

**Description and Rationale for Staff's Additional
Proposed Modifications to the
January 10, 2003 ZEV Regulatory Proposal**

March 5, 2003



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Appendix A

Staff's Suggested Modifications to the Proposed Regulation Order: Proposed Amendments to the California Zero Emission Vehicle Regulation

1. INTRODUCTION

1.1 Purpose of This Document

On January 10, 2003 ARB staff released an Initial Statement of Reasons outlining proposed amendments to the California Zero Emission Vehicle (ZEV) regulation. The amendments were intended to resolve issues that had been raised in litigation and take into account the current status of zero emission and near-zero emission vehicle development. The proposed amendments were originally scheduled for public hearing on February 27, 2003; that hearing was subsequently postponed to March 27, 2003.

Since release of the original proposal staff has received a significant amount of public comment. In response to this input, staff has been working to refine and augment the original proposal to better accomplish the original goals of the ZEV program. This document outlines additional modifications developed by staff, which will be considered by the Board along with the amendments originally proposed by staff at the March 27 public hearing.

This document begins with a review of the ZEV program goals and achievements. It then summarizes the major additional proposed modifications, outlines the next steps in the regulatory process, and provides a description of each proposed modification and its rationale. It concludes with a brief description of the impact of the additional proposed modifications on vehicle production and on air quality, and a summary of staff recommendations and remaining issues.

Please note that this document is a supplement to, rather than a replacement of, the January 10, 2003 Initial Statement of Reasons. The modifications use as a starting point the proposed regulatory amendments contained in the Initial Statement of Reasons. Thus the modifications proposed here are modifications to the January proposal, and any amendments originally proposed in January that are not further discussed here should be viewed as continuing on as originally proposed.

1.2 Program Goals

The ZEV program has undergone tremendous change since its adoption in 1990. Originally designed as a catalyst to stimulate the commercial introduction of zero-emitting battery electric vehicles (EVs), the program has been amended several times to recognize the state of technology development and incorporate the significant advances in emission control technology. Each time the ZEV program has been amended by the Board it has broadened flexibility and expanded the family of clean vehicle technologies. In 1998 and 2001, the program was adjusted to take advantage of the development of extremely low emitting technologies that, while not zero, provide meaningful and substantial air quality

benefits. Throughout this process, the Board has not wavered from its commitment to the ultimate goal of pure ZEV technology commercialization. While the focus on pure ZEV commercialization remains, there has been much debate and discussion on how to best ensure its success.

1.3 Program Achievements

Throughout the program's history, the primary metric for measuring success has been the number of pure ZEVs placed each year. The program has also, however, pushed the development of extremely clean conventional and advanced technology vehicles that are now achieving widespread commercialization.

During the 1990's, automaker research and development efforts focused on battery EVs as the compliance pathway for meeting the requirements beginning in 1998. Automakers developed prototypes and worked with battery developers to produce the most efficient and best performing EVs possible. Local, state and federal government provided resources to establish incentives and prepare the market. The U.S. Department of Energy provided major funding in a collaborative effort with industry to develop advanced batteries via the United States Advanced Battery Consortium. The ZEV program was the key driver in these efforts and responsible for the renewed efforts towards making a commercially viable battery EV.

In 1996, the ARB signed memoranda of agreement (MOA) with the seven largest automakers. The primary role of the MOAs was to ensure the placement of nearly 2,000 vehicles using advanced batteries. Battery experts suggested that this relatively small but significant market was needed to ensure that battery developers had the necessary capital to bring the next generation of advanced batteries to market. Such batteries were expected to overcome performance and cost issues and lead to a viable commercial product.

In the context of demonstrating large numbers of state-of-the-art battery EVs and providing the necessary investment in battery development, the MOAs were a success. However, because the expected advances in battery development fell short of expectations, the ensuing reluctance on the part of automakers to move forward with a commercial market and place vehicles created the impression that the MOAs were a failure.

During this time, improvements in a variety of areas including fuel control, materials and electronics provided an opportunity for new emission reductions from conventional vehicles. Thus, in 1998, the ARB developed a new emissions standard, the super ultra low emission vehicle (SULEV). The certification emission levels for the SULEV standard were based on the estimated power plant emissions resulting from electric vehicle charging. This standard, coupled with extended warranty and zero evaporative emissions to create a partial ZEV

allowance vehicle (PZEV), became an option in 1998 that automakers could use to meet a large percentage of the ZEV requirement.

Likewise, the Advanced Technology PZEV (AT PZEV) category, adopted in 2001, not only reduces emissions like the PZEVs but advances ZEV technology development and provides incentives for alternative fuels. The ZEV regulation provides AT PZEV incentives that are specifically designed to further the development and use of technologies and components that contribute to the commercialization of pure ZEVs. Again, the introduction and volume commercialization of AT PZEVs are a direct result of the ZEV program. These vehicles will provide significant near-term environmental benefits, foster the continued development of vehicle technologies and provide incentives for alternative fuels.

To summarize, the ZEV program has been a success. The regulation has been responsible for pushing the boundaries of ZEV technology, particularly battery EVs. PZEVs are available for purchase today, with over 100,000 expected to be sold in California this year. ZEV enabling technologies such as hybrid electric vehicles (HEVs) have also been commercialized; three HEV models and additional CNG models are currently offered for sale. ARB staff believes that automakers will introduce additional AT PZEVs in the near future once certainty in the regulations is provided.

While the program has pushed automotive emissions to zero and near-zero levels and has resulted in the achievements noted above, the technology needed to cost-effectively meet the pure ZEV requirement in the near term has not yet been commercialized. Recognition of this situation led the staff to propose additional amendments in the January 10, 2003 staff report and the further modifications in this document.

1.4 Further Modifications Proposed

The staff proposal for amendments to the ZEV regulation released January 10, 2003 addressed litigation issues and reflected staff's thinking on the current state of ZEV marketability relative to the percentage requirements. The 45-day public comment period since the proposal's release has been constructive. In light of the comments received and as a result of further deliberation by staff, the following additional modifications to the proposal are now recommended.

Early response to the January 10, 2003 proposal was mixed; while much focus was placed on near term implications, a growing concern began to be expressed about the feasibility of the out years of the program. Based on feedback from a number of stakeholders regarding the credibility of the ZEV program in the long term, ARB staff has concluded that the program requirements for pure ZEVs contained in the January 10, 2003 proposal are overly optimistic, especially the large increase required in the 2012 timeframe. Staff is concerned that if

modifications are not made, the program credibility will suffer due to unrealistic requirements, particularly in 2012 when a large increase is required but considerable uncertainty exists regarding commercialization and production volumes of ZEVs. The ZEV program's 10-plus year history of regulatory amendments dramatizes the need to address the credibility issue head-on in order to move beyond preparation for and evaluation of the requirements and into implementation and realization of air quality benefits of the program. As a result, ARB staff is proposing modifications to the January 10, 2003 proposal that more accurately reflect what staff believes is known today regarding the current state of development and the steps that lie ahead for commercialization of ZEVs. The goals of the proposed modifications are to:

- resolve litigation issues,
- begin implementation of the regulation as soon as possible,
- reduce criteria pollutant emission through increased introduction of PZEVs and AT PZEVs,
- support development of ZEV technology through AT PZEVs,
- focus pure ZEV technology research, development and deployment steps needed to achieve commercial success,
- assure that the program is reasonable, rational and feasible.

The proposed modifications are designed to:

- Increase the near-term air quality benefits through the commercialization of large numbers of PZEVs and AT PZEVs. The revised proposal recognizes the benefits of these vehicles and provides an alternative compliance path that will result in more AT PZEVs while industry invests in pure ZEV technology research, development and deployment. Greater air quality benefits will be realized under staff's proposal by ensuring implementation and by roughly doubling the number of AT PZEVs anticipated compared to the 2001 regulation;
- Focus fuel cell research, development and deployment efforts. The program's requirements for advancing technology must be realistic and sensible. The number of pure ZEVs required under the alternative compliance approach in the near term (2005-2008) will ensure that automakers are providing serious research and development efforts toward the technology while not arbitrarily requiring higher volumes;
- Better reflect the uncertainty that exists regarding the pace of pure ZEV development. Recognizing that staff cannot, at this time, credibly forecast the volumes of vehicles appropriate for the next stage of pure ZEV development, staff recommends that the Board establish a panel of experts to periodically assess and report on technology advances. Based on input from the Panel, the ARB may respond with percentage requirements for commercialization as the technology becomes available.

Although the changes contemplated are far-reaching and may be controversial, they give the regulation a solid foundation for long-term success.

1.5 Review of the Regulatory Process

In preparation for a planned February 2003 Board hearing, staff developed a proposal referred to as a “strawman” for discussion and deliberation at a public workshop held on December 5, 2002. The strawman was staff’s initial effort at addressing the issues raised by litigation and resolving the near-term commercialization issues resulting from the state of zero emissions technology development. Staff received considerable comment on the initial proposal both at, and subsequent to, the workshop. These comments and input were considered as staff worked to develop the proposal that was released to the public on January 10, 2003 for a 45-day public comment period. The proposed amendments were designed to push ZEV technology development in a series of stages prior to full commercialization in 2012.

The staff proposal was released with the understanding that additional amendments might be necessary to more fully meet the objectives of the ZEV program. In addition, as discussed in Chapter 8 of the January 10, 2003 Initial Statement of Reasons, staff had identified seven additional open areas of discussion that required evaluation during the 45-day comment period. In response to these issues and continued input from stakeholders since issuance of the hearing notice, ARB staff has developed additional suggested modifications to the original proposal.

To ensure adequate time for stakeholder review and input, the ARB has postponed the February 2003 hearing by one month. As a result, staff has had additional time to more thoroughly analyze the impacts of the proposed modifications and provide sufficient time for stakeholder review and comment on the modifications prior to the Board hearing. This one-month delay also provides additional time for input and comments related to the Initial Statement of Reasons released on January 10, 2003. The January 10, 2003 proposed amendments remain available for public comment and for the Board’s consideration in March.

Given the complex nature of the ZEV program, it is possible that the Board will make additional modifications at the March 27, 2003, public hearing. The proposed modifications contained in this document, if accepted by the Board, and any changes made by the Board at the hearing would be included as part of revised package released for supplemental public review and comment. Interested parties would have 15 days to respond. The proposed amendments would not become final until review and approval by the Office of Administrative Law.

2. PROPOSED ADDITIONAL MODIFICATIONS

The following section describes staff's proposed modifications to the proposed amendments of January 10, 2003. Broadly, the areas covered include establishment of an alternative compliance path, revision of credit categories, further modification of the AT PZEV definition and a variety of clarifying and corrective modifications. Appendix A contains the proposed regulatory language with new modifications denoted by double underline and double strikeout.

2.1 Staff Proposal of an Alternative Compliance Strategy

This modified staff proposal includes an alternative compliance approach under which manufacturers that meet a "floor" requirement for production of Type III ZEVs in model years 2001-2008 would be allowed to use AT PZEV credit in the gold category. Thus a large number of ZEVs would not be required in this timeframe. Manufacturers would also retain the ability to achieve compliance under the terms of the 2001 regulation. An Independent Expert Review Panel would advise the Board as to the technical and market potential for commercialization of pure ZEV technologies.

The following sections outline the rationale for this alternative approach and describe its major features.

2.1.1 Rationale for Alternative Approach

As noted above, the ZEV program serves a number of purposes:

- Advancing pure ZEV technology research, development and deployment (the focus of the gold category),
- Supporting the development of pure ZEV technology through volume production of ZEV-enabling advanced technology vehicles (the silver category), and
- Achieving significant criteria pollutant emission reductions (the silver and bronze categories).

The proposed changes are intended to better achieve these fundamental goals.

With regard to advancing pure ZEV technology, staff has concluded that the approach embodied in the existing regulation, which sets firm and ever-increasing production requirements as a ramp towards commercialization, is problematic given the current status of possible ZEV technologies. Battery vehicles, while technically mature and well suited from a performance standpoint for many applications, face severe cost challenges. As part of the 2000 ZEV Program Biennial Review, staff assembled a Battery Technology Advisory Panel

(Panel) to review the performance, cost and availability of advanced batteries. The Panel concluded that nickel metal hydride batteries for full function vehicles would cost EV manufacturers between \$9,500 and \$13,000 in quantities of 10,000 to 20,000 packs per year, and approximately \$7,000 to \$9,000 at production levels exceeding 100,000 packs per year. Based on these assessments, in the Initial Statement of Reasons for the 2001 amendments staff estimated the near term incremental cost for battery EVs at roughly \$8,000 for a City EV and \$17,000 for a full function EV.

To provide an update on current status, in late 2002 the ARB contracted with a battery expert and member of the 2000 Battery Technology Advisory Panel to provide an evaluation of the progress in battery EV technology since the Panel's work in 2000. The contractor relied in large part on information collected over the last two years during the preparation of his report entitled The 2002 Advanced Automotive Battery Industry Report – A Critical New Assessment of Automotive Battery Trends. The conclusions of the preliminary update (a final report will be available shortly) show that the cost and performance characteristics of advanced batteries have not meaningfully changed since the 2000 report and as a result the key findings of the Panel's report still hold true today.

In addition, independent of cost issues, recent marketing experience indicates that although there is a base demand from regulated electric utilities and EV early adopters, the sustainable level of demand appears to be small at least in the near term. Staff is aware of recent advances in battery performance, in particular with regard to cycle life, and will continue to track such developments and factor them in to its future consideration of program status. Battery EV development will also be assessed by the Independent Expert Review Panel described below. At present, however, any recent advances do not appear to significantly alter the fundamental cost equation.

Fuel cell vehicles are even more costly than battery EVs in their current stage of development, and face additional technical and engineering challenges involving durability, cold weather performance, and other factors. Manufacturers appear to believe there is a business case for fuel cell development. Staff concurs that the technology shows great promise and fully expects fuel cell development to proceed to commercialization. At present, however, the technology is not ready for volume production.

Thus, additional development is needed before any pure ZEV technology, which we refer to as "gold" in this report, will be ready for mass deployment. The pace of future pure ZEV technical development or cost reduction, however, is difficult to predict. Relatively modest near term vehicle improvements, such as those needed to meet incrementally more stringent emission standards, follow a well-understood path and in general have been achieved more quickly and at less cost than the original staff estimates. On the other hand, bringing a fundamentally different technology such as battery electric or fuel cell vehicles to

market requires advancements on a number of fronts, and experience to date has shown that these developments do not necessarily proceed at the pace predicted by staff. To the contrary, the 1996, 1998 and 2001 modifications to the ZEV program all resulted from a mismatch between ambitious targets established in the past and the reality of actual vehicle availability.

The rationale for maintaining an ambitious “ramp” has been that a firm goal, with specific numbers of vehicles needed by specific dates, is necessary to provide incentive for manufacturers to aggressively pursue the needed improvements. Staff recognizes the technology-forcing virtues of this approach, and as noted above, the ZEV program has been a clear success on that front. Not only has there been enormous progress on zero and near-zero electric drive technologies, but manufacturers have also been motivated to improve the emission performance of conventional vehicles to levels thought impossible not long ago.

At the same time, in reviewing the history of the program it is clear that the establishment of a firm ramp has not in itself been sufficient to result in commercialization of pure zero technologies. Some interested parties argue that this is due to a lack of commitment on the part of automakers, or lack of resolve on the part of ARB. Staff is persuaded, however, that the pace of progress is governed in large part by technical, engineering, manufacturing and cost challenges and not merely by the stringency of the regulatory requirement.

Meanwhile, rapid advances in PZEV (“bronze”) and AT PZEV (“silver”) development have resulted in widespread availability of extremely clean vehicles. A number of models have been certified to date and more will be available in the near future. Volume production of such vehicles will result in air quality improvement and, in the case of AT PZEVs, will also build the manufacturing and supplier base for componentry that will eventually be used on pure ZEVs.

Under these circumstances, staff believes that the best course of action is to take full advantage of the near term possibilities afforded by PZEVs and AT PZEVs, and adopt a stepwise approach towards pure ZEV commercialization that takes into account progress over time. The alternative compliance method put forth in this staff proposal is intended to maximize the air quality benefits afforded by extremely clean vehicles available in showrooms today, and use an Independent Expert Review Panel to help the Board keep the pure ZEV requirement aligned with the status of technology development over time. Staff believes the Board remains committed to the pursuit of ZEV commercialization for the simple reason that ZEVs will ultimately be necessary to meet health based air quality goals in the future.

The following sections describe the major elements of the alternative compliance approach.

2.1.2 Compliance Under Terms of the 2001 Regulation Remains as an Option

Section 1962(b)(2)(A)

Large volume manufacturers that choose not to pursue the alternative compliance approach discussed below would have the option to achieve compliance under the terms and conditions of the 2001 regulation's percentage requirements. For example, a manufacturer could choose to satisfy its entire ZEV obligation using banked credits, subject to the existing neighborhood electric vehicle (NEV) cap limitation in the gold category. In all cases vehicles produced in 2003 and later model years would earn credit according to the credit values defined in the most recent proposed modifications.

2.1.3 Minimum Floor Level for New Type III ZEV Production

Section 1962(b)(2)(B)1.

In order to take advantage of the compliance flexibility option, it is proposed that manufacturers produce Type III ZEVs (cumulative total over the 2001 through 2008 model years) sufficient to achieve a minimum floor credit level. These credits must come solely from production of vehicles (transportation system credit would not apply towards this calculation).

The minimum credit level that must be met with credits from Type III ZEVs produced in model years 2001 through 2008 is set at 1.09 percent of the manufacturer's average annual sales of PC and LDT1 vehicles over the 5 year period from model years 1997 through 2001. The obligation would be assessed against these past years in order to provide greater certainty as to the number of vehicles to be produced. As part of this modification, in order to provide greater certainty as to the number of vehicles to be produced, staff proposes that the credit level for 2006-2008 Type III ZEVs be increased from 15 to 40. This will provide for a uniform credit level throughout the 2001-2008 period. Staff had previously proposed 40 credits through 2006. This change will extend the 40 credit level through 2008. (Section 1962 (d)(5)(B))

Staff estimates that this minimum floor requirement, if met by all manufacturers, would result in a cumulative total of roughly 250 Type III ZEVs produced by the large manufacturers over the 2001-2008 model years. Staff believes that this number of Type III ZEVs is sufficient to satisfy the need for small-scale demonstration programs of fuel cell vehicles. Small-scale demonstrations are the next logical step in the path to commercialization of this technology.

ZEV credit earned by vehicles produced to satisfy the floor obligation would count towards compliance with a manufacturer's 10 percent obligation in the year in which the vehicle is produced.

Staff proposes that the regulation not contain a minimum Type III ZEV production requirement for model years 2009 and beyond. Staff believes that given the uncertainty involving pure ZEV technology development, it is difficult to set appropriate targets at this time. Rather, the Board would determine the program structure for those years at a future regulatory hearing, based on input from an Independent Expert Review Panel as described below.

The presence or absence of a fixed long-term ZEV requirement fundamentally is a policy issue because there is not sufficient technical information to make a quantitative finding. Nonetheless, many commenters have stated that post-2009 goals are important, even if they must be revised in the future. Staff expects that this issue will be discussed before the Board at its March 2003 hearing as noted in the Remaining Issues discussion below.

2.1.4 Use of AT PZEV Credits in the Gold Category

Section 1962(b)(2)(B)2.

Under the revised staff proposal, for model years 2005 through 2008 manufacturers that meet the minimum floor requirement for production of new Type III ZEVs would be allowed to use AT PZEV credit earned by vehicles (i.e. excluding transportation system credit) in the gold category. Manufacturers could elect to use the base program or the alternative compliance strategy in any model year, except that manufacturers that elect to use the alternative compliance strategy but fail to ultimately meet the floor production requirement for Type III ZEVs would be required to demonstrate compliance under the base 2001 program for all model years 2005-2008. Conversely, manufacturers that elect to use the base program initially but then meet the floor production requirement prior to the end of model year 2008 would have the option to retroactively take advantage of the alternative compliance strategy for all model years 2005-2008.

In model years 2009 and beyond, manufacturers would be able to use AT PZEV credit in the gold category without regard to whether they used the base program or the alternative compliance strategy for model years 2005-2008. Under the revised staff proposal there would be no minimum Type III ZEV production requirement needed in order to take advantage of the alternative compliance strategy in model years 2009 and beyond. This approach would remain in force until the Board took action to modify the program structure, based on input from an Independent Expert Review Panel as discussed below.

2.1.5 Independent Expert Review Panel

Under staff's proposal, the alternative compliance approach would apply until modified by the Board. Staff suggests that at least three years prior to the 2009

model year, the Board determine the appropriate regulatory approach for 2009 and beyond based in part on an assessment of the status of technology development as of that time by an Independent Expert Review Panel.

The role and composition of the Independent Expert Review Panel would not be specified in the regulation because it does not have regulatory powers. Instead, the Independent Expert Review Panel would provide input to the Board for consideration but its findings would not bind the Board in any way.

Staff envisions that this Panel would consist of independent experts with the skills and knowledge necessary to assess the status of ZEV commercialization. The Panel members would need to be free of conflict of interest concerns and would not have a direct economic interest in the technologies being assessed. The Panel would provide a factual assessment of the status of technology and the readiness of various technologies for market and consumer acceptance, but would not recommend specific compliance targets. The Panel's review would include the status of all pure ZEV technologies, including battery EVs as well as fuel cells.

2.2 Type III ZEVs Placed in a Section 177 ZEV State Applied to Compliance in California

Section 1962(d)(5)(C)

Section 177 of the Clean Air Act allows other states to adopt California's motor vehicle emission standards. Auto manufacturers have expressed concern that the ZEV program obligations in California are multiplied across other states that have adopted California's ZEV program. This is of particular concern when considering requirements for the production of fuel cell vehicles, as the volumes necessary to comply are challenging under the California program and even more difficult when considering other states as well. For these reasons, staff is proposing that Type III ZEVs placed in any state that has adopted California's ZEV program be allowed to count towards California's ZEV requirement. Similarly, under identical programs adopted by Section 177 states, Type III ZEVs placed in California would have to count towards the ZEV requirement in those other states.

2.3 Return to 2001 Regulation Percentage Requirements

Section 1962(b)(2)(A)

As described in section 2.1.2 above, a manufacturer may choose to comply under terms of the 2001 regulation. By doing so, a manufacturer would have a gold (ZEV) and silver (AT PZEV) category requirement of 2 percent each, increasing over time. In the January 2003 Staff Proposal the categories were modified to be 1 percent gold and 3 percent silver, also increasing over time.

Staff now proposes a return to the 2001 percentages. This modification is proposed in order to maintain the basic features of the 2001 regulation for those manufacturers that choose to achieve compliance based upon the 2001 regulatory structure.

This change does not affect manufacturers that take advantage of the alternative compliance method discussed in Section 2.1. Manufacturers using that method have the ability to fulfill their entire gold obligation using AT PZEV credits, and as a result the percentage limitation on the use of AT PZEV credits has no impact.

2.4 Allow Certain Early PZEV Placements to Earn AT PZEV Credit

Section 1962(b)(2)(D)

Under the 2001 regulation manufacturers were required to demonstrate compliance beginning with the 2003 model year. To address litigation issues, the staff proposal would delay the onset of required compliance until the 2005 model year. Because of the lead time involved in developing vehicles, however, some manufacturers have already made plans that would allow them to offer PZEVs during the 2003 and 2004 model years. Because these same manufacturers generally would have the ability to take full advantage of the PZEV option in 2005 and subsequent model years using current production in each year, banked PZEV credits would have little value and such manufacturers would have little incentive under the January 2003 staff proposal to produce PZEVs during 2003 or 2004. Meanwhile, providing the extended warranty needed to certify vehicles as PZEVs imposes additional cost on manufacturers.

In order to capture the potential air quality benefit afforded by additional PZEV production, and to provide early experience with such technologies, staff proposes that an incentive be provided to encourage manufacturers to certify 2003 and 2004 vehicles as PZEVs. Specifically, staff recommends that credits earned by “excess” PZEVs in the 2003 and 2004 model years be available for use in the AT PZEV category in the 2005 and 2006 model years. By credits from “excess” 2003 and 2004 PZEVs staff means credits from PZEV production above the number of vehicles that would be required to take full advantage of the PZEV option in each year, had the regulation been in effect. For example, if a manufacturer could use 500 credits under the PZEV option, staff recommends that credits earned in excess of 500 in each year be available for use in the AT PZEV category in model years 2005 or 2006.

Staff notes that under the optional compliance provisions in the suggested modifications, banked AT PZEV credit can be used in the gold category. Therefore the modifications already provide an incentive for early AT PZEV production, and thus staff believes that no additional change is needed.

2.5 Reintroduce NEV Cap in Silver Category, But Delay Until 2009

Section 1962(g)(6)

The 2001 amendments established a cap on the use of credits banked from model year 2001-2005 NEVs. Beginning in model year 2006 manufacturers could satisfy no more than 75 percent of any program category (gold, silver, bronze) using banked NEV credits. The maximum allowable use of banked NEV credits decreased to 50 percent in any program category for the 2007 and later model years.

The January 2003 staff proposal removed the NEV cap from the silver and bronze categories. The rationale for this change was to provide greater lead time and additional flexibility for manufacturers to take advantage of the AT PZEV and PZEV options. The cap was retained in the gold category to ensure that manufacturers would need to meet some minimum portion of the gold category using credits from vehicles other than NEVs.

As part of the additional proposed modifications outlined in this document, staff proposes a modification reinstating a NEV cap in the silver category, but delaying the imposition of the cap until 2009. Thus under the modifications manufacturers could satisfy no more than 75 percent of the AT PZEV category using banked NEV credits in the 2009 model year, with the percentage decreasing to 50 percent in 2010 and subsequent years. Staff proposes this change in order to ensure some minimum level of AT PZEV production in 2009 and later years without regard to the availability of NEV credits, while providing lead time and flexibility in the years prior to 2009 for manufacturers that may not have sufficient AT PZEV products available in that timeframe.

As a result of this change, manufacturers choosing the alternative compliance path would not be subject to any NEV cap prior to the 2009 model year. Through the 2008 model year such manufacturers could meet their gold obligation using any combination of new gold vehicles, banked gold credits, new silver vehicles, or banked silver credits. The cap on the use of banked NEV credits in the silver category would take effect in 2009 and subsequent model years.

2.6 Modifications to the AT PZEV Determination

2.6.1 Minimum Requirements for Advanced Componentry Credit

Section 1962(c)(4)(B)(1)

Staff proposes modifications to the criteria for determining if a hybrid electric vehicle (HEV) earns advanced componentry credit. The specific proposed criteria are set forth in Table 2.1 below. In brief, staff proposes a three-tier system:

- Low voltage, low power HEV (< 60 volts, minimum 4 kW motor power)
- High voltage, HEV (\geq 60 volts, minimum 10 kW motor power)
- High voltage, high power HEV (\geq 60 volts, minimum 50 kW motor power)

Staff's modified proposal retains the use of a maximum power rating for the electric drive system, but eliminates the use of "peak power ratio" as a criterion for advanced componentry qualification. Staff proposes the use of voltage level and rated peak power as criteria for AT PZEV credit qualification, along with traction drive boost, regenerative braking, and idle start/stop. These modifications are proposed because it is believed that HEVs equipped with high-voltage electric drive systems better advance the technology and manufacturing base for ZEVs. In order to meet the high power propulsion demands of light duty ZEVs, high voltage systems will be necessary in order to avoid excessive energy losses at impractical current levels. Staff therefore recommends that high voltage should also be a qualifier for AT PZEV advanced componentry credit. Staff proposes the establishment of three levels of credit incentive for HEVs. The first and mildest is described as a low voltage HEV. The second level is a high voltage HEV and the third is a high voltage, high power HEV. Each level of credit rewards ZEV enabling technology and increasing credit is awarded with increasing applicability to ZEVs.

Level 1 Low-Voltage Low-Power HEV AT PZEV Credit

Low Voltage HEVs are described in Table 2.1 as having system voltage less than 60 volts and a motor size of at least 4 kilowatts. Staff proposes that Low-Voltage HEVs not receive an additional advanced componentry credit but also proposes that the base 0.2 PZEV credit earned by such vehicles be available for use in the AT PZEV category through model-year 2008. These vehicles advance electric drive technology to the extent that they might be applicable in selected low power ZEV applications, and they help develop consumer recognition of HEV technology. These systems are expected to become commonplace in standard automobiles and reach technical maturity much more rapidly than the more challenging high-voltage systems. For this reason, staff believes that credit earned by low voltage systems should not be eligible for use in the AT PZEV category after model year 2008.

Level 2 High-Voltage HEV Advanced Componentry Credit

High Voltage HEVs are described in Table 2.1 as having system voltage greater than 60 volts and motor size of at least 10 kW. Staff proposes that the Board allow 0.4 credits for such HEVs for advanced componentry. Staff anticipates that in the 2012 and later timeframe, high-voltage 10+ kW systems may also become commonplace, and their benefit towards the promotion of ZEVs will diminish as volumes grow. Staff therefore proposes that the advanced componentry credit

for these systems be reduced in stages, first in 2012, and then again 2015 (See Table 2.1).

Level 3 High Voltage High Power HEV Advanced Componentry Credit

High Voltage, High Power HEVs are described in Table 2.1 as having system voltage greater than 60 volts and motor size of at least 50 kW. Staff proposes that the Board allow 0.5 credits for such HEVs for advanced componentry. Staff believes at this motor size, although the ratio of motor power to total drive system power may be quite low for selected vehicles with large engines, some hybrid electric vehicle motors may have sufficiently high power ratings to meet or exceed the power requirements for small ZEVs. For hybrid electric vehicles that are equipped with multiple motors, staff intends that the sum of these individual drive system motors rated peak powers must exceed 50 kW in order to earn the additional high power credit.

Credit Calculation for Grid HEVs

Grid rechargeable hybrid electric vehicles face substantial developmental challenges but also offer significant advantages over other AT PZEVs because of their ability to recharge directly from the electric supply grid and operate as “part-time” ZEVs. The revised staff proposal further increases credit levels for such vehicles beyond the levels outlined in the January 2003 staff proposal. Staff believes that under the revised proposal this class of vehicle is adequately encouraged through the various categories of AT PZEV credit in combination with a high phase-in multiplier that extends to 2011. High voltage grid HEVs are expected to exceed the criteria for high-voltage, high-power advanced componentry and will therefore be eligible to receive the maximum advanced componentry credit, along with a variable zero emission range and low fuel cycle emission credit. Although they have not yet been introduced in the marketplace, staff believes that grid HEVs should earn high credits through 2011 in order to encourage automakers to consider the potential benefits of this class of hybrids. Staff also believes that there is a potential synergy with fuel cell vehicles, and that grid rechargeable hybrids with fuel cell engines might someday offer performance that exceeds that of conventional fuel cell vehicles.

Credit Calculation for Hydrogen ICE Vehicles

Hydrogen internal combustion engine (ICE) vehicles likewise face significant challenges, in this case due more to infrastructure needs rather than to the vehicles themselves. Hydrogen ICE vehicles have been shown to be extraordinarily clean even without after-treatment and they offer the potential for significant air quality benefits. Widespread deployment of hydrogen ICE vehicles also will promote the development of hydrogen infrastructure that will help pave the way for eventual commercialization of zero emitting hydrogen fuel cells. For all of these reasons, staff believes that the ZEV program incentive structure

should encourage hydrogen ICE vehicles, and as is shown in Table 2.2 below, such vehicles would earn high levels of credit under the proposed credit structure.

**Table 2.1
Hybrid Electric Vehicle Advanced Componentry Requirements and Credit**

	Level 1 Low-Voltage HEV	Level 2 High-Voltage HEV	Level 3 High-Voltage High-Power HEV
Traction Drive System Voltage	< 60 Volts	>= 60 Volts	>= 60 Volts
Electric Drive System Peak Power Output	>= 4 kW	>= 10 kW	>= 50 kW
Traction Drive Boost	Yes	Yes	Yes
Regenerative Braking	Yes	Yes	Yes
Idle Start/ Stop	Yes	Yes	Yes
10 year/ 150k mile Battery Warranty	Yes	Yes	Yes
PZEV Status	AT PZEV (2005-2008 only)	AT PZEV	AT PZEV
Base Credit	0.2	0.2	0.2
Maximum Advanced Componentry Credit:			
MY 2005-2011	0.0	0.4	0.5
MY 2012-2014	0.0	0.35	0.45
MY 2015+	0.0	0.25	0.35
Total Credit	0.2	0.6 to 0.45	0.7 to 0.55

2.6.2 Hybrid Electric Vehicle Energy Storage Device Warranty Requirement

Section 1962(c)(2)(D)

Low Voltage HEVs certified as AT PZEVs would be subject to the PZEV extended warranty requirement. HEV batteries and/or capacitors that provide traction power and absorb regenerative braking energy would then be subject to the HEV energy storage 10 year, 150,000 mile warranty requirement.

In the January 10, 2003 staff proposal, the regulatory language used for the proposed modifications to the battery warranty was ambiguous. Staff did not intend to imply that the On-Board Diagnostic (OBD) elements of the energy storage system could be exempted from the extended warranty provisions. Staff proposes that the Board clarify the regulatory text so that energy storage OBD monitoring systems are outside of the warranty coverage limitations and must continue to operate as required by OBD regulations. Reference to hydraulic or pneumatic systems would also be eliminated.

2.6.3 Limit on Maximum Zero-Emission VMT Credit Alternative Procedure

Section 1962(c)(3)(B)

The January 10, 2003 proposal, as was the case with prior versions of the regulation, allows additional credit for vehicles (such as grid connect HEVs) that operate part of the time in zero emission mode. The credit earned is based on the zero emission range of the vehicle. The regulatory language provides an alternative procedure under which a vehicle that has zero emissions of one but not all pollutants (e.g. a reformer fuel cell or hydrogen ICE) also can earn credit under this provision of up to one-half that of a vehicle with zero emissions of all regulated pollutants. Because vehicles that qualify for this alternative procedure are likely to reach the maximum range specified in the regulation, staff proposes a simplification of the alternative by removing the reference to ZEV range and incorporating a maximum credit cap of 1.5.

2.6.4 AT PZEVs Qualifying for Both Zero Emission Range and Advanced Componentry Credit

Section 1962(c)(4)

Staff proposes that AT PZEVs qualifying for both the Zero Emission vehicle miles traveled (VMT) credit and the advanced ZEV componentry credit be allowed to make use of both credits. Staff believes that the combined use of both features is of further benefit and should therefore be rewarded. This would allow, for example, a hydrogen internal combustion engine vehicle that is also equipped with a high voltage hybrid electric drive system, or an Indirect Methanol FCV, to be rewarded for both zero emission VMT and advanced componentry features. Table 2.2 lists example credit values for a variety of AT PZEVs to illustrate the application of this proposal.

2.6.5 Use of High Pressure Gaseous Fuel or Hydrogen Storage System

Section 1962(c)(4)(A)

In the January 10, 2003 proposal the regulatory language regarding hydrogen storage was unclear. Staff did not intend that hydrogen fueled high-pressure gaseous vehicles receive both the 0.1 credit for gaseous storage and the 0.2 credit for exclusive fueling on hydrogen. Therefore, staff proposes modification of this language to indicate that these are alternative, not additive, credits. However, staff also recognizes the considerable technical challenges associated with on-vehicle storage of gaseous and hydrogen fuels and proposes that the advanced componentry credit for these storage systems be increased to 0.2 for CNG and 0.3 for hydrogen. Staff proposes a further modification that will allow dual fuel CNG-hydrogen vehicles to earn the higher 0.3 hydrogen storage advanced componentry credit if these vehicles are capable of operating exclusively on 100% hydrogen. The existing regulation language unnecessarily restricts this credit to vehicles fueled exclusively by hydrogen. This change is proposed in order to reward vehicles that are equipped with hydrogen-capable storage systems that advance the technology and manufacturing capability for hydrogen systems whether or not they are fueled on hydrogen 100% of the time.

2.6.6 Application of Early Introduction Multiplier and Zero Emission Range Multiplier

Section 1962(c)(7)(B)

Staff proposes a modification making it clear that the Early Introduction Multiplier and the Zero Emission Range Multiplier are not to be combined. The Zero Emission Range Multiplier was a modified phase-in multiplier and was intended as an alternative to the standard PZEV introduction phase-in multiplier. These multipliers were introduced in order to accelerate the development and deployment of PZEVs and to recognize that a subset of AT PZEVs, those earning zero emission range credit, would not be ready for market introduction for several more years. The phase-in multiplier for PZEVs that earn a zero emission VMT credit was developed as a substitute for the default PZEV phase-in multiplier, so staff proposes that this point be clarified to expressly allow PZEVs to make use of only one multiplier instead of both.

2.6.7 Combined AT PZEV Credit Examples

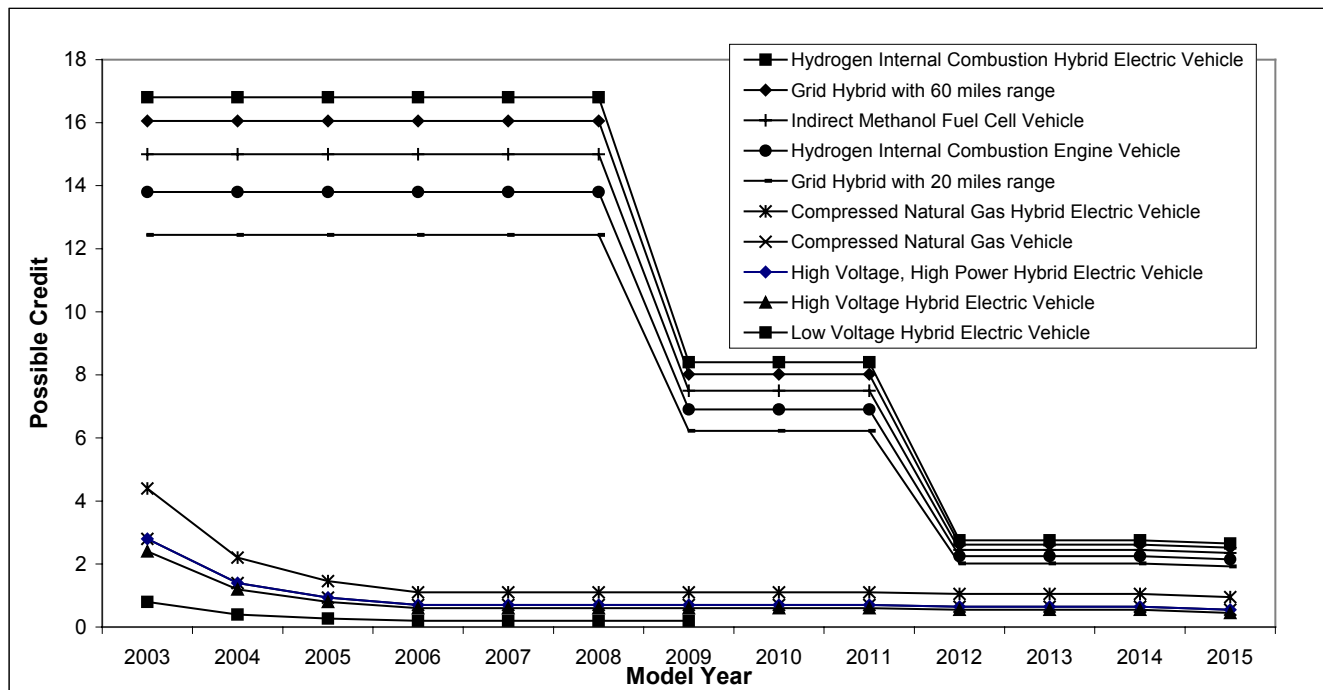
The following table provides examples of proposed credits for a variety of AT PZEV types with the proposed changes. These examples are for illustration purposes only and are, in some cases, dependent on a successful application to the Executive Officer for credits on particular vehicle configurations. It is entirely possible that different manufacturers' vehicles of the same general type may earn different AT PZEV credit.

**Table 2.2
2005-2011 ATPZEV Credit Determination
(without multipliers)**

	Zero Emission Range	Base Credit	Zero Emission Range Credit	Zero Emission Range Credit	Advanced Componentry Credit		Low Fuel Cycle Emission Credit	Total Credit
	Miles		Zero Emissions for single pollutant	Zero Emissions for all pollutants	Tanks	High Voltage		Without Early Intro Multipliers
Low Voltage HEV	0	0.2				0		0.2
High Voltage HEV	0	0.2				0.4		0.6
High Voltage, High Power HEV	0	0.2				0.5		0.7
Compressed Natural Gas Vehicle	0	0.2			0.2		0.3	0.7
Compressed Natural Gas Hybrid Electric Vehicle (10 kW)	0	0.2			0.2	0.4	0.3	1.1
Hydrogen Internal Combustion Engine Vehicle	0	0.2	1.5		0.3		0.3	2.3
Indirect Methanol Fuel Cell Vehicle	0	0.2	1.5			0.5	0.3	2.5
Grid Hybrid with 20 miles electric Range	20	0.2		1.25		0.5	0.12	2.1
Grid Hybrid with 30 miles electric Range	30	0.2		1.40		0.5	0.15	2.3
Grid Hybrid with 60 miles electric Range	60	0.2		1.82		0.5	0.15	2.7
Hydrogen Internal Combustion Engine Hybrid Electric Vehicle 10 kW	0	0.2	1.5		0.3	0.4	0.3	2.7
Compressed Natural Gas Hybrid Electric Vehicle with 20 Miles Electric Range	20	0.2		1.25	0.2	0.5	0.3	2.5

Figure 2.1 below shows the credit levels for selected vehicle types over time, taking into account the applicable early introduction multipliers.

**Figure 2.1
AT PZEV Credit**



2.7 “Placed In Service” Requirement

Section 1962(d)(3)(A) and 1962 (d)(5)(B)

In the past year there have been discussions regarding the date by which a vehicle must be placed in service in order to earn the early introduction multiplier provided in section 1962(d)(3)(A) of the ZEV regulation. In order to address these issues, on November 21, 2002, the Executive Officer issued a letter to affected vehicle manufacturers informing them that early introduction credits would be available through March 31, 2003 with a similar “sell through” period for the remainder of the early introduction credits. On December 24, 2002, in a lawsuit filed by DaimlerChrysler and General Motors a Fresno County judge issued a temporary restraining order enjoining ARB from implementing the provisions of the November advisory.

To provide regulatory certainty and clarification on this issue, the staff proposes a modification providing that a 2001-2002 model year ZEV qualifies for the early introduction multiplier if placed in service by September 30, 2003. Staff proposes that for 2003 and subsequent model years ZEVs, a vehicle be considered “placed in service” if placed in service in California by June 30 following the applicable model year. Staff believes this is appropriate in light of the challenges faced in placing ZEVs and the expectations of manufacturers regarding the application of the regulation.

2.8 Reporting Requirement

Section D.3 California Exhaust Emission Standards and Test Procedures

Staff proposes that the Board clarify the tracking and verification of credits earned and transferred by manufacturers subject to the ZEV requirement. Staff proposes that each manufacturer submit a report at least annually, by May 1 of the calendar year following the close of the model year, to the Executive Officer. The report will include necessary delivery and placement data of all vehicles generating ZEV credits or allowances, and all transfers and acquisitions of ZEV credits. The manufacturer may update the report by September 1 to cover activities occurring between April 1 and June 30. This proposed amendment would be incorporated by reference in the "California Exhaust Emission Standards and Test Procedures for 2003 and Subsequent Model ZEVs, and 2001 and Subsequent Model Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes."

2.9 Specialty Vehicles

Section 1962(d)(5)(A)

Under the 2001 amendments, specialty vehicles are those with the same platforms, battery, and drivelines as existing ZEV platforms. In order to better address specialty vehicles that may not be identical to existing ZEVs, staff proposes that manufacturers be allowed to request additional credit for specialty vehicles that are optimized for a particular function which conflicts with optimization for maximum vehicle range. The basis for approval of such an application would be the componentry equivalence or air quality benefit demonstrated by the specialty vehicle. For example, a medium duty urban delivery van may be equipped with a battery pack that has higher energy storage capacity than other Type II battery electric vehicles, but may not achieve the range minimum that a Type II passenger car or light-duty truck would achieve. Under the staff proposal, manufacturers that obtain Executive Officer approval may promote the specialty vehicle to the next highest range-based ZEV Type, for example, from Type 0 (utility EV) to Type I (City EV).

2.10 Clarification of In-Service Warranty Credit

Section 1962(f)

Under the 2001 amendments vehicles on the road beyond three years of service and meeting certain other conditions earned additional credit for each year of continued operation through the 2011 model year. In the January 2003 Staff Proposal, staff intended to propose limiting the granting of such additional credit to vehicles originally placed in service prior to the 2005 model year. The

proposed regulatory language did not clearly capture this intent, and could be read to terminate the award of any additional credit as of the 2005 model year, even for vehicles placed prior to that time. Staff proposes modifications to the regulatory language to accomplish the intent of the 2001 amendments.

2.11 Advanced Technology Demonstration Vehicle Credits

Section 1962(g)(4)

Demonstration vehicles by their nature are moved from location to location between states and countries. Staff proposes a modification providing that for a ZEV to qualify for credit under the advanced technology demonstration provision, vehicles must be located in California the majority of the time. The proposed amendments would clarify that to qualify for these credits, the application to the Executive Officer must demonstrate that an advanced technology demonstration vehicle will be in California (or, in the case of a Type III ZEV, cumulatively in California or a "Section 177" state) at least 50 percent of the time during its first year of placement.

2.12 Other Miscellaneous Clarifications

For clarification purposes other miscellaneous proposed modifications include:

- NEVs are not eligible for advanced technology demonstration program credits, Section 1962(g)(4)
- ZEV credits may be acquired from third parties in addition to vehicle manufacturers, Section 1962(g)(6)
- Removal of inadvertent remaining references to the high efficiency multiplier. Section 1962(c)(6)(A) and (i)(1)
- Optional credit multiplier based on vehicle range or battery specific energy for model-year 1999 ZEVs. Section 1962 (d)(2)
- Added definitions for "regenerative braking" and "Type 0,I,II,III ZEV" Section 1962 (i)

3. IMPACTS OF THE PROPOSED MODIFICATIONS

3.1 Impacts on Vehicle Production

The additional modifications proposed in this document would affect the number of vehicles needed to comply in several ways.

3.1.1 Providing Increased Advanced Componentry Credit For High Voltage-High Power HEVs

Under the revised staff proposal, HEVs with a motor power greater than 50 kW would earn an advanced componentry credit of 0.5, decreasing in future years (Vehicle total credit = 0.2 PZEV + 0.5 Advanced Componentry credit = 0.7). This compares to a maximum advanced componentry credit of 0.4 under the January 2003 staff proposal. To the extent that manufacturers build such high power vehicles, fewer would be needed to meet their compliance target. If all manufacturers built 0.7 credit vehicles, the number of vehicles needed to fill the gold and silver categories would decrease by about 17 percent.

3.1.2 Providing AT PZEV Credit for Low-Voltage Low-Power HEVs

Under the revised staff proposal, credits earned by low-voltage HEVs could be used in the AT PZEV category through model year 2008. Such vehicles would earn a credit of 0.2, as compared to 0.6 or 0.7 for high voltage HEVs. To the extent that manufacturers used low-voltage vehicles to satisfy the AT PZEV option, the number of vehicles silver needed would increase. If all manufacturers used 0.2 credit vehicles instead of 0.6 credit vehicles, the number of vehicles needed would triple. This change would have no effect in model years 2009 and beyond because credit earned by such vehicles could only be used in the PZEV category at that point.

3.1.3 Decreasing Advanced Componentry Credit in 2015 and Beyond

Under the 2001 amendments and the January staff proposal, the credit earned by HEVs decreases in model year 2012. The additional modifications proposed in this document would further decrease the credit levels in model year 2015. The resulting credit levels are shown below.

Vehicle Type	2003-2011 Credit	2012-2014 Credit	2015+ Credit
High Voltage	0.6	0.55	0.45
High Voltage, High Power	0.7	0.65	0.55

The credit decreases in 2015 and beyond would increase the number of vehicles required in those years by approximately 20 percent.

3.1.4 Alternative Compliance Option

Under the revised staff proposal, manufacturers have the option to build a demonstration-level number of Type III ZEVs in model years 2001-2008 and thereby take advantage of the alternative compliance option. The effect of this change is complex. For manufacturers with significant numbers of banked credits, the alternative compliance option would actually result in a larger number of ZEVs being produced (because manufacturers need to produce new vehicles rather than rely solely on banked credits). For manufacturers without banked credits, the alternative compliance option would result in a smaller number of ZEVs being required than under the 2001 regulation.

3.1.5 Future Modification by Board

Under the revised staff proposal the gold requirement for 2009 and beyond would be set by the Board based on input from an Independent Expert Review Panel. Therefore the effect of the revised staff proposal on the number of ZEVs required in 2009 and beyond cannot be determined at this time.

3.1.6 Possible Change to Use of Banked Credits

One other potential impact of the revised staff proposal involves manufacturer use of banked credits. Manufacturers that take advantage of the alternative compliance option under the revised staff proposal would have a reduced need for banked gold credits in the near term. (Banked credits cannot be used to satisfy the minimum floor production requirement, and the remainder of the gold obligation could be met with AT PZEV credits). Manufacturers in this situation may decide to use a greater number of banked gold credits in the AT PZEV category, rather than retaining them for future use in the gold category. To the extent that this occurred, it would reduce the number of AT PZEVs produced in the early years. Staff has reviewed the availability of banked credits and roughly estimates that the number of credits available would be sufficient to completely offset AT PZEV production for slightly more than two years, assuming trading across manufacturers and that all manufacturers took this course.

3.1.7 Net Effect

In general, staff expects that under the revised staff proposal the number of pure ZEVs would decrease and the number of AT PZEVs would increase as compared to the January 2003 staff proposal. It is not possible to more precisely estimate the net effect of the proposed modifications due to the number of variables involved, the different capabilities and strategies of each manufacturer, and the likelihood of future changes by the Board based upon input from the Independent Expert Review Panel.

In order to provide a rough estimate of the potential effect of the additional proposed modifications on air quality, however, staff has developed a model scenario. Under this scenario, all manufacturers take advantage of the alternative compliance option for model years 2001 through 2008. The entire remaining gold obligation in those years is met with credits from producing AT PZEVs. In model years 2009 and beyond the model scenario assumes no pure ZEV production, with the entire gold category satisfied by AT PZEV credits. (Please note that in reality staff fully expects that the Board will limit the use of AT PZEV credits in the gold category in the future; the “no pure ZEV” scenario was chosen as a bounding exercise).

In all cases all AT PZEVs produced are assumed to be high-voltage HEVs (0.6 credit in model years 2005-2011, 0.55 credit in 2012-2014, and 0.45 credit in 2015 and beyond). These estimates also assume free credit trading across manufacturers (as was the case with the emission estimates in the January staff proposal). Under the revised staff proposal some banked gold credits are used to make up a shortfall in needed AT PZEV production in the early years, but the remaining banked gold credits are retained by manufacturers for future use. Under the 2001 amendments and the January 2003 staff proposal banked gold credits are used to satisfy the gold obligation in this analysis.

The number of ZEV and AT PZEV vehicles that result, using the above assumptions, is shown below. The numbers of vehicles resulting from the same assumptions under the January 2003 staff proposal and the 2001 regulation are also shown for comparison purposes. It is important to bear in mind that this scenario is prepared for illustrative purposes only and the actual number of vehicles produced could differ significantly from the totals shown below.

Model Year	2001 Regulation		2003 January Staff Proposal		2003 Revised Staff Proposal	
	ZEV	AT PZEV	ZEV	AT PZEV	ZEV	AT PZEV
2005	0	13350	0	17244	250 total over this period	22418
2006	0	19848	0	25636		33327
2007	0	27905	0	43253		56229
2008	4333	47110	0	64069		83290
2009	8988	64768	2303	88084	0	117445
2010	11108	70648	4804	96082	0	128109
2011	12032	76529	5204	104079	0	138772
2012	18269	98061	17782	96991	0	193983
2013	18269	98061	17782	96991	0	193983
2014	18269	98061	17782	96991	0	193983
2015	24359	130748	23709	129322	0	316120
2016	24359	130748	23709	118545	0	316120
2017	24359	130748	23709	118545	0	316120
2018	30448	163435	29636	148181	0	395150
2019	30448	163435	29636	148181	0	395150
2020	30448	163435	29636	148181	0	395150

Please note that due to minor changes introduced late in the development of this document, the credit value for 2006-2008 fuel cell EVs used in the model scenario differs from the value recommended in the revised staff proposal. As a result, the estimated number of AT PZEVs shown above differs slightly from the totals that would result using the values recommended in the revised staff report. Such differences are small and do not materially affect the emission results discussed below.

3.2 Environmental Impacts

This section updates discussion of the emission impacts of the proposed regulatory amendments presented in the January 10, 2003 staff report and the additional modifications described in this document. This section also describes the model and the underlying assumptions used to determine the emissions.

3.2.1 Introduction

The Mobile Source Emission Inventory, EMFAC2002, was used to assess the emission impacts of the current regulation as described in the 2001 ZEV amendments adopted in final form on April 12, 2002, and the proposed modifications. Using EMFAC, staff modeled various implementation scenarios applicable to the South Coast Air Basin representing the emissions from vehicles subject to this regulation.

Assuming that all manufacturers follow the alternative compliance path, the modified proposal would reduce the required number of pure ZEVs from 2005 through 2008 to approximately 250. The number of ZEVs required starting in 2009 would depend on the state of the technology as determined by the Board with input from an Expert Review Panel. In place of the ZEV percentage requirements, manufacturers likely would produce additional AT PZEVs. There would be no change to the allowable number of PZEVs.

3.2.2 Emissions Scenarios and Assumptions

To determine the emission impacts of the proposed modifications, staff prepared emission estimates for the South Coast Air Basin under three scenarios: the 2001 amendments, the January 10, 2003 proposed modifications, and the additional modifications described in this document. For the 2001 amendments and the January 10, 2003 proposal scenarios, staff used the worst case scenario (free credit trading and no voluntary production). For the additional proposed modifications scenario, staff used the assumptions and resulting vehicle totals described in Section 3.1.7 above. Reference or baseline emission values are based on the assumptions used for the current regulations contained in the December 8, 2000 ZEV Program Regulations amendments staff report. The

assumptions used in this analysis are the same as those presented in the January 10, 2003 staff report with the following additions:

- The estimated number of PZEVs required from intermediate manufacturers has been revised from the totals used in the January 2003 estimates as well as the 2001 rulemaking. The required number of PZEVs for intermediate manufacturers was held constant at 10 percent in the vehicle total estimates prepared for the proposed January 2003 amendments and the 2001 rulemaking. In reality, the intermediate manufacturer PZEV obligation increases along with the overall ZEV obligation beginning in 2009 and plateaus at 16 percent in 2018. Given the assumed intermediate manufacturer sales base, the difference in 2018 is about 100,000 PZEVs. This is a noticeable increase and would result in increased emission reductions as compared to a no-ZEV alternative. This change would not affect the 2001 to January 2003 relative comparison listed in the January 10, 2003 staff report, since the changes would cancel out.

Tables 3.1 and 3.2 below present the direct emissions for the South Coast Air Basin in 2010 and 2020 for the 2001 amendments, the staff's January 10, 2003 proposal, the current proposal, and a "No-ZEV" scenario.

Table 3.1
Summertime Direct Emissions, South Coast Air Basin in 2010
(Tons per day)

	ROG	NOx	CO
2001 Amendments	155.15	143.28	1571.28
Proposed January 2003 Amendments	155.14	143.26	1571.23
Proposed March 2003 Amendments	155.12	143.22	1571.05
No ZEV Program	155.50	144.24	1574.80

Table 3.2
Summertime Direct Emissions, South Coast Air Basin in 2020
(Tons per day)

	ROG	NOx	CO
2001 Amendments	87.62	65.75	791.04
Proposed January 2003 Amendments	87.81	65.74	791.07
Proposed March 2003 Amendments	87.58	65.58	787.50
No ZEV Program	90.86	67.81	807.38

Table 3.3 below presents the net changes in emissions for the modified proposal relative to the 2001 amendments, the January 2003 proposal, and a no-ZEV scenario.

Staff estimates that the modified proposal will result in a net decrease of about 0.09 tons per day of direct emissions of reactive organic gases (ROG) and oxides of nitrogen (NOx) in 2010 and a net decrease of about 0.21 tons per day of direct emissions of ROG and NOx in 2020 as compared to the 2001 amendments.

When compared to the January 2003 proposal, the modified proposed amendments will reduce approximately 0.06 and 0.39 tons per day of ROG and NOx by 2010 and 2020, respectively.

Finally, when compared to a no-ZEV scenario the modified proposed amendments will reduce approximately 1.40 and 5.51 tons per day of ROG and NOx by 2010 and 2020, respectively.

Table 3.3
Net Change – Modified Proposal
(Tons per day)

	ROG	NOx	CO
Net change from 2001 Amendments			
2010	-0.03	-0.06	-0.23
2020	-0.04	-0.17	-3.54
Net change from January Proposal			
2010	-0.02	-0.04	-0.18
2020	-0.23	-0.16	-3.57
Net change from No ZEV Program			
2010	-0.38	-1.02	-3.75
2020	-3.28	-2.23	-19.88

The proposed modifications show an increased benefit to air quality. The near term reduction of the number of ZEVs is countered by a relatively larger increase in AT PZEV vehicles, thereby increasing the number of clean vehicles in the South Coast Air Basin fleet. While the modified proposal provides an increased benefit to air quality, staff continues to emphasize that ZEVs will ultimately be needed to provide continuous clean air benefits over the life cycle of a typical car.

3.3 Environmental Justice Impacts

There should be no negative environmental justice or neighborhood impacts of the proposed regulatory amendments. The proposed amendments further ARB's mission of meeting health based air quality standards for all California citizens.

The ZEV regulations have already resulted in the development of a variety of automotive emission control advancements such as vehicles meeting SULEV standards, PZEV, hybrid electric vehicles, and alternatively fueled vehicles. These vehicles operate throughout California including the most highly impacted neighborhoods.

Often the most appropriate use for electric vehicles and alternatively fueled vehicles are fleet applications, particularly postal delivery and electric or gas utility meter reading and maintenance. This driving cycle takes place in all neighborhoods in California and is marked by frequent starts, stops, and idle; arguably a high emission driving cycle. Using an electric or alternatively fueled vehicle can eliminate or reduce this locally high emission source.

In addition, as these near-zero emission vehicles age their prices on the used car market will decrease making them affordable to people of lower incomes. The inclusion of a 150,000 mile warranty on the PZEV vehicle actually adds a financial advantage to such vehicles, establishing a used car market with reliable emissions performance. Depending on the manufacturer's chosen method of compliance the proposed amendments will facilitate the increased availability of the lowest emitting conventional vehicles now in production or of zero emission vehicles.

4. SUMMARY AND STAFF RECOMMENDATION

4.1 Summary of Staff Proposal

As presented, staff's proposed modifications would increase the near-term air quality benefits through the commercialization of large numbers of PZEVs and AT PZEVs. The proposal recognizes their substantial benefits and offers an alternative compliance path that will result in greater numbers of AT PZEVs while industry invests in pure ZEV technologies. At the same time, the regulation allows automakers the opportunity to focus their fuel cell research, development and deployment efforts. By establishing a panel of independent experts to assess and report on technology advances and progress towards commercialization, the ARB will be better able to respond with percentage requirements for commercialization as the technology becomes available.

The staff proposal contains the following specific amendments:

Amend the Percentage Categories. Return to the 2001 regulation percentage requirements for 2 percent pure ZEV, 2 percent AT PZEV, and 6 percent PZEV, increasing over time.

ZEV Credit Amounts. Retain the ZEV credit amounts from the January 2003 staff proposal, except that 2006-2008 Type III ZEVs (fuel cells) would earn 40 credits through 2008.

Compliance Flexibility. Manufacturers that meet a "floor" requirement for production of new Type III ZEVs would be allowed to use AT PZEV credit earned by vehicles (excluding transportation system credit) in the gold category in the 2005-2008 model years. For 2009 and beyond, all manufacturers would have this option. This option would remain in force until the Board took action to modify the program structure, based on input from an Independent Expert Review Panel.

"Travel." Type III ZEVs placed in any state that has adopted California's ZEV program would count towards California's ZEV requirement.

Establish Independent Expert Review Panel. The alternative compliance option would be in force until modified by the Board. Information collected by the Independent Expert Review Panel would provide a basis for Board action to modify the ZEV requirement as appropriate for post-2009 model years.

Advanced Componentry Scoring. Establish a 3-level system based on voltage and motor size, with larger credits for use of components that have the greatest relevance to technology needed for ZEVs.

Sell-by Date. Establish a sell-by-date of September 30, 2003 for the 2002 model year and June 30 of the following calendar year for 2003 and later model years.

Additional clarifying and corrective modifications. The proposal contains several minor clarifying and corrective modifications.

4.2 Issues Identified in the January 2003 Staff Proposal

Since the release of the staff proposal on January 10, 2003, staff has continued efforts to resolve the issues raised in Section 8.2 of the Initial Statement of Reasons. Some of the identified issues are addressed in the proposed additional modifications. This section discusses the two issues that are not addressed in the proposed modifications.

4.2.1 ZEV Credit for Fueling Infrastructure Deployment

Staff has evaluated the generation of credit from the installation of refueling stations that support ZEVs, such as hydrogen refueling stations. While discussion on the appropriateness of such credit has continued, insufficient support and justification has been presented. Therefore, ARB staff recommends that no regulatory incentives be included at this time.

4.2.2 ZEV Credit for Placement of Stationary Fuel Cells

It has been suggested that the development of fuel cell technology for automobile applications would benefit greatly from the improvement and demonstration of the same fuel cell stack technology in stationary applications. Staff has received requests that credit be granted for placement of stationary fuel cells as a means to further development and to reduce costs for eventual commercialization in vehicles. ARB staff believes that it is not appropriate to provide credits for stationary applications in motor vehicle regulations, because this would create troublesome precedent for all other rulemakings. Staff also believes that there is potential for adverse anti-competitive effect on the stationary fuel cell industry. Finally, there are also enforcement difficulties.

4.3 Issues Related to Additional Proposed Modifications

This section discusses two issues that have arisen in the context of the additional proposed modifications. Staff anticipates further discussion of these issues prior to and at the March Board hearing.

4.3.1 Encouragement of All ZEV Technologies in Alternative Compliance Path

In developing the alternative compliance path option, staff considered the goals of the program, including advancement of ZEV technology to further California's

vision of ZEV commercialization. Staff has chosen to propose a credit-based approach to establish vehicle volumes for fuel cell vehicles in the near term. The volume established for these Tier III ZEVs is significant and accomplishes the goal of demonstrating and deploying a meaningful quantity of fuel cell vehicles in California.

However, the ZEV regulations have traditionally been technology neutral and staff has been exploring how to define a meaningful advancement target for development and deployment of battery electric vehicles that may be integrated into the Alternative Compliance Path Option. At this stage in battery electric vehicle commercialization, what matters is cost and volume. Staff has received comment that the key to commercialization of battery electric vehicles is volume increases in order to reduce costs of componentry. At issue therefore is how to structure an Alternative Compliance Plan approach that both advances Type III ZEVs at meaningful and appropriate levels while at the same time allowing manufacturers the option to advance Type I and II ZEVs through larger volumes than demonstrated to date.

Under the proposed credit structure, manufacturers must produce a total of about 10,000 credits worth of Type III ZEVs (250 vehicles at 40 credits per vehicle). If Type I and II ZEVs were allowed to satisfy the Alternative Compliance Option credit obligation using their proposed credit levels, only about 1,000 Type II ZEVs (at 10 credits each) or about 1,400 Type I ZEVs (at 7 credits each) would be required industry wide over the four-year stage.

Staff is soliciting assistance and comment on the issue described above. Several alternatives have been discussed, including developing a credit structure for a separate Alternative Compliance Path Option for Type I (City EV) and Type II (full function BEV) ZEVs. The goal of such an alternative structure would be to have the ratio of credits as compared to Type III ZEVs establish an appropriate volume requirement for all ZEV types that reflects their state of development and progress towards commercialization.

4.3.2 ZEV Requirements for 2009 and Beyond

Under the modified staff proposal, manufacturers would be allowed to use AT PZEV credits in the gold category until the Board takes action to eliminate or limit this flexibility. In order to take advantage of the option, manufacturers would be required to produce a minimum number of Type III ZEVs in model years 2001 through 2008, but no such requirement exists for 2009 and later model years. Staff anticipates that some stakeholders will argue for the retention of a minimum production requirement throughout the program. In staff's view there is not sufficient information to set such a target at this point; that is why the staff proposal relies on a subsequent Board action based on input from the Independent Expert Review Panel. Staff recognizes, however, that the presence or absence of a long-term requirement has significant implications to investors, to

potential consumers, and to all who monitor technological development. This is fundamentally a policy issue, and staff expects this issue to be specifically considered by the Board at its March hearing.

4.4 Staff Recommendation

The ARB staff recommends that the Board amend, with the suggested modifications to the original proposal, section 1962, Title 13, California Code of Regulations, and the incorporated “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 proposed modified amendments to section 1962 are set forth in the Staff’s Suggested Modifications to the Proposed Regulation Order in Appendix A.