



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:

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**State of California
AIR RESOURCES BOARD**

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

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

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**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 noise¹. 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. 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 NO_x, 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 NO_x annually. Similarly, excessive sleeper idling will approximately contribute an additional 230 tons and 13,700 tons of diesel PM and NO_x 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 TACs¹. 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 districts².

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. What action did staff take to consult with interested parties?

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-FUELED 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 Diesel 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. What exceptions would be allowed?

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 SmartWaySM 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	CO₂
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. Are there any adverse environmental impacts associated with the proposed control measure?

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. How does this Proposed ATCM relate to ARB's goals on Environmental Justice?

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 policies³. ARB's Environmental Justice Policies 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. Policies and Actions for Environmental Justice. Sacramento: 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 opacity 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 SmartWaySM 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 NO_x, which are necessary for California to meet its clean air commitments under the State Implementation Plan. In addition, local air districts use these NO_x 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 NO_x 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 environmentally efficient 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.

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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 NO_x, 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 (CO₂), sulfur dioxide (SO₂), NO_x, 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 SO₂, NO_x, 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 (PM₁₀). 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 NO_x 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 [$\mu\text{g}/\text{m}^3$]) 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 ($\text{PM}_{2.5}$) 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 $\text{PM}_{2.5}$ and secondary diesel $\text{PM}_{2.5}$, which is formed from the atmospheric conversion of diesel NO_x emissions to $\text{PM}_{2.5}$ nitrates. It was estimated that 2,000 and 900 premature deaths resulted from long-term exposure to 1.8 $\mu\text{g}/\text{m}^3$ of primary $\text{PM}_{2.5}$ and 0.81 $\mu\text{g}/\text{m}^3$ of secondary $\text{PM}_{2.5}$, 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 NO_x and hundreds of different volatile organic compounds. Ozone is formed by the reaction of VOCs and NO_x in the atmosphere in the presence of heat and sunlight. The highest levels of ozone are produced when both VOC and NO_x 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 PM₁₀, 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 PM₁₀ 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 PM₁₀ standards were first established in 1982 and most recently updated June 20, 2002 (ARB, 2002). The current State PM₁₀ 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 PM₁₀ standard.

Table II-1

State and National PM Standards

California Standard		National Standard	
PM₁₀			
Annual Arithmetic Mean	20 µg/m ³	Annual Arithmetic Mean	50 µg/m ³
24-Hour Average	50 µg/m ³	24-Hour Average	150 µg/m ³
PM_{2.5}			
Annual Arithmetic Mean	12 µg/m ³	Annual Arithmetic Mean	15 µg/m ³
24-Hour Average	No separate State standard	24-Hour Average	65 µg/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 PM₁₀ and PM_{2.5}, and consequently will help reduce the adverse public health 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 µg/m ³)	0.12ppm (235 µg/m ³)
8 hour		0.08 ppm (157 µg/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.

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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 from 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.

Hazard Identification

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].

Dose-Response Assessment

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 ($\mu\text{g}/\text{m}^3$), 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 ($\text{mg}/\text{kg}\text{-d}$), 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, $(\mu\text{g}/\text{m}^3)^{-1}$, 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 $\text{mg}/\text{kg}\text{-d}$ 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 $\text{mg}/\text{kg}\text{-d}$).

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., $(\text{mg}/\text{kg}\cdot\text{d})^{-1}$). For inhalation chronic noncancer impacts, the OEHHA recommended REL is $5 \mu\text{g}/\text{m}^3$.

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

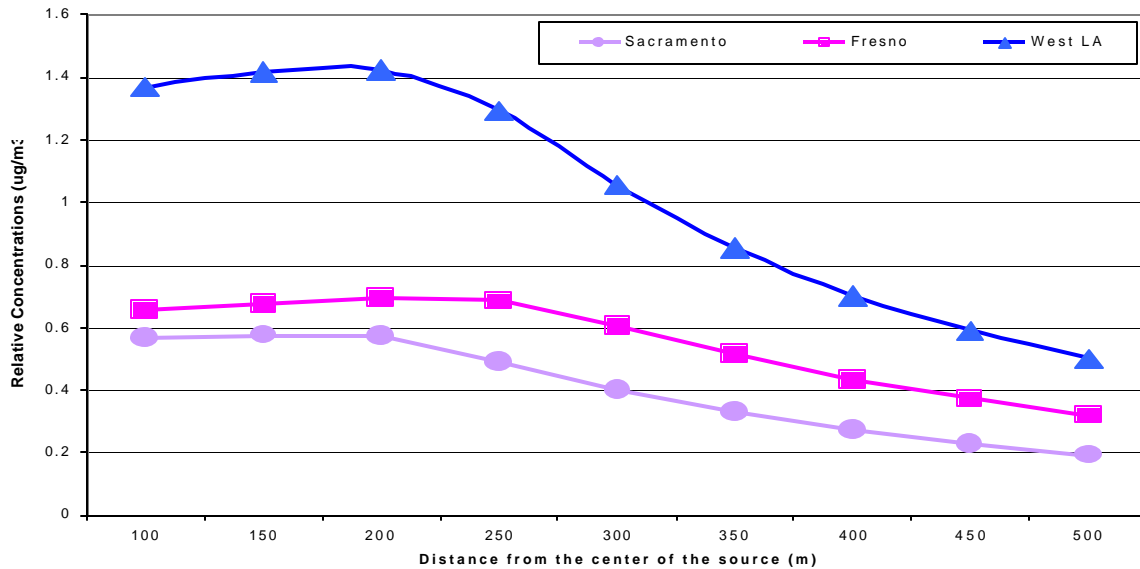
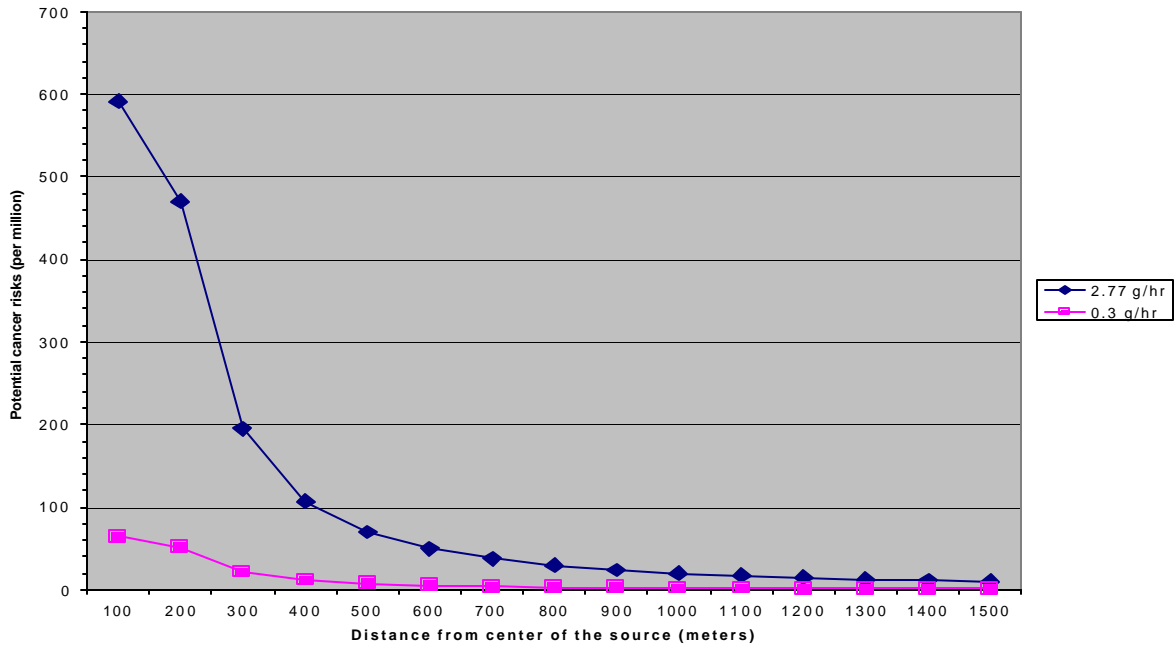


Figure IV-2 shows the potential cancer risks to nearby receptors between 100 to 1,500 meters from the center of the source of emissions as a result of 500 hours per day of diesel truck engine idling. The figure below compares the cancer health risk at the average fleet diesel PM emission rate of 2.77 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.

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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 NO_x 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 2007 and 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 than 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.

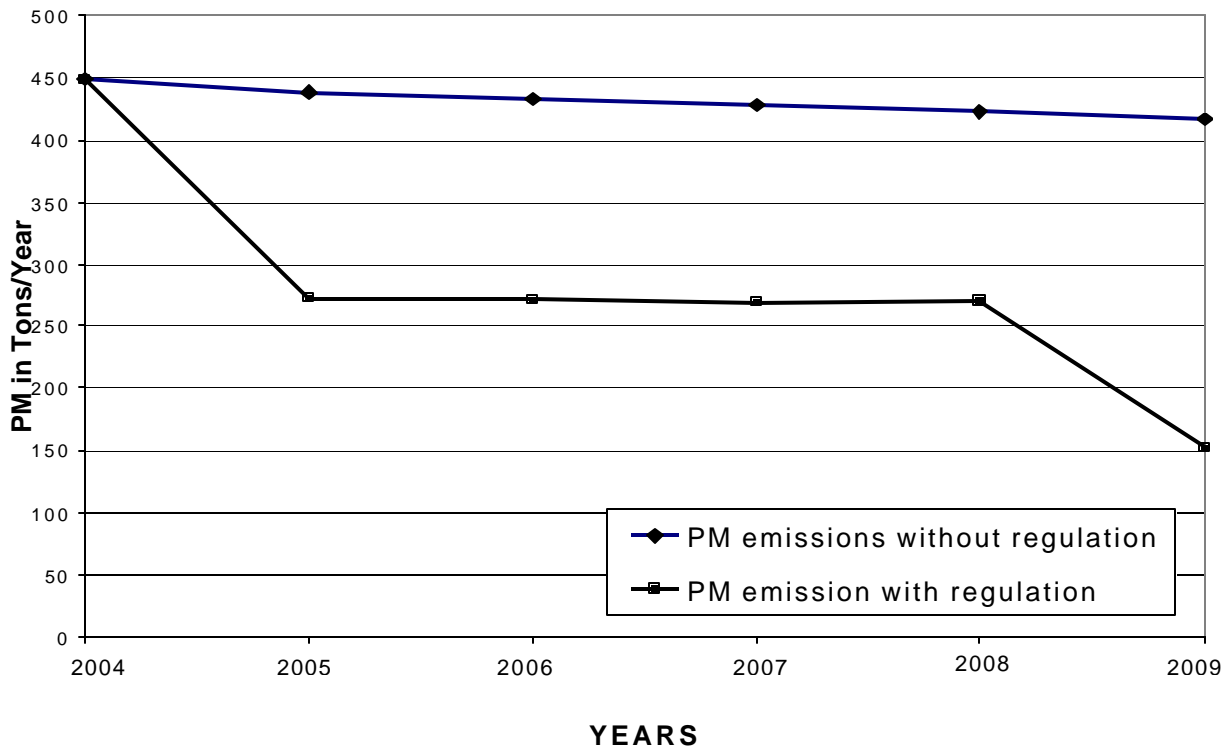
Effectiveness

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

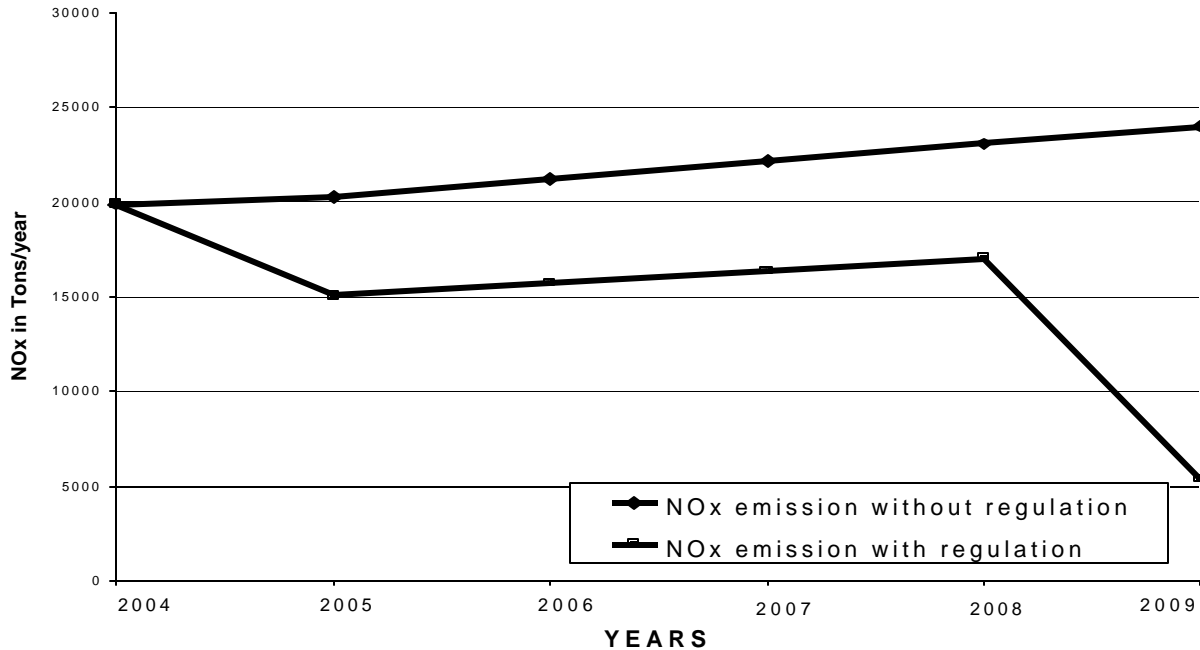
Projected Diesel PM Emissions with and without the Implementation of the Proposed ATCM



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.

Auxiliary Power Systems (APS)

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 drivers 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 PM₁₀, hydrocarbon, CO, and NO_x 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 NO_x 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 starting 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 µg/m³) 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 µg/m³ 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 in 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 µg/m³ 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 µg/m³ 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 policies⁵. 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 unhealthy 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.

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