California Air Resources Board

PUBLIC MEETING AGENDA

July 22-23, 2004
9:00 a.m. / 8:30 a.m.

04-7-1 Report to the Board on a Health Update- Mechanisms to Particulate Toxicity

04-7-2 Public Meeting to Consider a Research Proposal

04-7-3 Public Hearing to Consider the Adoption of the Airborne Toxic Control Measure (ATCM) to Limit Diesel-Fueled Commercial Motor Vehicle Idling

04-7-4 Report to the Board on Recent Development in Climate Change

04-7-5 Public Hearing to Consider the Amendments to the Unihose Dispenser Requirements in the Regulation for Certification of Vapor Recovery System of Dispensing Facility

04-7-6 Report to the Board on an Update on the Carbon Monoxide Maintenance SIP for Ten Areas

04-6-2 Report to the Board on an Update on the Implementation of ARB's Environmental Justice Policies and Actions

04-6-3 Report to the Board on ARB's Environmental Justice Program: Evaluation and Recommendation

Includes AcrobatTM ReaderTM

PC and Mac Compatible

California Environmental Protection Agency

ELECTRONIC BOARD BOOK

LOCATION:

Air Resources Board
Central Valley Auditorium, Second Floor
1001 I Street
Sacramento, California 95814

California Environmental Protection Agency

Air Resources Board

PUBLIC MEETING AGENDA

This facility is accessible by public transit. For transit information, call (916) 321-BUSS, website: http://www.sacrt.com
(This facility is accessible to persons with disabilities.)

July 22 - 23, 2004
9:00 a.m./8:30 a.m.

04-7-1 Report to the Board on a Health Update - Mechanisms to Particulate Toxicity

Staff will discuss findings that exposure to Airborne Particulate Matter (PM) has been linked to thousands of deaths and to hundreds of thousands of cases of respiratory symptoms and asthma attacks in California each year. To investigate how exposure to PM might lead to these outcomes, the ARB funded three-campus collaboratives with researchers from UC San Francisco, UC Irvine, and UC Davis. The three groups used similar exposure conditions: a laboratory-generated PM mixture of ammonium nitrate and carbon black. Both human clinical studies on asthmatic volunteers and animal model studies were conducted. Staff will share their findings and discuss how this will help us understand how particles affect human health.

04-7-2 Public Meeting to Consider a Research Proposal

"Characterization and Quantification of Emissions from Office Machines," University of California, Berkeley, Proposal No. 2551-243.

04-7-3 Public Hearing to Consider the Adoption of the Airborne Toxic Control Measure (ATCM) to Limit Diesel-Fueled Commercial Motor Vehicle Idling

Staff will propose adoption of an Airborne Toxic Control Measure (ATCM) to Limit Idling of Diesel-Fueled Commercial Motor Vehicles. The unnecessary idling of heavy-duty diesel-fueled motor vehicles is responsible for approximately 438 tons per year of particulate matter (PM) emissions, and more than 20,000 tons per year of nitrogen oxides emissions. The proposed ATCM will restrict idling of diesel-fueled commercial motor vehicles with a gross vehicle weight rating (GVWR) greater than 10,000 pounds to no more than 5 minutes at any location. In addition, idling for the purpose of providing power during sleep or rest periods will be restricted beginning January 1, 2009.

TO SUBMIT WRITTEN COMMENTS ON AN AGENDA ITEM IN ADVANCE OF THE MEETING:

CONTACT THE CLERK OF THE BOARD, 1001 I Street, 23rd Floor, Sacramento, CA 95814 (916) 322-5594
FAX: (916) 322-3928
ARB Homepage: www.arb.ca.gov

To request special accommodation or language needs, please contact the following:

- TTY/TDD/Speech-to-Speech users may dial 7-1-1 for the California Relay Service.
- Assistance for Disability-related accommodations, please go to http://www.arb.ca.gov/html/ada/ada.htm or contact the Air Resources Board ADA Coordinator, at (916) 323-4916.
- Assistance in a language other than English, please go to http://inside.arb.ca.gov/as/eeo/languageaccess.htm or contact the Air Resources Board Bilingual Coordinator, at (916) 324-5049.

SMOKING IS NOT PERMITTED AT MEETINGS OF THE CALIFORNIA AIR RESOURCES BOARD

04-7-4 Report to the Board on Recent Developments in Climate Change

This presentation shares with the Board some of the information presented at the 2004 Haagen-Smit Symposium on Climate Change, as well as familiarizes the Board with concepts that will be considered when the climate change regulation is presented at the September Board meeting. Several distinguished scientists are invited to give presentations in their respective research areas.

04-7-5 Public Hearing to Consider the Amendments to the Unihose Dispenser Requirements in the Regulation for Certification of Vapor Recovery System of Dispensing Facility

Staff will propose revisions to the unihose gasoline dispenser requirement to keep enhanced vapor recovery system upgrades cost-effective. The revisions will allow station operators to change to a system compatible with onboard refueling vapor recovery (ORVR) vehicles without forcing a change to unihose dispensers.

04-7-6 Report to the Board on an Update on the Carbon Monoxide Maintenance SIP for Ten Areas

The Board will consider adoption of an update to the State Implementation Plan (SIP) showing how ten areas of California that attained the federal carbon monoxide standard by 1993 will continue to maintain it through 2018. The revision will include an updated inventory and motor vehicle emission budgets for transportation conformity as well.

04-6-2 Report to the Board on an Update on the Implementation of ARB's Environmental Justice Policies and Actions

This item will give ARB's status report on the implementation of the ARB's Environmental Justice Policies and Actions since January 2003. It will include a description of products and technical tools completed during that period and a preview of future activities.

04-6-3 Report to the Board on ARB's Environmental Justice Program: Evaluation and Recommendation

Report by Hewlett Foundation Fellow on ARB's Environmental Justice Program.

This independent report will discuss the progress of ARB's Environmental Justice Program and recommendations for further action.

OPEN SESSION TO PROVIDE AN OPPORTUNITY FOR MEMBERS OF THE PUBLIC TO ADDRESS THE BOARD ON SUBJECT MATTERS WITHIN THE JURISDICTION OF THE BOARD.

Although no formal Board action may be taken, the Board is allowing an opportunity to interested members of the public to address the Board on items of interest that are within the Board's jurisdiction, but that do not specifically appear on the agenda. Each person will be allowed a maximum of five minutes to ensure that everyone has a chance to speak.

THOSE ITEMS ABOVE THAT ARE NOT COMPLETED ON JULY 22 WILL BE HEARD BEGINNING AT 8:30 A.M. ON JULY 23.

THE AGENDA ITEMS LISTED ABOVE MAY BE CONSIDERED IN A DIFFERENT ORDER AT THE BOARD MEETING.

LOCATION:

Air Resources Board
Central Valley Auditorium, Second Floor
1001 I Street
Sacramento, California 95814

California Environmental Protection Agency

Air Resources Board

INDEX

This facility is accessible by public transit. For transit information, call (916) 321-BUSS, website: http://www.sacrt.com
(This facility is accessible to persons with disabilities.)

July 22 - 23, 2004
9:00 a.m./8:30 a.m.

TO SUBMIT WRITTEN COMMENTS ON AN AGENDA ITEM IN ADVANCE OF THE MEETING:

CONTACT THE CLERK OF THE BOARD, 1001 I Street, 23rd Floor, Sacramento, CA 95814 **(916) 322-5594**
FAX: (916) 322-3928
ARB Homepage: www.arb.ca.gov

To request special accommodation or language needs, please contact the following:

- TTY/TDD/Speech-to-Speech users may dial 7-1-1 for the California Relay Service.
- Assistance for Disability-related accommodations, please go to http://www.arb.ca.gov/html/ada/ada.htm or contact the Air Resources Board ADA Coordinator, at (916) 323-4916.
- Assistance in a language other than English, please go to http://inside.arb.ca.gov/as/eeo/languageaccess.htm or contact the Air Resources Board Bilingual Coordinator, at (916) 324-5049.

SMOKING IS NOT PERMITTED AT MEETINGS OF THE CALIFORNIA AIR RESOURCES BOARD

State of California

AIR RESOURCES BOARD

Research Resolution

Research Division

July 22, 2004

INTRODUCTION

Contained herein for Board review is one resolution and accompanying summaries from the Extramural Research Program recommended to the Board by the Research Screening Committee.

Item 1 is a research proposal, Resolution 04-24, from the University of California, Berkeley, entitled, "Quantifying Pollutant Emissions from Office Equipment". The principal investigator will be Professor Thomas E. McKone, Ph.D. Resolution No. 04-24.

PROPOSED

State of California
AIR RESOURCES BOARD

RESEARCH PROPOSAL

Resolution 04-24

July 22, 2004

Agenda Item No.: 04-7-2

WHEREAS, the Air Resources Board has been directed to carry out an effective research program in conjunction with its efforts to combat air pollution, pursuant to Health and Safety Code sections 39700 through 39705;

WHEREAS, a research proposal, number 2551-243, entitled "Quantifying Pollutant Emissions from Office Equipment", has been submitted by the University of California at Berkeley;

WHEREAS, the Research Division staff has reviewed and recommended this proposal for approval; and

WHEREAS, the California Energy Commission has agreed to sponsor this proposal in full; and

WHEREAS, the Research Screening Committee has reviewed and recommends for funding:

> Proposal Number 2551-243 entitled "Quantifying Pollutant Emissions from Office Equipment", submitted by the University of California at Berkeley, for a total amount not to exceed $799,279.

NOW, THEREFORE BE IT RESOLVED, that the Air Resources Board, pursuant to the authority granted by Health and Safety Code section 39703, hereby accepts the recommendation of the Research Screening Committee and approves the following:

> Proposal Number 2551-243 entitled "Quantifying Pollutant Emissions from Office Equipment", submitted by the University of California at Berkeley, for a total amount not to exceed $799,279.

BE IT FURTHER RESOLVED, that the Executive Officer is hereby authorized to initiate administrative procedures and execute all necessary documents and contracts for the research effort proposed herein, and as described in Attachment A, in an amount not to exceed $799,279.

ATTACHMENT A

"Quantifying Pollutant Emissions from Office Equipment"

Background
There is increasing concern that commonly used office equipment such as printers and personal computers emit air pollutants at rates that can have adverse health impacts. A short list of studies have been conducted over the last decade that have found various pollutants including VOCs, ozone, and PM to be emitted at levels that may impact health. However, these studies have generally only focused on one type of equipment and one or two pollutants or pollutant groups, and none have focused on office equipment possessing a high share of the California market. Most importantly, ultrafine PM and a number of semi-volatile organic compounds (SVOCs) have not been measured from office equipment in previous studies. Methods by which the equipment users can reduce emissions or reduce their exposures to the pollutants from office equipment also have not been studied. This study would be the first comprehensive study of emissions and energy use from personal computers and printers.

The ARB is interested in obtaining better data on emissions from office equipment in order to assess Californians' indoor exposures to Toxic Air Contaminants, as required under HSC 39660.5. The ARB could also use the data in providing guidance to the public and to other agencies regarding their indoor exposures and approaches to reduce those exposures. The California Energy Commission (Commission) is interested in this information because of the increased energy requirements of office equipment, both from its operation and from the increased ventilation requirements attributable to the added heat load and emissions. The funding for this project is being provided through the Commission's Public Interest Energy Research (PIER) program.

Objective
There are four primary objectives of the proposed study. The first objective is to identify and quantify the emission rates of air pollutants emitted by office printers and personal computers by measuring the concentrations of these pollutants while the equipment is operated in a chamber. The second objective is to understand the temporal and operational factors which influence emissions from office printers and personal computers. Tests designed to understand these factors will also permit the evaluation of the variation in emissions from different types of equipment that are in use. The project will investigate the relationship between energy consumption and emissions for machines performing comparable tasks. Finally, operational practices that would reduce equipment emissions will also be identified.

Methods
A series of chamber tests would be conducted in which personal computers and printers are place in a sealed chambers (20 cubic meters and one cubic meter), whereby emissions are measured while the equipment is operated over prescribed duty cycles at controlled experimental conditions (e.g., temperature, air flow rate).

Energy use of the equipment will also be measured, and attempts will be made to estimate the heating loads that result from equipment operation. Finally, the identification of measures that operators can take to reduce emissions and exposures will be investigated in this project.

Expected Results
It is expected that the results of this project will provide the first set of comprehensive data on emissions from personal computers and printers, and the relationship between energy use and emissions for this equipment.

Significance to the Board
The ARB and the Commission will have data that can be used to evaluate the health effects of office equipment, ways to reduce the health effects of emissions from office equipment, and the relationship between energy use and emissions from this equipment. The results of this project will allow more feasible and cost-effective air quality and energy policies to be implemented.

Contractor:
University of California at Berkeley

Contract Period:
36 months

Principal Investigator (PI):
Dr. Thomas E. McKone

Contract Amount:
$799,279

Cofunding:
The California Energy Commission is funding this contract in full.

Basis for Indirect Cost Rate:
The State and the UC system have agreed to a ten percent indirect cost rate.

Past Experience with this Principal Investigator:
Previous work done in this area by both the Principal Investigator and subcontractor make them highly qualified to perform the work in this project.

Prior Research Division Funding to UCB:

Year	2003	2002	2001
Funding	$714,563*	$1,906,974	$296,261

* $445,864 from the California Energy Commission

BUDGET SUMMARY

University of California at Berkeley

Quantifying Pollutant Emissions from Office Equipment

DIRECT COSTS AND BENEFITS			
1.	Labor and Employee Fringe Benefits	$424,488	
2.	Subcontractors	$234,954	
3.	Equipment	$ 23,000	
4.	Travel and Subsistence	$ 2,880	
5.	Electronic Data Processing	$ 0	
6.	Reproduction/Publication	$ 1,750	
7.	Mail and Phone	$ 1,000	
8.	Supplies	$ 58,950	
9.	Analyses	$ 0	
10.	Miscellaneous	$ 3,000	
	Total Direct Costs		$750,022
INDIRECT COSTS			
1.	Overhead	$ 49,257	
2.	General and Administrative Expenses	$ 0	
3.	Other Indirect Costs	$ 0	
4.	Fee or Profit	$ 0	
	Total Indirect Costs		$49,257
TOTAL PROJECT COSTS			**$799,279**

Attachment 1

SUBCONTRACTORS' BUDGET SUMMARY

Subcontractor: Lawrence Berkeley National Laboratory

Description of subcontractor's responsibility: Lawrence Berkeley National Lab will provide the 20 cubic meter chamber that will be used in the testing, and will assist in the conducting of the screening tests and the individual equipment tests.

DIRECT COSTS AND BENEFITS			
1.	Labor and Employee Fringe Benefits	$103,226	
2.	Subcontractors	$ 0	
3.	Equipment	$ 0	
4.	Travel and Subsistence	$ 0	
5.	Electronic Data Processing	$ 0	
6.	Reproduction/Publication	$ 0	
7.	Mail and Phone	$ 2,160	
8.	Supplies	$ 16,275	
9.	Analyses	$ 0	
10.	Miscellaneous	$ 26,000	
	Total Direct Costs		$147,661
INDIRECT COSTS			
1.	Overhead	$ 66,921	
2.	General and Administrative Expenses	$ 0	
3.	Other Indirect Costs	$ 20,372	
4.	Fee or Profit	$ 0	
	Total Indirect Costs		$ 87,293
TOTAL PROJECT COSTS			**$234,954**

TITLE 13. CALIFORNIA AIR RESOURCES BOARD

NOTICE OF PUBLIC HEARING TO CONSIDER THE ADOPTION OF PROPOSED AIRBORNE TOXIC CONTROL MEASURE TO LIMIT DIESEL-FUELED COMMERCIAL MOTOR VEHICLE IDLING

The Air Resources Board (ARB or Board) will conduct a public hearing at the time and place noted below to consider adopting a regulation to reduce public exposure to diesel exhaust particulate matter (diesel PM) and other toxic air contaminants (TAC) by limiting unnecessary idling from specified vehicular sources.

DATE: July 22, 2004

TIME: 9:00 a.m.

PLACE: California Environmental Protection Agency
Air Resources Board
Central Valley Auditorium
1001 I Street
Sacramento, California 95814

This item will be considered at a two-day meeting of the ARB, which will commence at 9:00 a.m., on Thursday, July 22, 2004, and may continue at 8:30 a.m., Friday, July 23, 2004. This item may not be considered until Friday, July 23, 2004. Please consult the agenda for the meeting, which will be available at least ten days before July 22, 2004, to determine the day on which this item will be considered.

If you have a disability-related accommodation need, please go to http://www.arb.ca.gov/html/ada/ada.htm for assistance or contact the ADA Coordinator at (916) 323-4916. If you are a person who needs assistance in a language other than English, please go to http://www.arb.ca.gov/as/eeo/languageaccess.htm or contact the Bilingual Coordinator at (916) 324-5049. TTY/TDD/Speech-to-Speech users may dial 7-1-1 for the California Relay Service.

INFORMATIVE DIGEST OF PROPOSED ACTION AND POLICY STATEMENT OVERVIEW

Sections Affected: Proposed adoption of Chapter 10 - Mobile Source Operational Controls, Article 1- Motor Vehicles, section 2485, title 13, California Code of Regulations (CCR).

Background

The Board identified diesel particulate matter (PM) as a toxic airborne contaminant (TAC) in August 1998. In September 2000, the Board adopted the "Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles (DRRP)" which established a goal of reducing emissions and the resultant health risk from virtually all diesel-fueled engines and vehicles in the state of California by the year 2020. The DRRP identified various methods for reducing emissions of diesel PM including new, more stringent standards for all new diesel-fueled engines and vehicles, the replacement of older in-use engines with new cleaner engines, the use of diesel emission control strategies on in-use engines, and the use of low sulfur diesel fuel.

The major sources of diesel-PM are the approximately 1,250,000 diesel-fueled engines in vehicles and equipment used in California. Diesel exhaust from excessive idling imposes significant adverse health and environmental impacts on all Californians. Diesel exhaust is a complex mixture of thousands of gases and fine particles that contains more than 40 identified toxic air contaminants. These include many known or suspected cancer-causing substances, such as benzene, arsenic and formaldehyde. Diesel exhaust can irritate the eyes, nose, throat, and lungs. It can cause coughs, headaches, light-headedness, and nausea. Diesel exhaust is a major source of ambient particulate matter pollution as well, and numerous studies have linked elevated particle levels in the air to increased hospital admission, emergency room visits, asthma attacks, and premature deaths among those suffering from respiratory problems.

Human health and the environment are adversely affected by the air pollutants emitted by idling diesel-fueled engines. An estimated 449 tons of diesel PM will be generated in California in 2004 from commercial motor vehicle idling. Nitrogen oxides (NO_x) emissions from idling are estimated to be nearly 19,878 tons per year. Because of the high potency of diesel PM and the potential for large numbers of diesel-fueled engines to idle at one location (e.g.,truck stops), staff believes that there are situations where the estimated 70-year potential cancer risk resulting from exposure to diesel PM emissions will be in excess of 10 in a million.

ARB staff has prepared an Initial Statement of Reasons (ISOR) for the Proposed ATCM that, along with the DRRP, serves as the report on the need and appropriate degree of regulation for reducing idling of diesel-fueled commercial motor vehicles.

Description of the Proposed Regulatory Action

The Proposed ATCM to limit motor vehicle idling is designed to reduce the general public's exposure to diesel PM, other TACs, and air pollutants. The Proposed ATCM would apply to diesel-fueled commercial motor vehicles with gross vehicle weight ratings (GVWR) greater than 10,000 pounds operating in California, regardless of the state or country in which the vehicle is registered.

The requirements of the Proposed ATCM would impact both the public and private transportation industries. Public agencies that could be affected are transit agencies and public agencies with heavy-duty vehicles. Private businesses that could be affected are private transit and tour bus operations, contractors, distributors, transporters, delivery services, and heavy-duty vehicle fleets. Agencies and businesses would be affected to the extent they own, operate, or direct the operation of buses and heavy-duty vehicles.

The Proposed ATCM would be implemented in two phases. Phase one eliminates general unnecessary idling and would be implemented immediately upon approval of the Proposed ATCM into state law. The driver of a subject vehicle would be required to manually shut off the engine before the idling time limit of five minutes is reached. Buses, including transit, tour and coach, are not subject to the five minute idling restriction when passengers are on board and are allowed no more than 10 minutes of idling time prior to boarding of passengers to allow the passenger compartment adequate time to acclimate for passenger comfort.

Phase two of the Proposed ATCM would restrict idling of the main truck engine or diesel-fueled auxiliary power system (APS) during driver rest periods and becomes effective January 1, 2009. Options to comply with the restricted idling limitations would include shutting off the engine where weather conditions allow, off-board and on-board electrification, and non diesel-fueled auxiliary power systems. ARB staff intends to return to the Board in 2005 to propose procedures and specifications under which diesel-fueled APS units would be allowed to operate beyond January 1, 2009.

The Executive Officer has proposed circumstances under which exceptions to the Proposed ATCM's idle limits may be determined necessary. Idling restrictions contained in the Proposed ATCM would not apply when idling is necessary to prevent safety or health emergencies or when idling is necessary due to adverse weather conditions such as dense fog. Idling limits would not apply when the vehicle is stopped in situations in which the driver has no control such as being stopped at a traffic signal, railroad crossing, or construction zone. The Proposed ATCM's idle limitations would not apply when idling is necessary during servicing, testing, vehicle inspections or when idling is necessary to perform work for which the vehicle was designed such as turning a cement mixer. Additionally, the Executive Officer has proposed that when vehicles are within 100 feet of designated restricted areas, owners/operators would eliminate unnecessary cueing and extended driver rest period main engine idling; that is, they would remain subject to phase one restrictions.

AVAILABILITY OF DOCUMENTS AND AGENCY CONTACT PERSONS

The Board staff has prepared a Staff Report: Initial Statement of Reasons for the Proposed ATCM, which includes a summary of the potential environmental and economic impacts of the proposal. The ISOR is entitled, "Staff Report: Initial Statement of Reasons for the Proposed Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling."

Copies of the ISOR and the full text of the proposed regulatory language may be obtained from the Public Information Office, Air Resources Board, 1001 I Street, Visitors and Environmental Services Center, 1st Floor, Sacramento, CA 95814, (916) 322-2990, at least 45 days prior to the scheduled hearing (July 22, 2004).

Upon its completion, the Final Statement of Reasons (FSOR) will be available and copies may be requested from the agency contact persons in this notice, or may be accessed at the web site listed below.

This notice, the ISOR and proposed regulatory text described therein, and all subsequent regulatory documents, including the FSOR, when completed, are available on the ARB Internet site at http://www.arb.ca.gov/regact/idling/idling.htm.

Inquiries concerning the substance of the Proposed ATCM may be directed to the designated agency contact persons, John Kato, Manager of the Project Support Section, at (916) 322-2891, or by email at jkato@arb.ca.gov and John Gruszecki, PE, Air Resources Engineer, at (916) 327-5601, or by email at jgruszec@arb.ca.gov.

The agency representative and designated back-up contact persons to whom nonsubstantive inquiries concerning the proposed administrative action may be directed are Artavia Edwards, Manager, Board Administration & Regulatory Coordination Unit, (916) 322-6070, or Alexa Malik, Regulations Coordinator, (916) 322-4011. The Board has compiled a record for this rulemaking action, which includes all the information upon which the proposal is based. This material is available for inspection upon request to the contact persons.

If you have a disability-related accommodation need, please go to http://www.arb.ca.gov/html/ada/ada.htm for assistance or contact the ADA Coordinator at (916) 323-4916. If you are a person who needs assistance in a language other than English, please go to http://www.arb.ca.gov/as/eeo/languageaccess.htm or contact the Bilingual Coordinator at (916) 324-5049. TTY/TDD/Speech-to-Speech users may dial 7-1-1 for the California Relay Service.

COSTS TO PUBLIC AGENCIES AND TO BUSINESSES AND PERSONS AFFECTED

The determinations of the Board's Executive Officer concerning the costs or savings necessarily incurred by public agencies and private persons and businesses in reasonable compliance with the Proposed ATCM are presented below.

Pursuant to Government Code section 11346.5(a)(5), the Executive Officer has determined that the Proposed ATCM will not impose a mandate on local agencies or school districts. The Executive Officer has further determined pursuant to Government Code section 11346.5(a)(6) that the Proposed ATCM will result in some additional costs to the ARB and other state agencies. In addition, the Executive Officer has determined pursuant to Government Code section 11346.5(a)(6) that the Proposed ATCM will not create a cost to local agencies that are required to be reimbursed under Part 7 (commencing with section 17500) of Division 4 of the Government Code or other non-discretionary costs or savings imposed on local agencies or school districts. The Executive Officer further determined that the Proposed ATCM would not result in costs or savings in federal funding to the State.

The Executive Officer has determined that the Proposed ATCM will have an insignificant impact on costs to local agencies or school districts and will most likely result in cost savings. Cost savings will result from reduced fuel and maintenance costs due to reduced idling and should offset any cost associated with driver compliance education. Statewide, the total number of trucks equipped with sleeper berths owned or operated by local agencies and school districts is not known, but is expected to be very small, if any. The cost impact to any local agency or school district should therefore be very small.

Some minor costs will occur for state agencies that own and operate diesel-fueled commercial motor vehicles but will most likely result in cost savings. Cost savings will result from reduced fuel and maintenance costs due to reduced idling and should offset any cost associated with driver compliance education. Statewide, the total number of trucks equipped with sleeper berths owned or operated by state agencies is not known, but is expected to be small. Since these costs are insignificant compared to their overall budget, staff believes that the costs will easily be met within existing budgets.

The Executive Officer has determined that the total cost for implementing the Proposed ATCM for state agencies will be approximately $25,000 per year for outreach efforts in 2003 expenditure equivalent dollars. While the ARB is expected to absorb enforcement activities within current budgets and with current staff for the foreseeable future, if monies become available, an additional 12 person years could be required for enforcement. Initial outlay will not be necessary until fiscal year 2005-2006. The affected state agencies are ARB, California Highway Patrol, and potentially other state law enforcement agencies. It is anticipated that the agencies will be able to absorb costs, given the extended period allowed for compliance.

In developing this regulatory proposal, the ARB staff evaluated the potential economic impacts on representative private persons or businesses. The ARB is not aware of any cost impacts that a representative private person or business would necessarily incur in reasonable compliance with the proposed action.

The Executive Officer has made an initial determination that the Proposed ATCM will not have a significant statewide adverse economic impact directly affecting businesses, including the ability of California businesses to compete with businesses in other states, or on representative private persons.

The Executive Officer has determined, pursuant to title 1, CCR, section 4, that the Proposed ATCM will have a positive cost-savings impact on small businesses. The ARB staff believes that nearly 73 percent of affected businesses are small businesses.

The Executive Officer has determined that the total cost savings of the Proposed ATCM to affected businesses will be approximately $575 million for both cost/benefit analysis windows (phase one 2005 – 2009 and phase two 2009 – 2013), in 2003 equivalent dollars. This value represents the total cost savings of the Proposed ATCM if all money required to comply and all monetary benefits were spent or generated today. On an annual basis, the cost savings will vary between $17 to greater than $113 million per year. The cost savings for a typical business, including capital costs, is estimated to be up to $425 per vehicle per year in 2003 equivalent dollars. Additionally, owners and operators are expected to enjoy cost savings outside of the cost/benefit analysis windows for the lifetime of the regulation. The ARB staff estimates that the annual cost savings, including capital costs, to a typical small business (a fleet of seven or less vehicles) will be up to $425 per vehicle per year in 2003 equivalent dollars.

In accordance with Government Code sections 11346.3 and 11346.5(a)(10), the Executive Officer has determined that the Proposed ATCM may lead to creation or elimination of some businesses, the creation of new businesses or elimination of existing businesses within the State of California, or the expansion of businesses currently doing business within the State of California. The Proposed ATCM could create a demand in manufacturing and services of automotive diesel idle reduction technologies. The Proposed ATCM could also have a positive impact on the creation and expansion of jobs and businesses, especially for companies engaged in the engineering, design, and manufacture of auxiliary power systems. In the service sector, the Proposed ATCM could positively impact job creation at locations that choose to provide on- and off-board truck stop electrification services.

A detailed assessment of the economic impacts can be found in the ISOR.

CONSIDERATION OF ALTERNATIVES

Before taking final action on the proposed regulatory action, the Board must determine that no reasonable alternative considered by the agency or that has otherwise been identified and brought to the attention of the agency would be more effective in carrying out the purpose for which the action is proposed or would be as effective and less burdensome to affected private persons or businesses than the proposed action.

SUBMITTAL OF COMMENTS

The public may present comments relating to this matter orally or in writing at the hearing and in writing or by e-mail before the hearing. To be considered by the Board, written submissions not physically submitted at the hearing must be received **no later than 12:00 noon, July 21, 2004,** and addressed to the following:

Postal mail is to be sent to: Clerk of the Board
Air Resources Board
1001 "I" Street, 23rd Floor
Sacramento, California 95814

Electronic mail is to be sent to: idling@listserv.arb.ca.gov and received at the ARB **no later than 12:00 noon, July 21, 2004.**

Facsimile submissions are to be transmitted to the Clerk of the Board at (916) 322-3928 and received at the ARB **no later than 12:00 noon, July 21, 2004.**

The Board requests but does not require 30 copies of any written submission. Also, the ARB requests that written, facsimile, and e-mail statements be filed at least 10 days prior to the hearing so that ARB staff and Board Members have time to fully consider each comment. The ARB encourages members of the public to bring to the attention of staff in advance of the hearing any suggestions for modification of the proposed ATCM.

STATUTORY AUTHORITY

This regulatory action is proposed under the authority granted to the ARB in the California Health and Safety Code sections 39600, 39601, 39658, 39614 (b) (6) (A)

39667, 39674, 43000.5 (d), 43013 (b), 43013 (h), 43018 (b), and 43018 (c) and Western Oil & Gas Assn. v. Orange County Air Pollution Control Dist. (1975) [14 Cal.3d.411]. This action is proposed to implement, interpret, or make specific Health and Safety Code sections 39002, 39003, 39027, 39500, 39600, 39650, 39655, 39656, 39657, 39658, 39659, 39662, 39665, 39674, 39675, and 42403.5; Vehicle Code Sections 305, 336, 350, 440, 445, 545, 546, 642, 680, 21400, 22452, 22515, and 27153; and *California Code of Regulations sections* 1201,1900, 1962, and 2480, *title* 13.

HEARING PROCEDURES

The public hearing will be conducted in accordance with the California Administrative Procedure Act, title 2, division 3, part 1, chapter 3.5 (commencing with section 11340) of the Government Code.

Following the public hearing, the ARB may adopt the regulatory language as originally proposed or with non-substantial or grammatical modifications. The ARB may also adopt the proposed regulatory language with other modifications if the modifications are sufficiently related to the originally proposed text that the public was adequately placed on notice that the regulatory language as modified could result from the proposed regulatory action. In the event that such modifications are made, the full regulatory text, with the modifications clearly indicated, will be made available to the public for written comment at least 15 days before it is adopted.

The public may request a copy of the modified regulatory text from the ARB's Public Information Office, 1001 I Street, Visitors Environmental Services Center, 1st Floor, Sacramento, California 95814, (916) 322-2990.

CALIFORNIA AIR RESOURCES BOARD

Catherine Witherspoon
Executive Officer

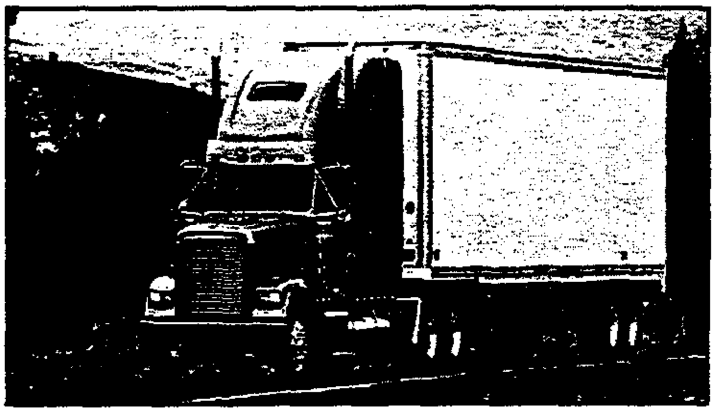
Date: May 25, 2004

"The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our Web-site at www.arb.ca.gov."

California Environmental Protection Agency

AIR RESOURCES BOARD

STAFF REPORT: INITIAL STATEMENT OF REASONS FOR PROPOSED RULEMAKING



AIRBORNE TOXIC CONTROL MEASURE TO LIMIT DIESEL-FUELED COMMERCIAL MOTOR VEHICLE IDLING

Stationary Source Division
Project Assessment Branch

July 2004

State of California
AIR RESOURCES BOARD

STAFF REPORT: INITIAL STATEMENT OF REASONS FOR PROPOSED RULEMAKING

Public Hearing to Consider

ADOPTION OF THE PROPOSED AIRBORNE TOXIC CONTROL MEASURE TO LIMIT DIESEL-FUELED COMMERCIAL MOTOR VEHICLE IDLING

To be considered by the Air Resources Board on July 22, 2004, at:

California Environmental Protection Agency
Headquarters Building
1001 "I" Street
Central Valley Auditorium
Sacramento, California

Stationary Source Division:
Peter D. Venturini, Chief
Robert D. Barham, Ph.D., Assistant Chief
Project Assessment Branch:
Michael J. Tollstrup, Chief
Project Support Section:
John Y. Kato, Manager

State of California
AIR RESOURCES BOARD

PROPOSED AIRBORNE TOXIC CONTROL MEASURE TO LIMIT DIESEL-FUELED COMMERCIAL MOTOR VEHICLE IDLING

Primary Authors

John Gruszecki, P.E.
Mike Sutherland

Contributing Air Resources Board Staff

Archana Agrawal
Kamal Ahuja
Merrin Bueto
Renee Coad
Daniel Hawelti
Paul Jacobs
Ada Komorniczak
Joann Lu
Araliza Manuel
Elizabeth Ota
Utpala Ramesh, Ph.D.
Dale Shimp
Linda Tombras Smith
Hien Tran
Beverly Werner

Legal Counsel

Aron Livingston, Office of Legal Affairs

Supporting Divisions

Enforcement Division
Monitoring & Laboratory Division
Office of Legal Affairs, Executive Office
Planning & Technical Support Division
Mobile Source Control Division
Research Division

Acknowledgements

This report was prepared with the assistance and support from other divisions and offices of the Air Resources Board. Staff especially acknowledges the Air Resources Board's Mobile Source Control Division for their comments and support. In addition, we would like to acknowledge the assistance and cooperation that we have received from many individuals and organizations.

Staff Report: Initial Statement of Reasons for Proposed Rulemaking
Airborne Toxic Control Measure to Limit Diesel-fueled
Commercial Motor Vehicle Idling

TABLE OF CONTENTS

APPENDICES

List of Tables

List of Figures

State of California
AIR RESOURCES BOARD

Staff Report: Initial Statement of Reasons for the Proposed Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling

Executive Summary

I. INTRODUCTION

This executive summary presents the Air Resources Board (ARB or Board) staff's Proposed Airborne Toxic Control Measure (Proposed ATCM) to Limit Diesel-Fueled Commercial Motor Vehicle Idling. This includes vehicles both in the public and private sectors. The Proposed ATCM would limit nonessential (or unnecessary) vehicle idling to specific time limits. It is applicable to all diesel-fueled commercial motor vehicles with a gross vehicular weight rating (GVWR) of greater than 10,000 pounds. This mobile source category encompasses vehicles operating in California, including those entering from other states or countries.

The Proposed ATCM is the second idling measure the Board will consider. The Board adopted the first in December 2002. This measure was the ATCM to Limit School Bus Idling and Idling at Schools (School Bus ATCM). The School Bus ATCM placed specific idling limits on school buses and idling limits on vehicles operating within a 100 feet of schools. The Proposed ATCM will address a significant portion of the remaining on-road diesel population.

Approximately 409,000 diesel-fueled vehicles with GVWR greater than 10,000 pounds operate daily throughout California's roadways and population centers. Over 25 percent of these vehicles operating in California are registered out-of-state. Of the more than 102,000 out-of-state vehicles, approximately 67,000 typically idle during extended rest periods each day in California.

The diesel exhaust from excessive idling imposes significant adverse health and environmental impacts on all Californians. Diesel exhaust is a complex mixture of thousands of gases and fine particles that contains more than 40 identified toxic air contaminants. These include many known or suspected cancer-causing substances, such as benzene, arsenic and formaldehyde. Diesel exhaust can irritate the eyes, nose, throat and lungs, and can cause coughs, headaches, light-headedness and nausea. Diesel exhaust is a major source of ambient particulate matter pollution as well, and numerous studies have linked elevated particle levels in the air to increased hospital admission, emergency room visits, asthma attacks and premature deaths among those suffering from respiratory problems.

The Proposed ATCM would apply to all diesel-fueled commercial motor vehicles used in the public and private sectors, including sleepers (trucks equipped with a sleeping berth or cab used during extended rest periods), and vehicle types that include transit buses, public transportation, food and supply delivery vehicles and construction/maintenance vehicles. Furthermore, the Proposed ATCM would limit the operation of diesel-fueled auxiliary powered systems (APS). By restricting the idling of these diesel-fueled vehicles and the operation of diesel-fueled APS systems, the Proposed ATCM would reduce exposures to diesel exhaust emissions, which contain toxic air contaminants and other air pollutants. The Proposed ATCM would have the additional benefits of reducing diesel fuel consumption and engine wear, thus reducing owner operating costs.

The Proposed ATCM would be implemented in two phases. Phase One would limit general idling of all commercial and publicly owned diesel-fueled vehicles with a GVWR of greater than 10,000 pounds and would be implemented immediately upon the effective date of the regulation under state law. Phase Two, which will be implemented beginning in January 1, 2009, specifically limits idling of the main engine and the operation of diesel-fueled APS systems during extended driver rest periods and would address trucks typically referred to as "sleepers:" However, in 2005, staff intends to develop specific emission standards for extended engine idling and APS use that are sufficient to reduce emissions to acceptable levels. Vehicles equipped with engines or APSs that comply with these levels will be able to use on-board power for extended periods.

II. BACKGROUND

1. Why is staff proposing an ATCM to limit idling of diesel-fueled commercial motor vehicles with GVWR greater than 10,000 pounds?

Currently, Californians are exposed to significant amounts of diesel particulate matter (PM) from excessive commercial diesel idling which causes adverse impacts that affect both human health and the environment. As California's population continues to grow as well as its demands for resources, goods and services, the practice of excessive idling needs to be addressed to reduce further the public exposure to diesel pollution.

The Proposed ATCM can easily be implemented to significantly reduce exposures to diesel particulate matter (PM), reduce the associated potential cancer risk, and reduce other adverse health effects. The Proposed ATCM would also reduce emissions of other air pollutants such as oxides of nitrogen (NOx) and hydrocarbons.

The ARB identifies and controls Toxic Air Contaminants (TAC) under the authority of the California Toxic Air Contaminant Identification and Control Program set forth in the California Health and Safety Code (H&SC) sections (§) 39650 through 39675. The Program involves a two-step process to address the potential health effects from TACs. The first step is the risk assessment (or identification) phase. In August 1998, following a ten-year scientific assessment process, ARB identified diesel PM as a TAC [ARB, 1998b]. This marked the completion of the identification phase of the process to address the potential for adverse health effects associated with diesel PM emissions.

The second step of the Program, the risk management (or control) phase, requires ARB to prepare a report on the need and appropriate degree of regulation of a substance identified as a TAC. H&SC § 39667 requires the Board to adopt ATCMs to achieve the maximum possible reduction in public exposure to TACs from vehicular sources. Regulations developed pursuant to this section must be based upon the utilization of best available control technologies or more effective control methods, unless the Board determines, based upon an assessment of risk, that an alternative level of emissions reduction is adequate or necessary to prevent endangerment of public health.

The ARB's October 2000 "Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-fueled Engines and Vehicles" (Diesel Risk Reduction Plan) contained a comprehensive regulatory needs assessment and plan addressing known sources of diesel PM. In the Diesel Risk Reduction Plan, ARB indicated that idling restrictions could be used to "limit the amount of time heavy-duty vehicle engines are allowed to operate while not performing useful work, e.g., moving the vehicle or operating essential equipment."

In December 2002, the Board adopted the ATCM to Limit School Bus Idling and Idling at Schools (School Bus ATCM). The School Bus ATCM requires a driver of a school bus or vehicle, transit bus, or other commercial motor vehicle to manually turn off the bus or vehicle engine upon arriving at a school and to restart no more than 30 seconds before departing. A driver of a school bus or vehicle is subject to the same requirement when operating within 100 feet of a school and is prohibited from idling more than five minutes at each stop beyond schools, such as parking or maintenance facilities, school bus stops, or school activity destinations. A driver of a transit bus or other commercial motor vehicle is prohibited from idling more than five minutes at each stop within 100 feet of a school. Idling necessary for health, safety, or operational concerns is exempt from these restrictions.

Staff developed the Proposed ATCM as one component in a larger strategy to reduce exposure to diesel PM and other TACs and air pollutants. The Proposed ATCM would have the additional benefit of reducing the cost of operating affected vehicles by reducing the fuel use and engine wear associated with unnecessary idling. This Proposed ATCM was developed using input obtained from a variety of interested parties and sources. In the fall of 2003, staff conducted surveys to determine the status of measures that limit idling in California and other states (see Appendix B for survey results). Staff consulted with South Coast Air Quality Management District officials and the California Highway Patrol (CHP). One public consultation meeting was held, followed by four public workshops. After considering the information gathered, ARB staff concluded that it was both beneficial and feasible to develop a proposed ATCM to limit idling of diesel-fueled commercial motor vehicles. The vehicle size limit of greater than 10,000 pounds GVWR was established to limit the Proposed ATCM to commercial motor vehicles, and maintain consistency with the School Bus ATCM.

2. What are the current idling practices of diesel-fueled commercial motor vehicles?

Drivers of diesel-fueled commercial motor vehicles greater than 10,000 pounds idle their engines for a number of reasons. First, based on the travel distance and the time spent driving, the drivers of commercial heavy-duty vehicles are required by federal law to take an extended rest period. When the vehicle drivers need to rest, they typically park at a truck stop or rest area, leave the engine running, and rest for a number of hours in the sleeper berth. A sleeper berth is a securely fixed area in the truck that is equipped for sleeping and is located in the cab or immediately adjacent to the cab. Idling in this case is used to provide heat or air conditioning for the sleeper compartment, and to provide electrical power for appliances such as televisions, microwaves and computers. Idling during rest periods also enables the driver to maintain comfort levels in the cab with the windows closed, a consideration for safety reasons and to minimize the intrusion of odors and noise[1]. Idling is also used during those rest periods to keep the fuel and engine warm in cold weather to avoid cold starting.

Vehicles also idle while being actively operated such as when waiting to load and unload commodities. Also, trucks and truck-trailer combinations may need to idle in order to operate auxiliary equipment, including power take-off (PTO) equipment. Power take-off equipment is defined as an accessory that is mounted onto a transmission, allowing power to be transferred outside the transmission to a shaft or a driveline. Some examples of vehicles with power take-off equipment are cement mixers, trucks with hydraulic winches, car carriers, mobile cranes and sewer cleaning trucks.

Idling practices categorized as nonessential or unnecessary are when the idling of the engine does not serve any practical, operational, or required purpose. An example of such a practice may be when a driver leaves the vehicle idling while doing an activity elsewhere. The idling engine was not used to operate or power another device needed for the driver or any goods.

3. What are the adverse impacts of idling?

Human health and the environment are adversely affected by air pollutants emitted during idling. I In 2005, staff estimates that approximately 438 tons of diesel PM, a toxic air contaminant, will be generated in California from nonessential commercial heavy-duty diesel idling. This accounts for approximately nine percent of the total on-road diesel PM emissions in California. Idling increases exposure to diesel PM and other toxic air contaminants and increases the associated cancer risks to the public, especially individuals in the proximity of the idling vehicle. Idling emissions also include other air pollutants such as NOx, carbon monoxide, and hydrocarbons. Staff estimates that in 2005 excessive general idling will result in about 208 tons of diesel PM and 6,600 tons of NOx annually. Similarly, excessive sleeper idling will approximately contribute an additional 230 tons and 13,700 tons of diesel PM and NOx respectively.

Nonessential idling has an adverse impact on energy supplies and global warming. Each phase will also reduce hundreds of thousands of tons of greenhouse gas emissions. Heavy-duty vehicles consume up to one gallon of diesel fuel for each hour at idle, using as much as 1,500 gallons of fuel every year per vehicle. Staff estimates fuel savings of approximately 52 million gallons per year from the implementation of phase one and an additional 69 million gallons per year from phase two.

Idling also increases maintenance costs and engine wear. Running an engine at low speed (idling) causes additional wear on internal parts compared to driving at regular speeds. This wear can lead to increased maintenance costs and can shorten the life of the engine.

4. What laws currently regulate idling in California and other states?

Currently California has various idling laws in sections of the Health and Safety Code. However, staff is unaware of any routine enforcement of these statutes.

On December 12, 2002, the Air Resources Board adopted an ATCM limiting school bus idling and idling at schools. This measure applies to the operation of every school bus, school pupil activity bus, youth bus and general public paratransit vehicle. It also governs transit buses and commercial motor vehicles operating at or near schools. This ATCM focused on reducing public exposure, especially that of school age children, to diesel exhaust PM and other TACs[1]. Also, beginning in 2003 State law (Health &Safety Code section 40720) limits diesel-fueled truck idling to less than 30 minutes outside the gates of California's ports.

A review of California air quality management and air pollution control district local rules and regulations showed no specific idling regulations. However, some California cities and counties have adopted local engine idling ordinances. For example, San Francisco has an ordinance that limits the idling of transit buses. Placer County has an ordinance that prohibits the idling of on-road and off-road engines when the vehicle is not moving, or when the off-road equipment is not performing work for a period of time greater than five minutes in any one-hour period. Currently, a number of idling measures are under evaluation in different California counties and air quality management districts[2].

Aside from California, the ARB staff identified 20 states with statewide, county, or municipal anti-idling regulations or ordinances. Approximately half of these state and local measures apply to all motor vehicles, while the others apply solely to diesel-fueled

[1] Limits on school bus idling at schools. www.arb.ca.gov/regact/sbidling/fro.pdf

[2] Suggested measures under evaluation.
www.baaqmd.gov/pln/plans/ozone/2003_workgroup/rpt2_under_evaluation_72303.pdf
www.airquality.org/cleanairplan/ws0306/ws0306Nindex.shtml

vehicles or urban buses. More than two-thirds of these measures restrict idling to five minutes or less.

Appendix B provides more information regarding existing laws and ordinances that limit idling.

5. What are the alternatives to idling?

Alternatives to idling diesel engines can be divided into two main categories: behavioral changes to eliminate nonessential idling and technology options specifically for sleepers that will no longer be able to rely on a poorly controlled main engine or APS for comfort and power needs.

A. Behavioral Changes:

As the simplest alternative, the engine is manually shut off. Education and driver incentives play an important role in behavioral changes. Informing the driver or operator of the emissions, health risks, fuel consumption, savings, and regulatory requirements may help change behavior.

B. Technology Based:

There are four main categories of technology-based alternatives that could apply to "sleepers": Adequately controlled auxiliary power systems or main engines; Electrification (on-board and off-board); Automatic engine shut-off/start up; and direct fired heaters. The purpose of these alternative technologies is to displace the use of the higher polluting main engine for providing power and comfort to the sleeping berth. The capital costs of these options to owners and operators of affected vehicles generally range from less than one hundred dollars for several of the off-board electrification options to several thousand dollars for auxiliary power systems. A detailed discussion of alternative technologies is contained in section V.

6. Do all technology-based alternatives achieve ARB's diesel reduction goals?

Of the alternatives ARB staff have evaluated, all provide a measure of diesel PM reductions. Unfortunately, the currently available diesel-fueled APS have not been optimized for PM reductions. They appear to provide initial diesel PM reductions when used in place of idling pre-2007 on-road engines, but emit higher levels when used in place of 2007 and later on-road engines. For this reason, the Proposed ATCM limits the operation of diesel-fueled APS systems as of January 1, 2009. Similarly, the emissions associated with the extended operation at idle of the very low NOx/PM engines to be available by 2010 are uncertain, and may or may not be adequate to reduce extended idling emissions to acceptable levels. ARB staff is proposing to return to the Board in 2005 to establish procedures and specifications for diesel-fueled APS systems and main engines that would be allowed to operate after January 1, 2009.

III. PUBLIC OUTREACH

An open public process is an essential part of the adoption of any air quality regulation, including this Proposed ATCM. ARB staff made extensive efforts to ensure that the public was aware of, and had an opportunity to participate in this rulemaking process. The staff's public outreach program involved interaction with:

- Industry (Heavy-Duty Vehicle fleets, Greyhound Bus Services, Independent Armored California-Operators Association)
- Organizations (California Trucking Association, American Trucking Association, Union of Concerned Scientists, Environmental Groups, Environmental Justice Community Activist Groups)
- Government Agencies (Public Transit Agencies, California Air Pollution Control and Air Quality Management Districts, U.S. EPA, U.S. Postal Service, Sacramento Municipal Utility District, Border Patrol- Homeland Security, California Highway Patrol, Sacramento Regional Transit, Los Angeles Metropolitan Transportation Authority and California Sheriff's Association)
- Other interested parties.

1. <u>What action did staff take to consult with interested parties?</u>

Staff contacted affected parties including individuals and organizations by telephone, electronic mail or regular mail.

In addition, staff developed and frequently updated (with list serve notification) a web page (http://www.arb.ca.gov/toxics/idling/idling.htm) describing the Proposed ATCM, its status, and contact information. Staff arranged and held personal meetings and conference calls, made presentations, and held one Public Consultation Meeting and four Public Workshops. Individuals and organizations were notified about the Public Consultation Meeting and the Public Workshops.

Major outreach activities included:

- Phone survey of California public and private agencies to determine existing idling policies
- Phone survey of private organizations to determine existing idling policies
- Phone survey of other states that had idling regulations
- Consultation with South Coast Air Quality Management District
- Site visits to landfill, truck stops
- Public Consultation Meeting held in Sacramento
- Four Public Workshops held in Sacramento

Details of the public outreach efforts are also presented in Chapter III of the staff report: Initial Statement of Reasons.

IV. EMISSIONS AND POTENTIAL HEALTH IMPACTS FROM DIESEL-FUELD COMMERCIAL MOTOR VEHICLE IDLING

Staff has estimated that exposure to diesel PM can be significantly reduced by limiting the idling of diesel-fueled commercial motor vehicles with GVWR greater than 10,000 pounds. Discussed briefly below are the emission estimates and potential health impacts.

1. What are the estimated emissions from diesel-fueled commercial motor vehicles with GVWR greater than 10,000 pounds in California?

According to the ARB's Disel Risk Reduction Plan, in the year 2000, California's PM emissions from diesel-fueled engines totaled about 28,000 tons. These emissions come from a wide variety of sources including over one million on-road and off-road vehicles, about 26,000 stationary engines, and approximately 33,000 portable engines over 50 horsepower. On-road engines account for about 27 percent of the emissions; off-road engines including portable engines, account for about 71 percent; and the remaining 2 percent of the emissions come from stationary engines.

Below, Table 1 presents nonessential diesel idling emissions from 2000, 2005, and 2009. These emission values do not reflect changes that may occur upon the adoption of the Proposed ATCM.

Table 1

Nonessential Diesel Idling Emissions (Before Regulation)

	PM (tons per year)	NO_x (tons per year)
2000	503	17,500
2005	438	20,300
2009	418	24,000

Emissions from idling account for approximately two percent of the total diesel PM emissions from diesel-fueled engines in California. Staff estimates that in 2005, approximately 208 and 230 tons per year of diesel PM contributions will be from general and sleeper idling respectively. In addition, staff estimates 6,600 and 13,700 tons per year of NO_x will be emitted from general and sleeper idling respectively. Though the sleeper population only accounts for approximately 16 percent of the population, sleepers contribute over half of the diesel PM and almost 70 percent of NO_x emissions.

2. What are the potential adverse health impacts from exposure to diesel PM and other TAC emissions?

The potential adverse health impacts from exposure to diesel PM and other TAC emissions from heavy-duty diesel vehicles include carcinogenicity, eye and respiratory irritation, enhanced respiratory allergic reactions, asthma exacerbation, immunotoxicity, teratogenicity, and hematotoxicity. The principal adverse health effect of concern regarding diesel PM exposure is increased cancer risk, and was thus the focus of staff's evaluation.

Generally, the Proposed ATCM will reduce ambient exposures of Californians to diesel PM and will thus reduce the associated cancer risks. The risks quantified by ARB staff considered exposures near concentrated sources of diesel idling emissions (i.e. truck stops). Based on staff's risk assessment, staff found that near source exposure to diesel idling could result in potential lifetime risks ranging from 10 to more than excess of 100 in a million depending on the location and other compounding factors.

Additionally, the proposed regulation is expected to reduce diesel PM emissions by approximately 1,680 tons by the end of year 2013. Cumulatively, these emission reductions would prevent an estimated 84 deaths.

V. SUMMARY OF THE PROPOSED ATCM TO LIMIT DIESEL-FUELED COMMERCIAL MOTOR VEHICLE IDLING

1. To what types of vehicles does the Proposed ATCM apply?

The Proposed ATCM would apply to diesel-fueled commercial motor vehicles with GVWR greater than 10,000 pounds operating in California, regardless of the state or country in which the vehicle is registered. Approximately 409,000 heavy-duty diesel-fueled vehicles with GVWR greater than 10,000 pounds operate throughout California's roadways daily. Of this number, staff estimates 67,000 trucks are idled each day for extended driver rest periods. Phase One of the Proposed ATCM, which would limit general idling, would apply to all such vehicles including trucks, transit buses, public transportation, food and supply delivery vehicles, and construction and maintenance vehicles. Phase Two of the Proposed ATCM would also limit idling during extended driver rest periods, unless the vehicle is equipped with on-board power systems that meet acceptable low-emission levels that will be defined in amendments to the regulations to be developed in 2005.

2. What does the Proposed ATCM require?

The Proposed ATCM will require the owner/operator of a vehicle to manually shut off the engine before the idling time limit has been reached. Under the Proposed ATCM, the operator of a subject vehicle cannot idle for more than five minutes at any one location. Buses, including transit, tour and coach, are allowed ten minutes of idling time prior to the boarding of passengers to allow the passenger compartment to acclimate for passenger comfort.

The Proposed ATCM would be implemented in two phases. Phase One eliminates general unnecessary idling of commercial and publicly owned diesel-fueled, heavy duty-vehicles with a GVWR of greater than 10,000 pounds and would be implemented immediately upon the effective date of the Proposed ATCM under state law. Staff expects the regulation to become effective within 6 to 9 months after Board approval. Owners and operators of commercial diesel-powered vehicles with a GVWR of 10,000 pounds or greater such as independent truck operators, public agencies that own affected vehicles, busing companies, etc., will be required to comply with the provisions of Phase One of the Proposed ATCM while operating in California.

Phase Two of the Proposed ATCM would restrict idling of the main engine and the operation of diesel-fueled APS systems during extended driver rest periods unless these engines or APS emit at low-emission levels that the staff will develop for consideration in 2005. Phase Two would become effective January 1, 2009 to allow adequate time for outreach, long-term planning, development of infrastructure, and installation of idle reducing technologies. Options to comply with the restricted idling limitations include shutting off the engine where weather conditions allow, using hotel rooms, off-board and on-board electrification, and non diesel-fueled auxiliary power systems. Assuming the Board modifies the regulation to incorporate appropriate extended idling and operational emission standards for engines and APS in 2005, vehicle owners would also have the option of using such systems as a source of independent, on-board power.

Upon adoption of the Proposed ATCM, staff will closely monitor the implementation of both Phases. Staff will also undertake outreach and education activities.

The Proposed ATCM will not require installation of any hardware or change in vehicle software. However, truck drivers that idle for purposes of comfort during prolonged rest periods may wish to install equipment such as an auxiliary power system (APS) or to connect to some form of off-board electrification to provide power for heating or cooling the sleeping berth and for other ancillary equipment. Technologies that may be utilized by vehicle owners and operators to provide a source of power other than idling of the main engine, including potential cost savings, are discussed more fully in the staff report.

3. Why do sleepers have until 2009 to comply with the idling limit?

By January 1, 2009, vehicles equipped with sleeping berths will be required to limit idling to 5 minutes during extended rest periods. In 2007, new on-road diesel engines will have to meet new stricter federal emission standards. Additionally, by 2010, new NOx emission requirements will be fully effective. It is anticipated that PM emissions from 2007 and later model main engines will be lower than PM emissions from existing auxiliary power systems even though the APS will continue to use less fuel per unit time. With this concern, diesel-fueled APS systems installed on sleepers are limited in operation beginning January 1, 2009. More time and outreach is needed to determine the appropriate emission standards for extended idling by main engines or the operation of APS. ARB staff is proposing to return to the Board in 2005 to establish procedures and specifications for diesel-fueled APS systems. Delaying the full implementation of this aspect of the ATCM until 2009 allows owners/operators to determine how they will comply with the ATCM and to make any necessary changes in equipment.

To ensure there is the widest possible choice of compliance options, staff will continue to evaluate the feasibility of developing regulations to mitigate emissions from auxiliary power systems and the extended idling of the main engine. Such regulations would ensure that using an APS would not have the negative affect of increasing overall PM emissions and that such systems have the maximum feasible reductions in PM and other pollutants. Staff could pursue such solutions by requiring an APS to achieve emission reductions typically associated with level three control. For diesel, greater than 85 percent PM reductions are typically associated with the installation of a particulate filter or other device that reduces PM emissions. Requiring APS emissions to be directed through a particulate filter could be accomplished by either using a dedicated standalone filter connected to the APS or routing the emissions through the existing particulate filter on newer trucks. Possible areas of concern could include main engine warranty issues, the cost of particulate filters, and development of smaller filter technologies. Currently, some engine manufacturers are developing OEM APS technologies that route the APS exhaust through the main stack and potentially the main engine DPF.

Sleepers will be required to comply with the five minute idling limit starting January 1, 2009 unless they use systems that meet standards expected to be established in the 2005 rulemaking. The delay will allow adequate time for outreach, long-term planning, development of infrastructure, definition of acceptable emissions from on-board systems, and the installation of idle reducing technologies. The implementation delay would also allow ARB staff time to propose procedures and specifications for diesel-fueled APSs.

4. <u>What exceptions would be allowed?</u>

Idling restrictions contained in the Proposed ATCM would not apply when idling is necessary for health, safety, or operational concerns in the following:

(a) Idling is necessary while stopped for an official traffic control device, traffic control signal, in a line of traffic, at a railroad crossing, in a construction zone, or at the direction of a peace officer
(b) Idling is due to queuing (i.e., lining up behind other trucks) in the normal course of conducting business over which the driver has no control, such as at landfills or weighing stations

(c) Idling is necessary due to immediate adverse weather conditions affecting the safe operation of the vehicle (e.g.. in a dense fog or poor visibility) or due to mechanical difficulties over which the driver has no control

(d) Idling is necessary to determine that the vehicle is in safe operating condition and is equipped as required by all provisions of law, either as part of the daily vehicle inspection, or as otherwise needed

(e) Idling is necessary for testing, servicing, repairing, or diagnostic purposes

(f) Idling is necessary to provide a power source for mechanical operations powered by the primary engine such as controlling cargo temperature or operating a crane, drill, pump, lift, hoist, mixer, or other auxiliary equipment. This exemption also applies when idling is necessary to perform work functions for which the vehicle was designed and where substitute alternate means to idling are not available.

(g) To operate defrosters, heaters, air conditioners, or other equipment solely to prevent a safety or health emergency

5. What does staff consider to be unnecessary idling?

The Proposed ATCM would establish all idling beyond 5 minutes as unnecessary, with some periods not counting toward that limit. Staff has identified examples of what is considered unnecessary. Included are (as long as a bus or vehicle is safely parked outside of traffic):

- Idling due to the concern that a diesel engine will not restart if it is shut off;
- Idling to "warm-up" a diesel engine for more than five minutes before operation,
- Idling while waiting for passengers, waiting for scheduled time of departure or when no passengers are on board
- Idling to avoid running down the battery while unnecessarily operating equipment (e.g., a heater or air conditioner).

6. When would other laws take precedence over the Proposed ATCM provisions?

Subsection (e) of the Proposed ATCM contains a provision that describes its relationship to other laws. The allowance of certain exempt periods within the Proposed ATCM does not legally permit idling beyond other applicable limits. Still, Proposed ATCM provisions that allow idling under specific conditions could conceptually conflict with other requirements that effectively prohibit idling when a driver leaves a vehicle unattended on a highway (VC§22515). The Proposed ATCM would preclude an affected bus or vehicle driver from using provisions in the Proposed ATCM to justify violation of specified safety requirements that continue to apply. In addition, the Proposed ATCM would allow local regulations or ordinances to apply, provided such requirements were as stringent as, or more stringent than, any comparable requirement in the Proposed ATCM

7. What alternatives to the Proposed ATCM did the staff consider?

Staff considered the following alternatives to the Proposed ATCM: 1) no action, 2) require electrification of all truck stops and rest areas, 3) require installation of new or add-on devices on all trucks, and 4) rely on federal, State or local voluntary programs.

The "no action" alternative would rely on fleet turnover and progressively more stringent State and federal emission standards for engines to achieve emission reductions over time. The federal standards for new diesel engines will not take effect for several years and do not affect existing vehicles. Based on EMFAC data, it would take an estimated 20 years after introducing vehicles with the more stringent 2007 federal emissions standards to turn over the entire heavy-duty fleet. Hence, progress toward reducing diesel PM emissions would be very slow by relying on natural turnover of the existing fleet.

The second alternative considered was to require the installation of electrical power infrastructure at truck stops and rest areas. Truck stop electrification (TSE) technology provides parked trucks with electrical power to run air conditioning, heating and on-board appliances and eliminates the need to idle the primary engine. It can be either an on-board or an off-board system. An off-board system does not require modification or retrofit of the vehicle. The infrastructure at the rest stops would provide the needed heating ventilation air conditioning (HVAC) and electrical power. The on-board system potentially requires modifications to the truck to install inverters that help utilize outside electrical power and also requires on-board installation of a HVAC system. Both alternatives would also require extensive modification of the infrastructure of entire facilities (truck stops and rest areas) with an estimated cost range between $4,000 and $10,000 per parking space for the truck stops depending on the technology selected. Additionally, vehicle owners could expect to pay up to $100 for off-board electrification and up to $3,500 for on-board electrification in addition to hourly usage fees.

The third alternative considered is to require installation of new or add-on devices on all trucks. These devices include, but are not limited to, automatic shut-off devices, fuel-fired heaters, auxiliary power systems (APS), and No-Idle Thermal Environment Systems (NITE). Requiring new or add-on devices would impose costs on the regulated community. Moreover, certain devices are not feasible or are feasible for only a small segment of the transportation fleet.

The fourth alternative considered relies on achieving emission reductions from voluntary programs. Federal and State incentive programs have been developed to encourage the use of less-polluting diesel engines. These programs (discussed in more detail in Chapter I of the Technical Support Document) include U.S. EPA's Voluntary Diesel Retrofit Program, ARB's Carl Moyer Program, and EPA's SmartWay℠ Transport Initiatives. These programs provide funds and other incentives to spur innovative projects that would reduce vehicular emissions. While significant emission reductions have been achieved from these voluntary programs, limited funding precludes relying on such programs to effectively reduce emissions from the large number of heavy-duty diesel engines in California. Moreover, funding limitations also restrict program participation, notably in voluntary efforts to install electrical power infrastructure at truck stops and rest areas.

VI. IMPACTS OF THE PROPOSED ATCM - EMISSIONS, ECONOMIC, ENVIRONMENTAL AND HEALTH

1. How will the Proposed ATCM reduce public health risk?

The elimination of unnecessary idling from diesel-fueled commercial motor vehicles with GVWR greater than 10,000 pounds is expected to reduce diesel PM and other TAC emissions and reduce public exposure to those pollutants. Reduced exposure is expected to result in a decrease in the risk of cancer and other adverse health effects associated with diesel PM and other TACs in heavy-duty vehicle exhaust. The Proposed ATCM is expected to reduce diesel PM by 166 tons per year (tpy) starting in 2005. An additional 134 tpy reduction in diesel PM emissions is expected starting in 2009 with implementation of the sleeper idling restrictions. With an expected high compliance rate, staff estimates the corresponding reductions in emissions will equate to 80 – 90 percent reduction to near source exposure and risk.

The Proposed ATCM is expected to benefit the environment because the elimination of unnecessary idling would reduce diesel PM emissions that contaminate air, water, soil, and vegetation. In addition, the Proposed ATCM is expected to reduce overall hydrocarbon, carbon monoxide, and oxides of nitrogen emissions from affected vehicles. Expected reductions of PM and other pollutants are presented in the following table.

Table 2

Projected Statewide Emissions Reductions (tons/year) from Implementing the Proposed ATCM

	PM	NOx	HC	CO	CO_2
Phase One - 2005	166	5,200	740	2,900	344,300
Phase Two only - 2009	134	12,300	895	7,000	622,300

2. What is the total cost of the Proposed ATCM?

Staff expects affected parties will realize net cost savings resulting from reducing idling of the main engine. State agencies could experience minor costs associated with implementing and enforcing the regulation, but the costs are expected to be minimal. Based on ARB staff's analysis, the total Statewide cost savings over the cost benefit analysis window (Phase One 2005-2009 and Phase Two 2009-2013) of the Proposed ATCM to California businesses as a result of savings on fuel consumption and the

reduced expenditure of maintenance of the diesel engines may be as high as $575 million.
During Phase One (2005 – 2009), compliance is expected by simply shutting off the engine before the idling limit has been reached. Because shutting off the engine is a procedural change and the installation of technology is not required, staff expects significant cumulative savings for the entire affected fleet of approximately 409,000 vehicles. Staff estimates fuel savings and reduced engine maintenance will result in overall savings of as much as $475 million over five years.

To meet Phase Two (2009 – and beyond) requirements, staff expects many owners/operators of sleeper berth trucks to have installed low-emitting auxiliary power systems to provide power during extended rest periods. Staff determined the regulatory cost savings by factoring in the purchase, installation and maintenance costs of an APS and the cost savings from reduced fuel consumption and maintenance of the main engine. The total cost savings during Phase Two is estimated to be approximately $100 million over the first five years. Although costs for APS and other technologies may be as high as $8,600, lower fuel and maintenance costs will still result in total cost savings.

3. What are the expected economic impacts of the Proposed ATCM on affected parties?

Private and public businesses that would be affected by the Proposed ATCM include owners and operators of heavy-duty diesel-fueled vehicles with GVWR greater than 10,000 pounds that operate in the State of California. Some of the affected entities include, but are not limited to, transportation companies, commodities and goods carriers, automobile carriers, mobile home transporters, transit agencies, and tourist bus operators.

The Proposed ATCM is not expected to have any significant impacts on local government. To the extent that idling is reduced, local government could realize cost savings in fuel and maintenance. The cost of implementing and enforcing the regulation by local peace officers is expected to be integrated into the local agency's existing annual budget. The regulation makes exceptions for emergency and necessary services such as fire departments, ambulance services from the proposed idling limit.

Owners or operators of affected vehicles are expected to ensure that the drivers are informed about the restrictions and that they turn off the engines before the specified limit is reached. ARB staff assumes that training will last no longer than thirty (30) minutes per driver and occur during normally scheduled meetings (such as training or safety meetings). ARB staff will also develop materials through ARB's Compliance Assistance Program to assist owners and operators. However, these costs are not considered mandatory since the Proposed ATCM does not require, as does the School Bus Idling ATCM, that owners and operators keep records of such communications.

Although the Proposed ATCM does not require installation of any control device, Phase two of the Proposed ATCM may result in owners of trucks choosing alternative means to provide power and comfort during extended rest periods. Compliance costs could range from the no cost alternative of simply turning off the engine to many thousands of dollars for alternate devices such as off-board and on-board truck stop electrification and auxiliary power systems. For the purposes of the economic analysis, staff assumes owners of such vehicles will incur initial costs of $8,600 for the installation of an approved auxiliary power system. This cost is expected to be offset by savings on fuel and maintenance as a result of eliminating unnecessary idling. With fuel and maintenance savings, staff estimates payback periods of three to five years. There are no significant economic impacts expected from complying with the Proposed ATCM.

4. <u>Are there any adverse environmental impacts associated with the proposed control measure?</u>

ARB Staff concluded that no significant adverse environmental impacts are likely to occur from the adoption of, and compliance with, the Proposed ATCM. However, some alternative technologies available to sleepers may increase emissions.

Preliminary data collected by ARB staff shows that currently available APS usage can decrease PM and NOx emissions when used in place of idling pre-2007 manufactured on-road diesel engines. However, staff estimates that an APS may emit significantly more diesel PM than the idling of a 2007 and newer EPA certified on-road engine. NOx emissions remain significantly higher for 2007 and newer on-road engines compared to the operation of an APS. NOx controls slated for introduction in 2007, and fully implemented by 2010 can reduce NOx emissions comparable to APS units. ARB staff is concerned with the effectiveness of the NOx controls on main engines during extended idling periods. Additional staff work is needed to determine the maximum feasible PM reductions that can be achieved are necessary for reducing PM from APS units and establishing NOx limits for extended idling of new on-road diesel engines. Staff will be evaluating further emissions from APS units and extended idling of on-road engines, and will return to the Board in 2005 to establish additional control options related to APS use by sleepers.

5. <u>How does this Proposed ATCM relate to ARB's goals on Environmental Justice?</u>

Environmental Justice (EJ) is defined as the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies[3]. ARB's Environmental Justice Polices are intended to promote the fair treatment of all Californians.

The goal of the Proposed ATCM is to reduce exposure to diesel PM from vehicular emissions, especially near rest areas, truck stops, and other areas where significant idling occurs. The Proposed ATCM is consistent with the ARB's Environmental Justice

[3] ARB 2001: California Air Resources Board. <u>Policies and Actions for Environmental Justice. Sacramento</u>: ARB, 13 December 2001

policy to reduce health risks from TACs in all communities, including low-income and minority communities. Many EJ communities are located near truck stops, storage distribution facilities, rail yards, and ports. Inner-city tractor-trailers and other vehicles with diesel engines idle a significant portion of the time. The actual extent of idling varies with the season and the type of operation. Idling produces airborne emissions as well as noise. By limiting the diesel-fueled heavy-duty vehicle idling, the Proposed ATCM would provide air quality benefits by reducing exposure to diesel PM and other TACs and pollutants.

VII. NEXT STEPS

If adopted, the ARB Enforcement Division would have the primary responsibility for enforcing the Proposed ATCM with assistance from peace officers, air quality management and air pollution control districts, and other local authorities. To implement and enforce the Proposed ATCM the following steps will be taken:

- ARB will develop educational materials for distribution to drivers of all affected vehicles and the general public.
- The ARB Enforcement Division will use its existing 1-800-END-SMOG telephone complaint line to receive complaints of non-compliance with the Proposed ATCM.
- The ARB Enforcement Division will respond to complaints of non-compliance with voluntary assistance from the CHP, local peace officers, and air pollution control or air quality management district personnel, if necessary.
- A procedure for addressing alleged non-compliance and violations of the Proposed ATCM will evolve once the Proposed ATCM is adopted and non-compliance complaints are received.

ARB staff will develop APS and engine emission standards that will define accepted performance levels for on-board power production for sleeper units. ARB staff is proposing to conduct additional investigations into auxiliary power systems, main engine extended idling performance, and truck stop infrastructure development. As the new federal emission standards for on- and off-road engines become effective, additional emissions data from engine performance testing from both auxiliary power systems and main engine idling may reveal the need for additional emission controls or standards when considered as alternatives to idling during prolonged periods of rest.

VIII. RECOMMENDATION

ARB Staff recommends that the Board adopt the Proposed ATCM contained in Appendix A of this Staff Report.

REFERENCES

ARB, 1998 b: California Air Resources Board and Office of Environmental Health Hazard Assessment . *Proposed Identification of Diesel Exhaust as Toxic Air Contaminant*. Appendix III, Part A, *Exposure Assessment*. Sacramento,: ARB and OEHHA, CD-ROM. April 22, 1998.

ARB, 2001: California Air Resources Board. Policies and Actions for Environmental Justice. Sacramento: ARB, 13 December 2000

EPA: Voluntary Retrofit Program - Idling Reduction, http://www.epa.gov/otaq/retrofit/idling.htm

Limits on school bus idling at schools. www.arb.ca.gov/regact/sbidling/fro.pdf

Suggested measures under evaluation.
www.baaqmd.gov/pln/plans/ozone/2003/workgroup/prtunderevaluation.pdf
www.airquality.org/cleanairplan/ws0306/ws0306Nindex.shtml

State of California
AIR RESOURCES BOARD

Staff Report: Initial Statement of Reasons for the Proposed Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling

Technical Support Document

I. INTRODUCTION

A. OVERVIEW

Diesel engine exhaust is a source of unhealthful air pollutants including gaseous- and particulate-phase Toxic Air Contaminants (TACs), particulate matter (PM), carbon monoxide (CO), hydrocarbons, and oxides of nitrogen (NOx). An estimated 409,000 on-road heavy-duty diesel-fueled vehicles, including buses, operate throughout California's roadways on a daily basis. When these vehicles idle, emissions of diesel exhaust increase public health risk, and adversely impact the environment and energy supplies. The focus of this Proposed Air Toxic Control Measure (Proposed ATCM) is to limit diesel-fueled commercial motor vehicle idling. Idling of diesel-fueled vehicles can occur from a variety of activities and at different locations. These locations include distribution facilities, ports, tourist attractions, truck stops, and construction sites.

In this Staff Report: Initial Statement of Reasons, the Air Resources Board (ARB) staff is proposing an ATCM to limit the idling from diesel-fueled commercial motor vehicles with a gross vehicular weight rating (GVWR) of greater than 10,000 pounds by establishing time limits within which the driver must turn off the idling engine. See Appendix A for the text of the Proposed ATCM.

This Staff Report: Initial Statement of Reasons for the Proposed ATCM includes:

- Background regulatory information (Chapter I)
- Need for Control of Diesel Particulate Matter (Chapter II)
- Summary of Public Outreach Efforts (Chapter III)
- Emissions, Exposure, Health Effects, and Risk Assessment (Chapter IV)
- A Summary of the Proposed ATCM, including alternative requirements considered (Chapter V)
- Economic Impact, Environmental Impact, and Environmental Justice Efforts (Chapter VI)
- References (Chapter VII)
- The proposed text of the ATCM and other supplemental information (Appendices A-H).

B. PURPOSE AND REGULATORY AUTHORITY

Purpose

The Proposed ATCM is designed to reduce the exposure of the general public to diesel PM, other TACs, and other air pollutants by limiting the idling time of diesel-fueled commercial motor vehicles with GVWR of greater than 10,000 pounds. The Proposed ATCM will establish a simple procedural requirement of manually shutting off the engine when the vehicle is parked beginning in 2005 (Phase one). It would prohibit the operator of the affected vehicle from idling beyond five minutes at any location. The Proposed ATCM would allow idling for greater than five minutes in specific situations where health, safety, or operational concerns must take precedence. Additionally, beginning January 1, 2009, vehicles equipped with sleeping berths would be required to limit idling the main engine and operating a diesel-powered APS beyond five minutes when supplying power or providing climate control to the sleeping berth (Phase two).

Idling diesel fueled engines increases the public health risks from diesel exhaust exposure, and adversely affects the environment. Idling emissions can contribute to increased cancer risks, premature mortality, bronchitis (chronic and acute), increased hospital admissions, respiratory symptoms, and asthma attacks. In addition to its contribution to adverse health effects, idling wastes fuel. Up to one gallon of diesel fuel is consumed for each hour of idling. Engine idling also results in increased maintenance costs associated with additional wear to the engine. The Proposed ATCM is expected to reduce exposure to toxic and other air pollutants, and also lower operating costs by reducing fuel use and engine wear associated with idling.

It is anticipated that PM emissions from 2007 and later model main engines will be lower than PM emissions from existing auxiliary power systems. With this concern, diesel-fueled APS systems installed on sleepers are limited in operation beginning January 1, 2009. ARB staff is proposing to return to the Board in 2005 to establish procedures and specifications for diesel-fueled APS systems that will enable their use during Phase Two (2009+).

Regulatory Authority

Several sections of the California Health and Safety Code (H&SC) provide the ARB with the authority to adopt the Proposed ATCM. H&SC § 39600 (General Powers) and 39601 (Standards, Definitions, Rules, and Measures) confer to the ARB the general authority and obligation to adopt rules and measures necessary to execute the Board's powers and duties imposed by State law. The H&SC also provides broad authority for adopting measures to reduce TAC and other air pollutant emissions from motor vehicles. H&SC § 39667 primarily authorizes the revision of new motor vehicle emission standards for the purpose of reducing TACs. However, it also authorizes requirements for best available control technology or a more effective control method on motor vehicles that are not new.

Specifically, California's Air Toxics Program, established under California law by AB 1807 (1983) and set forth in H&SC § 39650 through 39675 mandates the identification and control of TACs in California. The identification phase of the Toxic Air Contaminants Program requires the ARB, with participation of other State agencies such as the Office of Environmental Health Hazard Assessment (OEHHA), to evaluate the health impacts of, and exposure to, substances and to identify those substances that pose the greatest health threat as TACs. The ARB's evaluation is made available to the public and is formally reviewed by the Scientific Review Panel (SRP) established under H&SC § 39670. Following the ARB's evaluation and the SRP's review, the Board may formally identify a TAC at a public hearing. Once identified as a TAC, H&SC § 39665 requires the ARB, with the participation of the air pollution control and air quality management districts, and in consultation with affected sources and interested parties, to prepare a report on the need and appropriate degree of regulation for that substance.

In August 1998 [Cal/EPA and OEHHA, 1998], the Board identified diesel PM as a TAC and in October 2000, the ARB published the "Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-fueled Engines and Vehicles" (Diesel Risk Reduction Plan). In addition, in 2001 the Office of Environmental Health Hazard Assessment (OEHHA), pursuant to the requirements of Senate Bill 25 (1999, Escutia), identified diesel PM as one of the TACs that may cause children or infants to be more susceptible to illness. Senate Bill 25 also requires the ARB to adopt control measures, as appropriate, to reduce the public's exposure to these special case TACs (HSC § 39669.5). In the Diesel Risk Reduction Plan, the ARB indicated that idling restrictions could be used to "limit the amount of time heavy duty vehicle engines are allowed to operate while not performing useful work, e.g., moving the vehicle or operating essential equipment." Table I-1 lists several important TACs associated with diesel-, gasoline-, and alternative-fueled heavy-duty vehicle exhaust. Diesel PM is of particular interest since it is a complex mixture of gases, vapors, and fine particles that contains all of the TACs listed in Table I-1 and dozens of others as well. The Board determined that there was not sufficient scientific evidence available to support "safe" threshold exposure levels for the TACs listed in Table I-1 [ARB, 2000b; OEHHA, 2001]. Exposure to these TACs and to other air pollutants as a result of unnecessary idling will be reduced if the Board adopts the Proposed ATCM.

TABLE I- 1

TOXIC AIR CONTAMINANTS ASSOCIATED WITH HEAVY-DUTY VEHICLE EXHAUST

TAC	Year of ARB Identification
Acetaldehyde	1993
Acrolein	1993
Benzene	1985
Benzo[a]pyrene	1994
1,3-Butadiene	1992
Diesel Exhaust Particulate Matter	1998
Chlorinated Dioxins and Dibenzofurans	1986
Formaldehyde	1992

[ARB, 1984; ARB, 1986; ARB, 1992a; ARB, 1992b; ARB, 1993a; ARB, 1993b; ARB, 1994; ARB, 1998a; OEHHA, 2001]

In addition, several sections within Part 5, Division 26 of the Health & Safety Code grant the Board broad authority to adopt regulations to reduce toxic and other air contaminants from heavy-duty motor vehicles. Health & Safety Code sections 43000.5 (d), 43013 (b), 43013 (h), 43018 (b), and 43018 (c).

C. REGULATORY STATUS

This section provides a regulatory context for the Proposed ATCM by briefly discussing significant existing federal, State, and local air quality regulations and programs that apply to affected vehicles. It is not intended to address all of the air quality or other regulations that could possibly affect these vehicles.

Federal and California Emission and Fuel Standards

Standards for smoke emissions from on-road heavy-duty, diesel-fueled vehicles were set by the United States Environmental Protection Agency (U.S. EPA) in 1970. New engines were subject to PM exhaust emission standards beginning with model year 1988. Over the years, more stringent emission standards have paralleled improvements in control technology. Recent amendments to the on-road standards regulate the heavy-duty vehicle and its fuel as a single system, including diesel-fuel sulfur-content requirements. The particulate standard for new heavy-duty diesel engines is 0.01 grams per brake-horsepower hour (g/bhp-hr). This standard is a 90 percent reduction over the existing standard and will take effect with model year 2007. This standard is based on the use of high-efficiency exhaust emission control devices or comparably effective advanced technologies. Because these devices are less efficient when used with the current formulation of diesel fuel, reducing the level of sulfur in diesel fuel by 97 percent, to 15 parts per million by weight (ppmw) is also required.

Federal and California fuel standards specifically apply to fuel manufacturers and distributors rather than to motor vehicles or their operators. Nevertheless, these standards directly affect the emissions from motor vehicles. Fuel standards for aromatic content, Reid Vapor Pressure, and other fuel components and parameters play a critical role in meeting emission standards. Federal commercial fuel standards are set forth in 40 Code of Federal Regulations (CFR) Part 80, and California fuel standards are set forth in title 13 California Code of Regulations (CCR) sections 2250-2273 (gasoline), sections 2281 and 2282 (diesel), and section 2292 (methanol, ethanol, compressed natural gas, and liquid propane gas). Both California and the U.S. EPA will allow only very low sulfur levels (15 ppm) in diesel fuel beginning in 2006. Fuel suppliers for California must meet both federal and California fuel standards.

California Regulations Other Than Emission Standards

In addition to State emission standards, on-road vehicles are subject to several other air quality-related statutes and regulations in the H&SC, Vehicle Code (VC), and CCR. The ARB and California Highway Patrol (CHP) authorities overlap for several of these statutes and regulations. As a result, the two agencies have developed cooperative and complementary implementation and enforcement strategies. The ARB primarily develops, implements, and enforces air quality-related motor vehicle regulations with assistance from the CHP. The ARB may cite violators and impose penalties under civil codes, investigate and refer violations for criminal penalties, or both. The CHP may cite violators under criminal codes and, with respect to certain motor vehicle regulations, may be more likely than ARB staff to encounter and address violations.

Table I-2 lists several important State air quality-related provisions and regulations that apply to on-road vehicles. It is not intended to identify all possible air quality-related State provisions and regulations that may apply.

TABLE I - 2

CALIFORNIA AIR QUALITY REQUIREMENTS (OTHER THAN EMISSION STANDARDS) THAT APPLY TO HEAVY-DUTY VEHICLES

Citation(s)	Applicability	Provision/Regulation
H&SC §41700, VC §27153	Any source, including any motor vehicle Any motor vehicle	Nuisance, including excessive smoke Excessive exhaust products
H&SC §41701 VC §27153.5	Any source 1971 and later motor vehicles Pre-1971 motor vehicles	Ringelmann 2 or 40 percent opaci*y Ringelmann 1 or 20 percent opacity Ringelmann 2 or 40 percent opacity
H&SC §44011(a)(1)	Diesel-powered vehicles	Exemption from Smog-Check Program
H&SC §44011.6 13 CCR, §2180-2194	Heavy duty diesel vehicles	Heavy-Duty Vehicle Inspection Program - roadside visible emissions (opacity) test by CHP Periodic Smoke Inspection Program - fleet vehicle visible emissions (opacity) test by fleet owners/operators

California and Other State and Local Idling Measures

A number of State laws limit idling. H&SC § 42403.5 (Bus Idling, Civil) specifies civil penalties for the owner of any idling diesel-powered bus that violates H&SC § 41700 (No Person Shall Discharge Pollutants) to cause injury, detriment, nuisance, etc. However, an exemption is made for persons that can establish "by affirmative defense that the extent of harm caused does not exceed the benefit accrued to bus passengers as a result of idling the engine."

In addition to HSC § 42403.5, title 13 CCR section 1226 and VC § 22515 effectively limit school bus and other motor vehicles from idling under special circumstances. When children are aboard and a school bus driver leaves the driver's compartment, title 13 CCR § 1226 requires the driver to park the bus, turn off the engine, and remove the ignition keys. VC§ 22515 essentially requires the driver of any unattended vehicle (not limited to school buses) on a highway to do the same thing. In December of 2002, the Board adopted an ATCM that limits school bus idling and idling at schools, 13 CCR, §

2480. In addition, beginning in 2003, State law (H&SC § 40720) limits the idling or queuing of diesel-fueled trucks to less than 30 minutes while waiting to enter the gate into a marine terminal and applies to all marine terminals in the State of California.

A review of California air quality management and air pollution control district rulebooks showed no specific idling regulations. However, some California cities and counties have adopted local engine idling ordinances. For example, San Francisco has an ordinance that limits the idling of tour buses. Placer County limits the idling time of both on-road and off-road engines to five minutes or less in any one hour time period when the vehicle is not moving, or when the off-road equipment is not performing work. Currently, a number of idling measures are under evaluation in different California counties and air quality management districts.

Aside from California, the ARB staff identified 20 states with statewide, county, or municipal idling regulations or ordinances. Approximately half of these state and local measures apply to all motor vehicles while the other half apply solely to diesel-fueled vehicles or urban buses. More than two-thirds of these measures restrict idling to five minutes or less. Typical exemptions cited in the idling measures include: emergency vehicle idling, idling while in traffic, idling during service or repair, idling to power auxiliary equipment (e.g., operating a hoist, crane, pump, drill, mixer and equipment other than a heater or air conditioner), and idling when outside temperatures are below freezing. Appendix B provides a summary of state and local idling measures.

Voluntary and Incentive Programs

Federal, State, and local programs have been developed to encourage less polluting diesel engines. These programs include:

- U.S. EPA's Voluntary Diesel Retrofit Program
- The ARB's Carl Moyer Memorial Air Quality Standards Attainment Program
- Clean Air Transportation Communities Grant Program - U.S. EPA's SmartWay℠ Transportation Initiative.

Although U.S. EPA plans to reduce pollution from new diesel engines through new engine standards, the emission reductions from those standards will take many years to significantly impact the existing engine population due to the long lives typical of most diesel engines, approximately 20 or more years. In order to provide incentives to accelerate the rate of emission reductions, the U.S. EPA has developed the Voluntary Diesel Retrofit Program. The program addresses pollution from diesel construction equipment and heavy-duty vehicles that are currently on the road. The program is building a market for clean diesel engines by working with state, local, and industry partners to create demonstration projects around the country. The program's web site (www.epa.gov/otaq/retrofit/) is designed to help fleet operators, air quality planners in state/local government, and retrofit manufacturers understand this program and obtain the information needed to create effective retrofit projects.

California's Carl Moyer Memorial Air Quality Standards Attainment Program, administered by ARB, provides funds for the incremental cost of cleaner-than-required engines and equipment as an incentive for the increased use of cleaner engines. Eligible projects include cleaner on-road, off-road, marine, locomotive, and stationary agricultural pump engines, as well as forklifts, airport ground support equipment, auxiliary power units, and transport refrigeration units. The program achieves near-term reductions in emissions of NOx, which are necessary for California to meet its clean air commitments under the State Implementation Plan. In addition, local air districts use these NOx emission reductions to meet commitments in their conformity plans, thus preventing the loss of federal funding for local areas throughout California. The program also reduces particulate matter (PM), a component of diesel exhaust.

In the spring of 2002, California voters passed Proposition 40, the California Clean Water, Clean Air, Safe Neighborhood Parks, and Coastal Protection Act. Proposition 40 allocated $50 million to the ARB over two years for distribution to air districts for projects that "affect air quality in the State and local parks and recreation areas" in accordance with the Carl Moyer guidelines. Of these funds, the governor allocated $25 million to the ARB for the 2002/2003 fiscal year. Approximately $5 million from these funds were allocated for the acquisition of new, lower-emitting school buses statewide in order to achieve PM and NOx emission reductions. Further information is available at the web site www.arb.ca.gov/msprog/moyer/moyer.htm.

U.S. EPA's SmartWay Transport initiative is a voluntary partnership between various freight industry sectors and U.S. EPA that establishes incentives for fuel efficiency improvements, emission reductions affecting human health (especially in densely populated areas), and reductions of greenhouse gases. One component of this program invites companies that either use or provide freight shipping services (shippers and carriers, respectively) to become SmartWay Transport partners. Such partners apply innovative strategies and technologies to improve fuel efficiency, reduce emissions, and promote new, clean technologies. Partners that meet program requirements and exceed performance thresholds will have SmartWay logo rights and get public visibility and recognition for having outstanding environmentallyefficient freight transport services. They are allowed to publicize their environmental leadership to their customers and the public. Further information is available on the Web at www.epa.gov/otaq/smartway/index.htm.

D. REASONS FOR THE PROPOSED ATCM

The Proposed ATCM would simply and effectively eliminate unnecessary heavy-duty vehicle idling emissions before they occur and, most importantly, would reduce the public's exposure to TACs and other air pollutants beyond those reductions achieved by existing measures and programs. In addition to health and environmental benefits, the Proposed ATCM is anticipated to provide fuel and maintenance cost savings for motor carriers and affected vehicles.

Need

The Proposed ATCM would apply to diesel-fueled commercial motor vehicles with GVWR greater than 10,000 pounds that operate in the State of California. The Proposed ATCM is necessary as a component of ARB's Diesel Risk Reduction Plan for the reasons listed below:

- Idling increases the public health risks from diesel exhaust exposure, and adversely affects the environment.
- Unnecessary heavy duty idling accounts for about 9 percent of the total on-road diesel PM emissions in California..
- There are no California air district regulations, and very few local and county ordinances that limit idling of diesel-fueled commercial motor vehicles with GVWR greater than 10,000 pounds.
- Voluntary replacement and retrofit programs:
  - Provide a limited amount of funding for specified purposes;
  - *Are not always feasible due to terrain, fuel availability, or inability to retrofit;*
  - Usually require matching funds; and
  - Are subject to future uncertain government budget allocations.

Benefits

The Proposed ATCM would benefit the general public, the environment, and motor carriers of affected vehicles because the elimination of unnecessary idling would:

- Reduce the public's exposure to diesel PM and other TACs associated with increased cancer risks and other adverse health effects such as acute respiratory distress and, possibly, asthma attacks;
- Reduce emissions of particulate matter, oxides of nitrogen and other pollutants associated with the contamination of air, water, soil, and vegetation;
- Reduce noise and soiling, and improve visibility; and
- Reduce vehicle operating costs related to fuel use and engine wear.

Effectiveness

The Proposed ATCM would be reasonable and effective because it:

- simply requires manually shutting off a bus or vehicle engine when idling is not necessary under Phase one - no redesign or add-on mechanical devices are required;
- allows reasonable time for trucks equipped with sleeper berths to find alternative *means to idling during rest periods for the implementation of* Phase *two;*
- Recognizes situations where idling is necessary for safety or operational purposes;
- Can be effectively implemented and enforced through:
  - ARB development and distribution of educational materials to the regulated community;

- Training: staff expects that an owner, lessee, licensee, or bailee will inform their vehicle drivers about the requirements of the regulation. The regulation does not dictate the method or frequency of training and staff assumes businesses will choose the most cost and time effective methods for driver training;
- Enforcement by the ARB Enforcement Division, CHP, local peace officers, and air districts; and

- Is consistent with California and other state and local idling measures.

REFERENCES

ARB, 1984. California Air Resources Board and Department of Health Services. Report to the Scientific Review Panel on Benzene. Overview. Sacramento: ARB and OEHS,27 November 1984.

ARB, 1986. California Air Resources Board and Department of Health Services. Public Hearing to Consider the Adoption of a Regulatory Amendment Identifying Chlorinated Dioxins and Dibenzofurans as Toxic Air Contaminants. Sacramento: ARB and DHS, 6 June 1986.

ARB, 1992a. California Air Resources Board and Office of Environmental Health Hazard Assessment. Final Report on the Identification of Formaldehyde as a Toxic Air Contaminant. Part A Exposure Assessment. Sacramento: ARB and OEHHA, July 1992.

ARB, 1992b. California Air Resources Board and Office of Environmental Health Hazard Assessment. Proposed Identification of 1,3-Butadiene as a Toxic Air Contaminant. Staff Report/Executive Summary. Sacramento: ARB and OEHHA, May 1992.

ARB, 1993a. California Air Resources Board and Office of Environmental Health Hazard Assessment. Acetaldehyde as a TAC. Executive Summary. Sacramento: ARB and OEHHA, November 1993.

ARB, 1993b. California Air Resources Board. Identification of Federal Hazardous Air Pollutants as Toxic Air Contaminants. Staff Report. Sacramento: ARB, June 1993.

ARB, 1994. California Air Resources Board and Office of Environmental Health Hazard Assessment. Benzo[a]pyrene as a Toxic Air Contaminant. Executive Summary. Sacramento: ARB and OEHHA, July 1994.

ARB, 1998a. California Air Resources Board and Office of Environmental Health Hazard Assessment. Proposed Identification of Diesel Exhaust as Toxic Air Contaminant. Executive Summary. Sacramento: ARB and OEHHA, April 1998.

ARB, 2000b. Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel Fueled Engines and Vehicles.
http://www.arb.ca.gov/diesel/documents/rrpapp.htm

California Environmental Protection Agency (Cal/EPA) 1998: Proposed *Identification of Diesel Exhaust as a Toxic Air Contaminant: Risk Assessment for Diesel Exhaust; Appendix III, Part B*; Office of Environmental Health Hazard and Assessment: Sacramento, CA, 1998. (Available on a CD)
http://www.arb.ca.gov/regact/dieseltac/res98-35.pdf

OEHHA, 2001. Office of Environmental Health Hazard Assessment. Prioritization of Toxic Air Contaminants Under the Children's Environmental Health Protection Act. Sacramento: OEHHA, October 2001.

II. NEED FOR CONTROL OF DIESEL PARTICULATE MATTER

In 1998, the ARB identified diesel particulate matter (diesel PM) as a toxic air contaminant (TAC). Diesel PM contributes to over 70 percent of the estimated risk from air toxics today. In September 2000, the ARB approved the "Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles" (Diesel Risk Reduction Plan). The goal of the Diesel Risk Reduction Plan is to reduce diesel PM emissions and the associated cancer risk up to 85 percent by 2020. In addition, in 2001 the Office of Environmental Health Hazard Assessment (OEHHA), pursuant to the requirements of Senate Bill 25 (1999, Escutia), identified diesel PM as one of the TACs that may cause children or infants to be more susceptible to illness. Senate Bill 25 also requires the ARB to adopt control measures, as appropriate, to reduce the public's exposure to these special case TACs (HSC § 39669.5).

This Proposed ATCM to reduce diesel PM emissions from diesel-fueled commercial motor vehicles with GVWR greater than 10,000 pounds, is one of a group of regulations adopted or being developed to achieve the emission and risk reduction goals of the Diesel Risk Reduction Plan. The Proposed ATCM will also reduce emissions of NOx, precursors to the formation of ozone.

This chapter describes the physical and chemical characteristics of diesel PM and discusses the health effects of the pollutants emitted by diesel engines. It also discusses the environmental benefits of the Proposed ATCM.

A. PHYSICAL AND CHEMICAL CHARACTERISTICS OF DIESEL PM

Diesel engines emit a complex mixture of inorganic and organic compounds that exist in gaseous, liquid, and solid phases. The composition of this mixture will vary depending on engine type, operating conditions, fuel, lubricating oil, and whether or not an emission control system is present. The primary gas or vapor phase components include typical combustion gases and vapors such as carbon monoxide (CO), carbon dioxide (CO_2), sulfur dioxide (SO_2), NOx, reactive organic gases (ROG), water vapor, and excess air (nitrogen and oxygen).

There are over 40 substances in the emissions from diesel-fueled engines listed by the U.S. EPA as hazardous air pollutants and by the ARB as TACs. Fifteen of these substances are listed by the International Agency for Research on Cancer as carcinogenic to humans, or as probable or possible human carcinogens. The list of potentially carcinogenic compounds found in diesel exhaust includes the following substances: formaldehyde, acetaldehyde, 1,3-butadiene, antimony compounds, arsenic, benzene, beryllium compounds, inorganic lead, mercury compounds, bis(2-ethylhexyl)phthalate, dioxins and dibenzofurans, nickel, polycyclic organic matter (POM) including polycyclic aromatic hydrocarbons (PAHs), and styrene.
Diesel PM is either directly emitted from diesel-powered engines (primary particulate matter) or is formed from compounds in gaseous diesel emissions such as SO_2, NOx, or organic compounds (secondary particulate matter).

Diesel PM consists of both solid and liquid material and can be divided into three primary fractions: the elemental carbon fraction, the soluble organic fraction, and the sulfate fraction. The soluble organic fraction (SOF) consists of unburned organic compounds in the small fraction of the fuel and atomized and evaporated lubricating oil that escapes oxidation. These compounds condense into liquid droplets or are adsorbed onto the surfaces of the elemental carbon particles. Several components of the SOF have been individually identified as toxic air contaminants.

Diesel particles can exist in the atmosphere in different forms. Diesel particles can exist as a carbon core with a coating of organic carbon compounds, as sulfuric acid and ash, as sulfuric acid aerosols, or as sulfate particles associated with organic carbon. The organic fraction of the diesel particle contains compounds such as aldehydes, alkanes and alkenes, and high-molecular weight PAH and PAH-derivatives. Many of these PAHs and PAH-derivatives, especially nitro-PAHs, have been found to be potent mutagens and carcinogens. Nitro-PAH compounds can also be formed during transport through the atmosphere by reactions of adsorbed PAH with nitric acid and by gas-phase radical-initiated reactions in the presence of oxides of nitrogen.

Almost all of the diesel particle mass is in the fine particle range of 10 microns or less in diameter (PM_{10}). Approximately 94 percent of the mass of diesel particles is comprised of particles less than 2.5 microns in diameter ($PM_{2.5}$). Fine particles can remain in the atmosphere for days to weeks and travel through the atmosphere for hundreds to thousands of kilometers, while coarse particles deposit to the earth within minutes to hours and within tens of kilometers from the emission source. Diesel PM can be distinguished from noncombustion sources of $PM_{2.5}$ by the high content of elemental carbon with adsorbed organic compounds and the high number of ultrafine particles (organic carbon and sulfate).

B. HEALTH IMPACTS OF EXPOSURE TO DIESEL PM, AMBIENT PM, AND OZONE

The Proposed ATCM will reduce the public's exposure to diesel PM, as well as reduce ambient levels of particulate matter. In addition, the Proposed ATCM is expected to result in reductions in emissions of NOx and VOC, which are precursors to the formation of ozone in the lower atmosphere. The primary health impacts of these air pollutants are discussed below.

Diesel Particulate Matter

Diesel PM is of particular concern because it poses a lung cancer hazard for humans as well as a hazard for noncancer respiratory effects such as pulmonary inflammation. Because of their small size, diesel particles are readily respirable and can effectively reach the lowest airways of the lung along with the adsorbed compounds, many of which are known or suspected mutagens and carcinogens.

More than 30 human epidemiological studies have investigated the potential carcinogenicity of diesel PM. On average, these studies found that long-term occupational exposures to diesel exhaust were associated with a 40 percent increase in the relative risk of lung cancer [Cal/EPA 1998]. However, there is limited specific information that addresses the variable susceptibilities to the carcinogenicity of diesel exhaust within the general human population and vulnerable subgroups, such as infants and children and people with preexisting health conditions. In addition to the epidemiological studies, the genotoxicity (which is associated with carcinogenicity) of diesel exhaust and some of its chemical constituents have been reported in a number of studies [Cal/EPA 1998].

Diesel PM was listed as a TAC by ARB in 1998 after an extensive review and evaluation of the scientific literature by OEHHA [Cal/EPA, 1998]. Using the cancer unit risk factor developed by OEHHA for the TAC program and modeled ambient concentrations of diesel PM, it was estimated that for the year 2000, exposure to ambient concentrations of diesel PM (1.8 micrograms per cubic meter [$\mu g/m^3$]) represented a health risk of 540 potential cancer cases per million people exposed over a 70-year lifetime.

Another significant health effect of diesel exhaust exposure is its apparent ability to act as an adjuvant in allergic responses and possibly asthma. However, additional research is needed at diesel exhaust concentrations that more closely approximate current ambient levels before the role of diesel PM exposure in the increasing allergy and asthma rates is established.

Ambient Particulate Matter

Numerous epidemiological studies have shown that an increase in the ambient PM concentration can cause adverse health effects. The key health effects associated with ambient PM, of which diesel PM is a component, are premature mortality, aggravation of respiratory and cardiovascular disease (as indicated by increased hospital admissions and emergency room visits, school absences, work loss days, and restricted activity days), aggravated asthma, acute respiratory symptoms (including aggravated coughing and difficult or painful breathing), chronic bronchitis, and decreased lung function that can be experienced as shortness of breath. [U.S. EPA, 2000; ARB, 2002; U.S. EPA, 2003].

Health impacts from exposure to the fine particulate matter ($PM_{2.5}$) component of diesel exhaust have been calculated for California, using concentration-response equations from several epidemiological studies. Both mortality and morbidity effects have been associated with exposure to both directly-emitted (primary) diesel $PM_{2.5}$ and secondary diesel $PM_{2.5}$, which is formed from the atmospheric conversion of diesel NOx emissions to $PM_{2.5}$ nitrates. It was estimated that 2,000 and 900 premature deaths resulted from long-term exposure to 1.8 $\mu g/m^3$ of primary $PM_{2.5}$ and 0.81 $\mu g/m^3$ of secondary $PM_{2.5}$, respectively, in the year 2000 [Lloyd and Cackette, 2001]. The mortality estimates, based on epidemiological studies that did not identify the cause of death, may underestimate the health impact to some degree because they were likely to have excluded some deaths ascribed to cancer but not classified as being premature deaths. Exposure to fine particulate matter, including diesel $PM_{2.5}$ can also be linked to a number of heart and lung diseases.

Ozone

Diesel exhaust contains NOx and hundreds of different volatile organic compounds. Ozone is formed by the reaction of VOCs and NOx in the atmosphere in the presence of heat and sunlight. The highest levels of ozone are produced when both VOC and NOx emissions are present in significant quantities on clear summer days. Ozone is a powerful oxidant that can damage the respiratory tract, causing inflammation and irritation, which can result in breathing difficulties.

Studies have shown that there are adverse impacts on public health and welfare from ozone even at moderate levels that do not exceed the national 1-hour ambient ozone standard. Short-term exposures to high ambient ozone concentrations have been linked to increased hospital admissions and emergency visits for respiratory problems [U.S. EPA, 2000]. Repeated exposures to ozone can make people more susceptible to respiratory infection and lung inflammation, and can aggravate preexisting respiratory diseases such as asthma. Prolonged (6 to 8 hours) repeated exposure to ozone can cause inflammation of the lung, impairment of lung defense mechanisms, and possibly irreversible changes in lung structure, which over time could lead to premature aging of the lungs and/or chronic respiratory illnesses such as emphysema and chronic bronchitis.

The subgroups most susceptible to adverse ozone health effects include individuals exercising outdoors, children, and people with pre-existing lung disease such as asthma and chronic pulmonary lung disease. Children are more at risk from ozone exposure because they typically are active outside during the summer when ozone levels are highest. Also, children are more at risk than adults from ozone exposure because their respiratory systems are still developing. Adults who are outdoors and moderately active during the summer months, such as construction workers and other outdoor workers, are among those most at risk. These individuals, as well as people with respiratory illnesses such as asthma, especially asthmatic children, can experience reduced lung function and increased respiratory symptoms, such as chest pain and cough, when exposed to relatively low ozone levels during prolonged periods of moderate exertion.

C. HEALTH AND ENVIRONMENTAL BENEFITS FROM THE PROPOSED ATCM

This section presents a qualitative overview of the general health and environmental benefits of the Proposed ATCM. A more detailed and quantitative assessment of exposure reductions and the associated cancer risk reductions from the Proposed ATCM is presented in Chapter IV.

Reducing diesel PM emissions from the unnecessary idling of diesel-fueled commercial motor vehicles with GVWR greater than 10,000 pounds will have both public health and environmental benefits. The Proposed ATCM will reduce localized potential cancer risks associated with emissions from affected vehicles near receptors. The Proposed ATCM, by helping to lower ambient levels of diesel PM, will also reduce region-wide exposures to diesel PM and the associated risks. Additional benefits associated with the Proposed ATCM include further progress in meeting the ambient air quality standards for PM_{10}, $PM_{2.5}$, ozone, and in enhancing visibility.

Reduced Diesel PM Emissions

The Proposed ATCM, by reducing the idling of affected vehicles, will achieve significant reductions in diesel emissions. The magnitude of these reductions is estimated in Chapter IV. That chapter also quantifies the benefits of reduced exposures and risk due to the Proposed ATCM.

Reduced Ambient Particulate Matter Levels

Reducing diesel PM not only reduce cancer risks, it will also help efforts to achieve the ambient air quality standards for PM. Both the State of California and the U.S. EPA have established health-based standards for the concentration of PM_{10} in the ambient air. These standards define the maximum concentration of PM that can be safely present in outdoor air; i.e. ambient concentrations that exceed the standards are considered to be unhealthful. California's PM_{10} standards were first established in 1982 and most recently updated June 20, 2002 (ARB, 2002). The current State PM_{10} standard is more protective of human health than the corresponding national standard. Additional California and federal standards were established for $PM_{2.5}$ to further protect public health (Table II-1).

PM levels in most areas of California exceed one or more current State PM standards with the majority of the state designated as non-attainment for the State PM_{10} standard.

Table II-1

State and National PM Standards

California Standard		**National Standard**	
PM_{10}			
Annual Arithmetic Mean	20 $\mu g/m^3$	Annual Arithmetic Mean	50 $\mu g/m^3$
24-Hour Average	50 $\mu g/m^3$	24-Hour Average	150 $\mu g/m^3$
$PM_{2.5}$			
Annual Arithmetic Mean	12 $\mu g/m^3$	Annual Arithmetic Mean	15 $\mu g/m^3$
24-Hour Average	No separate State standard	24-Hour Average	65 $\mu g/m^3$

The emission reductions obtained from the implementation of this Proposed ATCM will assist in furthering progress toward meeting the ambient air quality standards for both PM_{10} and $PM_{2.5}$, and consequently will help reduce the adverse public heath impacts of those pollutants in California.

Reduced Ambient Ozone Levels

Emissions of NOx and VOC, precursors to the formation of ozone in the lower atmosphere, will also be reduced by the Proposed ATCM. In California, most major urban areas and many rural areas continue to be non-attainment for the State and federal 1-hour ambient air quality standards for ozone. Table II-2 shows the State and federal ozone standards in effect. Controlling emissions of ozone precursors would reduce the prevalence of respiratory problems associated with ozone exposure, and would reduce hospital admissions and emergency visits for respiratory problems.

Table II-2

State and National Ozone Standards

California Standard		National Standard
1 hour	0.09ppm (180 $\mu g/m^3$)	0.12ppm (235 $\mu g/m^3$)
8 hour		0.08 ppm (157 $\mu g/m^3$)

Improved Visibility

In addition to the adverse public health effects of fine particulate pollution, fine particulates including sulfates, nitrates, organics, soot, and soil dust contribute to the regional haze that impairs visibility.

In 1999, the U.S. EPA promulgated a regional haze regulation that calls for states to establish goals and emission reduction strategies for improving visibility in 156 mandatory Class I national parks and wilderness areas. California has 29 of these national parks and wilderness areas, including Yosemite, Redwood, and Joshua Tree National Parks. Reducing diesel PM from diesel-fueled commercial motor vehicles will help improve visibility in these Class I areas.

REFERENCES

United States Environmental Protection Agency, 2000: Assessment and Standards Division, Office of Transportation and Air Quality. *Regulatory Impact Analysis:* Heavy-*Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements*. December 2000, EPA420-R-00-026.

United States Environmental Protection Agency, Assessment and Standards Division, Office of Transportation and Air Quality, *Draft Regulatory Impact Analysis: Control of Emissions of Air Pollution from Nonroad Diesel Engines and Fuel.* EPA420-R-03-008, April 2003. (Available on a CD)

Lloyd, A. C. and Cackette, T. A., June 2001: Critical Review; Diesel Engines: *Environmental Impact and Control,* ISSN 1047-3289, J. Air & Waste Manage. Assoc. 51:809-847.

California Environmental Protection Agency (Cal/EPA) 1998:*Proposed Identification of Diesel Exhaust as a Toxic Air Contaminant: Risk Assessment for Diesel Exhaust; Appendix III, Part B*; Office of Environmental Health Hazard and Assessment: Sacramento, CA, 1998. (Available on a CD)
http://www.arb.ca.gov/regact/dieseltac/res98-35.pdf

Air Resources Board (2002) "Public Hearing to Consider Amendments to the Ambient Air Quality Standards for Particulate Matter and Sulfates." Sacramento, CA. (available on CD).
ftp://ftp.arb.ca.gov/carbis/research/aaqs/std-rs/pm-final/PMfinal.pdf

III. SUMMARY OF PUBLIC OUTREACH EFFORTS

An open public process is an essential part of adopting any air quality regulation, including the Proposed ATCM to Limit Diesel-Fueled Commercial Motor Vehicle Idling for vehicles with gross vehicular weight greater than 10,000 pounds. State law requires an open regulatory process to ensure that all affected parties have adequate opportunity to provide pertinent information and comments. The following government agencies, industry groups, and organizations were identified as those that could be affected by, or may have particular interest in, the Proposed ATCM:

Government Agencies:	California Highway Patrol (CHP)
	Transit Agencies - California Transit Association
	California Air Pollution Control and Air Quality Management Districts (APCD and AQMD)
	U.S Environmental Protection Agency (U.S. EPA)
	U.S. Postal Service
	Sacramento Municipal Utility District (SMUD)
	California Sheriff's Association
	Border Patrol - Homeland Security
	Central Costa County Transit Authority
	Los Angeles County Metropolitan Transportation Authority
	Sacramento Regional Transit
	California Department of Fish and Game
Industry /Organizations:	Heavy-duty vehicle fleets
	Environmental groups (Union of Concerned Scientists)
	California Bus Association
	California Trucking Association (CTA)
	American Trucking Association (ATA)
	Environmental Justice Community Activist Groups
	Greyhound Bus Services
	California Association for Coordinated Transportation - (CalACT)
	Manufacturers of alternate technologies
	Engine Manufacturers Association (EMA)
	Independent Armored Car Operators Association

ARB staff conducted public outreach to ensure that affected and interested parties were aware of, and had the opportunity to participate in, the development and review of the Proposed ATCM. These public outreach efforts are described below and summarized in Table III-1.

The public was initially made aware of the ARB's intention to address heavy-duty diesel-fueled vehicle idling emissions by the publication of the "Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles" in October 2000. The Diesel Risk Reduction Plan included a risk characterization scenario for idling, and general recommendations for reducing diesel PM from mobile sources. The

Plan recommended motor vehicle idling measures to enhance and maintain emission reductions achieved through new engine emission standards and retrofits. Idling exhaust from all but zero emission heavy-duty buses and vehicles contains toxic air contaminants (TACs) including diesel PM and other air pollutants harmful to the general public.

During development of the Proposed ATCM, staff identified a need to reach a large number of potential stakeholders. To address this need, staff established an Idling web page (http://www.arb.ca.gov/toxics/idling/idling.htm). Information regarding the Proposed ATCM was also posted on the ARB's Internet web site on diesel risk reduction. Those web sites provide background information on diesel PM, including fact sheets, workshop dates and locations, and other diesel-related information, and serve as a portal to other web sites with related information. ARB staff also created an Idling list serve, where interested individuals could sign up to receive notices and updates by electronic mail. To date, there are approximately 200 members of the Idling list serve.

Numerous personal consultations and small-group conference calls were held with affected government agencies, industry, and others. ARB consulted with the California Highway Patrol (CHP) throughout the development of the Proposed ATCM. The ARB staff also conducted telephone surveys of air quality regulators from different states, trucking companies and owners. The purpose of the surveys was to determine the extent to which idling has already been regulated and to request more information on existing idling statutes, regulations, ordinances, and policies. The information from the surveys confirmed the consistency of the Proposed ATCM with existing idling regulations and policies in other states. Appendix B provides a summary of various state and local idling measures.

A teleconference with South Coast Air Quality Management District (SCAQMD) officials was held to discuss the Proposed ATCM and to get a better understanding of their issues and concerns as it related to implementation and enforcement. Representatives from the Union of Concerned Scientists were also consulted regarding their concerns and suggestions.

The ARB Staff used the internet web pages described above and electronic mail broadcast notices to alert organizations and individuals to public consultation meetings, public workshops, and hearings. ARB staff also sent notices for the Public Consultation meeting held on December 15, 2003 and Public Workshops held subsequently to approximately 710 environmental justice (EJ) and environmental activists and organizations. Information was sent via electronic mail to invite participation from individuals who previously joined the list serve notification processes of other related ARB programs and regulations. Those list serves were from the following programs and regulations:

- Carl Moyer Program - This list serve provides updates and information on the ARB-administered Carl Moyer Program to numerous industries and other interested parties. This program provides funds to encourage the use of cleaner engines and equipment in order to achieve reductions of NOx and PM emissions;

- Diesel Retrofit Programs - This list serve provides updates and information on the verification status of diesel retrofit emission control strategies;
- Mobile Source Program mail out listing from the ARB's Mobile Source Control Division - This list serve includes updates on ARB activities regarding heavy-duty vehicles and engines, non-transit buses, on-road fleets, software upgrades for diesel engines, and other related areas.
- Portable Diesel Equipment ATCM - This list serve includes approximately 500 individuals from government, environmental groups and industries and provides information regarding the recently-approved ATCM aimed at portable diesel equipment;
- School bus idling ATCM list serve – This list serve includes individuals interested in an ATCM designed to reduce children's exposure to idling emissions from school buses and other vehicles;
- Selected List Serves Under the Diesel Risk Reduction Plan – These selected list serves cover the following program areas: mobile engines, stationary engines, and portable equipment.

A total of four public workshops were held in addition to the initial public consultation meeting. During the workshops, the ARB staff made presentations and responded to comments. Participants were encouraged to provide comments in-person, or by telephone, fax, electronic mail, or regular mail. All public workshops were web cast and allowed interested parties to submit questions by e-mail for ARB staff response during the workshops. Interested parties were also encouraged to contact John Kato, Manager, Project Support Section, to arrange a personal meeting or conference call with staff.

To generate additional public participation and to enhance the information flow between the ARB and interested persons, the ARB staff made all documents, including workshop presentations, available via the ARB's Internet web sites on diesel risk reduction and the Proposed ATCM.

Table III - 1

PUBLIC OUTREACH SUMMARY

Summary	Date	Affected and/or Interested Parties Involved
Public Workshop held at the Cal/EPA building, Sacramento	May 21, 2004	Representatives from different organizations and agencies
Site visit to Flying J truck stop at Lodi	May 4, 2004	ARB staff and Manager of Flying J truck stop.
Public Workshop held at the Cal/EPA building , Sacramento	April 28, 2004	Representatives from different organizations and agencies
Meeting with local CHP officers at the Cal/EPA building in Sacramento.	March 30, 2004	Representatives from ARB and local CHP officials

Table III – 1 Cont'd

Summary	Date	Affected and/or Interested Parties Involved
Public Workshop, held at the Cal/EPA building in Sacramento.	March 24, 2004	Representatives from different organizations and agencies
Meeting with representatives from Idleaire, at the Cal/EPA building , Sacramento	March 23, 2004	ARB Staff and Officials from Idleaire
Site visit to Ripon, California, to obtain information on alternative technologies to idling at truck stops	March 19, 2004	ARB staff, SMUD, PG&E, CEC, Idleaire Execs.,
State Capitol and Amtrak station site visit to observe idling buses, Sacramento	March 16, 2004	ARB staff
Public Workshop, held at the Cal/EPA building in Sacramento.	March 02, 2004	Representatives from different organizations and agencies
Meeting with local California Highway Patrol	February 25, 2004	Representatives from the Sacramento area California Highway Patrol
ARB staff visit to Newby Island landfill, location in Milpitas to observe operation and whether trucks line up extensively while waiting to get into the site	February 17, 2004	ARB staff and Manager of land fill
Public Workshop, held at the Cal/EPA building in Sacramento.	January 29, 2004	Representatives from different organizations, agencies
Field trip to 49er truck stop, in West Sacramento, to look at the truck stop electrification	January 23, 2004	Sacramento Metropolitan Utility District staff, ARB staff, truck stop owner
Field trip to Sacramento Municipal Utility District (SMUD), in Sacramento. Meeting held to discuss truck stop electrification (TSE) and Caterpillar electric system.	January 22, 2004	ARB staff, representatives from SMUD, Caterpillar, California Energy Commission (CEC), and a representative frcm a private trucking company.
Telephone Survey of 20 states with idling regulations, rules or ordinances	January 2004	Air Quality Regulators
Field trip to University of California, Davis (UCD): Demonstration of Auxiliary Power Unit ("Pony pack") and fuel cell technologies	January 20, 2004	UCD staff and ARB staff
Conference call with South Coast Air Quality Management District (SCAQMD) to discuss enforcement and issues related to SCAQMD Port idling regulation	December 23, 2003	SCAQMD staff and ARB staff
Public consultation meeting, held at the Cal/EPA building in Sacramento	December 15, 2003	Representatives from different agencies, organizations
Conference call with Union of Concerned Scientists to discuss the Proposed ATCM and obtain their views, comments, and concerns	November 6, 2003	ARB staff and representatives from Union of Concerned Scientists
Field trip to truck stop located in Ripon, California to obtain information on alternative technologies to idling at truck stops	July 23, 2003	ARB Staff and IdleAire representatives
ARB telephone survey to obtain information on implementation of idling policies, memos or directives	June 16, 2003	ARB staff, trucking companies

IV. EMISSIONS, EXPOSURE, AND RISK FROM IDLING DIESEL-FUELED COMMERCIAL MOTOR VEHICLES

This chapter provides an overview of the vehicle classes potentially impacted by the Proposed ATCM. It also includes estimates of pollutant emissions resulting from general idling and main engine idling during prolonged rest periods. Finally, this chapter presents a brief description of the health impacts of idling emissions and an overview of the modeling used to estimate the public health risks.

A. ESTIMATION OF VEHICLE IDLING EMISSIONS AND EMISSION REDUCTIONS

Affected Vehicles

The focus of the Proposed ATCM is the reduction of idling of commercial and publicly owned diesel-fueled, commercial motor vehicles with a gross vehicular weight rating (GVWR) of greater than 10,000 pounds. The heavy-duty diesel vehicle classification can be segregated into heavy, heavy-duty diesel vehicles (HHDDV) (GVWRs greater than 33,000 pounds), medium, heavy-duty diesel vehicles (MHDDV) (GVWRs between 14,000 and 32,999 pounds) and light heavy duty diesel (LHDV-2) (GVWR between 10,000 and 13,999 pounds). Examples of vehicles affected include, but are not limited to delivery trucks, trash trucks, bulk hauling trucks, cargo tankers, utility trucks, tour and urban buses, and construction vehicles.

The Proposed ATCM does not affect motor homes or school buses. Motor homes typically use on-board generator sets to provide electrical power when the vehicle is parked for any length of time to save fuel and reduce noise and vibration. Therefore, the primary diesel engine is not normally used while the motor home is parked. School bus idling is already regulated under the "Airborne Toxic Control Measure to Limit School Bus Idling and Idling at Schools" approved by the Board in December 2002.

Heavy-duty vehicle ages range widely from new model year vehicles to pre-1975 vehicles. Trucks used for interstate commerce tend to be much newer (post 1994) due to the demands placed on the vehicle by extensive travel. Many of these vehicles are equipped with sleeper berths that include ancillary devices such as computers, televisions, and microwave ovens to provide driver comfort and needed rest during federally mandated stopovers. Note that sleeper berths are installed only on trucks classified as HHDDVs, but not all HHDDVs are so equipped.

Number of Affected Vehicles in California

The projected vehicle populations operating in California that will be affected by the Proposed ATCM were obtained from EMFAC2002 v2.2 (EMFAC2002) and are as follows:

Table IV-1

Projected Vehicle Population Distribution

	2000	2005	2009
HHDDV	158,000	180,000	197,000
MHDDV	149,000	178,000	196,000
LHDV-2	33,000	35,000	38,000
Buses*	15,000	16,000	17,000
Total	355,000	409,000	448,000

*excluding school buses

These vehicle populations are the average number of both in-state and out-of-state vehicles operating in California at any one time. According to EMFAC 2002, the out-of-state HHDDV population accounts for about 25 percent or roughly 102,000 (based on 2005 projections) of vehicles operating in California at any one time. Of these vehicles, an estimated 90 percent or 92,000 vehicles are sleepers. Approximately 67,000 or 73 percent of them operate in California on any given day and typically idle for extended periods at driver rest. Staff assumed California registered sleepers would not typically remain in California and therefore any emissions contribution would be negligible. Below, Table IV-2 presents the portion of the aforementioned total population that idle the main engine during prolonged driver rest periods. Later in Table IV-3, it can be seen that this particular segment of the industry contributes a significant portion of the total idling emissions.

Table IV-2

Total Projected Daily Sleeper Population

2000	2005	2009
58,000	67,000	74,000

Projected Emission Estimates from the Affected Vehicle Population

The projected statewide diesel PM and NOx emissions from years 2004, 2005 and 2009 are included in Table IV-3. These estimates include new engine standards and turnover in the vehicle population, but do not include the projected additional reductions expected from implementation of the Proposed ATCM. Expected emission reductions from the implementation of the Proposed ATCM are discussed in Chapter V.

Table IV-3

Idling Emission Estimates from Affected Categories (without ATCM Implementation)

Idling Emissions (tons per year)		
Year	**Diesel PM**	**NOx**
2000	503	17,500
2005	438	20,200
2009	416	24,000

Table IV-4 shows that prolonged vehicle idling during driver rest periods contributes a significant portion of idling emissions in California. Though population-wise this category is 16% of the total, the main engine idling from prolonged driver rest comprises over 50 percent and approximately 70 percent of the total diesel PM and NOx pollutants respectively from idling diesel-fueled commercial motor vehicles with a GVWR of greater than 10,000 pounds.

Table IV-4

Emissions from prolonged Idling during driver rests (without ATCM Implementation)

Idling Emissions (tons per year)		
Year	**Diesel PM**	**NOx**
2000	268	12,600
2005	230	13,700
2009	253	16,100

B. NEW ENGINE AND APS IDLING EMISSIONS

By January 1, 2009, vehicles equipped with sleeping berths will be required to limit main engine idling and the operation of a diesel-fueled APS to 5 minutes during extended rest periods. In order to provide power to the sleeping berth, staff assumes the vast majority of vehicle will install an auxiliary power system (APS). The most common APSs today are powered by diesel fuel from the trucks fuel tanks. Other APS systems, such as those that are hydrogen-fueled or electrically-powered, are not currently developed for the mass market or are not universally practical. The current production model APS uses approximately one-fifth the amount of fuel and generates significantly less PM and NOx than the current standard (2006 and earlier) idling truck engines. In 2007, new on-road diesel engines will have to meet new stricter federal emission standards. Additionally, in 2010, new NOx emission requirements will be in affect. It is likely that PM emissions from 2007 and later model main engines could be lower than PM emissions from existing auxiliary power systems even though the APS will continue to use less fuel per unit time.

To ensure that emission reductions are achieved as a result of this regulation, staff is proposing to return to the Board in 2005 to establish procedures and specifications for diesel-fueled APS systems. Such procedures and specifications would ensure that using an APS would not have the negative affect of increasing overall PM emissions. Staff could pursue such solutions by requiring an APS to achieve emission reductions typically associated with level three control. For diesel, level three controls are typically associated with the installation of a particulate filter that reduces PM emissions by 85 percent. Requiring APS emissions to be directed through a particulate filter could be accomplished by either using a dedicated standalone filter connected to the APS or routing the emissions through the existing particulate filter on newer standard trucks. Possible areas of concern could include main engine warranty issues, the cost of particulate filters (thousands of dollars), and development of smaller filter technologies. Currently, engine manufactures are developing OEM APS technologies that route the APS exhaust through the main stack and potentially the main engine DPF.

In addition to PM emissions, NOx emissions could also present issues. By 2010, the main engine will be required to emit no more than 0.2 g/b-hp/hr in NOx emissions. However, current test procedures do not apply a NOx emission standard to vehicles during extended idle and the effectiveness of the vehicle's advanced control systems under these conditions is uncertified. Though an APS will typically give NOx emission benefits regardless of the year of the APS and the main engine, the APS could possibly result in a PM penalty when used with other main engine combinations. One possibility of mitigating idle emissions from the main engine is to establish NOx idling emission standards for the new 2007 and later model engines. If main engine idling emissions from PM (via particulate filter) and NOx are reduced to acceptable levels, idling of the main engine on 2007 and later trucks without an APS may be possible.

C. OVERVIEW OF HEALTH RISK ASSESSMENT

Diesel truck engine idling can have significant impacts on air quality, especially when idling trucks congregate in large numbers where their combined emissions could pose a significant health risk to those that live and work nearby. Exposure to these emissions could result in increased cancer risks and non-cancer health risks, such as irritation to the eyes and lungs, allergic reactions in the lungs, asthma exacerbation, blood toxicity, immune system dysfunction, and developmental disorders. Because ambient monitoring results are not available for diesel particulate matter (PM), estimates of the level of cancer risk are made using emission factors and various modeling techniques, as discussed below.

A health risk assessment (HRA) is an evaluation that a risk assessor (e.g., ARB, district, consultant, or facility operator) develops to describe the potential a person or population may have of developing adverse health effects from exposure to diesel PM emissions or from other toxic air contaminants (TACs). Some health effects that are evaluated could include cancer, developmental effects, or respiratory illness. The exposure pathways included in an HRA depend on the TACs that a person (receptor) may be exposed to, and can include breathing, the ingestion of soil, water, crops, fish, meat, milk, and eggs, and dermal exposure. For this HRA, we are evaluating the cancer health impacts for diesel particulate via the breathing or inhalation pathway only.

Generally, to develop an HRA, the risk assessor would consider information developed under the following four steps. The four steps are Hazard Identification, Dose-Response Assessment, Exposure Assessment, and Risk Characterization.

<u>Hazard Identification</u>

In the first step, the risk assessor would determine if a hazard exists, and if so, would identify the exact pollutant(s) of concern and the type of effect, such as cancer or noncancer effects.

For this assessment, the pollutant of concern, diesel PM from compression ignited internal combustion engines, has been formally identified under the Assembly Bill (AB) 1807 Program as a TAC through an open, regulatory process by the ARB [ARB 1998a].

<u>Dose-Response Assessment</u>

In this step, the assessor would characterize the relationship between exposure to a pollutant and the incidence or occurrence of an adverse health effect. The Office of Environmental Health Hazard Assessment (OEHHA) supplies dose-response relationships to the ARB in the form of inhalation cancer potency factors for inhalation cancer risks and substance-specific oral potency factors for oral (noninhalation) cancer risks. Under current OEHHA recommended risk assessment methodology, to estimate potential cancer risks, the estimated maximum annual ground level concentrations (GLCs), in micrograms per cubic meter (µg/m3), is converted to a pollutant dose. Multiplication of the average daily inhalation dose over 70 years, in milligrams per kilogram of body weight per day (mg/kg-d), with the inhalation cancer potency factor developed by OEHHA will give the inhalation cancer risk. Unit risk factors (URF), in the units of inverse concentration, (µg/m3)-1, used in previous assessments can be used for assessing cancer inhalation risk directly from air concentrations. However breathing rates, expressed in units of liters per kilogram of body weight-day coupled with the air concentrations to estimate dose in mg/kg-d is recommended for assessing cancer risks.

Potential chronic noncancer health risks are expressed as hazard quotients (HQ) if the risk assessment is for only one, non-multipathway pollutant. If there is more than one pollutant or pathway of exposure, the HQs are summed by target organ to give the noncancer hazard index (HI). For noncancer inhalation health risks, the estimated maximum annual GLCs are divided by the corresponding chronic inhalation reference exposure level (REL) for each toxic. For toxics with multipathway noncancer health impacts, the GLC is used to derive the oral dose to be used with the noncancer oral REL (in mg/kg-d).

These health risk values and the risk assessment methodology are presented in the OEHHA Air Toxics Hot Spots Program Risk Assessment Guidelines: The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments [OEHHA, 2003]. These OEHHA guidelines and this assessment utilize health and exposure assessment information in the Air Toxics Hot Spot Program Risk Assessment Guidelines, Part II, Technical Support Document for Describing Available Cancer Potency Factors [OEHHA, 2002] and Part IV, Technical Support Document for Exposure Analysis and Stochastic Analysis [OEHHA 2000].

Exposure Assessment

In this step of the risk assessment, the risk assessor estimates the extent of public exposure by looking at who is likely to be exposed (e.g., child or adult, or worker or resident), how exposure will occur (e.g., inhalation or ingestion), and the magnitude of exposure.

Risk Characterization

This is the final step of risk assessment. In this step, modeled concentrations and public exposure information, determined through exposure assessment, are combined with potency factors and RELs developed through dose-response assessment.

D. TOOLS USED FOR RISK ASSESSMENT

The tools and information that are used to estimate the potential health impacts-from a facility include air dispersion modeling and pollutant-specific health effect values. Information required for the air dispersion model includes emission rate estimates, physical descriptions of the source, emission release parameters, and meteorological data. Combining the output from the air dispersion model and the pollutant-specific health values provides an estimate of the potential cancer and non-cancer health impacts from the emissions of a TAC. For this assessment, the ARB staff estimated the potential health impacts of diesel PM-from diesel-fueled, heavy-duty truck engine idling operations. A brief description of the air dispersion modeling and pollutant-specific health effects values is provided in this Chapter. A more detailed discussion of the air dispersion modeling and parameters used for determining individual cancer risk is presented in Appendix C.

Air Dispersion Modeling

Air dispersion models are used to estimate the downwind GLCs of a pollutant after it is emitted from a source. The downwind concentration is a function of the quantity of emissions, release parameters at the source, and appropriate meteorological conditions. The two models that were used for this HRA are SCREEN3, version 96043 for sensitivity studies, and Industrial Source Complex Short Term (ISCST3), version 02035. Appendix C provides additional details on the sensitivity studies and the modeling results illustrating use of these models for calculating potential health impacts. The U.S. EPA recommends the SCREEN3 model for first order screening calculations and ISCST3 model for refined air dispersion modeling [U.S. EPA, 1995a; U.S. EPA, 1995b]. Both models are currently used by the ARB, air districts, and other states.

Pollutant-Specific Health Effects Values

OEHHA guidelines [OEHHA, 2003] gives inhalation and oral health effects values. Diesel PM is not a multipathway pollutant, and the inhalation pathway is the method of exposure to the cancer and noncancer impacts of this pollutant. The diesel exhaust PM inhalation cancer potency factor is 1.1 with units of inverse dose as a potency slope, (i.e., $(mg/kg\text{-}d)^{-1}$). For inhalation chronic noncancer impacts, the OEHHA recommended REL is 5 $\mu g/m^3$.

Although diesel PM has both chronic inhalation cancer and non-cancer health effects values, the cancer health risk impacts are so much greater than the non-cancer health impacts. The noncancer health impacts are considered insignificant compared to cancer impacts and were not quantified for this assessment.

E. POTENTIAL HEALTH EFFECTS OF DIESEL PM

This section summarizes the potential health impacts that can result from exposure to diesel PM, both cancer and noncancer health effects. The probable route of human exposure to diesel PM is inhalation. In August 1998, the ARB formally identified diesel particulate as a TAC following a 10-year review process [ARB, 1998b]. This marked the completion of the identification phase of the process to address the potential for adverse health effects associated with diesel PM emissions.

Cancer

The International Agency for Research on Cancer (IARC) concluded in 1989 that there is sufficient evidence that whole diesel engine exhaust probably causes cancer in humans and classified diesel exhaust in Group 2A: Probable human carcinogen [IARC, 1989]. The OEHHA staff has performed an extensive assessment of the potential health effects of diesel PM, reviewing available carcinogenicity data. The OEHHA concluded that exposures to diesel PM resulted in an increased risk of cancer.

Epidemiological studies in truck drivers, transport and equipment workers, dockworkers, and railway workers, reported a statistically significant increase in the incidence of lung cancer associated with exposure to diesel exhaust.

Noncancer

The OEHHA found that exposures to diesel PM resulted in an increase in long-term (chronic) noncancer health effects including a greater incidence of cough, labored breathing, chest tightness, wheezing, and bronchitis. At this time, OEHHA has not quantified short-term (acute) noncancer health effects.

F. HEALTH RISK ASSESSMENT FOR DIESEL TRUCK ENGINE IDLING OPERATIONS

This section examines the potential cancer health risks associated with exposure to diesel PM emissions from diesel truck engine idling operations. Additional details on the methodology and assumptions used to estimate the health risks are presented in Appendix C of this report.

Risk assessment is a complex process that requires the analysis of many variables to simulate real-world situations. There are five key variables that can impact the results of a health risk assessment for the diesel truck engine idling operations: 1) the amount of diesel PM emissions from the diesel truck engine idling operations, 2) the meteorological conditions that affect the dispersion of diesel PM in the air, 3) the distance between the receptor and the emission source, 4) the duration of exposure to the diesel PM emissions, and 5) the inhalation rate of the receptor.

For the first key variable, we modeled the amount of diesel PM emissions as a function of the total annual hours of diesel truck engine idling operations. Meteorological conditions, the second key variable, can have a large impact on the resultant ambient concentrations of diesel PM, with higher concentrations found along the predominant wind direction and under calm wind conditions. The meteorological conditions and proximity of the receptor to the source(s) of emissions affect the concentration of the diesel PM in the air where the receptor is located. In addition, the exposure duration and inhalation rates are key factors in determining potential risk, with longer exposure times and higher inhalation rates typically resulting in higher estimated risk levels. For this analysis staff assumed the 70 year exposure duration and inhalation rate recommended for estimating health impacts in the current OEHHA guidelines [OEHHA, 2003].

The risk estimates show the relative magnitude of potential cancer risk based on total hours of truck idling. These results can be used to give a general indication of the potential risk at particular locations, however a site-specific analysis would be needed to fairly represent the cancer risk at a specific location.

For diesel-fueled, heavy-duty truck engine idling operations, the receptors that are likely to be exposed include residents or off-site workers located near the facility. Exposure was evaluated for diesel particulate via the breathing or inhalation pathway only. The magnitude of exposure was assessed through the following process. Emission rates were developed using emission parameters determined from site visits, and from facility and manufacturer data gathering, and input from industry representatives. During the site visits, other information such as physical dimensions of the source, operation schedules, and receptor locations were obtained. Computer air dispersion modeling was used to provide downwind ground-level concentrations of the diesel PM at near-source locations.

Meteorological data from West Los Angeles were selected to evaluate meteorological conditions with lower wind speeds and more persistent wind directions, which result in less pollutant dispersion and higher estimated ambient concentrations. Additionally, meteorological data for Sacramento and Fresno were used to show the range of meteorological conditions expected in California and the diversity of results due to different meteorological conditions. Figure IV-1 shows the relative concentration impacts for these cities when compared to conditions at the West Los Angeles location.

Figure IV-1

Comparison of Diesel PM Concentrations Using Sacramento, Fresno, and West Los Angeles Meteorological Data

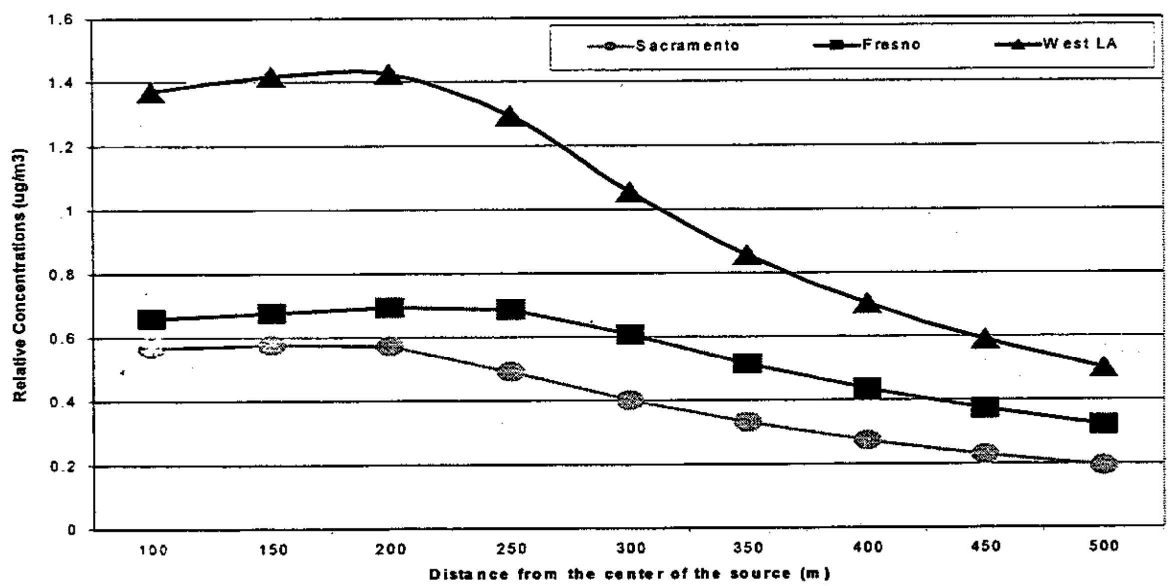
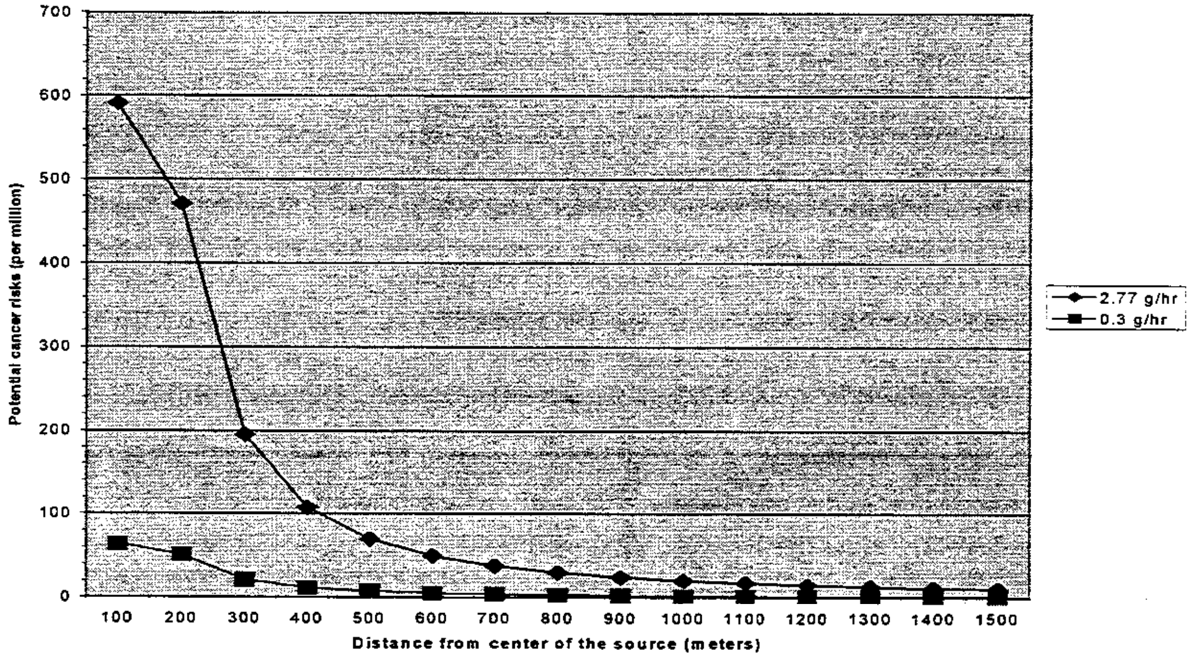


Figure IV-2 shows the potential cancer risks to nearby receptors between 100 to 1,500 meters from the center of the source of emissions as a result of 500 hours per day of diesel truck engine idling. The figure below compares the cancer health risk at the average fleet diesel PM emission rate of 2.77 grams per hour (g/hr), based on 1998 to 2006 model years, and at the projected 2007 and beyond model years average fleet diesel PM emission rate of 0.3 g/hr.

Figure IV-2

Comparison of Potential Cancer Health Impacts for Diesel Truck Engine Idling Operations based on Particulate Emission Rates



The estimated potential cancer risk is based on a number of assumptions; actual risks to individuals may be less than or greater than those presented here. For example, increasing the hours of idling would increase the potential risk levels. Decreasing the exposure duration or increasing the distance from the source to the receptor location would decrease the potential risk levels. The estimated risk levels would also decrease over time as lower-emitting diesel engines become more common within the fleet. As stated above, the results presented are generic in nature and not directly applicable to any particular location. Rather, this information is intended to provide an indication of the potential relative levels of risk that may be observed from diesel truck engine idling operations. All parameters and assumptions, along with the methodology for estimating these health risks are included in Appendix C.

REFERENCES

ARB, 1998a. California Air Resources Board and Office of Environmental Health Hazard Assessment. *Proposed Identification of Diesel Exhaust as Toxic Air Contaminant. Staff Report.* Sacramento: ARB and OEHHA, June 1998.

ARB, 1998b. California Air Resources Board and Office of Environmental Health Hazard Assessment. *Proposed Identification of Diesel Exhaust as Toxic Air Contaminant. Appendix III, Part A, Exposure Assessment.* Sacramento: ARB and OEHHA. CD-ROM. April 22, 1998.

IARC, 1989. International Agency for Research on Cancer (IARC). *IARC Monograph on the Evaluation of Carcinogenic Risks to Humans: Diesel and Gasoline Engine Exhausts and some Nitroarenes.* 46:41-57. World Health Organization. Lyon, France. 1989.

OEHHA, 2000. Air Toxics "Hot Spots" Program Risk Assessment Guidelines Part IV: Exposure Assessment and Stochastic Analysis Technical Support Document, October 27, 2000.
www.oehha.ca.gov/air/hot_spots/pdf/Stoch4f.pdf

OEHHA, 2002. Office of Environmental Health Hazard Assessment (OEHHA), *Air Toxic Hot Spots Program Risk Assessment Guidelines, Part II, Technical Support Document for Describing Available Cancer Potency Factors. CD-ROM.* December, 2002.
www.oehha.ca.gov/air/hot_spots/pdf/TSDNov2002.pdf

OEHHA, 2003. Office of Environmental Health Hazard Assessment (OEHHA), *The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments.* www.oehha.ca.gov/air/hot_spots/HRSguide.html. August, 2003.
www.oehha.ca.gov/air/hot_spots/pdf/HRAguidefinal.pdf

U.S. EPA, 1995a. United States Environmental Protection Agency (U.S. EPA), *ISCST3 Model User's Guide, Volume I, EPA-454/B-95-003a.* CD-ROM. Research Triangle Park, North Carolina, September 1995.

U.S. EPA, 1995b. United States Environmental Protection Agency (U.S. EPA), *ISCST3 Model User's Guide, Volume II, EPA-454/B-95-003b.* CD-ROM. Research Triangle Park, North Carolina, September 1995.

V. SUMMARY AND DISCUSSION OF THE PROPOSED AIR TOXIC CONTROL MEASURE TO LIMIT DIESEL-FUELED COMMERCIAL MOTOR VEHICLE IDLING

In this chapter, staff provides a "plain English" discussion of key requirements of the Proposed (ATCM) for limiting the idling from diesel-fueled commercial motor vehicles. This chapter begins with a general summary of the Proposed ATCM and then discusses and explains each major requirement. This chapter is intended to satisfy the requirements of Government Code section 11343.2, which requires that a noncontrolling "plain English" summary of the regulation be made available to the public.

A. SUMMARY

The Proposed ATCM will limit idling from diesel-fueled commercial motor vehicles with gross vehicular weight ratings (GVWR) greater than 10,000 pounds and is designed to reduce the general public's exposure to diesel PM emissions and other toxic air contaminants. The Proposed ATCM will also reduce emissions of other air pollutants such as oxides of nitrogen (NO_x) and hydrocarbons.

The Proposed ATCM would require that a driver of a diesel-fueled commercial motor vehicle with GVWR greater than 10,000 pounds not idle for greater than five (5) minutes at any location. Diesel-fueled commercial motor vehicles with GVWR greater than 10,000 pounds that do not need to be licensed or registered for operation on public highways are not subject to the requirements of the Proposed ATCM. The regulation does not require record keeping or reporting. Furthermore, the Proposed ATCM would limit the use of diesel-fueled APS systems typically used as an alternative to idling the main engines in sleepers.

All vehicles, regardless of origin, must comply with the requirements of the Proposed ATCM. The public agencies that own, operate, or direct the operation of subject vehicles would include federal, State and county agencies, and transit services. Private businesses affected include large and small heavy-duty fleet operations (such as long haul trucks, delivery trucks and vans, trash trucks, bulk hauling trucks, cargo tankers, buses, and utility trucks) and bus companies (such as tour, shuttle, and urban buses). Recreational vehicles are not subject to the Proposed ATCM.

Additionally, because of staff's concerns with sleepers potentially operating in residential neighborhoods and the resulting near source risks, restrictions for sleepers become effective immediately upon approval of the Proposed ATCM when idling the main engine or operating a diesel-fueled APS within 100 feet of any real property zoned for individual or multifamily housing units that has one or more units on it.

Exceptions to the 5 minute idling limit of the Proposed ATCM would include situations where health, safety, or operational concerns take priority. For example, staff has provided exceptions for idling in the midst of traffic; to verify safe operating conditions of the vehicle; for test, service, repair, or diagnostic purposes provided idling is essential; to accomplish work other than transportation for which a vehicle was designed (e.g., using a power take off or operating a lift, drill, etc.); to operate equipment, heaters, or air conditioners for individuals with special needs and to operate defrosters or other equipment to prevent a safety or health emergency. In addition, the Proposed ATCM contains a provision that describes its relationship to other laws. To avoid potential conflict with those laws, the Proposed ATCM clearly states that it does not allow idling in excess of other applicable limits, or in excess of more stringent limits. The full text of the Proposed ATCM is presented in Appendix A.

Staff anticipates PM emissions from 2007 and later model main engines will be lower than PM emissions from existing auxiliary power systems even though the APS will continue to use less fuel per unit time. With this concern, diesel-fueled APS systems installed on sleepers are limited in operation beginning January 1, 2009. ARB staff is proposing to return to the Board in 2005 to establish procedures and specifications for diesel-fueled APS systems.

B. DISCUSSION

Purpose

Subsection (a) states that the Proposed ATCM's intention is to protect the general public by reducing exposure to and the associated risks from emissions of diesel PM and other toxic air contaminants (TACs) from diesel-fueled, commercial motor vehicle exhaust. Also, adoption of the Proposed ATCM is expected to result in reduced emissions of other air pollutants such as NOx and hydrocarbons that contribute to violations of health-based federal and State ambient air quality standards.

Applicability

Subsection (b) establishes that the Proposed ATCM applies to all diesel-fueled commercial motor vehicles with GVWR greater than 10,000 pounds that operate in the State of California. This would include such vehicles that are based in and/or out of California. The provisions of the Proposed ATCM would be applicable to affected vehicles when they are operating within State boundaries. The Proposed ATCM does not apply to diesel-fueled commercial motor vehicles that do not operate and are not required to be licensed for operation on highways, as defined in the California Vehicle Code.

Idling Control Measure - Requirements

The Proposed ATCM's idling requirements, as specified in Subsection (c), requires a driver to manually turn off the engine to satisfy the requirements. There are no requirements for new or add-on control devices of any kind.

General Restriction on Idling.

The driver of a diesel-fueled commercial motor vehicle with GVWR greater than 10,000 pounds cannot idle the primary engine for greater than five (5) minutes at any location. The exceptions to this requirement are stated in section (d). The vehicle driver or operator is responsible for complying with the idling limits of the Proposed ATCM. Although not specifically required, the owner of a diesel-fueled commercial motor vehicle should inform the vehicle driver or operator of the requirements of the Proposed ATCM and the consequences for not complying with the requirements.

Special Consideration for Vehicles Equipped with Sleeper Berths.

The Proposed ATCM contains special provisions for prolonged idling during rest periods for trucks equipped with sleeper berths. Prior to January 1, 2009, when a driver of a sleeper berth equipped truck utilizes the sleeper berth for sleeping or resting, the primary engine may be idled in excess of the five (5) minute limit. However, beginning January 1, 2009, a driver of a truck equipped with a sleeper berth cannot idle the primary engine for more than five (5) minutes. Also effective immediately, at the time of installation, an auxiliary power system must be certified to the most stringent of California or federal standards for newly manufactured off-road or non-road engines respectively. With diesel APS emission concerns, APS operation limits are the same as sleepers. MSCD will return in 2005 with procedural and specific requirements for the diesel-fueled APS systems and possible main engine idling standards.

Alternatives to primary engine idling are currently available and are discussed later in this chapter. Additional detailed information regarding such alternatives may also be found in Appendix E.

When any truck equipped with a sleeper berth is not being used for sleeping or resting, the driver must still comply with the general idling requirements specified in Subsection (c) which limits idling of the primary engine to no more than five (5) minutes.

Special Consideration for Idling Buses – Passenger Comfort.

Under the Proposed ATCM, a driver of a bus shall not exceed the 5 minute idling limit when passengers are not onboard, but may idle up to 10 minutes prior to boarding passengers for passenger comfort. When any number of passengers are on board, the driver of the bus is not subject to the five-minute idling limit and may idle for a longer period to maintain passenger comfort.

Diesel-fueled Auxiliary Power System Control Measure – Requirement

In addition to the idling requirements, the Proposed ATCM also sets an operational limit when owners/operators of sleepers utilize a diesel-fueled APS as an alternative to idling the main engine. As with the limit set for sleepers, beginning January 1, 2009, diesel-fueled APS systems used as an alternative to main engine idling in sleepers will be limited to five (5) minutes of operation.

Exceptions

The Proposed ATCM is intended to eliminate unnecessary idling and generally would not apply to idling that is required for safety or operational reasons. Specific circumstances where all subject vehicles would be permitted to exceed the five (5) minute idling limit (by not counting certain exempted periods) are specified in Subsection (d) as described below:

Subsection (d)(1) allows a vehicle to idle while stopped at a traffic signal or other traffic control device or while forced to remain motionless due to traffic conditions in cases where the driver has no control over the situation. Subsection (d)(1) also acknowledges that the idling limit does not apply when the driver is required to idle for more than (5) minutes due to the direction of a peace officer.

Queuing

The ARB staff recognizes that under certain circumstances while a driver is in the normal course of conducting business, a truck must be idled while waiting in a moving line or queuing. However, the intent of the Proposed ATCM is to permit a driver to remain motionless or in a moving line in anticipation of the start or opening of a location where work or a necessary service is to be performed. Idling in line while waiting for a business to open is specifically not permitted. When the driver of the vehicle has no control over the situation, idling for greater than five (5) minutes is allowed as specified in subsection (d) (2). Examples of where queuing would be expected include weigh scales, produce and product distribution points, border check points, and landfills.

Adverse Weather Conditions or Mechanical Difficulties

There are additional circumstances over which a driver has no control and idling in excess of the five (5) minute limit would be permitted. A driver may idle the primary engine in excess of the five (5) minutes when forced to remain motionless due to immediate adverse weather conditions (such as dense fog, snow, ice, or other poor visibility conditions), affecting the safe operation of the vehicle. This exception also applies in circumstances caused by mechanical difficulties as specified in Subsection (d)(3).

Safety and Equipment Inspection

Subsection (d)(4) would allow a vehicle to idle to verify that it is in a safe operating condition only when idling the engine is mandatory for the verification. This exception does not apply when a safety or equipment inspection can be conducted with the engine off. For example, a visual inspection of equipment or an inspection that requires only the ignition key to be turned on must be conducted without the engine on. The

ARB staff acknowledges that problems may arise at any time and a safety or equipment inspection may be needed at times other than a scheduled safety inspection.

Testing, Servicing, Repairing, or Diagnostics

Subsection (d)(5) permit idling for greater than five (5) minutes when idling is necessary to conduct an emission test or to perform service, repair, or diagnostic operations. The ARB staff intends that this exception applies when a technician, mechanic, or other maintenance person is performing one of those activities.

Power Source for Mechanical Operations

Subsection (d)(6) allows the driver of a vehicle to exceed the idling limits when the vehicle is used as a power source for mechanical operations other than transporting passengers. Idling would be permitted when the primary engine is used to accomplish the work for which the vehicle was designed such as controlling cargo temperature or operating a lift, crane, pump, drill, hoist, mixer, or other equipment. The exception also applies to the operation of the power take off (PTO) or equivalent mechanism powered by the primary engine. The exception only applies when a substitute to idling the primary engine is not reasonably available.

Operations Solely to Prevent a Safety or Health Emergency

Subsection (d)(7) permits vehicle idling when necessary to operate defrosters, heaters, air conditioners, or other equipment in order to prevent a safety or health emergency. However, idling in order to use equipment solely for the comfort of the driver is not permitted under this exception. The staff intends this exception to allow idling only as long as it is necessary to prevent a safety or health emergency for the driver. For example, idling for defroster operation is allowed only as long as necessary to attain a clear visual field at the time of vehicle departure. Similarly, idling is allowed until brake pressure reaches a safe level for brake operation assuming proper maintenance of the vehicle. This exemption would also apply when catastrophic circumstances are occurring or are threatening to occur (e.g., a natural disaster, civil disorder, or similar emergencies).

Future APS or Main Engine Procedures and Specifications

Staff anticipates PM emissions from 2007 and later model main engines will be lower than PM emissions from existing auxiliary power systems. With this concern, diesel-fueled APS systems installed on sleepers are limited in operation beginning January 1, 2009. ARB staff is proposing to return to the Board in 2005 to establish procedures and specifications for diesel-fueled APS systems. These new standards could establish circumstances when idling the main engine or operating a diesel-fueled APS would be allowed.

Relationship to Other Laws

Subsection (e) recognizes the relationship of the Proposed ATCM to other laws, regulations, or ordinances. The Proposed ATCM does not permit idling beyond other applicable limits established by law. The Proposed ATCM provisions that allow up to five minutes of idling under specific conditions could conceptually conflict with other requirements that effectively prohibit idling when: (1) any driver leaves a vehicle unattended on a highway (VC§22515), (2) at schools (Title 13, Section 2480, California Code of Regulations), or (3) when trucks are queuing at ports (California Health and Safety Code section 40720). Under the circumstances specified, Subsection (e) states that the vehicle driver cannot use the exceptions in the Proposed ATCM to justify violation of more restrictive requirements that continue to apply. In addition, Subsection (e) would allow local regulations or ordinances to also apply provided such requirements were as stringent as or more stringent than any comparable requirement of the Proposed ATCM.

Note that minor clarifying changes were made to definitions and exceptions derived from the School Bus Idling ATCM. (Title 13, Section 2480, California Code of Regulations.) These changes were not intended to change the meaning of those definitions in either the School Bus Idling ATCM or the Proposed ATCM.

Enforcement

Enforcement provisions are specified in Subsection (f). Primary enforcement will be carried out by the ARB Enforcement Division and the California Highway Patrol. Additionally, peace officers, their respective law enforcement agencies' authorized representatives, and local air pollution control and air quality management district personnel are specifically authorized to enforce the Proposed ATCM.

ARB Staff recommends a grace period for outreach following the implementation of the ATCM before fines are imposed for non-compliance. Staff intends to continue working with all interested parties following adoption of the Proposed ATCM.

Penalties

The ARB expects a high degree of compliance with the Proposed ATCM. Nevertheless, penalties are needed to discourage non-compliance. Subsection (g) would provide for monetary penalties. Staff believes that both the motor carrier' potential assumption of their drivers' liability, and self-interest from related fuel savings are needed to motivate motor carriers to encourage driver compliance with the idling requirements. It is staff's intention that the collection, use, and distribution of all fines and penalties collected under the authority of the Proposed ATCM shall be the responsibility of the enforcement agency issuing the notice or citation.

Definitions

Most of the definitions listed in subsection (h) of the Proposed ATCM were directly taken from the Motor Vehicle Code. Staff working on this ATCM also coordinated with staff working on other diesel PM ATCMs to provide consistency where it was practical. Please refer to Appendix A, subsection (h) for a list of definitions.

C. ALTERNATIVE REQUIREMENTS CONSIDERED

California Government Code section 11346.2 requires the ARB to consider and evaluate reasonable alternatives to the Proposed ATCM and to provide reasons for rejecting those alternatives. Staff considered the following alternatives to the Proposed ATCM: no action; require electrification of all truck stops and rest areas; require installation of new or add on devices on all trucks; and rely on federal, State or local voluntary programs.

No Action

The "no action" alternative would rely on fleet turn-over and progressively more stringent state and federal emission standards for engines to achieve emission reductions. Newer diesel vehicles are expected to produce lower and relatively cleaner emissions over time. The federal diesel PM standards for new diesel engines, which mandate cleaner emissions, will not take effect until after 2007and does not require emission reductions from pre-2007 engines. The fleet-wide turn over rate for diesel engines is slow. Based on EMFAC modeling, engine turn-over would take an estimated twenty years after implementing the 2007 federal engine emissions standards before the entire heavy-duty fleet met that standard. Hence, relying solely on engine turn over to reduce exposure and risk from diesel PM would take many more years than it would through adoption of the Proposed ATCM.

Require Electrification of All Truck Stops and Rest Areas

The second alternative considered is to require the installation of electrical power infrastructure at truck stops and rest areas. Truck stop electrification (TSE) technology provides parked trucks with electrical power to run air conditioning, heating and on-board appliances and eliminates the need to idle the primary engine. This alternative would require extensive modification of the existing infrastructure (truck stops and rest areas). The estimated cost would range between $ 4,000 and $ 10,000- per parking space depending on the technology selected. Currently, the number of available truck parking spaces can accommodate only about 50% of the sleeper berth fleet operating in California during peak usage hours. Relying solely on TSEs would require the rapid development of significantly more truck stops and rest areas. These costs would be in addition to the cost of electrification and result in a cost prohibitive approach. Additionally, other factors such as the cost of California real estate and population encroachment could likely limit or reduce the number of parking areas in the future.

Require Installation of New or Add-on Devices to All Trucks

The third alternative considered is to require installation of new or add-on devices on all trucks (both with and without sleeping berths). Auxiliary power systems (APS) are available for use as alternatives to idling the primary engine. These devices include, but are not limited to fuel-fired heaters, auxiliary power units that are powered by small diesel-fueled engines, fuel cell-powered systems- and battery powered systems. Each of these devices would require some modification to the vehicle engine or retrofitting. Requiring new or add-on devices on all trucks would impose costs on the regulated community. Moreover, certain control devices are not feasible or are feasible for only a small segment of the transportation fleet .

Rely on Voluntary Programs

Federal and State incentive programs have been developed to encourage the use of less-polluting diesel engines. These programs include U.S. EPA's Voluntary Diesel Retrofit Program, ARB's Carl Moyer Program, and EPA's SmartWay Transport Initiatives. These programs provide funds and other incentives to spur innovative projects that would reduce vehicular emissions. While significant emission reductions have been achieved from voluntary programs, limited funding precludes relying on such programs to effectively reduce emissions from the large number of heavy-duty diesel engines in California.

D. EXISTING ALTERNATIVES TO IDLING OF THE MAIN ENGINE

The following describes some existing alternatives to idling the main engine that are currently available and projected to be available in the near future. Additional information and details on these alternatives may be found in Appendix E. The ATCM does not prescribe the installation of any equipment or software, nor does it prescribe methods that may be employed to provide alternatives to power the sleeper berth. The following alternatives are some examples that are available.

Off-Board Truck Stop Electrification

Off-board truck stop electrification provides climate control, power, and other amenities to a truck from an outside source. IdleAire is one company that provides off-board truck stop electrification services. Using IdleAire as a representative system, heating and air conditioning is provided through the truck's window from outside ductwork. The ductwork is connected to an HVAC system that is usually mounted on framework above the truck. The connecting ductwork also supplies additional features to the truck driver via an electronic computer screen user interface. Additional features include access to a high speed Internet connection, a telephone jack and the ability to view recent movies through the computer screen interface. Additionally, IdleAire also provides electrical outlets for power needed to run 110-volt appliances.

The costs to industry are currently small when compared to most other technologies that provide power and climate control to the sleeper berth. No retrofitting or modification of a vehicle is required. Owners and operators need only purchase a window template and pay an hourly usage fee to utilize the system. Currently IdleAire charges ten dollars for the window template and $1.25 per hour usage fee. Additional monies are charged for features such as high speed Internet access and viewing movies.

The estimated total number of available California truck parking spaces at truck stops and rest areas is ~10,000. During peak hours, the estimated demand for overnight truck parking is over 20,000 spaces. Currently IdleAire only exists in approximately 300 truck spaces in California. By equipping truck stop spaces with IdleAire, there could be a net reduction in overall spaces because of the area needed for equipment infrastructure. Possibly, the pavement could be re-striped in a different fashion to help mitigate any net reduction in spaces. However, even with a complete statewide truck stop/rest stop off-board electrification infrastructure in place, over half of the trucks will still be unable to utilize this type of service during peak usage hours. Additionally, IdleAire appears to require large public investment ($10,000 per space) for infrastructure and funding. Such funding may be difficult to acquire in the current budgetary environment.

On-Board Electrification

On-board electrification is an alternative to provide the power for HVAC climate control and to power ancillary devices. A simple outlet on the perimeter of the truck space typically supplies the 110-volt or 220-volt power.

Infrastructure costs are typically less that that of off-board truck stop electrification (e.g. IdleAire) because only a simple electric circuit and outlet are needed. Additionally, staff expects that current areas where drivers rest that are near, and readily accessible to, existing electrical outlets (e.g. loading docks). The actual hourly usage fee is expected to be less than that of off-board electrification.

Similar to off-board electrification, the number of spaces equipped with on-board electrification is small (less than 100) and the issue of available parking spaces remains. Also, in order to use on-board electrification for climate control the purchase of additional equipment for the sleeper cab may be needed. Approximately $3,500 would be needed to purchase a power inverter and HVAC system for the cab. It should be noted that there are systems that can be powered alone by 110 power such as a space heater or small cooler but there are questions as to the practicality of such devices for this use.

Auxiliary Power Systems (APS)

An auxiliary power system typically consists of an engine and compressor to supply electrical power and climate control to a sleeper berth. The unit is generally installed in place of one fuel tank and weighs approximately 300 pounds. There are several methods to power an APS including diesel fuel and electrical power. Also, systems powered by hydrogen fuel are currently in development. A typical APS costs approximately $8,600 for equipment and installation.

Currently, auxiliary power systems are a viable technology for most if not all vehicles affected by this regulation. Several heavy-duty diesel engine manufacturers are also developing integrated APS systems for their engines that will be available as an OEM option. By offering the APS as an OEM option, any issues with after market technology potentially affecting an engine warranty will be resolved. APS's are designed as self-contained units that require no external power source other than fuel. By not needing any off-board equipment, the APS is an ideal choice for owners and operator that need to provide power to the sleeping berth while the vehicle is away from truck stops or rest areas. Staff estimates that a typical payback period for an APS is 3-5 years resulting from fuel and maintenance savings. Staff believes that the APS would be used not just in California but elsewhere as well for the fuel and maintenance savings. Starting January 1, 2009, diesel-fueled APSs will no longer be able to operate. Staff is proposing to return to the Board in 2005 to establish procedures and specifications under which diesel-fueled APSs will be able to operate after January 1, 2009.

Auxiliary power systems tend to have an initial higher capital cost requirement compared to other idling reduction options. The APS payback period of 3-5 years is generated using a 'typical' vehicle that reduces main engine idling 1,500 hours per year. It is possible that vehicles that operate in California infrequently could find the payback period in fuel and maintenance savings vs. the cost of the APS longer than 3-5 years. Additional drawbacks could include increased refueling stops from the loss of a fuel tank by installing an APS. Also, potential warranty concerns could exist if the APS is integrated with the main engine during original or extended main engine warranty periods.

Table V-1 presents preliminary data showing that APS usage will decrease PM and NOx emissions when used in place of idling pre-2007 manufactured on-road diesel engines. However, staff estimates that an APS may emit significantly more diesel PM, but significantly less NOx emissions, than the idling of a 2007 and newer EPA certified on-road engine. Additional staff work is needed to determine if additional requirements are necessary for reducing PM from APS units and establishing NOx limits for extended idling of new on-road diesel engines. In order to reduce PM from idling 2007 and newer EPA certified on-road engines, staff will investigate developing regulations to reduce diesel PM from an APS through the potential use technologies such as diesel particulate filters. These regulations, if developed, could result in additional costs to affected parties.

Table V-1

Estimated Emission Rates from On- and Off-Road Engines

Engine Category	PM in g/hr	NOx in g/hr
On road engine Model Year 1998-2006	2.77	165
On road engine Model Year 2007-2010	0.28	165
Tier IV off road APS engine < 11 hp	1.3 *	29 *

* Calculated value based on engine standard

Hotel

One option to the installation of technologies is to stay in a hotel room during the rest period.

By staying in a hotel room, the vehicle owner or operator will avoid the installation of equipment to supply power to the sleeper berth. While this is a valid option, staff realizes this option will most likely be minimally utilized for reasons listed below.

Vehicle security is the primary concern that vehicle owners and operators have with staying in a hotel room and leaving their vehicle unattended. An additional concern may also include the price of the room compared to the price of fuel needed to power the main engine. The average hotel room rate could be significantly greater than the price of fuel to idle a diesel engine. At $1.66 per gallon of diesel, a truck idling 10 hours would consume approximately $17 in fuel and cost less than half of the estimated average hotel room rate in California of $50 per night. The nightly hotel room rate of $50 is an estimate and could vary significantly within California.

E. EVALUATION OF THE PROPOSED ATCM

Staff evaluated the Proposed ATCM against the same criteria that the alternatives were evaluated against: applicability, effectiveness, enforceability, and cost/resource requirements.

Applicability

The Proposed ATCM would apply to commercial heavy-duty diesel vehicles of GVWR of 10,000 lbs. or greater.

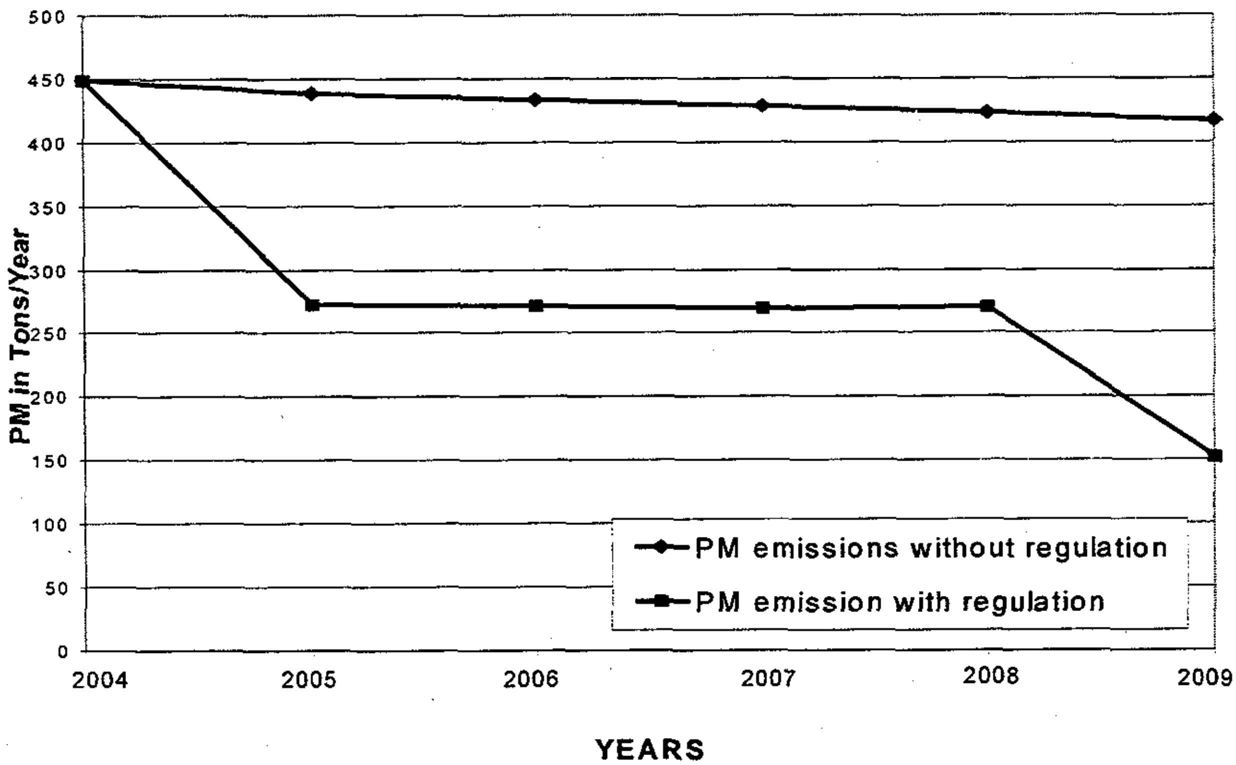
Effectiveness

The Proposed ATCM would substantially reduce diesel PM emissions immediately and achieve greater reductions for vehicles equipped with sleeper berths starting with phase two implementation in 2009. Figure V-I and V-II show comparisons of the annual idling diesel PM and NOx emissions with and without the implementation of the Proposed ATCM respectively. Without the Proposed ATCM, emission reductions would occur as seen in the "status quo" line in each of the aforementioned figures. The "status quo" reductions are achieved through routine repower and replacement of newer engines over a period of time (i.e. natural attrition). The area between the two curves of each respective figure quantifies the benefits of the Proposed ATCM.

The diesel PM emission reductions peak in 2009, at 266 tons per year or 0.73 tons per day, when the Proposed ATCM is fully implemented. Overall, the Proposed ATCM will result in diesel PM reduction of 166 tons in 2005 and 266 tons in 2009. The PM reduction in 2008 is the estimated value at the end of the year and the 2009 value is the value at the beginning of the year (Figure V-I, Bottom Line).

Figure V-1

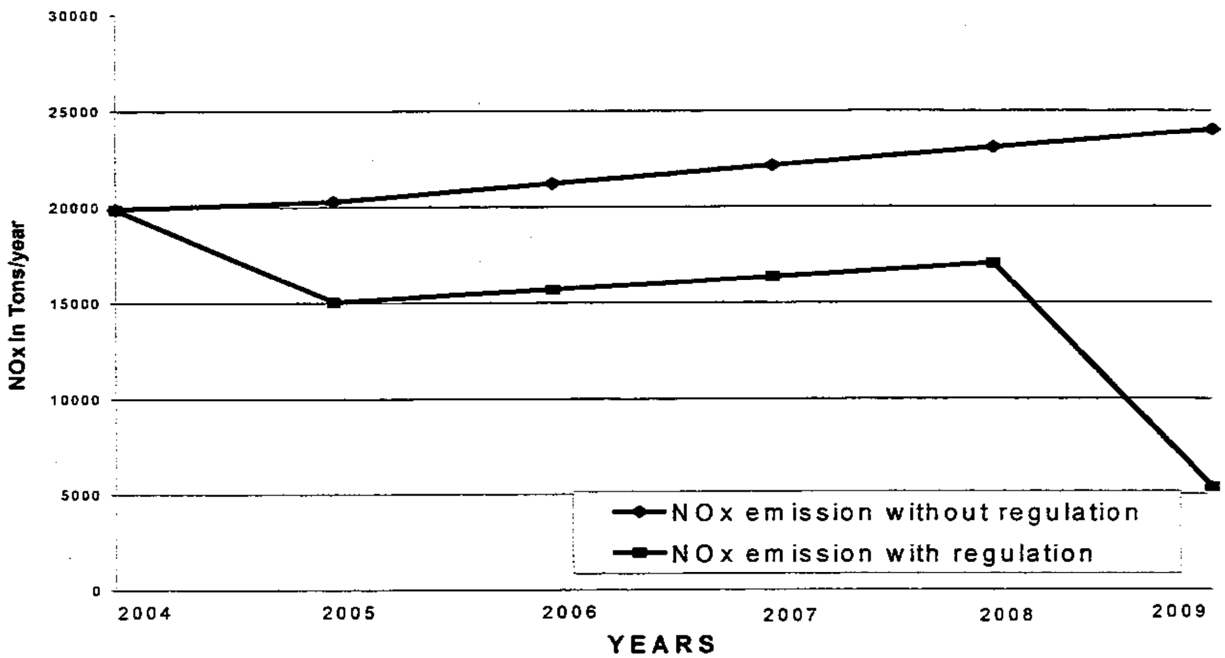
Projected Diesel PM Emissions with and without the Implementation of the Proposed ATCM



When fully implemented, the Proposed ATCM will result in NOx reductions of 5,200 tons in 2005 and an additional 12,300 tons in 2009. NOx emission controls are not expected to be implemented until 2010. The gradual yearly increase in NOx without the regulation (Figure V-II, Top Line) is a result of the natural increase in fleet size. NOx emissions with the regulation in place (Figure V-II, Bottom Line) increases at a slower rate until 2009 when the phase two becomes active. The NOx reduction in 2008 is the estimated value at the end of the year and the 2009 value is the value at the beginning of the year.

Figure V-2

Projected NOx Emissions with and without the Implementation of the Proposed ATCM



Enforceability

ARB would have the primary responsibility for implementing and enforcing the Proposed ATCM. The ARB anticipates that the California Highway Patrol (CHP) will provide valuable assistance in this effort, and that local air pollution control districts and local peace officers would also play a role.

The ARB believes that the CHP and local peace officers could enforce the Proposed ATCM as either a Vehicle Code section 27153 violation (Excessive Exhaust Products), or directly as a violation of Health and Safety Code section 39675. The CHP's ability to directly impose criminal penalties under the Vehicle Code is expected to complement and support the ARB Enforcement Division's ability to impose civil penalties or refer cases of non-compliance for criminal prosecution. While such criminal enforcement may sound drastic, it is not; all Vehicle Code violations are at minimum a criminal infraction (Vehicle Code section 40000.1).

The Health and Safety Code does not specifically require air districts to adopt and enforce ATCMs that apply solely to vehicular TAC sources. Nevertheless, subsection (d) of the Proposed ATCM and local nuisance rules would confirm an air district's independent authority to adopt and enforce measures such as the Proposed ATCM.

The ARB believes that the districts may enforce the Proposed ATCM in any of four ways: 1) as a violation subject to penalties under Health and Safety Code sections 39674 and 39675; 2) by injunction under Health and Safety Code section 41513; 3) as a Vehicle Code section 27153 violation pursuant to Health and Safety Code section 40753; and 4) for buses only, as an idling violation (HSC§42403.5).

Air districts could also exercise their independent authority to adopt the Proposed ATCM or a more stringent idling restriction as a transportation control measure ("TCM" - see Health & Safety Code section 40717(g)); in this case all available district enforcement responsibilities and mechanisms (e.g. Health and Safety Code sections 40752(b) and 40717(a)) would apply. The same is true for more stringent TCMs that local agencies adopt pursuant to Health and Safety Code subdivisions 40717(e)(2) & (h).

If enforcement personnel observe a violation, he or she may issue the driver a field citation or a report of violation. A peace officer may issue a separate field citation or report of violation to the motor carriers under Vehicle Code section 40000(b)(5). Both a field citation and a report of violation may be considered a notice of violation. Under ARB regulations adopted pursuant to SB 527 (Stats. 2001, Ch. 769), the ARB may consider, case by case, whether a violation of the Proposed ATCM is amenable to resolution through an administrative hearing process; if ARB so decides, then the violator would have the option of requesting an administrative hearing to have his or her violation adjudicated. The ARB may also refer a violation to the CHP. Also, the CHP, local peace officers, or air district personnel could assist the ARB in its enforcement activities if requested.

Additionally, while criminal penalties may be assessed up to the maximum extent provided by law, such penalties are likely to be at a scale similar to current Vehicle Code violations. Health and Safety Code section 39675 provides authority for the ARB, through the California Attorney General or a local District or City Attorney, to file criminal complaints in California Superior Courts against violators of these regulations. The Enforcement Division and cooperating enforcement authorities will evaluate the appropriate penalty types and levels for each case. The ARB expects that most violations it observes will be handled as civil matters under Health and Safety Code section 39674, again, at penalty levels comparable to those established for similar Vehicle Code violations.

If an air district enforces the Proposed ATCM, an air district notice of violation would adhere to air district penalty proceedings, also potentially including resolution through administrative civil penalty proceedings. Mutual settlement of violation is an option both before and after a violation has been appealed. A CHP or a local peace officer notice of violation under criminal codes could be appealed through the appropriate court (e.g., a traffic court) system for the jurisdiction in which the violation occurred.

Cost and Resource Requirements

The Proposed ATCM would have a minor fiscal impact on the State, as well as an economic impact on the owner/operators of these vehicles. Cost estimates for this ATCM are included in Chapter VI.

VI. ECONOMIC IMPACT, ENVIRONMENTAL IMPACT AND ENVIRONMENTAL JUSTICE

A. ECONOMIC IMPACT

Summary of Economic Impact

The Proposed ATCM is expected to have a positive overall economic impact on the public agencies and businesses subject to its requirements. Elimination of unnecessary idling is expected to result in cost savings from reduced fuel consumption and reduced vehicle engine maintenance. Furthermore, the health benefits and the health care cost savings for California's citizens are expected to justify the relatively minor regulatory cost of program implementation.

Unless otherwise stated, the following analysis was performed for each of the 5 year cost / benefits windows for each of the two phases. Phase one analysis is from 2005 – 2009 and the phase two analysis is from 2009 – 2013. Although not analyzed, owners and operators are also expected to enjoy cost savings and emission benefits outside of the cost/benefit analysis windows for the lifetime of the regulation.

Phase One of the Proposed ATCM, the elimination of general idling, applies to all diesel-fueled commercial motor vehicles with GVWR greater than 10,000 pounds. Emission reductions due to Phase One are estimated to be 166 tons of PM per year starting in 2005, which is associated with a reduction in cancer risk ranging from 10 to over 100 in a million depending on receptors and other environmental parameters. Additionally, staff estimates emission reductions of 5,200 tons of NOx per year starting in 2005. The entire affected heavy-duty fleet could realize average annual fuel savings of 51.6 million gallons of diesel and an annual average cost savings of $95.5 million during Phase One. Cumulative cost savings of approximately $477 million and cumulative fuel savings of 258 million could be realized during the five-year analysis.

Phase Two of the Proposed ATCM, which eliminates main engine idling and the operation of diesel-fueled APSs during prolonged rest periods, applies to trucks equipped with sleeper berths. Emission reductions due to Phase Two are estimated to be 62 - 134 tons of PM per year, which is associated with a reduction in cancer risk ranging from 10 to over 100 in a million depending on receptors and other environmental parameters, and a reduction of 12,300 tons of NOx per year starting in 2009.

The ARB staff estimates, beginning in 2009, that the vehicles affected by Phase Two may incur average costs of $8,600 for mechanisms to supply electrical power, heating, venting, and cooling to the sleeper berth. However, the initial investment in these devices is expected to be offset by savings achieved by decreased fuel consumption and the reduced cost of diesel engine maintenance. For the purposes of the economic analysis, staff assumes sleeper berth equipped trucks will install an auxiliary power system (APS) to supply power to the sleeper berth. It is probable that a portion of the trucks will choose less costly compliance alternatives, and thus the economic analysis may overestimate overall costs or underestimate the benefit to owners. The initial investment in an auxiliary power system is estimated to have a payback period (cost of APS vs. fuel and maintenance savings) of less than five years for a vehicle that reduces idling by 1,500 hours per year.

Although the regulation doesn't require the training of vehicle drivers, training costs are realistically expected to be incurred for compliance with both Phases One and Two. The regulation does not specify the method or frequency of training and staff assumes businesses will choose the most cost and time effective methods for driver training. Business compliance costs for the vehicle driver is estimated to be approximately $15 (2003 dollars) per affected driver for initial training. Staff assumes compliance training will occur during regularly scheduled meetings (such as safety meetings) and will have a negligible fiscal impact.

The ARB staff plans to create training and informational material reflecting the Proposed ATCM's requirements to provide guidance to all affected entities. The ARB staff estimates producing and distributing educational materials and public outreach efforts to cost approximately $25,000. The ARB will primarily be responsible for enforcement and is expected to absorb these costs within existing budgets and resources. However, if in the future, monies become available, staff estimates that up to ten enforcement personal and two clerical staff may be needed to enforce the proposed ATCM. The additional staff could incur personnel costs of $1.2million per year enforcing the Proposed ATCM. (See cost methodology: Appendix D)

Based on the staff's analysis, the net statewide cost savings with full implementation of both phases of the Proposed ATCM is estimated to be approximately $575 million over the 5-year cost-benefit analysis periods for each phase through fuel and maintenance savings. This estimate reflects staff's projection of fuel savings of over 600 million gallons over the same cost-benefit analysis timeline. (See cost methodology: Appendix D)

In addition, staff expects that the Proposed ATCM could potentially create a demand in manufacturing and servicing idle reduction technologies. The Proposed ATCM is not expected to affect California's businesses from competing with other states by making it more costly to produce goods and services in California nor is it expected to have a negative impact on employment.

Legal Requirements Applicable to the Economic Impact Analysis

Government Code section 11346.3 requires the ARB and other State agencies to assess the potential for adverse economic impacts on California businesses and individuals when proposing to adopt or amend any administrative regulation, including a regulation such as the Proposed ATCM. The assessment must include the impact of the proposed ATCM upon California: jobs; business expansion, elimination, or creation; and businesses' ability to compete with those of other states.

Health and Safety Code section 57005 further requires the ARB to perform an economic impact analysis of submitted alternatives to a proposed ATCM before the adoption of any major regulation. A "major regulation" is defined as a regulation that would potentially cost California businesses more than ten million dollars in any single year. Under a conservative (worst case scenario) reading of the applicable statute, this regulation could be considered "major" if the initial costs of Phase Two Implementation are neither amortized nor offset by operating cost savings. However, since such initial costs will be amortized and since operating cost savings will exceed initial costs, the Proposed ATCM is not expected to cost California businesses more than ten million dollars (net costs after benefits) in any single year. Therefore no economic impact analysis of alternatives is necessary.

In addition, Government Code section 11357 and instructions adopted by the Department of Finance (DOF) require the ARB and other State agencies to estimate a proposed ATCM's associated cost or savings to any local, State, or federal agency. The agency proposing a regulation is also required to determine whether, as a result of the regulation, any cost to local agencies is reimbursable by the State. Pursuant to Government Code section 17566, any cost to transit agencies, or other local public agencies as a result of the Proposed ATCM would not be reimbursable because private sector transportation businesses would be subject to the same requirements and costs.

Affected Businesses, Cost, and Cost Savings

Businesses Affected by Phase One (2005)

Owners and operators of commercial and publicly owned heavy-duty diesel-fueled vehicles with a GVWR of greater than or equal to 10,000 pounds operating in California would be required to comply with the general idling provisions of Phase One of the Proposed ATCM beginning in 2005. Some of the affected entities include, but are not limited to transportation companies, commodities and goods carriers, automobile carriers, and transit agency and tourist bus operators.

Table VI - 1

Estimated Vehicle Populations Affected by Phase One of the Proposed ATCM beginning in 2005

Vehicle Class	Population
HHDDV (both sleepers and nonsleepers)	180,000*
MHDDV	178,000
LHDT-2	35,000
Bus	16,000
Total	**409,000**

* The actual number of out-of-state vehicles affected by this regulation is unknown. Over the course of a year, staff estimates up to 1.7 million out-of-state vehicles could be affected by this regulation while in California. Staff assumes that the majority of out-of-state registered vehicles are sleepers.

Using EMFAC 2002, ARB staff projects the total number of heavy-duty vehicles affected daily by the regulation during Phase One implementation to be approximately 409,000 in 2005.

II. Costs – Phase One

The general idling restrictions of Phase One of the Proposed ATCM would not require any new or additional equipment. Compliance by affected vehicles is expected to be accomplished by the simple procedural change of shutting off the engine. The regulation does not mandate any driver training, but staff assumes businesses will implement some form of training and choose the most cost and time effective methods. Business compliance costs for training the vehicle driver are conservatively estimated to be $15 (2003 dollars) (see cost methodology, Appendix D) per driver for initial training. For the purposes of this regulation, staff calculated initial training costs based on the assumption of one driver per affected vehicle. It is possible companies will need to train more drivers than assumed. Staff assumes subsequent training will occur during scheduled meetings such as training or safety meetings, will take a small amount of time, and will impart negligible costs to business.

Cost Savings – Phase One

Staff expects that the compliance costs associated with the general idling restrictions of Phase One of the Proposed ATCM would be fully recovered by fuel cost savings and savings from reduced maintenance costs as the result of eliminating excessive idling. Table VI – 2 below presents an overview of staff's estimate of the Statewide annual cost savings that will be achieved by implementing Phase One of the Proposed ATCM beginning in 2005.

Table VI – 2

TOTAL REGULATORY 5-YEAR COST-BENEFIT ANALYSIS PHASE ONE (2005-2009)

Yearly Cost & Cost Savings by Vehicle Class and Year

YEAR	HHDV	MHDV	LHDV	BUS	2003 PV
2005	$772,203	$15,432,768	$(543,945)	$1,279,575	**$88,940,601**
2006	$75,956,704	$18,244,628	$(6,020)	$1,512,338	**$95,707,650**
2007	$76,663,818	$18,397,997	$(6,370)	$1,520,103	**$96,575,548**
2008	$77,723,703	$18,629,599	$(5,239)	$1,538,785	**$97,886,848**
2009	$78,137,894	$18,648,545	$(5,356)	$1,542,025	**$98,323,108**
TOTAL (2003)	**$381,254,322**	**$89,353,537**	**$(566,930)**	**$7,392,826**	**$477,433,755**

Staff assumptions used to develop the estimates presented in Table 4 are as follows:

- buses and medium heavy-duty vehicles (MHDV) will reduce idling by 12 minutes per day (EMFAC 2002) and consume 0.7 gal/hour fuel.
- heavy heavy-duty vehicles (HHDV) will reduce idling by 36 minutes per day (see Chapter IV for details) and consume a net 1.0 gal/hour fuel.
- an hour of reduced idling equates approximately to a $0.18 savings (2003 dollars) on engine maintenance costs (Staff estimate, TMC)

As shown in Table VI – 2, staff estimates that buses, medium heavy duty vehicles, and heavy heavy-duty vehicles could realize a total annual cost savings of $88 - $98 million with a 5-year savings of approximately $477.43 million as a result of implementing Phase One of this regulation. The actual amount of savings that will be achieved will depend on the actual amount of idling reduced and the frequency of performed engine maintenance.

Businesses Affected by Phase Two (2009)

Owners and operators of heavy-duty diesel-fueled sleeper berth equipped vehicles (sleepers) with a GVWR of greater than or equal to 10,000 pounds idling in the State of California would be required to comply with the provisions of Phase Two of the ATCM by January 1, 2009. Additionally, a vehicle equipped with a diesel-fueled APS would also be required to comply with phase two provisions by January 1, 2009. For this analysis, staff assumes that all vehicles equipped with diesel-fueled APSs are also sleeper berth equipped and are a subcategory of the heavy heavy-duty (HHDV) classification. Because data detailing the number of sleeper vehicles that idle during extended rest periods in California are not readily available, staff utilized truck stop space usage data to project a daily amount of idling in California (see methodology in Chapter IV). Based on daily truck stop space usage, staff estimates that a minimum of

67,000 trucks use their sleeping berth in California each day. Staff further assumes that potentially as many as 1,700,000 unique sleeper-berth equipped trucks operate in California over the course of a year (of which 67,000 are in California each day). (see cost methodology, Appendix D)

III. Costs – Phase Two

Sleeper trucks typically idle their main engine or use a diesel-fueled APS during periods of rest to provide electrical power, heat, and air conditioning to the sleeper berth. By January 1, 2009, idling the main engine or using a diesel-fueled APS to provide power to the sleeper berth will no longer be allowed unless the engine complies with low emission standards anticipated to be added to the rule in 2005. Staff assumes that affected truck drivers and owners will then utilize alternative means to provide for their comfort during prolonged rest periods. Also, ARB staff intends to return to the Board in 2005 to establish procedures and specifications under which diesel-fueled APS units and vehicle engines would be allowed to operate beyond January 1, 2009. Phase Two of the regulation does not prescribe alternative methods of providing for driver comfort. Compliance costs could range from the no cost alternative of simply turning off the engine to many thousands of dollars for alternate devices such as off-board and on-board truck stop electrification and auxiliary power systems. Owners are free to choose the best and most economical approach for their situation.

<u>Auxiliary Power Systems (APS)</u>

Staff conservatively assumes for this cost benefit analysis that compliance by sleepers will be accomplished by the installation of an auxiliary power system (APS) that will provide power to the sleeper berth while the main engine is off by the regulation compliance date of 2009. This assumption takes into account projections of future peak-hour shortages in available truck stop and rest area parking spaces in California (See Chapter IV). Because of those shortages, staff anticipates that many trucks requiring parking spaces will use highway off ramps, public streets, and locations at or near distribution points for their parking needs, where it is not feasible to use less costly alternatives to APS devices such as on- and off-board truck electrification systems. However, it is likely that a significant number of sleeper trucks will actually utilize currently available and less costly alternatives to comply with Phase Two of the Proposed ATCM. Thus, this cost analysis may over-estimate the fiscal impact on owners of affected sleeper trucks.

For the purposes of the economic analysis, staff assumes the costs associated with the installation and operation of an APS will be a conservative per vehicle average cost of compliance. In the year 2009, an APS will cost approximately $8,600 for hardware and installation, and approximately $500 per year for maintenance such as oil and filter changes. An APS uses approximately one-fifth the amount of fuel than that of an idling main engine. It should be noted that an APS is typically installed in place of one fuel tank because of space and weight limitations, and could lead to a shorter truck operating range that may result in additional costs and inconveniences (such as increased refueling stops) to the driver that were not specifically quantified in this analysis.

Truck Stop Electrification (TSE)

Operators of vehicles equipped with sleeper cabins that do not choose to install an APS or comparable device may choose to limit main engine idling by utilizing strategies such as on-board or off-board truck electrification services. On-board truck electrification provides power for heating, venting, and cooling of the sleeper berth. There is an initial cost for installing a charger/inverter on the truck to convert outside power, which is then used to run an independent HVAC unit in the vehicle. Thereafter, vehicle drivers pay minimal hourly charges for using the electrical connection at the truck stop while saving on fuel consumption and reduced cost of engine maintenance. Off-board electrification does not require the installation of any significant equipment on the vehicle. All heating, ventilating, air conditioning and power needed to run ancillary equipment is supplied to the vehicle from an outside source located at specially equipped parking spaces. There are typically hourly charges that the driver pays to utilize off-board electrification services. Currently there are less than 300 off-board electrification-equipped parking spaces available in California. Staff expects demand to increase as a result of Phase Two of this regulation, which could result in additional spaces being equipped with off-board electrification capabilities. As discussed above, to be conservative, the use of TSE devices was not included in these cost estimates.

Training

Like the general idling restrictions of Phase One, the Phase Two restrictions on idling during prolonged rest periods may lead to some driver training. Staff assumes businesses will choose the most cost and time effective methods for driver training. Business compliance costs for training the vehicle driver are conservatively estimated to be $15 (2003) per driver (see cost methodology, Appendix D) for initial training. For the purposes of this regulation, staff calculated initial training costs based on the assumption of one driver per affected vehicle. It is possible companies will need to train more divers than assumed. Thereafter, staff assumes any additional training will occur during regularly scheduled training periods, will take a small amount of time, and will impart negligible costs to business.

Cost Savings – Phase Two

Staff estimates annual fuel savings from restricting the idling during prolonged rest periods in California for the entire sleeper fleet to be on average 69 million gallons per year. (see Appendix D).

Staff expects that the fuel cost savings resulting from the elimination of excessive idling from affected sleepers will, over time, offset compliance costs associated with Phase Two of the Proposed ATCM. The break-even point will occur when fuel and maintenance savings from eliminating unnecessary idling of the main engine is equal to the cost of installing, maintaining, and fueling an APS. Break-even points for individual circumstances will depend on the actual cost of the APS or other idling reduction strategy utilized and the actual amount of idling reduced. Staff estimates a break-even point of a typical sleeper that uses an APS and reduces idling by 1,500 hours per year to be three to five years (see Appendix D).

Table VI – 3 shows that the estimated net cost savings for the affected sleeper fleet is approximately ($15 - $24) million dollars per year, based primarily on fuel and maintenance savings. These estimates were performed for the first five years of the implementation of Phase Two of the Proposed ATCM to reflect savings prior to the estimated break-even point for APS costs. Staff estimates of fuel savings (average 69 million gallons annually) only utilized the fuel savings that are projected to occur in California. However, we anticipate that vehicles equipped with an APS will achieve additional fuel savings when they operate outside of California. Data acquired from the California Department of Motor Vehicles (DMV) indicate that as many as 1,700,000 out-of-State trucks operate in California every year (of which 67,000 sleepers are in California each day). Many of those trucks will likely install an APS device. To the degree that those out-of-state trucks mitigate idling of their main engine both in and out-of-California as a result of this regulation, the entire affected fleet could experience overall significantly greater cost savings. The actual amount of savings will depend on the actual amount of idling reduced and the frequency of performed engine maintenance.

Table VI - 3

Estimated Annual Savings from Phase Two of the Proposed ATCM for the Affected Fleet of Sleeper-Berth Equipped Vehicles (2009 –2013)

Year	Idle Hours Reduced per Year	Fuel Savings Million Gal / Year (Rounded)	Total Fleet Cost-Savings $ Million / Year (Rounded – 2003 Dollars)
2009	244,710	71.5	$14.8
2010	240,478	70.2	$17.2
2011	236,901	69.2	$19.6
2012	231,731	67.7	$22.1
2013	226,561	66.1	$23.9
Total	**1,180,381**	**344.7**	**$97.5**

The assumptions used by staff to develop the estimates presented in Table 5 (above) are as follows:

- idling wastes .8 gal/hour (1.0 gal/hr main engine – 0.2 gal/hr APS)
- an hour of reduced idling equates approximately to a $0.18 (2003) savings on engine maintenance costs(TMC, 2000)
- Please see Appendix D for detailed cost methodologies

Table VI-4 below displays the estimated yearly costs and savings calculated for each of the first five years of implementation of Phase Two of the Proposed ATCM for a single vehicle after installing an APS. The net yearly savings are calculated by subtracting the fuel and maintenance costs, and capital recovery of a typical APS from the fuel and maintenance savings from the reduction of main engine idling. The annual savings of approximately $200-$400 (2003 dollars) per year, thus calculated, applies to the first five years of the regulation, when most of the fuel and maintenance savings are countering the costs of installing and maintaining an APS. Staff assumes after five years, the APS will be paid for and significant additional yearly cost savings will be realized. The actual amount of savings will depend on the actual amount of idling reduced and the frequency of performed engine maintenance.

Table VI - 4

Estimated Annual per Vehicle Costs and Savings for the First Five Years of Phase Two of the Proposed ATCM (2009 – 2013)*

Year	APS Annual Capitalization	Annual Fuel Savings	Annual Engine Maintenance Savings	APS Maintenance Costs	Sum Total Of All Cash Flows	2003 Present Value
2009	($2,090)	$ 2,832	$ 300	$ (498)	$ 544	$ 196
2010	($2,090)	$ 3,000	$ 300	$ (506)	$ 704	$ 255
2011	($2,090)	$ 3,180	$ 300	$ (514)	$ 876	$ 312
2012	($2,090)	$ 3,372	$ 315	$ (522)	$1,075	$ 374
2013	($2,090)	$ 3,576	$ 315	$ (530)	$1,271	$ 425
					5-Year Benefit of APS Purchase:	**$ 1,562**

* Please see Appendix D for calculation methodologies

Staff expects that any truck incurring the cost of installing an idle control strategy (i.e. APS) will use the strategy regardless of the state in which the vehicle is operating. Thus, there are additional cost benefits to truck owners/operators that operate part of the time out-of-state that were not included in our California-only analysis. Additionally, it is possible, although not quantified in our analysis, that the resale value of a vehicle could be enhanced by installing an idle reduction strategy.

Potential Effect of Phase One and Phase Two of the Proposed ATCM on Business Competitiveness and Creation, Elimination and Expansion of Jobs and Businesses

The Proposed ATCM is not expected to affect California business competitiveness. Staff estimates up to 1,700,000 heavy-duty diesel-fueled vehicles (DMV, 2004) operating in the State yearly are registered outside California. These vehicles are subject to the same State regulations and therefore do not place California businesses at a competitive disadvantage. Staff expects that owners and operators of out-of-state trucks will choose the most economical approach for their vehicle, and that every affected vehicle could potentially realize economic benefits from reduced fuel usage and lower maintenance costs.

Staff expects that the regulation could potentially create a demand in manufacturing and services related to diesel idle reduction technologies. As a result, the Proposed ATCM could have a positive impact on the creation and expansion of jobs and businesses, especially for companies engaged in the engineering, design, and manufacture of auxiliary devices used to power heavy duty diesel vehicles. In the service sector, the Proposed ATCM could positively impact job creation at truck stops that choose to provide electrification (on-board electrification), and heating, venting, and cooling services to heavy duty diesel-fueled vehicle operators.

Potentially Affected Local Public Agencies - Costs and Cost Savings

The Proposed ATCM is not expected to have a significant fiscal impact on local government. The ARB will be primarily responsible for enforcement. Although not quantified, there are possible additional enforcement costs that may be incurred by local Air Quality Management Districts (AQMD) that choose to enforce the ATCM. Staff does not anticipate that Districts will incur substantial costs that would not be covered by existing resources. Costs incurred may be recouped through penalties assessed under Health and Safety Code sections 39674, 39675 and 42403.5, and in some cases may be recouped through fees authorized by section 42311 of the Health and Safety Code.

Local regional transit agencies, cities, or counties that operate commercial heavy-duty diesel-fueled vehicles in California greater than 10,000 pounds GVWR could incur minor costs associated with educating drivers about compliance with the Proposed ATCM. Since the method for training the driver of the provisions of the proposed ATCM is not prescribed, staff expects training to be done in the most economical way possible and any costs to be minimal. Additionally, staff expects that local public agencies will enjoy the same fuel and maintenance cost savings as the private fleet, depending on the amount of idling reduced. The proposed ATCM does not constitute a reimbursable mandate because it applies to all residents and entities that operate affected heavy-duty vehicles in the State and does not impose unique requirements on local agencies. *County of Los Angeles vs. State of California*, 43 Cal 3d 46 (Jan 1987).

Potentially Affected State Agencies - Costs and Cost Savings

The affected State agencies are ARB, CHP, and potentially other State law enforcement agencies. The ARB is expected to incur additional costs of $25,000 per year for outreach efforts while implementing the Proposed ATCM. The ARB will have primary responsibility for enforcing the ATCM and expected operate within existing budgets and with existing personnel for the foreseeable future. Potentially, if monies become available, staff estimates that ten ARB personnel could be assigned for field enforcement at an annual cost of $100,000 per year per employee. In addition, two positions could be assigned to perform administrative tasks at a cost of $100,000 per year per employee. Because the ARB is primarily responsible for enforcement, staff expects minimal impact on other State law enforcement agencies. To the extent that State agencies operate vehicles affected by the ATCM, State agencies could also realize minor driver training costs and fuel and maintenance savings from the Proposed ATCM.

Potentially Affected Federal Agencies - Costs and Cost Savings

The Proposed ATCM is not expected to have a significant fiscal impact on the federal government. Any federally owned vehicles operating in California are expected to benefit from the same fuel and maintenance cost savings in complying with the requirements of the proposed ATCM. Potentially, federal law enforcement staff could incur minor costs associated with enforcing the regulation. Since the ARB is primarily responsible for enforcement, staff expects no significant economic impact as a result of any enforcement actions taken by federal staff.

B. ENVIRONMENTAL IMPACT

This section describes the potential impacts that the Proposed ATCM may have on the environment. The Proposed ATCM will reduce public health risks by reducing exposures to diesel exhaust, which contains toxic air contaminants (TAC) - most notably diesel PM - and other air pollutants. In this section, we consider potential impacts of the Proposed ATCM on the environment. Based upon available information, the ARB staff has determined that no significant adverse environmental impacts will occur as a result of adopting the Proposed ATCM.

Legal Requirements Applicable to the Environmental Impact Analysis

The California Environmental Quality Act (CEQA) and ARB policy require an analysis to determine the potential environmental impacts of proposed regulations. Since the ARB's program involving the adoption of regulations has been certified by the Secretary of Resources pursuant to Public Resources Code section 21080.5, CEQA environmental analysis requirements may be included in the Initial Statement of Reasons for this rulemaking in lieu of preparing an environmental impact report or negative declaration. In addition, staff will respond, in the Final Statement of Reasons for the ATCM, to all significant environmental issues raised by the public during the public review period or at the Board public hearing.

Public Resources Code section 21159 requires that the environmental impact analysis conducted by ARB include the following:

- An analysis of reasonably foreseeable environmental impacts of the methods of compliance;
- An analysis of reasonably foreseeable feasible mitigation measures; and
- An analysis of reasonably foreseeable alternative means of compliance with the ATCM.

Regarding mitigation measures, CEQA requires an agency to identify and adopt feasible mitigation measures that would minimize any significant adverse environmental impacts described in the environmental analysis.

Analysis of Reasonably Foreseeable Environmental Impacts of the Methods of Compliance

Compliance with the Proposed ATCM is expected to directly impact air quality alone. Therefore, the only reasonably foreseeable impact on other environmental media (i.e., water, soil, or vegetation) would be as a consequence of the air quality impact.

Phase one of the Proposed ATCM would be effective upon adoption into State law, with an expected implementation date of January, 2005. It would require the driver to turn off the engine of an affected vehicle when the idling limit has been reached as a means of reducing idling emissions. The subject vehicle cannot idle for more than five (5) minutes at a location except as noted in subsection (c) (1) of the Proposed ATCM text (Appendix A). The impact is a decrease in PM_{10}, hydrocarbon, CO, and NOx emissions from diesel-fueled heavy-duty vehicles. Staff estimates that emission reductions would be approximately 166 tons per year (tpy) of diesel PM and 5,200 tpy of NOx in 2005. It should be noted that the PM emission benefits relative to the baseline emissions would decrease over time as the population of older, more polluting heavy-duty diesel engines decreases and is gradually replaced by newer engines that meet more stringent emission standards.

Phase Two of the Proposed ATCM, is applicable to certain vehicles equipped with sleeper berths. Under Phase Two of the Proposed ATCM, trucks with diesel engines cannot idle the primary engine or operate a diesel-fueled APS during extended rest periods beginning January 1, 2009. If a vehicle operator chooses to supply power to the sleeper berth for more than 5 minutes, the operator must choose a source other than the main engine. Options to provide power to the sleeper berth include using non diesel-fueled auxiliary power systems (APS), on-board electrification, and off-board electrification. No local emissions are associated with the use of on-board or off-board electrification. Staff expects any emissions resulting from generating the electrical power (from a power plant or other source supplying power to the electrical grid) needed by the vehicle electrification system to be minor when compared to the main engine emission reductions realized. For trucks using an APS in lieu of main engine idling, some emissions are expected. A typical diesel-fueled APS is expected to emit about 0.312 g/hr of diesel PM and 4.61 g/hr of NOx, which are significantly lower levels than the corresponding emissions from the idling of a typical primary diesel engine.

Based on staff estimates, the elimination of idling is expected to decrease PM10 emissions from affected diesel-fueled vehicles by 166 tons/year starting in 2005 with the start of phase one and an additional 134 tons/year staring with phase two in 2009. Additionally, NOx emissions are expected to decrease by 5,200 tons/year in 2005 (phase one) and an additional 12,300 tons per year in 2009 (phase two) as a result of the Proposed ATCM. By achieving these emission reductions, the Proposed ATCM will reduce exposures and risks from diesel PM and other toxic air contaminants.

Reasonably Foreseeable Mitigation Measures

As described above, the Proposed ATCM will not result in any significant adverse environmental impacts. Therefore, no mitigation measures will be necessary.

Reasonably Foreseeable Alternative Means of Compliance with the ATCM

Pursuant to CEQA Guidelines (Title 14, California Code of Regulations) section 15187(c)(3), as there are no identified impacts from the Proposed ATCM to be avoided or mitigated, no alternative means of compliance with the Proposed ATCM need to be analyzed for CEQA purposes. However, alternatives to the Proposed ATCM are discussed in Chapter **[V]**, Section **(C)** of this Staff Report: Initial Statement of Reasons. Alternatives include, but are not limited to, installing an idle reduction device or a non diesel-fueled auxiliary power system. ARB staff has concluded that the Proposed ATCM provides the most effective approach to reducing the general public's exposure to TACs and other air pollutants as a result of diesel-fueled commercial motor vehicle idling. Requiring manual engine shut-off is the safest, most cost-effective means of limiting idling. Diesel exhaust emission reductions are achieved while providing the regulated community the flexibility in choice of alternatives to idling.

If the Proposed ATCM is not considered a performance standard for CEQA purposes, the same considerations above would apply to limit the need to consider alternatives to the Proposed ATCM.

Effects on Ambient Air Quality

The Proposed ATCM is expected to directly and beneficially impact air quality and is designed to reduce the exposure to diesel PM emissions by limiting vehicle idling time. Heavy-duty diesel-powered vehicles emit diesel PM, nitrogen oxides (NOx), carbon monoxide (CO), reactive organic gases (ROG) along with several other pollutants that have the potential to cause cancer and other adverse health effects

The projected daily emission reductions of diesel PM and NOx in California from implementing Phase One and Phase Two of the Proposed ATCM are provided in Table VI - 5 for the years 2005 (Phase One implementation date) and 2009 (Phase Two implementation date). These data show there would be a 0.455 tons per day PM reduction in 2005, and an additional 0.729 tons per day reduction beginning in 2009. In addition, the Proposed ATCM is expected to achieve NOx reductions of 14.35 tons per day in 2005 and additional NOx reductions of 51.03 tons per day beginning in 2009.

Table VI - 5 summarizes the projected PM and NOx emission reductions expected from implementing Phase One and Phase Two of the Proposed ATCM in 2005 and 2009, respectively. These emission reductions will lower ambient and near-source air concentrations of PM and NOx as well as other pollutants associated with diesel exhaust.

Table VI - 5

Projected Statewide PM and NOx Emissions Reductions from Implementing the Proposed ATCM

Emission Year	PM Reductions		NOx Reductions	
	Tons/day	Tons/year	Tons/day	Tons/year
2005	0.46	166	14	5,200
2009*	0.73	266	51	18,600

*The emission reductions that begin in 2009 are in addition to those that begin in 2005 and include both phase one and phase two reductions

Near Source Emission Impact Due to Idling

Exposure to diesel PM emissions from idling diesel-powered vehicles is associated with adverse health effects such as increased cancer risk. An estimated 409,000 heavy-duty diesel-fueled trucks and buses operate throughout California's roadways daily. The highest concentrations of diesel PM from idling engines occur at locations where numerous diesel-powered vehicles operate or congregate (i.e. truck stops, rest areas, and distribution facilities). Facilities where numerous vehicles commonly idle could pose significant health risks to individuals living nearby. (See Chapter 4 for a quantification of near-source cancer risks from idling.)

The reduction in diesel PM emissions and the associated reduction of cancer risk levels at locations where diesel-fueled vehicles idle will be a direct benefit of implementing the Proposed ATCM.

Health Benefits of Reducing Diesel PM Emissions

The emission reductions obtained from this Proposed ATCM will result in significant reductions of exposure to primary and secondary diesel PM and lower ambient PM levels. Lower near-source and ambient PM exposures in turn will result in a reduction of the prevalence of the diseases attributed to diesel PM including reduced cancer risk, reduced incidences of hospitalizations for cardio-respiratory disease, and prevention of premature deaths. The following primary and secondary diesel PM analysis use emission windows of: phase one 2005 – 2013 and phase two 2009 - 2013

Primary Diesel PM

The proposed regulation is expected to reduce diesel PM emissions by approximately 1,680 tons by the end of year 2013. Cumulatively, these emission reductions would prevent an estimated 84 deaths (41-127, as 95 percent confidence interval (95% CI)). This estimate accounts for the fact that the types of trucks affected by this regulation are not always operating in populated areas. For example, non-sleepers are in populated areas 90% of the time, but for sleepers it is only 25% of the time. The basis of the calculation is the premature mortality results of Krewski *et al.* (2000) and the methodology of Lloyd and Cackette (2001)[4]. Lloyd and Cackette (2001) estimated that direct diesel $PM_{2.5}$ exposure at the California average ambient population-weighted PM concentration (1.8 $\mu g/m^3$) would be associated with a mean estimate of 1,985 (974-2,991, 95% CI) cases of premature deaths per year in California. The diesel PM emissions corresponding to 1.8 $\mu g/m^3$ is 28,000 tons per year (ARB 2000). Based on this information, we estimate that reducing 14.11 tons of diesel PM emissions would result in one less premature death (28,000 tons/1985 deaths = 14.11 tons/death).

The U. S. EPA has established $6.3 million (in year 2000 dollars) for a 1990 income level as the mean value of avoiding one death (U.S. EPA 2003). As real income increases, the value of a life is also expected to rise. The U.S. EPA further adjusted the $6.3 million value to $8 million (in year 2000 dollars) for a 2020 income level to reflect an increase in real income.

In the U.S. EPA's guidance of social discounting, it recommends using both three and seven percent discount rates (U.S. EPA 2000a). Using these rates and the annual avoided deaths in the proposed regulation as weights, the weighted value of reducing a premature future death discounted back to year 2003 is $5.4 million at a seven percent discount rate, and $6.6 million at three percent. In addition to value of the health

---

[4] Although there are two mortality estimates in the report by Lloyd and Cackette (2001) – one based on work by Pope *et al.* (1995) and the other based on Krewski *et al.* (2000), we selected the estimate based on the Krewski's work. For Krewski *et al.*, an independent team of scientific experts commissioned by the Health Effects Institute conducted an extensive reexamination and reanalysis of the health effect data and studies, including Pope *et al.* The reanalysis resulted in the relative risk being based on changes in mean levels of $PM_{2.5}$, as opposed to the median levels from the original Pope *et al.* study. The Krewski *et al.* reanalysis includes broader geographic areas than the original study (63 cities vs. 50 cities). Further, the U.S. EPA has been using Krewski's study for its regulatory impact analyses since 2000.

benefits, there are additional economic benefits associated with reduced idling due to reduced fuel use and maintenance, which is discussed this section. As a result, this proposed regulation is a cost-effective mechanism to reduce premature deaths that would otherwise be caused by diesel PM emissions associated with truck idling.

Secondary Diesel PM

The proposed regulation is also expected to reduce NOx emissions and thus secondary diesel PM. Comparing the NOx emissions before and after this regulation, the proposed regulation would reduce NOx emissions by approximately 101,800 tons by the end of year 2013, which would prevent an estimated 93 deaths (46-140, 95% CI). This outcome was estimated following the same approach used for direct PM reduction above. Lloyd and Cackette (2001) estimated that indirect diesel $PM_{2.5}$ exposures at a level of 0.81 $\mu g/m^3$ resulted in a mean estimate of 895 (439-1,350 as 95% CI) premature deaths per year in California in addition to those caused by directly formed diesel PM. The NOx emissions level corresponding to the indirect diesel ambient PM concentration of 0.81 $\mu g/m^3$ is 598,965 tpy. Hence, reducing 669 tons of NOx emissions would result in one fewer premature death (598,965 tons/895 deaths = 669 tons/death). As described for the calculations with direct diesel PM, these estimates also account for the affected population based on the operating locations of the types of trucks affected by this regulation (90% for non-sleepers, 25% for sleepers).

The benefits associated with a reduction in emissions of NOx of 669 tons is $5.4 million to $6.6 million due to an avoided premature death. As previously indicated, in addition to the value of the health benefits, there are cost savings associated with reduced idling due to reduced fuel use and maintenance which are discussed earlier in this section. In summary, this rule is a cost-effective mechanism to reduce premature deaths that would otherwise be caused by NOx emissions associated with truck idling.

Reduced Ambient Ozone Levels

Emissions of NOx and ROG are precursors to the formation of ozone in the lower atmosphere. Exhaust from diesel engines contributes to the total of ozone precursors in any metropolitan area. Therefore, reductions in NOx and ROG emissions from diesel engines would make a contribution to reducing exposures to ambient ozone. Controlling emissions of ozone precursors would reduce the prevalence of the types of adverse respiratory symptoms associated with ozone exposure and would reduce hospital admissions and emergency visits for respiratory problems.

Reduced Greenhouse Gases

There is a close relationship between the concentration of the greenhouse gases in the atmosphere and global temperatures. Increasing concentrations of greenhouse gases such as carbon dioxide and oxides of nitrogen cause global warming which lead to changes in the earth's climate. The climate change affects California's ecosystem as well as the public health. Mobile sources are major contributors of greenhouse gases.

By limiting idling, the Proposed ATCM would, as a consequence of reducing the targeted diesel exhaust emissions from commercial heavy-duty diesel-fueled vehicles, decrease these vehicles' greenhouse gas emissions and thereby reduce the State's contribution to the climate change.

C. ENVIRONMENTAL JUSTICE

The ARB is committed to integrating environmental justice in all of its activities. On December 13, 2001, the Board approved "Policies and Actions for Environmental Justice," which formally established a framework for incorporating Environmental Justice into the ARB's programs, consistent with the directives of State law. Environmental Justice is defined as the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies[5]. These policies apply to all communities in California, but recognize that environmental justice issues have been raised more in the context of low-income and minority communities.

The Environmental Justice Policies are intended to promote the fair treatment of all Californians and cover the full spectrum of ARB activities. Underlying these Policies is a recognition that the agency needs to engage community members in a meaningful way as it carries out its activities. People should have the best possible information about the air they breathe and what is being done to reduce unhealthful air pollution in their communities. The ARB recognizes its obligation to work closely with all communities, environmental and public health organizations, industry, business owners, other agencies, and all other interested parties to successfully implement these Policies. (ARB, 2001b)

Chapter III of this Staff Report: Initial Statement of Reasons generally describes the efforts made to apprise the public about the development of the proposed ATCM. Specific outreach efforts to environmental justice communities and activities have included the following:

- Since the identification of diesel PM as a toxic air contaminant (TAC) in 1998, the public has been more aware of the health risks posed by this TAC. At many of the ARB's community outreach meetings over the past few years, the public has raised questions regarding efforts to reduce exposure to diesel PM. At these meetings in April 2003, ARB staff told the public about the Diesel Risk Reduction Plan, adopted in 2000, and described some of the measures in that plan, including the Proposed ATCM. These meetings were held in association with Children's Environmental Health Protection Program air monitoring studies in Barrio Logan (San Diego), Boyle Heights (Los Angeles), Wilmington (Los Angeles), and other low-income and minority communities.

[5] Senate Bill 115, Solis, 1999, California Government Code § 65040.12(c).

- The ARB's Environmental Justice Policies and Action web page (http://www.arb.ca.gov/ch/programs/ej/ej.htm) has provided a direct link to the Proposed ATCM web page via "Improving Air Quality: Diesel Risk Reduction Plan or California Air Toxics Program." The Proposed ATCM web page provides accessibility to: draft versions of the ATCM; the Staff Report: Initial Statement of Reasons (including the Proposed ATCM); a fact sheet in both English and Spanish; meeting and contact information; and list serve subscription.

- Environmental justice, children's health, community, and environmental activists have been notified by electronic and/or regular mail about the public workshops, the public hearing, and the availability of this Staff Report: Initial Statement of Reasons. Moreover, the ARB provides web cast access for the Proposed ATCM public workshops and hearing to allow virtually everyone in the State to participate.

The Proposed ATCM is consistent with the ARB Environmental Justice policy to reduce health risk from TACs in all communities, including low-income and minority communities. The proposed ATCM would reduce diesel PM emissions and health risks from heavy-duty diesel-fueled vehicles with GVWR greater than 10,000 pounds operating throughout California. In addition, staff anticipates significant diesel PM emission and health risk reductions to occur in neighborhoods surrounding heavily-traveled freeways, storage and distribution facilities, rail yards, and ports where heavy-duty diesel-fueled vehicles with GVWR greater than 10,000 pounds activity is concentrated. These neighborhoods are frequently co-located with low-income and minority communities.

REFERENCES

Lloyd and Cackette, 2001. Lloyd, A.C.; Cackette, T.A.; *Diesel Engines: Environmental Impact and Control*; J Air Waste Manage. Assoc. 2001, 51: 809-847.

Krewski et al, 2000. Krewski D.; Burnett R.; Goldberg M.; Hoover K.; Stemiatychi J.; Jerrett M.; Abrahamovicz M.; White W. *Reanalysis of the Harvard Six Cities Study and the American Cancer Society Study of Particulate Air Pollution and Mortality*, Health Effects Institute, Cambridge, Massachusetts; 2000. CD-ROM

ARB, 2000. California Resources Board. *The Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles*, Sacramento, California. October, 2000. On CD-ROM
http://www.arb.ca.gov/diesel/documents/rrpapp.htm

United States Environmental Protection Agency, 2000a, *Guidelines for Preparing Economic Analyses*. September 2000. EPA240-R-00-003. CD-ROM
http://www.epa.gov/opei/pubsinfo.htm

U.S. EPA, 2003. United States Environmental Protection Agency, Assessment and Standards Division, Office of Transportation and Air Quality, *Draft Regulatory Impact Analysis: Control of Emissions of Air Pollution from Nonroad Diesel Engines and Fuel*. EPA420-R-03-008. CD-ROM. Research Triangle Park, North Carolina. April 2003.

ARB 2001b: California Air Resources Board. Policies and Actions For Environmental Justice. Sacramento: ARB, 13 December 2001

VII. REFERENCES

ARB, 1984. California Air Resources Board and Department of Health Services. Report to the Scientific Review Panel on Benzene. Overview. Sacramento: ARB and OEHS,27 November 1984.

ARB, 1986. California Air Resources Board and Department of Health Services. Public Hearing to Consider the Adoption of a Regulatory Amendment Identifying Chlorinated Dioxins and Dibenzofurans as Toxic Air Contaminants. Sacramento: ARB and DHS, 6 June 1986.

ARB, 1992a. California Air Resources Board and Office of Environmental Health Hazard Assessment. Final Report on the Identification of Formaldehyde as a Toxic Air Contaminant. Part A Exposure Assessment. Sacramento: ARB and OEHHA, July 1992.

ARB, 1992b. California Air Resources Board and Office of Environmental Health Hazard Assessment. Proposed Identification of 1,3-Butadiene as a Toxic Air Contaminant. Staff Report/Executive Summary. Sacramento: ARB and OEHHA, May 1992.

ARB, 1993a. California Air Resources Board and Office of Environmental Health Hazard Assessment. Acetaldehyde as a TAC. Executive Summary. Sacramento: ARB and OEHHA, November 1993.

ARB, 1993b. California Air Resources Board. Identification of Federal Hazardous Air Pollutants as Toxic Air Contaminants. Staff Report. Sacramento: ARB, June 1993.

ARB, 1994. California Air Resources Board and Office of Environmental Health Hazard Assessment. Benzo[α]pyrene as a Toxic Air Contaminant. Executive Summary. Sacramento: ARB and OEHHA, July 1994.

ARB, 1998. California Air Resources Board and Office of Environmental Health Hazard Assessment. Proposed Identification of Diesel Exhaust as Toxic Air Contaminant. Executive Summary. Sacramento: ARB and OEHHA, April 1998.

ARB, 1998a. California Air Resources Board and Office of Environmental Health Hazard Assessment. *Proposed Identification of Diesel Exhaust as Toxic Air Contaminant. Staff Report.* Sacramento: ARB and OEHHA, June 1998.

ARB, 1998b . California Air Resources Board. *Report to the Air Resources Board on the Proposed Identification of Diesel Exhaust as a Toxic Air Contaminant; Appendix III, Part A, Exposure Assessment.* Sacramento, California. April 22, 1998. CD-ROM

ARB, 2000. Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel Fueled Engines and Vehicles.
http://www.arb.ca.gov/diesel/documents/rrpapp.htm

ARB 2001. California Air Resources Board. Policies and Actions For Environmental Justice. Sacramento, ARB, 13 December 2000

Air Resources Board (2002) "Public Hearing to Consider Amendments to the Ambient Air Quality Standards for Particulate Matter and Sulfates." Sacramento, CA. CD-ROM ftp://ftp.arb.ca.gov/carbis/research/aaqs/std-rs/pm-final/PMfinal.pdf

Bay Area Air Quality Management District, Air Quality Plans, Ozone Working Group: Suggested Measures Still Under Evaluation, www.baaqmd.gov/pld/plans/ozone/2003_workgroup/rpt2_under_evaluation_72303.pdf

California Environmental Protection Agency (Cal/EPA) 1998: *Proposed Identification of Diesel Exhaust as a Toxic Air Contaminant: Risk Assessment for Diesel Exhaust; Appendix III, Part B*; Office of Environmental Health Hazard and Assessment: Sacramento, CA, 1998. CD-ROM http://www.arb.ca.gov/regact/dieseltac/res98-35.pdf

Clean Air Plan Update On-Road Measure Index www.airquality.org/cleanairplan/ws0306/ws0306Nindex.shtml

Clean Air Technologies. Alternatives to Idling, August 2003. www.fhwa.dot.gov/environment/cmaqpgs/tseatach.htm

Employment Development Department, Labor Market Information. http://www.calmis.cahwnet.gov/file/occup$/ccoiswages/dclaw.cfm?occupation_code=971020)

EPA: Voluntary Retrofit Program - Idling Reduction. http://www.epa.gov/otaq/retrofit/idling.htm

IARC 1989. International Agency for Research on Cancer (IARC). IARC Monograph on the evaluation of Carcinogenic Risks to Humans: Diesel and Gasoline engine Exhausts and Some Nitroarenes. World Health Organization. Lyon France, 1989.

IdleAire Technologies, 2003. Input obtained from Kevin Benninger, Operations S[ecialist, IdleAire Technologies Corporation, Knoxville, Tennessee (Affiliates Loves Truck Stop, Ripon, California) on July 23, 2003.

Institute of Transportation Studies, University of California, Davis. Diesel Truck Fuel Cell APU. October 2003 www.its.ucdavis.edu/hfcv_openhouse/programspotlights/DieselAPU.pdf

Krewski et al, 2000. Krewski D.; Burnett R.; Goldberg M.; Hoover K.; Stemiatychi J.; Jerrett M.; Abrahamovicz M.; White W. *Reanalysis of the Harvard Six Cities Study and* *the American Cancer Society Study of Particulate Air Pollution and Mortality*, Health Effects Institute, Cambridge, Massachusetts; 2000. CD-ROM

Linda Gaines, 2003. "Don't Idle your Profits Away", Mid-America Truck Show, March 2003. Argonne National Laboratory, Transportation Technology R&D Center.

Limits on School Bus Idling at Schools. www.arb.ca.gov/regact/sbidling/fro.pdf

Lloyd, A. C. and Cackette, T. A., June 2001: Critical Review; Diesel Engines: *Environmental Impact and Control,* ISSN 1047-3289, J. Air & Waste Manage. Assoc. 51:809-847.

OEHHA, 2000. Air Toxics "Hot Spots" Program Risk Assessment Guidelines Part IV: Exposure Assessment and Stochastic Analysis Technical Support Document, October 27, 2000. CD-ROM
www.oehha.ca.gov/air/hot_spots/pdf/Stoch4f.pdf

OEHHA, 2001. Office of Environmental Health Hazard Assessment. Prioritization of Toxic Air Contaminants Under the Children's Environmental Health Protection Act. Sacramento: OEHHA, October 2001.

OEHHA, 2002. Office of Environmental Health Hazard Assessment (OEHHA), *Air Toxic Hot Spots Program Risk Assessment Guidelines, Part II, Technical Support Document for Describing Available Cancer Potency Factors. CD-ROM.* December, 2002.
www.oehha.ca.gov/air/hot_spots/pdf/TSDNov2002.pdf

OEHHA, 2003. Office of Environmental Health Hazard Assessment (OEHHA), *The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments.* www.oehha.ca.gov/air/hot_spots/HRSguide.html. August, 2003. CD-ROM
www.oehha.ca.gov/air/hot_spots/pdf/HRAguidefinal.pdf

Pony Pack,2003. Annual Pony Pack Maintenance Costs, Wear & Maintenance, Accessed from website at www.ponypack.com/savings.htm

Stodolsky, F., L. Gaines, A. Vyas. Analysis of Technology Options to Reduce the Fuel Consumption of Idling Trucks. Argonne National Laboratory. ANL/ESD-43. June 2000.
www.transportation.anl.gov/pdfs/TA/15.pdf

Technology Options to Reduce Truck Idling. Stodolsky Frank;, Gaines. Linda;, and Vyas. Anant. March , 2001. Argonne National Laboratory, Transportation Technology R&D Center.
www.transportation.anl.gov/pdfs/TA/74.pdf

Truck Stop Electrification EPA-OTAQ-Voluntary Programs -SmartWay Transport.
www.epa.gov/ptaq/retrofit/f03020.htm

U.S. EPA, 1995a. United States Environmental Protection Agency (U.S. EPA), *ISCST3 Model User's Guide, Volume I, EPA-454/B-95-003a.* Research Triangle Park, North Carolina, September 1995. CD-ROM.

U.S. EPA, 1995b. United States Environmental Protection Agency (U.S. EPA), *ISCST3 Model User's Guide, Volume II, EPA-454/B-95-003b.* Research Triangle Park, North Carolina, September 1995. CD-ROM.

United States Environmental Protection Agency, 2000a, *Guidelines for Preparing Economic Analyses.* September 2000. EPA240-R-00-003 CD-ROM. http://www.epa.gov/opei/pubsinfo.htm

United States Environmental Protection Agency, 2000b, Assessment and Standards Division, Office of Transportation and Air Quality. *Regulatory Impact Analysis: Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements.* December 2000, EPA420-R-00-026.

U.S. EPA. (2002). Study of Exhaust Emissions from Idling Heavy-Duty Diesel Trucks and Commercially Available Idle-Reducing Devices. EPA420-R-02-025, October 2002.

U.S. EPA. (2003). Currently Available Idle Reduction Technologies. Accessed: November 20, 2003. (http://www.epa.gov/otaq/retrofit/idlingtech.htm)

U.S. EPA, 2003. United States Environmental Protection Agency, Assessment and Standards Division, Office of Transportation and Air Quality, *Draft Regulatory Impact Analysis: Control of Emissions of Air Pollution from Nonroad Diesel Engines and Fuel.* EPA420-R-03-008. CD-ROM. Research Triangle Park, North Carolina. April 2003.

U.S. EPA, 2003. Impacts of truck idling on air an dfuel consumption, EPA420-F-03-002. February 2003.

U.S.EPA. Idling Reduction: Alternatives www.epa.gov/otaq/smartway/idlingalternatives.htm

49er Travel Plaza, 2004. Demonstration of "Truck Stop Electrification" by SMUD, West Sacramento, California, January 23, 2004.

APPENDICES

APPENDIX A

PROPOSED REGULATION ORDER: AIRBORNE TOXIC CONTROL MEASURE TO LIMIT DIESEL-FUELED COMMERCIAL MOTOR VEHICLE IDLING

PROPOSED AIRBORNE TOXIC CONTROL MEASURE TO LIMIT DIESEL-FUELED COMMERCIAL MOTOR VEHICLE IDLING

Adopt new section 2485 within Chapter 10 – Mobile Source Operational Controls, Article 1 – Motor Vehicles, Division 3. Air Resources Board, title 13, California Code of Regulations to read as follows:

Section 2485. Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling.

(a) **Purpose.** The purpose of this airborne toxic control measure is to reduce public exposure to diesel particulate matter and other air contaminants by limiting the idling of diesel-fueled commercial motor vehicles.

(b) **Applicability.** This section applies to diesel-fueled commercial motor vehicles with gross vehicular weight ratings of greater than 10,000 pounds that are or must be licensed for operation on highways.

(c) **Requirements.**

(1) The driver of any vehicle subject to this section shall not idle the vehicle's primary diesel engine or operate a diesel-fueled auxiliary power system (APS) for greater than 5.0 minutes at any location, except as noted in Subsection (d); and

(2) The owner of any vehicle subject to this section who installs or has installed on that vehicle on or after the effective date of this section an auxiliary power system (APS) powered in whole or in part by an internal combustion engine, must, at time of installation, install or have installed an APS that is certified to the more stringent of California or federal standards for newly manufactured offroad or nonroad engines, respectively, applicable on the date of installation.

(d) **Exceptions.**

Subsection (c) does not apply for the period or periods during which

(1) a bus is idling for
   (A) up to 10.0 minutes prior to passenger boarding, or
   (B) when passengers are onboard;

(2) idling of the main engine or operating the diesel-fueled APS is necessary to power a heater, air conditioner, or any ancillary equipment during sleeping or resting in a sleeper berth before January 1, 2009. This

provision does not apply when operating within 100 feet of a restricted area;

(3) idling when the vehicle must remain motionless due to traffic conditions, an official traffic control device, or an official traffic control signal over which the driver has no control, or at the direction of a peace officer;

(4) idling when the vehicle is queuing that at all times is beyond 100 feet from any restricted area;

(5) idling when forced to remain motionless due to immediate adverse weather conditions affecting the safe operation of the vehicle or due to mechanical difficulties over which the driver has no control;

(6) idling to verify that the vehicle is in safe operating condition as required by law and that all equipment is in good working order, either as part of a daily vehicle inspection or as otherwise needed, provided that such engine idling is mandatory for such verification;

(7) idling is mandatory for testing, servicing, repairing, or diagnostic purposes;

(8) idling when providing a power source for equipment or operations, other than transporting passengers or propulsion, which involve a power take off or equivalent mechanism and is powered by the primary engine for:
(A) controlling cargo temperature, operating a lift, crane, pump, drill, hoist, mixer, or other auxiliary equipment; or
(B) providing mechanical extension to perform work functions for which the vehicle was designed and where substitute alternate means to idling are not reasonably available;

(9) idling when operating defrosters, heaters, air conditioners, or other equipment solely to prevent a safety or health emergency; and

(10) idling by authorized emergency vehicles while in the course of providing services for which the vehicle is designed;

(e) **Relationship to Other Law.**

Nothing in this section allows idling in violation of other applicable law, including, but not limited to:

(1) California Vehicle Code Section 22515;

(2) Title 13, Section 2480, California Code of Regulations;

(3) California Health and Safety Code Section 40720; or

(4) any applicable ordinance, rule, or requirement as stringent as, or more stringent than, this section.

(f) **Enforcement.** This section may be enforced by the Air Resources Board; peace officers as defined in California Penal Code, title 3, chapter 4.5, Sections 830 et seq. and their respective law enforcement agencies' authorized representatives; and air pollution control or air quality management districts.

(g) **Penalties.** For violations of subsection (c), the driver (for (c)(1)) and owner (for (c)(2)) of a subject vehicle is subject to a minimum civil penalty of 100 dollars and to criminal penalties as specified in the Health and Safety Code and the Vehicle Code.

(h) **Definitions.**

The following definitions apply to this section:

(1) "Authorized emergency vehicle" is as defined in Vehicle Code Section 165.

(2) "Auxiliary power system" or "APS" means any device that provides electrical, mechanical, or thermal energy to the primary diesel engine, truck cab, or sleeper berth as an alternative to idling the primary diesel engine.

(3) "Bus" means any vehicle defined in Title 13, California Code of Regulations, Section 2480, subsections (h)(13)-(16), inclusive.

(3) "Commercial Motor Vehicle" means any vehicle or combination of vehicles defined in Vehicle Code Section 15210(b) and any other motor truck with a gross vehicle weight rating of 10,001 pounds or more, except the following:
(A) a zero emission vehicle; or
(B) a pickup truck as defined in Vehicle Code Section 471.

(4) "Driver" is as defined in Vehicle Code Section 305.

(6) "Gross vehicle weight rating" is as defined in Vehicle Code Section 350.

(7) "Highway" is as defined in Vehicle Code Section 360.

(8) "Idling" means the vehicle engine is running at any location while the vehicle is stationary.

(9) "Motor truck" or "motortruck" means a motor vehicle designed, used, or maintained primarily for the transportation of property.

(10) "Official traffic control device" is as defined in Vehicle Code Section 440.

(11) "Official traffic control signal" is as defined in Vehicle Code Section 445.

(12) Owner is as defined in Vehicle Code Section 460.

(13) "Primary diesel engine" means the diesel-fueled engine used for vehicle propulsion.

(14) "Queuing" means (A) through (C)
  (A) the intermittent starting and stopping of a vehicle;
  (B) while the driver, in the normal course of doing business, is waiting to perform work or a service; and
  (C) when shutting the vehicle engine off would impede the progress of the queue and is not practicable.
  (D) Queuing does not include the time a driver may wait motionless in line in anticipation of the start of a workday or opening of a location where work or a service will be performed.

(15) "Restricted area" means any real property zoned for individual or multifamily housing units that has one or more of such units on it.

(16) "Safety or health emergency" means:
  (A) a sudden, urgent, or usually unforeseen, occurrence; or
  (B) a foreseeable occurrence relative to a pre-disclosed medical or physiological condition.

(17) "Sleeper berth" is as defined in Title 13, California Code of Regulations, Section 1265.

(18) "Vehicle" is as defined in the Vehicle Code Section 670.

Authority Cited: Sections 39600, 39601, 39658, 39614 (b) (6) (A), 39667, 39674, 39675, 42400 et seq., 42402 et seq., 42410, 43000.5 (d), 43013 (b), 43013 (h), 43018 (b), and 43018 (c), Health and Safety Code; and Western Oil & Gas Assn. v. Orange County Air Pollution Control Dist. (1975) [14 Cal.3d.411].

Reference: Sections 39002, 39003, 39027, 39500, 39600, 39650, 39655, 39656, 39657, 39658, 39659, 39662, 39665, 39674, 39675, 42400 et seq., 42402 et seq., 42403.5, 42410 Health and Safety Code; Sections 305, 336, 350, 440, 445, 545, 546, 642, 680, 21400, 22452, 22515, 27153, 43018(e), Vehicle Code; and Sections 1201,1900, 1962, 2480, title13, California Code of Regulations.

APPENDIX B

SUMMARY OF IDLING REGULATIONS IN OTHER STATES

Summary of Idling Regulations in other States July 2002

State	Citation	Vehicle Applicability	Idling Time limit	Exemptions
Arizona (Draft Ordinance)	§ 11-876	Heavy duty diesel vehicles > 14,000 lbs.	5 Minutes	▪ Emergency vehicles ▪ Traffic conditions. ▪ Need for driver to sleep in vehicle. ▪ Necessary for equipment operation, i.e. refrigeration units. ▪ Vehicle is being serviced (Repaired). ▪ Operating at idle to conform to manufacturers warm up or cool down specifications. ▪ To supply Heat/Ac for passenger comfort/safety in vehicles providing commercial passenger transportation or school purposes. ▪ Vehicle is operated solely to provide Heat/AC for driver comfort in order for driver to comply with regulations regarding sleep or rest.
California Placer County, CA	H&S 42403.5 "….any violation of section 41700 resulting from the engine of any diesel-powered bus while idling shall subject the owner to civil penalties…." Proposed Section 10.14	Diesel bus On and off-road engines	N/A 5 Min. in a one hour period	▪ 42403.5 (b) If person accused of the violation establishes by affirmative defense that the extent of the harm caused does not exceed the benefit accrued to bus passengers as a result of idling the engine. ▪ Stopped at traffic light or by peace officer. ▪ Necessary for equipment operation. ▪ For testing, servicing, repairs. ▪ To recharge batteries. ▪ *Required for operating defrosters.*
Colorado (Denver)	City Code Section 4-48	Any motor vehicles	10 Minutes in any 1 hour period	▪ Ambient air temp. < 20° F for previous 24 hours. ▪ Ambient air temp. < 10° F. ▪ Emergency vehicles. ▪ Vehicles engaged in traffic operations. ▪ Vehicle is being serviced. ▪ Takeoff power for auxiliary uses ▪ Traffic conditions.
Connecticut	Section 22a - 174-18(a)(5)	'Mobile Source ' Engine	3 consecutive Minutes	▪ Traffic conditions. ▪ Mechanical difficulties. ▪ Heating or cooling when necessary to accomplish use of mobile source. ▪ Bring up to manufacturers recommended operating temp. ▪ Outdoor temp is below 20° F.

				▪ Mobil source is being repaired. ▪ Aircraft, Locomotives, Rail Traffic, Water Vessels, Lawn mowers, Snow blowers, Small home appliances.
Connecticut (School bus policy)	Non regulatory school bus policy, Jan, 4, 2002	School bus	1) Shut off engine immediately unless leaving within 3 Minutes 1) AM start up: idle only to bring engine to operating temp. or defrost windows.	▪ To operate safety equipment. ▪ To maintain safe temperature for children with special needs. ▪ Outside temp. is below 20° F.
Georgia, City of Atlanta	Municipal Code, Part II, Chapter 150, Article IV, Section 150-97.	Trucks and buses	15 minutes on any street or public place.	▪ Vehicles where they perform work. ▪ Where forced to remain motionless due to traffic. ▪ Trucks of buses used to supply HVAC for passenger safety or comfort used for commercial passenger transport. Idling limited to 25 minutes. ▪ If ambient temperature is less than 32 ° F, idling is limited to a maximum of 25 minutes.
Hawaii	§ 11-60.1-34	All motor vehicles	'No person shall cause, suffer, or allow any engine to be in operation while the motor vehicle is stationary at a loading zone, parking or servicing area, route terminal, or other off street areas,	▪ Vehicle is being serviced (Repaired). ▪ Necessary for auxiliary equipment built onto vehicle. ▪ Loading/unloading of passengers. Not to exceed 3 Minutes. ▪ Build up of pressure / cooling down of engine. Not to exceed 3 Minutes.

Illinois	625 ILCS 5/Ch. 11 Art. XIV	All motor vehicles	"No person shall . . . permit it (a motor vehicle) to stand unattended without first stopping the engine . . .	
Maryland	§ 22-402	Motor vehicles		▪ Traffic conditions. ▪ Mechanical difficulties. ▪ Necessary for auxiliary equipment installed on vehicle. ▪ To bring vehicle up to manufacturers recommended operating temp. ▪ 'When necessary to accomplish the intended use of the vehicle'.
Washington DC	Title 20, Reg . 900.1	Diesel vehicles Gasoline vehicles	3 Minutes	▪ When auxiliary power is needed for other equipment. ▪ To operate A/C for 15 Min. on bus with 12 or more people. ▪ To operate heating equipment when local temperature is at or below 32° F.
Massachusetts	Chapter 90: Section 16A	Motor vehicles	5 Minutes	▪ Vehicle is being serviced (Repaired). ▪ Delivery vehicles in which engine power is necessary. ▪ Vehicles in operation for which associate power need is required.
Minnesota (St. Cloud)	Section 706	Motor vehicles (within specified two block area of city)	5 Minutes	N/A
Missouri (St. Louis)	Ordinance 64749 D.	Motor vehicles.	10 Minutes.	▪ Emergency vehicles.

Montana (Lewis and Clark County)	Rule 3.101	Diesel or locomotive engine operating when health department declares air quality is poor.	2 Hours in any 12 hour period.	▪ When a Board of Health variance is granted.
Nevada	NAC 445B,576	Diesel truck or bus.	15 Minutes.	▪ When a variance is issued. ▪ Emergency vehicles. ▪ Removal of snow. ▪ Used to repair or maintain other vehicles. ▪ Traffic conditions. ▪ During repair/maintenance. ▪ Emission is treated and contained by method approved by commission. ▪ Engine must idle to perform a specific task. (i.e. drilling).
New Hampshire	Env-A 1101.05	Diesel vehicle. Gasoline vehicle.	5 Minutes > 32° F 15 Minutes > -10° F and < 32° F. No limit < -10° F and no nuisance created.	▪ Traffic conditions. ▪ Emergency vehicles. ▪ Takeoff power for auxiliary uses. ▪ Vehicle is being serviced (Repaired). ▪ Operated solely to defrost windshield.

New Jersey	7:27-14.2	Diesel powered motor vehicles.	3 Minutes. 30 Minutes for permanent vehicle at business. 15 Minutes for vehicle stopped for >= 3 hours.	▪ Emergency vehicles in an emergency situation. ▪ Emergency vehicle of GVWR >18,000 pounds, transporting property on public road. ▪ Diesel bus while loading/unloading. ▪ Traffic conditions. ▪ When auxiliary powe^r is needed for other equip. or climate control. ▪ Being inspected by State/Fed inspector. ▪ Vehicle is being serviced (Repaired). ▪ Detach/exchange trailer. ▪ Light-duty diesel vehicles.
New York	§217-3.2,3.3	Diesel Bus or Truck.	5 Minutes.	▪ Traffic conditions. ▪ If reg. already exists to maintain conditions for passenger comfort. ▪ During maintenance. ▪ To provide power for auxiliary purpose. ▪ Emergency vehicles. ▪ Mining/quarrying on own property. ▪ Temp < 25° F if motionless for 2 hours. ▪ Diesel waiting to undergo a roadside emissions inspection. ▪ Hybrid electric engine charging battery.
New York City	§ 24 -163	All Motor vehicles other than legally authorized emergency vehicles.	3 minutes	• Engine used to operate loading, unloading or processing device. • Legally authorized emergency vehicel • If ambient temperature is less than 40° F (engine of a bus)

Pennsylvania (Philadelphia)	Air Management Regulation IX	Heavy duty diesel vehicles >8,500 lbs. Or Passenger carrying capacity >12	2 Minutes. 0 Minutes for layovers . 5 Minutes < 32° F. 20 Minutes < 20° F. 20 Minutes (Buses with AC and non-openable windows and > 75° F).	N/A
Texas (Houston/Galveston attainment area)	Sections 114.500 114.502,114.507, 114.509	Heavy duty gasoline or diesel motor vehicles. GVWR > 14,000 pounds.	5 Minutes April 1 through Oct 31.	▪ Traffic conditions. ▪ Vehicle is being serviced (Repaired). ▪ Solely to defrost a windshield. ▪ Power source necessary for mechanical operation other than propulsion. ▪ Airport ground support equipment. ▪ Emergency/ law enforcement vehicle. ▪ HVAC for commercial transportation or School buses. Max 30 Min. idle time. ▪ Motor vehicle used for transit operations, Max 30 Min. idle time. ▪ Owner of rented or leased vehicle not operating the vehicle.
Utah (Salt Lake City - county)	Health Department Regulation # 26 6.8	Diesel vehicle.	15 Minutes.	▪ Supplying power to a refrigeration unit. ▪ Supply HVAC to a sleeper unit. ▪ Emergency vehicles.
Virginia	§ 46.2-1224.1.	Buses when unattended, parked, or stopped.	10 Minutes.	▪ Traffic conditions. ▪ Vehicle is being serviced (Repaired). ▪ School buses. ▪ Public transit buses.

APPENDIX C

METHODOLOGY FOR ESTIMATING THE POTENTIAL HEALTH IMPACTS FROM DIESEL TRUCK IDLING OPERATIONS

Methodology

This appendix presents the methodology used to estimate the potential cancer risk from exposure to diesel particulate matter (diesel PM) from diesel truck engine idling operations. This methodology was used to assist in the development of the proposed *Airborne Toxic Control Measure for Measure to Limit Diesel-Fueled Commmercial Motor Vehicle Idling.* The assumptions used to determine the potential cancer risks are not based on diesel truck engine idling at a specific location, rather a generic (i.e. example) operating scenario was used. The source parameters selected include a broad range of possible operating scenarios. The estimated risks provide an approximate range of potential risk levels from diesel truck engine idling operations.

The methodology used in this risk assessment is consistent with the Tier-1 analysis presented in the OEHHA Air Toxics Hot Spots Program Risk Assessment Guidelines: The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments (OEHHA, 2003). The OEHHA guidelines and this assessment utilize health and exposure assessment information that is contained in the Air Toxics Hot Spot Program Risk Assessment Guidelines, Part II, Technical Support Document for Describing Available Cancer Potency Factors (OEHHA, 2003) and Part IV, Technical *Support Document for Exposure Analysis and Stochastic Analysis* (OEHHA 2000).

The cancer health risk estimates provide a "qualitative" assessment of the potential impacts due to the operation of idling diesel truck engines. The cancer health risk estimates for a particular location will depend on actual site specific parameters, including number of diesel truck engines idling at a location, diesel particulate emission rates, location of idling trucks in relation to other idling truck engines, and site meteorology. Risk will also vary depending on the distance a receptor is from the location of the idling truck engines, the duration of exposure, type of receptor (residential or worker), and the inhalation rate.

A. *Source Description*

Potential cancer health risks due to diesel truck engine idling result from emissions of diesel particulate matter (diesel PM) which is a toxic air contaminant. For these analyses, the emission sources (idling trucks) were characterized as area sources where diesel truck engines were expected to operate in the idle mode over a period of time. Sensitivity studies were done to show that the point of maximum impact showed little difference whether the idling emissions were treated as an area source or as numerous small point sources.

The area source is modeled using an elevated area release height due to the where the trucks congregate, and due to the relative location of exhaust stacks, while keeping engines idling to provide cab atmosphere comfort (powering comfort heat or air conditioning). This section describes the parameters used to model emissions from diesel truck engine idling and shows potential health risks due to these emission sources.

A diesel PM emission factor of 2.77 grams per hour (g/hr) per truck was used. This emission rate reflects the current ARB estimated average fleet emission rate. Analyses were also developed using a diesel PM emission rate of 0.3 g/hr. The 0.3 g/hr value reflects the projected 2007 and beyond model year fleet average idling emission factor. Idling of the diesel truck engines within the area source was assumed to occur 24 hours per day and 7 days per week.

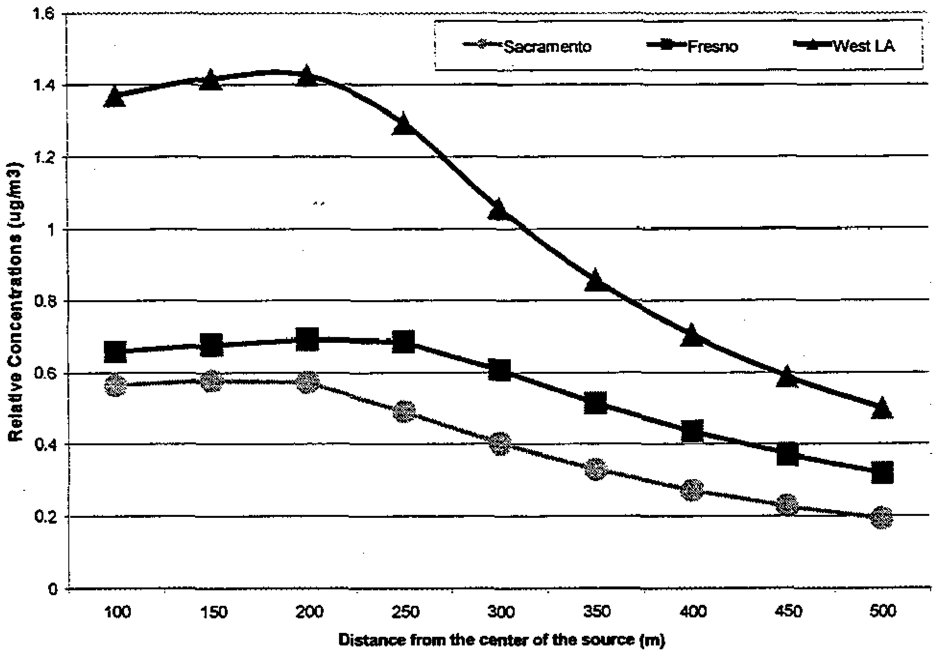
B. Dispersion Modeling Methods

The diesel PM airborne concentrations due to the diesel PM emissions from idling were estimated using the United States Environmental Protection Agency (EPA) ISCST3 version 02035 dispersion model. ISCST3 uses EPA-approved algorithms to estimate potential ambient annual average concentrations of diesel PM as a result of diesel PM emissions from area sources.

The analyses used actual meteorological data collected at the West Los Angeles meteorological site during 1981. The West Los Angeles meteorological data provides a more conservative estimate of risk than most of the other 30 meteorological data sets available to ARB because this site tends to have lower average wind speeds predominantly from the same direction resulting in less dispersion of pollutants. Other representative meteorological data reviewed for these analyses include Sacramento and Fresno. Figure C-1 shows a comparison of the relative concentration for the three meteorological data sets reviewed for this assessment.

Figure C-1

Comparison of Meteorological Data Sets Ambient Concentrations



Sensitivity studies were done to determine buoyancy and the plume height achieved due to stack gas temperature and upward velocity. The EPA screening dispersion model, SCREEN3 version 96043 was used to determine this data. The engine parameters and plume (initial release) height data used in the analyses are shown in Table C-1.

Table C-1

Dispersion Modeling Parameters

Source Type	area
Dispersion Setting	urban
Initial Vertical Dispersion Parameter (σ_z)	2.5 meters
Area Source Width and Length	320 meters
PM Emission Factor	2.77 grams/hr
Initial Release Height (from sensitivity studies)	5 meters

Polar coordinate receptors were placed at specific incremental distances from the area sources to determine the maximum off-site impacts. Receptors were placed at 50 meter increments from 100 meters to 500 meters and at 100 meter increments from 500 meters to 1500 meters.

C. Health Risk Assessment Methods

The dispersion model predicted maximum offsite concentrations were used to estimate potential cancer risk due to emissions of diesel PM. Under current OEHHA recommended risk assessment methodology, to estimate potential cancer risks, the estimated maximum annual ground level concentrations (GLCs), in micrograms per cubic meter (µg/m3), is converted to a pollutant dose. Multiplication of the average daily inhalation dose over 70 years, in milligrams per kilogram of body weight per day (mg/kg-d), with the inhalation cancer potency factor developed by OEHHA will give the inhalation cancer risk. Unit risk factors (URF), in the units of inverse concentration, (µg/m3)-1, used in previous assessments can be used for assessing cancer inhalation risk directly from air concentrations. However breathing rates, expressed in units of liters per kilogram of body weight-day coupled with the air concentrations to estimate dose in mg/kg-d is recommended for assessing cancer risks. The diesel exhaust PM inhalation cancer potency factor used for this analysis is 1.1 with units of inverse dose as a potency slope, (i.e., $(mg/kg\text{-}d)^{-1}$).

D. Health Risk Assessment Results

Table C-2 and Table C-3 present the estimated range of potential cancer health risks at nearby receptor locations due to exposures to the two diesel PM emission rates, 2.77 g/hr and 0.3 g/hr due to diesel truck engine idling. The cancer health risks are shown based on hours of diesel engine idling operations and downwind distance of the receptor. The horizontal line shaded boxes show where potential cancer risks, based on OEHHA's 95th percentile breathing rates, are greater than or equal to (≥) 100 per million. The grey shaded boxes show where potential cancer risks are less than (<) 10 per million. The unshaded boxes show where the potential cancer risk is ≥ 10 and < 100 per million.

Table C- 2

Estimated Range of Potential Cancer Health Risks (per million) due to diesel truck engines idling at one location – 2.77 g/hr

Idle Hours Per Day	Downwind distance from the center of the area source (m)																		
	100	150	200	250	300	350	400	450	500	600	700	800	900	1000	1100	1200	1300	1400	1500
100																			
150																			
200																			
250																			
300																			
350																			
400																			
450																			
500																			
600																			
700																			
800																			
900																			
1,000																			
1,100																			
1,200																			
1,300																			
1,400																			
1,500																			

Meteorological Data: West LA (1981)
Green Shading shows Cancer Risks < 10/million
Violet Shading shows Cancer Risks >/= 100/million
Annual emissions assume 52 weeks of operation

REFERENCES

OEHHA, 2000. Office of Environmental Health Hazard Assessment (OEHHA), *Air Toxics "Hot Spots" Program Risk Assessment Guidelines Part IV Technical Support Document for Exposure Assessment and Stochastic Analysis.* www.oehha.ca.gov/air/hot_spots/finalStoc.html. September 2000.

OEHHA, 2002. Office of Environmental Health Hazard Assessment (OEHHA), *Air Toxics Hot Spots Program Risk Assessment Guidelines: Part II Technical Support Document for Describing Available Cancer Potency Factors.* www.oehha.ca.gov/air/cancer_guide/TSD2.html. December 2002.

OEHHA, 2003. Office of Environmental Health Hazard Assessment (OEHHA), *The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments.* www.oehha.ca.gov/air/hot_spots/HRSguide.html. August 2003.

APPENDIX D

SUMMARY OF METHODOLOGIES FOR COST ANALYSIS

SUMMARY OF METHODOLOGIES FOR COST ANALYSIS

1. GENERAL METHODOLOGIES

A. Escalation of Auxiliary Power System (APS) & Annual Maintenance Costs

The factory cost of the Auxiliary Power System (APS Factory Cost) used to power the sleeper berth ($7,419) was obtained for base year (2004) from a survey of nine (9) manufacturers of auxiliary power units, generator sets, and hybrid systems used to power sleeper vehicles independent of the main engine. The APS purchase costs were then escalated for Phase Two (Sleeper) implementation (2009-2013) to account for inflation at the 10-Year (1994 - 2003) compound annual growth rate (CAGR) for Producer Price Index Series - Turbine & Turbine Generator Set Manufacturing (as provided by the US Bureau of Labor Statistics, Series ID PCU333611333611). This rate was determined to be 0.49% per year.

2004 APS Installation Costs are based on a professional auto service wage rate of $86 per hour and a staff determination that up to 10 hours of labor will be required for a typical installation. Thereafter, adjustment to the APS Installation Costs are based on the (1994 – 2003) average annual change in the Consumer Price Index (CPI) Wages for Los Angeles and San Francisco (as provided by the US Bureau of Labor Statistics (BLS), Series ID CWURA421SA0 and CWURA422SA0). This rate was determined to be 2.38%.

TABLE D - 1

PROJECTED APS PURCHASE AND MAINTENANCE COSTS

YEAR	APS FACTORY COSTS (1)	APS INSTALLATION COSTS (2)	APS TOTAL PURCHASE COSTS (1+2)	APS ANNUAL MAINTENANCE COSTS (3)
2004	**$ 7,419**	$ 860	$ 8,279	$ 460
2005	$ 7,455	$ 880	$ 8,335	$ 467
2006	$ 7,492	$ 901	$ 8,393	$ 474
2007	$ 7,529	$ 922	$ 8,451	$ 482
2008	$ 7,566	$ 944	$ 8,510	$ 490
2009	$ 7,603	$ 966	$ 8,569	$ 498
2010	$ 7,640	$ 989	$ 8,629	$ 506
2011	$ 7,677	$ 1,013	$ 8,690	$ 514
2012	$ 7,715	$ 1,037	$ 8,752	$ 522
2013	$ 7,753	$ 1,062	$ 8,815	$ 530

The 2004 Annual APS Maintenance Cost was obtained from Pony Pack, Inc. (a manufacturer of APS[1]) and prorated for 1,500 hours of APS use per year (estimated to be $460). Thereafter, 50% of the Annual APS Maintenance Costs were escalated for each year at the same rate of inflation as the APS (0.49%), and the other 50% of the APS Maintenance Costs were escalated at the average California labor rate of inflation (2.38%).

B. Forward Price of Diesel Fuel

The 5-Year lifetime benefit (cost savings) from a reduction in idling activity is proportionately based on the price of diesel fuel. Therefore, the 53-Week Average On-Highway Retail California Diesel Price for Week Ending (1/13/04), as reported by the U.S. Department of Energy (DOE), was used as the 2003 base price to project diesel fuel prices for individual years (2005 – 2013). The price growth forecast (projected commodity price) is based on the CAGR of the (1994 – 2003) Producer Price Index Series for Number 2 Diesel Fuel (US Bureau of Labor Statistics Series ID WPU057303). This CAGR was specifically determined to be 6.02% per year.

TABLE D- 2

PRODUCER PRICE INDEX (PPI) BASED DIESEL PRICE FORECAST

YEAR	PPI BASED DIESEL PRICE FORCAST PER GALLON
2003	$ 1.66
2004	$ 1.76
2005	$ 1.87
2006	$ 1.98
2007	$ 2.10
2008	$ 2.23
2009	$ 2.36
2010	$ 2.50
2011	$ 2.65
2012	$ 2.81
2013	$ 2.98

[1] Pony Pack, 2003. Annual Pony Pack Maintenance Costs, Wear & Maintenance, from website at www.ponypack.com/savings.htm

C. Projected Price of Truck Stop Electrification (TSE/ATE Services) Hourly Power Rate

Hourly electric power charges, and hence net cost savings from reduced idling and use of Truck Stop Electrification/Advanced Truck Electrification (TSE/ATE[2]) services is dependent on the price of wholesale industrial electric power at the TSE/ATE center. The 2003 base hourly electric power charge rate of $1.25 per hour was obtained from an IdleAire service center[3] (ATE) in Ripon, California, and is consistent with SMUD's electric power charge rate of $0.126 per kilowatt-hour for the maximum load or power consumed by installed devices on a typical truck. The 2003 base price was then escalated at the CAGR of the (1994 - 2003) Producer Price Index - Industrial Electric Power Series (as provided by the US Bureau of Labor Statistics, Series ID WPU0543). This rate was determined to be 1.24% and was applied to project hourly electric power prices at TSE/ATE for individual years (2005 – 2013).

TABLE D- 3

PROJECTED TRUCK STOP ELECTRIC POWER PRICES

YEAR	TSE/ATE PROJECTED HOURLY ELECTRIC POWER RATES
2003	$1.25
2004	$1.27
2005	$1.29
2006	$1.31
2007	$1.33
2008	$1.35
2009	$1.37
2010	$1.39
2011	$1.41
2012	$1.43
2013	$1.45

D. Costs for Driver Training & Education

Staff utilized labor market information from the Employment Development Department to derive a median hourly wage rate of $15.29 (2003) for "Truck Drivers – Heavy or Tractor Trailer" (1). This wage survey detailed average hourly wages in 22 local wage areas in California. Wages reflect those earned by workers with three years experience with the firm.

---

[2] 49er Travel Plaza, 2004. Demonstration of Truck Stop Electrification by SMUD, West Sacramento, California, January 23, 2004.

[3] IdleAireTechnologies , 2003. Input obtained from Kevin Benninger, Operations Specialist, IdleAire Technologies Corporation, Knoxville, Tennessee (Affiliate Loves Truck Stop, Rippon, California) on July 23, 2003.

The vehicle population that is affected by this proposed ATCM include all diesel-fueled commercial vehicles with a GVWR of greater than 10,000 pounds. Public and privately owned diesel transit buses are included in this applicable base. For the purposes of estimating the 5-Year lifetime costs and savings from this regulation, staff assumed that transit bus operator wages are on parity with truck driver wages. The wages were then projected for individual years (2005-2013) to determine the applicable driver training costs for that year. The adjustment to the wage rates are based on the average annual change in the (1994 – 2003) Consumer Price Index Wages for Los Angeles and San Francisco (as provided by the US Bureau of Labor Statistics, Series ID CWURA421SA0 and CWURA422SA0). This rate was determined to be 2.38% per year.

TABLE D- 4

MEDIAN TRUCK DRIVER HOURLY WAGE PROJECTIONS

YEAR	TRUCK DRIVER MEDIAN HOURLY WAGES
2003	$ 15.29
2004	$ 15.65
2005	$ 16.02
2006	$ 16.40
2007	$ 16.79
2008	$ 17.19
2009	$ 17.60
2010	$ 18.02
2011	$ 18.45
2012	$ 18.89
2013	$ 19.34

[4]http://www.calmis.cahwnet.gov/file/occup$/ccoiswages/dclaw.cfm?occupation_code=971020)

E. Savings from Reduction in Engine Maintenance

Staff assumes that owners and operators of both sleeper and non-sleeper vehicles will reap the cost benefit of reduced maintenance on the diesel engine as a result of the proposed ATCM. Therefore, staff derived an hourly estimate of this reduction in cost benefit based on truck service, maintenance, and overhaul costs information (1).

Staff assumed that heavy-duty diesel truck engines are rebuilt/overhauled at an interval of one million miles distance traveled. The cost to rebuild/overhaul the truck engine is estimated to be $15,000 (2003 dollars) (1). Furthermore, staff estimates that vehicle oil and filter changes will occur at an interval of 25,000 miles (1), and the cost to service an oil and filter change for an affected vehicle is between $170 - $370 (or an average of $270) (1). Staff also assumes that the fuel economy for a commercial diesel fueled

[4] http://www.calmis.cahwnet.gov/file/occup$/ccoiswages/dclaw.cfm?occupation_code=971020)

vehicle will vary from 7 miles per gallon for heavy heavy-duty diesel vehicles (HHDV), to 14 miles per gallon for light heavy-duty diesel vehicles. Using the methodology developed by the Truck Maintenance Councils (TMC) Recommended Maintenance Practices Manual (2004 Analysis of Costs from Idling & Parasitic Devices for Heavy Duty Trucks), staff developed a base year (2004) cost benefit, in dollars per hour of idling reduced, from reduction in engine maintenance as a result of reduced idling activities. Staff was then able to project base year cost benefits for individual year's (2005 – 2013) during which period the benefit or savings are to be estimated. To derive a benefit escalation during the years (2005 –2013), staff assumed 50% of the cost to rebuild is associated with labor, and adjusted for inflation based on the (1994-2003) Consumer Price Index Wage inflation rates for San Francisco and Los Angeles (2.38%). *Staff assumed no change in the inflation rate for parts based on the (1994-2003)* Producer Price Index data for Motor Parts (as provided by the US Bureau of Labor Statistics, Series ID WPU1412). However, staff did assume that the cost of the oil and filter change would grow at the 10-Year CAGR for the (1994-2003) Producer Price Index - Petroleum Lubricating Oils & Grease Manufacturing rate (as provided by the US Bureau of Labor Statistics, Series ID PCU324191324191). This rate was determined to be 2.35% per year. The estimated hourly savings from a reduction in idling for each vehicle category was derived for the individual applicable years (2004 – 2013) and is presented in the table below:

TABLE D- 5

PROJECTED DOLLAR SAVINGS PER HOUR FROM REDUCTION IN ENGINE IDLING

YEAR	HHDV	MHDV	UTBUS	SLEEPER
2004	$ 0.18	$ 0.18	$ 0.12	$ 0.18
2005	$ 0.18	$ 0.19	$ 0.12	$ 0.18
2006	$ 0.18	$ 0.19	$ 0.12	$ 0.19
2007	$ 0.18	$ 0.19	$ 0.12	$ 0.19
2008	$ 0.19	$ 0.19	$ 0.12	$ 0.19
2009	$ 0.19	$ 0.19	$ 0.12	$ 0.20
2010	$ 0.20	$ 0.19	$ 0.12	$ 0.20
2011	$ 0.20	$ 0.19	$ 0.14	$ 0.20
2012	$ 0.20	$ 0.19	$ 0.14	$ 0.21
2013	$ 0.21	$ 0.21	$ 0.14	$ 0.21

NOTES

(1) Truck service, maintenance, and overhaul Information was obtained from the Sacramento Truck Center, Sacramento, California, by CARB Staff Employee John Gruszecki.

(2) Information obtained from heavy-duty diesel engine and diesel vehicle manufacturers by CARB Staff John Gruszecki.

F. Diesel Vehicle Population Growth

This regulation is applicable to diesel-fueled commercial vehicles with a Gross Vehicle Weight Rating (GVWR) of greater than 10,000 pounds. The diesel vehicle population that would be affected by the proposed ATCM includes fleets of both sleeper-equipped berths and non-sleeper vehicles. The non-sleeper vehicle category includes heavy heavy-duty diesel vehicles (HHDV), medium heavy-duty diesel vehicles (MHDV), light heavy-duty diesel vehicles (LHDV), and urban transit buses (UTBUS). The estimated base year (2003) vehicle population and the vehicle population for every subsequent year thereafter was obtained from EMFAC 2002 (the California Air Resources Boards' emission factor modeling program) and is presented in the table below:

TABLE D- 6

PROJECTED DIESEL VEHICLE POPULATION GROWTH (EMFAC 2002)

YEAR	HHDV	MHDV	LHDV	UTBUS	TOTAL
1993	135,586	97,851	-	12,725	110,576
2003	170,513	166,801	-	15,345	182,146
2004	175,087	172,240	35,900	15,455	398,682
2005	179,838	177,598	36,263	15,562	409,261
2006	183,998	182,309	36,693	15,772	418,772
2007	188,356	186,905	37,148	16,101	428,510
2008	192,356	191,379	37,551	16,447	437,733
2009	196,534	195,767	37,963	16,816	447,080
2010	201,186	200,087	38,459	17,210	456,942
2011	204,532	203;814	38,882	17,529	464,757
2012	208,353	207,506	39,266	17,825	472,950
2013	212,093	211,138	39,708	18,079	481,018

Staff estimates an upper limit of 1.7 million out-of-state registered trucks operate in California every year (of which, 67,000 sleepers are in California each day). The number of out-of-state trucks comes from information given by the California Department of Motor Vehicles (DMV) detailing the number of apportioned registrations from non-California registered Class 8 trucks. The percentage of the 1.7 million out-of-state trucks that are equipped with sleeper berths is unknown. Staff further assumes that a majority of the sleepers idling will be registered as out-of-state vehicles. Staff also expects operators of out-of-state trucks (who employ an emissions control strategy such as the use of an auxiliary power system) will also utilize the emissions control strategy while out-of-state and will reap the same overall fuel and maintenance cost savings as in-state trucks by complying with this regulation.

Since the number of sleeper vehicles idling during extended rest periods in California is unknown, staff utilized the peak hour demand for commercial parking spaces along

California Interstate Highways (Federal Highway Administration report to Congress on the Adequacy of Parking Facilities, June 2002) to project a daily amount of idling that occurs in California. Using this estimate, and the net hourly cost savings per vehicle from the use of an APS, staff was able to derive an annual benefit from sleeper vehicles and also determine a minimum number of sleeper vehicles operating in California. Using information from EMFAC 2002 and truck stop field observations, staff estimates approximately 67,000 sleeper berth equipped vehicles idle during extended rest periods in California each day in 2005. Thus, 67,000 would establish a lower bound on the number of sleeper vehicles in California.

G. Other Input Parameters

In order to estimate the total costs and savings from the proposed ATCM over a lifetime or benefit period of 5 years, staff utilized the following parameters discussed below:

i. Discount and Interest Rates

Discount Rates are used to discount a future amount or payoff in time to present value. All reported costs and benefits represent the value as of December 31, 2003, or simply stated as 2003 dollars. The nominal and real (without inflation component) discount rates used in the lifetime cost-benefit analyses were provided by the Research Division of the California Air Resources Board (CARB) and are 7% and 5%, respectively. Staff does not expect long-term interest rates to change significantly over the course of the benefit estimation period (2005 –2013). Should interest rates increase significantly, then the cost savings reported in this analysis might be overstated.

The applicable interest rate for purchases of capital equipment such as auxiliary power systems (APS) was assumed to be 7%.

ii. Fuel Savings from Idle Elimination:

Staff has determined that heavy heavy-duty diesel fueled vehicles (HHDV, accompanied by a GVWR of at least 28,000 pounds) consume the greatest amount of fuel at typical idle conditions (1,000 rpm). Correspondingly, this class of vehicles stands to benefit the most from idle reduction or elimination. EPA estimates that 1.0 gallon of diesel fuel is saved by eliminating one-hour of idling at 1,000 rpm (Study of Exhaust Emissions from Idling Heavy-Duty Diesel Trucks and Commercially Available Idle-Reducing Devices, October 2002, EPA420-R-02-025). This category of diesel vehicles includes both sleeper and non-sleeper vehicles.

Other vehicle classes that will be impacted by the proposed regulation consume less fuel at idle conditions, and correspondingly save less fuel by elimination of idling. Staff has determined that medium heavy-duty diesel vehicles (MHDV, accompanied by a GVWR of at least 14,000 pounds) and urban transit buses (UTBUS, accompanied by a GVWR of at least 10,000 pounds) save 0.7 gallon per hour by eliminating idling, and light heavy-duty diesel vehicles (LHDV, accompanied by a GVWR of at least 10,000 pounds) save 0.5 gallon per hour by eliminating idling. The primary differential in fuel savings between the vehicle categories is determined by vehicle weight (GVWR) and engine size (hp). Idle operating conditions are expected to remain the same across all vehicle categories (800 – 1,000 rpm).

iii. Estimated Amount of Diesel Vehicle Idling By Category

Long haul or long duration truck drivers idle their trucks during rest periods to provide heat or air conditioning for the sleeper compartment, to keep the engine warm during cold weather, and to provide electrical power for their truck appliances. US EPA estimates (http://www.epa.gov/otaq/retrofit/idling.htm) that rest periods last from 6-8 hours per day, and over 300 days per year. Argonne National Laboratory Transportation Technology R&D Center estimates that a sleeper truck on average idles for over 1,830 hours per year (Mid-America Truck Show, March 2003). For the purposes of estimating cost benefits from a reduction in idling activity for an individual sleeper, staff has therefore conservatively assumed that a sleeper vehicle will idle for 6 hours per day, 5 days per week, and 50 weeks per year, or 1,500 hours per year.

Staff has obtained data from EMFAC/CARB Mobile Source Control Division (MSCD) that indicates that non-sleeper diesel fueled vehicles idle to a lesser extent than sleeper vehicles. It has been estimated that non-sleeper heavy heavy-duty diesel vehicles (HHDV) will idle for an estimated 36 minutes per day, 365 days per year, medium heavy-duty diesel vehicles (MHDV) will idle for an estimated 12 minutes per day, 365 days per year, and urban transit diesel buses (UTBUS) will idle for an estimated 12 minutes per day, 365 days per year. Light heavy-duty diesel vehicles (LHDV) are not expected to idle beyond the limits imposed by the proposed ATCM, and hence no benefits were estimated for this category.

2. 5-YEAR LIFETIME COST-BENEFIT ANALYSIS FOR PHASE ONE IMPLEMENTATION (2005 –2009)

Business compliance costs are determined for two phases of program (rule) implementation. Phase One will go into effect January 1, 2005, and affects heavy-duty diesel fueled vehicles with a GVWR of greater than 10,000 pounds. Phase Two will go into effect January 1, 2009, and affects heavy-duty diesel fueled vehicles equipped with sleeper berths and a GVWR of greater than 10,000 pounds.

ARB expects owners of vehicles will comply with the regulation by simply shutting off their engine after the idling time limit has been reached during Phase One implementation. The proposed ATCM is expected to significantly reduce the amount of diesel fuel used in California for the affected vehicle population as a whole, and also reduce a significant amount of particulate matter (PM) emissions as a result of an overall reduction in idling activity. It is estimated that approximately 258 million gallons of diesel fuel will be saved during the Phase One period (2005 –2009).

TABLE D- 7

ANNUAL FUEL SAVINGS (GALLONS) FOR PHASE ONE IMPLEMENTATION

YEAR	HHDV	MHDV	UTBUS	TOTAL
2005	39,384,522	9,075,258	795,218	**49,254,998**
2006	40,295,562	9,315,990	805,949	**50,417,501**
2007	41,249,964	9,550,846	822,761	**51,623,571**
2008	42,125,964	9,779,467	840,442	**52,745,873**
2009	43,040,946	10,003,694	859,298	**53,903,938**
TOTAL	**206,096,958**	**47,725,255**	**4,123,668**	**257,945,881**

Staff Assumptions:

(1) Fuel consumed during idle:
HHDV – 1.0 gal/hr
MHDV – 0.7 gal/hr
UTBUS – 0.7 gal/hr

(2) Minutes reduced idle per day (365 days per year)
HHDV – 36 min/day
MHDV – 12 min/day
UTBUS – 12 min/day

Annual fuel savings are derived from projected heavy-duty diesel vehicle population for each year during Phase One implementation, estimated hours of idle reduction per year, and the amount of fuel consumed by a particular category heavy-duty diesel vehicle at idle conditions.

Staff has also estimated that during Phase One, 166 tons of PM emissions will be removed annually from the atmosphere as a consequence of the proposed ATCM.

Although not required by the regulation, staff estimates that a typical business would allocate one hour of resources per driver for the initial training of the vehicle operator, for explaining their company's compliance strategy, and for providing any additional training specific to the use of an APS device or idle reduction technology. The cost of this training is estimated to be the median California truck driver hourly wage (apportioned to be $15.29 in 2003 dollars). Staff expects any subsequent training to be incorporated into the existing driver training and education programs (e.g. safety meetings), and be in the form of reminders.

Phase One Cost Savings: $477.43 Million:

The regulation specifies a maximum idling time limit and does not specify the specific use of any idle reduction technology or procedure (other than shutting of the engine) for compliance. Staff expects all non-sleeper vehicles to comply with the regulation by simply shutting off their engines. The amount of savings will depend on the actual amount of reduced idling that occurs. For purposes of the economic analysis, it was estimated that heavy heavy-duty vehicles (HHDV) reduced idling by 36 minutes each day, medium heavy-duty diesel vehicles (MHDV) reduced idling by 12 minutes each day, and urban transit buses (UTBUS) reduced idling by 12 minutes each day. Light heavy-duty diesel vehicles (LHDV) are not expected to benefit from idle reduction beyond the limits imposed by the regulation. All reductions are assumed to occur 365 days per year.

Table D - 8 below illustrates the annual cost savings for a 5-Year Lifetime Cost-Benefit Analysis for a vehicle in the heavy heavy-duty category (starting in 2005 with Phase One program implementation). The methodology used to calculate the 5-Year lifetime benefit of a particular vehicle is a discounted cash flow (DCF) analysis of the annual fuel and reduction in engine maintenance savings for the years 2005 – 2009. Staff does not expect a typical business owner of a non-sleeper vehicle to allocate capital equipment resources for compliance with the proposed ATCM.

TABLE D- 8

5-YEAR LIFETIME COST-BENEFIT ANALYSIS FOR A HHDV NON-SLEEPER (2005 PHASE ONE IMPLEMENTATION)

YEAR	ANNUAL FUEL SAVINGS (2)	ANNUAL ENGINE MAINTENANCE SAVINGS (3)	SUM TOTAL SAVINGS	2003 PRESENT VALUE (4)
2005 (1)	$ 410	$ 39	$ 449	$ 420
2006	$ 434	$ 39	$ 473	$ 413
2007	$ 460	$ 39	$ 499	$ 407
2008	$ 488	$ 42	$ 530	$ 404
2009	$ 517	$ 42	$ 559	$ 399
			5-Year Lifetime Benefit Per Vehicle of Proposed ATCM:	**$ 2,043**

NOTES:

(1) Staff assumes that in the first year a typical business will allocate one hour of resources for driver training & education. Expected training costs of $15.29 (2003) are not factored into the cost savings but are considered separately in Table 2 below.

(2) Annual Fuel Savings are based on a saving of 1.0 gallon per hour and a projected 2005 diesel price of $1.87 per gallon. Diesel prices are projected to increase 6% a year thereafter. For 2005, Fuel

Savings are 219 hours (36 min/day x 365 day/year) reduced idling per year x $1.87/gallon, or $410 per year.

(3) Annual Engine Maintenance Savings: Multiply the Year 2005 maintenance savings rate of $0.18 per hour by 219 of hours reduced idling per year, or $39 per year.

(4) 2003 Present Value (PV) is the discounted value on December 31, 2003, of the Annual Fuel & Engine Maintenance Savings (discounted at the nominal discount rate of 7%).

Table D - 9 below details the regulatory cost savings for the entire non-sleeper heavy heavy-duty (HHDV) fleet during Phase One implementation (2005 – 2009). An annually increasing vehicle population is used to derive the 5-year lifetime cost savings. The total lifetime benefit for HHDVs during the first five years (2005-2009) of the regulation is approximately $381.25 million.

TABLE D- 9

5-YEAR LIFETIME COST-BENEFIT ANALYSIS FOR ENTIRE HHDV FLEET (2005 - PHASE ONE IMPLEMENTATION)

YEAR	EMFAC 2002 POPULATION PROJECTION (1)	ANNUAL FUEL & MAINTENANCE COST SAVINGS PER VEHICLE	TOTAL BENEFITS	DRIVER TRAINING & EDUCATION COSTS (2)	2003 PRESENT VALUE OF NET HHDV FLEET SAVINGS (3)
2005	179,838	$ 449	$ 80,747,262	$ 2,881,005	$ 72,772,203
2006	183,998	$ 473	$ 87,031,054	$ 68,224	$ 75,956,704
2007	188,356	$ 499	$ 93,989,644	$ 73,171	$ 76,663,818
2008	192,356	$ 530	$ 101,948,680	$ 68,760	$ 77,723,703
2009	196,534	$ 558	$ 109,665,972	$ 73,533	$ 78,137,894
		5-Year Lifetime Benefit of Idling Regulation:	**$473,382,612**	**($ 3,164,693)**	**$ 381,254,322**

Notes:

(1) Populations account for fleet growth and are projected by EMFAC 2002

(2) Driver training costs assume 1 driver per vehicle and assume 1 hour of training time per driver in 2005 and only include additional drivers resulting from fleet growth in subsequent years.

(3) *The sum of Total Benefits and Driver Training & Education Costs were discounted at the nominal* discount rate of 7% for each year.

Using the same methodology, the 5-year lifetime benefits for non-sleeper vehicles other than the HHDV fleets are estimated to be $89.35 million for MHDV, ($0.57) million for LHDV, and $7.39 million for UTBUS. Table D-10 below sums up the cost and cost savings for all four vehicle categories (UTBUS, LHDV, MHDV, HHDV), and results in a total lifetime cost savings of $477.43 million in 2003 dollars for Phase One (2005-2009). The LHDV analysis is not cost positive because staff assumes no idling reduction from this category but still assumes driver training will be needed.

TABLE D- 10

TOTAL REGULATORY 5-YEAR LIFETIME COST-BENEFIT ANALYSIS (2005-2009 PHASE ONE IMPLEMENTATION)
Yearly Cost & Cost Savings by Vehicle Class and Year

YEAR	HHDV	MHDV	LHDV	UTBUS	2003 PV
2005	$ 72,772,203	$ 15,432,768	$ (543,945)	$ 1,279,575	$ 88,940,601
2006	$ 75,956,704	$ 18,244,628	$ (6,020)	$ 1,512,338	$ 95,707,650
2007	$ 76,663,818	$ 18,397,997	$ (6,370)	$ 1,520,103	$ 96,575,548
2008	$ 77,723,703	$ 18,629,599	$ (5,239)	$ 1,538,785	$ 97,886,848
2009	$ 78,137,894	$ 18,648,545	$ (5,356)	$ 1,542,025	$ 98,323,108
TOTAL (2003)	**$ 381,254,322**	**$ 89,353,537**	**$ (566,930)**	**$ 7,392,826**	**$477,433,755**

3. 5-YEAR LIFETIME COST-BENEFIT ANALYSIS FOR PHASE TWO (SLEEPER) IMPLEMENTATION (2009 –2013)

Phase Two of the proposed ATCM is expected to go into effect January 1, 2009, and affects all heavy-duty diesel fueled vehicles equipped with sleeper berths, and a GVWR of greater than 10,000 pounds. The cost-benefit methodologies for Phase Two (Sleeper) implementation are the same as the methodologies used to calculate costs-benefits for Phase One, with the exception that the discounted cash flow analysis (DCF) involves the additional purchase (annual capitalization costs) and maintenance costs of the auxiliary power device.

<u>Phase Two Cost Savings: $97.5 Million</u>

Phase Two, which limits idling of trucks and the operation of diesel-fueled auxiliary power systems during extended rest periods, will be implemented starting January 1, 2009. Staff expects a wide range of strategies to supply power to the sleeping berth to be implemented depending on the individual needs of the driver. A truck driver may employ any strategy he/she chooses so long as he/she complies with the regulation. Strategies include shutting off the engine when weather conditions allow, staying in a hotel room, purchase and installation of battery packs, non diesel-fueled auxiliary power systems, and the use of truck stop electrification services. Also, ARB staff intends to return to the Board in 2005 to establish procedures and specifications under which diesel-fueled APS units would be allowed to operate beyond January 1, 2009. There are many compliance alternatives with costs ranging from less than one hundred dollars to many thousands of dollars. Because it is not known to what degree different strategies will be chosen, staff chose to provide cost-benefit economic analysis assuming all sleepers will be equipped with an APS and assumes the costs of an APS will be a realistic average cost of compliance. However, staff expects not all trucks will install an APS (~$8,600) and many will choose less expensive alternatives and the economic cost-benefit analysis is expected to under-estimate the costs savings of the regulation.

Cost savings are generated by the reduction of main engine idling during extended driver rest periods. In order to provide power to the sleeper berth, and for the purposes of this economic analysis, staff assumes vehicle operators will install and operate an auxiliary power system (APS). Staff also assumes that a vehicle owner or operator will finance the purchase of the installation over a period of five years.

Table D -11 below shows an example of the cost analysis for a sleeper truck installing an APS in 2009. An APS is projected to cost $8,569 in the Year 2009 (equipment and installation) and is expected to use one-fifth the fuel of an idling main engine.

Main Engine: 1.0 gal/hr
APS: 0.2 gal/hr

Factoring in APS costs, training costs, fuel savings, and maintenance savings, staff has determined that an average sleeper truck that idles 1,500 hours per year will realize a payback period of 3-5 years, and a net 5-year cost savings of $1,562 (2003 dollars).

The methodology used to calculate the 5-Year lifetime benefit of a particular vehicle is a discounted cash flow (DCF) analysis of the annual fuel and reduction in engine maintenance savings, less APS capitalization and maintenance costs, for the years 2009 - 2013.

TABLE D- 11

EXAMPLE: 5-YEAR LIFETIME COST-BENEFIT ANALYSIS FOR THE PURCHASE OF AUXILIARY POWER SYSTEM (APS) FOR SLEEPER BERTH EQUIPPED VEHICLES

Year 2009 APS Purchase	APS (2) Annual Capital-ization	Annual Fuel Savings (3)	Annual Engine Maintenance Savings (4)	APS Maintenance Costs (5)	Sum Total Of All Cash Flows	2003 Present Value (6)
2009 (1)	($2,090)	$ 2,832	$ 300	$ (498)	$ 544	$ 196
2010	($2,090)	$ 3,000	$ 300	$ (506)	$ 704	$ 255
2011	($2,090)	$ 3,180	$ 300	$ (514)	$ 876	$ 312
2012	($2,090)	$ 3,372	$ 315	$ (522)	$1,075	$ 374
2013	($2,090)	$ 3,576	$ 315	$ (530)	$1,271	$ 425
					5-Year Lifetime Benefit of APS Purchase:	**$ 1,562**

NOTES:
1. Start of Phase Two (2009).
2. APS costs $8,569 in 2009 and is capitalized over 5 years at a rate of 7%. $2,090 is the annual amortized cost of the APS (5-Year Schedule) and is derived from the following equation:

Annual Amortized Cost (A) = Principal (P) x [(r)*(1+r)^n/(1+r)^n – 1], where "r" is the interest rate per period, and "n" is the number of payments to be made.

3. Fuel Savings are based on savings of 0.8 gallon per hour (1.0 gal/hr main engine – 0.2 gal/hr APS) and a projected 2009 diesel price of $2.36 per gallon. Staff estimates an average sleeper will reducing idling during rest periods by 1,500 hours / year.
4. Reduction in Engine Maintenance Savings (Year 2009) was estimated to be $0.20 per hour.
5. APS Maintenance Costs were obtained from Pony Pack, Inc. for 2003 and projected for estimated APS use in the Year 2009.
6. 2003 Present Value is the discounted value on December 31, 2003, of the Annual Fuel & Maintenance Savings (discounted at the applicable rate).

There is no information detailing the actual number of sleeper vehicles operating, and their related idling patterns, in California. To compute a minimum cost savings for the entire sleeper fleet population, staff derived an estimated daily amount of idling that would be reduced in California based on the number of parking spaces and space usage data in a Federal Highway Commission (FHC) study. Staff was then able to calculate an estimated annual cost benefit from a reduction in idling in California.

Since the amount of reduced idling by sleepers during Phase Two is stated in hours idling reduced per year, staff determined the cost savings on an hourly basis for an average sleeper using an APS. Staff then multiplied the result by total fleet hours idling reduced in California to get total annual cost savings for the sleeper fleet. Similar to the cost savings methodology detailed in Table D-11 (which is calculated yearly), staff determined all costs and cost savings on an hourly basis (Table D-12)

Table D -12 Methodology:

- All hourly costs and cost savings are grown by individual sector inflation components to determine the hourly costs and cost savings for each year (2009 – 2013).
- The 'Net Present Value of Hourly Benefit of Operating an APS' is the sum of all the hourly cost and cost saving components by year.
- The 'Estimate Total Annual Benefit of Idle Reduction' is the product of the hourly benefit and the idling hours reduced by day. The result is then multiplied by 365 to get the yearly cost savings.
- 'Estimate Total Annual Benefit of Idle Reduction' states the total annual benefit in 2003 dollars.

TABLE D-12

ANNUAL SLEEPER / APS COST SAVINGS DURING PHASE TWO (2009 – 2013)

	2009	2010	2011	2012	2013
Hourly Amortized Cost of APS ($/Hour) (1)	$ (1.3467)	$ (1.3561)	$ (1.3657)	$ (1.3754)	$ (1.3853)
Hourly Fuel Savings (Fuel Savings Less APS Fuel Consumption - $/Hour)	$ 1.8880	$ 2.0000	$ 2.1200	$ 2.2480	$ 2.3840
Hourly Savings from Reduction in Engine Maintenance ($/Hour)	$ 0.2000	$ 0.2000	$ 0.2000	$ 0.2100	$ 0.2100
Hourly Cost of APS Maintenance (Pony Pack) ($/Hour)	$ (0.3320)	$ (0.3373)	($ 0.3427)	$ (0.3480)	$ (0.3533)
Driver Training (2)	-	-	-	-	-
Net Present Value of Hourly Benefit of Operating an APS	$ 0.4093	$ 0.5066	$ 0.6116	$ 0.7346	$ 0.8554
Estimate of Truck Idling Hours Per Day Reduced(3)	**244,710**	**240,478**	**236,901**	**231,731**	**226,561**
Estimate Total Annual Benefit of Idle Reduction	$25,039,951	$ 30,456,539	$ 36,222,163	$ 42,557,398	$ 48,450,070
2003 NET PRESENT VALUE OF ANNUAL APS COSTS SAVINGS (4)	$14,755,524	$ 17,221,351	$ 19,576,551	$ 22,084,312	$ 23,865,709
Total 2003 Phase Two Savings:	**$97,503,447**				

NOTES:

1. Assume that the APS is capitalized in the first year of purchase (2009) for five years at the nominal interest rate of 7%.
2. Driver training component was not included in the overall sleeper costs savings analysis (Table 4) because the actual number of affected sleeper berth equipped vehicles is not known. The estimated range of affected sleeper vehicles is from 67,000 to 1.7 million. While the regulation does not specifically mandate training, staff expects training will be implemented. Training is estimated to take an hour and cost approximately $15 per driver.
3. Derived by staff from a Study of Adequacy of Parking Facilities, FHC, Report to Congress, June 2002, Projected for Years 2009 - 2013.
4. APU prices essentially have a zero inflation component. As a result, future cash outflows were discounted to present value (2003) at the real discount rate of 5%. All other costs, which have inflation components, and savings, are discounted to present value (2003) at 7%.

Cost savings for the sleeper fleet during the lifetime of the cost benefit analysis (2009 - 2013) is estimated to be approximately $97.5 million.

4. SUMMARY OF TOTAL REGULATION COSTS AND BENEFITS

A. Implementation Cost to The State of California

The ARB will be primarily responsible for enforcement. Occasionally the services of the California Highway Patrol may be utilized for assistance. Any CHP costs are expected to be minor and either reimbursed from the ARB or absorbed within CHP's operating budget.

The ARB is expected to be able absorb enforcement costs within existing budgets and resources. CARB also estimates that $25,000 will be needed for public outreach efforts (to design, reproduce, and distribute informational material during the first year).

B. Summary of Total Benefits to Business & Industry from Proposed ATCM

A summary of the total cost savings to Business and Industry from the Proposed ATCM for the 5-Year lifetime (benefit analysis period) is presented in Table D -13 below. Since all values are reported in 2003 dollars, we can conclude that the Proposed ATCM will yield a net cost savings to business and industry of $575 million over the 5-Year lifetime (benefit analysis period).

TABLE D-13

SUMMARY OF 5-YEAR LIFETIME COST SAVINGS FROM PROPOSED ATCM

5-YEAR (2005 - 2009) LIFETIME BENEFITS FOR PHASE ONE	
NON-SLEEPERS, HHDV	$381,254,322
NON-SLEEPERS, MHDV	$89,353,537
NON-SLEEPERS, LHDV	($566,930)
NON-SLEEPERS, UTBUS	$7,392,826
TOTAL PHASE ONE (2005 –2009):	**$477,433,755**
5-YEAR (2009 - 2013) LIFETIME BENEFITS FOR PHASE TWO	
TOTAL PHASE TWO (2009 - 2013), SLEEPERS	**$97,503,447**
TOTAL PHASE ONE & TWO COST SAVINGS (2003):	**$ 574,937,202**

REFERENCES

Employment Development Department, Labor Market Information. http://www.calmis.cahwnet.gov/file/occup$/ccoiswages/dclaw.cfm?occupation_code=97 1020)

Pony Pack, 2003. Annual Pony Pack Maintenance Costs, Wear & Maintenance, Accessed from website at www.ponypack.com/savings.htm

49er Travel Plaza, 2004. Demonstration of "Truck Stop Electrification" by SMUD, West Sacramento, California, January 23, 2004.

IdleAire Technologies, 2003. Input obtained from Kevin Benninger, Operations Specialist, IdleAire Technologies Corporation, Knoxville, Tennessee (Affiliates Loves Truck Stop, Ripon, California) on July 23, 2003.

Linda Gaines, 2003. "Don't Idle your Profits Away", Mid-America Truck Show, March 2003, Argonne National Laboratory, Transportation Technology R&D Center.

U.S. EPA, 2002. Study of emissions from idling Heavy-duty diesel trucks and commercially available idle-reducing devices. EPA420-R-02-025, October 2002.

U.S. EPA, 2003. Impacts of truck idling on air and fuel consumption, EPA420-F-03-002. February 2003.

APPENDIX E

ALTERNATIVES TO PRIMARY ENGINE IDLING

Alternatives to Primary Engine Idling

When the second phase of the Proposed ATCM takes effect, on January 1, 2009, operators of heavy-duty, diesel-fueled vehicles equipped with sleeper berths will need to consider an alternative to idling the primary engine. An alternative supply of power may be necessary for cab heating and cooling, engine heating, and operating on-board accessories when simply shutting off the engine is not practical. Commercially available alternatives include electronically controlled idle limiters for the main engine, diesel-fired heaters, auxiliary power systems, on- and-off board truck stop electrification, and other miscellaneous devices and software modifications.

A significant amount of idling of heavy-duty diesel vehicles can be eliminated by using currently available alternatives.

A. ELECTRONICALLY CONTROLLED IDLE LIMITERS

Idle limiting devices are software based idle limit controls. They include idle shutdown timers and automatic stop-start systems.

1. Idle Shutdown Timers

Idle shutdown timers are standard features in most modern electronically controlled heavy-duty engines. The system is built into the engine's electronic control software and enables the engine to shutdown automatically if it is left to idle for more than the programmed time. For example, the system can be programmed to shutdown automatically between 2 to 100 minutes in engines made by Detroit Diesel Corporation (DDC), between 2 to 1440 minutes in engines made by Cummins Inc., and 3 to 60 minutes in engines made by Caterpillar Inc. The system can also electronically turn off the ignition to avoid battery discharge that may occur if accessories such as lights and/or the radio, were left in the "on" position during engine shutdown.

2. Automatic Stop-Start Systems

Automatic stop-start systems are predominantly comprised of additional engine software controls that automatically stop and restart the engine as necessary to maintain the engine and cab/sleeper berth temperatures~~,~~ and battery voltage within pre-set limits. Currently several manufacturers, including DDC, Cummins Inc., Caterpillar Inc., and Mack Trucks Inc., offer this feature as a factory option. To date, DDC alone has over 75,000 of these systems installed on its engines nationwide. For safety purposes, the system only works when the parking brake is engaged with the transmission in neutral, the hood engine/compartment closed, and the ignition key in the "on" position. The system is disabled by turning off the ignition or when the vehicle is being driven. An "engine only" mode or a "cab comfort" mode are available. The "engine only" mode monitors engine oil temperature and battery voltage, while the "cab comfort" mode includes monitoring of engine mode parameters as well as sleeper berth temperature. In the cab comfort mode, a thermostat located inside the sleeper berth monitors the inside temperature and sends a signal to the electronic control module (or in some cases a separate control module) when to stop and restart the engine to maintain the sleeper berth temperature in the desired range. The system includes a sensor for monitoring the outside ambient temperature so that under extreme ambient conditions the engine runs continuously.

The amount of idling reduced by the automatic stop-start system varies. Among the major factors influencing the amount of engine run time are the ambient temperature and humidity, drivers preferences of temperature settings, power needs to operate on-board accessories, efficiencies of air conditioning systems, and insulating capabilities of the floor and the sleeper walls. The system does not add weight to the truck and does not require separate maintenance.

A frequently cited drawback of this system is the discomfort it causes to the sleeping driver during the periodic stop and restart of the engine. However, to minimize driver discomfort, the technology has been developed such that the engine speed slowly increases during start-up and slowly decreases before shutdown. Also, this technology still requires the inefficient use of the vehicle engine to meet ancillary needs. Depending on truck manufacturer, the system retails from $800 to $1,200.

B. FUEL-FIRED HEATERS

Fuel-fired heaters provide heat to the cab/sleeper berth and/or to preheat the engine block for easy engine start-up during cold weather. Different models exist for a variety of applications. They run 20 or more hours on a gallon of diesel fuel and typically use the fuel from the truck's fuel tank. The units are relatively small, inexpensive, and consume much less fuel than an idling diesel engine. Diesel fired heating systems provide cab and sleeper heat without idling the trucks. These heaters raise the temperature gradually and evenly. By tapping into the fuel and power supply of the vehicle they avoid the need for external hook ups and can operate anywhere.

The benefits include safety, reliable cold weather starting with no electrical plug-ins, and a warm cab and sleeper without idling the engine. A report by the U.S. EPA shows that diesel fuel-fired heaters reduce NOx emissions by approximately 99 percent and fuel consumption by 50 to 80 percent (U.S. EPA, 2002). The drawbacks of this technology are its inability to provide cooling and its use of the truck's battery power for operation. The cost of fuel-fired heaters ranges from $1,000 to $3,000 per unit (U.S. EPA, 2003).

C. AUXILIARY POWER SYSTEMS

Auxiliary power systems are truck mounted devices that provide electrical, thermal, or mechanical power for some or all of the options that would normally require the truck engine to idle. These devices include Auxiliary Power Units (APU), fuel cells, and battery packs.

1. Auxiliary Power Units

An APU uses a small compression ignition internal combustion engine powering a generator/alternator. The APU may also be equipped with air conditioning unit for cooling the sleeper berth. Often the APU provides electrical power or thermal energy through heat exchangers to heat the sleeper berth and heat to the engine for cold weather starting. The APU may also provide 12-volt DC electrical power to charge the batteries and AC power for on-board accessories such as televisions, microwaves, and computers. The APU typically uses fuel from the vehicle's fuel system. The fuel consumption of diesel fueled APUs range between 0.08 to 0.3 gal/hr (Stodolsky et al., 2000). This is a significant fuel savings compared to the vehicle's engine idling fuel consumption rate of about a gallon or more per hour. NOx emission reductions are also significant ranging up to 70 percent less than the idling primary engine (U.S. EPA, 2002). The drawbacks are their initial cost, additional weight, and maintenance requirements. The cost for an APU averages $8,600.

2. Fuel Cells

An auxiliary power system that has a promising future in eliminating truck idling emissions is the fuel cell. A fuel cell produces electricity by converting the chemical energy of fuel directly to electrical power in a controlled chemical reaction. Fuel cells are clean and efficient. They can provide sufficient power to heat or cool a cab/sleeper compartment and run on-board electrical equipment. Recently, researchers measured the emissions, fuel economy benefits and demonstrated the feasibility of a hydrogen proton exchange membrane (PEM)[1] fuel cell in a Freightliner class 8 truck sleeper cab.

Fuel cells are expected to be commercially viable within ten to fifteen years. However, technical and economic issues, such as availability and infrastructure of a suitable fuel, the production costs of the units, and integration of the units with other on-board truck systems need to be overcome before these systems can become cost-effective for commercial truck operators. While there are technical and economic issues that need to be addressed before these systems become commercially available, this technology holds promise to improve the air quality by reducing emissions.

3. Battery Packs

Manufacturers have developed on board systems for cooling and heating long-haul vehicles without the need to idle the main engine or operate an auxiliary diesel engine. Such systems combine a fully independent air-conditioning system designed to work independently of the main engine. They also include a control system and a power source.

[1] Institute of Transportation Studies, University of California, Davis. Diesel Truck Fuel Cell APU. October 2003 www.its.ucdavis.edu/hfcv_openhouse/programspotlights/DieselAPU.pdf

The air conditioning system weighs about 70 pounds and the heating system has a weight of approximately 8 pounds. The self-contained power system includes two deep cycle batteries and has a capacity of 220 amp-hours. The system can be operated up to 10 hours and has a battery life of over two years. The batteries are fully charged after 4-6 hours of main engine operation. The entire system has a total weight of 210 pounds including the two batteries and can be installed under the bunk bed in the sleeper berth.

The estimated cost of this system is $ 3,500. The drawback of this system is that it may not fully meet the ancillary power needs of the sleeper berth.

D. TRUCK STOP ELECTRIFICATION

The development of an electrical power infrastructure is another option to reduce engine idling emissions. This technology provides trucks with AC electrical power to run the air conditioning, heating, and ancillary appliances. Truck stop electrification (TSE) refers to an independent electrical system that provides a vehicle with an alternate source of power eliminating the need to idle the primary engine.

1. On-Board Truck Stop Electrification[2]

The on-board TSE system is an independent system that may supply power without modifying the vehicle or may require that the vehicle comes equipped with three essential components:

- An inverter to charge the truck batteries from grid supplied electricity and to convert the truck batteries' 12-volt DC to 120-volt AC power for all ancillary appliances. Currently, Freightliner, Volvo, and International offer AC power inverters, which are built into the truck as a factory option.

- An electrical HVAC (heating, ventilation, and air conditioning) system to provide heat and air which is powered by electricity.

- Hardware to plug into the electrical outlet.

For the truck stop operator, on-board TSE requires an outlet for the vehicle to plug into. The truck stop operator would regulate its use and charge a fee for the use of this service. A few truck stops currently provide outlets for use. If no electrical outlet is available, battery power can be used to operate the HVAC on some systems.

TSE requires that rest and truck stops be equipped with electrical outlets throughout the parking spaces and that trucks be equipped with inverter-chargers, electrical power connections, and electrically driven air conditioning units.

---

[2]. Truck Stop Electrification EPA-OTAQ-Voluntary Programs -SmartWay Transport. www.epa.gov/ptaq/retrofit/f03020.htm

The drawbacks of this system include the high initial truck stop infrastructure cost, cost for equipment add-ons to trucks, and its availability, which is currently limited to very few truck stops. The cost for inverter/chargers is approximately $1,400 per truck and an AC operated air conditioning unit is approximately $1,350 per unit. A truck stop electrification infrastructure installation cost is approximately $4,000 per truck parking space.

2. Off-Board Truck Stop Electrification

Another truck stop electrification system, which does not require truck modification, has been recently introduced into the market place. The system consists of a structure above the parking spaces with a HVAC unit for each space attached. The system provides 110-volt AC electrical power for on-board appliances, an externally mounted, individual thermostatically-controlled, heating and air conditioning unit, and hook-ups for basic telephone, internet, and television (access to cable/satellite) services at each truck parking space.

The unit is connected to the truck through a console mounted to the truck window using a template insert. The console contains all the necessary connections and controls, including a card reader for the billing system.

Currently, the basic services cost about $1.25 to $1.50 per hour. The drawbacks are the infrastructure installation and maintenance costs, availability is limited to a small fraction of truck stops, and the need for significant government subsidies for more rapid implementation. The potential for diminished parking capacity due to infrastructure space demands may also pose additional issues for truck stop owners and operators. The infrastructure cost is approximately $10,000 per parking space and may vary depending on the number of parking spaces installed.

E. MISCELLANEOUS

For certain drivers who infrequently require sleeping or resting accommodations, additional alternatives to idling may include turning the engine off when weather allows, and staying at hotels or motels. Additionally, equipping the sleeper berth with more insulating blankets may eliminate the need for idling during some inclement weather.

Summary

There are several technologies available to reduce or eliminate idling the primary truck engine for driver comfort in sleeper berths. Table E- 1[3] below provides a comparison of the technologies and estimated cost benefits.

Table E - 1

Technologies and Estimated Cost Benefits

Technology	Initial Cost	Op. charge	Fuel* Saving	Maintenance Saving/yr
Direct fired Heater [1]	$ 1-2K per unit	0	$1,152	$513
Automatic Engine Idle	$ 1-2K per unit	0	$ 1,350	$ 1, 056
APU	$ 5-7 K per unit	0	$ 2,880	$ 1,339
TSE (on-board)	$ 2.5K per parking spot, $ 2.5 K per truck modification	$ 1.00 - 1.50 per hr per truck	$ 3,660	$ 1,539
TSE (off-board)	$ 10K per parking space	$ 1.00 - 1.50 per hr per truck	$ 3,600	$ 1,539

* fuel savings / yr at $ 1.66/gal of diesel (projected price)
[1] Technology can operate to provide heat in cold weather

Table E-2[4]

Comparison of Benefits and Drawbacks of Various Technologies

Technology	Benefits	Drawbacks
Automatic start/stop	Intermittent services anywhere	Uses main engine, noise disrupts rest
Direct fired heater	Heat anywhere , small size and not expensive	Cannot supply cooling, requires battery power
Auxiliary power unit	HVAC and power anywhere	Heavy, large size, more expensive than heater
Truck stop electrification	HVAC and power	Not fully commercial and only available at limited locations

[3] Clean Air Technologies. Alternatives to Idling, August 2003. www.fhwa.dot.gov/environment/cmaqpgs/tseatach.htm

[4] Taken from Technology Options to Reduce Truck Idling. Stodolsky Frank;, Gaines. Linda;, and Vyas. Anant. March , 2001. Argonne National Laboratory, Transportation Technology R&D Center. www.transportation.anl.gov/pdfs/TA/74.pdf

REFERENCES

Institute of Transportation Studies, University of California, Davis. Diesel Truck Fuel Cell APU. October 2003
www.its.ucdavis.edu/hfcv_openhouse/programspotlights/DieselAPU.pdf

U.S. EPA. (2002). Study of Exhaust Emissions from Idling Heavy-Duty Diesel Trucks and Commercially Available Idle-Reducing Devices. EPA420-R-02-025, October 2002.

U.S. EPA. (2003). Currently Available Idle Reduction Technologies.
Accessed: November 20, 2003. (http://www.epa.gov/otaq/retrofit/idlingtech.htm)

Truck Stop Electrification EPA-OTAQ-Voluntary Programs -SmartWay Transport.
www.epa.gov/ptaq/retrofit/f03020.htm

Stodolsky, F., L. Gaines, A. Vyas. Analysis of Technology Options to Reduce the Fuel Consumption of Idling Trucks. Argonne National Laboratory. ANL/ESD-43. June 2000.
www.transportation.anl.gov/pdfs/TA/15.pdf

Clean Air Technologies. Alternatives to Idling, August 2003.
www.fhwa.dot.gov/environment/cmaqpgs/tseatach.htm

Technology Options to Reduce Truck Idling. Stodolsky Frank;, Gaines. Linda;, and Vyas. Anant. March , 2001. Argonne National Laboratory, Transportation Technology R&D Center.
www.transportation.anl.gov/pdfs/TA/74.pdf

APPENDIX F

MOTOR VEHICLES IDLING EMISSION ESTIMATES

MOTOR VEHICLES IDLING EMISSION ESTIMATES

This appendix provides an overview of the vehicle classes potentially impacted by the Proposed ATCM. It also includes an estimate of pollutant emissions resulting from unnecessary general idling and primary engine idling during prolonged rest periods. Further, this chapter provides estimates of the emission reductions expected from implementing the Proposed ATCM.

A. Estimation of Vehicle Idling Emissions

Affected Vehicles

The focus of the Proposed ATCM is the reduction of unnecessary idling of commercial and publicly owned diesel-fueled commercial motor vehicles with a gross vehicular weight rating (GVWR) greater than 10,000 pounds. The heavy-duty diesel vehicle classification can be segregated into heavy, heavy-duty diesel vehicles (HHDDV) (GVWR greater than 33,000 pounds), medium heavy-duty diesel vehicles (MHDDV) (GVWR between 14,001 and 32,999 pounds) and light heavy duty diesel vehicles (LHDT-2) (GVWR between 10,000 and 14,000 pounds). Examples of vehicles affected include, but are not limited to delivery trucks, trash trucks, bulk hauling trucks, cargo tankers, utility trucks, tour and urban buses, and construction vehicles.

The Proposed ATCM does not apply to motor homes. Motor homes typically use on-board generator sets to provide electrical power when the vehicle is parked for any length of time to save fuel and reduce noise and vibration. Therefore, the primary diesel engine is not normally used while the motor home is parked. School bus idling is already regulated under the "Airborne Toxic Control Measure to Limit School Bus Idling and Idling at Schools."

The population of heavy-duty vehicles ranges widely in age from new model year vehicles to pre-1975 vehicles. Trucks used for interstate commerce tend to be much newer (post 1994) due to the demands placed on the vehicle from extensive travel. Many of these vehicles are equipped with sleeper berths that include ancillary devices such as computers, televisions, and microwave ovens to provide driver comfort and safety during federally mandated rest periods. It should be noted that sleeper berths are assumed to be installed only on trucks classified as HHDDVs, but not all HHDDVs are so equipped.

Number of Affected Vehicles in California

The estimated vehicle populations operating in California that will be affected by the Proposed ATCM were obtained from EMFAC2002 v2.2 (EMFAC2002) and are as follows:

Table F-1

Projected Vehicle Population Distribution

	2000	2005	2009
HHDDV	157,877	179,838	196,534
MHDDV	149,452	177,598	195,767
LHDV-2	15,143	36,263	16,816
Buses*	33,496	15,562	37,963
Total	355,968	409,261	447,080

*excluding school buses

These vehicle populations include both in-State and out-of-State vehicles operating in California. According to EMFAC 2002, the out-of-state population accounts for about 25 percent or roughly 102,000 (based on 2005 projections), of all such vehicles in California. Of these, approximately 67,000 typically idle for extended rest periods in California each day. Staff assumed California registered sleepers would typically be used for interstate commerce outside of California and therefore any emissions contribution would be negligible. Table F-2 presents the portion of the aforementioned total population that idle the primary engine during prolonged driver rest periods.

Table F-2

Total Projected Daily Sleeper Population

2000	2005	2009
58,467	67,221	73,432

Estimated 2005 Vehicle Idling Times

Heavy-duty diesel vehicles in California operate a significant amount of the time at idle. Based on data collected using global positioning satellite data loggers (Battelle, 1999; JFA, 2002) and information obtained from a report by the United States Department of Energy (Stodolsky et al., 2000), staff estimated average unnecessary general idling times. A summary of unnecessary idling times by class are presented in Table F-3.

Table F-3

Average Unnecessary Idling Times by Affected Vehicle Class

Vehicle Class	Average Unnecessary General Idling Times
HHDDV	0.7 hour per day
MHDDV	0.3 hour per day
LHDT-2	0.0 hour per day
Bus	0.3 hour per day

The data listed in Table F-3 reflects only the unnecessary idling that will be addressed under the Proposed ATCM and does not include idling time for sleeper extended idling. Sleeper idling is addressed later in this appendix.

The reasons for general vehicle idling vary greatly. Drivers often operate their engines at idle to provide cab climate control, to keep the engine oil warm to avoid cold-start problems during winter months, to produce electrical power to operate appliances, or simply out of habit. According to a pilot survey on truck idling trends conducted in Northern California, the majority of the drivers run their engines at idle mainly for heating (67 percent) or air conditioning (83 percent) purposes (Brodrick et al., 2001). It should be noted that some drivers operate both heating and air conditioning during the course of a day due to changing weather conditions.

Estimated 2005 General Vehicle Idling Emissions

To establish baseline emissions (i.e., emissions prior to the reductions anticipated from the Proposed ATCM), staff segregated emission estimates into four major categories: HHDDV, MHDDV, LHDT-2, and tour/urban buses (buses). The following illustrates how vehicle idling emissions for 2005 were developed.

Table F-4 presents the average fleet emission factors used for the different vehicle categories in estimating 2005 emissions. Staff conservatively assumed that general idling emissions occurred when vehicles were not necessarily (on average) operating heaters, air conditioners, or ancillary equipment. Therefore, staff applied emission factors obtained when the engines were not under any load. The emission factors were used along with the 2005 population and the average unnecessary idling time for each vehicle category to calculate emissions. These emissions are summarized in Table F-5 and are estimated to be 208 tons per year (tpy) of PM in 2005. NOx emissions from unnecessary general idling were estimated to be 6,573 tpy in 2005.

Table F-4

Idle Emission Factors without Accessory Load

Category -Year	PM (g/hr)	NOx (g/hr)
LHDT-2-2005	1.74	80.7
All Others-2005	2.82	88.9

Table F-5

Unnecessary General Idling Emissions for 2005

Category	Population	hr/day Idling	PM (tpy)	NOx (tpy)
HHDDV	179,838	0.7	143	4,501
MHDDV	177,598	0.3	60	1,905
LHDT-2	36,263	0.0	0	0
Buses	15,562	0.3	5	167
Total	409,261		208	6,573

Estimated 2005 Sleeper Idling Emissions Methodology

Data on the number of in-State and out-of-State trucks that idle during prolonged rest periods in California are not readily available. Through utilization of California DMV, Caltrans, and internal survey data, staff estimated that approximately 67,000 sleepers may operate in California during any given day.

In this Staff Report: Initial Statement of Reasons, truck and rest stop parking spaces are referred to as designated spaces. Other areas typically used for extended rest periods include highway off ramps, public streets, and locations at or near distribution points. These are referred to in this Staff Report: Initial Statement of Reasons, as undesignated spaces. To estimate emissions from trucks parked at designated and undesignated spaces, two approaches were developed and are described below.

Designated Spaces

To estimate the number of trucks parked at designated spaces. Staff assumed that some reduction of idling emissions from prolonged rest periods would occur through the use of on- and off-board truck stop electrification devices (TSE). Based on staff's estimate of TSE development progress, staff assumed that about 10 percent of the available designated parking spaces would be equipped with TSE by 2009 and adjusted the data accordingly.

Using growth trends from EMFAC2002, the ARB staff estimated that between 5 and 10 percent of the 2009 HHDDVs would be certified to the 2007 federal on-road emission standards. To account for these trucks, the parking space data was further adjusted by 5 and by 10 percent, producing two scenarios to reflect the high and low range in the emission calculations.

Staff also developed estimates of idling times for trucks parked in designated spaces. In order to provide a reasonable range of likely idling times, two additional scenarios were developed to model the average amount of time that a truck would idle while parked at a designated space. The first scenario used data from an unpublished truck stop marketing survey by a leading manufacturer of TSE devices that found that while parked, the trucks idled for 90 percent of the time. In the second scenario, staff used the results of a survey of a northern California truck stop conducted by ARB staff that indicated that the trucks idled for 70 percent of the time.

Staff next estimated the number of hours per day that a given designated space would be occupied by a truck. Staff also considered that a designated space may be used by a number of different trucks throughout a 24 hour period. Using additional data from the unpublished truck stop marketing survey mentioned above, staff estimated the weighted average daily designated space utilization to be 78 percent, or 18.59 hours per day. Because of recent changes in the federal hours of service requirements that will increase the required number of hours per day that drivers must be off-highway, staff increased the estimate of designated space utilization to 20 hours per day.

Assuming trucks equipped with sleeper berths use the truck engine to power air conditioners, heaters, and ancillary equipment while idling, staff used the high idle with accessory load emission factors from Table C-3 of the staff report for "Public Hearing to Consider the Adoption of Heavy-Duty Vehicle Idling Emission Reduction Requirements," (ARB, 2003). Those emission factors are presented in Table F-6 below. Emission factors for the years 1998-2006 were chosen to reflect that trucks equipped with sleeper berths tend to be newer.

Table F-6

High Idle Emission Factors with Accessory Load for On-Road Heavy-Duty Diesel Vehicles

Model Year Group	PM (g/hr)	NOx (g/hr)
1998-2002	2.77	165
2003-2006	2.77	165
2007-2010	0.28	165
2010 - Newer	0.28	165

Annual emissions from trucks using designated parking spaces were then calculated using the estimates of the number of spaces, the hours per day of utilization, the percent of the utilization time spent idling, and the emission factors from Table F-6.

Undesignated Spaces

Staff also calculated the emissions from trucks equipped with sleeper berths parked at undesignated spaces or locations outside of truck stops and rest stops. Based on a study at Argonne National Laboratory (Argonne), the average truck idled for about 6 hours per day for purposes of rest or sleep. Because of recent changes in the federal hours of service requirements that increased the number of required off-highway hours per day, staff increased this value to 8 hours per day for our estimates. Pollutant emissions from trucks idling at undesignated parking spaces were then estimated based on the number of undesignated parking spaces occupied, the hours of idling per day, and the pollutant emission factors from Table F-6.

Estimated General and Sleeper Category Idling Emissions

Table F-7 presents the estimated emissions from sleepers for the years 2000, 2005, and 2009.

Table F-7

Emissions from Prolonged Idling During Driver Rests (without ATCM Implementation)

Idling Emissions (tons per year)

Year	Average Diesel PM	NOx
2000	268	12,590
2005	230	13,699
2009	253	16,103

The total combined general and sleeper projected statewide diesel PM and NOx emissions from years 2000, 2005 and 2009 are included in Table F-8. These estimates include new engine standards and turnover in the vehicle population, but do not include the projected additional reductions expected from implementation of the Proposed ATCM. Expected emission reductions from the implementation of the Proposed ATCM are discussed later in this appendix.

Table F-8

Idling Emission Estimates from Effected Categories (without ATCM Implementation)

Idling Emissions (tons per year)

Year	Diesel PM	NOx
2000	503	17,488
2005	438	20,272
2009	418	23,994

Table F-8 shows that prolonged vehicle idling during driver rest periods contributes a significant portion of idling emissions in California. Though population-wise this category is 16 percent of the total number of trucks operating in the State, primary engine idling from extended driver rest periods comprises over 50 percent and approximately 70 percent of the total diesel PM and NOx emissions, respectively.

B. Estimation of Vehicle Idling Emission Reductions from the Proposed ATCM

Emission reductions are expected to occur in two phases. The first phase will result in the elimination of general unnecessary idling of commercial and publicly owned diesel-fueled motor vehicles with a GVWR of greater than 10,000 pounds and will be effective immediately upon adoption of the Proposed ATCM into State law. The second phase *requires trucks that idle during extensive rest periods to limit idling of the main engine.* This provision becomes effective in January 1, 2009.

Phase One – Limiting Unnecessary General Idling

From the established idling times presented in Table F-3, staff calculated that with the general five (5) minute limit in place, the average unnecessary idling times would be reduced as presented in Table F-9 below.

Table F-9

Average Reduced Unnecessary Idling Times by Affected Vehicle Class

Vehicle Class	Average Reduced Unnecessary General Idling Times per Vehicle
HHDDV	0.6 hour per day
MHDDV	0.2 hour per day
LHDT-2	0.0 hour per day
Bus	0.2 hour per day

Table F-10 presents estimated emission reductions from the implementation of Phase One of the Proposed ATCM.

Table F-10

Estimated Reduced Unnecessary General Idling Emissions for 2005

Category	Population	hr/day Idling	PM (tpy)	NOx (tpy)
HHDDV	179,838	0.6	122	3,858
MHDDV	177,598	0.2	40	1,269
LHDT-2	36,263	0.0	0	0
Buses	15,562	0.2	4	111
Total	409,261		166	5,238

Staff estimates that emission reductions starting in 2005 *would be approximately* 166 tpy of diesel PM and 5,238 tpy of NOx. The PM emission benefits of the Proposed ATCM are expected to decrease over time relative to 2005 levels because the population of older, higher emitting heavy-duty diesel vehicle engines will decrease and the population of newer engines that meet more stringent emission standards will increase.

Phase Two - Limiting Engine Idling During Extended Rest Periods

To estimate the emission reductions from Phase two of the Proposed ATCM, staff assumed that the Proposed ATCM would limit all idling emissions from trucks parked at both designated and undesignated spaces. Further, staff assumed that after the

January 2009 implementation date of Phase Two of the Proposed ATCM, trucks parked for extended rest periods would use auxiliary power systems (APS) that use a small diesel engine to provide power for heating, air conditioning, and on-board appliances. This approach represents a very conservative estimate of the emission reductions expected from implementation of Phase two of the Proposed ATCM. Under this scenario, emission reductions achieved by restricting primary engine idling during extended rest periods will be offset to a small extent by additional emissions generated by APS use. Staff's calculations assume that APS emissions would essentially replace the primary engine idling emissions from all vehicles.

Emission factors for APS systems are presented in Table F-11. These emission factors do not represent new emission limits to be proposed by Staff in 2005. Emission factors contained in Table F-11 are based on established or proposed new engine emission standards for small off-road engines.

Table F-11

Emission Factors for Auxiliary Power Systems (<11 hp)

Year	PM (g/hr)	NOx (g/hr)
1995-1999	3.8	63
Tier I (2000-2004)	3.2	41
Tier II (2005-2007)	2.5	29
Tier IV (2008)	1.3	29

Staff also took under consideration that the Proposed ATCM requires that at the time of installation, the APS is to be certified to the more stringent of California or federal standards for newly manufactured off-road or nonroad engines.

Estimated emission reductions from implementation of Phase two are listed in Table F-12.

Table F-12

Emission Reductions from Prolonged Idling During Driver Rest (ATCM Implementation)

	Idling Emissions (tons per year)	
Year	Average Diesel PM	NOx
2009	134	12,338

The total combined general and sleeper population projected statewide reductions of diesel PM and NOx emissions from years 2000, 2005 and 2009 are included in Table F-13.

Table F-13

Idling Emissions Reduction Estimates from Affected Categories (ATCM Implementation)

Idling Emissions (tons per year)		
Year	**Diesel PM**	**NOx**
2000	-	-
2005	166	5,239
2009	266	18,626

The resulting estimated emission reductions equate to an overall 37 and 64 percent diesel PM reduction for years 2005 and 2009, respectively. NOx is similarly reduced by 26 and 78 percent.

APPENDIX G

GLOSSARY OF TERMS

Adverse Health Effects [Glossary][1]: A health effect from exposure to air contaminants that may range from relatively mild temporary condition, such as eye or throat irritation, shortness of breath, or headaches to permanent and serious conditions, such as birth defects, cancer or damage to lungs, nerves, liver or other organs.

Air Dispersion Model/Air Quality Simulation Model [Glossary]: A mathematical relationship between emissions and air quality which simulates on a computer the transport, dispersion, and transformation of compounds emitted in the air.

Air Pollutants [Glossary]: Amounts of foreign and/or natural substances occurring in the atmosphere that may result in adverse effects to humans, animals, vegetation and/or materials.

Air Pollution Control District [Glossary]: A county agency with authority to regulate stationary, indirect and area source air pollution (e.g. power plants, highway construction, and housing developments) within a given county, and governed by a regional air pollution control board composed of the elected supervisors.

Air Quality Management District [Glossary]: A group of counties or portions of counties, or an individual county specified in law with authority to regulate stationary , indirect and area sources of air pollution within the region and governed by a regional air pollution control board comprised mostly of elected officials from within the region.

Ambient Air [Glossary]: The air occurring at a particular time and place outside a structure. Often used interchangeably with "outdoor air"

California Environmental Quality Act (CEQA) [CEQA Handbook][2]: A state law intended to protect the environment of California. It is codified in sections 21000 through 21177 of the Public Resources Code.

Carcinogen [Glossary]: A cancer causing substance.

Commercial Vehicle: Any vehicle or combination of vehicles defined by the California Vehicle Code 15210(b) and any other with a gross vehicular weight rating (GVWR) of greater than 10,000 pounds.

Cost-effectiveness [Glossary]: The cost of an emissions control measure assessed in terms of dollars-per-pound, or dollars-per-ton of air emissions reduced.

---

[1] From the Air Resources Board's Glossary for Air Pollution Terms; available at http://www.arb.ca.gov/html/gloss.htm

[2] From the Air Resources Board's CEQA Review Handbook for Local Air Pollution Control Agencies, March 1990.

Criteria Pollutant [Glossary]: An air pollutant for which acceptable levels of exposure can be determined and for which an ambient air quality standard has been set. Examples include: ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, PM10 and PM 2.5. The term "criteria air pollutants" derives from the requirements that the U.S. EPA must describe the characteristics and potential health and welfare effects of these pollutants. The U.S. EPA and ARB periodically review new scientific data and many propose revisions to the standards as a result.

Diesel Exhaust Particulate Matter (diesel PM) [Diesel Risk Reduction Plan][3]: That portion of the exhaust from a diesel fueled compression ignition engine, which is collected via a particulate matter sampling method. Diesel PM consists of several constituents, including: an elemental carbon fraction, a soluble organic fraction, and a sulfate fraction. The majority of diesel PM (i.e., 98%) is smaller than 10 microns in diameter.

Driver: Any person who drives or is in actual physical control of a vehicle as defined in the California Vehicle Code section 305.

Emergency: A sudden, urgent, usually unforeseen, occurrence; or a foreseeable occurrence relative to a passenger's pre-disclosed medical or physiological condition.

Emission Factor [Glossary]: For stationary sources, the relationship between the amount of pollution produced and the amount of raw material processed or burned. For mobile sources, the relationship between the amount of pollution produced and the number of vehicle miles traveled. By using the emission factor of a pollutant and specific data regarding quantities of materials used by a given source, it is possible to compute emissions for the source. This approach is used in preparing an emissions inventory.

Emission Inventory [Glossary]: An estimate of the amount of pollutants emitted into the atmosphere from major mobile, stationary, area-wide, and natural source categories over a specific period of time such as a day or year.

Emission Rate [Glossary]: The weight of a pollutant emitted per unit of time (e.g., tons/year).

Emission Standard [Glossary]: The maximum amount of a pollutant that is allowed to be discharged from a polluting source such as an automobile or a smokestack.

Environmental Impact Report (EIR) [CEQA Handbook]: An informational document used to inform public agency decision-makers and the public of the significant effects of a project. The EIR also identifies the possible ways to eliminate or minimize the significant effects and describes reasonable alternatives to the project.

---

[3] From the Air Resources Board's *Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles*, October 2000.

Environmental Justice [Glossary]: The fair treatment of people of all races and incomes with respect to development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment implies that no person or group of people should shoulder a disproportionate share of negative environmental and economic impacts resulting from the execution of environmental programs.

Epidemiology [Glossary]: The study of the occurrence and distribution of disease within a population.

Exposure [Glossary]: The concentration of the pollutant in the air multiplied by the population exposed to that concentration over a specified time period.

Exposure Assessment [Glossary]: Measurement or estimation of the magnitude, frequency, duration, and route of exposure to a substance for the population of interest.

Fuel Cell [Glossary]: An electrochemical cell that captures the electrical energy of a chemical reaction between fuels such as liquid hydrogen and liquid oxygen and converts it directly and continuously into the energy of a direct electrical current.

Gross vehicle weight rating: The weight specified by the manufacturer as the loaded weight of a single vehicle as defined in the California Vehicle Code Section 350.

Health Risk Assessment [Glossary]: A document that identifies the risks and quantities of possible adverse health effects that may result from exposure to emissions of toxic air contaminants. A health risk assessment cannot predict specific health effects; it only describes the increased possibility of adverse health effects based on the best scientific information available.

Heavy-duty Vehicle: For the purposes of this regulation, any commercial diesel-fueled vehicle with a gross vehicular weight rating greater than 14,000 pounds.

Idling: The vehicle engine is running at any location while the vehicle is stationary.

Morbidity [Glossary]: Rate of disease incidence.

Mortality [Glossary]: Death rate.

Mutagenic [Glossary]: The ability of a chemical or physical agent to produce heritable changes in DNA of living cells.

Nitrogen Oxides (NOx) [Glossary]: A general term pertaining to compounds of nitric oxide (NO), nitrogen dioxide (NO2) and other oxides of nitrogen. Nitrogen oxides are typically created during the combustion processes, and are major contributors to smog formation and acid deposition. NO2 is a criteria air pollutant, and may result in numerous adverse health effects.

Noncarcinogenic Effects [Glossary]: Non-cancer health effects which may include birth defects, organ damage, morbidity, and death.

Office of Environmental Health Hazard Assessment (OEHHA) [Glossary]: A department within the California Environmental Protection Agency that is responsible for evaluating chemicals for adverse health impacts and establishing safe exposure levels. OEHHA also assists in performing health risk assessments and developing risk assessment procedures for air quality management purposes.

Official Traffic Control Device [VC §440]: Any sign, signal, marking, or device, consistent with section 21400 of the Vehicle Code, placed or erected by authority of a public body or official having jurisdiction, for the purpose of regulating, warning, or guiding traffic, but does not include islands, curbs, traffic barriers, speed humps, speed bumps, or other roadway design features.

Official Traffic Control Signal [VC §445]: Any device, whether manually, electrically, or mechanically operated, by which traffic is alternately directed to stop and proceed and which is erected by authority of a public body or official having jurisdiction.

Opacity [Glossary]: The amount of light obscured by particle pollution in the atmosphere. Opacity is used as an indicator of changes in performance of particulate control systems.

Ozone [Glossary]: A strong smelling, pale blue, reactive toxic chemical gas consisting of three oxygen atoms. It is a product of the photochemical process involving the sun's energy and ozone precursors, such as hydrocarbons and oxides of nitrogen. Ozone exists in the upper atmosphere ozone layer (stratospheric ozone) as well as at the earth's surface in the troposphere (ozone). Ozone in the troposphere causes numerous adverse health effects and is a criteria air pollutant. It is a major component of smog.

Primary diesel engine: The diesel-fueled engine used for vehicle propulsion.

Queuing: The intermittent starting and stopping of a vehicle while the driver, in the normal course of doing business. is actively waiting to perform work or a necessary service when shutting the vehicle engine off would impede the progress of the queue and is not practicable. Queuing does not include the time a driver may wait motionless in a line in anticipation of the start of or opening of a location where work or a necessary service will be performed.

Ringelmann Chart [Glossary]: A series of charts, numbered 0 to 5, that simulate various smoke densities by presenting different percentages of black. A Ringelmann No. 1 is equivalent to 20 percent black; a Ringelmann No. 5 is 100 percent black. They are used for measuring the opacity or equivalent obscuration of smoke arising from stacks and other sources by matching the actual effluent with the various numbers, or densities, indicated by the charts.

Rural Area [U.S. Census 2000]: The U.S. Census Bureau's classification of "rural" consists of all territory, population, and housing units located outside of urbanized areas and urban clusters. The rural component contains both place and nonplace territory. Geographic entities, such as census tracts, counties, metropolitan areas, and the territory outside metropolitan areas, often are "split" between urban and rural territory, and the population and housing units they contain often are partly classified as urban and partly classified as rural. (See also definition of "Urban Area")

Scientific Review Panel [Glossary]: Mandated by AB 1807, this nine-member panel advises the ARB, OEHHA, and the California Department of Pesticide Regulation on the scientific adequacy of the risk assessment portion of reports issued by those three agencies in the process of identifying substances as toxic air contaminants.

Sleeper berth: A securely fixed area properly equipped for sleeping located in the cab or immediately adjacent to the cab in full compliance with 49 CFR Ch. III (10-1-02 edition) section 393.77.

Toxic Air Contaminant [HSC §39655]: An air pollutant which may cause or contribute to an increase in mortality or in serious illness, or which may pose a present or potential hazard to human health. A substance that is listed as a hazardous air pollutant pursuant to subsection (b) of section 112 of the federal act (42 U.S.C. Sec. 7412(b)) is a toxic air contaminant. A toxic air contaminant which is a pesticide shall be regulated in its pesticidal use by the Department of Pesticide Regulation pursuant to Article 1.5 (commencing with section 14021) of Chapter 3 of Division 7 of the Food and Agricultural Code.

Unit Risk Factor [Glossary]: The number of potential excess cancer cases from a lifetime exposure to one microgram per cubic meter (μ/m^3) of a given substance. For example, a unit risk value of 5.5x10-6 would indicate an estimated 5.5 cancer cases per million people exposed to an average concentration of 1 μ/m^3 of a specific carcinogen for 70 years.

Urban Area [U.S. Census 2000]: For Census 2000, the U.S. Census Bureau classifies as "urban" all territory, population, and housing units located within an urbanized area (UA) or an urban cluster (UC). It delineates UA and UC boundaries to encompass densely settled territory, which consists of: (a) core census block groups or blocks that have a population density of at least 1,000 people per square mile and (b) surrounding census blocks that have an overall density of at least 500 people per square mile. In addition, under certain conditions, less densely settled territory may be part of each UA or UC.

APPENDIX H

ACRONYMS

Acronyms

AB	Assembly Bill
ARB	Air Resources Board
ATCM	Airborne Toxic Control Measure
Cal/EPA	California Environmental Protection Agency
CEQA	California Environmental Quality Act
CCR	California Code of Regulations
CFR	Code of Federal Regulations
CHP	California Highway Patrol
CNG	Compressed Natural Gas
CO	Carbon Monoxide
DMV	California Department of Motor Vehicles
EMFAC2002	Emission Factor Model 2002
GVWR	Gross Vehicular Weight Rating
HSC	Health and Safety Code
LNG	Liquid Natural Gas
LPG	Liquid Propane Gas
NOx	Oxides of Nitrogen
OEHHA	Office of Environmental Health Hazard Assessment
PM	Particulate Matter
PM10	Particulate Matter 10 micrometers in diameter and smaller
PM2.5	Particulate Matter 2.5 micrometers in diameter and smaller
PPM	Parts Per million
SCAQMD	South Coast Air Quality Management District
SRP	Scientific Review Panel
TAC	Toxic Air Contaminant
THC	Total Hydrocarbons
TPD	Tons Per Day
TPY	Tons Per Year
URF	Unit Risk Factor
U.S. EPA	United States Environmental Protection Agency
VC	California Motor Vehicle Code

TITLE 17. CALIFORNIA AIR RESOURCES BOARD

NOTICE OF PUBLIC HEARING TO CONSIDER PROPOSED AMENDMENTS TO THE UNIHOSE DISPENSER REQUIREMENTS IN THE REGULATION FOR CERTIFICATION OF VAPOR RECOVERY SYSTEMS OF DISPENSING FACILITIES (GASOLINE SERVICE STATIONS)

The Air Resources Board (ARB or Board) will conduct a public hearing at the time and place noted below to consider adoption of amendments to the regulations for certification of vapor recovery systems installed at gasoline dispensing facilities (service stations and similar facilities).

DATE: July 22, 2004

TIME: 9:00 a.m.

PLACE: California Environmental Protection Agency
Air Resources Board
Central Valley Auditorium, Second Floor
1001 I Street
Sacramento, Ca 95814

This item will be considered at a two-day meeting of the ARB, which will commence at 9:00 a.m., July 22, 2004, and may continue at 8:30 a.m., July 23, 2004. This item may not be considered until July 23, 2004. Please consult the agenda for the meeting, which will be available at least 10 days before July 22, 2004 to determine the time when this item will be considered.

If you have a disability-related accommodation need, please go to http://www.arb.ca.gov/html/ada/ada.htm for assistance or contact the ADA Coordinator at (916) 323-4916. If you are a person who needs assistance in a language other than English, please go to http://inside.arb.ca.gov/as/eeo/languageaccess.htm or contact the Bilingual Coordinator at (916) 324-5049. TTY/TDD/Speech-to-Speech users may dial 7-1-1 *for the California Relay Service.*

<u>INFORMATIVE DIGEST OF PROPOSED ACTION AND POLICY STATEMENT OVERVIEW</u>

Sections Affected: Proposed amendments to section 94011, title 17, California Code of Regulations (CCR) and the documents incorporated by reference therein.

Background

The Air Resources Board (Board or ARB) certifies the vapor recovery equipment that is used in service stations or gasoline dispensing facilities (GDFs). Control of the emissions from GDFs is necessary to reduce emissions that lead to the formation of ozone and to control emissions of benzene, a constituent of gasoline vapor that has been identified as a toxic air contaminant. The ARB is currently implementing the Enhanced Vapor Recovery (EVR) program, which requires that vapor recovery systems be compatible with fueling onboard refueling vapor recovery (ORVR) vehicles by April 1, 2005. The EVR program requires several additional standards to be met by April 1, 2009.

Need for Amendment and Adoption

Section 4.11 of CP-201, "Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities," describes the requirements for unihose dispensers. Section 4.11 currently triggers replacement of some dispensers if more than 50% of the dispenser vapor piping is modified. Modification of the dispenser vapor piping is necessary for some ORVR compatibility system upgrades. Gasoline marketers recently commented that costs to upgrade to ORVR compatible systems could be as high as $75,000 per station where dispenser replacement is required. This cost increase reduces the cost-effectiveness of the ORVR compatibility requirement. Therefore, the amendments are needed to eliminate high costs associated with dispenser replacement for GDF operators who must upgrade to ORVR compatible vapor recovery systems by April 1, 2005.

Summary of Staff Proposal

ARB staff proposes to revise section 4.11 of CP-201, "Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities," and to amend title 17, CCR, sections 94011, which incorporates CP-201 by reference.

The proposed amendment will remove language that triggers conversion to a unihose dispenser when modifying vapor piping in the dispensers. Section 4.11 will still require unihose dispensers for new facilities and for facilities that replace more than 50% of the dispensers. Dispensers that must be replaced due to damage resulting from an accident or vandalism may be replaced with the previously installed dispenser type.

Comparable Federal Regulations

There are no comparable federal regulations that certify gasoline recovery systems for service stations; however, changes to ARB vapor recovery regulations have a national impact. ARB certification is required by most other states which mandate Phase I or Phase II vapor recovery at service stations.

AVAILABILITY OF DOCUMENTS AND AGENCY CONTACT PERSON

The ARB staff has prepared a Staff Report: Initial Statement of Reasons (ISOR) for the proposed regulatory action that includes a summary of the environmental and economic impacts of the proposal. The report is entitled: "Staff Report: Initial Statement of Reasons for Proposed Rulemaking, Public Hearing to Consider Proposed Amendments to the Unihose Dispenser Requirements in the Regulation for Certification of Vapor Recovery Systems of Dispensing Facilities (Gasoline Service Stations)."

The ARB has determined that it is not feasible to draft the proposed regulatory action in plain noncontrolling English due to the technical nature of the regulations; however, a plain English summary of the proposed regulatory action is available from the agency contact person named in this notice, and is also contained in Section V, "Reasons and Summary of Proposed Amendments to the Certification Procedure (CP-201)," of the ISOR for this regulatory action.

Copies of the ISOR and full text of the proposed regulatory language, in underline and strike-out format to allow for comparison with the existing regulations, may be obtained from the ARB's Public Information Office, Visitors and Environmental Services Center, 1001 I Street, First Floor, Sacramento, California 95814, (916) 322-2990, at least 45 days prior to the scheduled hearing (July 22, 2004).

Upon its completion, the Final Statement of Reasons (FSOR) will be available and copies may be requested from the agency contact persons in this notice, or may be accessed on the web site listed below.

Requests for printed documents and inquiries concerning the substance of the proposed regulations may be directed to the designated agency contact persons: Cindy Castronovo or George Lew, Engineering and Certification Branch, Monitoring and Laboratory Division, at (916) 327-0900.

*Further, the agency representative and designated back-up contact persons to whom non-*substantive inquiries concerning the proposed administrative action may be directed are Artavia Edwards, Manager, Board Administration and Regulatory Coordination Unit, (916) 322-6070, or Alexa Malik, Regulations Coordinator, (916) 322-4011. The Board has compiled a record for this rulemaking action, which includes all the information upon which the proposal is based. This material is available for inspection upon request to the contact persons.

If you are a person with a disability and desire to obtain this document in an alternative format, please go to http://www.arb.ca.gov/html/ada/ada.htm for assistance or contact the ADA Coordinator at (916) 323-4916. If you are a person who needs assistance in a language other than English, please go to http://inside.arb.ca.gov/as/eeo/languageaccess.htm or contact the Bilingual Coordinator at (916) 324-5049. TTY/TDD/Speech-to-Speech users may dial 7-1-1 for the California Relay Service.

This notice, the ISOR, and all subsequent regulatory documents, including the FSOR, when completed, are available on the ARB Internet site for this rulemaking at http://www.arb.ca.gov/regact/unihose.htm.

COSTS TO PUBLIC AGENCIES AND TO BUSINESSES AND PERSONS AFFECTED

The determinations of the Board's Executive Officer concerning the cost or savings necessarily incurred by public agencies and private persons and businesses in reasonable compliance with the proposed regulatory action are presented below.

In developing this regulatory proposal, the ARB staff evaluated the potential economic impacts on representative private persons and businesses. The ARB has determined that some gasoline station operators may save $2,000 to $65,000 by not having to convert existing dispensers to the unihose configuration while complying with the ORVR compatibility requirement. The ARB is not aware of any costs that a representative private person or business would necessarily incur in reasonable compliance with the proposed action. Gasoline dispensing facilities operated by state and local agencies, such as the Department of General Services, California Highway Patrol or Caltrans may realize similar cost savings.

Pursuant to Government Code sections 11346.5(a)(5) and 11346.5(a)(6), the Executive Officer has determined that the proposed 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, except as discussed above, or other nondiscretionary savings to state or local agencies.

The Executive Officer has made an initial determination that the proposed regulatory action will not have a significant statewide adverse economic impact directly affecting businesses, including the ability of California businesses to compete with businesses in other states, or on representative private persons.

In accordance with Government Code section 11346.3, the Executive Officer has initially determined that the proposed amendments will not affect the creation or elimination of jobs within the State of California, the creation of new businesses and the elimination of existing businesses within the State of California, and the expansion of businesses currently doing business within the State of California.

The Executive Officer has also determined, pursuant to title 1, CCR, section 4, that the proposed regulatory action will affect small businesses that own or operate GDFs.

In accordance with Government Code sections 11346.3(c) and 11346.5(a)(11), the Executive Officer has found that the reporting requirements in the regulations and incorporated documents that apply to businesses are necessary for the health, safety, and welfare of the people of the State of California.

Before taking final action on the proposed regulatory action, the ARB must determine that no reasonable alternative considered by the ARB or that has otherwise been identified and brought to the attention of the ARB would be more effective in carrying out the purpose for which the action is proposed or would be as effective and less burdensome to affected private persons or businesses than the proposed action.

A detailed assessment of the economic impacts of the proposed regulatory action can be found in the ISOR.

SUBMITTAL OF COMMENTS

The public may present comments relating to this matter orally or in writing at the hearing, and in writing, or by e-mail before the hearing. To be considered by the Board, written submissions not physically submitted at the hearing must be received no later than **12:00 noon July 21, 2004,** and addressed to the following:

Postal Mail is to be sent to:

Clerk of the Board
Air Resources Board
1001 I Street, 23rd Floor
Sacramento, CA 95814

Electronic mail is to be sent to: unihose@listserv.arb.ca.gov and received at the ARB no later than **12:00 noon July 21, 2004.**

Facsimile submissions are to be transmitted to the Clerk of the Board at (916) 322-3928 and received at the ARB no later than **12:00 noon July 21, 2004.**

The Board requests, but does not require, 30 copies of any written statement be submitted and that all written statements be filed at least 10 days prior to the hearing so that ARB staff and Board Members have time to fully consider each comment. The ARB encourages members of the public to bring any suggestions for modification of the proposed regulatory action to the attention of staff in advance of the hearing.

STATUTORY AUTHORITY

This regulatory action is proposed under the authority granted to the ARB in sections 39600, 39601, 39607, and 41954 of the Health and Safety Code. This action is proposed to implement, interpret, or make specific sections 39515, 41954, 41956.1, 41959, 41960 and 41960.2 of the Health and Safety Code.

HEARING PROCEDURES

The public hearing will be conducted in accordance with the California Administrative Procedure Act, title 2, division 3, part 1, chapter 3.5 (commencing with section 11340) of the Government Code.

Following the public hearing, the ARB may adopt the regulatory language as originally proposed or with nonsubstantial or grammatical modifications. The ARB may also adopt the proposed regulatory language with other modifications if the modifications are sufficiently related to the originally proposed text that the public was adequately placed on notice that the regulatory language as modified could result from the proposed regulatory action. In the event that such modifications are made, the full regulatory text, with the modifications clearly indicated, will be made available to the public for written comment at least 15 days before it is adopted.

The public may request a copy of the modified regulatory text from the ARB's Public Information Office, Visitors and Environmental Services Center, 1001 I Street, First Floor, Sacramento, California 95814, (916) 322-2990.

California Air Resources Board

Catherine Witherspoon
Executive Officer

Date: May 25, 2004

"The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our Web-site at www.arb.ca.gov."

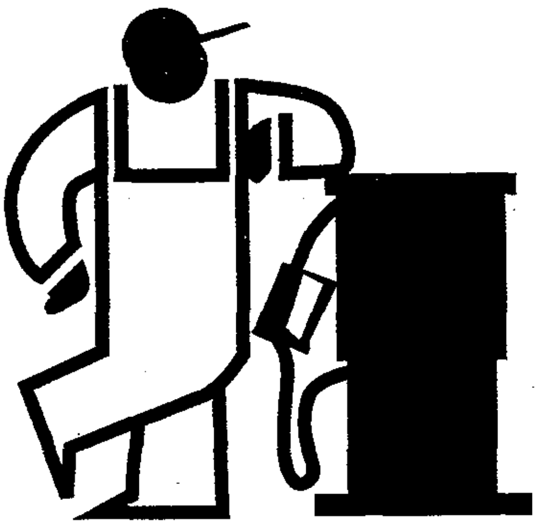
California Environmental Protection Agency

Air Resources Board

HEARING NOTICE AND STAFF REPORT

INITIAL STATEMENT OF REASONS FOR PROPOSED RULEMAKING, PUBLIC HEARING TO CONSIDER PROPOSED AMENDMENTS TO THE UNIHOSE DISPENSER REQUIREMENTS IN THE REGULATION FOR CERTIFICATION OF VAPOR RECOVERY SYSTEMS OF DISPENSING FACILITIES (GASOLINE SERVICE STATIONS)

June 4, 2004



California Environmental Protection Agency

Air Resources Board

STAFF REPORT:
INITIAL STATEMENT OF REASONS FOR PROPOSED RULEMAKING,
PUBLIC HEARING TO CONSIDER PROPOSED AMENDMENTS TO THE UNIHOSE DISPENSER REQUIREMENTS IN THE REGULATION FOR CERTIFICATION OF VAPOR RECOVERY SYSTEMS OF DISPENSING FACILITIES (GASOLINE SERVICE STATIONS)

Date of Release: June 4, 2004

Scheduled for Consideration: July 22 – 23, 2004

Location: California Environmental Protection Agency (Cal-EPA)
Headquarters Building
1001 I Street
Sacramento, CA 95814

Air Resources Board
P.O. Box 2815
Sacramento, CA 95812

STAFF REPORT: INITIAL STATEMENT OF REASONS FOR PROPOSED RULE MAKING, PUBLIC HEARING TO CONSIDER PROPOSED AMENDMENTS TO THE UNIHOSE DISPENSER REQUIREMENTS IN THE REGULATION FOR CERTIFICATION OF VAPOR RECOVERY SYSTEMS OF DISPENSING FACILITIES (GASOLINE SERVICE STATIONS)

Prepared by:

Cindy Castronovo
Monitoring and Laboratory Division

Reviewed by:

William V. Loscutoff, Chief, Monitoring and Laboratory Division
George Lew, Chief, Engineering and Certification Branch
Laura McKinney, Manager, Vapor Recovery Certification Section
Kirk Oliver, Senior Staff Counsel
Floyd Vergara, Staff Counsel

ACKNOWLEDGEMENTS

Staff wishes to acknowledge the participation and assistance of individuals from the following organizations in providing input on proposed amendments:

American Petroleum Institute
California Air Pollution Control Districts
California Air Pollution Control Officers Association (CAPCOA) Vapor Recovery Committee
California Independent Oil Marketers Association
Western States Petroleum Association

Staff also appreciates the input from the following vapor recovery equipment manufacturers:

Healy Systems, Inc.
OPW Fueling Products

Table of Contents

I. INTRODUCTION AND RECOMMENDATIONS

Introduction

In March of 2000, the Air Resources Board (ARB or Board) approved the Enhanced Vapor Recovery (EVR) regulations. The EVR regulations established new standards for vapor recovery systems to reduce emissions during storage and transfer of gasoline at gasoline dispensing facilities (service stations). In December 2002, the Board approved amendments to the EVR regulations, including revisions to operative and effective dates of the EVR standards to allow more time to develop and certify EVR vapor recovery systems. However, the date for all stations to comply with the Onboard Refueling Vapor Recovery (ORVR) compatibility standard by April 1, 2005 did not change as ORVR compatible systems have been certified since 1998.

A detailed cost analysis was included in the February 4, 2000 EVR staff report and was updated as part of the December 2002 rulemaking. Costs associated with equipment upgrades to meet the ORVR requirement assumed that only the "hanging hardware" (nozzles, hoses, etc.) attached to the dispenser would need to be replaced at existing stations. This assumption was based on the design of the ORVR compatible system certified in 1998. Although an application is under review to certify similar equipment as a retrofit for one popular existing system, the retrofit would not be available until early 2005, assuming that the system passes all certification tests. Thus, it is expected that many stations upgrading to ORVR compatibility may require a change to a different vapor recovery system. Changing over to one of the three certified ORVR compatible systems available now involves modification of the vapor piping in the gasoline dispensers as well as changes to the dispenser "hanging hardware".

Under existing regulations, vapor recovery system modifications that affect 50% or more of the vapor piping inside the dispenser trigger a conversion of a "six-pack dispenser" (individual nozzles for each grade of gasoline) to a "unihose dispenser" (same nozzle for all grades of gasoline). The cost to convert to a unihose dispenser can be quite expensive for some older dispensers.

Recommendations

Staff proposes to modify the regulations so that upgrades to make systems ORVR compatible do not require conversion to unihose until the dispenser is eventually replaced. This action will keep the ORVR compatibility requirement cost-effective.

Staff recommends that the Board adopt the following:

1. Amendments to the California Code of Regulations to incorporate the proposed certification and test procedures by reference (Appendix 1); and

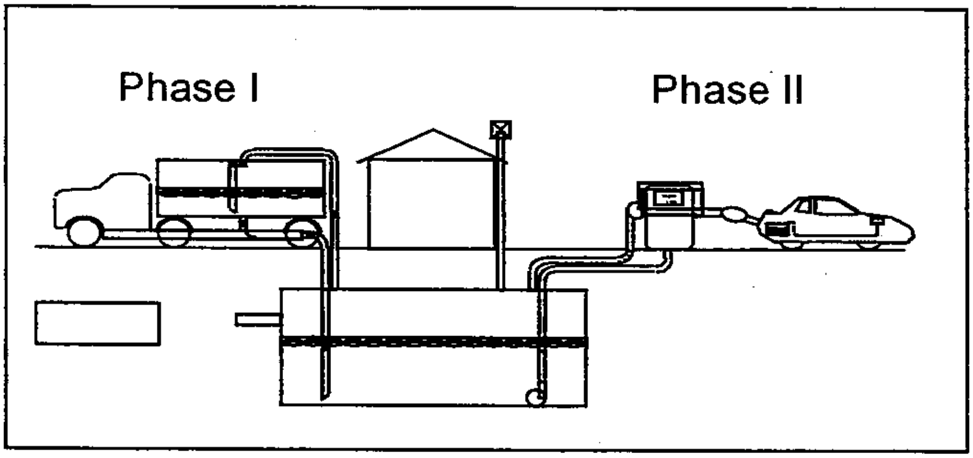
2. Amendments to the incorporated vapor recovery system certification procedure (Appendix 2).

II. BACKGROUND

A. Vapor Recovery Program Overview

Gasoline vapor emissions are controlled during two types of gasoline transfer. As illustrated in Figure II-1, Phase I vapor recovery collects vapors when a tanker truck fills the service station underground tank. Phase II vapor recovery collects vapors during vehicle refueling. The vapor recovery collection efficiency during both of these transfers is determined through certification of vapor recovery systems. Vapor recovery systems serve both as control for reactive organic gases (ROG) that lead to the formation of ozone and as control for benzene, a toxic air contaminant.

Figure II-1
Phase I and Phase II Vapor Recovery Systems at Service Stations



The ARB and the air pollution control and management districts (districts) share implementation of the vapor recovery program. ARB staff certifies prototype Phase I and Phase II vapor recovery systems installed at operating station test sites. District rules and state law require that only ARB-certified systems be installed. District staff inspects and tests the vapor recovery system upon installation during the permit process and conducts regular inspections to check that systems are operating as certified.

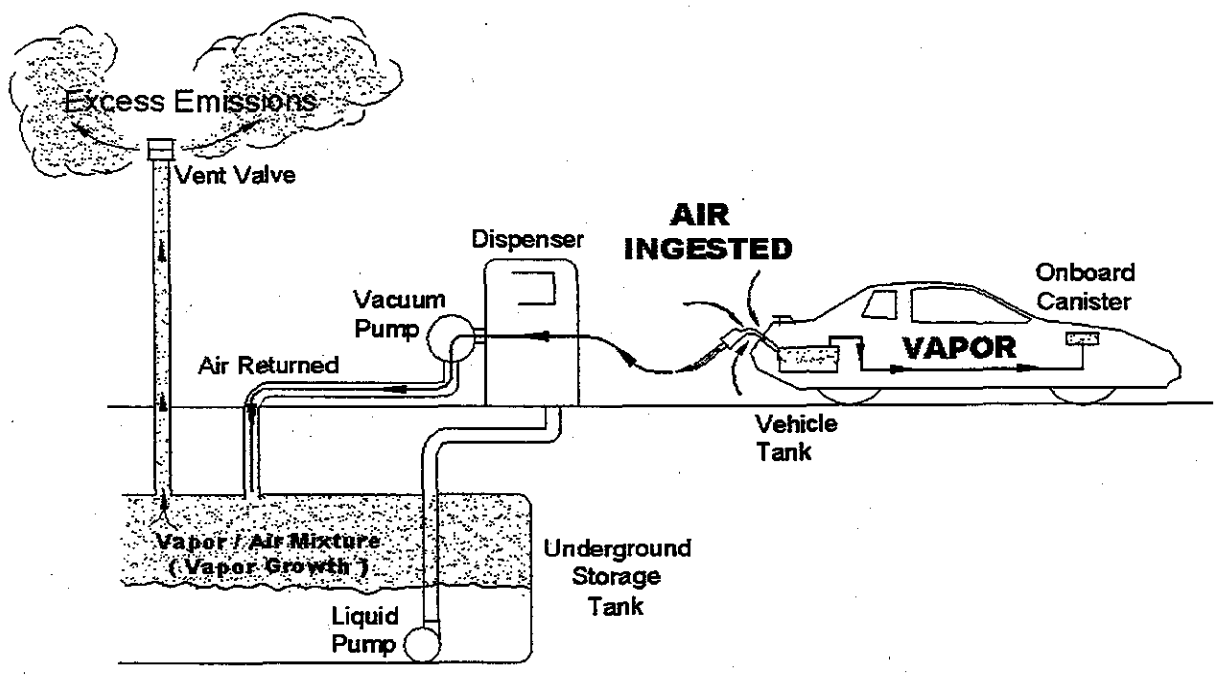
The vapor recovery requirements affect a multitude of stakeholders. These include the vapor recovery equipment manufacturers, gasoline marketers who purchase this equipment, contractors who install and maintain vapor recovery systems, and air pollution control districts who enforce vapor recovery rules. In addition, California certified systems are required by most other states and many countries.

B. ORVR Compatibility Requirement

Federal regulations require that vehicles be equipped with Onboard Refueling Vapor Recovery (ORVR) beginning in the 1998 model year and phased in over several years. ORVR works by routing gasoline vapors displaced during vehicle fueling to the onboard canister on the vehicle. For a non-ORVR vehicle, these displaced vapors are captured by the facility's Phase II vapor recovery system. Thus, ORVR and Phase II equipment seek to control the same emissions – the vapors displaced from the vehicle fuel tank during gasoline refueling.

ARB field tests have shown that fueling ORVR vehicles with some currently certified Phase II vapor recovery systems can lead to excess emissions. This is because some Phase II systems draw air into the underground storage tank (UST) during fueling of an ORVR vehicle. The air ingestion leads to vapor growth in the UST with corresponding fugitive and vent emissions of gasoline vapor shown as excess emissions in Figure II-2 below.

Figure II-2
Phase II Vapor Recovery System Incompatible with ORVR Vehicles



In recognition of the need for Phase II/ORVR compatibility, amendments to Health and Safety Code section 41954 (c)(1)(C), effective January 1, 2001, require that all Phase II systems be certified to be ORVR compatible.

The ORVR compatibility standard eliminates the excess emissions which can occur during fueling of an ORVR vehicle with a Phase II vapor recovery system that is not ORVR compatible. Compatibility is determined by verifying that the Phase II system can refuel ORVR vehicles without causing the vapor recovery system emissions to exceed the 0.38 lbs/1000 gallon performance standard.

Since 1998, ARB has certified several Phase II vapor recovery systems as being ORVR compatible. Systems were tested to verify that the Phase II system either 1) prevented ingestion of excess air when fueling an ORVR vehicle or 2) allowed air ingestion, but provided a method to control emissions related to vapor growth. The three ORVR systems that are commercially available are listed below.

Table II-1
Currently Certified ORVR Compatible Phase II Vapor Recovery Systems

Phase II System	ARB Executive Order & Approval Letters
Healy	G-70-186, G-70-191
Balance	G-70-52, Letter 03-04
Hirt	G-70-177-AA, Letter 03-06

C. EVR Emission Reductions

The EVR program requirements can be characterized in six EVR modules. Module 1 contains the standards for EVR Phase I systems. Modules 2 through 5 comprise the EVR Phase II system requirements. Module 6 is for in-station diagnostics, which monitors the performance of the Phase I and Phase II systems. Table II-2 summarizes the emission reductions associated with each module.

Table II-2
EVR Emission Reduction Summary

Module	Description	2010 ROG Reductions Statewide, tons/day	**Phase II & ISD Only** 2010 ROG Reductions Statewide, tons/day
1	Phase I	5.5	
2	Phase II	3.1	3.1
3	ORVR Compatibility	4.5	4.5
4	Liquid Retention	0.2	0.2
5	Spillage/Dripless Nozzle	3.9	3.9
6	In-Station Diagnostics	8.5	8.5
	Total	25.7	20.2

The emission reductions for Gilbarco and Wayne Phase II systems were estimated based on field tests conducted in 1998 simulating approximately 40% ORVR vehicle penetration. The estimated emission reductions from the three predominant existing Phase II systems are shown in Table II-3 below. Details on the emission reduction calculations are available in the staff reports for the March 2000 and December 2002 EVR rulemakings.

Table II-3
EVR Phase II and ISD Emission Reductions by System Type*

Module	Description	Balance ROG Reductions Statewide, tons/day	Gilbarco ROG Reductions Statewide, tons/day	Wayne ROG Reductions Statewide, tons/day
2	Phase II	0.0	3.0	0.1
3	ORVR Compatibility	0.0	4.3	0.2
4	Liquid Retention	0.1	0.1	0.0
5	Spillage/Dripless Nozzle	1.8	1.4	0.8
6	In-Station Diagnostics	5.6	1.9	1.0
	Total	7.4	10.6	2.1

* NOTE: Modules 2 and 3 emissions from ARB baseline and simulated ORVR field tests
Modules 4 and 5 emissions are prorated by system throughput
Module 6 emissions calculated using ARB-district audit results as per App. 3 of 2002 EVR Tech Review
Reductions are estimated based on Gilbarco and Wayne systems because those are the predominant assist systems used in California

D. Legal Authorities

Section 41954 of the Health and Safety Code (Appendix 3 contains a copy of section 41954) requires ARB to adopt procedures and performance standards for controlling gasoline emissions from gasoline marketing operations, including transfer and storage operations to achieve and maintain ambient air quality standards. This section also authorizes ARB, in cooperation with districts, to certify vapor recovery systems that meet the performance standards. Section 39607(d) of the Health and Safety Code (HSC) requires ARB to adopt test procedures to determine compliance with ARB and the districts' non-vehicular standards. State law (HSC section 41954) requires districts to use ARB test procedures or their equivalent for determining compliance with performance standards and specifications established by ARB.

To comply with state law, the Board adopted the certification and test procedures found in title 17, Code of Regulations, sections 94110 to 94015 and 94101 to 94165. These regulations reference procedures for certifying vapor recovery systems and test procedures for verifying compliance with performance standards and specifications.

E. Comparable Federal Regulations

There are no comparable federal regulations that certify gasoline vapor recovery systems for service stations; however, changes to ARB vapor recovery certification regulations may have a national impact. ARB certification is required by most other states that mandate the installation of vapor recovery systems in gasoline dispensing facilities.

III. EVR PROGRAM IMPLEMENTATION

The EVR standards are being phased in over several years and apply both to new and existing facilities. This section discusses the timetable for EVR implementation for existing and future service station installations.

A. State Law Requirements and Four-Year Clock

The EVR program that the Board approved in March 2000 significantly modified standards for Phase I and Phase II vapor recovery systems. This means that existing vapor recovery system certifications expire on the EVR operative date of the new requirements. New vapor recovery systems installed after that date must be certified to the new EVR standards.

State law (HSC section 41956.1) provides that vapor recovery systems certified under procedures in effect prior to adoption of revised standards and installed prior to the effective date of the revised standards may continue to be used for a period of four years after the effective date of the revised standards. This is commonly referred to as the "4-year clock." Thus, for example, if the effective date of the new standard is April 1, 2001, station owners who purchased and installed new vapor recovery systems before April 1, 2001, would have until April 1, 2005, before their systems would be required to be replaced or upgraded to meet the EVR standard. State law requires that replacement parts and components must be certified.

New facilities must use certified vapor recovery systems that meet the EVR requirements in effect at time of installation. The "operative date" concept was developed by staff and adopted by the Board to provide additional time to certify systems for new installations after the start of the 4-year clock is triggered by the standard's effective date. For example, the effective date for the ORVR compatibility requirement is April 1, 2001. This started the 4-year clock. However, the operative date for ORVR compatibility is April 1, 2003, which allowed two years before the ORVR requirement was imposed on new facilities. All facilities must comply with the ORVR requirement at the end of the 4-year clock on April 1, 2005. Facilities that undergo a major modification as defined in the EVR regulations are considered to be new facilities and must also install, or upgrade to, EVR systems.

B. Phase-In of EVR Requirements

The EVR standards are being phased-in from April 1, 2001, to April 1, 2009, to allow time to develop systems that meet the technology-forcing standards and that accommodate the 4-year clock discussed above. The operative dates of the EVR standards, which apply to equipment sales and new facilities, are represented by the beginning of each shaded bar in Figure III-1. The end of each bar indicates when all facilities must comply with the standard; thus, it represents the end of the 4-year clock period. The open, dotted bars show the time between the standard's effective date, which triggers the 4-year clock, and the standard's operative date, when the standard must be met by through equipment sales and at new facilities.

For example, the fourth bar in the timeline shows the phase-in of the ORVR compatibility standard. As described above, all new facilities after the April 1, 2003, operative date must install an ORVR compatible Phase II system. Existing facilities have until April 1, 2005, to upgrade their Phase II systems to be ORVR compatible. In this case, the effective date of the ORVR compatibility standard is April 1, 2001, the operative date is April 1, 2003, and the end of the 4-year clock is April 1, 2005.

C. Replacement Parts

As discussed above, HSC section 41956.1 provides that existing systems may be used for four years after the effective date of new standards. However, many vapor recovery components, such as nozzles and hoses, are expected to need replacement during this four-year period. Because state law requires that all necessary repair or replacement parts or components used during the four-year period be certified, a limited-term certification of replacement components was adopted to allow installed systems to continue operation with the best replacement parts available. The certifications for these replacement parts will expire at the end of the four-year clock if the parts do not meet all of the requirements of the new standards. However, when replacement parts certified to meet the new standard are commercially available and are compatible with the existing vapor recovery system, only those replacement parts will be allowed to be installed.

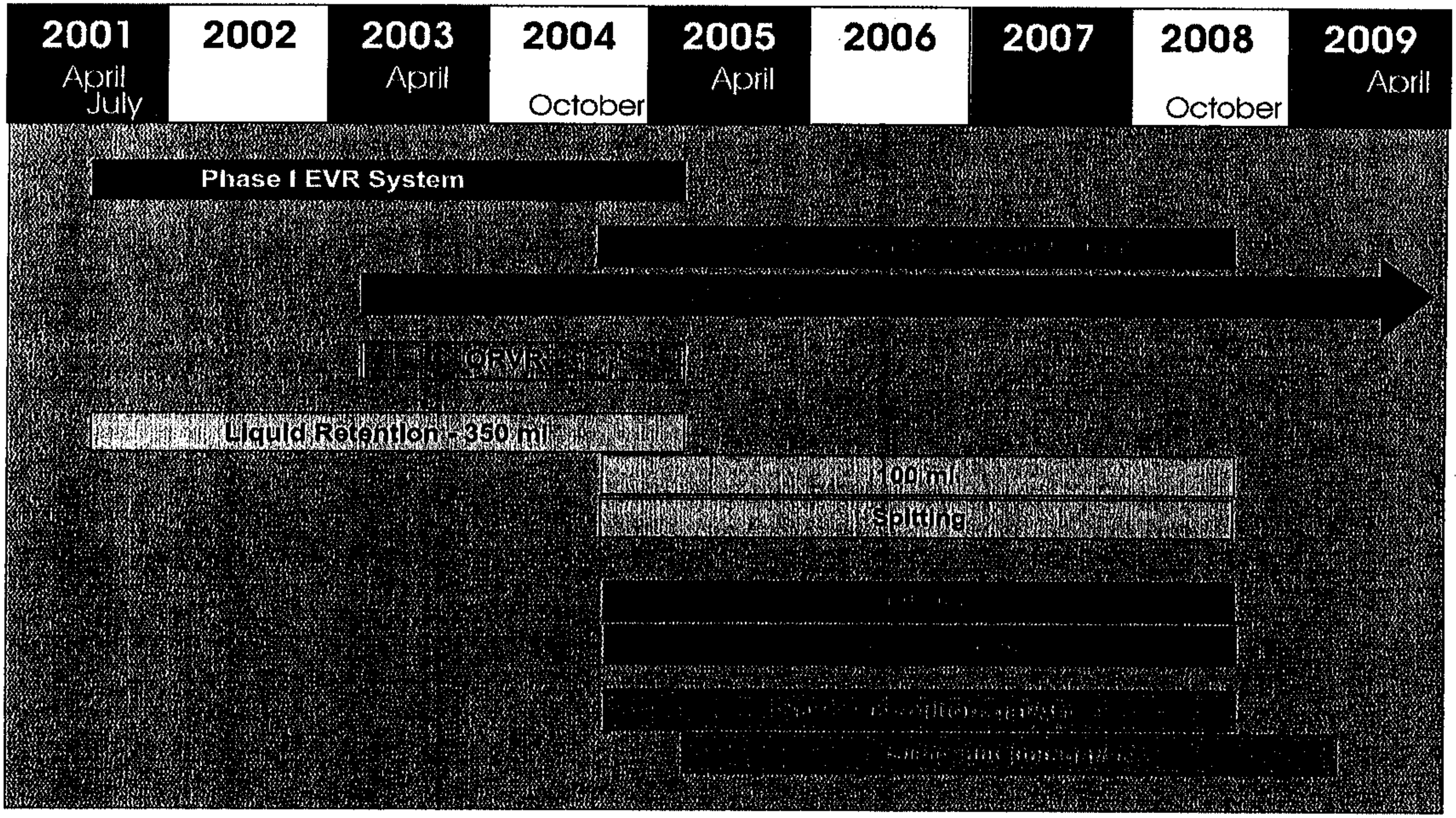
D. Effect of EVR Requirements on New Service Stations

As stated above, new facilities must meet the operative EVR requirements at the time of installation. Because of the phase-in of the requirements, a new station installed in May 2004 is likely to have a vapor recovery system that meets only some of the EVR standards. For example, a new station installing a system that meets the requirement to be compatible with vehicles equipped with on-board-refueling-vapor recovery (ORVR) will have until 2008 or 2009 to install, or upgrade to, a system that meets all of the EVR requirements.

E. Effect of EVR Requirements on Existing Service Stations

As described above, existing stations may continue to use their current vapor recovery systems for four years and maintain these systems with certified replacement parts. Stations that have installed an ORVR compatible vapor recovery system will need to upgrade or replace the vapor recovery system to meet all of the proposed EVR requirements by 2008 or 2009. Stations with Phase II systems that are not ORVR compatible will have to upgrade to a system that is ORVR compatible by April 1, 2005. When an EVR Phase II system is certified (expected September 2004), stations will have the option to meet all EVR requirements by April 1, 2005, but are not required to do so until either October 1, 2008, or April 1, 2009, depending on the station gasoline throughput. Existing stations undergoing a major modification as defined in the EVR regulations are treated as new facilities and must meet the EVR requirements upon installation.

Figure III-1
EVR Timeline



Dotted box: time between start of 4-year clock and operative date
Start of solid bar: date required for new or modified facilities (operative date)
End of solid bar: date required for existing facilities (installed before start of bar)
Not required for dispensers installed before April 2003

IV. RULE DEVELOPMENT PROCESS AND PUBLIC OUTREACH EFFORTS

The staff proposal was communicated to and discussed with Enhanced Vapor Recovery stakeholders through individual meetings, ARB's web site, and a listserve via the internet. Additional discussions are planned via a public workshop.

A. Workshops

ARB staff plans to conduct a workshop in Sacramento on June 16, 2004.

B. Meetings

Meetings were held with a number of stakeholders as summarized below.

Table IV-1
ORVR Compatibility Meetings Held in 2004

Stakeholder	Date(s)
American Petroleum Institute (API)	March 9, March 16, March 30
CA Independent Oil Marketers (CIOMA)	March 9, May 21
CAPCOA Vapor Recovery Committee	April 15
Healy Systems	February 4
Western States Petroleum Association (WSPA)	January 20, March 9, March 16, March 30, April 14

C. Internet

Stakeholders were encouraged to join the vapor recovery list-serve to receive electronic mail (e-mail) notifications when new materials are posted on the vapor recovery webpage (www.arb.ca.gov/vapor/vapor.htm). The workshop notices, agendas, and presentations, as well as the letters to the manufacturers are all available on the webpage. Stakeholders were encouraged to submit formal comments by letter, but they were also permitted and encouraged to address questions and comments to staff via e-mail.

V. REASONS FOR AND SUMMARY OF PROPOSED AMENDMENTS TO THE CERTIFICATION PROCEDURE (CP-201)

The proposed amendment will reduce the cost to comply with the ORVR compatibility requirement for stations that do not currently have unihose gasoline dispensers. It is expected that many stations upgrading to ORVR compatibility will require a change to a different vapor recovery system. Changing over to one of the three certified ORVR compatible systems available now involves modification of the vapor piping in the gasoline dispensers as well as changes to the dispenser "hanging hardware."

Under existing regulations, vapor recovery system modifications that affect 50% of the vapor piping inside the dispenser trigger a conversion of a six-pack dispenser (individual nozzles for each grade of gasoline) to a unihose dispenser (same nozzle for all grades of gasoline). The cost to convert to a unihose dispenser varies, because retrofit kits are available for newer dispensers, while older dispensers cannot be retrofitted and would need to be replaced.

CP-201, "Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities," contains the EVR system performance standards and specifications. Staff proposes revisions to the unihose dispenser requirement specified in CP-201 (section 4.11) as shown below:

> *There shall be only one hose and nozzle for dispensing gasoline on each side of a multi-product dispenser (MPD). This shall not apply to facilities installed prior to April 1, 2003 unless the facility replaces more than 50 percent of the dispensers ~~or makes a modification, other than the installation of required sensors, that modifies over 50 percent of the vapor piping in the dispensers~~. Facility modifications that meet the definition of "major modification" for a Phase II system in D-200 trigger the unihose requirement as the facility is considered a "new installation". Exception: dispensers which must be replaced due to damage resulting from an accident or vandalism may be replaced with the previously installed type of dispenser.*

The staff's proposal affects only existing facilities with non-unihose dispensers. Existing facilities that replace more than 50% of the dispensers will still be required to convert to unihose dispensers. New service stations are required to have unihose dispensers. When the non-unihose dispensers reach the end of their useful life (7 to 10 years), the facility normally will purchase new dispensers for all fueling points, and these are required to be unihose dispensers. EVR Phase II vapor recovery systems will be certified for use with both unihose and non-unihose dispensers.

A. History of Unihose Dispenser Requirements

Gasoline dispensers with the unihose configuration have one hose for all grades. The unihose configuration reduces the number of hoses, nozzles and other hanging hardware by two-thirds compared to the "six-pack" configuration (3 nozzles per dispenser side). As the hanging hardware equipment has leak sources, such as nozzle check valves, minimizing the amount of hanging hardware reduces the potential for leaks. In the February 4, 2000 staff report (Reference 1) for the March 2000 EVR rulemaking, staff proposed that all EVR Phase II systems have unihose dispensers.

Based on comments received prior to the March 23, 2000 hearing as to the considerable cost to upgrade existing dispensers to meet this requirement, proposed section 4.11 was modified before adoption to exempt dispensers installed before the effective date of the unihose requirement. The intent was to allow existing dispensers to be used until replacement at the end of the dispenser useful life (7 to 10 years). This allowed station operators to recover their investment of approximately $10,000 per dispenser. The exemption is voided if the facility replaces more than 50% of the dispensers or makes a modification, other than the installation of required sensors, that modifies over 50% of the dispenser piping. Section 4.11 also allows that dispensers that are damaged due to accident or vandalism may be replaced with the previously installed type of dispenser.

B. Cost to Comply with ORVR Compatibility

The excess emissions due to ORVR incompatibility are attributed to the two predominant assist systems in the state, the Wayne and Gilbarco systems. As shown previously in Table II-2, these two systems combined generate 4.5 tons/day related to ORVR vehicle fuelings as projected in the 2002 EVR rulemaking. Staff, in cooperation with WSPA, is presently re-evaluating these emission estimates that are expected to increase. Staff used the estimated costs to modify Wayne and Gilbarco systems to be ORVR compatible that were provided by WSPA and CIOMA in their letter dated January 30, 2004 (Reference 3). It should be noted that upgrading Wayne and Gilbarco systems to be ORVR compatible may require modification of over 50% of the dispenser vapor piping, thereby triggering the unihose requirement. The total fixed costs per facility vary depending on the number of dispensers at the facility. Costs are estimated for five model gasoline dispensing facilities (GDFs) designated as GDF1 through GDF5, which vary from 2 to 6 dispensers (4 to 12 fueling points) as described in Table V-1 below:

Table V-1

Gasoline Dispensing Facility (GDF) Model Stations used in Cost Analysis

GDF Model	GDF 1	GDF 2	GDF 3	GDF 4	GDF 5
Typical throughput, gal/mo	13,233	37,500	75,000	150,000	300,000
Throughput range, gal/mo	0-25,000	25,001-50,000	50,000-100,000	100,001-200,000	200,001 and up
Number of dispensers	2	2	4	5	6
number of stations (% of statewide total)	458 4.7%	1,375 14.1%	4,456 45.7%	3,052 31.3%	409 4.2%

Tables V-2 and V-3 summarize the estimated costs to make Gilbarco and Wayne systems ORVR compatible under the existing regulation. As can be seen, the cost is especially high for the older non-Advantage Gilbarco and Wayne non-VISTA dispensers. The difference in cost is due to the availability of a retrofit kit to convert the Gilbarco Advantage and Wayne Vista dispensers. No such kit exists for the Gilbarco Non-Advantage dispensers and the Wayne Non-Vista dispensers.

Table V-2
Summary of WSPA Estimated Costs to Convert to Currently Available ORVR Compatible Systems for an Existing Gilbarco System under Existing Regulation
Total Fixed Costs (Equipment Purchase and Installation)

Starting GDF Type		Gilbarco Unihose		Gilbarco 6-pack Advantage		Gilbarco 6-pack Non-Advantage	
Ending GDF Type		Unihose, Balance	Unihose, Healy	Unihose, Balance	Unihose, Healy	Unihose, Balance	Unihose, Healy
Model GDF	Number of dispensers						
GDF 1	2	$3,100	$7,500	$6,100	$10,500	$28,600	$30,000
GDF 2	2	$3,100	$7,500	$6,100	$10,500	$28,600	$30,000
GDF 3	4	$4,700	$13,500	$10,700	$19,500	$52,200	$55,000
GDF 4	5	$5,500	$16,500	$13,000	$24,000	$64,000	$67,500
GDF 5	6	$6,300	$19,500	$15,300	$28,500	$75,800	$80,000

Table V-3
Summary of WSPA Estimated Costs to Convert to Currently Available ORVR Compatible Systems for an Existing Wayne System under Existing Regulation
Total Fixed Costs (Equipment Purchase and Installation)

Starting GDF Type		Wayne Unihose		Wayne 6-pack VISTA		Wayne 6-pack Non-VISTA	
Ending GDF Type		Unihose, Balance	Unihose, Healy	Unihose, Balance	Unihose, Healy	Unihose, Balance	Unihose, Healy
Model GDF	Number of dispensers						
GDF 1	2	$3,100	$7,500	$6,100	$10,500	$11,900	$16,300
GDF 2	2	$3,100	$7,500	$6,100	$10,500	$11,900	$16,300
GDF 3	4	$4,700	$13,500	$10,700	$19,500	$22,300	$31,100
GDF 4	5	$5,500	$16,500	$13,000	$24,000	$27,500	$38,500
GDF 5	6	$6,300	$19,500	$15,300	$28,500	$32,700	$45,900

By contrast, Tables V-4 and V-5 show the lower costs to convert to ORVR compatibility if the staff's proposal is adopted to defer the unihose requirement until 50% of the dispensers at a facility are replaced.

Table V-4
Summary of WSPA Estimated Costs to Convert to Currently Available ORVR Compatible Systems for an Existing Gilbarco System under Staff's Proposal
Total Fixed Costs (Equipment Purchase and Installation)

Starting GDF Type		Gilbarco Unihose		Gilbarco 6-pack	
Ending GDF Type		Unihose, Balance	Unihose, Healy	6-pack, Balance	6-pack, Healy
Model GDF	Number of dispensers				
GDF 1	2	$3,100	$7,500	$4,700	$11,100
GDF 2	2	$3,100	$7,500	$4,700	$11,100
GDF 3	4	$4,700	$13,500	$7,900	$20,700
GDF 4	5	$5,500	$16,500	$9,500	$25,500
GDF 5	6	$6,300	$19,500	$11,100	$30,300

Table V-5
Summary of WSPA Estimated Costs to Convert to Currently Available ORVR Compatible Systems for an Existing Wayne System under Staff's Proposal
Total Fixed Costs (Equipment Purchase and Installation)

Starting GDF Type		Wayne Unihose		Wayne 6-pack	
Ending GDF Type		Unihose, Balance	Unihose, Healy	6-pack, Balance	6-pack, Healy
Model GDF	Number of dispensers				
GDF 1	2	$3,100	$7,500	$4,700	$11,100
GDF 2	2	$3,100	$7,500	$4,700	$11,100
GDF 3	4	$4,700	$13,500	$7,900	$20,700
GDF 4	5	$5,500	$16,500	$9,500	$25,500
GDF 5	6	$6,300	$19,500	$11,100	$30,300

As shown by the tables, the conversion to a balance system for a GDF5 facility with the Gilbarco non-Advantage system is reduced from $75,800 to $11,100, saving $64,700. A similar conversion for a Wayne non-VISTA system provides savings of $34,800.

C. Cost-Effectiveness of ORVR Compatibility Upgrades

Data on the configurations of vapor recovery systems statewide are difficult to obtain, so some assumptions are necessary to estimate the cost-effectiveness of ORVR system upgrades statewide. WSPA estimates that 15% of Gilbarco systems are already in the unihose configuration based on information for the greater Bay Area (Reference 2). This 15% unihose assumption is used for both Wayne and Gilbarco statewide.

As discussed in the previous section, the cost of converting a 6-pack to a unihose configuration varies because newer dispensers can be retrofitted, but older dispensers do not have retrofit kits available and must be replaced. Staff have assumed that 40% of existing sites have 6-pack dispensers of the older type (non-Advantage or non-VISTA), 45% have 6-pack dispensers that are newer and can be retrofitted (Advantage or VISTA), and 15% are unihose.

The total fixed costs per facility vary depending on the number of dispensers at the facility. The EVR cost analysis (References 1 and 3) considers costs for five station types designated as GDF1 through GDF5, which are described in Table V-1. The total number of stations statewide is assumed to be 9,750 as provided on the US Department of Energy web site (Reference 4). Staff has also assumed that half of the stations in each GDF category are assist and half are balance.

The cost analysis assumes a conversion to a balance system as it is the lowest cost conversion. However, the conversion to a Healy system has the advantages of being a first step towards installing a full EVR Phase II system. The Healy EVR Phase II system is completing certification testing and is expected to be certified by late summer.

Cost-effectiveness is a generally accepted measure of the regulatory costs incurred to reduce one pound of pollutant. It is a useful tool for comparing how cost efficient the proposed action is for reducing a given amount of pollutant relative to prior regulations.

The cost-effectiveness is calculated as follows:

$$\text{Cost-Effectiveness} = \frac{\text{Annualized Costs}}{\text{Annual Emission Reductions}} = \frac{(\$/\text{station})(\#\text{ of stations statewide})}{(\text{tons/day})(2000\text{ lb/ton})(365\text{ days/yr})}$$

The following tables show that the staff's proposal significantly improves the cost-effectiveness compared to the existing regulation. As expected, the overall ORVR cost-effectiveness is higher than the $1.74 calculated in 2002 with the assumption that only "hanging hardware" replacement would be necessary to achieve ORVR compatibility. The effect on the total cost-effectiveness of the EVR program (Modules 1 through 6) is an increase from $5.24/lb to $5.65/lb.

Table V-6
ORVR Cost-Effectiveness (C.E.) per Model GDF
Under Existing Regulation

GDF Model	GDF 1	GDF 2	GDF 3	GDF 4	GDF 5
number assist stations (50% of GDF cat total)	229	688	2228	1526	205
ORVR em red (tpd)	0.03	0.24	1.54	2.12	0.57
Total Fixed Cost per station for ORVR Upgrade	$3,100 to $28,600	$3,100 to $28,600	$4,700 to $52,200	$5,500 to $64,000	$6,300 to $75,800
Annualized Cost for ORVR upgrade ($/yr/station)	$2,544	$2,544	$4,730	$5,823	$6,916
2004 ORVR C.E. ($/lb)	$26.60	$9.98	$9.37	$5.74	$3.40
2004 Overall ORVR C.E. ($/lb)	**$7.05**				

Table V-7
ORVR Cost-Effectiveness (C.E.) per Model GDF
Under Staff's Proposal

GDF Model	GDF 1	GDF 2	GDF 3	GDF 4	GDF 5
number assist stations (50% of GDF cat total)	229	688	2228	1526	205
ORVR em red (tpd)	0.03	0.24	1.54	2.12	0.57
Total Fixed Cost per station for ORVR Upgrade	$4,700	$4,700	$7,900	$9,500	$11,100
Annualized Cost for ORVR upgrade ($/yr/station)	$1,531	$1,531	$2,818	$3,461	$4,104
2004 ORVR C.E. ($/lb)	$16.01	$6.01	$5.58	$3.41	$2.02
Overall 2004 ORVR C.E. ($/lb)	**$3.99**				

VI. OUTSTANDING ISSUES

1. Different Schedules for ORVR Compatibility and other Phase II System Standards

ORVR compatibility is required for all facilities by April 2005. All EVR Phase II standards must be met by all facilities by April 2009. Equipment installed or upgraded to meet ORVR compatibility by April 2005 may also need to be replaced or modified again before April 2009. Petroleum marketers have requested that the ORVR implementation schedule be aligned with the Phase II requirement so that only one system installation or upgrade is necessary (Reference 2).

Staff believes it is unnecessary and inappropriate to delay the ORVR compliance date for up to four years as suggested by petroleum marketers. First, staff's assessment shows that equipment modifications needed to comply with ORVR requirements will be compatible with EVR systems now undergoing certification testing. Thus, it should not be necessary to repeat ORVR modifications that are made now. Second, ORVR compliance will achieve emission reductions within the next year, rather than by 2009. Delaying the ORVR compliance date as requested will deprive Californians of cleaner air unnecessarily.

2. ORVR Upgrades are not Cost-Effective

Industry representatives have claimed that the ORVR systems available now are not cost-effective, even with the staff's proposed amendments (Reference 2). Based on the analysis presented in this ISOR, staff maintain that upgrading to an ORVR compatible system remains cost-effective. The overall cost-effectiveness for the ORVR requirement is $3.99/lb as shown in Table V-7.

VII. ECONOMIC AND ENVIRONMENTAL IMPACTS

A. Economic Impact of Proposed Amendments

The proposed amendments will allow station owners to upgrade to ORVR compatible Phase II vapor recovery systems without having to buy new unihose dispensers. Staff estimate the fixed capital cost savings, relative to the existing regulation, for these facilities ranges from $2,000 to $65,000, depending on the dispenser type and station size. The high end of the range represents savings to operators of facilities with older dispensers for which unihose retrofits are not available and where full dispenser replacement would be necessary for the unihose conversion. For example, Table V-2 shows that changing Gilbarco 6-pack dispensers to balance unihose dispensers costs $75,800 for a stations with 6 dispensers. Table V-4 shows that changing the same station to a balance station while keeping the 6-pack configuration costs $11,100, a difference of $64,700.

The 6-pack dispensers will eventually be replaced with unihose dispensers at the end of their useful life (estimated at 7 to 10 years). EVR Phase II systems will be certified to be used with both unihose and non-unihose dispenser configurations.

Environmental Impacts of Proposed Amendments

The unihose requirement reduces the number of possible leak sources at a gasoline dispensing facility with a corresponding decrease in the potential for fugitive gasoline vapor emissions. No EVR emission reductions will be lost under staff's proposal. However, it may be more difficult for facilities to comply with existing requirements that limit the total allowable leak for the vapor recovery system.

VIII. ALTERNATIVES CONSIDERED

We have considered as an alternative the option of not adopting the proposed vapor recovery amendments. Not adopting the proposed procedures would be detrimental as some service station operators would pay up to $65,000 more than necessary to meet the ORVR compatibility requirement.

IX. REFERENCES

1. Staff Report: Initial Statement of Reasons for Proposed Amendments to the Vapor Recovery Certification and Test Procedures for Gasoline Loading and Motor Vehicle Gasoline Refueling at Service Stations, February 4, 2000, Air Resources Board

2. January 30, 2004 letter from Jay McKeeman of California Independent Oil Marketers Association and Joe Sparano of Western States Petroleum Association to Diane Johnston of the Air Resources Board regarding Governor's retrospective review of regulations adopted, amended or repealed since January 6, 1999

3. EVR Technology Review Report, October 2002, Monitoring and Laboratory Division, Air Resources Board

4. California Petroleum Profile at US Department of Energy website <http://tonto.eia.doe.gov/oog/info/state/ca.html>, visited on May 10, 2004

Appendix 1

Proposed Amendments to Title 17, California Code of Regulations

PROPOSED REGULATION ORDER

Note: ~~Strikeout~~ indicates deleted text; <u>underline</u> indicates inserted text.

Amend Title 17, California Code of Regulations, section 94011 to read:

§ 94011. Certification of Vapor Recovery Systems of Dispensing Facilities.

The certification of gasoline vapor recovery systems at dispensing facilities (service stations) shall be accomplished in accordance with the Air Resources Board's CP-201, "Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities" which is herein incorporated by reference. (Adopted: December 9, 1975, as last amended ~~October 8, 2003~~ <u>[date of amendment to be inserted]</u>.

The following test procedures (TP) cited in CP-201 are also incorporated by reference.

TP-201.1 – "Volumetric Efficiency for Phase I Systems" (Adopted: April 12, 1996, as last amended February 1, 2001)

TP-201.1A – "Emission Factor For Phase I Systems at Dispensing Facilities" (Adopted: April 12, 1996, as last amended February 1, 2001)

TP-201.1B – "Static Torque of Rotatable Phase I Adaptors" (Adopted: July 3, 2002)

TP-201.1C – "Pressure Integrity of Drop Tube/Drain Valve Assembly" (Adopted: July 3, 2002)

TP-201.1D – "Pressure Integrity of Drop Tube Overfill Prevention Devices" (Adopted: February 1, 2001, as last amended July 3, 2002)

TP-201.2 – "Efficiency and Emission Factor for Phase II Systems" (Adopted: April 12, 1996, as last amended July 25, 2001)

TP-201.2A – "Determination of Vehicle Matrix for Phase II Systems" (Adopted: April 12, 1996, as amended February 1, 2001)

TP-201.2B – "Pressure Integrity of Vapor Recovery Equipment" (Adopted: April 12, 1996, as last amended February 1, 2001)

TP-201.2C – "Spillage from Phase II Systems" (Adopted: April 12, 1996, as last amended February 1, 2001)

TP-201.2D – "Post-Fueling Drips from Nozzle Spouts" (Adopted: February 1, 2001)

TP-201.2E – "Gasoline Liquid Retention in Nozzles and Hoses" (Adopted: February 1, 2001)

TP-201.2F – "Pressure-Related Fugitive Emissions" (Adopted: February 1, 2001)

TP-201.2H – "Determination of Hazardous Air Pollutants from Vapor Recovery Processors" (Adopted: February 1, 2001)

TP-201.3 – "Determination of 2 Inch WC Static Pressure Performance of Vapor Recovery Systems of Dispensing Facilities" (Adopted: April 12, 1996, as last amended March 17, 1999)

TP-201.3A – "Determination of 5 Inch WC Static Pressure Performance of Vapor Recovery Systems of Dispensing Facilities" (Adopted: April 12, 1996)

TP-201.3B - "Determination of Static Pressure Performance of Vapor Recovery Systems of Dispensing Facilities with Above-Ground Storage Tanks" (Adopted: April 12, 1996)

TP-201.3C – "Determination of Vapor Piping Connections to Underground Gasoline Storage Tanks (Tie-Tank Test)" (Adopted: March 17, 1999)

TP-201.4 – "Dynamic Back Pressure" (Adopted: April 12, 1996, as last amended July 3, 2002)

TP-201.5 – "Air to Liquid Volume Ratio" (Adopted: April 12, 1996, as last amended February 1, 2001)

TP-201.6 – "Determination of Liquid Removal of Phase II Vapor Recovery Systems of Dispensing Facilities" (Adopted: April 12, 1996, as last amended April 28, 2000)

TP-201.6C – "Compliance Determination of Liquid Removal Rate" (Adopted: July 3, 2002)

NOTE: Authority cited: sections 39600, 39601, 39607, and 41954, Health and Safety Code. Reference: sections 39515, 41954, 41956.1, 41959, 41960 and 41960.2, Health and Safety Code.

Appendix 2

Proposed Amendments to the Unihose Requirement in the Regulation for Certification of Vapor Recovery Systems of Dispensing Facilities

California Environmental Protection Agency

Air Resources Board

Vapor Recovery Certification Procedure

CP - 201

Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities

Adopted: December 9, 1975
Amended: March 30, 1976
Amended: August 9, 1978
Amended: December 4, 1981
Amended: September 1, 1982
Amended: April 12, 1996
Amended: April 28, 2000
Amended: February 1, 2001
Amended: June 1, 2001
Amended: July 25, 2001
Amended: July 3, 2002
Amended: March 7, 2003
Amended: July 1, 2003
Amended: October 8, 2003
Amended: ________________

Note: The text is shown in ~~strike-out~~ to indicate text that is proposed for deletion and underline to indicate text that is proposed for addition. Only the amended section is shown.

4.11 Unihose MPD Configuration

There shall be only one hose and nozzle for dispensing gasoline on each side of a multi-product dispenser (MPD). This shall not apply to facilities installed prior to April 1, 2003 unless the facility replaces more than 50 percent of the dispensers ~~or makes a modification, other than the installation of required sensors, that modifies over 50 percent of the vapor piping in the dispensers~~. Facility modifications that meet the definition of "major modification" for a Phase II system in D-200 trigger the unihose requirement as the facility is considered a "new installation". Exception: dispensers which must be replaced due to damage resulting from an accident or vandalism may be replaced with the previously installed type of dispenser.

Appendix 3

Vapor Recovery Health and Safety Code Statutes

H&S 41950 Vapor Recovery Systems for Stationary Gas Tanks

41950. (a) Except as provided in subdivisions (b) and (e), no person shall install or maintain any stationary gasoline tank with a capacity of 250 gallons or more which is not equipped for loading through a permanent submerged fill pipe, unless such tank is a pressure tank as described in Section 41951, or is equipped with a vapor recovery system as described in Section 41952 or with a floating roof as described in Section 41953, or unless such tank is equipped with other apparatus of equal efficiency which has been approved by the air pollution control officer in whose district the tank is located.

(b) Subdivision (a) shall not apply to any stationary tanks installed prior to December 31, 1970.

(c) For the purpose of this section, "gasoline" means any petroleum distillate having a Reid vapor pressure of four pounds or greater.

(d) For the purpose of this section, "submerged fill pipe" means any fill pipe which has its discharge opening entirely submerged when the liquid level is six inches above the bottom of the tank. "Submerged fill pipe," when applied to a tank which is loaded from the side, means any fill pipe which has its discharge opening entirely submerged when the liquid level is 18 inches above the bottom of the tank.

(e) Subdivision (a) shall not apply to any stationary tank which is used primarily for the fueling of implements of husbandry.

(Added by Stats. 1975, Ch. 957.)

H&S 41951 Definition of Pressure Tank

41951. A "pressure tank" is a tank which maintains working pressure sufficient at all times to prevent hydrocarbon vapor or gas loss to the atmosphere.

(Added by Stats. 1975, Ch. 957.)

H&S 41952 Definition of Vapor Recovery System

41952. A "vapor recovery system" consists of a vapor gathering system capable of collecting the hydrocarbon vapors and gases discharged and a vapor disposal system capable of processing such hydrocarbon vapors and gases so as to prevent their emission into the atmosphere, with all tank gauging and sampling devices gastight except when gauging or sampling is taking place.

(Added by Stats. 1975, Ch. 957.)

H&S 41953 Definition of Floating Roof

41953. A "floating roof" consists of a pontoon-type or double-deck-type roof, resting on the surface of the liquid contents and equipped with a closure seal, or seals, to close the space between the roof edge and tank wall. The control equipment required by this section shall not be used if the gasoline or petroleum distillate has a vapor pressure of 11.0 pounds per square inch absolute or greater under actual storage conditions. All tank gauging and sampling devices shall be gastight except when gauging or sampling is taking place.

(Added by Stats. 1975, Ch. 957.)

H&S 41954 ARB Shall Certify Vapor Recovery Systems

41954. (a) The state board shall adopt procedures for determining the compliance of any system designed for the control of gasoline vapor emissions during gasoline marketing operations, including storage and transfer operations, with performance standards that are reasonable and necessary to achieve or maintain any applicable ambient air quality standard.

(b) The state board shall, after a public hearing, adopt additional performance standards that are reasonable and necessary to ensure that systems for the control of gasoline vapors resulting from motor vehicle fueling operations do not cause excessive gasoline liquid spillage and excessive evaporative emissions from liquid retained in the dispensing nozzle or vapor return hose between refueling events, when used in a proper manner. To the maximum extent practicable, the additional performance standards shall allow flexibility in the design of gasoline vapor recovery systems and their components.

(c) (1) The state board shall certify, in cooperation with the districts, only those gasoline vapor control systems that it determines will meet the following requirements, if properly installed and maintained:

(A) The systems will meet the requirements of subdivision (a).

(B) With respect to any system designed to control gasoline vapors during vehicle refueling, that system, based on an engineering evaluation of that system's component qualities, design, and test performance, can be expected, with a high degree of certainty, to comply with that system's certification conditions over the warranty period specified by the board.

(C) With respect to any system designed to control gasoline vapors during vehicle refueling, that system shall be compatible with vehicles equipped with onboard refueling vapor recovery (ORVR) systems.

(2) The state board shall enumerate the specifications used for issuing the certification. After a system has been certified, if circumstances beyond the control of the state board cause the system to no longer meet the required specifications or standards, the state board shall revoke or modify the certification.

(d) The state board shall test, or contract for testing, gasoline vapor control systems for the purpose of determining whether those systems may be certified.

(e) The state board shall charge a reasonable fee for certification, not to exceed its actual costs therefor. Payment of the fee shall be a condition of certification.

(f) No person shall offer for sale, sell, or install any new or rebuilt gasoline vapor control system, or any component of the system, unless the system or component has been certified by the state board and is clearly identified by a permanent identification of the certified manufacturer or rebuilder.

(g) (1) Except as authorized by other provisions of law and except as provided in this subdivision, no district may adopt, after July 1, 1995, stricter procedures or performance standards than those adopted by the state board pursuant to subdivision (a), and no district may enforce any of those stricter procedures or performance standards.

(2) Any stricter procedures or performance standards shall not require the retrofitting, removal, or replacement of any existing system, which is installed and operating in compliance with applicable requirements, within four years from the effective date of those procedures or performance standards, except that existing requirements for retrofitting, removal, or replacement of nozzles with nozzles containing vapor-check valves may be enforced commencing July 1, 1998.

(3) Any stricter procedures or performance standards shall not be

implemented until at least two systems meeting the stricter performance standards have been certified by the state board.

(4) If the certification of a gasoline vapor control system, or a component thereof, is revoked or modified, no district shall require a currently installed system, or component thereof, to be removed for a period of four years from the date of revocation or modification.

(h) No district shall require the use of test procedures for testing the performance of a gasoline vapor control system unless those test procedures have been adopted by the state board or have been determined by the state board to be equivalent to those adopted by the state board, except that test procedures used by a district prior to January 1, 1996, may continue to be used until January 1, 1998, without state board approval.

(i) With respect to those vapor control systems subject to certification by the state board, there shall be no criminal or civil proceedings commenced or maintained for failure to comply with any statute, rule, or regulation requiring a specified vapor recovery efficiency if the vapor control equipment which has been installed to comply with applicable vapor recovery requirements meets both of the following requirements:

(1) Has been certified by the state board at an efficiency or emission factor required by applicable statutes, rules, or regulations.

(2) Is installed, operated, and maintained in accordance with the requirements set forth in the document certification and the instructions of the equipment manufacturer.

(Amended by Stats. 2000, Ch. 729, Sec. 14.)

References at the time of publication (see page iii):

Regulations:
17, CCR, sections 94006, 94010, 94011,
94012, 94013, 94014, 94015, 94148, 94149, 94150, 94151, 94152, 94153,
94154, 94155, 94156, 94157, 94158, 94159, 94160, 94163

H&S 41955 Certification Required by Other Agencies

41955. Prior to state board certification of a gasoline vapor control system pursuant to Section 41954, the manufacturer of the system shall submit the system to, or, if appropriate, the components of the system as requested by, the Division of Measurement Standards of the Department of Food and Agriculture and the State Fire Marshal for their certification.

(Added by Stats. 1976, Ch. 1030.)

H&S 41956 Other Agencies to Adopt Rules for Certification

41956. (a) As soon as possible after the effective date of this section, the State Fire Marshal and the Division of Measurement Standards, after consulting with the state board, shall adopt rules and regulations for the certification of gasoline vapor control systems and components thereof.

(b) The State Fire Marshal shall be the only agency responsible for determining whether any component or system creates a fire hazard. The division shall be the only agency responsible for the measurement accuracy aspects, including gasoline recirculation of any component or system.

(c) Within 120 days after the effective date of this subdivision, the Division of Measurement Standards, shall, after public hearing, adopt rules and regulations containing additional performance standards and standardized certification and compliance test procedures which are reasonable and necessary to prevent gasoline recirculation in systems for the control of gasoline vapors resulting from motor vehicle fueling operations.

(Amended by Stats. 1981, Ch. 902.)

H&S 41956.1 Revision of Standards for Vapor Recovery Systems

41956.1. (a) Whenever the state board, the Division of Measurement Standards of the Department of Food and Agriculture, or the State Fire Marshal revises performance or certification standards or revokes a certification, any systems or any system components certified under procedures in effect prior to the adoption of revised standards or the revocation of the certification and installed prior to the effective date of the revised standards or revocation may continue to be used in gasoline marketing operations for a period of four years after the effective date of the revised standards or the revocation of the certification. However, all necessary repair or replacement parts or components shall be certified.

(b) Notwithstanding subdivision (a), whenever the State Fire

Marshal determines that a system or a system component creates a hazard to public health and welfare, the State Fire Marshal may prevent use of the particular system or component.

(c) Notwithstanding subdivision (a), the Division of Measurement Standards may prohibit the use of any system or any system component if it determines on the basis of test procedures adopted pursuant to subdivision (c) of Section 41956, that use of the system or component will result in gasoline recirculation.

(Amended by Stats. 1996, Ch. 426, Sec. 2.)

References at the time of publication (see page iii):

Regulations: 17, CCR, section 94011

H&S 41957 Division of Industrial Safety Responsibilities

41957. The Division of Occupational Safety and Health of the Department of Industrial Relations is the only agency responsible for determining whether any gasoline vapor control system, or component thereof, creates a safety hazard other than a fire hazard.

If the division determines that a system, or component thereof, creates a safety hazard other than a fire hazard, that system or component may not be used until the division has certified that the system or component, as the case may be, does not create that hazard.

The division, in consultation with the state board, shall adopt the necessary rules and regulations for the certification if the certification is required.

(Amended by Stats. 1981, Ch. 714.)

H&S 41958 Rules Shall Allow for Flexibility in Design

41958. To the maximum extent practicable, the rules and regulations adopted pursuant to Sections 41956 and 41957 shall allow flexibility in the design of gasoline vapor control systems and their components. The rules and regulations shall set forth the performance standards as to safety and measurement accuracy and the minimum procedures to be followed in testing the system or component for compliance with the performance standards.

The State Fire Marshal, the Division of Occupational Safety and

Health, and the Division of Measurement Standards shall certify any system or component which complies with their adopted rules and regulations. Any one of the state agencies may certify a system or component on the basis of results of tests performed by any entity retained by the manufacturer of the system or component or by the state agency. The requirements for the certification of a system or component shall not require that it be tested, approved, or listed by any private entity, except that certification testing regarding recirculation of gasoline shall include testing by an independent testing laboratory.

(Amended by Stats. 1982, Ch. 466, Sec. 72.)

H&S 41959 Certification Testing

41959. Certification testing of gasoline vapor control systems and their components by the state board, the State Fire Marshal, the Division of Measurement Standards, and the Division of Occupational Safety and Health may be conducted simultaneously.

(Amended by Stats. 1981, Ch. 714.)

References at the time of publication (see page iii):

Regulations: 17, CCR, sections 94010, 94011, 94012, 94013

H&S 41960 Certification by State Agencies Sufficient

41960. (a) Certification of a gasoline vapor recovery system for safety and measurement accuracy by the State Fire Marshal and the Division of Measurement Standards and, if necessary, by the Division of Occupational Safety and Health shall permit its installation wherever required in the state, if the system is also certified by the state board.

(b) Except as otherwise provided in subdivision (g) of Section 41954, no local or regional authority shall prohibit the installation of a certified system without obtaining concurrence from the state agency responsible for the aspects of the system which the local or regional authority disapproves.

(Amended by Stats. 1996, Ch. 426, Sec. 3.)

References at the time of publication (see page iii):

Regulations: 17, CCR, sections 94011, 94012, 94013

H&S 41960.1 Operation in Accordance with Standards

41960.1. (a) All vapor control systems for the control of gasoline vapors resulting from motor vehicle fueling operations shall be operated in accordance with the applicable standards established by the State Fire Marshal or the Division of Measurement Standards pursuant to Sections 41956 to 41958, inclusive.

(b) When a sealer or any authorized employee of the Division of Measurement Standards determines, on the basis of applicable test procedures of the division, adopted after public hearing, that an individual system or component for the control of gasoline vapors resulting from motor vehicle fueling operations does not meet the applicable standards established by the Division of Measurement Standards, he or she shall take the appropriate action specified in Section 12506 of the Business and Professions Code.

(c) When a deputy State Fire Marshal or any authorized employee of a fire district or local or regional firefighting agency determines that a component of a system for the control of gasoline vapors resulting from motor vehicle fueling operations does not meet the applicable standards established by the State Fire Marshal, he or she shall mark the component "out of order." No person shall use or permit the use of the component until the component has been repaired, replaced, or adjusted, as necessary, and either the component has been inspected by a representative of the agency employing the person originally marking the component, or the person using or permitting use of the component has been expressly authorized by the agency to use the component pending reinspection.

(Added by Stats. 1981, Ch. 902.)

H&S 41960.2 Maintenance of Installed Systems

41960.2. (a) All installed systems for the control of gasoline vapors resulting from motor vehicle fueling operations shall be maintained in good working order in accordance with the manufacturer' s specifications of the system certified pursuant to Section 41954.

(b) Whenever a gasoline vapor recovery control system is repaired or rebuilt by someone other than the original manufacturer or its authorized representative, the person shall permanently affix a plate to the vapor recovery control system that identifies the repairer or rebuilder and specifies that only certified equipment was used. In addition, a rebuilder of a vapor control system shall remove any identification of the original manufacturer if the removal does not affect the continued safety or performance of the vapor control system.

(c) (1) The executive officer of the state board shall identify and list equipment defects in systems for the control of gasoline vapors resulting from motor vehicle fueling operations that substantially impair the effectiveness of the systems in reducing air contaminants. The defects shall be identified and listed for each certified system and shall be specified in the applicable certification documents for each system.

(2) On or before January 1, 2001, and at least once every three years thereafter, the list required to be prepared pursuant to paragraph (1) shall be reviewed by the executive officer at a public workshop to determine whether the list requires an update to reflect changes in equipment technology or performance.

(3) Notwithstanding the timeframes for the executive officer's review of the list, as specified in paragraph (2), the executive officer may initiate a public review of the list upon a written request that demonstrates, to the satisfaction of the executive officer, the need for such a review. If the executive officer determines that an update is required, the update shall be completed no later than 12 months after the date of the determination.

(d) When a district determines that a component contains a defect specified pursuant to subdivision (c), the district shall mark the component "Out of Order." No person shall use or permit the use of the component until the component has been repaired, replaced, or adjusted, as necessary, and the district has reinspected the component or has authorized use of the component pending reinspection.

(e) Where a district determines that a component is not in good working order but does not contain a defect specified pursuant to subdivision (c), the district shall provide the operator with a notice specifying the basis on which the component is not in good working order. If, within seven days, the operator provides the district with adequate evidence that the component is in good working order, the operator shall not be subject to liability under this division.

(Amended by Stats. 1999, Ch. 501, Sec. 1.)

References at the time of publication (see page iii):

Regulations: 17, CCR, sections 94006, 94010, 94011

H&S 41960.3 Telephone Number for Reporting Problems

41960.3. (a) Each district which requires the installation of systems for the control of gasoline vapors resulting from motor vehicle fueling operations shall establish a toll free telephone number for use by the public in reporting problems experienced with the systems. Districts within an air basin or adjacent air basin may enter into a cooperative program to implement this requirement. All complaints received by a district shall be recorded on a standardized form which shall be established by the state board, in consultation with districts, the State Fire Marshal, and the Division of Measurement Standards in the Department of Food and Agriculture. The operating instructions required by Section 41960.4 shall be posted at all service stations at which systems for the control of gasoline vapors resulting from motor vehicle fueling operations are installed and shall include a prominent display of the toll free telephone number for complaints in the district in which the station is located.

(b) Upon receipt of each complaint, the district shall diligently either investigate the complaint or refer the complaint for investigation by the state or local agency which properly has jurisdiction over the primary subject of the complaint. When the investigation has been completed, the investigating agency shall take such remedial action as is appropriate and shall advise the complainant of the findings and disposition of the investigation. A copy of the complaint and response to the complaint shall be forwarded to the state board.

(Amended by Stats. 1986, Ch. 194, Sec. 1.)

H&S 41960.4 Operating Instructions

41960.4. The operator of each service station utilizing a system for the control of gasoline vapors resulting from motor vehicle fueling operations shall conspicuously post operating instructions for the system in the gasoline dispensing area. The instructions shall clearly describe how to fuel vehicles correctly with vapor recovery nozzles utilized at the station and shall include a warning that repeated attempts to continue dispensing, after the system having indicated that the vehicle fuel tank is full, may result in spillage or recirculation of gasoline.

(Added by Stats. 1981, Ch. 902.)

H&S 41960.5 Nozzle Size Requirements

41960.5. (a) No retailer, as defined in Section 20999 of the Business and Professions Code, shall allow the operation of any gasoline pump from which leaded gasoline is dispensed, or which is labeled as providing leaded gasoline, unless the pump is equipped with a nozzle spout meeting the required specifications for leaded gasoline nozzle spouts set forth in Title 40, Code of Federal Regulations, Section 80.22(f)(1).

(b) For the purpose of this section, "leaded gasoline" means gasoline which is produced with the use of any lead additive or which contains more than 0.05 gram of lead per gallon or more than 0.005 gram of phosphorus per gallon.

(Added by Stats. 1987, Ch. 592, Sec. 2.)

H&S 41960.6 Fuel Pump Nozzles

41960.6. (a) No retailer, as defined in subdivision (g) of Section 20999 of the Business and Professions Code, shall, on or after July 1, 1992, allow the operation of a pump, including any pump owned or operated by the state, or any county, city and county, or city, equipped with a nozzle from which gasoline or diesel fuel is dispensed, unless the nozzle is equipped with an operating hold open latch. Any hold open latch determined to be inoperative by the local fire marshal or district official shall be repaired or replaced by the retailer, within 48 hours after notification to the retailer of that determination, to avoid any applicable penalty or fine.

(b) For purposes of this section, a "hold open latch" means any device which is an integral part of the nozzle and is manufactured specifically for the purpose of dispensing fuel without requiring the consumer's physical contact with the nozzle.

(c) Subdivision (a) does not apply to nozzles at facilities which are primarily in operation to refuel marine vessels or aircraft.

(d) Nothing in this section shall affect the current authority of any local fire marshal to establish and maintain fire safety provisions for his or her jurisdiction.

(Added by Stats. 1991, Ch. 468, Sec. 2.)

H&S 41961 Fees for Certification

41961. The State Fire Marshal, the Division of Measurement Standards, and the Division of Occupational Safety and Health may charge a reasonable fee for certification of a gasoline vapor control system or a component thereof, not to exceed their respective estimated costs therefor. Payment of the fee may be made a condition of certification. All money collected by the State Fire Marshal pursuant to this section shall be deposited in the State Fire Marshal Licensing and Certification Fund established pursuant to Section 13137, and shall be available to the State Fire Marshal upon appropriation by the Legislature to carry out the purposes of this article.

(Amended by Stats. 1992, Ch. 306, Sec. 5. Effective January 1, 1993. Operative July 1, 1993, by Sec. 6 of Ch. 306.)

H&S 41962 Vapor Recovery Systems on Cargo Tank Vehicles

41962. (a) Notwithstanding Section 34002 of the Vehicle Code, the state board shall adopt test procedures to determine the compliance of vapor recovery systems of cargo tanks on tank vehicles used to transport gasoline with vapor emission standards which are reasonable and necessary to achieve or maintain any applicable ambient air quality standard. The performance standards and test procedures adopted by the state board shall be consistent with the regulations adopted by the Commissioner of the California Highway Patrol and the State Fire Marshal pursuant to Division 14.7 (commencing with Section 34001) of the Vehicle Code.

(b) The state board may test, or contract for testing, the vapor recovery system of any cargo tank of any tank vehicle used to transport gasoline. The state board shall certify the cargo tank vapor recovery system upon its determination that the system, if properly installed and maintained, will meet the requirements of subdivision (a). The state board shall enumerate the specifications used for issuing such certification. After a cargo tank vapor recovery system has been certified, if circumstances beyond control of the state board cause the system to no longer meet the required specifications, the certification may be revoked or modified.

(c) Upon verification of certification pursuant to subdivision (b), which shall be done annually, the state board shall send a verified copy of the certification to the registered owner of the tank vehicle, which copy shall be retained in the tank vehicle as evidence of certification of its vapor recovery system. For each system certified, the state board shall issue a nontransferable and nonremovable decal to be placed on the cargo tank where the decal can be readily seen.

(d) With respect to any tank vehicle operated within a district, the state board, upon request of the district, shall send to the district, free of charge, a certified copy of the certification and test results of any cargo tank vapor recovery system on the tank vehicle.

(e) The state board may contract with the Department of the California Highway Patrol to carry out the responsibilities imposed by subdivisions (b), (c), and (d).

(f) The state board shall charge a reasonable fee for certification, not to exceed its estimated costs therefor. Payment of the fee shall be a condition of certification. The fees may be collected by the Department of the California Highway Patrol and deposited in the Motor Vehicle Account in the State Transportation Fund. The Department of the California Highway Patrol shall transfer to the Air Pollution Control Fund the amount of those fees necessary to reimburse the state board for the costs of administering the certification program.

(g) No person shall operate, or allow the operation of, a tank vehicle transporting gasoline and required to have a vapor recovery system, unless the system thereon has been certified by the state board and is installed and maintained in compliance with the state board's requirements for certification. Tank vehicles used exclusively to service gasoline storage tanks which are not required to have gasoline vapor controls are exempt from the certification requirement.

(h) Performance standards of any district for cargo tank vapor recovery systems on tank vehicles used to transport gasoline shall be identical with those adopted by the state board therefor and no district shall adopt test procedures for, or require certification of, cargo tank vapor recovery systems. No district may impose any fees on, or require any permit of, tank vehicles with vapor recovery systems. However, nothing in this section shall be construed to prohibit a district from inspecting and testing cargo tank vapor recovery systems on tank vehicles for the purposes of enforcing this section or any rule and regulation adopted thereunder that are applicable to such systems and to the loading and unloading of cargo tanks on tank vehicles.

(i) The Legislature hereby declares that the purposes of this section regarding cargo tank vapor recovery systems on tank vehicles are (1) to remove from the districts the authority to certify, except as specified in subdivision (b), such systems and to charge fees therefor, and (2) to grant such authority to the state board, which shall have the primary responsibility to assure that such systems are operated in compliance with its standards and procedures adopted pursuant to subdivision (a).

(Amended by Stats. 1982, Ch. 1255, Sec. 2. Operative July 1, 1983, or earlier, by Sec. 27.5 of Ch. 1255.)

References at the time of publication (see page iii):

Regulations: 17, CCR, sections 94014, 94015

CALIFORNIA AIR RESOURCES BOARD

NOTICE OF PUBLIC HEARING TO CONSIDER APPROVAL OF A REVISION TO THE STATE IMPLEMENTATION PLAN FOR CARBON MONOXIDE

The Air Resources Board (the Board or ARB) will conduct a public hearing at the time and place noted below to consider approving a revision to the State Implementation Plan (SIP) for carbon monoxide (CO). The revision consists of an update to the CO maintenance plan (Plan) for ten urban areas that have attained the federal air quality standard for CO since the early 1990s: Bakersfield, Chico, Fresno, North Lake Tahoe, South Lake Tahoe, Modesto, Sacramento, San Diego, San Francisco Bay Area, and Stockton. The staff's proposed Plan shows how all of these areas will continue to maintain the standard through 2018. It updates emissions estimates and establishes new on-road motor vehicle emission budgets for transportation conformity purposes.

DATE: July 22, 2004

TIME: 9:00 a.m.

PLACE: California Environmental Protection Agency
Air Resources Board
1001 I Street
Central Valley Auditorium, Second Floor
Sacramento, California 95814

This item will be considered at a two-day meeting of the Board, which will commence at 9:00 a.m., July 22, 2004, and may continue at 8:30 a.m., July 23, 2004. This item may not be considered until July 23, 2004. Please consult the agenda for the meeting, which will be available at least 10 days before July 22, 2004, to determine the day on which this item will be considered.

If you have a disability-related accommodation need, please go to http://www.arb.ca.gov/html/ada/ada.htm for assistance or contact the ADA Coordinator at (916) 323-4916. If you are a person who needs assistance in a language other than English, please go to http://inside.arb.ca.gov/as/eeo/languageaccess.htm or contact the Bilingual Coordinator at (916) 324-5049. TTY/TDD/Speech-to-Speech users may dial 7-1-1 for the California Relay Service.

At the hearing, ARB staff will make an oral presentation and recommend that the Board adopt the Plan. Copies of the proposed Plan will be available from the Board's Public Information Office, 1001 I Street, 1st Floor, Environmental Services Center, Sacramento CA 95814, (916) 322-2990, no later than June 22, 2004. The proposed Plan may also be obtained from ARB's internet site at http://www.arb.ca.gov/planning/sip/co/co.htm.

Interested members of the public may also present comments orally or in writing at the meeting, and in writing or by e-mail before the meeting. To be considered by the Board, any written comments not physically submitted at the meeting must be received no later than 12:00 noon, July 21, 2004.

Postal mail is to be sent to:.

Clerk of the Board
Air Resources Board
1001 "I" Street, 23rd Floor
Sacramento, California 95814

Electronic mail is to be sent to cosip@listserv.arb.ca.gov, and received at ARB no later than 12:00 noon, July 21, 2004.

Facsimile submissions are to be transmitted to the Clerk of the Board at (916) 322-3928 and received at ARB no later than 12:00 noon, July 21, 2004.

The Board requests, but does not require, 30 copies of any written submission. Also, the ARB requests that written and e-mail statements be filed at least 10 days prior to the meeting so that ARB staff and Board members have time to fully consider each comment. Further inquiries regarding this matter should be directed to Ms. Lucille van Ommering, Staff Air Pollution Specialist, at (916) 323-0296.

CALIFORNIA AIR RESOURCES BOARD

Catherine Witherspoon
Executive Officer

Date: June 18, 2004

Proposed

2004 Revision to the California State Implementation Plan for Carbon Monoxide

Updated Maintenance Plan For Ten Federal Planning Areas

Date of Release: June 22, 2004
Board Hearing: July 22, 2004

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our Website: http://www.arb.ca.gov.

California Environmental Protection Agency
AIR RESOURCES BOARD

(This page intentionally left blank.)

DOCUMENT AVAILABILITY

Electronic copies of this document, the July workshop and hearing notices hearing notice, and related materials can be found on ARB's web site at: http://www.arb.ca.gov/planning/sip/co/co.htm. Alternatively, paper copies may be obtained from the Board's Public Information Office, 1001 I Street, 1st Floor, Environmental Services Center, Sacramento, California 95814, (916) 322-2990.

If you have a disability-related accommodation need, please go to http://www.arb.ca.gov/html/ada/ada.htm for assistance or contact the ADA Coordinator at (916) 323-4916. If you are a person who needs assistance in a language other than English, please go to http://inside.arb.ca.gov/as/eeo/languageaccess.htm or contact the Bilingual Coordinator at (916) 324-5049.

CONTACT

For questions, please contact Lucille van Ommering, Staff Air Pollution Specialist, at (916) 323-0296 or by email at lvanomme@arb.ca.gov.

PUBLIC WORKSHOP

Staff will hold a public workshop to discuss the proposed Plan:

July 13, 2004 from 2:00 p.m. – 3:00 p.m.
California Environmental Protection Agency, Room 720
1001 I Street, Sacramento, California

AIR RESOURCES BOARD HEARING

The Board will consider this item and others during its regular meeting:

Begins July 22, 2004 at 9:00 a.m. and may continue July 23, 2004 at 8:30 a.m.
California Environmental Protection Agency, Central Valley Auditorium, Second Floor
1001 I Street, Sacramento, California

Prior to the hearing, the public may submit written comments through regular mail, e-mail or fax. To be considered by the Board, written comments not physically submitted at the hearing must be **received no later than 12:00 noon, July 21, 2004,** and sent to:

Clerk of the Board
Air Resources Board
1001 I Street, 23rd Floor
Sacramento, California 95814

or by e-mail to: cosip@listserv.arb.ca.gov
or by facsimile transmission to the Clerk of the Board at (916) 322-3928

AUTHORS

Darryl Hawkins, Air Resources Engineer
Gary Honcoop, Manager, Strategic Analysis and Liaison Section
Lucille van Ommering, Staff Air Pollution Specialist

CONTRIBUTORS

Motor Vehicle Emissions Estimates
Doug Thompson, Manager, Motor Vehicle Assessments Section
Dennis Wade, Associate Air Pollution Specialist
Tom Scheffelin, Air Resources Engineer

Air Quality Data
Gayle Sweigert, Manager, Air Quality Analysis Section
Marci Nystrom, Staff Air Pollution Specialist

Emissions Inventory Data
Martin Johnson, Staff Air Pollution Specialist
Larry Hunsaker, Air Pollution Specialist

ACKNOWLEDGEMENTS

We would like to thank the staff of the local air districts and transportation planning agencies in the ten carbon monoxide maintenance areas who provided data and information in the development of this Plan.

Table of Contents

List of Tables

Appendices

EXECUTIVE SUMMARY

The dramatic reduction in carbon monoxide (CO) levels across California is one of the biggest success stories in air pollution control. Air Resources Board (ARB or Board) requirements for cleaner vehicles, equipment, and fuels have cut peak CO levels in half since 1980, despite growth. All areas of the State designated as nonattainment for the federal 8-hour CO standard[1] in 1991 now attain the standard, including the Los Angeles urbanized area. Even the Calexico area of Imperial County on the congested Mexican border had no violations of the federal CO standard in the 2003-2004 winter season. Only the South Coast and Calexico continue to violate the more protective State 8-hour CO standard, with declining levels beginning to approach that standard.

With the support of the affected local air pollution control and air quality management districts (districts), ARB adopted a State Implementation Plan (SIP) revision in 1996 documenting that ten areas had attained the federal 8-hour CO air quality standard between 1992-1995 and demonstrating how they would continue to maintain compliance with that standard.

Bakersfield Metropolitan Area	Modesto Urbanized Area
Chico Urbanized Area	Sacramento Urbanized Area
Fresno Urbanized Area	San Diego Area
Lake Tahoe North Shore Area	San Francisco-Oakland-San Jose Area
Lake Tahoe South Shore Area	Stockton Urbanized Area

In response, the U.S. Environmental Protection Agency (U.S. EPA) approved the 1996 SIP revision and formally redesignated these ten areas to attainment in 1998.

The Board formally amended the approved CO Maintenance Plan in 1998. As part of the phaseout of methyl tertiary butyl ether (MTBE), the Board rescinded its requirement for most California counties that oxygenates be added to gasoline in the wintertime, a control measure identified in the 1996 CO Maintenance Plan. ARB concluded that stricter vehicle emission standards would more than make up for the CO reductions foregone as a result of this action. ARB submitted two SIP revisions in 1998: a rule amendment to remove the wintertime oxygenates provision for the specified counties from the approved regulation in the SIP, and a revised CO Maintenance Plan demonstrating that the ten areas would continue to attain the CO standard with the then-current control program. U.S. EPA has not yet acted on these submittals. This proposed revision reflects our 1998 submittals.

By 2003, all ten maintenance areas were monitoring CO levels 30 to 90 percent below the federal 8-hour CO standard. These levels, together with declining emissions due to an ever-cleaner vehicle fleet, provide assurance that the ten areas will continue to attain the standard by a generous margin.

[1] The federal CO standard is 9 parts per million (ppm) averaged over 8 hours. To determine attainment, the greater of the second high levels measured at a site in each of two consecutive years (known as the design value) is compared to the standard. With federal rounding conventions, a design value of up to 9.4 ppm equals attainment.

Monitoring Shows Ambient CO Levels Are Far Below Federal Standard

CO Maintenance Area	Attainment Level (ppm)	Monitored CO Value in 2003 (ppm)	Percent Below Attainment Level (as of 2003)
Bakersfield	9.4	2.5	77%
Chico	9.4	3.4	64%
Fresno	9.4	4.3	54%
Lake Tahoe North Shore[1]	9.4	0.9[1]	90%
Lake Tahoe South Shore	9.4	6.5	31%
Modesto	9.4	3.7	61%
Sacramento	9.4	4.2	55%
San Diego	9.4	4.1	56%
San Francisco – Oakland – San Jose	9.4	4.9	48%
Stockton	9.4	3.2	66%

[1]Data for 1993 - 1995 were collected at the Tahoe City site, which subsequently was closed in June 1995. Data for 2000 were collected at a site in Incline Village, which was closed in August 2001 because of very low values. Although Incline Village is in the State of Nevada, the design value is included here to give an indication of CO values at Lake Tahoe North Shore.

We propose to update the CO SIP for the ten federal maintenance areas to:

- Extend the 1996 CO Maintenance Plan demonstration to 2018, reflecting the existing CO control program[2] without wintertime oxygenates.
- Incorporate significant improvements to the emissions inventory for past, present, and future years – especially new motor vehicle estimates using the current emissions model (EMFAC2002) and latest transportation planning assumptions.
- Revise the on-road vehicle emission budgets for transportation conformity based on the improved inventory.

This SIP revision would benefit air quality and public health by:

- Demonstrating that ARB regulations will continue to cut CO emissions, thereby reducing public exposure, especially in high traffic areas.
- Setting a new emission baseline that uses the most current data and reflects the benefits of additional controls on motor vehicles, off-road equipment, and fuels.
- Tightening the emission benchmark for on-road motor vehicles required to ensure that transportation plans and projects will not cause or contribute to new violations of the federal CO standard.

Recommendation

ARB staff recommends that the Board adopt this proposed 2004 Revision to the California State Implementation Plan for Carbon Monoxide – Updated Maintenance Plan for Ten Federal Planning Areas (2004 Update) for submittal to U.S. EPA and federal approval.

---

[2] Reflects State, local, and federal regulations adopted as of the end of 2002.

I. BACKGROUND

CO is a colorless and odorless gas that is directly emitted as a product of combustion. The highest concentrations are generally associated with cold stagnant weather conditions that occur during winter. In contrast to ozone, which tends to be a regional pollutant, CO problems tend to be localized.

High CO levels are a health concern because the pollutant is readily absorbed through the lungs into the blood, where it binds with hemoglobin and reduces the ability of the blood to carry oxygen. As a result, insufficient oxygen reaches the heart, brain, and other tissues. The harm caused by CO can be critical for people with heart disease, chronic lung disease, or anemia. Even healthy people exposed to high levels of CO can experience headaches, fatigue, slow reflexes, and dizziness.

Both ARB and U.S. EPA have established health-based air quality standards for CO, measured over one hour and eight hours. Prior to the 1990s, many urban areas in California routinely violated the State and federal 8-hour standards for CO. Ambient CO levels have dropped statewide in response to continued emission reductions. This proposed SIP revision focuses solely on the federal 8-hour CO standard.

In 1991, U.S. EPA designated eleven areas in California as nonattainment of the federal 8-hour CO standard. By 1995, CO levels in ten[3] of these areas met the air quality test for attainment (we refer to these collectively as the CO maintenance areas):

Bakersfield Metropolitan Area	Modesto Urbanized Area
Chico Urbanized Area	Sacramento Urbanized Area[4]
Fresno Urbanized Area	San Diego Area[5]
Lake Tahoe North Shore Area[6]	San Francisco-Oakland-San Jose Area[7]
Lake Tahoe South Shore Area[8]	Stockton Urbanized Area

The Clean Air Act (Act) (section 107(d)(3)(E)) defines the applicable requirements for an area to be formally redesignated to attainment:

(1) show that monitored air quality meets the federal standard;
(2) have a fully approved SIP under section 110(k) of the Act;
(3) show that the air quality improvement is permanent and enforceable;
(4) meet applicable requirements under section 110 and part D of the Act; and
(5) have a fully approved maintenance plan pursuant to section 175A of the Act.

[3] The eleventh nonattainment area – the Los Angeles urbanized area – has now attained the federal 8-hour CO standard as well. The local district is preparing a separate maintenance plan and request for redesignation.
[4] Urbanized parts of Sacramento, Placer, and Yolo Counties.
[5] Western part of County only.
[6] Placer County part of Lake Tahoe Air Basin.
[7] Urbanized parts of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma Counties.
[8] El Dorado County part of Lake Tahoe Air Basin.

In 1996, ARB adopted and submitted a CO Maintenance Plan[9] for the ten areas listed above and requested that they be redesignated to attainment for the federal 8-hour CO standard. U.S. EPA found that the State satisfied all five criteria based on the 1996 CO Maintenance Plan and prior SIP submittals for other elements. U.S. EPA acted to approve the 1996 CO Maintenance Plan as part of the California SIP, and redesignated the ten areas effective June 1, 1998[10].

The 1996 CO Maintenance Plan showed how each area would continue to attain the standard through 2010. The Act requires the initial maintenance plan to cover at least a ten-year period, with a second SIP revision due within eight years of redesignation to demonstrate that the area will maintain the standard for another ten years (i.e., a full 20 years from the date of redesignation to attainment or 2018 in this case).

Having already satisfied the five requirements for redesignation, this proposed 2004 revision to the CO SIP for the ten areas focuses on updating the fifth element by extending the maintenance plan through 2018. This Update complies with the Act's requirements in section 175A for maintenance plans, by including:

- Air quality data that demonstrate the ten areas continue to be in attainment.
- Emissions forecasts that demonstrate the ten areas will remain in attainment for the full 20-year period through 2018.
- Contingency emission reductions from adopted ARB measures that generate progressively more benefits over time, effectively decreasing CO emissions during the remainder of the maintenance period well below the levels that resulted in attainment.
- Continued air monitoring to verify the attainment status of the redesignated areas.

---

[9] The 1996 CO Maintenance Plan was adopted on April 26, 1996. A copy of the Plan is available on ARB's website at: http://www.arb.ca.gov/planning/sip/co/co.htm.

[10] Federal Register, Volume 63, Number 61, 15305-15312, March 31, 1998.

II. MAINTENANCE DEMONSTRATION

The 2004 Update relies on a combination of two approaches to demonstrate maintenance of the CO standard through 2018 – monitored air quality trends showing a decline in wintertime CO levels between 1993 and 2003, and significant reductions in CO emissions projected from 1993 through 2018.

A. Air Quality Monitoring

1. Monitoring Data

Table 1 shows that CO design values for sites with operating monitors have declined 30 to 60 percent overall between the applicable attainment period (1992-1995) and 2003, and are well below the federal standard.

Table 1
Design Values for the Federal 8-hour CO Standard
(ppm)

CO Maintenance Area	Attainment Period		1995	2000	2003
Bakersfield	1992-1994	6.1	6.1	5.2	2.5
Chico	1993-1995	5.4	5.0	4.0	3.4
Fresno	1993-1995	9.1	8.5	7.6	4.3
Lake Tahoe North Shore [1]	1993-1994	3.8	3.2	0.9	N/A
Lake Tahoe South Shore [2]	1993-1994	7.4	6.8	4.3	6.5
Modesto	1993-1994	6.6	6.3	6.3	3.7
Sacramento Area	1993-1995	9.1	8.0	6.2	4.2
San Diego	1993-1994	7.0	7.4	4.9	4.1 [3]
San Francisco – Oakland – San Jose	1993-1994	7.2	7.5	6.9	4.9
Stockton	1993-1994	7.5	7.5	6.3	3.2

[1] Data for 1993 - 1995 were collected at the Tahoe City site, which subsequently was closed in June 1995. Data for 2000 were collected at a site in Incline Village, which was closed in August 2001 because of very low values. Although Incline Village is in the State of Nevada, the design value is included here to give an indication of CO values at Lake Tahoe North Shore.

[2] Data for 1993 - 1995 were collected at the South Lake Tahoe – Stateline site. Data for 2000 - 2003 were collected at the Harvey's Casino site in Nevada. Harvey's is a "microscale" monitoring site, which means that it provides values that are only representative of a very small area; such sites are also prone to greater fluctuations in the monitored data.

[3] San Diego recorded unusually high CO values in late October 2003 during the extensive wildfires that impacted air quality throughout Southern California. The San Diego Air Pollution Control District, when reporting the monitoring data to U.S. EPA, informed U.S. EPA that it was flagging the CO values for October 28 as having been affected by an exceptional event. ARB staff excluded CO values recorded from 10/26/03-11/01/03 to calculate a representative 2003 design value for trends evaluation in this report.

The CO air quality data in Table 1 are contained in California's Aerometric Data Analysis System (ADAM) database and retrievable from U.S. EPA's Aerometric Information Retrieval System (AIRS). ARB staff reviewed the data for completeness, especially for the winter months of November, December, and January, when CO concentrations are highest. To determine 8-hour CO design values for each of the ten maintenance areas, ARB observed U.S. EPA protocols[11] and identified the maximum and second maximum (non-overlapping) 8-hour CO values at each site for each of the most recent two years of data. The design value for each area is the site that has the highest second high value.

2. *Monitoring Network*

The network of monitoring stations that provide the data used to demonstrate attainment and maintenance consist of State and Local Air Monitoring Stations, together with the National Air Monitoring Stations. ARB and U.S. EPA review the adequacy of the network annually as part of the development of the State and Local Air Monitoring Network Plan, required by Title 40 Code of Federal Regulations (CFR), Part 58. Appendix A lists the monitoring stations in the ten CO maintenance areas, including each station's location, beginning and ending date of operation, and the agency responsible for monitoring at that station.

ARB and affected local air districts will continue to collect air quality data in the CO maintenance areas for use in demonstrating ongoing attainment. In addition, ARB will annually review data from the two most recent consecutive years to verify continued attainment of the federal standard.

B. Emissions Estimates

All of the CO emission estimates presented in this 2004 Update are in tons per day (tpd) during the winter season. We used current information on emissions and activity to produce the estimates, which may differ significantly from the 1996 CO Plan in historical years. Although the maintenance areas typically include only the urbanized portion of a county, we report the emissions for the entire county within the applicable air basin. The 1996 CO Plan approved by U.S. EPA relied on the same approach.

The dominant source of CO emissions in all areas is on-road motor vehicles. This 2004 Update uses the current version of California's motor vehicle emission model EMFAC2002, version 2.2, with the latest travel activity developed by local transportation planning agencies. Vehicle emission projections in the 1996 CO Maintenance Plan were based on the now outdated EMFAC7F model. EMFAC2002 includes more recent information on: the number and types of vehicles, additional adopted controls for vehicles and fuels, emission testing results from thousands of vehicles, evaporative emissions, and Californian's driving habits. U.S. EPA approved EMFAC2002 for use in SIPs and transportation conformity on April 1, 2003.

The emissions for stationary, area, and off-road mobile sources reflect the ARB-district inventory improvement efforts conducted to support recent air quality field studies and develop plans for ozone and particulate matter. We projected the CO emissions for these categories using the Central California Ozone Study (CCOS) inventory,

[11] For further information on how design values are derived, please refer to U.S. EPA's website at: http://www.epa.gov/oar/oaqps/greenbk/laxton.html

version 2.10. ARB made significant changes to the activity data for lawn/garden/utility equipment in 2003 as part of a regulatory development effort. Improved information showed more pieces of this equipment throughout California. Because these gasoline engines emit CO, we adjusted the CCOS 2.10 inventory outputs for this category to reflect the activity changes. Other recent California SIP revisions submitted in 2003-2004 include the same activity assumptions for this equipment.

1. Statewide Trends

Although this Plan focuses on the ten maintenance areas, it is useful to look at statewide CO emission trends by major source category to provide a context for what is happening across California. Table 2 shows the statewide winter CO emissions for informational purposes. The steep decline in total CO emissions (63 percent between 1993 and 2018) is driven by the 84 percent reduction in on-road motor vehicle emissions. Stationary and areawide source emissions are projected to increase slightly during the same period, due to the expected growth in residential fuel combustion associated with population increases.

Table 2
Statewide CO Emission Trends
((Winter Seasonal Emissions in Tons per Day)

Source Category	1993	2003	2010	2018
Stationary Sources	480	450	490	500
Area-Wide Sources	2,620	2,780	2,800	2,840
On-Road Mobile Sources	17,230	8,310	5,050	2,850
Off-Road Mobile Sources	3,300	2,680	2,450	2,610
Total	**23,630**	**14,220**	**10,790**	**8,800**

2. Emissions in Ten CO Maintenance Areas

Table 3 shows our current estimate of total winter CO emissions in each maintenance area for: 1993 (the common attainment year), 2003 (current data), 2010 (the out year of the 1996 CO Maintenance Plan for comparison) and 2018 (the horizon or out year of this 2004 Update). The data show that estimated 2003 emissions are 20-42 percent below 1993 attainment year levels; by 2018, emissions are projected to be 30-69 percent below attainment year levels.

Table 3
Total CO Emissions in Each Maintenance Area
(Winter Seasonal Emissions in Tons per Day)

CO Maintenance Area	Area Included in Inventory	1993	2003	2010	2018
Bakersfield	Western Kern County	478	298	234	191
Chico	Butte County	232	164	134	113
Fresno	Fresno County	627	400	302	244
Lake Tahoe North Shore	Eastern Placer County	25	19	16	14
Lake Tahoe South Shore	Eastern El Dorado County	61	49	45	43
Modesto	Stanislaus County	331	206	151	120
Sacramento	Sacramento County, Yolo County, Western Placer County	1125	658	487	388
San Diego	San Diego County	1889	1101	829	643
San Francisco-Oakland-San Jose	San Francisco Bay Area Air Basin	4254	2645	1716	1322
Stockton	San Joaquin County	433	258	188	153

Compared to the projections in the 1996 CO Maintenance Plan, these 1993 year emissions are generally higher due to improved estimates for motor vehicles and gasoline equipment, but lower by 2010 in response to additional controls adopted since the 1996 Plan was developed. This steeper decline in emissions over time adds to the strength of the maintenance demonstration in the 2004 Update.

Using today's inventory, CO emissions in 2003, 2010, and 2018 are significantly lower than the 1993 levels that resulted in attainment. This occurs despite growth in population and vehicle miles traveled due to the benefits of increasingly tighter emission standards for new engines, fuel requirements, and turnover of the vehicle fleet to lower-emitting models.

Appendix B shows the CO winter inventory for each of the ten maintenance areas over multiple years, summarized by source category. Documentation of the on-road motor vehicle inventory and the adjustment to lawn and garden equipment activity are available on ARB's website at: http://www.arb.ca.gov/planning/sip/co/co.htm. More extensive levels of emission detail for CCOS 2.10 and links to inventory methods are available on ARB's website at: http://www.arb.ca.gov/app/emsinv/ccos/index.php.

C. Change to Wintertime Oxygenates Provision

The approved 1996 CO Maintenance Plan lists wintertime oxygenated gasoline as a recent control measure that contributed to attainment of the CO standard. Oxygenates reduce CO emissions by promoting more complete fuel combustion. Beginning in 1992, ARB required oxygenates in gasoline during the specified "winter" months, generally October through February. MTBE was the refiners' oxygenate of choice at this time.

In response to subsequent concerns about the impacts of MTBE on drinking water (via migration from leaking fuel storage tanks into groundwater and direct exhaust from watercraft engines to surface water), ARB took action in August 1998 to rescind the wintertime oxygenates provision in the State's reformulated gasoline regulation in all areas other than Los Angeles, Orange, Riverside, San Bernardino, Ventura, and Imperial Counties.

1. *Impact of Removing Wintertime Oxygenates*

The Board concluded that the wintertime oxygenates requirement was not needed to ensure continued CO attainment in the ten maintenance areas. Staff analyses showed that the increase in CO emissions without wintertime oxygenates would be more than offset by the benefits of additional vehicle controls adopted since the 1996 CO Maintenance Plan. Thus, CO emissions were projected to decrease far below 1995 levels, declining annually from turnover of the vehicle fleet to cleaner models.

2. *Corresponding SIP Revisions*

ARB submitted amendments to its Phase 2 reformulated gasoline regulations (including deletion of the wintertime oxygenates requirement in much of the State) to U.S. EPA in September 1998 as a revision to the original fuels regulations that had previously been approved into the SIP.

The Board then amended the 1996 CO Maintenance Plan in November 1998 (1998 CO Plan) and submitted it to U.S. EPA for approval as a SIP revision in December 1998. Appendix C includes Board Resolution 98-52 (November 19, 1998) adopting the 1998 CO Plan. The Board found that even without wintertime oxygen in gasoline, updated emissions in the ten maintenance areas remain below the attainment levels. The Board further found that the contingency measures in CO SIP that are being or will be implemented, coupled with fleet turnover, provide an ample margin of safety to maintain the CO standard. The Board also directed that ARB staff review CO monitoring data in the areas no longer subject to the wintertime oxygen requirement and "if [CO] violations are monitored in any of the areas, staff will propose that appropriate action be taken regarding reinstatement of the minimum wintertime oxygen content in gasoline as previously contained in section 2262.5, title 13, CCR, in the area at the beginning of the following winter season."

U.S. EPA has not acted on the regulatory SIP revision or the 1998 CO Plan.

3. *Conclusions Confirmed by New Data*

Between 1998 and 2000, wintertime oxygenates were phased out of California gasoline, except in the Los Angeles urbanized area and Calexico. Table 1 showed that for the ten areas, CO values actually measured in ambient air during winter 2000 (without wintertime oxygenates) were lower than the CO values recorded in the 1992-1995 attainment period.

For all areas except Lake Tahoe, Table 4 shows that current estimates (without wintertime oxygenates) of the percent emission reduction to be achieved between 1993 and 2010 are 12-31 percent greater than those projected in the 1996 CO Maintenance Plan over the same period. The percent change in emissions for the two Lake Tahoe areas is essentially the same as in the 1996 Plan. We attribute the lack of comparable reductions in Lake Tahoe to significantly higher growth in the number of vehicles and the miles traveled during this time period, which consumes the benefits of the additional controls reflected in this 2004 Plan.

Table 4
Comparison of Change in Projected CO Emissions from 1993 to 2010
(Winter Seasonal Emissions)

CO Maintenance Area	Percent Reduction from 1993-2010	
	1996 Plan	2004 Plan
Bakersfield	20	51
Chico	19	42
Fresno	26	52
Lake Tahoe - North Shore	36	36
Lake Tahoe - South Shore	28	26
Modesto	25	54
Sacramento	38	57
San Diego	44	56
San Francisco-Oakland-San Jose	43	60
Stockton	29	57

D. Fresno Area Rollback Analysis

By virtue of its CO design value and original classification, the Fresno Area was the only one of the ten areas subject to U.S. EPA's policy that maintenance demonstrations use the same modeling approach as the CO attainment demonstration. The attainment demonstration in Fresno's 1992 *Carbon Monoxide Nonattainment Plan* relied on a rollback analysis that presumed CO air quality levels change in direct proportion to emissions. The 1996 CO Maintenance Plan also included a rollback analysis for the Fresno area that projected continued maintenance.

We updated the rollback analysis with new CO emissions and air quality data, consistent with the one included in the approved Fresno attainment demonstration. The results in Table 5 project that design values in 2003, 2010, and 2018 will be far below the federal 8-hour CO standard. For the horizon year of the maintenance period in 2018, the rollback analysis shows a design value 62 percent below the level associated with the 1993-1995 attainment period. The analysis demonstrates that the Fresno area will be able to maintain the CO standard by a considerable margin, despite the 84 percent projected increase in vehicle miles traveled between 1993 and 2018.

Table 5
CO Rollback Analysis for Fresno Area
(Winter Seasonal Emissions)

Fresno Urbanized Area	1993	2003	2010	2018
All Sources of CO in the Emission Inventory (Tons per Day)	627	400	302	244
Projected Design Value for All Sources in the Inventory (in ppm)[1]	9.1[2]	5.8	4.4	3.5
On-Road Motor Vehicle Portion of the CO Emission Inventory (Tons per Day)	450	236	141	77
Projected Design Value for On-Road Motor Vehicle Portion of the Inventory (in ppm)[3]	9.1	4.8	2.9	1.6
Vehicle Miles Traveled (in thousands)	15,987	20,624	24,895	29,487

[1]The design value for the forecast year is derived by multiplying the 1993-1995 attainment design value by the forecast year emission inventory, and dividing the total by the 1993 emission inventory.
[2]1993-1995 attainment design value.
[3]The design value for the on-road motor vehicle portion in the forecast year is derived by multiplying the 1993-1995 design values for the on-road motor vehicle portion of the inventory by the motor vehicle portion of the emission inventory for the forecast year, and dividing the total by the 1993 emission inventory for on-road motor vehicles.

E. Contingency Measures

One of the federal Clean Air Act requirements for maintenance plans is to identify contingency measures to offset any unexpected increases in emissions and ensure maintenance of the standard. The traditional view is to hold contingency measures in reserve and implement them only if an area violates the standard.

However, California's ongoing motor vehicle program creates a unique situation that allows ARB to offer, as contingency, a number of adopted measures that are already being implemented and reducing emissions far below attainment levels. These regulations continued to cut CO emissions despite increases in growth in passenger vehicles and vehicle miles traveled. The margin by which these regulations bring CO levels even further below the standard serves to satisfy the contingency requirement and provide additional public health benefit now by lowering CO exposure. Table 6 shows the State's contingency measures in the 1996 CO Maintenance Plan. U.S. EPA approved California's approach as part of the 1996 Plan, finding that these measures would provide sufficient reductions in future years to guarantee an ample margin of safety to ensure maintenance.

Table 6
Adopted Contingency Measures in the 1996 CO Maintenance Plan

Implementation Date	Contingency Measure
1996	Improved Basic Inspection and Maintenance (I/M) Program (Bay Area[1], Chico, North and South Shore Lake Tahoe)
1996	Enhanced I/M Program (Bakersfield, Fresno, Modesto, Sacramento Area, San Diego, Stockton)
1996	On-Board Diagnostics II (statewide measure)
1996	California Cleaner-Burning Gasoline (statewide measure)
1997	Off-Highway Recreational Vehicles (statewide measure)
1999	Lawn and Garden Equipment - Tier II (statewide measure)
1996-2003+	Low-Emission Vehicles and Clean Fuels I – Post 1995 Standards (statewide measure)

[1]Measure included prior to change in State law that applied Enhanced I/M in the Bay Area.

Since 1996, ARB has adopted additional measures that have multi-pollutant benefits and that will contribute to ongoing reductions in CO emissions. These measures include tighter emission standards for cars, trucks, buses, off-road equipment (like forklifts, lawn and garden equipment, and marine pleasurecraft). The future year reductions from the new measures substantially increase the margin of compliance to ensure maintenance of the standard and address contingency requirements. We propose to go a step further by setting the on-road motor vehicle emission budgets at levels well below the 1993 attainment inventory.

Table 7 shows that the combination of the proposed motor vehicle emission budgets and projected emissions from off-road mobile, stationary, and areawide sources in this 2004 Update will provide reductions of 10-40 percent beyond the levels needed for attainment. These are the contingency emission reductions for the 2004 Update.

Table 7
Contingency Emission Reductions

CO Maintenance Area	Percent Emission Reduction in 2018 Beyond Attainment Levels[1]
Bakersfield	36%
Chico	27%
Fresno	35%
Lake Tahoe North Shore	16%
Lake Tahoe South Shore	10%
Modesto	37%
Sacramento	37%
San Diego	40%
San Francisco-Oakland-San Jose	39%
Stockton	38%

[1]Degree to which maximum emissions under this Plan are below the 1993 levels that brought attainment.

III. TRANSPORTATION CONFORMITY REQUIREMENTS

The federal transportation conformity regulation[12] requires SIPs to specify the level of on-road motor vehicle emissions that are consistent with attainment and maintenance of air quality standards. To receive federal approval and funding, transportation agencies must demonstrate that emissions from transportation plans, programs, and projects conform to these "emission budgets."

A. Budget Approach

Motor vehicle emission budgets have typically been derived from the projected inventory in each area. For recent 1-hour ozone maintenance plans in California, the transportation budgets were derived from projected vehicle emissions in (or close to) the horizon year of those plans, which represented ten years from the anticipated redesignation to attainment. It was important to preserve all the expected emission reductions for ozone precursors, beyond the attainment levels for the 1-hour standard, because of the need to ensure progress towards the more health-protective federal 8-hour and State ozone standards.

This 2004 Update is a rather novel situation for these ten areas of California – it's the second decade of maintenance; future vehicle emissions are way, way below the levels that resulted in attainment of the federal 8-hour CO standard; and there are no more health-protective CO goals to be achieved. Table 8 shows the steep decline in projected motor vehicle emissions for each area, for informational purposes only.

Table 8
On-Road Motor Vehicle CO Emission Inventory
(Winter Seasonal Emissions in Tons per Day)

CO Maintenance Area	Area Included in Inventory	1993	2003	2010	2018
Bakersfield	Western Kern County	347	177	112	66
Chico	Butte County	138	75	46	23
Fresno	Fresno County	450	236	141	77
Lake Tahoe North Shore	Eastern Placer County	18	10	7	4
Lake Tahoe South Shore	Eastern El Dorado County	32	18	13	7
Modesto	Stanislaus County	246	126	74	42
Sacramento	Sacramento County, Yolo County, Western Placer County	857	410	244	96
San Diego	San Diego County	1,472	728	457	249
San Francisco-Oakland-San Jose[1]	San Francisco Bay Area Air Basin	3,314	1,840	979	563
Stockton	San Joaquin County	326	162	97	55

[1] Reflects Basic I/M program in place through mid-2003. The Enhanced I/M program that was implemented in late 2003 will provide further reductions.

[12] U.S. EPA maintains online information on its transportation conformity program, including access to relevant rulemakings, policy guidance, and reports at: http://www.epa.gov/otaq/transp/traqconf.htm.

There is a spectrum of acceptable approaches that could be taken to establish transportation budgets for these ten CO maintenance areas. At one end, the budget could be based on the 1993 emission levels that resulted in attainment – the 1996 CO Maintenance Plan used this approach. On the other end, the budget could be based on 2018 emissions – but these numbers are less than one-fifth of the attainment levels. Some of the available extra vehicle reductions are needed to compensate for small emission increases in other source categories by 2018.

B. Proposed Transportation Emission Budgets

Deciding what level to propose for the CO maintenance budgets was a joint policy call. ARB staff developed the proposal through the transportation conformity interagency consultation process with local, State, and federal air and transportation agencies representing the ten CO maintenance areas.

Table 9 shows the proposed budgets, which are derived from 2003 CO emissions, as determined by ARB's EMFAC2002 model, with minor adjustments. The travel activity data used with EMFAC2002 emission rates were updated by the local transportation agencies, and reflect the latest planning assumptions in force at the time the budgets were developed. We then rounded the projected emissions up to the next highest ten tons, except for the Tahoe areas (rounded up to the next highest one ton).

Table 9
Proposed On-Road Motor Vehicle CO Emission Budgets
Applicable to All Future Years
(Winter Seasonal Emissions in Tons per Day)

CO Maintenance Area	Area Included in Budget	Emission Budget	
		2003	2018
Bakersfield	Western Kern County	180	180
Chico	Butte County	80	80
Fresno	Fresno County	240	240
Lake Tahoe North Shore	Eastern Placer County	11	11
Lake Tahoe South Shore	Eastern El Dorado County	19	19
Modesto	Stanislaus County	130	130
Sacramento	Sacramento County, Yolo County, Western Placer County	420	420
San Diego	San Diego County	730	730
San Francisco-Oakland-San Jose	San Francisco Bay Area Air Basin	1850	1850
Stockton	San Joaquin County	170	170

These emission budgets will apply to all subsequent analysis years as required by the federal conformity regulation, including: any interim year conformity analyses, the 2018 horizon year, and years beyond 2018. These budgets will become effective upon a finding of budget adequacy by U.S. EPA, typically 90 days after submittal of a SIP revision.

U.S. EPA requests that states explicitly quantify how proposed motor vehicle emission budgets differ from projected vehicle emissions. These numbers can be derived from Tables 8 and 9. We display the calculations here to compare the proposed budgets against the two ends of the spectrum discussed earlier as the possible basis for those budgets -- the 1993 vehicle inventory that resulted in attainment and the projected 2018 vehicle inventory. Column C shows the extent to which the proposed budgets are lower than attainment emissions; column F shows the extent to which the proposed budgets are higher than projected emissions in the last year of the maintenance period. The proposed budgets are close to the mid-point between these ends of the range, with a slight bias towards preserving more emission reductions beyond the levels needed for attainment.

Table 10
Comparison of Proposed Motor Vehicle Budgets to Projected Vehicle Inventories
(Winter Seasonal Emissions in Tons per Day)

CO Maintenance Area	(A) Projected 1993 Vehicle Inventory	(B) Proposed 2018 Emission Budget	(C) Difference (A) – (B)	(D) Proposed 2018 Emission Budget	(E) Projected 2018 Vehicle Inventory	(F) Difference (D) – (E)
Bakersfield	347	180	167	180	66	114
Chico	138	80	58	80	23	57
Fresno	450	240	210	240	77	163
Lake Tahoe North Shore	18	11	7	11	4	7
Lake Tahoe South Shore	32	19	13	19	7	12
Modesto	246	130	116	130	42	88
Sacramento	857	420	437	420	96	324
San Diego	1,472	730	742	730	249	481
San Francisco-Oakland-San Jose	3,314	1,850	1,464	1,850	563	1,287
Stockton	326	170	156	170	55	115

C. Further Illustration that Budgets are Adequate for Maintenance

The proposed budgets represent a health-protective middle ground, providing a comfortable increment of extra reductions to ensure maintenance and offsetting the small emission increases expected from growth in areawide and stationary sources. To further illustrate that basing the proposed budgets on 2003 vehicle emissions ensures maintenance, we provide two analyses using monitored air quality data and a maximum emissions scenario.

1. *Air Quality Basis*

Table 11 shows that by 2003, all areas were already monitoring CO levels 31 to 90 percent below the federal 8-hour CO standard – a significant margin of safety for continued maintenance with vehicle emissions at 2003 levels. This comparison also provides evidence that removal of wintertime oxygenates from gasoline did not interfere with the ability of these areas to maintain the standard. In fact, the comparison shows that the additional controls phased in by 2003 will continue to ensure attainment by a generous margin.

Table 11
Monitored CO Levels in 2003 versus Level Needed to Attain Standard

CO Maintenance Area	Level to Attain Standard (ppm)	Design Value in 2003 (ppm)	Percent Below Attainment (as of 2003)
Bakersfield	9.4	2.5	77%
Chico	9.4	3.4	64%
Fresno	9.4	4.3	54%
Lake Tahoe North Shore	9.4	0.9[1]	90%
Lake Tahoe South Shore	9.4	6.5	31%
Modesto	9.4	3.7	61%
Sacramento	9.4	4.2	55%
San Diego	9.4	4.1	56%
San Francisco – Oakland – San Jose	9.4	4.9	48%
Stockton	9.4	3.2	66%

[1]Data for 1993 - 1995 were collected at the Tahoe City site, which subsequently was closed in June 1995. Data for 2000 were collected at a site in Incline Village, which was closed in August 2001 because of very low values. Although Incline Village is in the State of Nevada, the design value is included here to give an indication of CO values at Lake Tahoe North Shore.

2. *Emissions Basis*

Another way to look at the combined effect of the budgets and emissions from other sources is to compare the resulting maximum emissions that could be allowed with this Plan Update to the 1993 emission levels that resulted in attainment. Table 12 shows the 1993 attainment emissions, the maximum potential 2018 emissions (based on the emission budgets for on-road vehicles, plus projected 2018 levels for off-road mobile, stationary, and areawide sources), and the resulting percent emission reduction below attainment levels.

Table 12
Percent Reduction in CO Emissions Using Maximum Levels in 2018
(Winter Seasonal Emissions in Tons per Day)

CO Maintenance Area	1993 Inventory	Maximum Potential 2018 Emissions[1]	Percent Reduction
Bakersfield	478	305	36%
Chico	232	170	27%
Fresno	627	407	35%
Lake Tahoe North Shore	25	21	16%
Lake Tahoe South Shore	61	55	10%
Modesto	331	208	37%
Sacramento	1125	712	37%
San Diego	1889	1124	40%
San Francisco-Oakland-San Jose	4254	2609	39%
Stockton	433	268	38%

[1] Motor vehicle emission budgets + 2018 stationary, areawide, and off-road inventories.

IV. POTENTIAL IMPACTS

A. Environmental Impacts

The 2004 CO Plan Update relies on adopted regulations for continued emission reductions. When first adopted, each regulation was evaluated for potential environmental impacts as part of an extensive public process. The Board approved the California Environmental Quality Act analysis as part of each rulemaking. Because there are no new controls proposed in the 2004 CO Plan Update, there is no possibility that the 2004 CO Plan Update will have a significant adverse effect on the environment.

B. Environmental Justice

The 2004 CO Plan Update demonstrates that CO emissions, already well below attainment levels, will continue to drop even further into the foreseeable future. CO levels are highly correlated to populated areas with high traffic – freeways and heavily traveled roads in close proximity to residential areas, schools, and other sensitive sites. As CO emissions decrease, so too will public exposure in nearby communities. However, local governments and transportation agencies should consider and address the potential for high localized CO levels from new transportation systems and projects that may be sited in close proximity to populated areas.

C. Economic Impacts

The 2004 CO Plan Update relies on adopted regulations for continued emission reductions. When first adopted, each regulation was evaluated for its potential economic impacts. The Board approved the economic analysis as part of each rulemaking. Because there are no new controls proposed in the 2004 CO Plan Update, there will be no potential economic impacts as a result of the 2004 CO Plan Update.

APPENDIX A

Carbon Monoxide Air Monitoring Network

AREA	STATION NAME AND LOCATION	BEG DATE	END DATE	AGENCY
Bakersfield	225 Chester Ave., Bakersfield	01-Jan-72	30-Apr-94	ARB
	3311 Manor St., Oildale	01-Jan-80	31-Jul-94	ARB
	5558 California Ave., Bakersfield	01-Mar-94		ARB
	1128 Golden State Hwy, Bakersfield	01-Jun-94		San Joaquin
Chico	468 Manzanita Ave., Chico	01-Jan-79		ARB
	101 Salem St., Chico	01-Jan-81	19-Feb-98	ARB
Fresno	3250 E. Olive St., Fresno	01-Jan-76	01-Jan-90	ARB
	9240 S. Riverbend, Parlier	01-Jan-84	05-Jan-94	San Joaquin
	4706 E. Drummond St., Fresno	01-Jan-85		San Joaquin
	Sierra Skypark #2, Fresno	01-Jan-87		San Joaquin
	3425 N. First St., Fresno	01-Jan-90		ARB
	908 N. Villa Ave., Clovis	01-Sep-90		San Joaquin
	1145 Fisher St., Fresno	27-Oct-93	31-May-00	ARB
Lake Tahoe South Shore	Stateline-4045 HWY 50, South Lake Tahoe	01-Jan-80	31-Oct-98	ARB
	Stateline – Harvey's Hotel	01-Oct-99		Nevada
	3337 Sandy Way, South Lake Tahoe	01-Dec-92		ARB
Lake Tahoe North Shore	165 River Road, Tahoe City	01-Nov-92	30-Jun-95	ARB
	846 Tahoe Blvd, Incline Village	01-May-99	31-Aug-01	Washoe County, NV
Modesto	814 14th St., Modesto	01-Jan-81		ARB
	900 S. Minaret St., Turlock	01-Apr-92		San Joaquin
Sacramento	7823 Blackfoot Way, North Highlands	01-Jan-80		Sacramento
	7400 Sunrise Blvd., Citrus Heights	01-Feb-80	18-Mar-93	ARB
	3535 El Camino & Watt, Sacramento	15-Dec-80		Sacramento
	Del Paso Manor-2701 Avalon Dr., Sacramento	01-Jan-81		Sacramento
	1309 T. St., Sacramento	01-Dec-88		ARB
	7926 Earhart Dr., Sacramento	01-Mar-89	31-Oct-97	Sacramento
	5000 Rocklin Road, Rocklin	01-Dec-91	12-May-96	ARB
	40 Sutter St., Woodland	01-Jan-92	31-Dec-93	Yolo-Solano
	23 Russel Blvd., Davis	01-Jan-94	28-Feb-95	Yolo-Solano
San Diego	80 E. J St., Chula Vista	01-Aug-74		San Diego
	80 E. Valley Pkwy., Escondido	01-Jan-79		San Diego
	5555 Overland Ave., San Diego	01-Jan-79	4-Jan-99	San Diego
	1133 Union St., San Diego	01-Jan-81		San Diego
	1155 Redwood Ave., El Cajon	01-Jan-82	7-Jan-99	San Diego
	1701 Mission Ave., Oceanside	01-Jan-84	10-Mar-99	San Diego
	330A 12th Ave., San Diego	01-Jun-89		San Diego
	1100 Paseo International, San Diego	01-Feb-90		San Diego

AREA	STATION NAME AND LOCATION	BEG DATE	END DATE	AGENCY
San Francisco Bay Area	897 Barron Ave., Redwood City	01-Jan-67		Bay Area
	534 4th St., San Rafael	01-Jan-67		Bay Area
	939 Ellis St., San Francisco	01-Jan-69		Bay Area
	40733 Chapel Way, Fremont	01-Aug-70		Bay Area
	1144 13th St., Richmond	01-Jan-73	6-May-99	Bay Area
	304 Tuolumne St., Vallejo	01-Jan-76		Bay Area
	822 Alice St., Oakland	01-Jan-80		Bay Area
	2975 Treat Blvd., Concord	21-Feb-80		Bay Area
	2614 Old 1st. St., Livermore	01-Jan-81	30-Nov-99	Bay Area
	10 Arkansas St., San Francisco	01-Jan-86		Bay Area
	120B N 4th St., San Jose	01-Aug-72		Bay Area
	1866 W. San Carlos St., San Jose	01-Jul-89	20-Apr-95	Bay Area
	583 W. 10th St., Pittsburg	01-Jan-68		Bay Area
	2552 Jefferson Ave., Napa	01-Jan-73		Bay Area
	837 5th St., Santa Rosa	01-Jan-81		Bay Area
Stockton	Hazelton-HD., Stockton	01-Jan-63		ARB
Stockton	4310 Claremont, Stockton	01-Jan-82	31-Dec-00	ARB

For various reasons, six monitoring stations (in five areas) that were operating in 1992 and 1993 were replaced, relocated, or removed from service:

- The original Bakersfield monitoring site on Chester Street was closed in April 1994 and moved to the present location on California Avenue.
- The Chico site on Salem Street was closed in 1998 because it was found to be redundant with the Manzanita Avenue site.
- The Fresno monitoring site on Fisher Street was closed in 2000 after parallel monitoring demonstrated that the First Street site was representative of the Fisher site.
- The Tahoe City site on the Lake Tahoe North Shore operated from 1993 through 1995 and was then closed due to low concentrations (maximum 8-hour concentration was 4.7 ppm).
- ARB lost the lease to the Lake Tahoe South Shore site at Stateline in 1998. It was replaced with a site at Harvey's Casino. Although Harvey's is located in Nevada, U.S. EPA staff has indicated it is willing to consider the Harvey's site as representative for CO data for all of the Lake Tahoe Air Basin, both North and South shores.
- The Claremont site in Stockton was closed in 2000. The Hazelton Street site replaces Claremont as the primary CO monitor in Stockton.

Both U.S. EPA and ARB have approved all remaining sites for monitoring CO levels in the ten planning areas.

APPENDIX B

Winter Seasonal CO Emissions Inventory For Ten Areas

(In Tons Per Day)

(By Major Source Category)

Note: Appendix displays only source categories with reported emissions in each area. If reported emissions are less than 0.05 tons per day, the table shows 0.0.

Bakersfield

Winter Season CO Emissions in Tons Per Day

(Kern County)

Major Source Category	1993	2003	2010	`2018
ELECTRIC UTILITIES	0.4	0.2	0.2	0.2
COGENERATION	5.6	7.7	8.9	9.7
OIL AND GAS PRODUCTION (COMBUSTION)	17.8	10.4	11.0	11.4
PETROLEUM REFINING (COMBUSTION)	0.3	0.4	0.4	0.4
MANUFACTURING AND INDUSTRIAL	1.1	1.6	1.9	2.1
FOOD AND AGRICULTURAL PROCESSING	2.4	2.3	2.2	2.2
SERVICE AND COMMERCIAL	1.2	2.7	2.9	3.0
OTHER (FUEL COMBUSTION)	0.8	0.4	0.2	0.2
INCINERATORS	0.0	0.0	0.0	0.0
OIL AND GAS PRODUCTION	0.1	0.1	0.1	0.1
PETROLEUM REFINING	0.0	0.2	0.2	0.2
CHEMICAL	0.0	0.0	0.0	0.0
MINERAL PROCESSES	0.1	0.0	0.0	0.1
OTHER (INDUSTRIAL PROCESSES)	0.0	0.0	0.0	0.0
RESIDENTIAL FUEL COMBUSTION	25.0	25.7	26.6	27.9
FIRES	0.1	0.1	0.1	0.2
WASTE BURNING AND DISPOSAL	11.2	10.8	10.5	10.3
LIGHT DUTY PASSENGER (LDA)	109.1	54.5	31.5	17.2
LIGHT DUTY TRUCKS - 1 (LDT1)	86.9	44.6	25.7	14.0
LIGHT DUTY TRUCKS - 2 (LDT2)	55.0	29.5	20.0	11.7
MEDIUM DUTY TRUCKS (MDV)	16.7	12.5	8.7	5.6
LIGHT HEAVY DUTY GAS TRUCKS - 1 (LHDV1)	22.8	4.1	2.1	1.5
LIGHT HEAVY DUTY GAS TRUCKS - 2 (LHDV2)	3.2	1.4	0.9	0.5
MEDIUM HEAVY DUTY GAS TRUCKS (MHDV)	17.2	7.3	4.4	2.4
HEAVY HEAVY DUTY GAS TRUCKS (HHDV)	12.4	5.5	3.4	1.8
LIGHT HEAVY DUTY DIESEL TRUCKS - 1 (LHDV1)	0.1	0.1	0.2	0.2
LIGHT HEAVY DUTY DIESEL TRUCKS - 2 (LHDV2)	0.1	0.1	0.2	0.1
MEDIUM HEAVY DUTY DIESEL TRUCKS (MHDV)	0.8	0.9	1.0	1.0
HEAVY HEAVY DUTY DIESEL TRUCKS (HHDV)	5.8	3.9	3.3	2.8
MOTORCYCLES (MCY)	6.5	4.6	4.6	3.9
HEAVY DUTY DIESEL URBAN BUSES (UB)	0.1	0.2	0.2	0.2
HEAVY DUTY GAS URBAN BUSES (UB)	2.5	2.5	2.5	1.4
SCHOOL BUSES (SB)	1.5	0.8	0.8	0.6
MOTOR HOMES (MH)	6.4	4.7	2.7	0.7
AIRCRAFT	19.5	23.2	25.9	27.6
TRAINS	1.5	1.8	2.0	2.2
RECREATIONAL BOATS	2.2	2.4	2.3	3.4
OFF-ROAD RECREATIONAL VEHICLES	4.7	4.6	5.1	5.7
OFF-ROAD EQUIPMENT	32.3	22.3	17.8	16.1
FARM EQUIPMENT	4.5	3.5	3.1	3.0
TOTAL	**477.9**	**297.9**	**233.5**	**191.4**

Chico

Winter Season CO Emissions in Tons Per Day

(Butte County)

Major Source Category	1993	2003	2010	2018
ELECTRIC UTILITIES	1.1	0.6	0.6	0.6
MANUFACTURING AND INDUSTRIAL	0.4	0.4	0.4	0.4
FOOD AND AGRICULTURAL PROCESSING	0.0	0.0	0.0	0.0
SERVICE AND COMMERCIAL	0.1	0.1	0.1	0.1
OTHER (FUEL COMBUSTION)	0.4	0.2	0.2	0.1
PETROLEUM MARKETING	0.0	0.0	0.0	0.0
FOOD AND AGRICULTURE	0.0	0.0	0.0	0.0
MINERAL PROCESSES	0.0	0.0	0.0	0.0
WOOD AND PAPER	0.0	0.1	0.2	0.2
RESIDENTIAL FUEL COMBUSTION	35.1	33.3	32.7	32.8
FIRES	0.1	0.1	0.1	0.1
WASTE BURNING AND DISPOSAL	20.7	20.6	20.5	20.3
LIGHT DUTY PASSENGER (LDA)	45.5	25.6	14.4	6.6
LIGHT DUTY TRUCKS - 1 (LDT1)	35.4	19.7	12.3	5.6
LIGHT DUTY TRUCKS - 2 (LDT2)	18.1	10.6	6.7	3.5
MEDIUM DUTY TRUCKS (MDV)	8.1	6.1	3.8	2.1
LIGHT HEAVY DUTY GAS TRUCKS - 1 (LHDV1)	9.7	1.7	0.8	0.5
LIGHT HEAVY DUTY GAS TRUCKS - 2 (LHDV2)	0.6	0.2	0.1	0.1
MEDIUM HEAVY DUTY GAS TRUCKS (MHDV)	6.7	3.0	1.6	0.6
HEAVY HEAVY DUTY GAS TRUCKS (HHDV)	5.9	3.3	2.3	0.9
LIGHT HEAVY DUTY DIESEL TRUCKS - 1 (LHDV1)	0.0	0.0	0.0	0.0
LIGHT HEAVY DUTY DIESEL TRUCKS - 2 (LHDV2)	0.0	0.0	0.0	0.0
MEDIUM HEAVY DUTY DIESEL TRUCKS (MHDV)	0.1	0.1	0.2	0.1
HEAVY HEAVY DUTY DIESEL TRUCKS (HHDV)	1.1	0.7	0.6	0.4
MOTORCYCLES (MCY)	2.2	1.4	1.2	1.2
HEAVY DUTY DIESEL URBAN BUSES (UB)	0.0	0.0	0.0	0.0
HEAVY DUTY GAS URBAN BUSES (UB)	1.0	0.6	0.5	0.3
SCHOOL BUSES (SB)	0.4	0.2	0.2	0.1
MOTOR HOMES (MH)	3.4	2.2	1.4	0.3
AIRCRAFT	3.0	4.1	5.0	5.6
TRAINS	0.5	0.6	0.6	0.7
RECREATIONAL BOATS	1.8	1.9	1.6	2.2
OFF-ROAD RECREATIONAL VEHICLES	12.5	13.2	14.7	16.5
OFF-ROAD EQUIPMENT	15.0	11.4	9.5	9.2
FARM EQUIPMENT	3.0	2.4	2.1	1.9
TOTAL	**231.8**	**164.2**	**134.2**	**113.3**

Fresno

Winter Season CO Emissions in Tons Per Day

(Fresno County)

Major Source Category	1993	2003	2010	2018
ELECTRIC UTILITIES	0.1	0.1	0.2	0.4
COGENERATION	1.2	0.4	0.4	0.8
OIL AND GAS PRODUCTION (COMBUSTION)	6.9	4.7	4.6	4.2
MANUFACTURING AND INDUSTRIAL	0.2	0.2	0.2	0.2
FOOD AND AGRICULTURAL PROCESSING	2.3	2.3	2.2	2.2
SERVICE AND COMMERCIAL	0.4	0.5	0.6	0.6
OTHER (FUEL COMBUSTION)	1.4	0.8	0.6	0.4
INCINERATORS	0.0	0.0	0.0	0.0
COATINGS AND RELATED PROCESS SOLVENTS	0.0	0.0	0.0	0.0
OTHER (CLEANING AND SURFACE COATINGS)	0.0	0.0	0.0	0.0
PETROLEUM MARKETING	0.0	0.0	0.0	0.1
FOOD AND AGRICULTURE	0.0	0.0	0.0	0.0
MINERAL PROCESSES	0.1	0.1	0.2	0.2
GLASS AND RELATED PRODUCTS	0.0	0.0	0.0	0.0
RESIDENTIAL FUEL COMBUSTION	38.7	39.6	41.3	44.2
FIRES	0.4	0.5	0.5	0.5
WASTE BURNING AND DISPOSAL	32.6	31.9	31.4	30.8
LIGHT DUTY PASSENGER (LDA)	163.9	86.4	47.9	24.8
LIGHT DUTY TRUCKS - 1 (LDT1)	98.6	54.2	30.6	16.0
LIGHT DUTY TRUCKS - 2 (LDT2)	69.9	38.3	24.6	13.6
MEDIUM DUTY TRUCKS (MDV)	20.6	15.8	10.4	6.4
LIGHT HEAVY DUTY GAS TRUCKS - 1 (LHDV1)	26.0	5.1	2.3	1.6
LIGHT HEAVY DUTY GAS TRUCKS - 2 (LHDV2)	2.7	1.3	0.9	0.5
MEDIUM HEAVY DUTY GAS TRUCKS (MHDV)	25.5	9.0	5.1	2.5
HEAVY HEAVY DUTY GAS TRUCKS (HHDV)	18.9	8.1	4.8	2.4
LIGHT HEAVY DUTY DIESEL TRUCKS - 1 (LHDV1)	0.0	0.1	0.1	0.1
LIGHT HEAVY DUTY DIESEL TRUCKS - 2 (LHDV2)	0.1	0.1	0.1	0.1
MEDIUM HEAVY DUTY DIESEL TRUCKS (MHDV)	0.9	0.9	1.0	0.9
HEAVY HEAVY DUTY DIESEL TRUCKS (HHDV)	5.9	3.9	3.2	2.5
MOTORCYCLES (MCY)	5.0	4.5	4.3	3.5
HEAVY DUTY DIESEL URBAN BUSES (UB)	0.2	0.2	0.2	0.1
HEAVY DUTY GAS URBAN BUSES (UB)	4.1	2.3	1.8	1.2
SCHOOL BUSES (SB)	1.9	1.0	0.7	0.4
MOTOR HOMES (MH)	5.9	4.6	2.8	0.8
AIRCRAFT	19.4	20.2	21.9	23.2
TRAINS	0.3	0.4	0.4	0.5
RECREATIONAL BOATS	2.6	2.7	2.3	3.2
OFF-ROAD RECREATIONAL VEHICLES	12.4	12.5	13.8	15.5
OFF-ROAD EQUIPMENT	44.0	36.0	30.9	29.4
FARM EQUIPMENT	14.5	11.6	10.1	9.7
TOTAL	**627.2**	**400.1**	**302.4**	**243.8**

Lake Tahoe North Shore

Winter Season CO Emissions in Tons Per Day

(Placer County – Lake Tahoe Air Basin)

Major Source Category	1993	2003	2010	2018
MANUFACTURING AND INDUSTRIAL	0.0	0.0	0.0	0.0
SERVICE AND COMMERCIAL	0.0	0.0	0.0	0.0
OTHER (FUEL COMBUSTION)	0.0	0.0	0.0	0.0
RESIDENTIAL FUEL COMBUSTION	2.1	2.5	2.6	2.8
FIRES	0.0	0.0	0.0	0.0
WASTE BURNING AND DISPOSAL	2.8	3.0	3.2	3.3
LIGHT DUTY PASSENGER (LDA)	4.5	2.4	1.2	0.5
LIGHT DUTY TRUCKS - 1 (LDT1)	0.7	0.1	0.1	0.0
LIGHT DUTY TRUCKS - 2 (LDT2)	4.1	2.6	2.0	1.3
MEDIUM DUTY TRUCKS (MDV)	6.0	4.0	3.0	1.9
LIGHT HEAVY DUTY GAS TRUCKS - 1 (LHDV1)	0.7	0.1	0.0	0.0
LIGHT HEAVY DUTY GAS TRUCKS - 2 (LHDV2)	0.1	0.0	0.0	0.0
MEDIUM HEAVY DUTY GAS TRUCKS (MHDV)	0.3	0.1	0.1	0.1
HEAVY HEAVY DUTY GAS TRUCKS (HHDV)	0.3	0.2	0.1	0.1
MEDIUM HEAVY DUTY DIESEL TRUCKS (MHDV)	0.0	0.0	0.0	0.0
HEAVY HEAVY DUTY DIESEL TRUCKS (HHDV)	0.0	0.0	0.0	0.0
HEAVY DUTY DIESEL URBAN BUSES (UB)	0.0	0.0	0.0	0.0
HEAVY DUTY GAS URBAN BUSES (UB)	0.4	0.4	0.4	0.2
MOTOR HOMES (MH)	0.5	0.3	0.1	0.0
RECREATIONAL BOATS	0.6	0.7	0.6	0.9
OFF-ROAD RECREATIONAL VEHICLES	1.2	1.2	1.4	1.5
OFF-ROAD EQUIPMENT	1.2	1.0	0.9	0.9
TOTAL	**25.4**	**18.7**	**15.8**	**13.6**

Lake Tahoe South Shore

Winter Season CO Emissions in Tons Per Day

(El Dorado County – Lake Tahoe Air Basin)

Major Source Category	1993	2003	2010	2018
MANUFACTURING AND INDUSTRIAL	0.0	0.0	0.0	0.0
SERVICE AND COMMERCIAL	0.0	0.0	0.0	0.0
OTHER (FUEL COMBUSTION)	0.0	0.0	0.0	0.0
SEWAGE TREATMENT	0.1	0.1	0.1	0.1
MINERAL PROCESSES	0.0	0.0	0.0	0.0
RESIDENTIAL FUEL COMBUSTION	16.8	18.4	19.0	19.9
FIRES	0.0	0.0	0.0	0.0
WASTE BURNING AND DISPOSAL	0.0	0.0	0.0	0.0
LIGHT DUTY PASSENGER (LDA)	8.0	4.8	3.3	1.4
LIGHT DUTY TRUCKS - 1 (LDT1)	1.0	0.2	0.1	0.0
LIGHT DUTY TRUCKS - 2 (LDT2)	8.0	4.7	3.3	2.0
MEDIUM DUTY TRUCKS (MDV)	9.9	6.2	4.4	2.8
LIGHT HEAVY DUTY GAS TRUCKS - 1 (LHDV1)	1.6	0.2	0.1	0.1
LIGHT HEAVY DUTY GAS TRUCKS - 2 (LHDV2)	0.3	0.2	0.2	0.1
MEDIUM HEAVY DUTY GAS TRUCKS (MHDV)	1.0	0.5	0.3	0.2
HEAVY HEAVY DUTY GAS TRUCKS (HHDV)	0.7	0.1	0.1	0.0
MEDIUM HEAVY DUTY DIESEL TRUCKS (MHDV)	0.0	0.0	0.0	0.0
HEAVY HEAVY DUTY DIESEL TRUCKS (HHDV)	0.0	0.0	0.0	0.0
HEAVY DUTY DIESEL URBAN BUSES (UB)	0.0	0.0	0.0	0.0
HEAVY DUTY GAS URBAN BUSES (UB)	0.7	0.5	0.4	0.2
MOTOR HOMES (MH)	0.7	0.6	0.4	0.1
AIRCRAFT	1.4	2.3	2.8	3.2
RECREATIONAL BOATS	1.3	1.5	1.4	2.1
OFF-ROAD RECREATIONAL VEHICLES	5.8	6.2	7.0	7.8
OFF-ROAD EQUIPMENT	4.0	2.9	2.5	2.5
TOTAL	**61.4**	**49.4**	**45.3**	**42.6**

Modesto

Winter Season CO Emissions in Tons Per Day

(Stanislaus County)

Major Source Category	1993	2003	2010	2018
ELECTRIC UTILITIES	0.0	0.7	0.8	0.8
COGENERATION	0.0	0.0	0.0	0.0
OIL AND GAS PRODUCTION (COMBUSTION)	0.0	0.0	0.0	0.0
PETROLEUM REFINING (COMBUSTION)	0.0	0.0	0.0	0.0
MANUFACTURING AND INDUSTRIAL	0.1	0.1	0.1	0.1
FOOD AND AGRICULTURAL PROCESSING	0.2	0.2	0.2	0.2
SERVICE AND COMMERCIAL	0.1	0.5	0.5	0.5
OTHER (FUEL COMBUSTION)	0.8	0.4	0.3	0.2
INCINERATORS	0.0	0.0	0.0	0.0
MINERAL PROCESSES	0.0	0.0	0.0	0.0
GLASS AND RELATED PRODUCTS	0.0	0.0	0.0	0.0
OTHER (INDUSTRIAL PROCESSES)	0.0	0.0	0.0	0.0
RESIDENTIAL FUEL COMBUSTION	19.8	21.3	22.5	24.1
FIRES	0.1	0.2	0.2	0.2
WASTE BURNING AND DISPOSAL	26.4	24.9	24.0	23.0
LIGHT DUTY PASSENGER (LDA)	86.9	46.6	25.6	13.8
LIGHT DUTY TRUCKS - 1 (LDT1)	55.2	28.2	15.8	8.6
LIGHT DUTY TRUCKS - 2 (LDT2)	34.6	19.8	12.6	7.3
MEDIUM DUTY TRUCKS (MDV)	11.2	8.6	5.7	3.7
LIGHT HEAVY DUTY GAS TRUCKS - 1 (LHDV1)	15.3	2.4	1.1	0.9
LIGHT HEAVY DUTY GAS TRUCKS - 2 (LHDV2)	1.5	0.6	0.4	0.2
MEDIUM HEAVY DUTY GAS TRUCKS (MHDV)	13.2	4.9	2.8	1.4
HEAVY HEAVY DUTY GAS TRUCKS (HHDV)	13.1	4.7	2.3	1.1
LIGHT HEAVY DUTY DIESEL TRUCKS - 1 (LHDV1)	0.0	0.1	0.1	0.1
LIGHT HEAVY DUTY DIESEL TRUCKS - 2 (LHDV2)	0.0	0.1	0.1	0.1
MEDIUM HEAVY DUTY DIESEL TRUCKS (MHDV)	0.4	0.4	0.5	0.4
HEAVY HEAVY DUTY DIESEL TRUCKS (HHDV)	3.1	1.8	1.5	1.3
MOTORCYCLES (MCY)	3.6	2.5	2.2	1.8
HEAVY DUTY DIESEL URBAN BUSES (UB)	0.1	0.1	0.1	0.1
HEAVY DUTY GAS URBAN BUSES (UB)	1.9	1.4	1.1	0.7
SCHOOL BUSES (SB)	0.9	0.5	0.4	0.2
MOTOR HOMES (MH)	4.9	3.7	2.2	0.6
AIRCRAFT	3.8	4.0	4.3	4.5
TRAINS	0.2	0.2	0.3	0.3
RECREATIONAL BOATS	1.0	1.0	0.8	1.0
OFF-ROAD RECREATIONAL VEHICLES	2.5	2.0	2.1	2.4
OFF-ROAD EQUIPMENT	23.1	18.9	16.4	16.0
FARM EQUIPMENT	6.7	5.3	4.7	4.5
TOTAL	**330.8**	**206.0**	**151.2**	**120.0**

Sacramento Area – Placer

Winter Season CO Emissions in Tons Per Day

(Placer County – Sacramento Valley Air Basin)

Major Source Category	1993	2003	2010	2018
ELECTRIC UTILITIES	0.0	0.0	0.0	0.0
MANUFACTURING AND INDUSTRIAL	1.8	1.1	1.2	1.4
FOOD AND AGRICULTURAL PROCESSING	0.0	0.0	0.0	0.0
SERVICE AND COMMERCIAL	0.4	0.5	0.6	0.6
OTHER (FUEL COMBUSTION)	0.3	0.2	0.1	0.1
INCINERATORS	0.0	0.0	0.0	0.0
CHEMICAL	0.0	0.0	0.0	0.0
MINERAL PROCESSES	0.0	0.1	0.1	0.1
WOOD AND PAPER	0.0	0.0	0.0	0.1
RESIDENTIAL FUEL COMBUSTION	29.1	34.3	36.6	38.9
FIRES	0.0	0.0	0.0	0.0
WASTE BURNING AND DISPOSAL	17.4	17.3	17.3	17.3
LIGHT DUTY PASSENGER (LDA)	38.3	23.7	14.1	7.7
LIGHT DUTY TRUCKS - 1 (LDT1)	24.9	15.3	9.1	4.9
LIGHT DUTY TRUCKS - 2 (LDT2)	17.4	10.6	7.5	4.6
MEDIUM DUTY TRUCKS (MDV)	6.5	5.5	4.0	2.7
LIGHT HEAVY DUTY GAS TRUCKS - 1 (LHDV1)	6.8	1.3	0.4	0.2
LIGHT HEAVY DUTY GAS TRUCKS - 2 (LHDV2)	0.8	0.3	0.1	0.1
MEDIUM HEAVY DUTY GAS TRUCKS (MHDV)	3.5	1.8	0.9	0.4
HEAVY HEAVY DUTY GAS TRUCKS (HHDV)	3.5	2.2	1.0	0.4
LIGHT HEAVY DUTY DIESEL TRUCKS - 1 (LHDV1)	0.0	0.0	0.0	0.0
LIGHT HEAVY DUTY DIESEL TRUCKS - 2 (LHDV2)	0.0	0.0	0.0	0.0
MEDIUM HEAVY DUTY DIESEL TRUCKS (MHDV)	0.1	0.1	0.1	0.1
HEAVY HEAVY DUTY DIESEL TRUCKS (HHDV)	0.6	0.5	0.3	0.2
MOTORCYCLES (MCY)	2.2	1.8	1.0	0.4
HEAVY DUTY DIESEL URBAN BUSES (UB)	0.0	0.0	0.0	0.0
HEAVY DUTY GAS URBAN BUSES (UB)	0.4	0.3	0.3	0.2
SCHOOL BUSES (SB)	0.4	0.2	0.1	0.1
MOTOR HOMES (MH)	2.2	1.6	1.0	0.3
AIRCRAFT	0.7	0.7	0.7	0.7
TRAINS	0.5	0.6	0.6	0.7
RECREATIONAL BOATS	6.6	7.4	7.0	10.3
OFF-ROAD RECREATIONAL VEHICLES	0.8	0.7	0.7	0.8
OFF-ROAD EQUIPMENT	14.1	11.3	10.2	9.7
FARM EQUIPMENT	0.9	0.8	0.7	0.6
TOTAL	**180.0**	**140.2**	**115.9**	**103.7**

Sacramento Area - Sacramento

Winter Season CO Emissions in Tons Per Day

(Sacramento County)

Major Source Category	1993	2003	2010	2018
ELECTRIC UTILITIES	0.1	0.4	0.4	0.4
COGENERATION	3.7	0.0	0.0	0.0
OIL AND GAS PRODUCTION (COMBUSTION)	0.3	0.2	0.3	0.2
MANUFACTURING AND INDUSTRIAL	0.2	0.2	0.2	0.2
FOOD AND AGRICULTURAL PROCESSING	0.1	0.0	0.0	0.0
SERVICE AND COMMERCIAL	1.7	2.7	2.8	2.8
OTHER (FUEL COMBUSTION)	1.4	0.9	0.6	0.4
LANDFILLS	0.0	0.1	0.1	0.1
INCINERATORS	0.0	0.0	0.0	0.0
OTHER (WASTE DISPOSAL)	0.0	0.0	0.0	0.0
PRINTING	0.0	0.0	0.0	0.0
CHEMICAL	0.0	0.0	0.0	0.0
MINERAL PROCESSES	0.0	0.4	0.4	0.5
WOOD AND PAPER	0.0	0.0	0.0	0.0
RESIDENTIAL FUEL COMBUSTION	65.6	65.6	69.3	74.4
FIRES	0.4	0.4	0.4	0.5
WASTE BURNING AND DISPOSAL	4.2	4.1	4.1	4.1
LIGHT DUTY PASSENGER (LDA)	257.3	121.1	67.7	35.3
LIGHT DUTY TRUCKS - 1 (LDT1)	124.2	56.1	32.1	17.2
LIGHT DUTY TRUCKS - 2 (LDT2)	93.9	43.3	29.7	17.7
MEDIUM DUTY TRUCKS (MDV)	32.1	19.7	13.9	9.0
LIGHT HEAVY DUTY GAS TRUCKS - 1 (LHDV1)	28.3	5.3	2.1	1.2
LIGHT HEAVY DUTY GAS TRUCKS - 2 (LHDV2)	5.0	1.9	0.9	0.4
MEDIUM HEAVY DUTY GAS TRUCKS (MHDV)	36.1	12.8	7.3	3.6
HEAVY HEAVY DUTY GAS TRUCKS (HHDV)	47.2	19.5	9.0	3.3
LIGHT HEAVY DUTY DIESEL TRUCKS - 1 (LHDV1)	0.1	0.1	0.1	0.1
LIGHT HEAVY DUTY DIESEL TRUCKS - 2 (LHDV2)	0.1	0.1	0.1	0.1
MEDIUM HEAVY DUTY DIESEL TRUCKS (MHDV)	1.1	1.1	1.0	0.8
HEAVY HEAVY DUTY DIESEL TRUCKS (HHDV)	5.4	3.4	2.5	1.8
MOTORCYCLES (MCY)	8.2	4.9	3.4	2.0
HEAVY DUTY DIESEL URBAN BUSES (UB)	0.4	0.3	0.3	0.2
HEAVY DUTY GAS URBAN BUSES (UB)	5.4	2.6	1.6	0.9
SCHOOL BUSES (SB)	1.8	1.1	1.0	0.8
MOTOR HOMES (MH)	9.1	6.4	4.5	1.7
AIRCRAFT	2.4	2.9	3.3	3.5
TRAINS	0.6	0.7	0.7	0.8
SHIPS AND COMMERCIAL BOATS	0.2	0.1	0.1	0.1
RECREATIONAL BOATS	7.5	8.3	8.1	12.2
OFF-ROAD RECREATIONAL VEHICLES	4.2	3.3	3.5	4.0
OFF-ROAD EQUIPMENT	72.8	55.7	47.6	43.0
FARM EQUIPMENT	2.6	2.1	1.8	1.7
TOTAL	**823.6**	**447.8**	**320.8**	**245.1**

Sacramento Area - Yolo

Winter Season CO Emissions in Tons Per Day

(Yolo County)

Major Source Category	1993	2003	2010	2018
ELECTRIC UTILITIES	0.0	0.6	0.6	0.6
COGENERATION	0.0	0.0	0.0	0.0
MANUFACTURING AND INDUSTRIAL	0.0	0.0	0.0	0.0
FOOD AND AGRICULTURAL PROCESSING	0.3	0.4	0.4	0.4
SERVICE AND COMMERCIAL	0.0	0.1	0.1	0.1
OTHER (FUEL COMBUSTION)	0.6	0.2	0.1	0.1
SEWAGE TREATMENT	0.0	0.0	0.0	0.0
INCINERATORS	0.0	0.0	0.0	0.0
COATINGS AND RELATED PROCESS SOLVENTS	0.0	0.0	0.0	0.0
PRINTING	0.0	0.0	0.0	0.0
ADHESIVES AND SEALANTS	0.0	0.0	0.0	0.0
OIL AND GAS PRODUCTION	0.0	0.0	0.0	0.0
PETROLEUM MARKETING	0.0	0.1	0.2	0.2
CHEMICAL	0.5	0.5	0.5	0.5
FOOD AND AGRICULTURE	0.0	0.0	0.0	0.0
MINERAL PROCESSES	0.0	0.3	0.3	0.4
OTHER (INDUSTRIAL PROCESSES)	0.0	0.0	0.0	0.0
RESIDENTIAL FUEL COMBUSTION	7.4	7.1	7.1	7.3
FIRES	0.0	0.0	0.0	0.0
WASTE BURNING AND DISPOSAL	2.3	2.3	2.2	2.2
LIGHT DUTY PASSENGER (LDA)	32.1	17.6	10.0	5.4
LIGHT DUTY TRUCKS - 1 (LDT1)	17.8	9.0	5.1	2.7
LIGHT DUTY TRUCKS - 2 (LDT2)	12.3	6.6	4.3	2.6
MEDIUM DUTY TRUCKS (MDV)	4.6	3.4	2.3	1.5
LIGHT HEAVY DUTY GAS TRUCKS - 1 (LHDV1)	5.5	0.9	0.3	0.2
LIGHT HEAVY DUTY GAS TRUCKS - 2 (LHDV2)	0.4	0.2	0.1	0.1
MEDIUM HEAVY DUTY GAS TRUCKS (MHDV)	8.8	1.8	0.9	0.5
HEAVY HEAVY DUTY GAS TRUCKS (HHDV)	7.0	1.7	0.7	0.3
LIGHT HEAVY DUTY DIESEL TRUCKS - 1 (LHDV1)	0.0	0.0	0.0	0.0
LIGHT HEAVY DUTY DIESEL TRUCKS - 2 (LHDV2)	0.0	0.0	0.0	0.0
MEDIUM HEAVY DUTY DIESEL TRUCKS (MHDV)	0.3	0.3	0.3	0.2
HEAVY HEAVY DUTY DIESEL TRUCKS (HHDV)	2.1	1.3	0.9	0.6
MOTORCYCLES (MCY)	1.2	1.1	0.9	0.7
HEAVY DUTY DIESEL URBAN BUSES (UB)	0.0	0.0	0.0	0.0
HEAVY DUTY GAS URBAN BUSES (UB)	0.5	0.3	0.2	0.2
SCHOOL BUSES (SB)	0.3	0.2	0.1	0.1
MOTOR HOMES (MH)	1.3	1.1	0.7	0.3
AIRCRAFT	0.8	0.8	0.8	0.8
TRAINS	0.0	0.0	0.0	0.0
SHIPS AND COMMERCIAL BOATS	0.1	0.1	0.1	0.1
RECREATIONAL BOATS	1.7	1.8	1.7	2.4
OFF-ROAD RECREATIONAL VEHICLES	0.7	0.5	0.6	0.7
OFF-ROAD EQUIPMENT	9.5	7.8	6.5	6.2
FARM EQUIPMENT	2.9	2.4	2.0	1.8
TOTAL	**121.2**	**70.4**	**50.1**	**39.1**

San Diego

Winter Season CO Emissions in Tons Per Day

(San Diego County)

Major Source Category	1993	2003	2010	2018
ELECTRIC UTILITIES	2.7	9.7	26.8	30.1
COGENERATION	4.0	2.1	2.2	2.4
MANUFACTURING AND INDUSTRIAL	0.2	1.4	2.2	2.9
FOOD AND AGRICULTURAL PROCESSING	36.3	28.3	25.7	23.0
SERVICE AND COMMERCIAL	0.5	0.2	0.3	0.3
OTHER (FUEL COMBUSTION)	3.4	4.0	3.9	3.8
SEWAGE TREATMENT	0.0	0.1	0.1	0.1
LANDFILLS	0.0	0.1	0.1	0.1
INCINERATORS	0.0	0.0	0.0	0.0
OTHER (WASTE DISPOSAL)	0.0	0.0	0.0	0.0
PETROLEUM REFINING	0.2	0.0	0.0	0.0
MINERAL PROCESSES	0.4	0.1	0.2	0.2
OTHER (INDUSTRIAL PROCESSES)	0.0	0.3	0.3	0.4
RESIDENTIAL FUEL COMBUSTION	104.4	105.6	110.8	118.2
FIRES	0.6	0.6	0.7	0.7
WASTE BURNING AND DISPOSAL	10.9	10.4	10.1	9.7
LIGHT DUTY PASSENGER (LDA)	704.3	349.3	210.7	109.4
LIGHT DUTY TRUCKS - 1 (LDT1)	270.6	126.3	78.0	38.5
LIGHT DUTY TRUCKS - 2 (LDT2)	211.8	105.0	77.6	41.9
MEDIUM DUTY TRUCKS (MDV)	80.3	51.9	29.1	22.7
LIGHT HEAVY DUTY GAS TRUCKS - 1 (LHDV1)	60.8	9.1	3.6	2.8
LIGHT HEAVY DUTY GAS TRUCKS - 2 (LHDV2)	6.3	2.5	1.3	0.8
MEDIUM HEAVY DUTY GAS TRUCKS (MHDV)	35.8	12.8	7.5	3.9
HEAVY HEAVY DUTY GAS TRUCKS (HHDV)	27.8	16.1	8.4	3.6
LIGHT HEAVY DUTY DIESEL TRUCKS - 1 (LHDV1)	0.1	0.3	0.3	0.3
LIGHT HEAVY DUTY DIESEL TRUCKS - 2 (LHDV2)	0.2	0.2	0.2	0.2
MEDIUM HEAVY DUTY DIESEL TRUCKS (MHDV)	1.4	1.7	1.8	1.5
HEAVY HEAVY DUTY DIESEL TRUCKS (HHDV)	10.2	7.6	6.7	4.7
MOTORCYCLES (MCY)	22.6	17.6	13.2	12.2
HEAVY DUTY DIESEL URBAN BUSES (UB)	0.6	0.6	1.2	0.5
HEAVY DUTY GAS URBAN BUSES (UB)	7.3	5.4	8.0	2.9
SCHOOL BUSES (SB)	3.4	1.9	1.3	0.8
MOTOR HOMES (MH)	28.4	20.1	7.8	2.5
AIRCRAFT	19.0	18.4	19.0	19.5
TRAINS	0.1	0.1	0.1	0.1
SHIPS AND COMMERCIAL BOATS	4.5	4.4	4.4	4.4
RECREATIONAL BOATS	23.7	25.9	24.5	36.1
OFF-ROAD RECREATIONAL VEHICLES	16.1	13.1	14.0	15.7
OFF-ROAD EQUIPMENT	186.5	144.2	124.5	123.6
FARM EQUIPMENT	4.1	3.3	2.9	2.6
TOTAL	**1,889.4**	**1,100.8**	**829.3**	**643.1**

San Francisco – Oakland – San Jose

Winter Season CO Emissions in Tons Per Day

(San Francisco Bay Area Air Basin)

Major Source Category	1993	2003	2010	2018
ELECTRIC UTILITIES	6.1	7.2	15.1	15.1
COGENERATION	1.5	2.8	3.0	3.2
OIL AND GAS PRODUCTION (COMBUSTION)	0.0	0.0	0.0	0.0
PETROLEUM REFINING (COMBUSTION)	4.5	4.9	5.4	5.9
MANUFACTURING AND INDUSTRIAL	6.7	12.5	13.6	15.1
FOOD AND AGRICULTURAL PROCESSING	0.3	0.1	0.2	0.2
SERVICE AND COMMERCIAL	2.6	4.1	4.5	4.9
OTHER (FUEL COMBUSTION)	14.1	8.2	6.1	5.5
SEWAGE TREATMENT	0.0	0.0	0.0	0.0
INCINERATORS	0.3	0.1	0.1	0.1
SOIL REMEDIATION	0.0	0.0	0.0	0.0
OTHER (WASTE DISPOSAL)	0.0	0.0	0.0	0.0
COATINGS AND RELATED PROCESS SOLVENTS	0.0	0.0	0.0	0.0
PRINTING	0.0	0.0	0.0	0.0
OIL AND GAS PRODUCTION	0.0	0.0	0.0	0.0
PETROLEUM REFINING	1.4	1.3	1.4	1.6
CHEMICAL	26.1	0.1	0.1	0.1
FOOD AND AGRICULTURE	0.0	0.3	0.3	0.3
MINERAL PROCESSES	0.1	0.1	0.1	0.1
METAL PROCESSES	0.0	0.1	0.1	0.1
WOOD AND PAPER	0.0	0.0	0.0	0.0
ELECTRONICS	0.0	0.0	0.0	0.0
OTHER (INDUSTRIAL PROCESSES)	0.1	1.2	1.3	1.4
RESIDENTIAL FUEL COMBUSTION	270.6	283.4	276.5	272.9
FIRES	3.7	3.1	3.3	3.4
WASTE BURNING AND DISPOSAL	9.1	18.4	18.5	18.5
OTHER (MISCELLANEOUS PROCESSES)	1.5	1.5	1.5	1.5
LIGHT DUTY PASSENGER (LDA)	1,604.2	913.0	442.0	232.1
LIGHT DUTY TRUCKS - 1 (LDT1)	514.4	290.0	147.7	82.1
LIGHT DUTY TRUCKS - 2 (LDT2)	456.8	255.5	156.7	100.9
MEDIUM DUTY TRUCKS (MDV)	206.6	148.1	97.1	68.4
LIGHT HEAVY DUTY GAS TRUCKS - 1 (LHDV1)	138.3	28.4	10.7	6.6
LIGHT HEAVY DUTY GAS TRUCKS - 2 (LHDV2)	18.8	9.2	4.8	2.5
MEDIUM HEAVY DUTY GAS TRUCKS (MHDV)	118.9	44.8	23.8	13.0
HEAVY HEAVY DUTY GAS TRUCKS (HHDV)	92.4	44.4	20.6	9.6
LIGHT HEAVY DUTY DIESEL TRUCKS - 1 (LHDV1)	0.2	0.5	0.6	0.5
LIGHT HEAVY DUTY DIESEL TRUCKS - 2 (LHDV2)	0.5	0.5	0.6	0.4
MEDIUM HEAVY DUTY DIESEL TRUCKS (MHDV)	4.7	5.4	5.2	4.2
HEAVY HEAVY DUTY DIESEL TRUCKS (HHDV)	23.0	16.2	12.0	9.0
MOTORCYCLES (MCY)	68.3	36.5	22.9	12.4
HEAVY DUTY DIESEL URBAN BUSES (UB)	3.3	3.2	3.0	2.7
HEAVY DUTY GAS URBAN BUSES (UB)	17.3	13.3	12.4	10.3
SCHOOL BUSES (SB)	6.0	3.5	2.7	2.1
MOTOR HOMES (MH)	40.7	27.6	16.0	6.1
AIRCRAFT	53.6	39.9	44.7	48.4
TRAINS	1.8	2.1	2.3	2.6
SHIPS AND COMMERCIAL BOATS	3.0	3.1	3.4	3.6
RECREATIONAL BOATS	24.3	25.8	23.1	32.6
OFF-ROAD RECREATIONAL VEHICLES	29.7	3.5	2.6	2.1
OFF-ROAD EQUIPMENT	473.0	374.7	305.8	316.4
FARM EQUIPMENT	5.6	6.5	4.1	3.7
TOTAL	**4,253.8**	**2,645.3**	**1,715.9**	**1,322.2**

Stockton

Winter Season CO Emissions in Tons Per Day

(San Joaquin County)

Major Source Category	1993	2003	2010	2018
ELECTRIC UTILITIES	0.0	1.3	1.3	1.8
COGENERATION	0.0	0.0	0.0	0.1
OIL AND GAS PRODUCTION (COMBUSTION)	0.1	0.1	0.1	0.1
MANUFACTURING AND INDUSTRIAL	1.3	1.8	1.9	2.0
FOOD AND AGRICULTURAL PROCESSING	0.8	0.7	0.7	0.7
SERVICE AND COMMERCIAL	0.4	0.5	0.5	0.5
OTHER (FUEL COMBUSTION)	1.9	0.4	0.3	0.2
INCINERATORS	0.0	0.0	0.0	0.0
FOOD AND AGRICULTURE	0.0	0.0	0.0	0.0
METAL PROCESSES	0.1	0.1	0.1	0.1
GLASS AND RELATED PRODUCTS	0.0	0.0	0.0	0.0
ELECTRONICS	0.0	0.0	0.0	0.0
OTHER (INDUSTRIAL PROCESSES)	0.0	0.0	0.0	0.0
RESIDENTIAL FUEL COMBUSTION	23.6	24.2	24.9	26.3
FIRES	0.1	0.1	0.1	0.1
WASTE BURNING AND DISPOSAL	16.6	16.1	15.8	15.4
LIGHT DUTY PASSENGER (LDA)	127.7	67.9	38.9	20.8
LIGHT DUTY TRUCKS - 1 (LDT1)	66.8	30.9	18.0	10.0
LIGHT DUTY TRUCKS - 2 (LDT2)	45.0	24.3	15.8	9.6
MEDIUM DUTY TRUCKS (MDV)	15.0	11.2	7.7	5.3
LIGHT HEAVY DUTY GAS TRUCKS - 1 (LHDV1)	17.4	3.2	1.2	0.7
LIGHT HEAVY DUTY GAS TRUCKS - 2 (LHDV2)	1.6	0.7	0.4	0.2
MEDIUM HEAVY DUTY GAS TRUCKS (MHDV)	15.6	5.9	3.2	1.5
HEAVY HEAVY DUTY GAS TRUCKS (HHDV)	18.5	5.2	2.1	1.1
LIGHT HEAVY DUTY DIESEL TRUCKS - 1 (LHDV1)	0.0	0.1	0.1	0.1
LIGHT HEAVY DUTY DIESEL TRUCKS - 2 (LHDV2)	0.1	0.1	0.1	0.1
MEDIUM HEAVY DUTY DIESEL TRUCKS (MHDV)	0.5	0.6	0.6	0.5
HEAVY HEAVY DUTY DIESEL TRUCKS (HHDV)	3.8	2.3	1.8	1.2
MOTORCYCLES (MCY)	4.9	3.2	2.7	1.7
HEAVY DUTY DIESEL URBAN BUSES (UB)	0.1	0.1	0.1	0.1
HEAVY DUTY GAS URBAN BUSES (UB)	2.4	1.4	1.4	1.0
SCHOOL BUSES (SB)	0.9	0.5	0.3	0.3
MOTOR HOMES (MH)	5.9	4.1	2.7	1.0
AIRCRAFT	3.8	5.0	5.9	6.6
TRAINS	0.6	0.8	0.8	0.9
SHIPS AND COMMERCIAL BOATS	0.2	0.2	0.2	0.2
RECREATIONAL BOATS	10.5	11.7	11.1	16.5
OFF-ROAD RECREATIONAL VEHICLES	2.3	1.9	2.0	2.2
OFF-ROAD EQUIPMENT	36.9	25.8	20.6	19.1
FARM EQUIPMENT	7.1	5.7	5.0	4.8
TOTAL	**432.7**	**257.7**	**188.5**	**152.7**

APPENDIX C

Board Resolution 98-52, November 19, 1998

State of California
AIR RESOURCES BOARD

Resolution 98-52

November 19, 1998

Agenda Item No.: 98-11-4

WHEREAS, sections 39600 and 39601 of the Health and Safety Code authorize the Air Resources Board (ARB or Board) to adopt standards, rules and regulations and to do such acts as may be necessary for the proper execution of the powers and duties granted to and imposed upon the Board by law;

WHEREAS, section 39602 of the Heath and Safety Code designates the ARB as the state air pollution control agency for all purposes set forth in federal law and as the state agency responsible for the preparation of any State Implementation Plan (SIP) required by the federal Clean Air Act (CAA; 42 U.S.C. sections 7401 et seq.);

WHEREAS, on September 13, 1985, the U.S. Environmental Protection Agency (U.S. EPA) promulgated a national ambient air quality standard (NAAQS) for carbon monoxide (CO) of 9 parts per million (ppm) (eight hour average);

WHEREAS, under CAA sections 107(d)(4)(A) and 186(a)(1), the following ten areas were designated as nonattainment for CO and classified as "moderate" or unclassified:

Bakersfield Metropolitan Area
Chico Urbanized Area
Fresno Urbanized Area
Lake Tahoe North Shore Area
Lake Tahoe South Shore Area
Modesto Urbanized Area
Sacramento Area
San Diego Area
San Francisco-Oakland-San Jose Area
Stockton Urbanized Area

WHEREAS, CAA section 107(d)(3)(D) provides that a state may request the U.S. EPA to redesignate an area from nonattainment to attainment for the NAAQS;

WHEREAS, on April 25, 1996, the Board approved Resolution 96-13 which adopted the CO Redesignation Request and Maintenance Plan for the ten CO nonattainment areas and directed the Executive Officer to submit the plan to U.S. EPA as a SIP revision;

WHEREAS, on March 31, 1998, the U. S. EPA proposed approval of the CO Redesignation Request and Maintenance Plan as a direct final rule (FR Vol. 63, No. 61, pp. 15305-15312);

WHEREAS, the direct final rule became effective on June 1, 1998;

WHEREAS, the maintenance demonstration contained in the approved CO Maintenance Plan contains emission estimates incorporating the effects of the wintertime requirement for oxygen in gasoline, as specified in section 2262.5, title 13, California Code of Regulations (CCR);

WHEREAS, on August 27, 1998, the Board approved Resolution 98-37, which amends section 2262.5, title 13, CCR to rescind the wintertime oxygen requirement in gasoline in certain CO attainment areas of the state;

WHEREAS, the Board's action to remove the wintertime oxygen requirement makes it necessary to amend the maintenance demonstration in the approved SIP for Carbon Monoxide to reflect the Board's action;

WHEREAS, the Board staff has prepared a revision to the SIP for Carbon Monoxide which incorporates the effects of the removal of the wintertime oxygen requirement in gasoline;

WHEREAS, the California Environmental Quality Act and ARB regulations provide that no project that may have significant adverse environmental impacts shall be approved as originally proposed if feasible alternatives or mitigation measures are available to reduce or eliminate such impacts;

WHEREAS, the Board in Resolution 98-37, which approved the amendments eliminating the wintertime oxygen requirement, found that:

1. To the extent that refiners and importers reduce the amount of oxygen in gasoline in response to the wintertime oxygen amendments, CO emissions from motor vehicles operating on that gasoline will increase as a result of the reduced oxygen content;

2. Even in a worst case scenario, vehicular CO emissions under the partial elimination of the wintertime minimum oxygen requirements would remain less than they were in 1995, and would decline annually from the turnover of the vehicle fleet to new vehicles; and

3. The limitations incorporated into the wintertime oxygen amendments will assure that any CO emission increases resulting from the amendments will not interfere with the attainment or maintenance of the federal or state ambient CO standards.

WHEREAS, the Board reaffirms the above findings in Resolution 98-37, and further finds that:

1. Even with no wintertime oxygen in gasoline, the emission levels in all of the 10 federal planning areas remain below the 1995 attainment levels as determined in the Carbon Monoxide Redesignation Request and Maintenance Plan;

2. The contingency measures in the Carbon Monoxide SIP that are being implemented or will be implemented, coupled with vehicle fleet turnover, provide an ample margin of safety to maintain the CO standard; and

3. This action will not have a significant adverse impact on the environment, since this action simply revises the maintenance demonstration to reflect the Board's previous action eliminating the wintertime oxygen requirement.

WHEREAS, the Board directs ARB staff to review carbon monoxide air quality data in the areas no longer subject to the wintertime oxygen requirement; if violations are monitored in any of the areas, staff will propose that appropriate action be taken regarding reinstatement of the minimum wintertime oxygen content in gasoline as previously contained in section 2262.5, title 13, CCR, in the area at the beginning of the following winter season.

NOW, THEREFORE BE IT RESOLVED that the Board hereby adopts the Revision to the State Implementation Plan for Carbon Monoxide and directs the Executive Officer to forward the revision to the U.S. EPA for inclusion in the SIP.

BE IT FURTHER RESOLVED, that the Board certifies that the SIP revision was adopted after notice and public hearing as required by 40 CFR 51.102, and directs the Executive Officer to submit the appropriate supporting documentation to U.S. EPA along with the SIP revision.

I hereby certify that the above is a true and correct copy of Resolution 98-52, as adopted by the Air Resources Board.

Pat Hutchens

Pat Hutchens, Clerk of the Board