology. In addition, ARB staff has participated in more than 100 community events, schools, conferences and other venues throughout the state to both demonstrate and educate the public about the technology.

This issue was raised at the Board's September 8, 2000 meeting, in which the Board, in affirming the ZEV program, also expressed the need to build upon and increase the public awareness and education efforts to date. In response, the ARB plans to establish a statewide steering committee to make certain that the entire spectrum of stakeholders are involved, including members of lower income communities.

109. Comment: We request that the ARB delay any vote on the proposal for 90 days to allow time for our input as stakeholders. (Boyle Heights Mejoramiento, Sanchez, Mother's of East L.A. Santa Isabel)

Agency Response: See response to comment 108, part 2.

110. Comment: Delay the scheduled vote on the ZEV rule. Some commentators just asked for a delay, others specified the length of delay (120 days), most asked for the delay to look at alternative strategies. (City of Redono Beach, City of Santa Ana, League of California Cities, Gabriel Valley Council of Governments)

Agency Response: See response to comment 108, part 1.

111. Comment: The staff proposal is workable in the near term but more unpredictable in the long term. Therefore, the Board should delay the requirements for 2006 and beyond. (Ford)

Agency Response: One of the comments received through the biennial review process has been that a lack of certainty about the status of the ZEV regulation in the near- and long-term has lead to a lack of investment and progress in the technology needed to meet the ZEV regulations. Consequently, establishing a very short effective date (2003 to 2006) would create an even more uncertain future for the requirement, fueling the

tendency on the part of auto manufacturers to avoid making research and development commitments that could bring about break-through cost-effective ZEVs.

ARB has a consistent history of assessing progress and effectiveness of its regulations. Should it become apparent as the regulation is implemented that the future year requirements are not workable, the Board would address these issues as they arrive and modify the regulation at that time.

112. Comment: The staff proposal fails to address the issue of ZEV program expansion to other states. The Board should implement the first 3 years as agreements with automakers or delay the decision to allow time for automakers to work with the Northeast states. (Ford, Toyota, AAM, BMW)

Agency Response: The ARB is working closely with the Northeast states who have adopted the California ZEV program pursuant to section 177 of the federal Clean Air Act to make sure their activities help build towards successful ZEV implementation rather than create barriers. Our experience with the MOA process in connection with the 1996 postponement of the initial ZEV requirements suggests that it is far preferable for the ARB to act in the traditional regulatory sphere.

113. Comment: Delay the ZEV requirements for better stakeholder participation. (DaimlerChrysler, GM)

Agency Response: The ZEV program has been reviewed on a biennial basis since 1994, and most recently was brought before the Board in September 2000 for a comprehensive report on technology progress, marketing efforts, and cost effectiveness. Preparations for this review commenced up to one year prior to the Board hearing including three workshops, numerous individual meetings with stakeholder groups, outreach events and dissemination of various staff analyses and findings. Stakeholder participation in the review process was very active.

So, when the Board directed staff at the September 2000 Board hearing to develop modifications to the regulation, the stakeholder population was already well informed of the issues that would be addressed in the regulatory process. Additionally, staff held a public workshop and additional numerous meetings with affected and interested parties prior to the 45-day public notice release. Staff continued to meet with and respond to comments received prior to the January 2001 hearing and in fact incorporated some suggestions into staff's proposal at the hearing (contained in the first 15-day comment package).

Given this substantial public involvement, the duration of the process (starting in fall 1999) and the closeness of the implementation date of the regulation (model year 2003), delay of the regulatory decision was not viewed as appropriate.

114. Comment: Alternative technologies such as fuel cell vehicles hold greater technical promise than battery electric vehicles. We believe that fuel cell technologies

hold the greatest promise of offering the substantial emission reductions sought by the ZEV regulations and proposed amendments. Research and development of these technologies continues with significant commitment. Unfortunately, the current ZEV regulations and proposed amendments seem to ignore the promise of these technologies in favor of mandating technology-limited battery electric vehicles in a specific timeframe which are not cost effective and not acceptable to the general public. We recommend that the proposed amendments be modified to allow for the development and implementation of these promising technologies, as opposed to choosing one technology at the expense of other technologies which may achieve the goal of emission reduction more quickly, more effectively, and more economically. (Honda)

Agency Response: EVs are proven today as feasible. Fuel cells have not been proven to be feasible, we should not therefore delay in the hope that fuel cells will be ready for market in some future year. We must start now with EVs to obtain the emission reductions needed. The numbers required are the seed for developing the market for zero emission vehicles.

115. Comment: We request that the Board direct staff to develop several ZEV options for manufacturers on the two-percent side of the mandate. This would allow each manufacturer to apply its resources to advance the true ZEV technologies it believes have the best prospects. One option would be for a pure battery EV program. Another option, a program for the fuel cell vehicles, developed around a set of performance based parameters and milestones. Progress would be measured against these parameters and milestones and demonstrated to the public.

Environmental performance could be one of the parameters advanced during the development. Achievement would be based on technology performance rather than the number of vehicles produced. This is because technology performance is the real foundation for commercial readiness. Keep the true ZEV component but make it forward looking to drive progress on fuel cell vehicles. (GM)

Agency Response: The modified regulation achieves this goal by providing manufacturers with flexibility to choose their compliance path through the ZEV credit system. Adequate flexibility is provided within the regulation through incorporation of several elements:

- Credit award systems that are performance based
- Banking and trading of credits is allowed
- High levels of credit are awarded for fuel cell technology in the early years of the program to encourage technology development

At the same time, the Board recognized the need to maintain the timeline of implementation for this regulation to achieve air quality benefits in a timely manner.

116. Comment: The Board should conduct a fair market test of the technology to determine whether a successful, sustainable market for battery electric vehicles exists. To determine this, the mandate would be suspended and all large and intermediate size

manufacturers would participate in the placement of about 2,500 vehicles in Los Angeles for evaluation. (DaimlerChrysler, GM, AAM, BMW)

The Fair Market Test (FMT) offers two distinct advantages over this discouraging but very realistic ZEV mandate scenario. First, the number of vehicles to be provided under the FMT, while large, is not as large as the number to be provided under any of the various ZEV mandate proposals. The FMT should therefore lower manufacturers' compliance costs, thus freeing resources for more productive use in the development of more promising emissions-control technologies. Second, the FMT offers a realistic prospect of helping ARB to build a political consensus to either retain the mandate (should the experiment succeed) or repeal it (if it fails). The FMT, unlike the mandate, would bring vehicles in all market segments before the public in a context of a controlled experiment to evaluate their desirability. The market tests have been designed by the manufacturers to be objective. It is therefore possible that the FMT results would be accepted by even the ZEV mandate's most committed proponents. (Austin)

Agency Response: ARB staff evaluated the proposal and believe that it is based on a false premise - that high volume cost at this early stage of technology development is relevant to the long term cost of battery electric vehicles. Industry has stated that volume should not be increased until several evolutions of technology occur. Yet the fair market test proposes to determine the fate of ZEVs based on the cost of producing today's vehicles in volume production. This approach does not allow or take into consideration cost reductions due to technology improvements. Moreover, by its structure the fair market test would remove any incentive for manufacturers to pursue such technical improvements.

The proposed test would suspend not only the ZEV requirements for pure ZEVs, but also suspend the requirements for PZEVs and AT PZEVs. There is no need for a market test of these technologies because they are being sold now. As proposed, the test would severely limit the size and scope of the ZEV program, create additional uncertainty, fail to encourage further technical progress, and it limit the Board's authority.

117. Comment: We recommend that staff develop a non-regulatory alternative. The alternative would involve the concept of individual agreements between CARB and each manufacturer that would comprehend the essence of the staff proposal that includes improved air quality and technological innovation. The alternative would permit each manufacturer to pursue its particular strength in advanced technologies without having to dilute and complicate that effort because of concerns about the actions of other states. Other programs could be included in this individual agreement approach. One program could involve something as simple as retrofitting diesel school buses in California with particulate traps, thereby providing immediate environmental benefits to hundreds of California communities. Or the program could fund a program to buy back gross emitting vehicles in targeted California communities with the greatest need. Still another program could involve a cooperative effort with the State to fund distribution of new gasoline storage cans. (GM)

There are many mobile source control measures that would be much less expensive and more cost-effective than the ZEV mandate, with or without the changes recently proposed by the staff. AIR examined one alternative to the ZEV mandate that would reduce emissions more than the ZEV mandate, and at a far lower cost. In this alternative, the durability period (“useful life”) over which certain vehicles are certified would be increased from either 100,000 miles or 120,000 miles, to 150,000 miles. This would not preclude manufacturers from still offering battery electric vehicles and PZEVs for sale. This alternative would necessitate reduced emissions when vehicles are very new, and a greater attention to emission component durability to ensure that the emission standards are met over a longer period of time. The emission reduction benefits of the ZEV mandate are less than that achieved by the extended durability requirement. Estimated on a vehicle lifetime basis, the cost effectiveness of this alternative would be approximately \$2.64 per pound for LEV1 vehicles, \$2.87 per pound for ULEV1s, \$11.26 per pound for LEV1Is, and \$12.44 per pound for ULEV1Is. This compares to \$132 to \$142 for the ZEV mandate, as modified by ARB’s recently proposed changes. (Darlington)

Agency Response: Responding first to the suggestion that the ZEV program be replaced with an agreement between ARB and each manufacturer to achieve the goals of the ZEV regulations, ARB’s authority rests in the California Clean Air Act to establish and enforce emission standards for motor vehicles. Replacing the ZEV regulations in the long term with agreements with auto manufacturers would create a questionably effective and unenforceable program which would not guarantee successful achievement of ARB’s goals of air quality improvement over the long-term and technology advancement.

California strives to attain and maintain health-based air quality standards through a comprehensive strategy of near-term, on-going and long-term programs. These include near-term programs to immediately reduce emissions and air pollution exposure through retrofit, re-power, replacement and incentive programs that strive to accelerate the turn-over of pollution sources to newer cleaner technologies. Such programs are similar to what the comment suggests should be done as an alternative to the ZEV program.

The other end of California’s program to attain and maintain air quality is based on regulations that set standards for future sources like new cars, trucks, buses, and gas cans. These regulations are the basis for the long-term success of California’s future air quality. There is no doubt that near term programs like diesel school bus retrofit and replacement, retirement of gross polluting passenger cars and replacement of gasoline storage cans has significant impact on air quality. ARB’s Carl Moyer Memorial Air Quality Standards Attainment Program, the Lower-Emission School Bus Program and the Bureau of Automotive Repair’s repair assistance and buy-back programs achieve significant gains in air quality improvement. But, long term success depends on establishment of emission standards and requirements that improve the overall technology – in this case for passenger cars, even to the point of zero emissions. It is

questionable, given California's vehicle population and vehicle miles traveled per year, whether air quality standards can be met without zero emission vehicles in our future vehicle fleet mix. As such, it would be inappropriate to allow manufacturers to substitute near term emission reduction programs for the ZEV requirement which moves the vehicle fleet so significantly in the direction it needs to go in order to meet our goals for vehicle emissions.

118. Comment: Rather than require auto manufacturers to invest in ZEV technology, it may be appropriate for them instead to pay in a fund to retrofit diesel school buses to reduce emissions. This action would reach a different population than investment in ZEVs only. (League of California Cities)

Agency Response: See response to Comment 117.

119. Comment: Consider alternatives that will establish a performance-based approach to attaining air quality goals. (City of Santa Ana)

Agency Response: The ZEV program as modified and adopted by the Board establishes performance based emission standards for several categories of vehicles (PZEV, AT PZEV and ZEV). Within that framework, production requirements are only set for the ZEV portion of the regulation (two percent of sales). Beyond the two percent requirement, much flexibility has been created for manufacturers to meet the regulation with technologies that suit their strengths. Even within the two percent ZEV requirement, flexibility exists through the credit calculation process allowing manufacturers to build different types of vehicles depending on their particular ability and market interests.

120. Comment: The ZEV program will divert resources from other alternatives and slow the pace of technology development. This comment refers specifically to battery electric vehicles. (Honda, AAM, BMW)

Agency Response: From a policy standpoint, the Board has clearly articulated the need to maintain a core zero-emission requirement to provide an incentive for further development. The tremendous progress that has been seen to date can at least in part be attributed to the existence of the ZEV requirement, and ARB staff believes that maintaining this requirement will accelerate the pace at which true zero technologies are commercialized. At the same time, given the wide-open nature of ongoing technical advances, the amendments to the program provide increased flexibility for manufacturers to pursue specific strategies that in their view offer long-term promise. The amendments provide incentives for ongoing technology advancement, across a wide variety of vehicle types (both ZEVs and PZEVs). The reduced number of pure ZEVs required in the near term are designed to adequately explore many different possible market applications while allowing time for continued design and cost improvements.

121. Comment: The ZEV regulations are not necessary and technically feasible. (Honda)

Agency Response: With respect to the environment, ZEVs are the "gold standard" for vehicular air pollution control as they reduce both criteria and toxic pollutant emissions to the maximum feasible extent. High-efficiency ZEVs and AT PZEVs also cut emissions of carbon dioxide and other greenhouse gases. The ARB has concluded that there are no technological barriers to building battery powered ZEVs but that issues of cost and consumer acceptance remain. With regard to near-zero emission vehicles, technology exists that allow vehicles to achieve the required level of performance. While the amendments significantly improve the cost-effectiveness of the ZEV requirements, they still result in higher costs per ton of pollution reduced than any other ARB regulatory measure. Nevertheless, the amended ZEV regulations remain an essential component of the State's long-term air quality strategy because of the promise and ultimate necessity of zero-emission technologies.

122. Comment: Do not increase future ZEV requirements. There is no justification to expand program in the future. (Toyota, AAM, BMW)

Agency Response: As noted in the response to Comments 120 and 121, ZEVs are necessary to achieve the State's public health protection goals. Increasing the ZEV requirements in the long-term will further encourage the commercialization of a number of emerging zero emission and near zero emission technologies now under development.

123. Comment: Manufacturers do not have sufficient time to take advantage of near term flexibility offered by the proposed regulations. (DaimlerChrysler)

Agency Response: The amendments are designed to provide incentives for a wide variety of vehicle types and ensure the near term production requirements better correspond to PZEV availability and the emerging market for ZEVs. The reduction in near term production requirements address the Board's concerns regarding the cost impacts of the program and encourage the early introduction of vehicles. In addition, the amendments also provide an additional "carry-back" year, so that automakers have two years to make up a PZEV shortfall rather than the one year allowed under the previous regulation.

124. Comment: The ZEV mandate, as currently proposed, will not do enough to clean up the air or protect public health. The 10 year-old mandate needs to be reviewed and updated to include new technologies such as fuel cells, compressed natural gas vehicles, hybrid electric vehicles, and new diesel emission control devices. (San Gabriel Valley Council of Governments, City of Santa Ana)

Agency Response: ZEVs represent the cleanest vehicle technologies available by reducing criteria and toxic pollutant emissions to the maximum feasible extent. ZEVs eliminate catastrophic and deteriorating emissions issues in older gas-powered cars as

well as reduce emissions from “upstream” sources. Clearly, these vehicles are necessary in large quantities if California is going to meet its air quality goals. The program has been reviewed and modified as a result of the advances made in a variety of technologies including fuel-cells, natural gas, and hybrid electric vehicles. The complexity of the regulation is largely a result of the different strategies and technologies being pursued by industry. Significant emission benefits will be achieved in the future as these various technologies are produced in large quantities.

125. Comment: The ZEV program will increase the demand for electricity and exacerbate the energy shortage situation. (Brooks, Dunbar)

On a per vehicle basis, the average ZEV will use about 19 kilowatt-hours per day in 2010, and about 15 kilowatt-hours per day in 2020. Household energy consumption can be estimated from the California Energy Commission’s estimate of total residential electricity usage, and the number of households. Using the CEC’s estimate of total residential electricity consumption, and the U.S. Census Bureau estimate of 12 million households in California, average per day electricity consumption is about 17 kilowatt-hours per day. Thus, one ZEV consumes more electricity per day than one household. (Darlington)

Agency Response: In response to this issue, the ARB in cooperation with the California Energy Commission evaluated the impacts to our electricity supply from battery electric vehicles. First, most vehicle recharging occurs during off-peak hours due to lower rates and convenience, and will not contribute to the shortages that have been prevalent during peak hours. Second, the total number of electric vehicles and electricity demand from them is extremely small when compared to the overall system demand. Vehicles on the road today account for about five one-thousandths of one percent of the total annual energy use. New power plants are being built to alleviate the power shortage over the new decade. Nonetheless, even in greater numbers reasonably expected by the regulations, total electrical use from battery electric vehicles would be approximately twelve one-hundredths of one percent of the projected demand in 2010. As a result, the ARB believes that the use of battery electric vehicles will have no meaningful impact on California’s energy situation.

126. Comment: The ZEV program should be eliminated as it will cause a shift in energy industry and displacement of workers (Dunbar)

Agency Response: As noted in the response to the comment above, the total amount of electricity needed for recharging electric vehicles represents an extremely small percentage of the overall California demand. As such, the California Energy Commission has concluded that the commercialization of battery electric vehicles will have essentially no impact on issues related to energy supply or production.

127. Comment: The ZEV program creates hazardous situations in accidents and disposal due to the use of batteries. (Brooks)

Agency Response: The ARB has worked with the State Fire Marshal and other state and local emergency response officials and towing companies to create a comprehensive training program to ensure preparedness for incidents involving EVs. In 1998, this effort resulted in the development of a training program consisting of material to train instructors, an instructor's manual and compact disc, and slide teaching materials and student manuals. Train-the-trainer courses have been held throughout the state with a complete package of training materials distributed to every state Fire Marshal Office in the United States. To staff's knowledge, no public safety issues have arisen regarding the safety of EVs or the actions of emergency response personnel in responding to an EV accident.

The MOA directed the ARB to work with the Department of Toxic Substances Control, the Integrated Waste Management Board, and the Office of Environmental Health Hazard Assessment to ensure the availability of sufficient battery recycling capacity. In addition, ARB staff has followed battery recycling issues at the national level by participating on the Department of Energy's Advanced Battery Readiness Working Committee. At this time, there do not appear to be any overwhelming obstacles to disposal and recycling of battery technologies expected in the 2003 timeframe. Currently, there is one facility in the United States capable of recycling nickel-based batteries. Another plant in Canada is now successfully recycling large military lithium-based batteries. While recycling technologies are being developed and are expected to be in place, it will be necessary to build new recycling plants for certain battery types, such as lithium-ion, to accommodate their use in large quantities. Any new recycling facilities would be required to meet stringent air quality and environmental regulations that would minimize any adverse effects of the recycling processes.

128. Comment: The program should be dropped, as there is no market for ZEVs due to cost and operational limitations. (Surber, Burns, Toyota, Honda, AAM, BMW, Volkswagen)

Agency Response: There is significant disagreement over the extent of market demand for electric vehicles. While automakers and opponents assert that the lack of leases during the MOA period demonstrates that the market can only absorb a minimum number of vehicles per year, electric vehicle advocates and fleet operators point to current waiting lists as evidence of strong customer interest and pent-up demand. The entire market is new and product availability has been constrained such that true consumer interest is extremely difficult to gauge. In addition, the introduction of city- and neighborhood electric vehicles further clouds the market for electric vehicles. Surveys and market studies indicate that pricing, range and recharge time are the most important factors affecting the EV market. The ARB believes that a market exists for the relatively small number of vehicles required by the regulations and that the single greatest need is for near-term product availability followed by a smooth orderly ramp-up to larger commercialization.

(l) Legal Issues

129. Comment: In reaching a decision in this rulemaking the Board must consider all of the evidence before it, including the substantial submittal on January 23, 2001 by General Motors asserting that the ZEV mandate increases emissions because of the fleet turnover effect. The ARB is required by the California Administrative Procedure Act (APA), its case law and the due process clause of the federal Constitution to consider the entire administrative record. (GM)

Agency Response: As reflected in the October 31 Staff Review of the NERA-Sierra Report and this FSOR, the ARB has seriously considered GM's submittals prior to taking final action to adopt amendments in this rulemaking. More generally, we believe we have considered the entire rulemaking file for this rulemaking.

130. Comment: While the Board possesses broad authority to regulate emissions, it has no power to adopt and enforce regulations that will increase, not decrease, emissions from the in-use fleet. The paramount legislative purpose for ARB is to improve air quality. See, e.g., Health and Safety Code sections 43000, 43010, and 43801. To say that ARB is simultaneously empowered to prevent pollution and to enforce regulations like the ZEV mandate that would increase pollution would make no sense, and would violate the canon against self-contradictory statutory constructions. The Board cannot exceed its legislative authority by trying to decide that some regulations that would increase emissions are acceptable or reasonable, without implicating Constitutional principles of separation of powers. See *Clean Air Constituency v. ARB*, 11 Cal.3d 801, 816-17 (1974). Since the new evidence presented by GM regarding the fleet turnover effect shows that the ZEV mandate will have the unintended effect of increasing rather than reducing emissions, it is beyond the ARB's authority. (GM)

Agency Response: As explained in this FSOR, we believe the record shows that the amended ZEV regulation will not increase emissions compared to having no ZEV requirements.

131. Comment: The ARB should recognize its CEQA obligations with regard to the ZEV mandate. The provisions of the ARB's alternative CEQA system certified by section 15251, title 14, CCR, which applies to the adoption or amendment of regulations used in the regulatory program to protect and enhance air quality, covers the ZEV regulation. But the ARB is still required to produce the "functional equivalent" on an environmental impact report ("EIR"). None of the categorical exemptions in CEQA apply to the ZEV mandate, nor do any of the exceptions in Public Resources Code section 21080(b). The ZEV mandate is also a "project" within the meaning of Public Resources Code section 21065 and section 15378, title 14, CCR. The ARB must consider the potential adverse environmental impacts of continuing the ZEV mandate. The ARB's own regulations commit it to respond in writing to "significant environmental issues" raised during the decision-making process. Section 60007(a), title 17, CCR. Previous analyses of the ZEV mandate do not limit the Board's current responsibility to

evaluate the mandate anew under CEQA. Based on the “fleet turnover effect” evidence presented by GM, the ARB will be forced to recognize that the ZEV mandate causes “potentially significant effects on the environment.” Thus ARB must either abandon the project, accept one of GM’s mitigation measures, prepare the functional equivalent of an EIR, and/or after preparing such a substitute EIR, determine that the mitigation measures proposed by GM are infeasible or that the Board’s are equivalent or superior. (GM)

Agency Response: There is no doubt that this rulemaking falls within the ARB’s functional equivalent program certified by the Resources Agency. The Staff Report: Initial Statement of Reasons contained a chapter analyzing the environmental impacts of the proposed amendments pursuant to section 60005, title 17, CCR. The originally proposed amendments made substantial changes to the ZEV regulation as last amended in the 1998-99 “LEV II” rulemaking. The ZEV regulation’s percentage ZEV requirements apply starting in the 2003 model year, but manufacturers have been taking various steps to comply – including generating early introduction credits – for some time.

Consistent with past ARB practices, the Staff Report compared the anticipated environmental impacts of the proposed amendments to the environmental conditions existing if no amendments were adopted and manufacturers were accordingly required to comply with the outstanding ZEV regulation. The ZEV requirements were originally adopted in a 1990-1991 rulemaking, and then were amended in rulemakings conducted in 1992-1993, 1996, and 1998-1999. In each rulemaking the Board had conducted environmental reviews of the amendments. If a project such as a rulemaking is amending previously adopted regulations that were subject to environmental reviews, an agency may appropriately conduct its new environmental review solely on the impact of the amendments on the preexisting regulation. See *Black Property Owners Association v. City of Berkeley*, 22 Cal.App. 974, 985-986 (1994), *Benton v. Board of Supervisors*, 226 Cal.App. 3d 1467, 1475-1482 (1991) and *Temecula Band of Luisino Mission Indians v. Rancho California Water Dist.*, 43 Cal.App. 4th 425, 437-438 (1996).

The originally proposed amendments had the overall effect of significantly reducing the number of ZEVs and vehicles generating partial ZEV allowances (PZEVs) that needed to be marketed, particularly in the nearer term. The Staff Report estimated that the proposed amendments would increase direct emissions of reactive organic gases plus oxides of nitrogen (ROG + NOx) by 0.14 tons per day in the South Coast Air Basin in 2010. In 2020, the comparable figure was a net decrease of 0.08 tons per day of ROG + NOx.

In accordance with section 60007(a), title 13, CCR, the ARB has seriously considered, and addressed in writing, GM’s assertions that the ZEV program, either before or after the amendments, will increase emissions because of the fleet turnover effect. As discussed in detail elsewhere in this FSOR, we have concluded that GM’s analysis is flawed and that the amended program will not increase emissions compared to not having a ZEV program.

132. Comment: Any claimed secondary environmental or related benefits for the ZEV mandate would provide no lawful justification for the mandate. Proponents of the ZEV mandate sometimes suggest that it is beneficial because it will reduce dependence on international sources of petroleum, or help reduce emissions of “greenhouse gases.” The U.S. Congress has decided that the issue of global climate change should be addressed, if at all, through action by the nation and international community as a whole. Regulation of greenhouse gas emissions by California is preempted. Likewise, state regulation of vehicle designs to reduce dependence on overseas sources of petroleum is preempted by both “field” preemption and “obstacle” preemption by the federal Motor Vehicle Information and Cost-Savings Act (MVICSA). (GM)

Agency Response: The motivating rationale for the amended ZEV regulation is the long-term reduction in criteria pollutants, not reductions in greenhouse gases or reductions in dependence on international sources of petroleum. See also the response to Comment 70.

133. Comment: Even if one credits the benefits claimed for the ZEV mandate as a means of controlling smog-forming emissions, the cost-effectiveness is vastly inferior to the alternative measure GM has proposed to extend the useful life of certain vehicle types. In that respect, the mandate is thus not “necessary,” “cost-effective,” or a part of the “most cost-effective combination of controls” as required by the Health and Safety Code, even if one ignores GM’s evidence on the fleet turnover effect. (GM)

Agency Response: The basis for the ARB’s cost-effectiveness determination is set forth in Section II.B.3. of this FSOR. The reasons for not substituting GM’s “extended useful life” alternative are set forth in Section I. The Staff Report and this FSOR similarly demonstrate that the amendments are a necessary element of ARB’s long-term program to attack air pollution.

B. RESPONSES TO COMMENTS RECEIVED DURING FIRST 15-DAY COMMENT PERIOD

Comments submitted by General Motors regarding the effect of fleet turnover on vehicle emissions, taken from (1) report entitled Impacts of ZEV Sales Mandate on California Motor Vehicle Emissions: Responses to Comments of Air Resources Board Staff and Related Documents Provided as Part of the 15-Day Notice, National Economic Research Associates, Inc. and Sierra Research, Inc., and (2) related declarations.

On January 23, 2001, General Motors Corporation filed extensive written comments in the current ARB rulemaking, including a report entitled Impacts of Alternative ZEV Sales Mandates on California Motor Vehicle Emissions: A Comprehensive Study. This report, prepared by National Economic Research Associates, Inc. and Sierra Research, Inc. (NERA-Sierra Report 1), argued that the ZEV mandate would result in higher overall fleet emissions than would be expected under business as usual without a ZEV mandate. Specifically, the report argued that the ZEV mandate would lead to higher

prices on new vehicles in California; this “ZEV tax” would lead to higher retention rates for older vehicles; the reduction in the scrappage of older vehicles, in turn, would result in an increase in overall fleet emissions, because older vehicles have much higher emissions on average than newer, cleaner vehicles.

On October 31, 2001 ARB staff released for public comment a review of the above referenced report, entitled ARB Staff Review of Report Entitled “Impacts of Alternative ZEV Sales Mandates on California Motor Vehicle Emissions: A Comprehensive Study” (ARB Staff Review). The ARB Staff Review concluded that the NERA-Sierra Report 1 significantly overstated the impact of the California ZEV program on vehicle prices, vehicle sales, and fleet turnover-related changes to vehicle emissions. The ARB Staff Review relied in part on a memo prepared at ARB’s request by economists from the Institute for Economic and Environmental Studies, California State University Fullerton (Hall-Brajer memo). This memo was also released for public comment on October 31, 2001.

On November 15, 2001 General Motors submitted as public comment a new report, also prepared by NERA-Sierra, entitled Impacts of ZEV Sales Mandate on California Motor Vehicle Emissions: Responses to Comments of Air Resources Board Staff and Related Documents Provided as Part of the 15-Day Notice (NERA-Sierra Report 2). This report discusses the points raised in the ARB staff review and the Hall-Brajer memo. The General Motors submittal also included several declarations that support and amplify points contained in the NERA-Sierra Report 2.

This section summarizes the comments provided in the November 15, 2001 General Motors submittal (NERA-Sierra Report 2) and provides staff’s response. Where appropriate additional comments from the related declarations are included within the NERA-Sierra Report 2 summary. Such comments are individually identified.

The NERA-Sierra Report 2 is divided into two sections, which separately address the Hall-Brajer memo and the ARB staff review. This summary and response to comments follows the organization of the NERA-Sierra Report 2 and discusses each issue in turn.

Constant Marginal Cost As Represented in Appendix D

134. Comment: The Hall Brajer memo claims that the NERA-Sierra study represents marginal cost as a horizontal line in Appendix D, which means that any cost increase is passed entirely on to the consumer.

Contrary to the Hall-Brajer claim, the figure in Appendix D is not related to the model used in the NERA-Sierra study to develop empirical estimates of the effects of the ZEV tax. The Appendix D figure demonstrates that increasing prices outside of California (or lowering them in California) relative to the pricing used in the NERA-Sierra analysis would result in lower manufacturer profits, and therefore that manufacturers would not adopt such pricing. This is the only point that the figure was intended to illustrate, and the use of a horizontal marginal cost curve does not in any way affect this result. In the

figure – which assumes linear demand and marginal revenue curves – the manufacturer does *not* pass on the entire cost increase to consumers. Instead, the price faced by consumers only increases by half of the total increase in marginal cost, because manufacturers' marginal revenue curve is not the same as the demand curve.

Additional Comment from Declaration:

Marginal Costs of Production: The change in California vehicle sales as a result of the ZEV mandate will be a tiny fraction of the relevant United States sales. Even if the national marginal cost curve were not perfectly horizontal, it would be impossible to quantify any detectable change in marginal costs over the very small change in vehicle sales volumes on a national basis. (Dr. Michael Whinihan)

Agency Response: The results produced by the NERA-Sierra model, and the implications of the assumptions used, are discussed separately in the ARB review of NERA-Sierra Report 1. The ARB review accepted the internal workings of the NERA-Sierra model on its own terms, and only modified various input assumptions. Thus the conclusions of the ARB staff review do not depend on the interpretation of the graph in Appendix D.

With respect to the interpretation of the graph, the commenter is correct given the assumption that the manufacturer has some control over price and is not selling in a perfectly competitive market. In contrast, if marginal cost slopes upward, less than one-half of any cost increase is passed on to the consumer.

Use Of National Scrapage Rates in the Scrapage Model

135. Comment. The Hall-Brajer memo states that it is possible that Californians may scrap their cars sooner than the national average in which case fewer old cars might remain on the road than estimated in NERA-Sierra.

In fact, however, we understand that California vehicle owners retain their cars for longer than the national average. Thus older California vehicles remain on the road longer than older vehicles in the rest of the country, if anything resulting in higher fleet-wide emissions than would be predicted using national scrapage rates.

Agency Response. The empirical analysis conducted by ARB staff relied on the scrapage data and assumptions used in the NERA-Sierra model. Staff did not adopt any change based upon the point raised in the Hall-Brajer memo. Therefore this point does not affect the conclusions reached in the ARB staff review.

Gasoline Prices in the Scrapage Model

136. Comment. The Hall-Brajer memo states that the NERA Sierra scrapage model uses a gasoline price of \$1.26 per gallon, which is too low. This leads to estimates of used vehicle retention rates that are too high.

The scrappage model relies on historical information from 1970-1998 to derive a statistical relationship between scrappage rates and the new vehicle price. Among the *historical* information used to derive this relationship is the price of gasoline....Nowhere does the scrappage model assume that the current price of gasoline is \$1.26.

Agency Response. The NERA-Sierra documentation is vague on the question of what is assumed about future fuel prices, and the only price for gasoline cited in relevant documents is \$1.26 per gallon. This comment clarifies their approach, but does not negate the importance of the historical pattern of fuel prices embedded in the model and the effect of that pattern when extrapolated to future sales. Prices fell during much of the period from 1970 to 1998, but rose sharply in 2000 and 2001. This had an impact on consumer choice, as was explained in the Hall-Bajer memo: "The U.S. Bureau of Economic Analysis (BEA, 2001) reports that sales of small cars have increased over the past year as sales of large and middle-sized cars have declined in the context of rising fuel prices. It should also be noted that gasoline prices in California tend to stay above the national average, for a variety of reasons related to supply conditions and product specifications."

Consistency of Marginal Cost and Price Assumptions

137. Comment. The Hall-Brajer memo claims that the NERA-Sierra report is inconsistent regarding whether the ZEV tax would apply only to California covered vehicles or to all national sales, since they note that anecdotal reports have suggested that manufacturers have spread some incremental costs nationally.

The NERA-Sierra report is not inconsistent in its discussion of the possibility that small cost differences may not be reflected in regional price differences. It is perfectly consistent to observe that pricing decisions in response to very small incremental cost increases may differ from pricing decisions in response to large cost increases. There are likely to be fixed administrative costs associated with any decision to alter vehicle pricing in a particular region, and for very small incremental cost increases, it may not be cost-effective to change pricing. The profit maximizing strategy may be to ignore relatively small cost differences because the administrative costs of implementing price changes may exceed the gains from the price differences.

Agency Response. The comment makes reference to undefined "administrative costs" to support the assertion that manufacturers do not charge different prices in different regions when faced with a "relatively small" localized cost increase, but do not price nationally for larger price increases. The process of making *any* pricing decision, even one as simple as raising the price everywhere by a constant amount, involves some amount of effort and expense. The connections between these undefined "administrative costs," the size of the cost increase to be allocated, and NERA-Sierra's implied conclusion (that with a "large" cost increase, price increases won't be levied across different regions, while "relatively small" increases will be) is neither clearly explained nor convincing.

Relationship Between the California Market and Other Markets

138. Comment. The Hall-Brajer memo claims that the NERA-Sierra report's assertion that the California market is isolated from the rest of the market is not true.

The NERA-Sierra report points out that California – along with other states planning to adopt a ZEV mandate – is different from non-mandate states, because the mandate imposes incremental costs on the sale of covered vehicles in California. In states without a ZEV mandate, there is no additional incremental cost imposed on the sale of vehicles. This distinction is no less true because the same vehicles are sold in California as in the rest of the country. This distinction is no less true because the same vehicles are sold in California as in the rest of the country.

Any covered vehicle that is sold in California incurs the obligation to produce and sell some fraction of a ZEV – or related vehicle – whether or not similar vehicles are sold outside the state. When manufacturers produce vehicles intended for sale in California, they already know that when sold, the vehicles will incur the obligation to produce and sell a ZEV. Consequently, manufacturers delivering vehicles for sale in California incur additional costs from the sale of *those* vehicles, even if the same vehicles are produced in Detroit, for example, and sold worldwide.

Agency Response. The mandate imposes sales requirements. It is up to the manufacturer to decide how to allocate the associated costs. The comment regarding production of vehicles for sale in California might be a reasonable statement, given consideration of ZEV requirements when manufacturers decide future production of covered vehicles, but begs the question of how the costs will be allocated.

139. Comment. It is implausible to suggest that higher prices in California would lead to a wholesale migration of vehicle consumers to out-of-state dealers.

Agency Response. This is a mischaracterization. The actual statement is, “With more than 90 percent of all models meeting California emissions standards, it is clear that manufacturers and dealers face significant competitive pressure to not significantly raise prices in California. This also implies that the maximum price increase that could be imposed would be the difference between the price of a vehicle delivered at a California dealer and one delivered from out-of-state.” There is no assumption here of “wholesale” out-of-state sales, but recognition that the possibility of out of state sales is another source of competitive pressure on the large manufacturers’ pricing strategies in California, compared to the rest of the U.S. Further, reference is to a “vehicle *delivered*,” clearly recognizing that in versus out of state price is not the only consideration.

Industry Expert on Pricing

140. Comment. The assertion that the pricing assumed in the NERA-Sierra report is inconsistent with industry practice is based on a brief conversation with an unnamed “industry expert”. Review of the notes of that conversation – made possible by a Public Information Request – reveals that the “industry expert” was not properly briefed on the nature of the ZEV mandate. The industry expert was apparently not presented with a situation similar to the ZEV mandate regulation, in which the “standard” independence of vehicle lines no longer holds. Rather than being two separate and independent lines – as presented by the Hall-Brajer memo – the covered non-ZEVs and ZEVs are linked to each other.

It is of course true that under normal circumstances, the costs of one vehicle line play a limited role, if any, in the pricing of a different vehicle line. However, in the case of the ZEV mandate, the regulation *imposes* a direct link between sales of one vehicle line and sales of another. The direct link created by regulation results in a situation in which manufacturers are no longer able to maximize their profits by treating vehicle lines independently, as they would normally do under “standard” circumstances

The Hall-Brajer analysis states that car makers plan out, well in advance, how many of each type of car they will produce. Nothing in the NERA-Sierra report conflicts with the notion that manufacturers plan out their future production. In fact it is the Hall-Brajer memo that is misleading when it suggests by virtue of the fact that ZEV production must be planned in advance, it is necessarily a sunk cost.

In addition to the cost of steel and parts and assembly, the marginal costs of covered vehicles include the marginal costs of the ZEV, PZEV, and AT PZEV obligations incurred by each covered vehicle. These ZEV mandate costs are *not* fixed costs, because they are incurred *every time* an additional covered vehicle is offered for sale in California. Additional sales are triggered, but the entire cost of those sales is not variable.

Agency Response: The industry expert was exactly that--an extremely knowledgeable person regarding all aspects of the auto industry. Staff believes that this individual was fully aware of the context.

The California ZEV regulation is not the only regulation that imposes a direct link between one vehicle line and another. Corporate Average Fuel Economy (CAFE) standards effectively do this. No evidence has been presented that in such cases manufacturers allocate costs across product lines rather than treating them independently.

Many of the costs of manufacturing are fixed in capital-intensive industries. Any variable costs of covered vehicles that are higher because of the link to the mandate would in fact not be sunk. Many of the costs to meet the mandate, however, are fixed, including contractual arrangements with suppliers.

Consumer Response to Prices: Price Elasticity

141. Comment. The Hall-Brajer memo claims that the overall price elasticity of -1.0 used in the NERA-Sierra analysis is too high.

The overall price elasticity used in the NERA-Sierra report represents the rough midpoint of price-elasticity estimates in the economics literature. The Hall-Brajer memo presents no evidence that their recommended value is more appropriate.

Moreover, analyses prepared by the ARB in their review of the NERA-Sierra report show clearly that, contrary to the Hall-Brajer memo's claim the price elasticity it recommends has a very small effect on the results.

Agency Response. The comment that no evidence was presented in support of the Hall-Brajer discussion of overall price elasticity is inaccurate. The referenced memo includes the following: "Since the NERA-Sierra conclusions rest heavily on the assumed level of price elasticity, this is a key variable. They assume an aggregate elasticity of -1.0 , referencing Gruenspecht (2000) who constructed this figure from other sources. NERA-Sierra and Gruenspecht both reference McCarthy (1996), who estimates an elasticity of -0.87 , based on a 1989 household survey. McCarthy, in contrast to Gruenspecht, who finds a 'clustering of estimates in the neighborhood of -1.0 ', also concludes that 'the market demand for new vehicles lies in the unitary price elasticity range, but is income elastic.' He then states that 'estimated market price elasticities of demand...fall in the $(-1.2, -0.6)$ range *with the preponderance of estimates lying below unity*.' (Emphasis added.) That is, elasticities fall primarily below -1.0 . Using an elasticity of less than -1.0 would reduce any level of impacts substantially. NERA assigns elasticities for PCs and LDT1s of -1.2 and LDT2-4s of -1.6 , respectively (GM V. II, C-10). Using McCarthy's estimate of -0.87 , fleet turnover increases substantially compared to the NERA-Sierra results, with additional sales of 927, 1,101, and 1,573 in 2003, 2007 and 2020, respectively."

Changing the assumed price elasticity does, as the commenter notes, have a relatively small effect on the overall results. This does not mean that the change is invalid, however, nor does it refute the fact that this change in conjunction with other similar small changes collectively change the outcome of the NERA-Sierra analysis.

Single Price Elasticity

142. Comment. The Hall-Brajer memo claims that the NERA-Sierra report inappropriately uses a single price elasticity over a wide range of models, prices and attributes.

The nested logit New Vehicle Market Model used in the NERA-Sierra analysis develops separate price elasticities for each manufacturer's vehicles in the covered and non-

covered vehicle classes, for the two vehicle classes, and for the vehicle market as a whole.

Agency Response. As noted in the response to Comment 141, the Hall-Brajer memo acknowledges the use of different price elasticities for different vehicle categories.

Present and Future Price Elasticity

143. Comment. The Hall-Brajer memo states that currently, price is a less important factor affecting consumers' vehicle choices than it was in the past. By relying on past estimates of the price elasticity, the NERA-Sierra study overestimates the effects of price changes.

The claim that price elasticity estimates from the current literature are not relevant to future price increases is groundless. Hall and Brajer provide survey information purporting to show that consumers place less importance on price now than they did previously. This information on what consumers report to be important to them when they make vehicle choice decisions is only marginally relevant here. For one, consumer self-reporting does not always accurately reflect the behavior that they display in the market. More importantly, even if it were true that consumers did not consider price to be as important as it has been in the past, this would not necessarily mean that price elasticity had declined. Without direct empirical evidence concerning recent consumer behavior, there is no reason to believe that the estimates used by the NERA-Sierra analysis are not relevant for predicting the effects of future price increases in California...."

Agency Response. The primary problem with the price elasticity chosen by NERA-Sierra is that, as noted in the response to Comment 141, it does not reflect the values stated in the references they cite. With respect to possible changes in consumer behavior over time, economists often rely on consumer surveys to study nontraditional and newly developing markets. With careful design and implementation, reliable estimates are often obtained, despite the hypothetical nature of these procedures. The U.S. Department of Energy data cited in support of the observations in the Hall-Brajer memo have been developed to track consumer attitudes toward vehicle attributes over time.

Consumer Substitution: Shifts to LDT2

144. Comment. The Hall-Brajer memo claims that the results of the NERA-Sierra study depend upon the assumption that consumers who decide to defer the purchase of a new vehicle will shift to the LDT2-4 classes of heavier light-duty trucks. Furthermore, the shift to larger vehicles is said to be inconsistent with the NERA-Sierra assumptions about price-sensitivity, because the larger vehicles are more expensive.

The results of the NERA-Sierra model do not depend on the substitution by consumers of larger LDT2s for passenger cars or LDT1s. This shift to LDT2s by consumers is one

possible option available to them when they are faced with higher prices on large manufacturers' covered vehicles. There are many other alternatives available to consumers. The nested logit model used in the NERA-Sierra report includes all of these possibilities.

The claim that the substitution of LDT2s is inconsistent with other assumptions about price sensitivity is incorrect on several counts. First, the statement ignores the fact that some passenger cars and LDT1 trucks are just as expensive as certain LDT2s. More fundamentally, this assertion appears to dispute the concept of cross-elasticity. The fact that one of the alternatives initially is more expensive than the other – which is inevitably the case – does not mean that changes in the price of the less expensive alternative have no effect on sales of the other alternative.

Agency Response. The substitution of an LDT2 vehicle for a LDT1 vehicle is one of the possible outcomes of the logit model and in that sense such substitutions are an integral part of the modeling results. With regard to cross-elasticity and the fact that different initial prices do not prevent substitution, staff agrees--this is a basic economic concept. Many factors influence the purchasing decisions of consumers, including the prices of related products. However, in the relevant section of the Hall-Brajer memo, a different point was being made concerning possible consumer substitutions. As the memo stated, "More importantly, these [LDT2-4 class vehicles] are far less fuel efficient than PCs or LDT1s, and from Table 1 it is apparent that consumers are sensitive to fuel economy in years when fuel prices are high, rising, or expected to rise. Sensitivity to this factor almost tripled from 1998 to 2000...Assuming wholesale switching to less fuel-efficient options is unreasonable."

Effects Of Gasoline Price on Demand For LDT2s

145. Comment: The Hall-Brajer memo claims that higher future gasoline prices would reduce the demand for LDT2s. This claim has no factual foundation and the claim about future projected gasoline prices is wrong. In addition, this issue is a minor one in terms of the overall modeling. Because the shift to LDT2s constitutes only one component of the fleet-wide effects of the ZEV mandate, the effects of a change in gasoline price is unlikely to have a significant effect on the overall conclusions of the NERA-Sierra analysis.

The Hall-Brajer memo does not cite any source to support its suggestion that gasoline prices could go up. In fact, gasoline prices are projected to fall from their relatively high levels in 2001 and 2002 and to remain flat in real terms over the next two decades, based upon the most recent Department of Energy forecasts.

Agency Response. Current U.S. Department of Energy³ forecasts from the Energy Information Administration Annual Energy Outlook 2002 in fact predict a rise in petroleum prices beginning in 2002, from \$22.48 per barrel in 2001 and continuing to rise, reaching \$24.68 in the year 2020, which is the last year in the forecast. Gasoline

³ Energy Information Administration/Annual Energy Outlook 2002

prices are forecast to be about \$0.13 lower in 2020 than in 2000 (in 2000 dollars), but almost \$0.19 higher than in 1999. The salient point is that gasoline prices are very hard to predict and that earlier forecasts generally missed the price run-up in 2000 and 2001. Clearly, gasoline prices can, and do, go up as well as down.

Losses in Market Share to Intermediate Manufacturers

146. Comment. The Hall-Brajer memo claims that manufacturers who followed the NERA-Sierra pricing predictions would lose market share to intermediate manufacturers not subject to the same ZEV mandate requirements.

This claim is correct but irrelevant because the effect is incorporated in the NERA-Sierra modeling. Price increases for the large California manufacturers due to the “ZEV Tax” will cause them to lose market share to the intermediate and small manufacturers with whom they compete, and who are not required to produce ZEVs under the mandate. The nested logit model used for the NERA-Sierra analysis includes all intermediate manufacturers, and these losses in market share are exactly what the model predicts. Thus, the NERA-Sierra estimates of new vehicle price changes already reflect the downward pressure on prices due to competitive pressures from non-covered manufacturers

Agency Response. This comment appears to recognize a key concern for the large manufacturers – market share. As noted in the Hall-Brajer memo, “Any manufacturers that followed the cost allocation and pricing policies that are the foundation of the NERA-Sierra conclusions would lose market share. Berry et al. (1995) found large cross price elasticities across manufacturers and models. A \$1,000 increase in the price of a Chevy Cavalier, for example, increases the market share of the Mazda 323 by nearly 10 percent.” The discussion of market share was intended to emphasize the fact that large manufacturers face competitive pressures that must be incorporated into their pricing decisions.

Cost Estimates

147. Comment. The Hall-Brajer memo states that the NERA-Sierra study did not rely completely on ARB cost estimates as was claimed. The NERA-Sierra report is clear that in some cases ARB cost estimates were not used.

Agency Response. Staff concurs that the NERA-Sierra report identified those instances where ARB cost estimates were not used. The use of alternative cost estimates is discussed separately below in the comment section dealing with the ARB staff review; see especially “AT PZEV Long Term Costs” Comment 158.

Use of ZEV Sales and Price Information

148. Comment. The Hall-Brajer memo states that the NERA-Sierra study’s use of ZEV sales information from 1996-2000 does not reflect a “well-functioning” market; thus

extrapolating from this experience is likely to give an unrealistic (and pessimistic) estimate of future ZEV demand.

Agency Response. See response to Comment 163 “Use of MOA Data.”

BEV Costs Related to Battery Industry Structure

149. Comment. The Hall-Brajer memo states that the NERA-Sierra report suggest that ARB assumed a single supplier for batteries, and that this would result in unrealistically low estimates of battery costs. In fact, since a single battery supplier would be a monopolist, the battery costs assumed by ARB would if anything overstate the costs of batteries, since monopolists can command higher prices than firms in competitive markets.

This claim is misplaced. The ARB assumption of a single battery producer results in lower ZEV costs than the alternative assumption of multiple producers because a single producer would have greater economies of scale and thus lower costs than multiple producers serving the same market. The issue of monopoly pricing is simply irrelevant here.

Agency Response. Staff concurs that having two battery suppliers would reduce the volume production for each and thereby lead to reduced economies of scale. ARB staff did not question this assumption in its review of the NERA-Sierra Report 1. Therefore this issue has no effect on the conclusions reached by ARB staff in that review.

AT PZEV Costs

150. Comment. The Hall-Brajer memo states that the NERA-Sierra study reportedly relies upon AT PZEV incremental cost estimates made by Duleep. However, Duleep estimates these costs at \$2,300, whereas the NERA-Sierra study uses an incremental cost of \$2,500.

Duleep does not provide a single estimate, but rather several estimates depending upon the type of vehicle. The value of \$2,500 used by NERA-Sierra is consistent with the Duleep AT PZEV estimates for the types of vehicles expected to be sold as AT PZEVs. The NERA-Sierra analysis uses a number that is consistent with the range presented by Duleep for the more aggressive hybrid drive trains likely to be used by manufacturers (e.g. Toyota Prius). More recent information developed by Sierra indicates that the cost increase for the Prius-type system would be greater than the value used in the NERA-Sierra report.

The Hall-Brajer memo does not acknowledge the alternative estimates contained in the NERA-Sierra report or provide any indication that they reviewed the basis for the ARB estimate. Moreover, the memo does not address the fact that even with the reduction in cost, the ZEV mandate is still estimated to cause an increase in emissions of ozone precursors in Southern California.

Agency Response. Although the commenter states that the \$2,500 value used by NERA-Sierra “is consistent with” Duleep’s estimates for more aggressive hybrid drive trains such as the Toyota Prius, in fact it exceeds the \$2,300 figure provided as Duleep’s specific near-term estimate for the Prius. AT PZEV cost estimates are discussed more completely in the response to Comment 158 “AT PZEV Long Term Costs.”

The commenters note that this single change, taken alone, is not enough to overturn the conclusion reached in the NERA-Sierra Report 1. This same point, which also is made with regard to various other individual changes, is irrelevant. What is important is the collective effect of whatever changes are appropriate. As ARB staff demonstrated in its review of NERA-Sierra Report 1, substituting a series of reasonable alternative assumptions resulted in a fundamentally different conclusion.

Relation/Connection Between Price and Marginal Cost

151. Comment. The Hall-Brajer memo claims that because of the way the NERA-Sierra analysis calculated marginal cost, if price is overstated, marginal cost will also be overstated. The Hall-Brajer memo’s intent, presumably, is to suggest that the marginal cost estimates used for mandate vehicles...have been overstated. However, the marginal costs that this criticism apparently refers to are the marginal costs of new conventional vehicles. These marginal costs are only loosely related to the incremental costs of mandate vehicles.”

Agency Response. This comment appears to be inconsistent with other NERA-Sierra comments asserting that the incremental costs of mandate vehicles directly increase the marginal cost of covered vehicles.

Expected ZEV VMT Replacement: Use of Three Cities Study Travel Data

152. Comment. The Hall-Brajer memo states that travel data from the “Three Cities Study” may not be representative of California. The Hall-Brajer memo provides no suggested alternative to the Three-Cities Study nor does it provide any evidence that a bias was in fact introduced. In fact, contrary to the suggestion in the Hall-Brajer memo, the annual mileage accumulation rates contained in ARB-s EMFAC model and the corresponding EPA MOBILE model used for other states indicates that vehicle usage in California is not significantly different from the national average.

Agency Response. In its review of the NERA-Sierra Report 1, ARB staff did not introduce any change related to this specific issue and therefore this issue does not affect the conclusions reached by ARB in its review.

Assumptions Regarding Consumer Substitution

153. Comment. The Hall-Brajer memo claims that the NERA-Sierra assumption that light-duty trucks are a substitute for covered vehicles is incorrect. The nested logit framework used in the NERA-Sierra study allows for complicated interactions among the demand for different vehicle types. The Hall-Brajer memo suggests that the authors did not understand this complexity. The NERA-Sierra analysis is correct in incorporating a degree of substitutability between the passenger car and LDT1 classes and the heavier light-duty trucks such as LDT2s.

Agency Response. Staff agrees that people make substitutions at the margin. The issue of consumer substitution was addressed earlier.

Demand for City EVs

154. Comment. The Hall-Brajer memo claims that an earlier NERA-Sierra report published in September 2000 notes that demand for city cars will be low. This will depend upon marketing, and success with the Smart car in Europe suggests that these vehicles *are* attractive to consumers.

Presumably the Hall-Brajer comment is intended as an argument that the NERA-Sierra report underestimates the demand for at least some types of ZEVs. This comment ignores the specific details of the ZEV mandate that influence the likely manufacturer responses. City EVs would not offer a cost-minimizing alternative for complying with the ZEV mandate.

The length of the period allowed for comment has not been sufficient to allow a comparative review of motor vehicle demand in the United States and Europe. However, even a superficial review suggests that a comparison to the European market in this case is inappropriate.

Agency Response. European consumers are obviously different in some ways from Americans, and fuel taxes are much higher. The relevant point is that limited market data on EVs are currently available and that therefore forecasting future demand for a new product is a difficult exercise.

Implications of Lower Non-ZEV Prices

155. Comment. The Hall-Brajer memo takes issue with the NERA-Sierra report assertion that “using a lower bound estimate for non-ZEV transaction prices reduces the attractiveness of non-ZEVs”. The lower the transaction costs, the more attractive non-ZEVs would be. The NERA-Sierra footnote cited by the Hall-Brajer memo concerns transaction prices, not transaction costs. The two are totally unrelated. A transaction price is the price at which a buyer and a seller agree to complete a sale, net of any discounts or bargaining that may occur. A transaction cost is a cost incurred in the

process of attempting to buy or sell something, such as the cost of searching for a seller or buyer, or the fee paid to a broker.

Agency Response. In its review of the NERA-Sierra Report 1, ARB staff did not introduce any change related to this specific issue and therefore this issue does not affect the conclusions reached by ARB in its review.

New Vehicle Model Cost Assumptions: PZEV Costs

156. Comment. ARB staff now estimates that the incremental cost of a PZEV is only \$200 per vehicle, rather than \$500 per vehicle, as ARB staff reported in the December 2000 Staff Report. It is difficult to evaluate this revised cost information since it appears to be based upon virtually no supporting information, or at least no information that can be verified. We contacted all of the large volume manufacturers and several intermediate volume manufacturers on the understanding that the information would be confidential; none of these manufacturers responded that they had provided ARB with this information. Moreover, the information we received from these manufacturers in the course of this review indicates that the relevant costs of PZEVs will be on the order of or exceed ARB staff's original estimate of \$500 per vehicle. In addition, it appears that ARB staff did not include some costs of servicing PZEVs that could be significant, such as the costs of dealing with false alarms in on-board emissions diagnostics.

Additional Comments from Declaration:

Cost Estimates for Partial Zero-Emission Vehicles. In an attempt to verify and validate the revised PZEV cost estimates, my partner Mr. Austin and I have contacted or are aware of contacts with all six large-volume manufacturers and many of the intermediate-volume manufacturers subject to the ZEV mandate. Mr. Austin and I asked representatives of those companies to provide us with available cost information regarding PZEVs on a confidential basis. The information Mr. Austin and I received indicates that even the lowest manufacturer estimates of the hardware cost associated with the production of PZEVs are higher than staff's revised estimates of the total cost. I have concluded that the DFARG staff did not obtain clear and precise estimates of the costs of producing PZEVs or the warranty costs of PZEVs from any of the manufacturers that Mr. Austin or I contacted. The manufacturers contacted by Mr. Austin and by me have also each stated that they are not the source of the warranty cost information related to PZEVs included in the staff's revised estimates for PZEVs. I conclude that the revised PZEV cost estimates contained in the new staff documents do not reflect the costs of any single manufacturer, or the industry as a whole, to produce the substantial number of PZEVs assumed in the CARB staff's analysis of the costs and benefits of the ZEV program. (Lyons)

Agency Response. This issue is addressed in the Agency Response to a similar comment submitted separately by the Alliance of Automotive Manufacturers and General Motors.

Comment. In addition to underestimating the cost of producing PZEVs relative to SULEVs, CARB staff has failed to account for the costs associated with the fact that the ZEV mandate will require manufacturers to produce PZEVs instead of LEVs and ULEVs, although the agency has claimed all of the resulting emission reductions as benefits of the ZEV mandate. (Lyons)

Agency Response. The commenter is correct that in the early years of the program, some PZEVs would otherwise have been vehicles other than SULEVs or SULEV equivalent vehicles, and that in some instances this would result in additional incremental cost. Staff estimates that PZEVs produced in model years 2003 through 2006, and a small portion of those produced in model year 2008, fall into this category.

This does not, however, affect the results of the NERA-Sierra analysis. In the methodology used by NERA-Sierra, a ZEV program vehicle produced in year “X” is assigned a marginal cost equivalent to the discounted value of the incremental cost of complying with the program in year “X plus 6”. This is intended to account for the fact that each vehicle sold in year “X” triggers the obligation to comply with the program in year “X plus 6” by producing vehicles in that year that earn ZEV credit. Given this 6 year time lag, the marginal cost assigned to vehicles in model year 2003 is based upon vehicles produced in model year 2009. By 2009, all PZEVs produced would otherwise have been SULEVs or SULEV equivalent vehicles. Therefore the \$200 incremental cost to go from SULEV to PZEV is the appropriate measure to use for vehicles produced in those years. The only possible impact relates to vehicles produced in 2002, whose marginal cost is related to vehicles produced in model year 2008. Staff estimates that in 2008, about 4 percent of the PZEVs produced would not otherwise have been SULEV or SULEV equivalent vehicles. When discounted back to 2002, the additional incremental for such vehicles on a program wide basis would be insignificant.

Number of AT PZEVs

157. Comment. ARB staff assert that the NERA-Sierra Report did not properly account for efficiency multipliers in calculating the required number of AT PZEVs. In fact, the 0.45 credit assigned by the NERA-Sierra analysis to hybrid AT PZEVs was based on an assessment of the most cost-effective way to take advantage of the ability to use AT PZEVs to satisfy a portion of the ZEV mandate. The NERA-Sierra analysis concluded that the incremental cost of producing hybrids that would earn additional efficiency credits would be too high to justify their additional cost over and above the incremental cost of hybrids earning 0.45 credits. ARB staff here appears to adopt a methodology whereby the cost of the least expensive alternative is combined with the benefits achieved by the highest cost alternative.

Agency Response. This comment states that the assumed NERA-Sierra HEV, with an incremental cost of \$2,300, is not expected to earn an efficiency multiplier. This is a misstatement that is contradicted by other comments in this same document and in related declarations.

Specifically, in an earlier discussion of AT PZEV costs by these same commenters the statement is made that “the NERA-Sierra analysis uses a number that is consistent with the range presented by Duleep for the more aggressive hybrid drive trains likely to be used by manufacturers (e.g. Toyota Prius)”. (NERA-Sierra Report 2, page 23). Similarly, the Tom Austin declaration states that “the NERA-Sierra analysis uses a number that is consistent with the range presented by Duleep for the more aggressive hybrid drivetrain used in the Toyota Prius” (page 6).

Thus it is clear that, contrary to this comment, the incremental cost totals estimated by ARB and used by NERA-Sierra in their analysis are based upon Prius-type hybrid electric vehicles. This also is clear from the Duleep study that NERA-Sierra relies upon for its alternative cost estimate of \$2,500 per vehicle (in fact the \$2,500 per vehicle cost used by NERA-Sierra exceeds the Duleep estimate of \$2,300 for the Prius).

ARB used the performance of a Prius-type HEV to estimate the 0.544 credit level that would be earned by a typical HEV. Because the NERA-Sierra cost estimates are based on the same vehicle type, the NERA-Sierra assumed vehicle likewise would earn the same credit level.

The commenter provides no reference to another vehicle type from the Duleep study that has a \$2,300 incremental cost but would not earn an efficiency multiplier. Therefore there is no basis to conclude that a vehicle with a \$2,300 estimated cost would not earn an efficiency multiplier. The NERA-Sierra report, by failing to include an efficiency multiplier for its \$2,300 vehicle, overstates the required number of vehicles.

The commenter goes on to argue that the \$1,086 long term cost assumed by ARB is too low to accommodate Prius-type technology. This is a separate issue, which is discussed below. The issue addressed in this comment is whether or not the assumed NERA-Sierra vehicle would earn an efficiency multiplier.

AT PZEV Long-Term Costs

158. Comment. ARB staff suggests that the hybrid vehicle cost estimates reported by Duleep are intended to be short term estimates that would not hold until 2020. This approach is flawed, because it ignores the effect of improvements in average vehicle efficiency. The NERA-Sierra report’s assumption that AT PZEV costs do not decline significantly once they are fully phased in reflects the increased difficulty of achieving credit for advanced technology when baseline vehicle efficiency is also improving. The alternative AT PZEV costs do not change the fundamental outcome of the analysis—fleetwide emissions in the South Coast are still increased through the entire analysis period.

Additional Comment from Declaration:

AT PZEV Costs. CARB staff estimate of \$1,086 for long term HEV cost is not credible because it allows only \$0 to \$300 for HEV components other than batteries in volume

production. These costs could only at best apply to mild hybrids that would not qualify for AT PZEV credit. HEVs that qualify for 0.544 credit will be far more expensive than estimated by CARB staff. (Austin)

Agency Response. The commenters assert that fleetwide fuel economy will improve in future years, making it more difficult for vehicles to earn an efficiency multiplier. No evidence is provided to support this assertion, nor do recent trends provide any reason to expect a significant fleetwide improvement.

In addition, any improvements seen from the expanded use of hybrid technology will only affect that portion of the fleet using the technology. According to the commenters, such technology is not cost-effective or desirable to consumers, and thus would not be voluntarily adopted by manufacturers. Following their logic, there is no reason to expect that such technology would be used other than to meet the ZEV regulation. Because the regulation only affects a fraction of the fleet, there is no reason to expect any significant improvement in fleet wide fuel economy due to the use of hybrid technology. Any other improvements that affect the overall fleet presumably would be available for AT PZEVs as well and therefore the difference between AT PZEVs and the fleet average would not be reduced.

The commenter statement that the ARB staff estimate of \$1,086 for long term HEV cost only allows \$0 to \$300 for non-battery components is based on an assumption that battery cost never drops below the level assumed by ARB staff for volume production. As was made clear in the ARB staff review of NERA-Sierra Report 1, the ARB staff estimates used by NERA-Sierra were near term in nature and were not intended to be used to characterize vehicle cost through 2020. Therefore any further reductions in battery cost would reduce the battery portion of the total AT PZEV incremental cost.

It is true that this single adjustment, alone, does not change the fundamental outcome of the analysis. That is irrelevant. As was demonstrated in the ARB staff review of the NERA-Sierra report, the various ARB staff adjustments taken together were sufficient to change the fundamental outcome.

AT PZEV incremental Costs

159. Comment. The ARB staff suggests that AT PZEVs will provide fuel economy benefits to users and that these benefits should be reflected in the costs, leading to a reduction of \$1,600 in the costs. We believe the staff analysis of this issue is not appropriate (or at least not complete) for the following reasons:

- Specifics of the ARB staff calculations of the dollar value of the fuel economy difference
- Evidence suggesting that fuel economy differences are not reflected in new vehicle prices
- Need to develop other adjustments rather than just one ad hoc change if fuel economy differences were to be modeled as influencing new vehicle demand, and
- Mistake in using the nested logit model to model changes in fuel economy.

Some analysts have found that consumers appear to discount potential savings on vehicle operating costs such as fuel savings at rates as high as 20 percent. The discount rate used by staff here does not appear to take into account the rather high discount rate that consumers appear to apply to fuel savings.

Even these reduced fuel savings estimates are far too high, because ARB staff's statements about AT PZEV efficiency improvements are misleading because they attribute all efficiency gains to the advanced componentry in the vehicle. In fact, almost half of the efficiency gain is due to other vehicle characteristics, such as lower than average power and alternative "packaging" of the passenger compartment. Detailed computer simulations run by Sierra indicate that a relatively aggressive hybrid system such as the one used in the Prius can improve fuel economy by only 48 percent over the current baseline vehicle. This analysis is supported by independent testing of the Prius by EPA, in which EPA concluded "if one accounts for the performance difference between the Toyota Prius and the average 3,000 pound car and the average subcompact car, the fuel economy advantage of the Toyota Prius is reduced to 45 percent".

Because many of the characteristics associated with hybrid efficiency improvements are associated with negative consumer valuations—for example, small vehicle size or lower power—it is inappropriate to include arbitrarily one particular characteristic of the vehicle that has a positive value (namely fuel savings) while ignoring other characteristics with potentially negative value.

Additional Comment from Declaration:

Consumer Bias in Surveys. Consumer biases associated with the survey process tend to make direct application of consumer survey data to economic models problematic. I [have] repeatedly evaluated survey work that estimated how much money consumers would be willing to pay for vehicles with high fuel-economy ratings. Those studies consistently predicted that consumers would be willing to spend three to four dollars to save a single dollar when buying gasoline. From an economic point of view, such preferences are not rational. GM also studied whether consumers might, for non-economic but nevertheless rational reasons, be willing to "buy" more fuel economy than could be economically justified. GM tested this hypothesis by reviewing sales data from various GM models with various fuel-economy ratings. We found that consumers in the actual marketplace are willing to pay little or nothing for fuel economy beyond what can be economically justified. (Dr. Michael Whinihan)

Agency Response. Commenters argue that the value of future fuel savings should be discounted by 20 percent. Meanwhile, commenters argue that "economically irrational" findings that consumers would pay three to four dollars for a dollar of fuel savings should be rejected. Discounting future savings by 20 percent is just as economically irrational. Staff believes that it is appropriate to apply a standard discount rate to the value of future fuel savings. This is particularly true with respect to fuel savings from

hybrid vehicles, given that such savings are one of the vehicle's defining characteristics and purchasers of such vehicles presumably would be attentive to the fuel savings potential.

In calculating fuel savings in the August 7, 2000 staff report, staff assumed a fuel economy benefit of 50 percent in 2003 and 57 percent in future volume production. Thus staff did not take credit for the entire 90 percent efficiency improvement exhibited by a vehicle such as the Prius. The staff assumptions thus are in the same range as the 48 percent improvement for the Prius reported by commenters in their computer simulation or the 45 percent reported by USEPA. Meanwhile, the dollar value of fuel savings will be higher for many vehicle types than for a subcompact Prius, because most vehicles inherently use more fuel. For example, hybrid technology applied to SUVs, pickup trucks and other larger vehicles will result in larger absolute fuel savings, even if in percentage terms the fuel economy improvement is not as large.

Commenters assume based upon the Prius that all hybrid vehicles will exhibit negative performance characteristics relative to conventional vehicles. This does not appear to be the case for several hybrid vehicles under development such as the Ford Escape, the Dodge Durango, or the GM ParadiGM platform. Therefore there is no basis to conclude that negative characteristics must be taken into account in valuing fuel savings.

Finally, with regard to consumer bias in surveys used to estimate willingness to pay for fuel economy savings, the commenters rely upon points made in a declaration by Dr. Michael Whinihan. That declaration, however, addressed problems with surveys in which consumers professed willingness to pay an "irrational" premium that greatly exceeded the value of the fuel savings (e.g. a premium of three to four dollars for one dollar of fuel savings). Nowhere in the declaration does it state that consumers would not be willing to pay an economically rational amount, equal to the value of the fuel savings. Specifically, as noted in the comment the declaration states "We found that consumers in the actual marketplace are willing to pay little or nothing for fuel economy *beyond what can be economically justified*". (Emphasis added)

Learning Curve Effects of ZEV Costs

160. Comment. The NERA-Sierra analysis provides for future reductions in the incremental costs of producing ZEVs based on the increased volumes likely to be produced in future years. In contrast to the claims of ARB staff, these estimates do appear to include relevant "learning curve" effects. For example, with regard to the battery cost estimates that form the basis of the costs ultimately used in the NERA-Sierra analysis, the Battery Panel's 2000 Report specifically states "These cost projections assume reductions arising from incremental technological advances as well as cost reductions resulting from the economies of scale of materials procurement and high-volume manufacturing." The Panel also noted that the cost estimates reported by the Panel were unlikely to change substantially without a significant breakthrough, but

that no major breakthroughs in battery technology are expected in the foreseeable future.

Additional Comment from Declaration:

Learning Curve Effects on Cost. CARB's claim that the NERA-Sierra analysis has overstated the costs of AT PZEVs and EVs by ignoring so-called learning curve effects is incorrect. The NERA-Sierra analysis is based on battery costs that are consistent with those made by CARB's own Battery Panel in 2000. It is clear from the Battery Panel report that the cost projections assume reductions arising from incremental technological advances as well as cost reductions resulting from the economies of scale. Significant cost reductions from additional learning are also incorporated into the NERA Sierra forecasts by virtue of the fact that an increased cost differential for alternative technologies is not assumed to occur in the future. This implies additional cost reductions will occur at a rate to keep pace with the ever-increasing efficiency with which conventional, gasoline-fueled vehicles are manufactured. (Thomas C. Austin)

Agency Response. Commenters state that the Battery Panel report, which provided the basis for ARB staff battery cost estimates, took into account incremental technological advances, and that therefore there is no basis to assume any additional future cost reductions. The commenters fail to note, however, the relevant time frame of the Battery Panel's analysis. As is stated in the first sentence of the "Purpose and Scope" section of the Introduction to the Battery Panel report, "The purpose of the study summarized in this report was to examine the current state of the leading advanced EV-battery technologies and to assess the prospective costs and commercial availability of these technologies *in the year 2003 or soon thereafter*" (Emphasis added). This issue illustrates a recurring characteristic of the commenters' analysis, in which staff estimates specifically developed to provide background for the Board's consideration of the 2003 ZEV requirement are assumed to hold true in perpetuity.

ZEV Costs in Light of Potential Fuel Cell Vehicles

161. Comment. ARB argues that the NERA-Sierra analysis ignores the possibility that fuel cell vehicles will provide a lower-cost alternative way to fulfill the mandate. ARB staff supports its claim that fuel cells will be a commercial reality as early as 2003 by relying on articles from the popular and trade press; on public statements, often taken out of context, by manufacturer employees; and on a study published by Arthur D. Little. For a variety of reasons, the ARB staff analysis here is very unrealistic. First, although some of the news articles provide relevant information on certain technologies, none deal with the issues in the detail that would be required to model a scenario in which fuel cells are used to satisfy the mandate. Only pure hydrogen FCEVs qualify for full ZEV credits, but the development of hydrogen infrastructure faces huge obstacles. ARB staff's estimates dramatically understate the additional costs of putting the fueling infrastructure in place.

Although ARB staff might suggest that the small numbers of FCEVs that initially would be required to comply with the mandate could be satisfied with fleet sales, the argument for the fleet solution is flawed in a number of ways. First, the fleet market is in fact not primarily centrally fueled, but also includes vast fleets of vehicles refueled at gas stations. Perhaps more importantly, the figures cited in the Green Car Institute study suggest that each year, more than a quarter of the fleet population is turned over. Therefore, on average, fleet vehicles are replaced every four years. However, if fleet users of hydrogen FCVs attempted to resell their hydrogen vehicles, they would face the same problems that would hamper manufacturers' efforts to create a consumer hydrogen FCV market: no one would be willing to purchase vehicles without access to a refueling infrastructure, which as argued above would not be available.

Additional Comment from Declaration:

Hydrogen Fuel Cell Vehicles. CARB's ZEV mandate is premised on the assumption that at some future point in time, manufacturers will shift their ZEV programs from battery-powered vehicles to vehicles powered by hydrogen fuel cells. This assumption is not realistic because it is inconsistent with basic facts about fuel cell vehicle technology. Only hydrogen fueled fuel cell vehicles are treated as ZEVs. Hydrogen fuels are very expensive. There are currently no global, national or even statewide networks of hydrogen refueling stations, and there is no prospect that hydrogen can be sold in large quantities to the general public as a motor fuel at competitive prices. The costs associated with the development of a hydrogen refueling infrastructure are huge and unaccounted for by CARB staff in its analysis of the costs and benefits of the ZEV mandate. Assuming investors would risk the cost of a hydrogen refueling infrastructure for a return on their investment of only 15%, lifetime fuel costs for hydrogen fuel cell vehicles would be at least \$6,500 higher than the fuel costs for conventional, gasoline-fueled vehicles. This calculation is based on an assumed optimistic fuel cell vehicle production level consistent with the assumptions used in the "Scenario Study" performed for the California Fuel Cell Partnership. Although the "Scenario Study" concludes that the cost of hydrogen could be equal to the cost of gasoline, by its design the "Scenario Study" used whatever assumptions were necessary to demonstrate an economic case for hydrogen regardless of whether those assumptions were reasonable. Several critical assumptions used in the Scenario Study were unreasonable. Correction of only some of the unreasonable assumptions indicates that the true cost of hydrogen fuel will be prohibitive. (Thomas C. Austin)

Agency Response. Staff does not claim that fuel cells will be a commercial reality by 2003, but rather that it is reasonable to assume that future ZEV technology will be less expensive than the NERA-Sierra estimated ZEV incremental cost of more than \$32,000 in 2020. Commenters do not discuss or dispute the cost estimates provided in the A.D. Little study referenced by staff, which provided cost estimates for hydrogen fuel cell vehicles of \$9,300 in the 2010 to 2020 timeframe, with further cost reductions possible as fuel cells become more reliable and warranty issues are less of a concern. Nor do commenters provide a rationale for the billions of dollars being invested by manufacturers in fuel cell research and commercialization, given that according to

commenters there is no prospect for a return on that investment in the 2003-2020 timeframe.

With regard to infrastructure, staff acknowledged in its review of the NERA-Sierra Report 1 that there are infrastructure issues associated with the use of hydrogen to power fuel cell vehicles. Staff also noted that there is considerable work underway to address such issues. On this point as well staff questions why manufacturers would continue to make huge investments in hydrogen fuel cell technology if the infrastructure issue posed a fatal flaw with no possible mitigation. Again this appears to be a case where manufacturers, unlike the commenters, believe that there is a likelihood of technical progress over the next 20 years.

Staff also continues to believe that infrastructure for the small number of vehicles required under the ZEV program could be accommodated in a variety of ways. Commenters point out potential difficulties with using the fleet market, but those difficulties do not rule out the fleet market as a possible option for the small number of vehicles at issue.

Comments on Pricing Assumptions

162. Comment. The staff comments do not provide a reason to believe that the added costs to non-ZEVs that covered manufacturers bear due to the ZEV mandate will not be reflected in higher new vehicle prices in California. The argument that manufacturers will avoid raising prices because of the cost increase in order to avoid losing market share is not sensible. If total profit is maximized by raising prices, this is what each manufacturer will do. Similarly, ARB's suggestion that intermediate manufacturers could establish a "price ceiling" above which large manufacturers would not be able to raise prices mischaracterizes the way that manufacturers arrive at prices in a differentiated market of close substitutes like the vehicle market. The ARB staff's claim that competition would prevent cost increases from being passed on to consumers is contradictory to basic economic theory. Cost increases affecting the bulk of the relevant market will affect market prices. ARB staff attempts to justify their assertion that manufacturers will simply absorb the additional costs of the ZEV mandate by noting that mandate costs will only represent a small share of manufacturer's net income. There is no basis in economic logic for producers to lower profits willingly where there is an opportunity to avoid or reduce the loss.

Additional Comments from Declaration:

Vehicle Pricing. The ARB Staff Review alleges that the market will not allow motor vehicle manufacturers to reflect the costs of the ZEV mandate in prices. This conclusion apparently is based on discussions between ARB's economic consultant, the ARB staff, and an "unnamed expert" who was consulted regarding automotive industry pricing practices. Notes taken during the discussions with the unnamed "industry expert" suggest that the industry expert was not given an accurate assessment of the nature of the ZEV mandate. The nature of the ZEV mandate means that the

incremental costs of producing a covered non-ZEV will include the added costs of the relevant ZEV requirement. This is not an issue of cross-subsidizing one vehicle line with another – as the industry expert apparently is discussing – but rather reflecting accurately the costs of producing non-ZEV vehicles for sale in California. As a result it is not appropriate to rely on these comments by ARB staff or its consultants for the proposition that ZEV mandate costs will not be reflected in non-ZEV prices in California. (Dr. Michael Whinihan)

Market Strategy. ARB staff and its consultants have both raised the issue of whether manufacturers would reflect the costs of the ZEV mandate in California or elsewhere. As an initial matter, since neither the demand for vehicles nor the cost of doing business has changed in the other 49 states, manufacturers would lose profits if they increased prices outside California in order to recover costs associated with the ZEV mandate. If the ZEV tax were about \$500, or about 2 percent of transaction price, some dealers at the California borders would lose some sales to dealers near the California border in other states. But this leakage should be moderate because there are already several state borders in the continental U.S. where sales tax differentials exceed 2 percent. Increased competition from manufacturers controlling only 15 percent of the market will not prevent large manufacturers from raising prices because of increased costs. If each covered manufacturer has significant costs associated with complying with the ZEV mandate, failing to impose a \$500 ZEV tax in order to maintain current profit margins is the same as offering a \$500 “regional” sales incentive. I can identify no plausible reason for any economically rational manufacturer to maintain a permanent regional incentive in California. Manufacturers did initially pass on the regulatory costs of \$100 to California buyers. Next, manufacturers began dropping California regulatory charges when they began selling California-certified vehicles in several Northeast states and as they were preparing to sell vehicles under the NLEV program nationwide. The difference in cost between meeting California emission standards and meeting nationwide emission standards was rapidly declining, and at some point declined to the level where the administrative costs of maintaining separate prices was no longer justified. Unlike the small and rapidly declining cost differential cited above, under the ZEV program there is a large and virtually permanent cost differential that is several times larger than the case cited above. In such circumstances automobile manufacturers will be forced to consider the ZEV program costs in their vehicle pricing decisions. (Dr. Michael Whinihan)

Agency Response. The allocation of costs is a manufacturer decision. As commenters concede, precedent exists for small regulatory cost increases to not be passed along to California vehicle purchasers. Thus the issue becomes the assumed incremental cost, which staff believes is overstated in the NERA-Sierra analysis. Precedent also exists for certain vehicle lines to be internally subsidized by the manufacturer, if there is a corporate reason to do so. Staff’s point is simply that these decisions are matters of corporate policy rather than an inevitable outcome of economic theory.

Use of MOA Data

163. Comment. ARB argues that the NERA-Sierra analysis relies on data from 1996-2000, which does not provide a sound basis for projecting future consumer behavior. ZEV sales during this period represent the best indication of actual consumer demand for the vehicles. Furthermore, given the relatively small number of full function ZEVs that would be required when the ZEV mandate goes into effect in 2003, it is not clear that this earlier period would be unrepresentative of the future market in the near term.

Additional Comment from Declaration:

Market Demand for ZEVs. The assertion by some groups that there is a pent up demand for ZEVs is, in my opinion, absurd. GM's experience with the EV1 demonstrated that it was not possible to sell even a handful of ZEVs, even at heavily subsidized prices in spite of their novelty value and favorable publicity. Consumers were unwilling to accept the risk of low resale value or the costs of battery replacement. In my opinion, the resale risk would be even greater for onboard hydrogen fuel cell vehicles. The differences between the public's actual demand for ZEVs, as experienced by GM with the EV1, and the statements by a few select individuals that claim there are many similar consumers who would purchase ZEVs, is an artifact of the non-representative nature of those individuals who chose to participate in the ZEV rulemakings. (Dr. Michael Whinihan)

Agency Response. This point was addressed in detail in August 7, 2000 Biennial Review staff report and in the ARB staff review of the NERA-Sierra Report 1 (pp. 16-18). In brief, staff concluded that the marketing of vehicles to date has differed from a normal market in several significant respects:

- Only two manufacturers, GM and Honda, offered their vehicles to retail customers with broad-based marketing efforts. The remaining manufacturers marketed only to fleets, using a marketing approach appropriate for fleet sales.
- Although a variety of vehicle platforms was produced, none of the manufacturers chose to develop a five passenger four door sedan.
- Manufacturers used a variety of approaches to sell, distribute and service the vehicles, but no manufacturer marketed its vehicles at all dealerships.
- Due to the new technology employed, EVs imposed unusual information and training demands on all involved parties – customers, dealership staff, infrastructure providers, and marketing staff.
- Manufacturer pricing strategies were intended to gather information about customer demand, but were not set in a competitive fashion based on prices of otherwise equivalent conventional vehicles.
- Most vehicles were available for lease only rather than for purchase, and some leases included low mileage caps of 10,000 miles per year. (August 7, 2000 Staff Report, page 83).

Constant Marginal Cost Assumption

164. Comment. This topic is addressed above under Marginal Cost Allocation and Pricing.

Agency Response. See related response to Comment 151.

ZEV Tax Impact on Customer

165. Comment. Basic economic theory holds that a change in price, even if small, will lead to a change in the quantity demanded. ARB staff cites patterns in manufacturer price incentives as evidence that consumers are unlikely to respond to price increases under \$500. These incentives, however, are often attempts by manufacturers to move excess inventory that is costing them and their dealers money by remaining on lots and preventing newer vehicles from taking their place. This need to move vehicles quickly may account for the relatively large incentives that manufacturers' experiences suggest they must offer. Furthermore, it bears mentioning that the changes in the numbers of new vehicles purchased in the NERA-Sierra analysis are relatively small, but this does not lend support to staff's assertions that small price increases do not matter. For example, a \$300 increase in vehicle price might make it necessary for a consumer saving for a new vehicle to defer the purchase by only a month or two. Although this effect may appear to be small, when aggregated across the entire California market, it does have discernible effects, and this is what the NERA-Sierra analysis shows.

Agency Response. Whatever the reason or intent, the fact remains that the vast majority of dealer incentives are significantly greater than the price increases at issue here. As staff noted in its review of the NERA-Sierra Report 1, only 2 out of 2,068 manufacturer incentives were for less than \$500, and 80 percent were for \$1,000 or more. This suggests that manufacturers find it necessary to offer incentives at this level in order to elicit a meaningful response from customers.

Consumer Response to Price Increases

166. Comment. This topic is addressed above under Consumer Response to Prices.

Agency Response. See related response to Comment 141.

Relevance of ZEV Mandate Costs

167. Comment. ARB staff's complaint that the fleet turnover issue has not been raised in the past is clearly irrelevant. First, it is not correct as this issue was addressed in a previous Sierra analysis regarding the ZEV mandate (SR-94-02-04). Even if it were true, this fact would in no way imply that the issue was not relevant in previous cases, nor does it mean that the issue is not relevant now.

Agency Response. Staff concurs that the fleet turnover issue had been raised in past analyses.

Fleet Population Model

168. Comment. This topic is addressed above under Marginal Cost Allocation and Pricing.

Agency Response. See related response to Comment 151.

Scrappage Model

169. Comment. ARB staff suggests that the effect of new car prices on vehicle scrappage may be overstated because of the effects of vehicle quality. This theoretical possibility is not translated into an empirical estimate, and thus it is not possible to evaluate the significance of their argument quantitatively.

Agency Response. The ARB review of NERA-Sierra Report 1 accepted the internal workings of the NERA-Sierra model on its own terms, and only modified various input assumptions. No change was made with respect to this issue. Thus, the conclusions of the ARB staff review are not affected by this comment.

Use of Pre-Tax Gasoline Price

170. Comment. ARB staff claim that the NERA-Sierra analysis uses the ARB staff estimate of the pre-tax gasoline price (\$1.26) rather than the post-tax gasoline price (\$1.75). As noted in the response to the Hall-Brajer memo above, the scrappage model used in the NERA-Sierra analysis uses neither of these gasoline prices.

Agency Response. As was the case with the previous issue, the ARB review of NERA-Sierra Report 1 accepted the internal workings of the NERA-Sierra model on its own terms, and only modified various input assumptions. No change was made with respect to this issue. Thus the conclusions of the ARB staff review are not affected by this comment.

Scrappage of Older Vehicles

171. Comment. Although the programs noted here by ARB staff are likely to affect scrappage rates in the state, their effects are not likely to change the effects of the ZEV mandate. Thus, for example, programs to encourage vehicle retirement could result in scrappage rates for 12 year old vehicles in California that are 5 percent higher than might be expected based on comparisons with states lacking such programs. The introduction of the ZEV mandate would still reduce 12 year old scrappage rates (now at somewhat higher than expected California levels) by the same amount.

Agency Response. Once again, in the ARB review of NERA-Sierra Report 1 no change was made with respect to this issue. Thus the conclusions of the ARB staff review are not affected by this comment.

VMT Model: Use of Three Cities Study Travel Data

172. Comment. This topic is addressed above under Expected ZEV VMT Replacement.

Agency Response. See related response to Comment 152.

VMT Adjustment

173. Comment. ARB staff cites no evidence to suggest that improvements in battery technology will lead to significant increases in the range of battery electric vehicles. Further, no such finding was reached by the Year 2000 Battery Technology Advisory Panel commissioned by ARB to assess the current and future status of battery technology. Similarly, staff's assertion regarding the elimination of the VMT adjustment with the advent of fuel cell vehicles is not sensible unless they assume that a comprehensive hydrogen infrastructure, on par with the current gasoline infrastructure, is developed. As noted above, without a large refueling network, it will not be possible to use hydrogen FCEVs in the same way that gasoline powered vehicles are currently used.

James Michael Lyons

Additional Comment from Declaration:

Inability of ZEVs to Completely Replace Gasoline Powered Vehicles. In performing analyses of the emission impacts of the ZEV mandate, CARB has ignored the fact that ZEVs cannot, in general, completely satisfy the travel needs of their operators. By making the invalid assumption that ZEVs will completely satisfy operator travel needs, CARB overestimates the emission benefits attributable to the ZEV mandate. CARB staff now claims in the absence of any supporting technical data that "future battery electric vehicles may have extended range as compared to today's battery vehicles, which would minimize the effect of any decrease in VMT." In addition to the unfounded statements regarding battery electric vehicles, CARB staff asserts in the 15-day package that "fuel cell vehicles, because they can be rapidly refueled, will have range sufficient to remove any purported VMT reduction effect". Staff also asserts that only 8,000 hydrogen fuel cell vehicles will be needed to fully comply with the ZEV regulation and that infrastructure for this small number of vehicles could be accommodated in a variety of ways. Those assumptions lead to an overestimation of the emission benefits attributable to the ZEV mandate.

Agency Response. As noted above, the 2000 Battery Panel study was focused on the 2003 period and should not be viewed as ruling out future technical improvement in

battery capacity. Similarly, over the time frame under consideration in this analysis and given the small number of vehicles involved it is reasonable to assume that fuel cell vehicles could achieve average VMT in various applications.

Emissions Model: Changes to LEV II Program

174. Comment. The changes that ARB staff refer to here result in further reductions in the emissions baseline from conventional vehicles in the absence of any ZEV mandate. Therefore the changes actually would reduce the per vehicle emission reductions that arise from the sale of ZEVs under the ZEV mandate.

Agency Response. In December 2000, the ARB amended the LEV II regulations to incorporate portions of U.S. EPA's recently promulgated Tier 2 regulations, in order to ensure that California continues to receive only the cleanest cars and light trucks available. The effect of these follow-up amendments to the LEV II program was discussed in the ARB staff review of the NERA-Sierra Report 1 (pages 25 and 26).

As was noted in that discussion, the LEV II follow-up amendments do not just reduce the overall emission baseline, but they also further reduce emissions under the ZEV program alternative. This occurs because of the relationship of the ZEV requirements to the fleet average NMOG requirement that is a central feature of the overall LEV regulations. Each year, a manufacturer's overall fleet of passenger cars and light-duty trucks certified to the LEV program's various tiers of exhaust emission standards must meet an incrementally more stringent fleet average NMOG standard – based on the NMOG standards to which individual vehicle models are certified. At the same time, the manufacturer must separately meet the ZEV requirements, with a chosen mix of ZEVs and PZEVs. Since the zero or almost zero NMOG emissions of a manufacturer's ZEVs and PZEVs are included in the calculation of its overall fleet average NMOG levels, the ZEVs and PZEVs allow the manufacturer to market other models with relatively high NMOG emissions. But the LEV II follow-up amendments will in some instances preclude the manufacturer from fully offsetting the zero or almost zero emissions from the ZEVs and PZEVs with higher-emitting vehicles, because the manufacturer will instead have to market Tier 2 models certified to cleaner standards. Because of the ratcheting down of the NOx standards in LEV II and Tier 2, those cleaner Tier 2 models will also result in lower NOx emissions. To the extent this happens, the emission benefits of the ZEV program will increase. The effect of these changes on estimated emissions was incorporated in the emission impact scenarios presented in the staff review.

Miscellaneous Comments Related to the NERA-Sierra Report

175. Comment: Implications of Alternative Discount Rates in the NERA-Sierra Disbenefits Study. The sensitivity analysis of the results of the NERA-Sierra disbenefits study has identified that the discount rate that NERA applies to future ZEV vehicle costs can affect the emissions disbenefits of the ZEV mandate. The 7 percent discount rate used in the NERA-Sierra disbenefits analysis would understate the "ZEV Tax" relative to

plausible alternative rates. As a result, the NERA-Sierra Study's choice of discount rate would underestimate the emissions disbenefits of the ZEV mandate relative to the disbenefits if other plausible discount rates were chosen. (David Harrison, Jr.)

Agency Response. The analyses, studies and precedents cited by the commenter were in hand at the time the original analysis was performed and the original discount rate was chosen. Presumably the choice made at that time reflected the best judgment of the modelers. Therefore this retrospective review of the discount rate used in NERA-Sierra report 1 appears to be motivated by a desire to change the internal workings of the model to increase the emission disbenefit. The commenters provide no specific analysis on this point so there is no effect on the conclusions reached in the ARB review of the report.

The following comments are no longer taken from the NERA-Sierra report:

176. Comment: The options offered under "advanced ZEV componentry" score, reductions in CO₂ emissions and improvements in fuel efficiency, have no direct link to ZEV componentry. In fact, the alternatives provide favorable scoring for very lightweight, aerodynamic, mild-hybrid electric vehicles where most of the efficiency gains are achieved by technologies other than advanced ZEV. More aggressive HEVs implemented as a powertrain option on a conventional vehicle employ higher levels of ZEV componentry, yet achieve lower credit scores and are thereby not encouraged by the ZEV regulation. This is contradictory to the purpose of the advanced ZEV componentry provisions. Ford recommends that ARB delete the CO₂ and efficiency options, retaining the "peak power" methodology for calculating advanced ZEV componentry scores. (Ford)

Agency Response: Under the proposed modifications the long-term advanced componentry scoring methods are based on 1) the CO₂ savings that a vehicle achieves versus the average for its class (this metric was chosen because of the effect of global warming on ground level ozone production, and the emerging importance of CO₂ savings as a vehicle technology goal) or 2) "best in class" efficiency performance within each size and weight classification. The near-term alternate method rewards the degree to which electric drive is used. All of these characteristics are beneficial in and of themselves and as transitions to pure ZEVs. And furthermore, automakers are not required to meet CO₂ standards but have the option of earning additional credit for reducing CO₂ emissions.

177. Comment: Retain the 0.25 PZEV allowance for advanced ZEV componentry – The proposal to the Board providing for a 0.25 PZEV allowance for advanced ZEV componentry should be the baseline from which additional PZEV allowance for HEVs begin. (DaimlerChrysler, Ford)

Agency Response: Automakers are now bringing a wide variety of advanced technology vehicles to market. The use of advanced components varies from vehicle to vehicle. The modifications were made to ensure that the credits are only provided to vehicles

using technology that will promote the development and commercialization of zero emission vehicles in the future. Under the January 2001 proposal, the criteria was too vague and would have allowed Advanced Technology credit for vehicles that do not employ the technologies needed for future ZEVs.

178. Comment: The staff modified the PZEV allowance for Zero Emission VMT by eliminating the 0.25 PZEV allowance for advanced ZEV componentry and creating new "advanced componentry" criteria. The Board gave no direction to the staff to pursue these modifications. The requirement now includes fuel efficiency (CO₂ reduction) criterion, and optional fuel economy increase and peak power measurement criteria. The new "advanced componentry" does not require ZEV componentry, which is the intent of the zero emission VMT component of the PZEV allowance (to promote development of ZEV componentry). (DaimlerChrysler)

Agency Response: As noted in the response to the comments above, staff reviewed the entire set of incentives available for such vehicles, and determined that post-hearing modifications to the advanced ZEV componentry allowance provision were warranted. The changes provide more specific criteria for the awarding of credits, add flexibility and options for automakers and, in the case of the percent peak power option, ensure that credits are provided to vehicles using technology that will promote the development and commercialization of zero emission vehicles in the future. While the CO₂ reduction and vehicle efficiency options do not specifically require advanced components in and of themselves, the regulation requires the vehicle earning such credits to use an electric drive system. Each of these requirements furthers and supports ZEV technology development.

179. Comment: The provision that is available for ZEV related componentry (Percent Peak Power) excludes HEVs with advanced ZEV componentry that were previously thought to qualify for the 0.25 credit. While electric assist, and regenerative braking had been discussed as potential advanced ZEV componentry requirements, the staff had not previously discussed a requirement for idle stop/start. The requirement for idle stop/start to qualify for advanced ZEV componentry should be deleted since HEVs can be equipped with advanced ZEV componentry and still not be equipped with idle stop/start. The provision disqualifies HEV technology for PZEV allowance that previously qualified. (DaimlerChrysler)

Agency Response: Under the modifications, in order to earn any score using the Percent Peak Power method a vehicle must be able to recover kinetic energy through regenerative braking and provide at least 13 percent of "maximum available power" from the electrical storage device. These requirements are necessary to ensure that credits are provided to vehicles using technology that will promote the development and commercialization of zero emission vehicles. However, in the second set of modifications released for public comment, the regulation language requiring idle stop was removed in response to this comment.

180. Comment: While an HEV may not qualify for any PZEV allowance, the staff has proposed to give additional VMT credit for gaseous-fueled vehicles with a fuel storage system capable of refueling at 3,600 pounds per square inch. This is neither ZEV componentry nor advanced componentry since these systems have been in use for more than a decade. This is inconsistent with the intent of the VMT allowance. (DaimlerChrysler, AAM)

Agency Response: The modifications provide an advanced ZEV componentry incentive for gaseous fuel storage, in recognition that such storage systems will be used in zero-emission hydrogen fuel cell vehicles. Vehicles now using gaseous fuels have an additional incentive and will likely pursue advances in storage technology to improve the range of these alternative-fueled vehicles.

181. Comment: The Peak Power provision should be amended in conjunction with the retention of the 0.25 PZEV allowance for advanced ZEV componentry. An allowance for HEVs that exceed 25 percent peak power should be based on the percent peak power divided by 100. (DaimlerChrysler)

Agency Response: ARB staff believes that 13 percent peak power is the appropriate floor for the credit to reward less complex systems. The flat 0.25 credit level was deleted in order to provide a variable credit that rewards vehicle characteristics as recommended by other commenters.

182. Comment: Specific provisions included in 15-Day Notice result in a lead-time issue because credit for “advanced componentry” is aimed at vehicles already in the market. Had these provisions been available with adequate lead-time, all manufacturers would have had the opportunity to make these products available. (DaimlerChrysler)

Agency Response: The modifications are designed to provide incentives for vehicles using advanced components and technologies. Flexibility is provided through the use of three different credit schemes to ensure that each manufacturer will be appropriately rewarded. The credits are not aimed at vehicles already in the market but will provide value to automakers that have already proactively made advances with these incentives. Again, these provisions are not regulatory requirements but rather additional credits for advanced technology vehicles, regardless of when they were introduced.

183. Comment: The advanced componentry method for valuing hybrid credits should not be a basis for determining credit allowances by itself. This method does not correlate well with environmental performance or technology for overall efficiency. Allow the efficiency method (1962.c.4.B.2.b) as an alternative to the CO₂ reduction method for 2008 and later years. With just the CO₂ reduction method available from 2008 on, it rewards relatively small efficiency improvements in large vehicles, rather than larger improvement in efficiency in a mid-size or smaller vehicle. The efficiency method promotes near-zero emission, high efficiency vehicles and technology without a bias favoring larger cars and trucks. (Honda)

Agency Response: The regulations were changed per this comment to allow the efficiency method to be used for 2008 and later years.

184. Comment: If only the CO₂ reduction method is allowed in 2008 on, add an additional credit calculation term in order to fairly recognize low fuel consumption vehicles for AT PZEV qualification. The CO₂ reduction threshold should vary with class of vehicle and not favor only the high fuel consumption vehicles. For example, small and medium-sized hybrid vehicles with relatively low absolute CO₂ emissions could have a CO₂ reduction threshold consistent with a 20-30% efficiency improvement over class averages. (Honda)

Agency Response: The change that allows the efficiency method to be used in 2008 and later years also addresses this concern. The commenter's suggested change is not needed. See response to Comment 183.

185. Comment: Hybrid vehicles qualifying for AT PZEV credits require advanced ZEV componentry. Clarify that advanced ZEV componentry would in addition to an advanced battery, include other electrical storage technologies including ultracapacitors, electric-powered flywheels and lead acid batteries. (Honda)

Agency Response: The existing regulatory language allows other electrical storage technologies, including ultracapacitors, electric-powered flywheels, and lead-acid batteries to be treated as advanced componentry. Given the rapid developments in these areas, staff believes that it is more appropriate to provide performance-orientated definitions rather than technology-specific definitions.

186. Comment: ARB has proposed many complex changes that address specific vehicle designs. However, most of these provisions ramp down the credit level over the same period that the regulations add heavier light trucks. For example:

1. The range and efficiency phasing factors were reduced compared to the January 2001 proposal in every year beginning in 2005, and by as much as 40% in a given year.
2. The basis for qualification for efficiency multipliers was increased from 1.5 times to two-times the class average starting in 2008.
3. The city car base comparison was adjusted from the subcompact average of 30.6 mpg to 45.9 mpg beginning in 2008.
4. The fast-fuel provisions sunset in 2008, reducing FCEV credits.

The combined impact of these revisions on Ford is a reduction in total credits for our battery electric vehicles of 30% to 55%, and 65% for FCEVs from 2006 to 2012. Taken in conjunction with the ZEV ramp-up, multi-manufacturer provisions, and the addition of LDT2 class trucks, our true-ZEV volume requirement increases by 5 to 7 times (excluding NEVs – the increase would be greater with NEVs because of the discount multiplier). We do not believe that increases in market demand of this magnitude are realistic and expect that incentives will fall far short of creating the necessary demand. (Ford, AAM)

Agency Response: The creation of a separate efficiency calculation for ZEVs, beginning in MY 2008, sets a higher efficiency benchmark for ZEVs in keeping with their inherently higher efficiency. This modification reduces the efficiency scores in future years, and also reduces the sensitivity of the calculation method to changes in efficiency. The effect of this change is to provide greater certainty that future vehicle totals will hit the targets established by the Board. This change is delayed until the 2008 model year to avoid disrupting manufacturers' near-term compliance planning. This change will also affect the scores for AT PZEVs with a zero emission range of 10 miles or more (range-extended hybrid vehicles, reformer fuel cell vehicles, and hydrogen ICE vehicles). In general, the noted changes were necessary to meet the vehicle total targets established by the Board.

187. Comment: The staff proposal presented to the Board on January 25 included a minimum 50 percent reduction in the number of pure ZEVs required. This was accomplished through the introduction of a new "ZEV bin" consisting of AT PZEVs that could be used to meet half of the pure ZEV requirement and allowing AT PZEVs with zero emission VMT to satisfy all or part of the remaining pure ZEV requirement. Board action on this issue was:

- to eliminate the pure ZEV credit for the for AT PZEVs with zero emission VMT
- to direct the staff to reduce ZEV credits so that the number of ZEVs required by 2012 model year is doubled
- to retain the AT PZEV bin.

The resulting proposal now requires the same number of ZEVs required prior to the staff proposal to the Board while maintaining the requirement for the new AT PZEV bin requirement. This action effectively increases the ZEV mandate by three percent by the 2012 model year and five percent in the 2018 model year. (DaimlerChrysler)

Agency Response: The commenter is correct in that the modifications effectively increase the pure ZEV mandate from two percent in 2003 to three percent by the 2012 model year and five percent in the 2018 model year. Still the amended regulation and proposed modifications provide manufacturers with greater flexibility and more options for compliance with the requirements. AT PZEV manufacture is optional. These increased volumes are appropriate given expected technology development and necessary for air quality.

188. Comment: The decision of the Board to double the ZEVs required by 2012 was arbitrary and based on simple discussions among the Board members regarding number of vehicles rather than based on air quality improvements. (DaimlerChrysler)

Agency Response: The decision to double the number of ZEVs by 2012 reflects the importance of ZEVs to the environment. ZEVs are the "gold standard" for vehicular air pollution control as they reduce both criteria and toxic pollutant emissions to the maximum feasible extent. High-efficiency ZEVs and AT PZEVs also cut emissions of

carbon dioxide and other greenhouse gases. The ARB has concluded that there are no technological barriers to building battery powered ZEVs but that issues of cost and consumer acceptance remain. With regard to near-zero emission vehicles, technology exists that allow vehicles to achieve the required level of performance. While the amendments significantly improve the cost-effectiveness of the ZEV requirements, they still result in higher costs per ton of pollution reduced than any other ARB regulatory measure. Nevertheless, the amended ZEV regulations remain an essential component of the State's long-term air quality strategy because of the promise and ultimate necessity of zero-emission technologies.

189. Comment: The staff was directed at the January Board hearing to double the number of ZEVs required by the 2012 model year. Most of that goal is met with the addition of a ZEV requirement for LDT2s. The phase-in/phase-down factors should be by adjusted to provide more credit and should be weighted to provide equal credit for the range and efficiency multipliers. (DaimlerChrysler)

Agency Response: Staff believes that the changes will result in approximately twice the number of vehicles proposed at the hearing and meet the Board's direction. It is very difficult to project the total number of vehicles that will be placed as credits depend on a variety of factors related to vehicle characteristics. In the long-term, vehicle efficiency is more important than range and is therefore provided greater incentives.

190. Comments: Doubling the number of ZEVs required by 2012 ignores the reality of insufficient market demand and would only exacerbate the significant adverse effects that will result from the original amendments. (Honda)

Agency Response: The Board recognizes that it will be challenging to place the required number of ZEVs. In approving the amendments to the regulation, the Board has also directed staff to work with ZEV stakeholders to build on work already done in public outreach and education, and form statewide working groups to deal with issues of high vehicle costs and infrastructure issues which will assist marketing efforts. Three working groups focusing on these areas have been formed and are meeting regularly, at least quarterly.

191. Comment: The changes to the long term phase-in and phase-out multipliers for range and efficiency for ZEVs result in a 40 percent decrease in the credit for ZEVs in 2008 and beyond, undermining the idea that both range and efficiency are desirable long-term attributes. (Toyota)

Agency Response: The credit calculation modifications are necessary to meet the vehicle volume targets established by the Board.

Definition of City EV category

192. Comment: We request that "subcompact" be retained as the city car base comparison. Because there are no gasoline city cars in the U.S. market, the smallest

comparable vehicle is a subcompact. Hence, the comparison to subcompact is representative of the contribution city cars make, as well as the choice consumers face. (Ford)

Agency Response: The modifications establish, effective with the 2008 model year, a new vehicle class of City Vehicle and a City Vehicle specific baseline fuel economy for the purpose of determining efficiency multipliers. Without this change, City Vehicles would have been treated as subcompacts, which represent the smallest category of US vehicles. In fact, as City Vehicles are much smaller than the typical subcompact, a more real world comparison can be made with the Japanese K class and European A class vehicles, which have about a 50 percent greater fuel economy than the subcompact class. Without the modifications, the relatively high efficiency scores earned by City EVs in later years when the efficiency multiplier is fully phased in would reduce the number of vehicles required under a 50/50 mix of FFEV and City EVs. It should be noted, that the implementation of the City Vehicle class is delayed to the 2008 model year to avoid disrupting manufacturer product planning and to ensure that City Vehicles receive significant incentives in the early years.

193. Comment: Reducing the credit for city electric vehicles by creating a new City Vehicle class for purpose of determining efficiency, coupled with reductions in the baseline multiplier from 2 to 1.5 may stunt longer-term investment in the development of City cars. (Toyota, AAM)

Agency Response: Per the response above, the use of the City Vehicle class provides a real world based fuel economy for determining the efficiency multiplier. As noted earlier, the implementation of the City Vehicle class is delayed to the 2008 model year to avoid disrupting manufacturer product planning and to ensure that City Vehicles receive significant incentives in the early years. The proposed modification of the baseline multiplier from 2 to 1.5 times the baseline fuel economy beginning with the 2008 model year is uniformly applied to all vehicle classes. The amended regulation and proposed modifications provide manufacturers with greater flexibility and more options for compliance with the requirements. City EVs are merely one option.

Measure vehicle performance vs. like vehicle rather than class average

194. Comment: For several credit provisions, scores are calculated based on how a particular vehicle performs compared to a class average. The classes used can encompass a broad range of vehicles. A vehicle positioned at the large end of a particular class will not fare as well compared to the average as will a vehicle on the low end of the class. For instance, a large HEV may be very efficient compared to the non-HEV version of the same vehicle, but is penalized in calculating credits because the rules require comparison to the class average. We recommend that ARB allow comparison to a like vehicle as an option to the proposed class average in all cases where class average is specified in the proposal. (Ford, AAM)

195. Comment: The proposed modifications require ZEVs and AT PZEVs to be compared to class average vehicles when determining efficiency multipliers and AT PZEV VMT allowances. This is not an adequate measure for the impact that ZEV componentry has on the efficiency of a vehicle. For like vehicles that have a higher than the class average fuel economy to begin with, additional credit is provided unrelated to the ZEV mandate. Vehicles below the class average fuel economy are penalized even if the improvement in fuel economy (or CO₂ reduction) due to advanced ZEV componentry is greater than 50 percent. This shortcoming can be corrected by including a provision for a comparison to a like vehicle. (DaimlerChrysler, AAM)

Agency Response: The modifications provide encouragement to manufacturers to raise the bar for a given class. The best in the class, that is vehicles that exceed the class average and are in the top half, are included, not vehicles performing in the bottom half of a class.

Do not phase out incentives for fuel cell vehicles so quickly

196. Comment: The proposal reduces the level of credit for fuel cell electric vehicles to levels approximating BEV scores beginning in 2008. This is a significant reduction, taking FCEVs to less than half of the 2007 credit level in a single step function. Fuel cell vehicle technology is in the very early stages of development, with only a handful of operating vehicles worldwide. Considerable advancements are necessary to provide commercial quality products at competitive costs. Reducing FCEV credits in the proposed timeframe is premature and we recommend retaining favorable treatment through 2012, or until such time as FCEVs meet certain triggers. Measures to be considered should include cost, functionality, and market penetration. (Ford, AAM)

Agency Response: The proposed modification responds to the Board's directive to equalize in the long term the credits earned by battery EVs and hydrogen fuel cell EVs. Without this modification, manufacturers could comply with far fewer fuel cell vehicles in later years of implementation than would be the case with battery electric vehicles, adversely impacting a smooth, orderly build up to a cleaner and more diverse California vehicle fleet.

197. Comment: Zero-emission fuel cell vehicles should continue to earn a phase-in multiplier of at least 4.0 in the 2003 to 2008 timeframe. Honda believes hydrogen – fueled cell vehicles hold the greatest promise as ZEVs. The sudden drop in the phase-in multiplier for 2003 (from 4.0 to 1.25) discourages fuel cell vehicle development. (Honda)

Agency Response: The comment is outside the scope of the of the 15 day comment. The regulatory text relating to ZEV phase-in multipliers was approved by the Board at the January 25, 2001 hearing. The intent of the phase-in multiplier is to encourage early placement of the ZEVs, to assist in market preparation for the 2003 ZEV mandate.

198. Comment: Elimination of the fast fueling credit in 2008 at a time when hydrogen fueling is expected to begin to become commercially viable. Taking away this credit disincentivizes the development of hydrogen fuel cell vehicles. (Toyota)

Agency Response: The proposed modification responds to the Board's directives to double the number of ZEVs, compared to staff's original proposal, required by year 2012, with the ramp up to begin in 2007. While the fast credit fueling provision is appropriate for the early years of implementation, in later years they would result in too few vehicles being required under compliance scenarios that rely on hydrogen fuel cells

199. Comment: The SUV requirement not only increases the ZEV requirement; the requirement increases disproportionately for manufacturers creating a competitive issue. Adding SUVs is equivalent to increasing the industry-average mandate approximately 25 percent by 2012 model year. While the industry average increase is 25 percent, the ZEV mandate more than doubles for DaimlerChrysler Corporation, presenting a regulatory-driven competitive issue. (DaimlerChrysler)

Agency Response: In 1998 the Board voted to include LDT2s in the LEV II program in recognition of their frequent use as passenger and commute vehicles in today's market. Using the same logic, the Board agreed that LDT2s should be included in the baseline volume used to determine ZEV requirements. Their decision also reflected comments made by other stakeholders that such vehicles should be included in the baseline in order to remove the incentive to shift product lines and production towards SUVs and larger trucks to reduce a manufacturer's ZEV obligation. In this way, the ZEV regulation fairly treats the entire vehicle fleet operated on California's roads as passenger and commute vehicles, contributing to California's air quality challenges.

200. Comment: The Board directed the staff to include SUVs in determining the number of ZEVs required. The staff went beyond this direction in two ways. First, the staff included all trucks greater than 3750 lbs. LVW and less than 8501 lbs. GVWR (LDT2), not just SUVs. Second, the staff included the LDT2s in the ZEV baseline. Again, the impact is disproportionate on manufacturers. The ZEV mandate for the industry increases approximately 75 percent while the DaimlerChrysler Corporation will realize a three-and-a-half fold increase in the number of ZEVs required. While other companies may still satisfy their ZEV requirement with the car fleet, DaimlerChrysler will be required to include a substantial number of trucks in our ZEV compliance plan. This will increase the cost of compliance per vehicle, if compliance is even feasible for the affected trucks. The Board has provided no cost, cost-effectiveness or feasibility studies to support this action. (DaimlerChrysler)

Agency Response: With regard to inclusion of LDT2s please see response to Comment 199 and Comment 67. With regard to cost-effectiveness and feasibility, please see the comments on those topics. The regulation, while including LDT2s in the baseline volume for calculation of the number of ZEVs that need to be produced, does not stipulate what types of vehicles must be used to comply with that requirement. Substantial flexibility has been created in the regulation that allows the use of various

vehicle types ranging from neighborhood, city, full function electric vehicles through fuel cell vehicles. Additionally, the majority the requirement can be met with gasoline PZEVs or AT PZEVs that can be passenger cars, SUVs or trucks.

201. Comment: Please consider tying ZEV requirements to the number of SUVs sold by a manufacturer. (Kobb)

Agency Response: The Board agreed with this recommendation and directed staff to address this in the modifications issued for 15-day comment.

202. Comment: Large volume manufacturers have a competitive disadvantage compared to Intermediate volume manufacturers because they are required to produce pure ZEVs. This disadvantaged is made greater because ZEVs will likely be incremental vehicles whose sales will impose additional ZEV requirements, increasing the number of ZEVs, AT PZEVs and PZEVs. This additional competitive disadvantage can be eliminated by not including ZEVs in the ZEV baseline. (DaimlerChrysler, AAM)

Agency Response: As staff understands this comment, there are two issues to address. The first is the effect of including ZEVs generally in the baseline used to calculate the ZEV requirement. Since most ZEVs generate more than one credit per vehicle, the incremental increase in the number of vehicles needed to comply is very small. Additionally, the ZEV requirement is appropriately applied to all passenger cars and light trucks produced by a manufacturer, and ZEVs are included in that vehicle category.

The second issue is the effect of including NEVs that are used to meet the ZEV requirement in the baseline used to calculate the ZEV requirement. As the credit earned by NEVs in the later years of the program decreases to 0.15, every 100 NEVs produced would create an additional 2 pure ZEV credit obligation, thus requiring 13 NEVs to be produced which would create a further obligation. Carrying out the mathematical progression of this calculation, for an auto manufacturer using only NEVs to meet its pure ZEV obligation, each 100 NEVs produced will engender a further 15 NEV obligation. Although this is unfortunate, such a situation underscores the Board's desire that NEVs not be the sole strategy of auto manufacturers for meeting the ZEV requirements. NEV's less than 1 credit level is characteristic of this position and the further effect of including them in the ZEV requirement baseline is consistent.

203. Comment: The fast refueling credit provisions should be extended to at least the 2012 model year. The effect of extending the credit will have limited impact on the number of ZEVs because the credit impacts mainly fuel cell vehicles, which will be in limited production for the near term. (DaimlerChrysler)

Agency Response: The original staff proposal provided permanent additional credits for fast refueling. The purpose of this credit is to provide a large regulatory incentive for vehicles than can be refueled quickly during the years that the market is developing. This is in consideration of the high costs of introducing a new fueling infrastructure when

vehicle production volumes are very limited. Upon further consideration, ARB concluded that while these provisions are appropriate in the early years, in later years they would result in too few vehicles being required under compliance scenarios that rely on hydrogen fuel cell vehicles. This would be counter to the Board's directive to both double the number of ZEVs in the year 2012 and to equalize in the long term the credits earned by battery electric vehicles and hydrogen fuel cell electric vehicles.

Provide flexible alternative to mandate

204. Comment: Develop flexible alternatives to the ZEV portion of the mandate in the near term, with periodic reviews. Battery technology has not advanced to the level required for the potential of commercial viability. A breakthrough is needed in terms of range, recharge time, and cost performance for viability. (Honda)

Agency Response: This comment is outside the scope of the 15 day comments. The Board considered alternatives to ZEV mandate in January, and determined that the commercialization of ZEVs through regulatory requirements is critical to the long-term success of California's clean air program.

However, in response to the comment, ARB disagrees with the comment made regarding status of battery technology. While, battery electric vehicles are a viable technology, as evidenced by the fact that every major auto manufacturer has had a model commercially available and driven in California in the last several years, the issue of cost remains. The amendments to the ZEV regulation approved by the Board maintain progress towards commercialization of ZEVs while providing more time to auto makers to address near term constraints due to cost, lead-time, and technical challenges.

Extend PZEV early introduction multiplier for additional years

205. Comment: Encourage Advanced Technology PZEVs by keeping the initial 2003 phase-in multiplier through 2005, and consider market mechanisms based on the environmental benefits of these vehicles. (Honda)

Agency Response: This is outside the scope of the 15-day comments, as the Board did not direct staff to make any changes to the early introduction credit for PZEVs.

However, in response to the comment, the purpose of the early introduction credit is to provide an attractive regulatory incentive to encourage increased numbers of PZEVs into the market before they would have otherwise occurred. This credit recognizes the constraints on the number of PZEVs that can be produced in the early years (2002-3), due to the difficulty of recouping high costs associated with development and commercialization efforts. Introducing PZEVs in 2003 provides important near-term air quality benefits. Maintaining a high credit of 4.0 until 2005 is not needed, as evidenced by the fact that PZEVs are already commercially available from several manufacturers.

It would also result in less PZEVs produced, which is contrary to the Board's direction to increase the number of vehicles required.

The ZEV program incorporates market mechanisms by providing considerable flexibility in the compliance mechanism.

Allow early EV re-leased vehicles to earn battery warranty credit

206. Comment: Allow extended warranty credits for early advanced battery EVs with demonstrated service exceeding the MOA service term of three years. (Honda)

Agency Response: This comment was incorporated into the adopted regulation.

Requirement to track vehicles under warranty

207. Comment: Section (f) whose zero-emission energy storage or conversion system is under an original warranty from the vehicle manufacturer beyond three years of service and is registered for operation on public roads in California

While it may be possible to track leased units in California, there is no reliable mechanism to track sold units and their migration, sale or destruction. This credit should be granted at the time of original sale or lease based on the term of original warranty provided. (Toyota, AAM)

Agency Response: Automakers are not required to track vehicles that are sold unless they choose to take advantage of this optional in-service/ under-warranty credit option. ARB is not yet aware of any automaker plans to sell rather than lease ZEVs early in the program that would be eligible for this additional credit. If an automaker were to propose early-year ZEV sales, ARB is willing to work with the California DMV to help develop a means to determine which vehicles remain in-service (registered) on a yearly basis.

Fuel Economy

208. Comment: For CAFE purposes, improvements in fuel economy for one model can be offset by decreases in another model, subject to the overall corporate average. The ZEV mandate would provide manufacturers with strong incentives to increase the fuel economy of AT PZEVs, and will also encourage manufacturers to improve the energy efficiency of EVs and hydrogen FCEVs. The actual exhaust and evaporative emissions of regulated pollutants from AT PZEVs have no impact on the amount of additional credit provided. The DOE method for calculating fuel economy for electric vehicles contains a multiplier that artificially increases the calculated fuel economy. However, the fuel economy benefits of EVs will typically be offset, or nullified, by other vehicles with lower fuel economy. Because of the artificial way EVs are treated under CAFE regulations, the ZEV mandate will likely result in a net disbenefit in terms of actual fuel economy. (Austin)

Agency Response: The purpose of the relevant ZEV credit provisions is to encourage technology improvements on an individual vehicle basis.

CO2 emissions

209. Comment: The actual CO2 emissions associated with the operation of an EV are about five times higher than the CO2 emissions for that vehicle as calculated under DOE regulations. The effect of this discrepancy is that actual CO2 emissions are allowed to be higher when EVs are part of a manufacturer's sales mix. (Austin)

Agency Response: This is outside the scope of the 15 day comments, as the commenter inappropriately makes a prediction regarding a possible impact of the entire ZEV program, not the proposed modifications. Also, the commenter appears to have issues regarding DOE methods for determining compliance with CAFÉ that should be directed to DOE. However, it is clear from DOE fuel economy tables that EVs are the best, or among the best, vehicles in terms of fuel economy (equivalent) and low CO2 emissions. In the Board's view ZEVs, including battery EVs, set the gold standard for environmental responsive automotive technology.

210. Comment: Apparently the proposed ARB ZEV credit provisions are based on the erroneous assumption that CO2 emissions are positively correlated with increased peak ozone levels. A positive correlation between daily maximum temperature and daily maximum ozone is well documented. Because of this relationship and the predicted temperature increase due to rising carbon dioxide levels described in the report of the Intergovernmental Panel on Climate Change, there is concern that this will result in increased ozone concentrations. However, the observations of the actual temperature trends do not support this trend. The 0.6 degree C surface temperature increase observed over the past century has been confined mainly to the colder months of the year and to the daily minimum temperatures not the daily maximum temperatures. Although the U.S. average annual temperature increased 0.4 degree C from 1953 to 1990 the average summer maximum temperature actually decreased and all of the warming was due to an increase in the daily minimum temperature. Thus increases in background CO2 levels have not been observed to increase peak ozone concentrations. (Wolff)

Agency Response: The proposed modifications deal with a variety of ZEV credit allowances and multipliers for advanced vehicle componentry and fuel efficiency. Some scoring methods use CO2 savings as a metric because of CO2 contributions to global warming and the emerging importance of CO2 savings as a vehicle technology goal. High-efficiency ZEVs and hybrid electric near-ZEVs will have significant reductions in emissions of CO2 and other greenhouse gases and less air and water pollution resulting from reduced gasoline demand and promote energy diversity. State and federal government, businesses and non-governmental organizations recognize the seriousness of the global issue of climate change, even as scientists continue to learn more about global climate change, its causes, potential impacts and possible solutions.

211. Comment: Although CARB has claimed the ZEV mandate will encourage technological innovation, the opposite is true. Reformer-equipped fuel cell vehicles capable of using economical liquid fuels appear to offer the greatest potential for simultaneously achieving near-zero emission levels and significantly higher energy efficiency without the practical and economic problems associated with battery electric vehicles and hydrogen fuel vehicles. However, the proposed regulations require manufacturers to divert resources to the production of technologies that are unlikely to become an economic success in all but the smallest of niche markets. (Austin)

Agency Response: From a policy standpoint, the Board has clearly articulated the need to maintain a core zero-emission requirement to provide an incentive for further development. The Board disagrees with the comment and believes that the tremendous progress made to date can at least in part be attributed to the existence of the ZEV requirement. The ARB believes that maintaining this requirement will accelerate the pace at which true zero technologies are commercialized. At the same time, given the wide-open nature of ongoing technical advances, the amendments to the program provide increased flexibility for manufacturers to pursue specific strategies that in their view offer long-term promise. The amendments provide incentives for ongoing technology advancement, across a wide variety of vehicle types (both ZEVs and PZEVs). The reduced number of pure ZEVs required in the near term are designed to adequately explore many different possible market applications while allowing time for continued design and cost improvements.

212. Comment: It would have been appropriate for CARB to have accepted the auto industry's proposal for a Fair Market Test prior to the imposition of a production mandate for ZEVs. The Fair Market Test was never subjected to a proper analysis. Similarly, the CARB and staff did not give any consideration to a number of other alternatives offered by General Motors at the hearing that could provide emission reductions at least equal to the ZEV mandate at far less cost. (Austin)

Agency Response: ARB staff evaluated the Fair Market Test proposal and believe that it is based on a false premise – that high volume cost at this early stage of technology development is relevant to the long term cost of battery electric vehicles. Industry has stated that volume should not be increased until several evolutions of technology occur. Yet the fair market test proposes to determine the fate of ZEVs based on the current cost, which have not benefited from the lower cost of technology improvements.

The proposed test would suspend not only the ZEV requirements for pure ZEVs, but also suspend the requirements for PZEVs and AT PZEVs. There is no need for a market test of these technologies because they are being sold now. As proposed, the test would severely limit the size and scope of the ZEV program, create additional uncertainty, fail to encourage further technical progress, and it limit the Board's authority.

213. Comment: Air Improvement Resource, Inc. (AIR) examined one alternative to the ZEV mandate that would reduce emissions more than the ZEV mandate, and at a far lower cost. In this alternative, the durability period over which certain vehicles are certified would be increased from either 100,000 miles or 120,000 miles to 150,000 miles. I have estimated the cost of meeting these longer durability requirements to be on the order of \$25 per vehicle. (Darlington)

Agency Response: The long-term success of meeting state and federal air quality standards depends on establishment of emission standards and requirements that improve the overall technology – in this case for passenger cars, even to the point of zero emissions. It is questionable, given California's vehicle population and vehicle mile traveled per year, whether air quality standards can be met without zero emission vehicles in our future vehicle fleet mix. As such, it would be inappropriate to allow manufacturers to substitute alternative emission reduction programs for the ZEV requirement which moves the vehicle fleet so significantly in the direction it needs to go to meet our goals for vehicle emissions.

214. Comment: Concerning the range test for electric vehicles, I think that terminating the test when the vehicle speed falls below 95 percent of the maximum speed initially achieved is an unrealistic number. A more realistic number would be around 80 percent. For the NEV, this would provide for a drop of the top speed of 35 miles per hour, down to 20 miles per hour, and still stay within the Federal and State guidelines for NEV speed requirements. (Doran)

Agency Response: The amount of ZEV credit for NEVs is not based on electric range. Therefore, the suggested change has no effect on the amount of credit earned or vehicles needed to comply with the regulation. Furthermore, the change identified was not made as part of the 15-day changes but rather during the initial statement of reasons.

215. Comment: Please do more to discourage NEVs and CEVs. A vehicle should be capable of freeway travel. A limited number of ZEV credits is reasonable but I do not believe that NEVs are either significantly useful for most consumers. Please do whatever possible to encourage 4 passenger vehicles. (Kobb)

Agency Response: The ZEV program strongly encourages production of full function ZEVs in the long term by reducing the base credit amount for NEVs to 0.5 credits in 2004 and 2005, and 0.15 credits in 2006 and beyond. In the near-term, it would be unfair to manufacturers to change the credit scheme since most have already developed compliance plans for the 2003 timeframe based on the regulations adopted. As the ARB continues to pursue zero emission transportation technologies, NEVs and CEVs are expected to fulfill a modest niche in the overall market. The ZEV mandate encourages the production of a variety of vehicles to meet the mandate while giving more credit to vehicles with elements of advanced technology and efficiency.

216. Comment: GM's EV1 is ironically, the best-suited vehicle to comply with the ZEV mandate. I agree that a void exists in the market with regard to availability of a 5 passenger, 4 door vehicle. Consideration of total well to wheels cycle should be considered for cost analysis – including costs associated with “Desert Storm” and other efforts made to protect petroleum interests. Similarly, multi-media impacts of petroleum use should be calculated for comparison to EVs. (Pohorsky)

Agency Response: The cost-effectiveness calculations do not include costs associated with protecting petroleum interests but do include capital and operating costs. It is difficult to accurately assign cost benefits to issues such as protecting petroleum interests.

217. Comment: Staff should consider some sort of “shelf life” for ZEV credits earned in the early years to mitigate such possibilities as Daimler Chrysler's alleged announcement of 14,000 NEV's being “dumped” into the California market before the end of 2002. This action would earn them about 56,000 ZEV credits, “enough to satisfy Chrysler's entire ZEV requirement (including PZEVs and ATPZEVs) for over 5 years.” (Hanssen)

Agency Response: The Board agrees with the issue addressed by this comment, and therefore modified the regulation to restrict the future use of “banked” credits earned by Neighborhood Electric Vehicles. Under the current proposal, NEVs placed in service in 2001 and 2002 earn 4 credits each. The Board supported the use of such vehicles as a low-cost option in the early years that can fill certain narrow market niches and help introduce the public to the idea of electric transportation. However, the introduction of large numbers of NEVs in the 2001-2002 model years could allow manufacturers to earn sufficient credits to completely “walk away” from the ZEV program for a number of years; plausibly through 2008 and beyond. In response to these concerns, staff proposed modifications such that NEV credits earned in prior years can only be used to satisfy 75 percent of a manufacturer's ZEV obligation in 2006 and 50 percent in 2007 and beyond. This will ensure that some new product is available in the marketplace in each year. The imposition of the cap was delayed until 2006 to allow manufacturers sufficient lead-time to make any necessary adjustments in their product planning.

218. Comment: I am concerned that the credits for NEVs are too big and that automakers will be able to generate tens of thousands of credits by placing 8,000 to 14,000 NEVs in 2002. These credits will allow automakers to avoid the continued placement of vehicles and thus not meet the direction of the Board at the January 25, 2001 Board hearing. To prevent this, we urge that either the banked credits be discounted by applying a discount multiplier for NEVs, or restrict the use of banked credits to within 2 to 3 years from the which they were generated. Or, the Board should limit the amount of an automaker's annual ZEV obligation that could be filled with banked ZEV credits. For example, 75 percent of an automaker's ZEV obligation in 2003, 50 percent in 2004, 25 percent in 2005, 15 percent in 2006 and thereafter.

We recommend, at a minimum, CARB limit the amount of an automaker's annual ZEV obligation that can be met with banked credits beginning in 2006 (75 percent of obligation from banked credits in 2006, and 50 percent in 2007 and beyond). (Cal ETC)

Agency Response: The Board agrees with this comment, therefore the modified regulation has restricted the future use of "banked" credits earned by Neighborhood Electric Vehicles as described in the response to Comment 217.

219. Comment: I feel that discount multipliers should not be applied to NEVs, or maybe less of a discount, especially in 2006 and beyond. Because of their environmental benefits, I'd propose that at a minimum, the NEV credit should never be less than one half of a full-function ZEV. (Doran)

Agency Response: The Board supports the use of NEVs as a low-cost option in the early years that can fill certain narrow market niches and help introduce the public to the idea of electric transportation. In addition, NEVs receive multiple credits for model years 2003 and 2004. This is a sufficient amount of time to test the market with these vehicles. NEV credits will be further evaluated once additional information is available regarding how such vehicles are used, the number of trips they replace, and the number of zero emission miles that they accumulate.

220. Comment: The proposed changes appear to be well thought out and I would agree with them. ARB also needs to establish an electric vehicle education program, take steps to further encourage the EV fleet market through 2006, provide better options to encourage manufacturers to build extended-range hybrids, and allow 3-wheeled vehicles and large scooters to earn ZEV credit. Infrastructure deployment is also critically needed, both public and private. Legislation needs to be enacted to make it easier to install charging stations in apartments and condominiums. (Adams)

Agency Response: The Board agrees with this comment and is planning to expand its current ZEV outreach and educational program. The Board currently operates a number of successful outreach programs. These include the short-and long-term ev Loan programs, EVs for Education, and ev Sacramento. In addition, staff attends hundreds of outreach events at schools, parks and conferences to expose the public and children to EVs and other clean-air transportation options. We recognize that additional resources would allow the Board to expand our outreach efforts further, however there are other items taking priority over ZEV outreach at this time. When it is appropriate, the Board will pursue funding for this task. In the meantime, the Board will continue to build partnerships with all the stakeholders in order to combine our resources and talents to develop a comprehensive outreach program.

221. Comment: We have grave concerns about DaimleChrysler's reported plans to "place" 14,000 GEM Neighborhood Electric Vehicles on the market in 2002. We urge you to prevent this abuse of the ZEV program credit system and request regulatory remediation during this 15-day notice period. We believe this plan violates the spirit of the regulation and runs counter to the Board's intent in supporting multiple credits for

early introduction. The intent was to encourage automakers to take early action to build a sustainable market, not to generate sufficient credits to enable a company to meet its ZEV obligation early on and thus postpone any genuine effort to build a sustainable market. We offer the following suggestions for your consideration to at least reduce the potentially devastating impact such activity could have on the long-term sustainable market for ZEVs:

1. Decay and eliminate the ability to use banked ZEV credits generated by early introduction of NEVs. This could be done, for instance, by applying the existing “ZEV Discount Multiplier for NEVs” (0.5 in 2004 and 2005, 0.15 in 2006 and subsequent) to NEV credits that have been banked due to early introduction in the same way that the discount multiplier would apply to NEVs actually placed in those years. Alternatively, CARB could restrict the use of “banked” NEV credits to within 2-3 years of the year during which they were generated.
2. Limit the amount of a manufacturer’s annual ZEV obligation that could be fulfilled with “banked” ZEV credits. For example: 75% of a manufacturer’s ZEV obligation in 2003, 50% in 2004, 25% in 2005, 15% in 2006 and thereafter. (California ZEV Alliance)

Agency Response: The Board agrees with this comment, therefore the modified regulation has restricted the future use of “banked” credits earned by Neighborhood Electric Vehicles as described in the response to Comment 217.

222. Comment: NEVs and CEVs trivialize electric vehicles in the eyes of the public. Limit NEVs and CEVs much more strongly than proposed. (Chestnut)

Agency Response: The Board agrees with this comment, therefore the modified regulation has restricted the future use of “banked” credits earned by Neighborhood Electric Vehicles as described in the response to Comment 217.

223. Comment: Staff needs to consider procuring enough resources to properly address public education on the subject of “pure ZEVs” in order to fully undertake directives set forward by the Board during the January 25th, 2001 hearing, acknowledging the need for extensive public outreach in the arena of ZEV education. (Hanssen)

Agency Response: The Board is planning to expand its current ZEV outreach and education program. The Board currently operates a number of successful outreach programs. These include the short-and long- term ev Loan programs, EVs for Education, and ev Sacramento. In addition, staff attends hundreds of outreach events at schools, parks and conferences to expose the public and children to EVs and other clean-air transportation options. We recognize that additional resources would allow the Board to expand our outreach efforts further, however there are other items taking priority over ZEV outreach at this time. When it is appropriate, the Board will pursue funding for this task. In the meantime, the Board will continue to build partnerships with all the stakeholders in order to combine our resources and talents to develop a comprehensive outreach program.

Regarding Battery Warranty Requirement for Extended Range HEVs

224. Comment: A 15 year/150,000 mile warranty requirement on the battery of plug in hybrid vehicles doesn't make sense particularly in relation to the lack of the same requirement for city EV's with equivalent battery storage. Furthermore staff extended warranty credit proposals, perhaps to "compensate for the obnoxious battery warranty", fall short of providing enough credit to properly support plug-in hybrids. (Greg Hanssen)

Agency Response: The reason ARB chose to require a battery warranty on extended-range HEVs and not on battery electric vehicles is because an extended range HEV may continue to operate after its battery pack ceases to function. With some proposed range extended HEV designs, there would be very little difference in performance after the battery fails and therefore very little incentive for automakers to voluntarily offer battery warranties. Late in its operational life, the ZEV-like benefits of the extended-range HEV would be lost. BEV's are treated differently because their performance is completely dependent on battery pack condition, and if it degrades or fails, vehicle performance will also degrade until it no longer meets its mission requirements. Since aging early-introduction battery electric vehicles may not function unless the battery is replaced, either the owner or the manufacture will replace this battery, or the vehicle will be retired. Either way, the BEV remains a zero emission vehicle and a battery warranty requirement is not needed to insure reduced emissions. ARB chose to incentivize BEV manufacturers into keeping battery electric vehicles in operation by offering the yearly in-service, under-warranty credit option (1962 (f)). ARB also chose to extend this additional credit provision to extended-range HEVs so that even though they are required to be covered by this extended warranty, they may also take advantage of it and earn the warranty credit for each year they are both in-service and under warranty (see 1962 (f)).

Regarding reduced battery warranty requirement during a phase-in period

225. Comment: The warranty requirement for range-extended HEVs creates a strong disincentive to vehicle manufacturers that is not a present barrier in other potential technologies. We recommend that Section (c)(2)(A) be modified to state:

"For PHEVs that are advanced technology with an all electric range that demonstrates to the reasonable satisfaction of the Executive Officer that the PHEV is equipped with software and/or other strategies that would promote maximum use of off-vehicle charging, and that the strategies employed are reasonably reliable and tamper-proof, the performance and defects warranty on all emission related components shall require a 15 year or 150,000 mile warranty. The traction battery utilized for all electric drive requiring off-vehicle charging shall require a warranty of 50,000 miles for the first 5 years after market introduction, 100,000 miles from years 6 through 10 and 150,000 miles thereafter." (EPRI)

The cycle life requirements for range-extended HEVs are more difficult than those of either pure EVs or power-assist HEVs. Thus, the proposed warranty requirement for batteries for range-extended HEVs of 150,000 miles and 15 years significantly exceeds the specifications of batteries recently developed for EV and range-extended HEV applications and could be a heavy burden on the industry as we try to introduce this promising new vehicle technology. The cycle life of advanced batteries would be less of an issue if warranty requirements were set at least initially to 5 years and 50,000 miles. (Ovonic Battery Company)

The 15-day changes create a disincentive to introduce grid-connected HEVs into the California vehicle marketplace by requiring that batteries in these vehicles have a 15-year, 150,000 mile warranty. CARB should charge the HEV Working Group with examining this issue, and evaluating the many technical considerations that must be a part of ensuring consistent minimum emissions performance of all types of range-extended HEVs over a minimum 15-year or 150,000 mile life. The HEV Working Group should report back to the Board within 6 to 12 months with their findings and recommendations. Until then, the proposed battery warranty requirement for range extended HEVs should be temporarily reduced (5 year, 50,000 miles) or delayed. (Cal ETC, Coalition for Clean Air, Kirsch Foundation, Long Island Power Authority, EPRI, OBC, NRDC, PCL, ZEBRA Battery Company, New York Power Authority)

Agency Response: Automakers still have the option of offering extended range hybrids for lease rather than selling them outright during the market introduction period. This means that automakers must provide battery warranty coverage only as long as the vehicles are under lease, perhaps for even less time than the intermediate warranty periods you propose. Automakers would have the option of extending these leases as long as they believe the early-introduction battery technology will allow them to. ARB believes that the existing lease option offers more flexibility than your proposed phase-in of HEV warranty requirements. Leasing allows for a buildup in production volume and battery experience until automaker's are confident enough to sell these vehicles outright with a 15/150k battery warranty.

Additionally, the cycle-life requirements of an extended-range HEV battery are not necessarily more challenging than those for batteries in some ZEVs. City EVs and short-range fleet battery electric vehicles with small battery packs will be used for predictable commute or fleet requirements and may experience full-discharge daily battery cycling similar to shorter-range HEVs.

226. Comment: I believe that grid-connected hybrids are necessary to bridge the gap to the ZEV mandate. CARB should amend the ZEV regulations to make it easier and not harder for these vehicles to be put on the road. The 150,000-mile warranty is counter-productive. The batteries could be supplied on a lease basis and replaced until 150,000 miles. (Ventura County APCD)

Agency Response: Automakers may choose to lease either the battery pack or the entire hybrid electric vehicle. The proposed regulation does not prevent or discourage

an automaker from selling extended range hybrids with leased batteries, as long as they are included in the warranty coverage for the term of the vehicle lease or up to 15 years/ 150k miles. ARB is not yet requiring a minimum warranty period for leased vehicles in order to allow these vehicles to be placed in service with minimal risk to auto manufacturers. See also the response to Comment 225.

227. Comment: I write to urge you to make no changes or modifications to the ZEV mandate. Hybrid vehicles are not ZEVs and should not be considered as part of the program. (Chesnut)

Agency Response: In January, the Board chose to remove the earlier option that would have allowed particular HEVs and other full-allowance vehicles to satisfy an automaker's entire ZEV obligation. Automakers must now build a steadily increasing quantity of true ZEVs. HEVs that qualify as ATPZEVs are quite beneficial and should remain an option for automaker's to satisfy some portion of their overall ZEV obligation. Increasing volumes of HEVs may also help bring down the cost of electric drive system components and provide indirect benefit to true ZEVs.

228. Comment: The credit amounts for range-extended HEVs are actually lower under the 15-day language released on October 31, 2001 than they were at the CARB hearing on January 25, 2001. Since the Board directed that incentives be increase for these vehicles, we recommend that range-extended HEVs be given a temporary "Technology Development Multiplier" which is designed to encourage the introduction of these vehicles. This credit multiplier would be available from 2003 to 2008. Second, CARB should charge the Hybrid Electric Vehicle Working Group with critically examining the credit levels for range-extended HEVs, evaluating whether they can be expected to advance the goals of developing and commercializing a technology capable of emissions reduction, and reporting back to the Board within 6 to 12 months with their findings and recommendations. (Cal ETC, Coalition for Clean Air, Kirsch Foundation, Long Island Power Authority, EPRI, OBC, NRDC, PCL, ZEBRA Battery Company, New York Power Authority)

Decreased credit for plug in hybrids from proposed Dec 2000 ISOR Agrees with the Board that "ENHANCED credits will be needed to create incentives to build" hybrid electric vehicles, because hybrids are the viable gap between ICE's and fully electric vehicles. Furthermore, the industry seems to be largely disinterested in hybrids and hybrid technology. New staff proposals for plug in hybrid credits will NOT create the enhancements that the Board directed in January, and therefore are NOT enough to affect the desired stimulation of plug-in hybrid technology in the OEMs. (Hanssen)

Agency Response: The latest modifications to the regulation now allow extended-range HEVs to earn substantially more credit than in the January proposal. Introduction phase-in multipliers for extended range HEVs have been pushed out beyond the basic PZEVs until 2011. This additional credit in later years allows automakers much more time to develop and introduce this new class of HEVs. Minimum eligibility requirements have also been relaxed from 20 down to 10 miles of zero emission range, making it

easier for automakers to test market the extended-range HEV concept on a lower-cost vehicle.

229. Comment: I am writing to support a car that runs on batteries for 20 or 30 miles and then uses a small gasoline generator for anything longer. (Osborn)

Agency Response: ARB continues to support the concept of extended range hybrid electric vehicles and allows automaker's considerably flexibility in what sort of vehicles may be produced to meet the bulk of their ZEV obligation. Under the proposed regulation, automakers may choose to build extended-range HEVs to satisfy up to 80% of their ZEV obligation.

230. Comment: The ATPZEV HEV battery warranty requirement at 15 years/150,000 miles will be very challenging. In the case of Prius, we introduced a new second-generation battery for the 2001 model year. We anticipate additional changes for the next generation vehicle. While we have what we believe to be accurate bench data, real in-use experience does not exist. Toyota product development is largely driven by continuous improvement, feeding back field experience to the design process. Data in hand leads us to conclude that scheduled replacement will not be necessary. However, some level of unscheduled maintenance is possible. It is our intent to monitor battery performance and set the MIL as necessary. The rate of battery development and advancement make it difficult to remove the uncertainty of battery life regarding in-use variability. As reliability data become available over the next several years, we request that ARB maintain an open mind, as future changes may be necessary in the presence of data. Earlier examples of advanced technology introductions (i.e. oxygen sensors and catalytic converters) required several design iterations and more than 10 years to achieve the durability level required to meet this type of requirement. (Toyota, AAM)

Eliminate the 15 year/150,000 mile battery warranty requirement for hybrids. Battery life is expected to be significantly longer in self-charging hybrid applications compared to battery EV applications. Battery electric vehicle has no specific requirement for battery warranty. By imposing an onerous warranty requirement on hybrids that exceeds today's technology, the proposed modifications add significant expense, and undermine the development, affordability and marketplace success of these vehicles. (Honda)

The rules require a 15 year, 150,000 mile battery warranty for HEVs. Our first HEV, the Escape, has a battery life of less than 15 years. Replacement will be required at least once during the proposed warranty period. The warranty provision would increase the cost of the Escape HEV relative to the standard Escape. Because our HEV option costs are already double the level we believe consumers are willing to pay, the added costs for warranty will further inhibit marketability and erode volumes. Resultant degraded overall program financials will make it very difficult to sustain additional HEV programs within Ford Motor Company. It is more appropriate to allow the industry to react to consumer demand and competitive pressures in establishing battery warranties. Further, ARB is proposing to adopt this warranty requirement with essentially no lead-

time, which precludes the integration of cost-optimized battery systems into our HEVs. Accordingly, we recommend that any battery warranty beyond the emissions warranty periods be established voluntarily by industry for reasons of consumer satisfaction and competitiveness. (Ford)

Agency Response: ARB does not require a battery warranty beyond the term of the emissions warranty period. These warranty periods are the same (15 year/ 150k miles). Steady auto industry improvements in quality and durability now allow automobiles to remain in service for much longer than in the past. ARB is obligated to take this durability into account when assessing emissions-related warranty requirements. While it is true that inclusion of the battery in the warranty requirement may result in an increase in the initial purchase price of an HEV, consumers would still have had to pay to purchase their replacement battery sometime in the future in order to maintain the emissions and efficiency benefits that their HEV is certified to achieve.

231. Comment: More differentiation between the plug-in and non-plug-in hybrids is needed to encourage manufacturers to produce plug-in hybrids. (Chestnut)

Agency Response: Extended-range HEVs now earn substantially more credit than a minimal ATPZEV HEV. In addition to this up-front credit, only extended range HEVs are eligible for the yearly in-service/ under-warranty credit along with ZEVs. This provides even more incentive for manufacturers to consider this class of HEVs in meeting their obligation. Also, see response to Comment 228.

232. Comment: The changes to the long term phase-in and phase-out multipliers for range and efficiency for ZEVs result in a 40 percent decrease in the credit for ZEVs in 2008 and beyond, undermining the idea that both range and efficiency are desirable long-term attributes. (Toyota)

Agency Response: Efficiency remains a desirable long-term attribute and is still a significant part of ZEV credit determination beyond 2008. Range and efficiency attributes are rewarded significantly during the early years of the program in order to incentivize automakers into building vehicles that perform well. As the ZEV market gains experience with early year ZEVs and becomes more discerning, market forces will begin to affect vehicle attributes and allow automakers to charge more for vehicles that demonstrate these desirable attributes.

In-service/ under-warranty credit

233. Comments: Decreasing the credit awarded for extended warranty in later years of the program takes away the incentive for offering warranty on the single most expensive element of the vehicle – the battery and suggests that extended warranty is not a desirable attribute in future vehicles, this is contrary to the ARB direction for internal combustion engine vehicles. (Toyota)

Agency Response: ARB believes that this yearly warranty incentive is not as necessary in the future as ZEV energy storage system performance and lifetime improve. ZEV energy storage warranty coverage will remain a desirable attribute, but market forces will begin to determine what level is needed. Removal of this incentive to allow market forces to determine warranty coverage is not contrary to ARB warranty coverage requirements on ICE vehicles because warranties are still needed on ICE vehicles that may continue to be driven by customers after emissions systems fail. In addition, removal of the future battery warranty credit was needed to reliably achieve the vehicle production targets established by the Board.

Efficiency

234. Comment: Changing the efficiency credit calculation for ZEVs in 2008 effectively doubles the fuel efficiency baseline for earning efficiency credit which sets too high a hurdle to encourage efficient ZEVs. (Toyota)

Agency Response: Barring a tremendous improvement in class baseline fuel economy values in the future, the efficiency credit will still be achievable for many ZEVs. Even though this credit multiplier is reduced, it should continue to incentivize automakers to take advantage of this option and pursue vehicle design improvements.

235. Comment: Greater education of the public is needed to enhance understanding of the difference between today's non-plug hybrids and potential plug-in hybrids. (Chestnut)

Agency Response: The Board agrees with this comment and is planning to expand its current ZEV outreach and educational materials to include a variety of materials that will educate and inform the public about the entire family of clean-air, advanced-technology vehicles. We recognize that there is a lot of confusion about the differences between pure electric vehicles, today's non-plug hybrids, and potential plug-in hybrids. The Board plans on developing materials designed specifically to clarify and educate the public on the differences between these vehicles as well as to explain the benefits of each. It is important as we develop our outreach and educational materials that we recognize the role that all of these different technologies play cleaning our air and advancing motor vehicle technologies.

236. Comment: In order to encourage reasonable fast charging implementation staff should consider "charging speeds as low as 15kW. Perhaps instead of a brick wall credit at 60 miles/10 minutes, a sliding scale could be established to allow partial credit for charging speeds between 10 and 60 miles of range in 10 minutes of charge." (Hanssen)

Agency Response. This comment is outside the scope of the 15-day notice. No changes were made to the requirements for fast charging in the 15-day notice. The only changes covered the timing of allowable credit.

However, in response to the comment, the purpose of the credit for fast charging is to provide a large incentive for vehicles than can be refueled quickly. Fast charging has not been well utilized to date because of the difficulty of recouping the high equipment costs from the market. The benefits of fast charging a battery electric vehicle in ten minutes or less are enormous. It substantially increases the driving range of the vehicles, and thus the number of “ZEV” miles that the vehicle will be driven, and the marketability of the vehicle. Due to the inability to recoup investment costs, it is very unlikely that fast-charging systems will be implemented without attractive regulatory credits. Also, providing more credits for infrastructure would further reduce the number of ZEVs required by manufacturers.

237. Comment: AC Propulsion proposes several changes to the portion of the proposed regulation that rewards fast refueling. The regulation should provide an incentive that increases with charging speed instead of the existing step function where there is no benefit unless an EV can recover 60 miles in 10 minutes. ACP also suggests halving the requirement to earn the full adjustment from 60 miles in 10 minutes down to 30 miles in 10 minutes, and should also require manufacturers that earn fast refueling adjustments to provide onboard chargers or to include at least 20% of the cost of the necessary fast refueling charger for each EV. (AC Propulsion)

Agency Response: This comment is outside the scope of the 15-day notice. No changes were made to the requirements for fast charging in the 15-day notice, and comments on this portion of the regulation should have been made during the 45 day comment period.

238. Comment: As the owner/driver of two ZEVs we would urge you in the strongest of terms to refrain from diluting the ZEV mandate any farther than it already has been. (Harris)

Agency Response: The Air Resources Board continues to believe in a strong ZEV mandate and remains committed to achieving zero emissions from vehicles. As mentioned above, at its September 7 and 8, 2000 hearing, the Board directed staff to develop and propose regulatory modifications and other steps to address the challenges associated with the successful long-term implementation of the ZEV program. One of the Board’s concerns in particular was to address near-term constraints due to cost, lead-time and technical challenges.

The alternative to not modify the ZEV mandate poses a great cost burden on manufacturers. Batteries are the single most expensive component of electric vehicles. For that reason, affordable battery packs—both today and when produced in volume—are crucial to achieving a sustainable electric vehicle market. ARB established an independent battery panel that concluded battery costs are indeed high and will not meet cost-competitive targets for some time. Although volume production will help, a breakthrough is needed to achieve truly affordable battery packs. ARB staff believes a more gradual ramp of ZEV requirements is necessary to adjust for the realities of high cost and the development of battery technology.

At the hearing in January, the Board proposed a scenario that increases the number of ZEVs from Staff's proposal. It is important to note that the Board's proposal when compared with the current mandate will surpass the number of ZEVs required in 2015. In the long term, the Board's proposal increases the number of ZEVs required by as much as two times. The Board's proposal also includes, beginning in 2007, the addition of heavier sport utility vehicles, pickup trucks and vans in the sales figures used to calculate each manufacturer's ZEV requirement. Thereby, increasing the ZEV requirements and the strength of the ZEV program. ARB staff believes that allowing a more gradual ramp of the ZEV requirements along with the Board's increase of ZEVs will ensure the long-term success of a sustainable market for ZEVs.

239. Comment: We disagree with rule changes that will further reduce the number of future ZEVs offered to consumers. CARB should hold the line on ZEV production numbers, rather than pushing back public sales of ZEVs until the year 2010. Driving range of less than 150 miles is adequate. The state should create a new class of vehicle, along with regulations and tax relief, to encourage the formation of new ZEV producing companies. It would be in the best interest to focus and support companies whose primary goal is to build ZEVs, not on major automakers whose well-established goal is to eliminate government rules restraining their behavior, and whose core business is incompatible with the marketing and production of clean, efficient ZEVs. (Fischer)

Do not reduce the number of ZEV's in the early years. We need them now! (Smith)

I strongly urge that the amendments which would allow the car manufacturers to avoid building electric cars now be rejected. The ZEV does not need to be modified, it needs to be enforced. (Morrow)

It is not possible to provide specific comments, because of the difficulty for a lay person to understand the technical details of the document and the short time allowed for review. However, public health cannot afford the constant postponement of clean air standards that can be achieved with now with incentives to manufacture ZEVs. Please adopt regulations that show more concern for California citizen than automobile manufacturers and corporations. (Denison)

These comments apply to the need for clean fuel vehicles to protect public health, and compliment and refer to the issues in the ARB staff response to the NERA Sierra report. There are many benefits to ZEVs. These include substantial benefits to public health. Emission benefits can be further increased by charging with a solar electric system or by utilizing green energy that is available from electricity suppliers. EVs work, and we need more of them to protect air quality. There are waiting lists for EVs, and if you require more ZEVs be produced, there will be no problem in finding customers. There are no specific comments on the 15-day proposals. (Thompson)

Agency Response: Please see response to Comment 238.

240. Comment: The January 25 proposal provided transportation system credits based on linking transit systems to homes and jobs. The 15-Day Notice requires the shared use of vehicles to become eligible. Ford has been active in establishing station car programs in California and New York since the January 25 hearing. These programs are linked to transit, but do not involve shared cars or intelligent technologies. We are developing these programs with numerous partners, including the transit authority, state government, and the power authority. A broad effort is required to secure charging infrastructure, free electricity, and prime parking. The vehicles are subsequently leased to single users. These programs demonstrate the viability of station car applications as well as demonstrate the public benefits, including reduced emissions and reduced vehicle-miles-traveled. We have provided detailed descriptions of our efforts to ARB separately, including the financial resources we have committed to establishing these programs. Ford requests that vehicles in station car programs be provided credit based on the linkage to transit, and that the shared car basis be deleted. (Ford, AAM)

Agency response. Staff has reviewed the information provided and agrees that such projects have the potential to increase transit ridership and enhance the visibility and public appeal of ZEVs. Staff therefore concurs that such projects should be able to earn additional credit, upon review of an application submitted by the manufacturer and if appropriate the project manager. The language in Section (g)(5)(B) has been modified accordingly.

241. Comment: The January 25 proposal did not cap the amount of credit from these placements. The 15-day Notice caps the use of the credits from ZEVs at 10% of the ZEV obligation, AT-PZEVs at 5% of the ZEV obligation, and PZEVs at 2% of the ZEV obligation. Included in the cap are the base vehicle credit and the transportation system credit. Certainly there should be no cap applied to the base credit, as this is the credit associated with the vehicle regardless of how it is used. Further, we recommend that ARB remove the caps entirely. This would encourage more widespread transportation system programs, helping to break the single-occupant commute paradigm and reduce congestion. (Ford, AAM, DaimlerChrysler)

Agency response. Staff believes that a cap on the use of credits earned by vehicles placed in transportation systems is appropriate. The air quality benefits of such systems, although potentially substantial, are unproven. The level of credits earned (9 per vehicle) was deliberately set at a high level to encourage manufacturers to experiment with such systems so that real world information could be gathered regarding transit use, trip replacement, and other relevant factors. Given the uncertainty regarding the benefits, however, staff did not want to allow a situation where manufacturers could rely solely on such placements.

In addition, removing the cap would create the possibility of significant reductions in the number of vehicles produced in a given year. This would be contrary to the Board's directive to provide for a steady, sustainable growth in the ZEV obligation. For example,

for the 2005 model year staff estimates that a “50/50 mix” of full function and City EVs would result in production of about 7700 vehicles, without the use of transportation system credits. If all manufacturers took full advantage of the transportation systems option, and the use of such credits was not capped, staff estimates that production would drop to about 1600 vehicles – a reduction of almost 80 percent. The cap limits the potential impact of transportation system placements on total vehicle production.

Excluding the vehicle itself from the cap would lessen the effect of the cap and allow for fewer vehicles to be produced. Staff included the vehicle within the cap to further limit the potential impact of transportation system placements.

242. Comment: The 15-day Notice assigns transportation system credits to the project manager rather than the vehicle manufacturer. The credits are only of value to manufacturers subjected to the mandate and are our primary incentive for establishing station car programs. In reality, credit ownership would be negotiated up front as a condition of our involvement in any program. ARB need not address this issue. (Ford, AAM).

Agency response. Because several different entities will be involved in a typical transportation system project, staff felt that it was important to provide clarity as to the ownership of the resulting credits. Given that the regulation requires that approval from all participating parties is required prior to allocation of the credits, staff does not believe that assignment to one party rather than another has much of a practical impact. This point is acknowledged by the commenter, who notes that credit ownership would be negotiated up front as a condition of manufacturer involvement.

243. Comment: The Notice excludes NEVs from transportation system credit eligibility. There are many customers for whom NEVs can fully perform the function of a station car, transporting the owner between the station and home, or between the station and work on streets with speed limits of 35 mph or less. Because of their light weight, NEVs are capable of performing this task more efficiently than a larger vehicle and occupy less of the valuable parking space in the transit and work lots. We request that ARB allow NEVs to qualify for station car credits, and allow the market to establish the limits. (Ford, AAM)

The proposed regulations prohibit NEVs from earning credit for transportation systems. Failing to give credits for NEVs denies credit to a class of vehicles that could have a major role in future communities and transportation systems. (Doran)

Agency response. Staff agrees that NEVs could play a useful role in transportation system projects. Staff believes, however, that the credit levels earned by NEVs are adequate even in the absence of any additional incentives such as might be provided due to placement in transportation systems. Concern over manufacturer reliance on NEV credits has already prompted staff to propose modifications limiting the future use of banked NEV credits. These issues would be exacerbated if NEVs also were eligible

to earn transportation system credit. Finally, the regulation does not preclude the use of NEVs in such projects; it rather states that they do not earn additional credit.

244. Comment: The Board made no resolution to restrict station car eligibility for transportation system credits. Instead, the Board resolved to "work to establish an implementation partnership focusing on incentives for station cars and encouraging sustainable transportation systems". Ford recommends that ARB develop station car protocol and guidelines with input from the public and manufacturers. The ZEV rules could establish broad limits, allowing Executive Officer discretion in allocating credits until detailed guidelines could be developed through stakeholder meetings. (Ford)

In the proposal presented to the Board, the staff had no details for the transportation system provisions. The staff has provided definition of the program in the 15-Day Notice without the input of the automotive industry. Since some automotive companies may be directly involved with the establishment of transportation systems, the program details should be withdrawn until everyone has an opportunity to participate in the process similar to that used for ZEV incentives, ZEV outreach and ZEV infrastructure. (DaimlerChrysler)

Agency response. The regulation as written does provide for Executive Officer discretion. The regulation must, however, provide basic criteria governing the exercise of that discretion. The details provided in the regulation establish the basic framework for the evaluation of project applications and the award of additional credits. Staff anticipates that additional detail will be forthcoming in the form of guidelines, developed along the lines suggested by the commenters.

245. Comment: Continue the credit for advance transportation systems instead of eliminating it in 2008. (Honda)

Sunset of the transportation system credit after 2007 without a scheduled future review or regulatory fallback will diminish interest in participation in such programs. (Toyota)

Agency response. Sunset of the transportation system credits in 2008 is appropriate given the current uncertainty regarding the operation and benefits of transportation system projects. The regulatory credit scheme is intended to encourage experimentation. The sunset makes clear that the near-term credit levels are not intended to continue indefinitely, but rather should be reviewed when we have real-world data regarding vehicle miles traveled, trip reduction, transit substitution patterns, and other relevant factors. If appropriate, staff would recommend a future Board action to continue the credits at the appropriate level.

246. Comment: Section (c)(4)(B)(2) currently reads:
Advanced Componentry Allowance = ((CMPEG / 1.3 * Baseline Fuel Economy) – 1) * 0.5

Should be:

Advanced Componentry Allowance = ((CMPEG / (1.3 * Baseline Fuel Economy)) – 1) * 0.5

(Toyota)

Agency Response. This modification was adopted in Section (c)(4)(B)(2).

247. Comment: Section (c)(6) currently reads:

The combined PZEV allowance for a qualifying vehicle in a particular model year is the sum of: the PZEV allowances listed in this section 1962(c)(6), multiplied by any PZEV introduction phase-in multiplier or PZEV high efficiency multiplier listed in section 1962(c)(7) (if a 2005 model-year PZEV qualifies for both multipliers listed in section 1962(c)(7), the product of the two multipliers is used as the PZEV multiplier).

In (c)(7)(B), staff extends efficiency credit back to 2002. The 2005 reference in this paragraph should conform to that change. (Toyota)

Agency Response. This modification was adopted in Section (c)(6).

248. Comment: Section (d)(3)(C)(3) currently reads:

Multiplier Phase Down. Starting with the 2005 model year, the ZEV extended electric range multiplier is phased down to ~~one-half~~ 0.15 of its value in accordance with section 1962(e)(4).

Should be:

Multiplier Phase Down. Starting with the 2005 model year, the ZEV extended electric range multiplier is phased down to ~~one-half~~ 0.15 of its value in accordance with section 1962(e)(6). (Toyota)

Agency Response. This modification was adopted in Section (d)(3)(C)(3).

249. Comment: Section (e)(1) currently reads:

ZEV and Advanced Technology PZEV High Efficiency Multipliers Eligibility. *Beginning with the 2005 model year, both ZEVs and advanced technology PZEVs are eligible for a high efficiency multiplier. A NEV or other vehicle unable to maintain the speed and time tolerances contained in 40 CFR 86.115-00 (b)(1) and (2) (as effective July 1, 2000) for at least one cycle of both the UDDS and HFEDS is not eligible to earn an efficiency multiplier. A vehicle earning an efficiency multiplier value of less than 1.00 pursuant to section 1962(e)(3) will be treated as having an efficiency multiplier of 1.*

This language is confusing since AT PZEVs are eligible for high efficiency multipliers in 2002. (Toyota)

Agency Response. The language in Section (e)(1) was modified to clarify that the high efficiency multiplier is available for ZEVs beginning with the 2005 model year and for PZEVs beginning with the 2002 model year for AT PZEVs.

250. Comment: Section (e)(2)(B) currently reads:

For battery electric vehicles and off-vehicle charge capable HEVs with 20 10 mile zero-emission range, CMPEG....

The < 10 mile zero-emissions range should be >10 mile zero-emission range. (Toyota)

Agency Response. This modification was adopted in Section (e)(2)(B).

251. Comment: Section (e)(4) currently reads:

(4) High efficiency multipliers for the 2002-2007 model years. For model years 2002-2007, the efficiency multiplier for each vehicle class is determined according to the following equation:

$$\text{High Efficiency Multiplier} = \text{CMPEG} / 1.5 * \text{Baseline Fuel Economy}$$

Should be:

(4) High efficiency multipliers for the 2002-2007 model years. For model years 2002-2007, the efficiency multiplier for each vehicle class is determined according to the following equation:

$$\text{High Efficiency Multiplier} = \text{CMPEG} / (1.5 * \text{Baseline Fuel Economy})$$

(Toyota)

Agency Response. This modification was adopted in Section (e)(4).

252. Comment: Section (e)(5) currently reads:

For all other AT PZEVs: Efficiency multiplier = CMPEG / (15 * Baseline Fuel Economy)

The 15 in the denominator should be 1.5. (Toyota)

Agency Response. This modification was adopted in Section (e)(5).

253. Comment: Section (f) currently reads:

In-Service Warranty Multiplier for ZEVs and PZEVs With ~~20~~10 Mile Zero Emission Range. Except in the case of a NEV, an additional ZEV or PZEV multiplier will be earned for the 2001 through 2011 model years by a ZEV or a PZEV with ~~20~~10 mile zero emission range

The symbol preceding 10 mile range is probably meant to be >. However, since grid HEVs were moved to Silver and subject to the 15/150,000 warranty, it is likely that both references to these vehicles in this section are incorrect. (Toyota)

Agency Response. Staff intends that this in-service warranty multiplier continue to be available for range-extended hybrids with greater than 10 mile zero emission range. Therefore the language in section (f) was modified to replace the symbol with a “greater than” sign.

LEGAL ISSUES RAISED IN COMMENTS IN RESPONSE TO THE FIRST 15-DAY NOTICE

Scope of the Notice

254. Comment: The ARB is prohibited by Government Code section 11346.8(c) from adopting regulatory modifications that would apply the ZEV mandate to sales of vehicles in the LDT2 category, because those modifications are not sufficiently related to the regulatory text made available with the December 8 hearing notice. (Alliance, Ford, GM, DaimlerChrysler, Isuzu, Honda, and Toyota)

Under section 11346.8(c), the only changes that may be made to the originally proposed regulatory amendments are changes that are “sufficiently related to the original text that the public was adequately placed on notice that the change could result from the originally proposed regulatory action.” An OAL regulation 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.” Section 42, title 1, CCR. (Alliance, Isuzu, GM, Honda)

The December 8 notice described numerous proposed amendments, which can fairly be broken into 11 different categories. None of these involved including the sales of LDT2s in the determination of the ZEV requirements for any manufacturers, and a reasonable member of the directly affected public could not have anticipated these changes from the original notice. At no time in the 11-year history of the ZEV rulemaking had ARB ever published a proposal to include these trucks in the mandate – the change was first mentioned at the January 25, 2001 hearing. The change significantly affects the burden that the mandate imposes on the regulated parties, the costs of the regulation to members of the public, and even changes the identity of the manufacturers who are subject to the mandate. Isuzu Motors and Land Rover, which are not manufacturers of passenger cars and LDT1s in California, would be made subject to the ZEV mandate by virtue of the proposed action. The overall effect of this change runs counter to the general direction of the proposed amendments in 2000, which was to try to reduce the costs of ZEV compliance for the industry and the public. It is particularly burdensome for companies like Isuzu that were not affected in a direct way by the mandate. (Alliance)

Including LDT2s to determine ZEV requirements beginning with MY 2007 is a major change and is not in any way related to changes proposed in the hearing notice for the January 25, 2001 Board hearing. In light of the October 31, 2001 15-day notice’s

significant new language, Isuzu Motors, for the first time in the decade-long development of the ZEV mandate, is suddenly subject to the ZEV requirements. The proposed regulatory “modifications” included substantial amendments that would vastly expand the scope of the ZEV program, add heavy new costs to Isuzu, its dealers and customers, and disrupt Isuzu Motors’ efforts to compete in the California vehicle market as well as disrupt production plans and potential vehicle offerings. We recommend removal of LDT2 vehicles as a basis for determining manufacturer obligations under the ZEV program. If after following the statutorily mandated public participation procedures, ARB concludes this amendment is appropriate in the future, this amendment could later be adopted through the standard notice and comment rulemaking procedures. This would allow affected parties such as Isuzu Motors, meaningful opportunity to comment on the proposed changes. It would also ensure that the Board was informed of the effect of the proposed change on companies such as Isuzu Motors. (Isuzu)

Expansion of the mandate population to include all vehicles up to 8500 lbs. gross vehicle weight in the ZEV baseline is not within the scope of Staff’s December 8, 2000 proposal, and could not have been anticipated by manufacturers at any time during the rulemaking process leading up to the January 25, 2001 Board Hearing. This revision is significant in that it would more than double the volume of vehicles Ford is required to sell in order to comply with the mandate. Because this revision is substantial, was not noticed, and could not have been anticipated, ARB must follow the same notice and comment process that would apply to any new regulation. This should include analyses of cost, benefit and alternatives, and opportunities for public comment. We request separate rulemaking on the LDT2 provision. (Ford)

The December 2000 notice made no mention of *expanding* the basis for calculating the classification of auto manufacturers; rather the amendments were characterized as reducing the cost of the program and reducing the number of ZEVs. But the modification making vehicles in the LDT2 category subject to the ZEV requirements has just the opposite effect. (GM)

Agency Response: In written comments and testimony at the January 25, 2001 hearing, several commenters urged the Board to make the ZEV requirements applicable to SUVs and other vehicles in the LDT2 class. In particular, a joint letter dated January 24, 2001 on behalf of the ZEV Alliance – signed by representatives of NRDC, PCL, ALA, Kirsch Foundation, CALPIRG, Coalition for Clean Air, UCS, CETC and the Sierra Club – urged as its second recommendation that LDT2s be included in the total number of vehicles from which the ZEV percentage requirement are calculated. The commenters noted that the current program encourages manufacturers to sell more large, inefficient vehicles in order to reduce the number of ZEVs and PZEVs they must produce.

In response to those comments, and because these vehicles are increasingly used for personal transportation as substitutes for passenger cars, the Board concluded it was appropriate to add these vehicles to the baseline of vehicles against which the ZEV percentage requirements are applied, as long as sufficient lead time is provided.

Accordingly, the Board indicated that the ZEV requirement should not apply to any LDT2 until after the 2006 model year, at which point the requirements will be gradually phased in between the 2007 and 2012 model years. Interested parties were apprised of this action at the hearing and with the subsequent issuance of Resolution 01-1. The express modified regulatory language was made available for a supplemental 15-day comment period by issuance of the October 31 Notice of Public Availability of Modified Text.

We agree with the commenters that in determining the kinds of modifications that are permitted without the need for a new 45-day notice, the ARB is governed by Government Code section 11346.8(c) and section 42, title 1, CCR. In this context, it is important to recognize that a core principle of administrative procedure is that the reason for conducting a public hearing is to enable the decision-maker to consider and, where appropriate, adopt changes to the originally-noticed proposal. In the leading California case in this area, the court explained:

[E]ventual adoption of a regulation differing from that described in the pre-hearing notice is an objective of the hearing process. Fairness too is a statutory desideratum. After an opportunity for participation in a hearing considering the subject or issue evoked by the pre-hearing draft or summary, affected interests cannot claim unfairness when the agency's consideration of new information and views persuades it into a different enactment dealing with the identical subject or issue. To confine the agency to the terms of its pre-hearing proposal would negate a basic purpose of the hearing. To require a new notice and hearing would tie the agency into time-consuming, circular proceedings transcending the statutory objective.

Schenley Affiliated Brands Corp. v. Kirby, 21 Cal.App.3d 177, 193 (1971), cited approvingly in *Western Oil and Gas Ass'n. v. Air Resources Board*, 37 Cal.3d 502, 526 (1984).

The hearing notice published December 8, 2000 identified a large number of proposed amendments to the currently applicable ZEV requirements. Taken as a whole, the initially proposed amendments would substantially reduce the overall number of ZEVs that would have to be produced by manufacturers in the early years of the program. The hearing notice estimated that under the current regulation, for model year 2003 roughly 22,000 ZEVs would have to be produced assuming 100 percent full function vehicles, and about 38,000 ZEVs would have to be produced if the manufacturers built 100 percent City EVs or NEVs. Large manufacturers would also produce about 290,000 PZEVs, and intermediate manufacturers would produce another 90,000 PZEVs. The original staff proposal was estimated for two alternative compliance scenarios. In the first scenario, assuming no advanced technology PZEVs, the number of ZEVs in 2003 would be roughly 9,300 for full-function EVs, 23,500 for City EVs, or 30,900 for NEVs. The number of PZEVs in 2003 would be roughly 72,000 for large manufacturers plus 22,500 for intermediate manufacturers. In the second scenario, with

manufacturers taking full advantage of advanced technology PZEVs, the number of ZEVs would be 4,650 assuming full function, 11,750 assuming City EVs, and 15,500 assuming NEVs. There would be the same number of 0.2 allowance PZEVs as in the first scenario, with 10,700 advanced technology PZEVs. In part because the December 8 staff proposal ramped up the basic 10 percent ZEV requirement by 1 percent increments every three years between 2009 and 2018, the total expected number of ZEVs under the staff proposal would increase but not approach the number required under the current regulation. The December 8 notice indicated that the Board could choose to adopt sufficiently related modifications to the proposal, and that these modifications could include modifications to the phase-in schedules for various vehicle types.

While the modification phasing in a ZEV requirement for LDT2s during 2007-2012 significantly increases the overall number of required ZEVs compared to the original staff proposal, the final adopted amendments still represent a reduction of ZEVs compared to the current regulation – particularly in the nearer term. The amendments with the modification remain consistent with the underlying thrust of the original proposal. Moreover, the modification to phase-in applicability of the ZEV requirement to LDT2s during 2007-2012 is consistent with the longer term element of the original proposal ramping up the basic 10 percent ZEV requirement starting in the 2009 model year. A number of environmental groups have advocated an aggressive ZEV program during the biennial review process, and the recent LEV II rulemaking is phasing in a requirement making the LDT2 vehicle category subject to the passenger car standards for the first time. Under these circumstances, it would have been reasonable for an interested party reviewing the hearing notice and regulatory text to anticipate that environmentalists would urge that the December 8 proposal be modified to make LDT2s subject to the percentage ZEV requirements. We therefore conclude that the modification was not barred by Government Code section 11346.8(c).

255. Comment: The Board adopted major modifications to the ZEV regulation at the hearing that will significantly increase the number of ZEVs required to meet the mandate – particularly the decision to double the ZEVs required by 2012. The Board introduced the changes after the conclusion of public testimony denying the opportunity for public comment. There had been no indication from ARB that the Board would take such action. No cost, cost-effectiveness or feasibility studies have been presented to justify the increased ZEV requirement. As a result of these substantial changes, DaimlerChrysler believes that Section 11346.8 of the California Government Code requires that the Air Resources Board issue a new 45-day notice and if requested, a hearing. (DaimlerChrysler)

The Board's decision to require twice the number of ZEVs by the 2012 model year could not reasonably be contemplated based on the materials provided prior to the hearing. (Honda)

The December 8 proposal also did not mention the possibility of a substantial increase in the overall number of pure ZEVs that would be required, let alone a 100 percent increase by 2012. (Alliance)

Agency Response: It is important to note that the doubling of the required number of ZEVs by the 2012 model year is in comparison with the original staff proposal, not in comparison to the preexisting regulation. As shown in Attachment D to Resolution 01-01, the increase in the required number of ZEVs still results in considerably fewer ZEVs during the 2007-2012 period than is the case with the preexisting regulation. And there is very little change to the 2003-2006 phase-in originally proposed by staff. Given the fact that the notice expressly indicated that modifications to the phase-in schedules could be made at the hearing and the previously expressed views of many in the environmental community, we believe that interested parties were sufficiently put on notice that this sort of modification could result from the hearing process.

256. Comment: After the hearing, the staff modified the PZEV allowance for zero emission VMT by eliminating the 0.25 PZEV allowance for advanced ZEV componentry and creating new “advanced componentry” criteria which add PZEV allowances for CO₂ reduction, fuel efficiency, percent peak power, and gaseous fuel storage systems and hydrogen. These major revisions require a 45-day notice. (DaimlerChrysler, Alliance)

In the December 2000 proposal, the staff recommended an “advanced componentry” allowance for all power assist hybrid PZEVs, and qualified all power assist PZEVs as advanced technology PZEVs with a total PZEV allowance of 0.45. But the 15-day notice proposes three near-term options for “advanced componentry” credit, under which some power-assist hybrid PZEVs receive no credit, some receive less, and some receive more. Given the lack of leadtime to change product plans for the first several years of the mandate, these modifications have disproportionate competitive impacts on some manufacturers, and are not permitted by Government Code section 11346.8(c). (GM)

Agency Response: The originally noticed staff proposal included a number of amendments to the provisions on allowances and multipliers for ZEVs and PZEVs. One of the changes was to increase the PZEV allowance for advanced ZEV componentry from 0.1 to 0.25; a vehicle qualifying for this allowance would automatically qualify as an advanced technology PZEV. The hearing notice stated that the types of modifications the Board might make to the original proposal included modifications to the types of vehicles that can be used to satisfy the advanced technology PZEV portion of a manufacturer’s obligation. The modifications regarding the advanced ZEV componentry allowance provide a graduated mechanism for assigning allowances more closely tailored to the characteristics of a given vehicle. Among other things, an extended range HEV can qualify for an advanced ZEV componentry allowance of more than 0.25 in circumstances; other systems will qualify for less than 0.25. Changes of this nature to the allowance could reasonably be expected from the notice and comments made by interested parties.

257. Comment: ARB and the Executive Office gave no warning, and until now have never even suggested publicly, that emissions related warranties for HEVs would become part of the regulation. (AAM)

Agency Response: The preexisting regulations have required that all PZEVs carry an extended emissions performance and defects warranty of 15 years or 150,000 miles, whichever occurs first (§1962(c)(2)(D).) One of the modifications identified in the modified text dated January 19 was to specify that for HEVs that are advanced technology PZEVs, the traction battery must be included as a warranty item. The requirements for qualifying for PZEV and AT PZEV allowances were an integral part of the original staff proposal presented for the Board's consideration, and additional revisions to those requirements could reasonably be anticipated as a potential result of the hearing process.

258. Comment: Other regulatory modifications that are not permitted without a new 45-day notice are the significant reductions in the range and efficiency multipliers for ZEVs, the wholesale revisions to the transportation credits, and the completely new definition of "City Car" and associated reduction in credit. (AAM)

The APA provides that substantial changes to the originally noticed proposal, such as making the LDT2 category subject to the ZEV requirements, cannot be made without renouncing the modified proposal. In addition, ARB proposed to add or modify the following other sections and definitions, for the first time, pursuant to the October 31, 2001 order:

- 13 CCR § 1962(c)(2)(D) (expanding the performance and defects warranty to include traction batteries);
- § 1962(c)(3)(B) (altering the method for calculating zero emission VMT);
- § 1962(c)(3) (creating new incentives for grid-connect hybrid electric vehicles);
- § 1962(e)(4) (creating new efficiency multipliers)
- § 1962(e)(5) (creating new efficiency multipliers)
- §1962(e)(6)(B) (providing for the application of range and efficiency multipliers);
- §1962(g)(5)(C) (placing a cap on the use of ZEV credits);
- §1962(g)(5)(D) (providing for the allocation of ZEV credits at the pleasure of the Executive Officer);
- § 1962(j) (5) (creating a new definition for a "specialty electric vehicle");
- §1962(j) (establishing a new "LDT2" class for light-trucks weighing 3751-8500 pounds). (GM)

Agency Response: With regard to some of these modifications, see the responses to Comments 254 to 257. The changes to the method for calculating zero emission VMT are designed to increase the allowance for AT PZEVs, partially offsetting the impact of the Board's removal of these vehicles from the top 20 percent category for large volume manufacturers. This kind of adjustment could reasonably be anticipated to result from the rulemaking. As pointed out in the commentary to the modified text, the changes regarding efficiency multipliers were intended to improve the calculation methodology

but do *not* significantly affect the resulting scores. Similarly, the commentary to the modifications in section 1962(e)(6) explain how in significant part they grow out of other modifications discussed above and make improvements to the originally proposed mechanism. The modifications in section 1962(g)(5)(C) and (D) are part of an expansion of the originally proposed provisions on ZEV credits for transportation systems. Since this credit was introduced as part of the original staff proposal, it could reasonably anticipated that changes to the mechanism could be included in the modifications made to the original proposal. And the new definition in section 1962(j)(5) was created for a term used in a limited clarification in section 1962(d)(3)(C)1. on how the ZEV extended electric range multiplier is calculated.

Need for More Time to Comment on Modifications and Other Materials Released with the October 31, 2001 Notice

259. Comment: We are disappointed that the Board provided only a 15-day comment period on the proposed modifications. Given the sudden and unanticipated departure from the scope of the November 2000 amendments, the shortened comment period is inappropriate. Moreover, we have serious concerns about the nine-month delay in issuing the new and modified text since the January 25 hearing. (Honda)

The ARB should allow more than 15 days to comment on the material released October 31. It is clear from those materials that the ARB staff decided, for whatever reason, to delay release of some of the documents for which it has established a November 15 deadline. The Hall-Brajer memorandum appears to have been completed and sent to ARB by the authors on October 15, and other documents are dated in the week of October 3-6. The fact that the staff delayed release of the memorandum for two weeks, without any justification, undercuts any suggestion that there is an urgent and legitimate need to close the period for public comment by November 15. And it is not reasonable or fair to expect anyone to comment within 15 days on the results of modeling that the ARB staff waited several months to undertake, and apparently waited for more than 15 days to circulate for public comment. (Sierra Research)

Agency Response: The ARB released the October 31 materials and modified text as soon as they had all been completed, and provided the 15-day comment period specified by Government Code section 11347.1. We believe it was appropriate to make the materials available for supplemental comment at one time.

Since the Board hearing in January, the staff has maintained close communications with many interested parties on the expected content of the final modified regulatory text. As a result, we believe that few of the modifications can be characterized as altogether unexpected.

260. Comment: The Board did not adequately consider the procedural delay in publishing the sweeping new requirements released October 31, 2001, and failed to provide the public with sufficient lead time before proposing the modifications. The more than 9 month delay between the hearing and issuance of the October 31 notice

creates a significant reduction in time during which manufacturers could adjust their existing design or production plans. We and others relied on the scope of the December 8, 2001 notice and the originally drafted amendments in preparing for our future obligations to the maximum extent feasible, including planning our AT-PZEV production based on the qualification requirements and credit calculations provided in the original amendments. Now the AT-PZEV qualification thresholds will be very high. (Honda)

Agency Response: By the end of the January Board hearing, the public had notice of the general changes directed by the Board, and it was appropriate for manufacturers to take those modifications into account in connection with their compliance plans. As noted in the response to the previous comment, the staff also maintained communications with interested parties on expected implementation of the Board's directions.

Issues of Executive Officer vs. Board Authority

261. The specific instructions from the Board in Resolution 01-01 regarding the additional modifications to the regulations were in some respects too vague to provide adequate direction to the Executive Officer. For example, the direction that the additional modifications be consistent with the "red line" scenario on Attachment D of the resolution was tantamount to an instruction to the Executive Officer to prepare a regulatory text that would select one of potentially scores of different specific sets of requirements of ZEVs. This essentially means that the Executive Officer would have to engage in rulemaking on his own. However, he is precluded from doing so by ARB Resolution 78-10 (February 23, 1968), which specifically reserves unto the Board the authority to amend emission standards and test procedures for new motor vehicles. Nothing in Resolution 01-01 gives the Executive Officer any authority that is inconsistent with the 1978 resolution. Since there is no way to establish whether the Executive Officer complied with the instructions in Resolution 01-01, there must be plenary consideration of the regulatory text by the full Board after public notice and a full 45-day comment period. Otherwise, the Executive Officer should explain how each change he is making fulfills a *specific* direction from the Board. (GM)

Agency Response. The commenter fundamentally misunderstands the effect of the 1978 "reservation of powers" resolution. Under Health and Safety Code sections 39515 and 39516, any authority the Board has *may* be delegated to the Executive Officer, and any authority that may be delegated is to be conclusively *presumed* to have been delegated unless the Board reserves the power to itself in writing. The 1978 resolution removes that presumption of delegation for a number of activities, including amending emission standards for new motor vehicles. But Resolution 78-10 was never intended to restrict the sort of authority the Board could delegate to the Executive Officer on a case-by-case basis in subsequent resolutions. For instance, there have been a number of instances since 1978 where the Board has delegated to the Executive Officer the full authority to conduct a rulemaking with no Board involvement.

In Resolution 01-01, the Board clearly delegated to the Executive Officer the authority to take the further actions necessary to complete the rulemaking consistent with the overall directions in the resolution. For example, it must be presumed that the Board understood there were different ways the Executive Officer could implement the direction that the modifications be consistent with the “red line” scenario in Attachment D to the resolution, and was delegating sufficient authority to enable the Executive Officer to take the actions he deems most appropriate consistent with the overall direction of the Board. The modified regulatory text made available with the October 31, 2001 “15-day” notice included extensive discussions of the rationale for the various proposed modifications. There is no legal requirement that for each of the many modifications the Executive Officer separately set forth the specific direction of the Board being implemented.

262. Comment: The 15-day notice goes well beyond the request of the Board by expanding the base mandate population to include all LDT2 classification trucks, and by applying the expanded base to AT-PZEVs and PZEVs. Staff’s considerations should be constrained to the Board’s request to investigate including SUVs for the pure-ZEV portion of the requirement only. Any increase beyond this expands the mandate far in excess of the Staff Proposal and the Board’s request and creates unnecessary competitive issues. (Ford)

By adding the LDT2 trucks, staff has also expanded the required number of ATPZEVs and PZEVs. This expansion exceeds the direction given by the Board. The required number of vehicles in the PZEV category will increase by approximately 75%. This is clearly a significant expansion of the regulatory obligation. It puts at risk manufacturer’s ability to comply. (Toyota)

The Board directed the staff to include SUVs in determining the number of ZEVs required. The staff went beyond this direction in two ways. First, the staff included all trucks in the LDT2 category, not just SUVs. Second the staff included LDT2s in the ZEV baseline. (DaimlerChrysler)

Agency Response: The ZEV volume production targets (“red-line”) as presented to the Board were based upon inclusion of LDT2s rather than SUVs, and were described to the Board in that fashion. Therefore, the Board fundamental direction to meet the “red-line” implies inclusion of LDT2s. The Board was motivated by two primary considerations. First, while a large percentage of vehicles in the LDT2 category have traditionally been used for work purposes, it is now very common for the SUVs, pick-up trucks and minivans making up the category to be used primarily for personal transportation, i.e. as passenger cars. In recognition of this phenomenon, a key element of the LEV II rulemaking in 1998 was to make these vehicles subject to the same exhaust emission standards as passenger cars. This requirement is being phased in during the 2004 – 2007 model years. For the same reason it is appropriate for these vehicles to trigger the same ZEV obligations as passenger cars. Secondly, the current regulation encourages a manufacturer to sell more large, inefficient vehicles in order to reduce the number of zero and near zero emission vehicles it must produce.

Another issue raised by commenters relates to how the expanded base, after the LDT2 phase-in, relates to the overall ZEV program. The commenters object to applying the expanded base to the entire program (including the AT PZEV and PZEV options) rather than limiting the expansion to only the ZEV portion of the regulation.

The ZEV regulation requires that certain percentages of vehicles offered for sale in California must be ZEVs. The AT PZEV and PZEV portions of the program are not separate freestanding requirements, but rather are options that manufacturers may use to offset a portion of the overall mandate. Thus in the operation of the program there are not separate “base fleets” that apply to PZEVs or AT PZEVs; these options are integrally linked to the fundamental ZEV requirement. Any action that expands the base fleet for the ZEV requirement necessarily also expands the base fleet for the alternatives that the regulation provides.

It would be possible, of course, to draft the regulation such that it makes such a separation. This would be a departure from the conceptual structure underlying the program. The Board provided no indication that it intended to set up different base fleets for different portions of the program. In the absence of any such direction, staff has drafted the regulation so as to be consistent with the historical operation of the program. Staff is confident that this approach reflects the intent of the Board.

Compliance with the Legal Requirements Regarding Cost-Effectiveness, Necessity and Technological Feasibility

263. Comment: Health and Safety Code section 43013(a) only authorizes the ARB to adopt motor vehicle emission standards that the Board has found to be cost-effective. Adoption of control measures that are not cost-effective are invalid under Government Code section 11342.1. There was no legally-required finding of cost-effectiveness in neither Resolution 01-01 or the October 31, 2001 notice. Before deciding what action to take on the October 31 modifications, the Board or the Executive Officer must determine whether the ZEV program, or these amendments, will be cost-effective. (GM)

In their current form, the modified amendments are not cost-effective as required by ARB’s enabling statutes. The ARB has failed to produce any substantial evidence to counter this fact. (Honda)

Agency Response: Executive Order G-01-058, which is the vehicle by which the Executive Officer is adopting the amendments, contains the required finding regarding cost-effectiveness. Also see the discussion on the cost-effectiveness of the amended ZEV regulations elsewhere in this Final Statement of Reasons.

264. Comment: The modifications proposed on October 31, 2001, expand the scope of the ZEV mandate and will increase total vehicle emissions in California. This conflicts with the ARB’s statutory mandate to adopt rules that reduce smog-forming emissions. See, e.g., HSC §§ 39602, 43000, 43010, 43018(a), 43801. Therefore it is

invalid because it is not *consistent with* the enabling statute as required by Government Code section 11342.2. (GM)

Agency Response: As discussed elsewhere in this FSOR, we do not agree with GM's assertion that expanding the ZEV requirements will increase vehicle emissions in the state. In any event, the "expansion" that GM addresses is based on the differences between the modifications released October 31 and the staff's original proposal released in December 2000. But in evaluating whether the action taken in this rulemaking is consistent with the enabling statutes, the appropriate comparison is between the finally adopted amendments and the preexisting regulatory requirements. The overall impact of the adopted amendments is to reduce the number of ZEVs that will be required in the state, particularly in the near term.

265. Comment: The necessity for the changes in the regulations that the Executive Officer included in the October 31 notice has not been demonstrated. That necessity must be demonstrated with respect to each element in the proposed changes. See 1 C.C.R. § 10(b)(2). (GM)

The most recent proposed changes in the regulations have no specific relation to, and cannot be said to have as their purpose, the reduction of criteria and toxic air pollutants. Creation of credits and multipliers that reduce the number of actual ZEVs required makes sense as a method of reducing those pollutants only if (as GM as demonstrated) it is conceded that the mandate will increase those pollutants – but in that event, the more logical alternative would be to eliminate the mandate entirely. (GM)

Agency Response: The rationale for the various modifications contained in the regulatory text released October 31 is contained in the "commentaries" interspersed in the text. We note that there is no separate requirement for demonstrating the necessity of modifications made during a rulemaking – the focus is on the necessity of the finally adopted amendments to the preexisting regulatory requirements.

266. Comment: Based on the record, the ZEV mandate is beyond the scope of the Board's legislative authority. The Legislature has clearly directed ARB to implement rules that will reduce emissions, and the ZEV mandate will *increase* emissions. There can, by definition, be no "reasonable necessity" for a regulation that, while supposedly advancing the cause of new technology, also increases emissions from the fleet as a whole, especially when alternatives exist. And while the record includes claims by ARB staff that the ZEV mandate will reduce urban-area vehicle noise and the pollution of groundwater by gasoline, there is no shred of factual evidence to support either claim. (GM)

Agency Response: The commenter's claim that the ZEV regulation as amended will increase emissions is based on the NERA Sierra reports that focus on the "fleet turnover effect." This FSOR includes the staff's responses to the NERA Sierra analyses, on which basis we conclude that the ZEV regulation will on balance reduce emissions of criteria pollutants and precursors. We believe that maintaining a core zero

emission requirement is necessary to provide an incentive for further development of true zero emission technologies. The ZEV program is a cornerstone of a long-term vision involving a transformation of our vehicle pollution control strategy towards vehicles with lifetime durability.

267. Comment: At present, only traction-battery technology can meet the ZEV requirement and be mass-produced. Therefore, both in its current form and under the proposed amendments, the ZEV mandate is essentially a mandate to build and deliver battery-powered electric vehicles. This triggers the duty to meet an enhanced standard for necessity because the ZEV mandate thus operates as prescriptive standard under the APA. A “prescriptive standard” is “a regulation that specifies the sole means of compliance with a performance standard by specific actions, measurements, or other quantifiable means.” Gov. Code § 11342.590. On the other hand, a “performance standard” is defined as a regulation that describes an objective with the criteria stated for achieving the objective.” Gov. Code § 11342.570. (GM)

Agency Response: Under section 1962(a), a zero emission vehicle is a vehicle that produces “zero exhaust emissions of any criteria pollutant (or precursor pollutant) under any and all possible operational modes and conditions,” with special criteria associated with a fuel fired heater that cannot be operated at ambient temperatures above 40 degrees F. This describes an objective with the criteria stated for achieving the objective.

Legal Requirements Regarding Economic Impacts

268. Comment: Another requirement so far overlooked in this administrative process is that the APA requires that agencies deal forthrightly with the potential impact of regulation on the economy. Government Code section 11346.5(a)(8) requires that an agency’s findings that a rule will have no adverse economic impact be clear and supported with evidence in the initial staff publication. Section 11350(b)(2) provides that a court may declare a regulation invalid if the declaration required by section 11346.5(a)(8) is in conflict with substantial evidence in the record. (GM)

Agency Response: Prior to the initiation of this rulemaking, automakers were subject to the ZEV requirements in section 1962, title 13, CCR as amended in the 1998-99 LEV II rulemaking. The regulatory amendments initially proposed in this rulemaking would substantially reduce the automakers’ costs of compliance with the preexisting ZEV regulations. Sections 11346.5(a)(7) and (a)(8) expressly refer to determinations that the “action” being proposed to “adopt, amend, or repeal” an administrative regulation will or will not have a significant adverse economic impact on businesses. The economic impact analysis on pages 9-11 of the hearing notice in this rulemaking addressed potential impacts of the amendments proposed, and concluded they would result in cost savings to manufacturers of between \$130 million and \$400 million for the 2003 model year. Accordingly, the notice stated that the Executive Officer had determined the proposed regulatory action will not have a significant adverse impact on businesses.

We are not aware of substantial evidence in the record that conflicts with this determination.

269. Comment: Neither the economic analysis nor the findings required by the APA in advance of final action on a regulatory proposal was presented in the October 31 notice. This deficiency needs to be addressed in an appropriate notice and public comment on the economic impacts assessed by the Board with respect to the proposed amendments and must be received in the manner contemplated by the Government Code. (GM)

Agency Response: We believe that all economic determinations and analyses required by the APA in advance of final action are contained in the Executive Order and other documents in the final regulatory package. We are aware of no requirement that these determinations and analyses be separately included in the materials made available October 31, 2001 for supplemental comment. We also note that there are relatively few differences between the adopted amendments and the original proposal as they apply to pre-2006 model-year vehicles.

Federal Preemption Issues

270. Comment: The October 31 notice includes an advanced technology scoring method for AT-PZEVs that calculates an additional credit allowance based on reductions in CO₂ emissions or improvements in fuel economy compared to the average vehicle in the class. We are not aware of any statute that gives ARB the authority to regulate CO₂ or fuel economy, or to implement policies that may reduce motor vehicle CO₂ emissions or fuel consumption. The ambient air quality standards do not include CO₂ as a criteria pollutant, and there is at best a tenuous connection between global warming and the attainment of ambient air quality standards. Further, encouraging CO₂ emission reductions or fuel economy improvements on a small subset of vehicles sold in California would have no impact on worldwide global warming. (Ford)

The staff proposal includes many changes from the previous ZEV requirements that lead the ZEV mandate regulations away from the ZEV mandate and towards a fuel economy requirement. Federal regulations preempt California from taking such actions.

Federal Code of Regulations, Title 49 Subtitle VI, Part C, Chapter 329
§32919. - Preemption

(a) General. - When a prescribed fuel economy standard prescribed under this chapter is in effect, a State or a political subdivision may not adopt or enforce a law or regulation related to fuel economy standards or average fuel economy standards for automobiles covered by an average fuel economy standard under this chapter. (DaimlerChrysler)

The new category of advanced componentry that provides PZEV Allowance for AT PZEV multipliers not based on ZEV componentry effectively act as fuel economy requirements:

- PZEV Allowance based on CO₂ reduction (measured from fuel saved)
- PZEV Allowance based on fuel economy improvement

In addition, the determination of ZEV and AT PZEV efficiency multipliers based on fuel economy improvement is in effect a fuel economy requirement. Not only are these criteria fuel economy related on their own, but when the improvements are based on gains compared to the vehicle class average values other criteria than ZEV componentry are being considered (size, weight aerodynamics, tires, etc.) that add to the fuel economy aspect of the regulation.

The staff also made revisions to the combined ZEV multiplier to heavily bias the efficiency multiplier over the range multiplier that also adds to the fuel economy aspect of the regulation. (DaimlerChrysler)

The Health and Safety Code does not allow ARB to regulate in an area reserved to the national government and preempted from state regulation. See HSC section 43023(a). The statutory framework of the Motor Vehicle Information and Cost Savings Act (MVISCA) preempts the ZEV mandate because the mandate has the effect of regulating fuel economy.

ARB cannot try to defend the amendments on the grounds they only provide incentives for specific levels of fuel economy or CO₂ control because ARB's cost benefits and cost estimates appear premised on optimization of ZEV compliance strategies that rely on use of these new credits and multipliers.

Both the ZEV mandate and efficiency multipliers will have direct impacts on manufacturers' computations of their corporate average fuel economy for federal regulatory purposes. Two of the three mechanisms for computing credits for AT PZEVs are based directly on fuel economy.

Under the Department of Energy (DOE) CAFE regulations, the fuel economy value of EVs for CAFE purposes is artificially increased by a factor of nearly seven times. The sale of EVs – required by law under the California ZEV mandate – will therefore improve a manufacturer's average fuel economy and provide an opportunity for the manufacturer to produce more vehicles with higher fuel consumption. But because of the artificial fuel economy increase for EVs, modification of the ZEV mandate would therefore be likely to result in a net disbenefit in terms of the fleet's actual fuel economy. MVISCA preempts the ZEV mandate because the ZEV program directly affects the fleetwide fuel economy averages of the major auto manufacturers. The ZEV mandate in effect regulates fuel economy. Under MVISCA, states are not allowed to require any auto manufacturer to build more fuel efficient vehicles than the federal government requires.

The language of 49 U.S.C. § 32904(a) preempts all state regulations "related to fuel economy standards or average fuel economy standards." Under *Morales v. Trans World Airlines, Inc.*, 504 U.S. 374, 383-85 (1962), Congressional use of the language "relating to" implies broad preemptive effect.

The ZEV mandate also creates an obstacle to the accomplishment of a clear Congressional objective in MVISCA – to ensure federal regulation of fuel economy through a regulatory approach emphasizing manufacturer choice and flexibility. The ZEV mandate forces manufacturers to replace the system of fleetwide averaging with a requirement that manufacturers produce a set percentage of ZEVs (a vehicle category based on fuel economy) and then compounds that departure with a complicated high mileage credit scheme for AT PZEVs. (GM)

Agency Response: The provisions on AT PZEVs and efficiency multipliers provide optional mechanisms that a manufacturer may choose to use to comply with a portion of its ZEV requirements. Under such circumstances, the state approach is not preempted where one of the options if enacted alone would have been allowable. *Ray v. Atlantic Richfield Co.*, 435 U.S. 151, 172-3 (1978). We acknowledge that some ARB analyses are based on use of these optional features, but that makes them no less optional.

Courts recognize that there is a presumption against preemption of state regulation of health and safety matters and that a person invoking the supremacy clause “faces an uphill battle” to show preemption. *Hillsborough County v. Automated Med. Labs., Inc.*, 471 U.S. 707, 714-715 (1985). In expanding California’s exception from preemption of motor vehicle emission standards under section 209 of the federal Clean Air Act as part of the 1977 amendments, the House Committee stated, “The Committee amendment is intended to ratify and strengthen the California waiver provision and to affirm the underlying intent of that provision, i.e., to afford the broadest discretion in selecting the best means to protect the health of its citizens and the public welfare.” (H.R.Rep. 95-294, 301-301 (1977), cited with approval in *Motor and Equipment Manufacturers Ass’n v. EPA*, 627 F.2d 1095, 1110 (D.C. Cir. 1979).) Given this clear expression of Congressional intent, the preemption provision in MVISCA should be construed narrowly to avoid unintended preemption of elements of California’s motor vehicle emission control program.

The Supreme Court does not always construe “relating to” language in preemption statutes as implying broad preemptive effect. For instance, the ERISA preemption statute uses “relating to” language, and the U.S. Supreme Court has stated, “In order to evaluate whether the normal presumption against pre-emption has been overcome in a particular case, we concluded that we ‘must go beyond the unhelpful text and the frustrating difficulty of defining its key term, and look instead at the objectives of the ERISA statute as a guide to the scope of the state law that Congress understood would survive.’” *De Buono v. NYSA-ILA Medical and Clinical Services Fund*, 520 U.S. 806, 813-14 (1997), quoting *N.Y. State Conference of Blue Cross & Blue Shield Plans v. Travelers Ins. Co.*, 514 U.S. 645, 656.

The central element in the provisions on the PZEV allowance for vehicles with advanced ZEV componentry is that a vehicle does not qualify for an advanced technology allowance *unless* “the vehicle is equipped with advanced ZEV componentry such as an advanced battery integral to the operation of the vehicle power train or an

electric power train.” The ZEV regulation is designed not only to achieve emission reductions from ZEVs put on the road in the next few years, but also to stimulate technological developments which will lead to the application of zero-emission technologies in future years. We recognize that there is an outstanding need for further development of ZEV energy storage systems and technologies that will extend zero-emission range, and the allowance encourages that in vehicles that are not full ZEVs. A vehicle with high fuel efficiency or low CO₂ emissions will not receive any allowance unless the vehicle has advanced ZEV componentry such as an electric power train or an advanced battery integral to the operation of the power train. The three optional means of determining the amount of the advanced ZEV componentry allowance are performance standards that measure the utility of the particular componentry in advancing ZEV technologies. This is substantially different from a fuel economy standard.

GM’s claim that the underlying ZEV requirement is preempted because the Department of Energy’s regulations are designed to favor EVs is clearly erroneous. This claim would construe the MVISCA law and regulations to have an effect precisely the opposite of what GM characterizes as DOE’s intent to favor and encourage alternative fuels such as electricity.

271. Comment: The ZEV mandate also regulates “greenhouse gases” because ZEV quotas affect the overall fuel economy and carbon dioxide emissions of manufacturer fleets. The federal Clean Air Act preempts California from regulating carbon dioxide through the ZEV mandate by limiting greenhouse gas regulation to research, education, and voluntary agreements and by withholding, even from U.S. EPA, the authority to regulate greenhouse gas emissions. See Clean Air Act sections 102(g) and 602. (GM)

Agency Response: To the extent that elements of the ZEV regulation can be characterized as regulating greenhouse gases, we do not believe they are preempted by the federal Clean Air Act. There is no express preemption language other than section 209(a), with the section 209(b) waiver mechanism for California. And the commenter has not demonstrated that the ZEV regulation stands as an obstacle to the accomplishment and execution of the full purposes and objectives of Congress.

272. Comment: California’s regulation of greenhouse gases would violate the conditions of the Clean Air Act’s section 209(b) waiver of federal preemption. Section 209(b) allows U.S. EPA to waive preemption if the Administrator finds that California needs its own standards to meet “compelling and extraordinary conditions.” Such a finding cannot be made with respect to greenhouse gases. (GM)

Agency Response: U.S. EPA does not require a finding regarding “compelling and extraordinary conditions” with respect to each pollutant being regulated; rather the issue is whether such conditions more generally justify a separate California motor vehicle emission control program. 49 F.R. 18887 (May 3, 1984). U.S. EPA has made that finding in the past, and there is no reasons why it should not continue.

273. Comment: The sweeping changes being proposed to the ZEV regulations are outside any waiver or exemption from the federal Clean Air Act previously granted by the U.S. EPA. If adopted, the proposed modifications would represent the kind of action for which a waiver cannot legally be granted under federal law pursuant to 42 U.S.C. § 7543(b). (Honda)

Agency Response: The original ZEV requirements are covered by the original waiver for the LEV regulations, and on January 25, 2001, U.S. EPA published its determination that the 1998 ZEV amendments were within the scope of the previous waiver (66 Fed. Reg. 7751). Our waiver request for the LEV II amendments is pending with U.S. EPA. Since the overall impacts of the current amendments are to make it easier for manufacturers to comply compared to the preexisting requirements, we believe the amendments should be found to be within the scope of earlier waivers. If U.S. EPA determines that it is appropriate to consider the amendments within the context of a new waiver request, we believe they would qualify under 42 U.S.C. § 7543(b), on many of the same basic grounds that justify the amendments under state law.

274. Comment: The regulatory steps proposed in connection with the October 31 notice also would violate constitutional provisions concerning federal regulation of interstate commerce. They would both regulate transportation in ways that burden interstate commerce and put up barriers to the interstate flow of goods. By mandating the sale of certain numbers of ZEVs in California as a percentage of the total sales of certain vehicles in the state, the regulations burden out-of-state manufacturers' sales of non-ZEVs in California. In addition, the Board's stated intent to "spread" financial impacts to out-of-state markets imposes burdens on other states in order to further California's own interests. (Honda)

Agency Response: The commenter cites no legal authority for this position. From its inception, the California motor vehicle emission control program has imposed requirements that must be met by out-of-state manufacturers before they may market new motor vehicles in California, and those requirements have not been considered unconstitutional burdens on interstate commerce. The Board has not expressed an "intent" that the costs of ZEVs be spread to out-of-state markets.

CEQA Issues

275. Comment: The October 31, 2001 notice does not address the very significant environmental issues that the proposed regulatory modifications raise under CEQA – increased emissions due to the higher "ZEV tax," greenhouse gas emission increases, reductions in funding transportation infrastructure projects, and solid waste disposal issues. (GM)

Agency Response: Neither CEQA nor the Board's implementing regulations (sections 60005-60007) require the ARB to separately consider the environmental impact of *modifications* to a proposed regulatory action compared to the impact of the originally proposed action. The appropriate "project" to be evaluated is the actual rulemaking

action. The Response to Significant Environmental Impacts and this FSOR appropriately consider the impact of the adopted amendments compared to the preexisting ZEV regulatory program.

Reliance on Response to NERA-Sierra Report and Other New Material

276. Comment: The new materials added to the record October 31, 2001 by the ARB staff include substantial revisions in the ARB staff's own prior estimates of the hardware and warranty costs for PZEVs. The October 31 materials claim the change in hardware costs is based on "confidential information from several manufacturers." But in light of a November 9 letter from an ARB staff counsel to Sierra Research, it now appears the staff's hardware cost estimates are to be based on (i) the certification application of one manufacturer in the case of exhaust system hardware costs, and from (ii) a meeting of the staff with a single manufacturer of evaporative hardware. Thus the "several manufacturers" claim appears incorrect.

Because of our concerns, Sierra Research surveyed the large volume manufacturers and several intermediate volume manufacturers to determine if any of them had given ARB estimates of hardware costs that would support the conclusions in the new materials. Each said they had not. Similarly, no manufacturer surveyed by Sierra Research provided any data that supported the ARB staff's revised PZEV costs. (Alliance, GM)

Agency Response: The commenters mischaracterize the ARB's November 9 letter, misunderstand the process by which ARB staff estimates compliance costs, and ignore the substantial expertise of that staff.

The ARB staff counsel's November 9 letter is attached to the Alliance's comments. It was a response to a request under the California Public Records Act, Government Code section 6250 et seq., and solely addressed the extent to which the ARB had *records* regarding the new information regarding hardware and hardware costs for PZEVs referred to on page 5 of the October 31 Staff Response and the evaluation of recent warranty information on the same page. The November letter describes a pending certification application for a 2003 model year passenger car submitted by a major automobile manufacturer, which is currently confidential under ARB regulations. With regard to near-zero evaporative emission control systems, it refers to pages in an ARB employee's files reflecting information provided in a meeting with a major automobile manufacturer. But in its efforts to accuse the ARB staff of making incorrect claims, the commenter fails to mention the next paragraph of the letter:

The material described above represents all records in the possession of the ARB covered by your request. Additional relevant information was provided orally by manufacturers and is not reflected in records in possession of ARB staff other than the October 31 review itself.

Since the Alliance represents the vehicle manufacturers who meet with ARB staff regarding their emission control strategies, it surely knows that it is not uncommon for manufacturers to orally describe sensitive information in meetings with staff, and on occasion to distribute materials that are collected by the manufacturer at the end of the meeting. As the letter made clear, the fact that few “records” exist does not mean that staff has not received substantial and relevant information from several manufacturers.⁴

Second, the Sierra Research survey was fundamentally misdirected, in that it appears to have focussed entirely on PZEV cost information that manufacturers may have and may have provided ARB staff. For example, Sierra Research partner Jim Lyons states in paragraph 12 of his November 15, 2001 declaration submitted by GM that, “The lowest PZEV hardware incremental cost estimate that any manufacturer indicated that it had provided to CARB staff for any type of vehicle was on the order of \$250,” and “No other manufacturer reported that it had given hardware cost estimates below \$250 to the CARB staff or other officials.” But it is clear from the discussion on page 5 of the October 31 Staff Response that the staff’s analysis was not based on cost-estimates provided by manufacturers. Rather, the staff explained that “The revised cost reflects a reevaluation of the likely technology to be used by PZEVs.” The “confidential information from several manufacturers” pertained to the hardware expected to be used for PZEVs. As it has typically done in the past, the staff evaluated the likely technology and used its own considerable expertise to estimate the likely costs of the technology.

Without disclosing confidential information, the discussion on page 5 of the October 31 Staff Response is quite enlightening. It states that the information indicates that “PZEVs soon to be introduced for sale in California will use a simpler and much less costly combined HC adsorber/ catalyst rather than a separate adsorber and an attendant switching valve as had been assumed earlier.” And “Additional catalyst volume will not likely be required as was the case in the first PZEV system certified for sale in California.” With regard to zero evaporative emission controls, the systems will be less involved than had previously been anticipated, with “some additional carbon trap capability being added along with improved seals and reconfiguration of some components that do not add large cost.”

The staff noted that the original warranty cost estimate of \$300 “assumed three repairs per vehicle over the extended warranty period, due in part to the more complex technology involved.” The staff’s revised estimate of \$125-150 per vehicle is “[b]ased on evaluation of recent warranty information provided to ARB, the less complex nature of the underlying technology, and the increased durability of emission control components used by PZEVs.” Estimating warranty costs for vehicles not yet in large scale production is challenging since manufacturers will generally not release warranty costs, treating them as highly confidential due to the competitive nature of the vehicle business. Staff relied on several sources for warranty and technology information. The

⁴ On December 5, 2001, a staff member discovered in an ARB file a document from a manufacturer describing simpler componentry for a model the manufacturer plans to certify as a PZEV. Staff’s previous belief had been that the manufacturer had not left any documents on this subject with staff. Staff plans to contact the manufacturer and verify whether the document qualifies for confidential treatment under ARB regulations.

warranty information provided to staff was in regard to another matter and pertaining to vehicles not originally designed for PZEV emission standards nor the PZEV 150,000 mile durability requirement. Nonetheless, the source for the information has established a high level of integrity with the ARB over many years. In its re-analysis of PZEV costs, staff considered that manufacturers would build in sufficient component durability in order to avoid the considerably larger costs for warranty repair and vehicle recall. It makes no sense for a manufacturer to send vehicles into the field with components it expects to fail during the warranty period. Instead, they will add durability to the components because it is less costly. In fact, staff estimates for warranty are probably too high in light of this. The reduced complexity of the technology required to meet PZEV emission standards, information supplied by several manufacturers, was also considered in light of the information on warranty cost supplied above.

The ARB staff members making the cost estimates based on expected technology needed for PZEVs have extensive experience and expertise in making such estimates. Steve Albu, the chief of the Engineering Studies Branch of the ARB's Mobile Source Control Division, has overall responsibility in estimating direct and warranty costs associated with exhaust emission control systems for PZEVs and other light- and medium-duty vehicles. Mr. Albu has a B.A. in mechanical engineering from UCLA and a Masters in Mechanical Engineering from the University of Michigan. He worked for Chrysler for 10 years, 8 of which were devoted to designing emission control systems for vehicles being marketed in California. He has been an ARB employee since 1981, and has had primary responsibility for making compliance cost estimates for the original LEV program in 1990, the LEV II regulations in 1998, and the Board's various rulemakings on advanced on-board diagnostic systems (OBD II). As part of the LEV II rulemaking, he directed test programs in which the staff installed hardware and made fuel system and engine adjustments on production vehicles to successfully demonstrate the feasibility of stringent new exhaust emission standards. Over 4000 hours of testing time was devoted to tests of the vehicles before and after the staff's modifications. Mr. Albu generally participates in all significant meetings with light- and medium-duty vehicles on expected control technologies and product plans.

The cost estimates for zero and near-zero evaporative emission control systems were primarily developed by Stephan Lemieux, who until his recent promotion to a supervisory position has been an Air Resources Engineer in the Mobile Source Control Division's Emission Research Section. He holds a B.S. in mechanical engineering from California Polytechnic University, Pomona. Since joining the ARB in 1995, Mr. Lemieux's primary responsibility has focused on evaporative emission controls. Specifically, he has had the opportunity to study evaporative emission control systems and strategies used and evaluated by virtually all automobile manufacturers, and has played a major role in the development in the evaporative emission control elements of the LEV II program. He has also been the project manager in major evaporative emission testing programs conducted at the ARB's Haagen-Smit Laboratory, where he gained extensive hands-on experience with current and advanced evaporative emission control systems.

The staff's cost analyses in the LEV I rulemaking have proven to be more accurate than those of private industry consultants, and its analyses in the LEV II rulemaking were generally not disputed.

277. Comment: Material released for comment on October 31 included opinions attributed to an unnamed "expert" on automotive production costs and pricing. The ARB staff has taken the unprecedented step of relying on that individual's statement even though the individual requested, and received, a promise of anonymity. Accordingly, one cannot evaluate whether the person is qualified as an expert within the meaning of OAL regulations (see section 10(b)(2), title 1, CCR). Based on information in the November 9 letter to Sierra Research, this "expert" appears to have provided no reference to any specific facts, or any other empirical basis for his or her opinions. (Alliance)

Agency Response: It should be clear from the October 31 Staff Response that it is not dependent on the opinions attributed to the unnamed industry expert referred to on page 4 of the October 15 Hall-Brajer memorandum. We believe that the opinions offered by the individual are useful, recognizing that they are necessarily considered in the context in which the individual's identity has not been disclosed.

278. Comment: The October 31 circulation of the material on PZEV costs in the October 31 Staff Response, and references to the unnamed "expert" are inadequate to permit reliance on them because the conclusions drawn by staff are based on information not provided to the public for comment and review and not properly included in the administrative record for purposes of possible judicial review.

It is important for ARB and other public agencies to follow the requirements of the Government Code and basic standards of openness, candor and accuracy in public communications in order to permit "meaningful public participation and effective judicial review" in quasi-legislative rulemaking. *Western Oil & Gas Ass'n [WOGA] v. Air Resources Board*, 37 Cal. 3d. 502, 524 (1984). There is no judicial approval, in any case of which the industry is aware, for factual conclusions and estimates by the staff that are based on "private surveys or other factual matters unavailable to the public and scholars." *Id.* at 526. An agency may not rely in a quasi-legislative rulemaking on "factual material not available to the public." *Id.* Even when "posthearing information may be considered without violating a fair hearing requirement," the cases establish that "contending parties are entitled to confront the body of data on which the agency intends to act." *Id.* at 528-29. In this case, the identity and any compromising details about the single systems that related to PZEV hardware costs could have been withheld from publication. (Alliance, GM)

Agency Response: As explained in the responses to the previous two comments, we believe that the manner in which the information in question was disclosed in the October 31 Staff Response provided not only conclusions but as much disclosure of the underlying information as possible. Given the substantial resources being devoted to this rulemaking by the regulated industry, as reflected by the confidential survey of

manufacturers described in the Lyons declaration, we believe there has been sufficient disclosure to assure meaningful public participation.

The *WOGA* case cited by the commenters actually upheld the ARB's treatment of information relied upon in a rulemaking. The court identified the sort of agency conduct that is not permitted: "This is not a case where the agency used the public hearing as a façade for a private decision resting on privately acquired data." *WOGA*, 37 Cal.3d 502, 529. Clearly no such façade exists in the current rulemaking.

279. Comment: Some of the basic elements of the ARB staff's Response to the NERA-Sierra Report were not actually released on October 31, 2001, and in fact have not been circulated to all interested parties at any time. The missing materials include the version of EMFAC used in the staff's analysis, and input files used in that analysis. These materials were then requested by Sierra Research, but were not made available until the week after October 31. They were not otherwise available to the public. More time should have been allowed for their review. (Alliance)

We request that the period of public comment on the additional material made available by the October 31 notice be extended until at least November 30, 2001. Some of those materials were premised on the use of the emissions inventory model EMFAC 2001, and the emissions estimates in those materials cannot receive effective public review without access to the relevant portions of EMFAC 2001 and the input files. The model and input files were not available to the public on October 31. On request, Sierra Research was given access to the source code of the relevant version of EMFAC 2001 model on the evening of November 2, and the input files on November 6. No organization can be expected to comment on the new model or outputs and inputs within the 9 day period between November 6 and 15, a period far less than the minimum 15-day period required by the Government Code. (Sierra Research)

Agency Response: In response to the request from Sierra Research, on November 15 the ARB issued a Second Notice of Public Availability of Supporting Documents and Information, announcing that EMFAC 2001 ver. 2.07(draft) was being added to the rulemaking file, along with relevant source codes and a fleet implementation schedule. Electronic files containing these materials were made available directly from the ARB's website for this rulemaking. The supplemental notice announced a November 30 deadline for comment on the newly identified material. It indicated that during the November 16-30 comment period, the only comments regarding the October 31 Staff Response or the economic, environmental, or other impacts of the proposed amendments that would be considered by the Executive Officer would be comments on how the staff analysis or estimated impacts should appropriately be affected by EMFAC 2001 (draft). We believe this supplemental notice fully complied with Government Code section 11347.1.

280. Comment: The October 31 notice does not explain why the Board or the Executive Officer is soliciting comment on the environmental impact study that GM had placed in the record in January. In recent litigation, the ARB asserted that GM's

comments were beyond the scope of the current rulemaking. On that assumption, the only apparent purpose of the new material in the rulemaking file would be (i) to enlarge the scope of the current rulemaking, (ii) to provide post hoc justifications for the Board's action in January, or (iii) to try to buttress the Board's position on the issues presented to it under CEQA in connection with last winter's decision to proceed with the mandate. While the APA allows an agency to add information to the rulemaking file after an initial publication of a rulemaking proposal, no provision of the APA allows the agency to add information to the file after the decision-maker has acted, and then attribute a reliance on that information to the action already taken by the agency. (GM)

Agency Response: It is indeed remarkable that GM – after submitting over a thousand pages of comments in this rulemaking two days before the hearing – now takes the apparent position that it is improper for the ARB to add to the record a systematic response to the primary argument in those comments. At the January hearing, the Board directed the Executive Officer to make the text of modified regulatory amendments available to the public for a supplemental 15-day comment period, and then to take appropriate final action after considering the comments received. The final action of amending the ZEV regulations had not occurred when the staff response to GM's emissions study was added to the rulemaking file. In making the staff response available for a supplemental 15-day comment period, the ARB clearly complied with the Government Code section 11347.1 requirements for adding technical analyses to the rulemaking file after the hearing notice has been issued. The terms of Government Code section 11346.8(d) both before and after the 2000 amendments expressly anticipate the introduction of new material after the hearing is conducted and the initial comment period ends.

281. Comment: The ARB cannot use the staff response to GM's emissions study to help satisfy some obligation under CEQA. The relevant decisions here are (i) the decision to proceed with implementation of the ZEV mandate, and (ii) the decision to adopt the modifications to the regulations. ARB cannot finalize any action related to either decision without first offering a complete written report that complies with CEQA and the Board's regulations prior to reading (sic) that decision. The only candidate for such status would be the staff report published in December 2000. That document did not meet ARB's CEQA obligations with respect to the decision to proceed with the ZEV mandate in model year 2003, and obviously did not consider the CEQA implications of the amendments created by the Board in January, or by the Executive Officer in October. (GM)

In the very confusing regulatory framework created by the October 31 notice, there are consequently some basic questions that remain to be answered by the Executive Officer regarding the decision to proceed with the ZEV mandate in model year 2003. (GM)

Agency Response: This rulemaking does not directly involve a decision to proceed with the ZEV requirements in model year 2003. The current ZEV regulation is operative and effective, and no affirmative act by the ARB was necessary for the program to be

implemented. In this rulemaking the ARB is considering amendments to the ZEV regulation that better reflect the near-term realities of ZEV cost and availability.

282. Comment: If the Executive Officer's position is that the CEQA review process is still under way, or that the economic impact or cost-effectiveness analysis of the mandate is still ongoing, the following questions need to be addressed in order to evaluate whatever findings actions or actions he might make or take:

(a) What is the relevant baseline for the decision that is being made now, and that is subject to CEQA?

(b) Has the Board or the Executive Officer ever estimated the costs or economic impacts of the mandate as it is to be finally implemented in model year 2003, compared with a scenario in which there is no ZEV mandate? If so, where is that estimate to be found?

(c) Has the Board or the Executive Officer determined the cost-effectiveness ratio for the ZEV mandate as it will be implemented in model year 2003, using any metric for any type of pollutant that would be controlled by the mandate in relation to the estimated costs for control? If so, where is that determination to be found?

(d) If the "fair market test" and the enhanced durability test are being rejected as alternative to all or a part of the ZEV regulations, is their rejection based on a lack of feasibility? If not, on what basis are they being rejected as alternatives?

(e) How do the additional materials placed in the record on October 31 relate to the Executive Officer's solution to the four preceding questions? (GM)

Agency Response: The answers to these questions should be readily apparent to the commenter with the issuance of the Final Statement of Reasons, Executive Order G-01-058 and the Notice of Decision and Response to Significant Environmental Issues.

C. RESPONSES TO COMMENTS RECEIVED DURING SECOND 15-DAY COMMENT PERIOD (EMFAC AVAILABILITY)

Response to comments submitted by Phil Heirigs in November 30, 2001, memo to General Motors. Subject: Review of ARB Staff's Emissions Analyses Presented in ARB staff Review of Report Entitled "Impacts of Alternative ZEV Sales Mandates on California Motor Vehicle Emissions: A Comprehensive Study" (October 31, 2001)

283. Comment: Sierra Research noted errors in staff's revised estimates of the ZEV program that were presented in the October 31 report. These include incorrectly allocating the number of PZEVs for evaporative emissions in EMFAC2001, including the effects of the ZEV mandate for only Passenger cars and Light-Duty Truck 1, and an error in the implementation schedule for the no-ZEV baseline case.

Agency Response: ARB staff acknowledged an error in the EMFAC2001 (draft) emissions inventory model which incorrectly estimated the evaporative emissions contribution of Partial ZEVs (PZEV). There was also an error in the no-ZEV implementation schedule that was provided by ARB staff. A revised no-ZEV implementation schedule was made available to Sierra Research and Air Improvement Resource, and changes were made to account for the coding error in EMFAC2001 (draft). The revised benefits calculated by staff, which incorporate these changes, are consistent with those presented in Table 1 of Sierra's comments titled, "Above + Correct Inconsistent non-ZEV Baseline Case per ARB Staff". While the October 31 report reported benefits of the ZEV program for only Passenger Cars and Class 1 Light-Duty Trucks, the revised numbers account for all vehicles up to 8500 pounds including Light-Duty Truck 2 and Medium-Duty Trucks. (Sierra Research)

284. Comment: Inconsistencies exist in the LEV II implementation schedules used to determine the emission benefits of the ZEV program. The EMFAC2001 baseline case (ZEV vehicles included) uses a faster implementation of LEV II vehicles than the Non-ZEV baseline case. Therefore, Sierra modified the EMFAC2001 LEV II implementation schedule for the ZEV baseline case to be consistent with the non-ZEV baseline case. An analysis by Sierra using the revised implementation schedule shows lower emission benefits for the ZEV program than Staff's analysis. (Sierra Research)

Agency Response: The inconsistency between the two scenarios is a result of two factors that influence how LEV II is implemented in California. For the ZEV baseline case, vehicles certified to meet the ZEV requirement in model year 2003 are counted as LEV II vehicles. Typically, LEV II vehicles introduced before model year 2004 earn credits that can be used to moderate the phase-in of LEV II vehicles between model years 2004 and 2007. However, due to the requirement that manufacturers must market federal Tier 2 vehicles that are cleaner than their comparable California models (LEV II amendments adopted December 2000), and the separate phase-in requirements for vehicles in the PC/LDT1 and the LDT2 classes, manufacturers are precluded from using these credits. The combination of these two factors effectively force a more aggressive phase-in of LEV II vehicles for the ZEV baseline case than is required for the non-ZEV baseline case. Sierra apparently ignored the effect of these factors and developed a scenario that has no basis in the regulatory requirements.

285. Comment: Revisions to the ZEV program in the 15 day notice require vehicles in the LDT2 class (vehicles from 3751 lbs. LVW to 8500 lbs. GVW) to be included in the portion of the fleet subject to the ZEV requirements. How manufacturers comply with the mandate affects the emission benefits of the ZEV program. In modeling the emission benefits of the ZEV program, staff assumed that all vehicles used to meet the ZEV requirements would fall into the PC/LDT1 class. However, manufacturers are likely to comply by making LDT2 vehicles that meet the ZEV requirements. Accordingly, Sierra Research has included vehicles meeting PZEV and AT PZEV criteria in the LDT2 class in its emission modeling. The result is "...increased numbers of PZEVs allow

manufacturers to produce additional 'dirtier' LEV II vehicles in the Tier 2 category (and reduce the number of federal Tier 2 vehicles in the PC/T1 category) and still comply with the fleet average NMOG requirements." The results of this analysis show a further decrease in the benefits of the ZEV program when fleet turnover effects are ignored. (Sierra Research)

Agency Response: Sierra is only correct in its conclusion that assumptions on how manufacturers will comply with regulatory requirements affect the emission benefits. In its analysis, staff considered the four major factors that influence the fleet implementation schedule: the LEV II phase-in requirements, the federal Tier 2 requirements, the ZEV program, and the NMOG fleet average requirements. For the federal Tier 2 requirements, staff relied on the implementation schedule used in the draft version of Mobile 6, US EPA's emission inventory model. Mobile 6 assumes that manufacturers will make a significant number of cleaner PC/LDT1 vehicles to offset the higher emissions of their SUVs and large trucks. The implementation schedule for LEV II similarly assumes that manufacturers will meet the most stringent requirements (PZEVs) with their lighter vehicles that are technically more easily modified to achieve low emission standards. Credits earned by the lighter vehicles will be used to offset emissions from their SUVs and large trucks. However, in its analysis, Sierra has chosen to ignore US EPA's Tier 2 implementation schedule, surmising that manufacturers will market significant numbers of SUVs and large trucks meeting the very stringent requirements for PZEVs. This is an incorrect assumption, since manufacturers argued vigorously at the LEV II hearing about the technical feasibility of meeting the proposed LEV and ULEV emission standards (standards significantly higher than PZEV) with their larger vehicles. Furthermore, this assumption is not supported in Sierra's comments by any statements from the manufacturers that they will certify any LDT2 to PZEV emission standards. In addition, no manufacturer has indicated to staff that they will market any PZEVs in the LDT2 class. Accordingly, staff believes that Sierra's assumptions in this case are unsubstantiated and, therefore, invalid.

286. Comment: Staff criticized the January 2001 NERA-Sierra study in the October 31, 2001 staff report because they failed to account for the LEV II adjustments of December 2000 (incorporation of federal Tier 2 vehicles in the LEV program) in their emission analysis. In fact, staff did not account for these amendments in the emission analysis for the for the January 2001 hearing, nor did they quantify the benefits at the December 2000 hearing. The NERA-Sierra study did not account for the LEV II adjustments in order to make an emission comparison using the same baseline. (Sierra Research)

Agency Response: The simple fact is that during the December 2000 - January 2001 time period, program requirements for light-duty vehicles were in flux. As noted above, the interaction between the LEV II amendments and the ZEV program have a significant impact on how manufacturers will comply with the emission requirements. Accordingly, staff did not develop an implementation schedule incorporating both elements until after the January 2001 hearing. Furthermore, the October 31 staff report did not seek to

“criticize” the NERA-Sierra study for its lack of consideration of the effects of the LEV II amendments, rather to recognize the fact that updated implementation schedules were available for the emission benefit analyses (these were supplied to Sierra at their request).

The following six comments were provided in the November 30, 2001 Alliance of Automotive Manufacturers submittal (NERA-Sierra Report 3). The responses address new issues raised for the first time in this submittal, generally involving the emission benefit analysis contained in the ARB staff response. Comments made in this submittal that are carried over from previous submittals are not repeated here, nor are the ARB responses.

287. Comment: The ARB staff published emissions estimates on October 31, 2001 that claimed to consider fleet-wide emission effects of the new regulatory language. However, the staff did not use any precisely integrated or quantitative methodology to take account of the impact of the regulatory changes in the Modified mandate. ARB staff merely made very simplified assumptions about the effects of the new language on vehicle prices—for example, staff speculated on an *ad hoc* basis that adding class 2 light duty trucks and doubling the required number of ZEVs would result in an 80 percent increase in program costs. Staff made no attempt to analyze the effects of the changes to the ways that multipliers were calculated, or to determine at what price ZEVs would have to be offered under the Modified Mandate when twice as many ZEV vehicles must be sold.

The staff’s October 31 analysis therefore made arbitrary and incomplete assumptions about how the change in the regulations would affect fleet-wide emissions. Given the scope of the changes in the mandate effected since last December, and in particular the addition of a large number of trucks to the group of vehicles that are subject to the ZEV quotas, the approach taken in the October 31 document is not a reliable method of predicting fleet-wide emission effects. The only state reason for the ARB staff’s approach was that the staff was not able to modify the source code of the nested Logit model—which we had provided to them in January 2001—in order to reflect the Modified Mandate.

Agency Response. The ARB emission estimates published on October 31, 2001 fully modeled the fleet-wide emission effects of the modified program, including the addition of LDT2 vehicles. Commenters have separately noted several areas where corrections to the October 31, 2001 methodology were appropriate. Even when such corrections are incorporated, the Board’s EMFAC 2001 (draft) inventory model shows that the modified ZEV program results in an emission decrease in the South Coast Air Basin for 2010 and 2020.

The remaining point made by commenters is that the October 31, 2001 estimates did not use the NERA-Sierra methodology to specifically predict any change to the purported fleet turnover effect that might result from the addition of LDT2 vehicles. Rather, staff used the ratio of program costs to approximate the fleet turnover effect of

the expanded program. Using this approach, staff found in its review of NERA-Sierra report 1 that using reasonable ARB assumptions significantly reduced the ZEV tax and the fleet turnover effect, to the extent that the emission increase claimed by NERA-Sierra did not materialize. As is noted below, commenters have provided no analysis or evidence to suggest that this conclusion does not also hold true using the NERA-Sierra methodology for the modified program, when all ARB assumptions are taken into account.

288. Comment: Applying EMFAC 2001 and taking into account the changes in the compliance strategies needed for the Modified mandate, the ZEV program still will increase fleet-wide emissions at least until 2020, even under extremely optimistic assumptions regarding the costs of the relevant vehicles and the other factors that the ARB staff's October 31 publications have interjected into the analysis.

ARB staff has recently suggested that lower cost per vehicle estimates and other assumptions be used in an analysis of the impact of the ZEV mandate on fleet-wide emissions. But the increase in the volume-related requirements in the ZEV program created by the Modified Mandate lead to higher costs, compared to the Staff Proposal Mandate. The greater costs of the modified Mandate in comparison to the Staff Proposal Mandate will overwhelm the lower per-vehicle costs implied under the plausible assumptions put forth by ARB staff in the ARB October 31 report.

Agency Response. The commenters strongly imply that they have performed an analysis that uses the plausible assumptions identified by ARB staff in the review of the NERA-Sierra Report 1, and that even when using those assumptions, the increase in the volume-related requirements of the Modified Mandate overwhelm the lower per vehicle costs. This is not the case. The commenters have not performed an analysis that includes all modified ARB assumptions. For example, none of the scenarios modeled by commenters in this most recent submittal incorporate a \$200 incremental cost for PZEVs. As was demonstrated in the ARB staff review of the NERA-Sierra Report 1, this single change has a significant effect because of the large number of PZEVs. In the staff review modeling results, the reduction in estimated PZEV incremental cost reduced the ZEV tax by about 15 to 20 percent (depending on the year under consideration) and reduced the fleet turnover effect by about 18 to 23 percent.

Other changes not incorporated include:

- Recognizing that AT PZEVs with an incremental cost of \$2,300 will earn credit scores greater than 0.45.
- Using a price elasticity of demand of 0.87, in keeping with estimates in the economic literature.

Therefore commenters have no basis to conclude that the ZEV program will increase fleet-wide emissions at least until 2020 under any and all circumstances.

289. Comment: Staff's treatment [of AT PZEV costs] ignores ARB's own estimates of the additional maintenance costs associated with hybrid-electric vehicles, as described

in the August 2000 Staff report. There, Staff acknowledged that hybrid-electrics would have additional maintenance costs of 1.5 cents/mile relative to conventional vehicles. These additional maintenance costs reduce any benefits claimed as a result of improvements in relative fuel-economy.

Agency Response. The relevant section from the August 7 Staff Report reads as follows (emphasis added): “Maintenance costs for hybrid electric vehicles *may* differ from those for gasoline or battery electric vehicles. Because hybrid vehicles employ both a conventional and an electric drive system, staff assumes that maintenance cost for hybrids will be higher than for gasoline or electric vehicles. *In the absence of more specific information* staff assumes that hybrid electric vehicle maintenance costs will be 25 percent higher than for ICE vehicles, or \$0.075 per mile.”

As noted above, the assumed increased cost was derived by increasing the maintenance cost for a conventional ICE vehicle by 25 percent, and was justified by concluding that the increased complexity of hybrid electric vehicles (HEVs) would result in increased maintenance requirements. In re-examining maintenance costs for HEVs, staff has concluded that there should be no incremental maintenance cost for these vehicles. Staff is unaware of any significant additional scheduled maintenance costs that could be attributed to the vehicle battery and the electrical components of the powertrain (recommended scheduled maintenance for the 2001 and 2002 Toyota Prius includes only a coolant change for the inverter at 34,000 miles). Therefore, maintenance costs should be limited to the vehicle’s ICE and other conventional vehicle components. In fact, there should be some savings compared to conventional ICE vehicles due to reduced brake wear from the use of regenerative braking. Furthermore, staff believes that in order for these vehicles to be competitive with conventional vehicles in the marketplace, manufacturers will need to build in sufficient component durability such that maintenance requirements will be similar. This is supported by the fact that the Toyota Prius currently carries an eight year/100,000 mile powertrain warranty and requires no tune-ups until 105,000 miles of operation.

290. Comment: The NERA-Sierra report assumed cost and credit values for AT PZEVs are as follows:

AT PZEV Costs

Mild Hybrids	\$1,225-\$1,645
Aggressive Hybrids	\$2,569
Unspecified/Average	\$2,500 after ramp-up

AT PZEV Credits

Mild Hybrids	0.30-0.20
Aggressive Hybrids	0.45-0.31
Unspecified/Average	0.45

Agency Response. Commenters assume that an “aggressive” hybrid, with an incremental cost of \$2,569, will earn a credit level of 0.45-0.31. Commenters have

stated, however, that “the NERA-Sierra analysis uses a [cost] number that is consistent with the range presented by Duleep for the more aggressive hybrid drive trains likely to be used by manufacturers (e.g. Toyota Prius)”. (NERA-Sierra Report 2, page 23; Declaration of Tom Austin, page 6). Staff projects that a vehicle with the performance characteristics of the Toyota-Prius would earn an AT PZEV credit of 0.620 until 2007 and 0.544 for 2008 and beyond, 38 percent and 23 percent, respectively, greater than the maximum 0.45 assumed by commenters. Thus there is inconsistency between the cost assumptions and the credit assumptions used by commenters. This discrepancy affects the required number of AT PZEVs and hence the program cost.

291. Comment: Under all the scenarios considered here, EMFAC 2001 shows that fleet-wide emissions under the ZEV mandate are higher than without the mandate. The fleet-wide emissions increases due to the Modified Mandate in the State of California as a whole of course would be larger than these South Coast Air Basin values.

In summary, under any plausible scenario, the modifications to the ZEV mandate proposed by ARB staff in its October 31 and November 19 15-day notices will result in higher overall fleet-wide emissions than if no ZEV mandate existed.

Agency Response. Commenters did not consider a scenario which used the reasonable assumptions outlined by ARB staff in its review of NERA-Sierra Report 1. Specific differences include the estimated incremental cost for PZEVs and AT PZEVs, the credit value assumed for “aggressive” HEVs, and the assumed price elasticity of demand. As was demonstrated in the ARB staff review, using the ARB set of assumptions and the NERA-Sierra methodology resulted in fleet turnover and emission projections that show the ZEV program leading to an emission decrease, rather than the emission increase posited by NERA-Sierra.

The failure by commenters to include a scenario that modeled the ARB assumptions in their entirety suggests that such a scenario, when modeled, does not produce the desired result. In any event, it is not appropriate for commenters to suggest that their results hold true “under any plausible scenario”.

Memo to Casimer Andary, Alliance of Automotive Manufacturers, from Tom Darlington, Air Improvement Resource, Inc.

292. Comment: The ARB recently updated their estimates of the costs and the benefits of the ZEV mandate. The purpose of this memo is to estimate cost-effectiveness of the ZEV mandate taking into account these latest changes.

There are at least two different methods of estimating cost-effectiveness of vehicle controls. In the first method, incremental vehicle costs are divided by incremental vehicle lifetime emission reductions. For example, the cost effectiveness of a battery electric vehicle (BEV) could be determined by estimating its incremental costs and emission reductions versus a gasoline SULEV. In the second method, total costs are estimated from sales and incremental per-vehicle costs, and emission reductions are

estimated every calendar year using a model like EMFAC. Cost effectiveness is estimated over every calendar year over a long period, say 30 years, and then a weighted average cost effectiveness over the entire period is estimated.

The first method works well where there is only one vehicle type that needs to be estimated, and incremental costs are static. In this case, however, there are several different vehicle types encompassed in the ZEV mandate. Also, costs are not static— ARB is estimating that costs are very high initially and decline as manufacturers build more of these advanced technology vehicles. The second approach not only estimates the costs and emission reduction of the ZEV program, but also is capable of incorporating the short- and long-term estimates of cost effectiveness. Therefore, the second approach is most appropriate for estimating the cost effectiveness of the ZEV mandate.

Annual cost-effectiveness for the ZEV mandate is shown in Table 6. Cost-effectiveness starts at \$450,000 per ton, and declines to \$115,000 per ton. The weighted average cost-effectiveness of the mandate over the 27 year period from 2003-2030 utilizing a discount rate of 8% is \$314,000 per ton, or \$157 per pound.

Year	Cost Effectiveness (\$/ton of ROG + NOx)
2005	405,000
2010	330,100
2015	252,000
2020	194,000
2025	145,500
2030	115,000
Weighted average	314,000

Agency Response. The commenters provide a cost effectiveness estimate based primarily on ARB cost and emission assumptions, using a method that compares fleet-wide incremental costs in a particular year with fleet-wide emission reductions in that year. For comparison staff has also prepared cost-effectiveness calculations using the other method mentioned by commenters, which compares the incremental cost of vehicles with the emission reductions achieved by those vehicles over their lifetime. This approach uses the total cost and lifetime emission reductions for the ZEV, AT PZEV and PZEV vehicles produced in a given year, using the same vehicle production totals as the commenter. Per-vehicle lifetime emission reductions are as follows, taken from information prepared by staff and used by Toyota in its cost effectiveness comments:

Vehicle Type	NMOG (g/mile)	NOx (g/mile)	150,000 mile ROG + NOx (pounds)	Benefit vs. SULEV/0.5 evap (pounds)
SULEV/0.5 evap	0.0703	0.0266	32.02	
PZEV SULEV	0.0577	0.0256	27.52	4.50
PZEV HEV	0.0477	0.0251	24.05	7.97
BEV	0.0020	0.0003	0.76	31.26

The first staff calculation uses the same cost information as the commenters. The second staff calculation uses the commenter cost information but removes the additional estimated maintenance cost attributed to AT PZEV vehicles in the commenter estimate (see discussion in response number 265 above regarding this point).

Year	Cost Effectiveness (\$/ton of ROG + NOx)	
	Including additional maintenance cost	Not including additional maintenance cost
2005	193,700	156,100
2010	139,500	93,900
2015	143,900	81,500
2020	129,800	58,200
2025	129,800	58,200
2030	129,800	58,200

As the above table illustrates, using the alternative method and the same cost information results in lower dollar per ton totals in the early years and slightly higher dollar per ton totals in later years. Excluding the additional maintenance cost further reduces the dollars per ton estimate in all years.

The above discussion illustrates the range of results that can be obtained using different cost effectiveness methodologies. The more important point, however, is that the ZEV program is not a traditional emission control measure, and the traditional way of comparing cost-effectiveness is not appropriate for this program. The Board seeks to achieve not only the maximum feasible emission reductions from on-road and off-road mobile sources in the near term, but also to take a quantum step forward in introducing zero-emission technologies for the long term. In that sense, the ZEV program reflects the Board's vision of the future consisting of zero and near-zero-emission vehicles. The costs for zero emission technologies will be higher than other less dramatic departures, but the ultimate long-term pay-off is worth those greater costs.

Legal Issues Raised in Comments in Response to the Second 15-Day Notice of Availability of Supporting Documents and Information

293. Comment: The documents and information disclosed by the Board on November 15 – the EMFAC2001 emissions inventory model and a fleet implementation schedule – purportedly support the Board's response to a report it received over 10 months ago. These documents, if relied upon by the Board, should have been available many months ago. The delay in formally releasing this information fails to meet required standards of rulemaking. The Board's decision to withhold disclosure of this information for almost a year is an abuse of discretion that cannot be cured now at the eleventh hour of the rulemaking process. (Honda)

Agency Response: The Board of course did not rely either on EMFAC 2001 (draft) or the October 31 Staff Response during the hearing on January 25. EMFAC 2001 (draft) was still under development and the comprehensive staff analysis of the NERA-Sierra

report submitted two days earlier had not been initiated. But it was wholly appropriate after the hearing but before final action on the proposed amendments for staff to conduct such an analysis and to use the newest emissions model being developed – particularly since it was the first model to reflect the impacts of the LEV II follow-up amendments approved by the Board in December 2000 and approved by OAL April 30, 2001. It was also appropriate for the Executive Officer to consider the staff response prior to taking final action to adopt ZEV amendments.

The staff response to NERA-Sierra was not released before October 31 quite frankly because it was not completed before then. And while versions of EMFAC 2001 (draft) could have been released earlier pending further quality control, its utility in this rulemaking would have been limited in the absence of the completed staff response to NERA-Sierra.

Although the November 15 Notice announced a 15-day comment period, interested parties wishing to use and analyze the EMFAC 2001 (draft) model in fact had more time than that. Since the model was used in a response to a report prepared by NERA-Sierra, NERA and Sierra were the parties most likely to want access to the model. As correspondence from Sierra in the record indicates, Sierra representatives contacted the ARB to access the model shortly after the October 31, 2001 Staff Response was issued, and on Friday November 2 – only two days after issuance of the October 31 15-day Notice – the model source code was posted for download by Sierra personnel. When Sierra personnel sought from ARB staff fleet schedules they believed would be of use in their analyses, these too were provided. Any other party intending to evaluate the use of EMFAC2001 (draft) in the October 31 Staff Response would in all likelihood have contacted the ARB's emission inventory staff; none did. If there had been such contacts, the parties would have been provided the same access as Sierra.

When it was decided that the EMFAC 2001 (draft) source code and related material should be added to the rulemaking record in accordance with Government Code section 11347.1, the specified 15-day comment period ending November 30 was announced to all parties identified in that section. But Sierra in fact had access to the material for substantially longer than 15 days prior to the deadline for comment.

We regret that the ARB has not had more time to review the comments on the effect of EMFAC2001 (draft) on the projected emissions impacts of the ZEV program. Of course commenters did not necessarily need to wait for the comment deadline to submit comments.

D. RESPONSES TO COMMENTS RECEIVED DURING SECOND 15-DAY COMMENT PERIOD

294. Comment. ARB has promoted NEVs as a legal ZEV compliance strategy since at least 1998. In its December 2000 proposal, the staff proposed ZEV credits for NEVs without any kind of limitation on how much of the ZEV mandate could be met with such credits. Until the November 19, 2001 notice, there has been no indication that ZEV

credits derived from NEVs would be limited and therefore treated differently than any other ZEV credits.

In reliance on the NEV option, several manufacturers and California dealers have invested substantial funds, time and effort to build and market NEVs, including full product design and development, establishing a supply network and production capacity, developing the necessary distribution and service network, establishing marketing plans, and dedicating human resources to make this program a success. While the proposal allows continued use of banked credits earned by NEVs, it places limits on the amount of credits that can be used to meet the 2% ZEV requirement. Therefore, ZEV credits that manufacturers earn from NEVs placed in California are now of less value.

Manufacturers could not have anticipated this last-minute change. Manufacturers that face these proposed new constraints must scramble to find another source of credits to fill this newly created gap with no time to respond. This situation is exacerbated by the increasing ZEV volume requirements in the 2006-2007 time frame due to the reduction in various credit multipliers and the phase-in of LDT2s. (AAM)

This issue is covered in the comments submitted by the Alliance of Automotive Manufacturers, which GM supports to the extent consistent with these comments. (GM)

Changes in the regulations that restrict the utility of the NEV component of a compliance plan to any significant extent present particularly serious problems for companies like DaimlerChrysler. The NEV element of a compliance plan is understood to be a comparatively low cost means to bridge to the future ZEV products. DaimlerChrysler believes that recognition of this fact is one reason why the Board rejected efforts at the January 25, 2001 public hearing on the ZEV amendments to curtail use of NEVs in the industry's compliance plans. The change proposed in the November 19 notice is contrary to the Board's action and should not be implemented.

Judged by the prospect for providing value for customers, NEVs are much more likely to succeed than "full function" battery-powered ZEVs. ... NEVs provide a means to get a large number of Californians into ZEVs, and to create personal experience with zero-emission driving.

The projects [supported by DaimlerChrysler] should also put to rest the notion that DaimlerChrysler intended to place NEVs in the market without a systematic plan to ensure that customer and environmental benefits would be maximized. In reliance on the NEV option and its market potential, DaimlerChrysler has invested tens of millions of dollars, time, and effort to build and develop NEVs. DaimlerChrysler believes that there is a viable market for NEVs and has invested substantial funds to develop this market.

The need to develop a ZEV plan and start to implement it as soon as possible was increased by the Board's action in January. At the January hearing, the Board expanded the ZEV program. The technical and market risks of the fuel-cell strategy that

DaimlerChrysler adopted, combined with the increase in quotas created for a company with DaimlerChrysler's conventional vehicle product line, made it especially important to have the ability fully to use NEV credits after MY 2005. This need was not, as some have claimed, driven by the goal of achieving a "product black-out": it was essential to assure short-term compliance with the mandate at moderated cost levels, so that enough resources would be available to permit the development and production of fuel-cell ZEVs, AT PZEV hybrids, and PZEVs.

There was no indication of any intent by ARB staff or the Board to change course until November of this year.

Because the November 19 notice allows only two weeks for a response, the magnitude of the specific impacts of the proposed change on DaimlerChrysler cannot be exactly determined. It is clear, however, that the change will have an impact, that the impact will be adverse, and the impact will be substantial...As noted above the reduction in the value of NEV credits starts just prior to the time when DaimlerChrysler's quotas will be greatly increased as a result of the other changes in the program that have resulted from the amendment process. As a result, it is clear that DaimlerChrysler would need to make substantial changes in its product plan now in order to try to comply with the mandate in the future. Those changes will have immediate adverse economic effects on DaimlerChrysler including the loss in value of its NEV production facilities, and a loss in the value of NEV credits already earned in California. The proposed change will also substantially increase near-term costs to develop additional ZEV and AT PZEV products in order to compensate for the reduction in the value of NEV credits after MY 2005.

DaimlerChrysler therefore recommends that the Executive Officer withdraw the proposed change in the NEV credit rules in the November 19 notice. (DaimlerChrysler)

Agency Response. Throughout the Biennial Review process and the consideration of the ZEV regulation, one fundamental underlying objective of the Board has been to encourage a smooth, orderly progression in ZEV development and availability. Resolution 01-1, adopted by the Board at its January 25, 2001 meeting on ZEV program amendments, emphasizes this objective when it states that "Whereas, at its September 7-8, 2000 meeting, the Board ...directed the staff to develop and propose regulatory modifications and other steps that address the challenges associated with the successful long-term implementation of the ZEV program—in particular the need for *product availability and market stability*....and that result in a sustainable market for ZEVs. (emphasis added).

The Board recognized that NEVs could play a role in this overall progression, providing a low-cost alternative to manufacturers in the near term while introducing the public to electric transportation and satisfying various specialized applications. Public comments on the October 31, 2001 staff proposed modifications pointed out, however, that the NEV early introduction incentives could in some scenarios jeopardize the product availability and market stability sought by the Board. Specifically, the introduction of large numbers of NEVs in the 2001-2002 model years could allow manufacturers to

earn sufficient credits to completely “walk away” from the ZEV program for a number of years; plausibly through 2008 and beyond. Staff agrees that the possibility of such a significant blackout period in ZEV availability is of concern and is contrary to the direction provided to staff by the Board at the January 25, 2001 hearing.

Staff also recognizes, as noted by commenters, that manufacturers have made product planning decisions based on the regulatory structure as proposed. Therefore it is necessary to provide sufficient lead time prior to any changes. Accordingly, the staff proposal would make no changes prior to the 2006 model year. This provides four years of lead time, which covers at least one model cycle.

Beginning in 2006, the proposal would limit the extent to which “banked” NEV credits can be used to satisfy ZEV obligations. The proposed limitations do not eliminate the use of previously earned NEV credits. In 2006, manufacturers may still use such credits to satisfy 75 percent of their ZEV obligation, and in 2007 and beyond manufacturers may use such credits to satisfy 50 percent of their obligation. Thus the credits earned in prior years still have value, and manufacturer investments still have a payoff.

The proposed modifications will not affect any strategy that is based on an ongoing, sustainable introduction of ZEV and near-ZEV vehicles. Rather, it only constrains approaches that would use large numbers of banked NEV credits to avoid any meaningful participation in the ZEV and near-ZEV market in the 2006 model years and beyond.

Staff believes that a limitation of this type is necessary in order to meet the Board’s directive that the staff modifications address product availability and market stability. In the absence of such limitations staff would be unable to assure the Board that there would be any product whatsoever available in the 2006-2008 timeframe. Staff determined that a delay in the imposition of such limits would, due to lead time considerations, push back their effective date, thus further deviating from the Board’s direction.

295. Comment: I believe that the environment that is being rescued is the political and economic one for the automotive industry. The staff report recommendations seem only to dilute the pure intent of the January 2001 ARB goals. Earned credits, linkage to transit, technology multiplier to augment any credit, removal of the idle stop capability and pushing back deadlines all add up to a weak policy. Californians need an agency as influential as yours, with the long-term effects on the general health and welfare of millions, to have a backbone and show leadership in tough political arenas. We count on you and your board. I am disappointed. (Marks)

Agency Response: The changes noted (by the commentator) all have a specific rationale. Restriction of previously earned NEV credits reduces the likelihood of a production “blackout”; credit for linkage to transit encourages certain innovative approaches to our air pollution and congestion problem; technology multipliers encourage automakers to introduce advanced technologies sooner rather than later; removal of the idle stop

requirement allows automakers to pursue a broader range of hybrid electric vehicles. No changes to the program deadlines were made in the amendments under discussion.

More generally, requiring ZEVs from automakers who are unanimously in opposition to manufacturing them would be a challenging and likely unsuccessful endeavor. As originally proposed, the ZEV regulation offered automakers very little flexibility and required them to abruptly step up to significant production volumes of ZEVs that they have very little experience with making and selling. This latest regulation proposal allows more flexibility in vehicle types that may fulfill ZEV requirements and it also allows automakers to gradually ramp up to large ZEV volumes. This increases the likelihood of a successful transition to zero and near-zero emission vehicles

Extended Battery Warranty/Released Vehicles

296. Comment: The November 19 test also includes additional language concerning the re-lease of ZEVs prior to January 25, 2001, when the new lease is not accompanied by certain warranties. Based on a conversation with the staff, I understand the provision will not limit GM's ability to receive full ZEV credit for its re-lease program of Gen I EV-1 vehicles (GM)

Agency Response: ZEVs re-leased prior to January 25, 2001 are not required to have the energy storage or conversion system under an original manufacturer warranty. If ZEVs meet the remainder of the provisions in Section 1962 (f), they will be eligible to receive the in-service credit for each year they remain in service.

297. Comment: While DaimlerChrysler believes that manufacturers should be entitled to ZEV credits for any ZEV placed in service (including those that are re-leased), staff has once again gone beyond the direction provided by the Board at the January 25, 2001. The staff proposal to the Board proposed ZEV phase-in multipliers retroactive to the 2000 MY. The Board questioned why the staff would provide incentives for actions taken prior to the proposal and directed the staff to eliminate the credit. With the above proposal, the staff has ignored the board direction not to provide incentives for actions taken previous to the Board hearing. (DaimlerChrysler)

Agency Response: ARB believes that such early re-releases beyond MOA commitments supported the purposes of the ZEV program, and at the time of the re-releases manufacturers were unaware that a warranty would be needed to qualify.

ATPZEV Lead Time

298. Comment: The November 19 test makes a significant and unanticipated change in the starting date for the ATPZEV high-efficiency multiplier. It would permit such credits for specific types of ATPZEVs starting in MY 2002, rather than in MY 2005. While GM generally supports modifications to regulations that would increase compliance options and reduce costs, this change comes far too late to permit any company to incorporate in its forward product planning. The prior starting date, MY

2005, was the earliest that any company that planned on using this provision based on the December 2000 staff proposal could have possibly met. The proposed change in the November 19 text can only serve as a “windfall” for product lines that already include qualifying vehicles. Thus, it does not help to stimulate the expansion of the ATPZEV component of the regulations, and would have unfair competitive impacts by diminishing the requirements for the product lines that obtain this windfall. The change would also fail the “necessity” test under the California Administrative Procedure Act. There cannot be any reasonable need for an amendment that will not increase the number of ATPZEVs that the industry can release. There cannot be a reasonable need for an amendment that reduces compliance costs for some but not all regulated parties on a fair and competitively neutral basis. “Each provision” in an amended regulation must meet the test of necessity. (GM)

Specific provisions for “advanced componentry included in the first 15-Day Notice result in a leadtime issue because credit is provided for vehicles already in the market. In the third 15-Day Notice, ARB has provided additional credit for these vehicles by advancing the high efficiency multiplier to the 2002 MY from the 2005 MY. Only manufacturers that currently have a qualifying vehicle can qualify for this credit. Had these provisions been available with adequate leadtime, all manufacturers would have had the opportunity to make these products available. Because of the leadtime issue, this credit should not be allowed. (DaimlerChrysler)

Agency Response: The proposed change applies to all ATPZEVs, not just specific types as the first comment claims. Advancing the early-credit introduction date does not change the nature of the types of vehicles that may qualify for ATPZEV credit. Automakers have been made aware of which types of vehicles will earn ATPZEV credit for sufficient time to have already begun development. ARB has also made other changes to increase ATPZEV credit for the types of ATPZEVs that are already under development at each of the companies providing the above comments.

299. Comment: The second 15-day notice of availability of modified regulatory text did not comply with the APA with regard to the modifications on NEVs. The failure to comply with the notice, public comment and hearing provisions of the Government Code in the new 15-day notice is extremely prejudicial and unfair. No party – including the advocates of reduced NEV credits – could seriously claim that these changes could have been anticipated under the December 2000 regulatory text. (AAM, DaimlerChrysler, GM)

The extensive, last minute changes to the ZEV regulations released November 19 cannot legally be adopted with only a 15-day review and comment period. With the latest proposed changes, the proposed ZEV regulations now differ even more dramatically from the originally noticed version. (Honda)

Agency Response: The criteria for evaluating whether modification to the originally proposed text may be made without issuance of a new 45-day notice are described in the response to Comment No. 250.

The preexisting ZEV regulation made no distinction between NEVs and any other ZEVs. The staff's original proposal in this rulemaking expressly introduced a new approach under which NEVs would be treated differently from other ZEVs and would ultimately be of less value in meeting the ZEV requirements. The proposal added a definition of NEVs in section 1962(i)(4). Section 1962(d)(3)(B) established a "ZEV discount multiplier for NEVs" of 0.5 in model years 2004-2005 and 0.15 for model years 2006 and subsequent. No other kind of ZEV was assigned a discount multiplier. Coupled with the ZEV phase-in multiplier in section 1962(d)(3)(A) (4.0 for MYs 2001-2002 and 1.25 for MYs 2003-2005), this meant that NEVs would receive the following multipliers:

MYs 2001-2002:	4.0
MY 2003:	1.25
MYs 2004-2005:	0.625
MYs 2006 +	0.15

The notice stated that among the modifications to the original proposal that the Board might make as part of this rulemaking were "further adjustments to the calculation of credits and allowances earned [and] modifications to the phase-in schedules for various vehicle types." (p. 12). The Staff Report explained that staff was proposing that future NEV credits be reduced because "Under the current regulation, the credit value for NEVs, given their cost and functionality, is high relative to that for other vehicle categories." (p. 11). It also noted that staff recognized "that manufacturers need appropriate lead time in order to adjust their product plans in response to any downward revision to the credits earned by NEVs." The modification capping the use of credits from NEVs placed in service in model years 2001 through 2005, starting in the 2006 model year, was added in response to comments received during the first 15-day comment period.

It accordingly is clear that a reasonable member of the directly affected public could have determined from the notice that the ultimately adopted amendments might include NEV discount multipliers that resulted in the placement of 2002 through 2005 NEVs having a lesser value in meeting a manufacturer's ZEV requirements than was originally proposed. While the modification ultimately made by the Executive Officer is in the form of restricting the use of credits from NEVs rather than the calculation of NEV credits *per se*, it is very similar to the sort of potential further modification described in the hearing notice. We therefore conclude that it was a change permitted under Government Code section 11346.8(c) and title 1, California Code of Regulations section 42 without the need to issue a new 45-day notice.

300. Comment: The Board was very clear at the hearing on January 25 that the December 2000 proposal relating to NEVs was to be implemented. The staff, including the Executive Officer, has no authority, either under the general provisions of the Health and Safety Code and Government Code or under the specific Resolutions governing staff and Executive Officer authority that pertain to this rulemaking, to reverse the decision of the Board (AAM, DaimlerChrysler)

The proposed change in the treatment of NEVs after MY 2005 would involve the exercise of rulemaking power by the Executive Officer, in violation of Resolution 78-10. That Resolution reserved to the Board certain powers otherwise subject to delegation, including the power to adopt and amend regulations. (GM)

Agency Response: The direction to the Executive Officer in Resolution 01-1 was that after receiving comments during the 15-day supplemental comment period and before taking final action, he “shall make modifications as may be appropriate in light of the comments received, and shall present the regulations to the Board if he determines that this is warranted.” Under Health and Safety Code sections 39515 and 39516, the Executive Officer may be delegated any authority the Board deems appropriate. The Executive Officer’s further modification regarding the use of NEV credits was clearly in response to comments during the first 15-day comment period, and as discussed above it was modification permitted under the original notice. It was appropriate for the Executive Officer in the exercise of discretion to conclude that this was a modification he had the authority to make without first reporting back to the Board.

With respect to Resolution 78-10, see the response to the earlier comment involving that resolution. It does not prevent the Board from delegating to the Executive Officer in this rulemaking the authority to make additional modifications and then take final action.

301. Comment: It is too late for ARB suddenly to decide that NEVs will not be a valuable part of the ZEV program it has developed, and that those who acted in reliance on what the Board and the staff had previously said should have guessed what these changes might be. Manufacturers have already begun efforts to distribute NEVs in California. For this reason, the proposed change in the regulations would also violate Constitutional limits on retroactive regulation. Under California law, a regulation operates retroactively if it “substantially alter[s] the legal effect of past events.” *Union of American Physicians v. Kizer*, 223 Cal.App. 3d 490, 499-503, 505, 505 n. 7 (1990). In that case the Court of Appeal held that modifications to procedures used to review Medi-Cal reimbursements could not apply to office visits that had already occurred. Similarly, a rule that divests manufacturers of the value of investments in NEVs that have already been made would also be unlawful. (AAM)

Agency Response: The new modifications do not affect the multipliers that apply to NEVs, or the way credits from 2001 through 2005 NEVs may be used before the 2006 model year. Certainly no NEVs have been built to date that are not generating credits that can be fully used before the 2006 model year. Thus the *Kizer* case is not comparable.

302 Comment: In addition, the retroactive effect of this change, and the hardship that it will cause manufacturers who have relied upon NEVs as a compliance strategy, raises serious questions as to whether this change amounts to a taking in violation of the California and U.S. Constitutions. (AAM)

Depending upon the impact of the change limiting the use of credits from NEVs, it would also violate the limitations on takings of private property. (GM)

Agency Response: Given the limited number of NEVs that have been placed in California to date, and the fact that the modification does not restrict the use of credits from NEVs in meeting the ZEV requirements for model years 2003 through 2005, we do not see how the modification would constitute a taking.