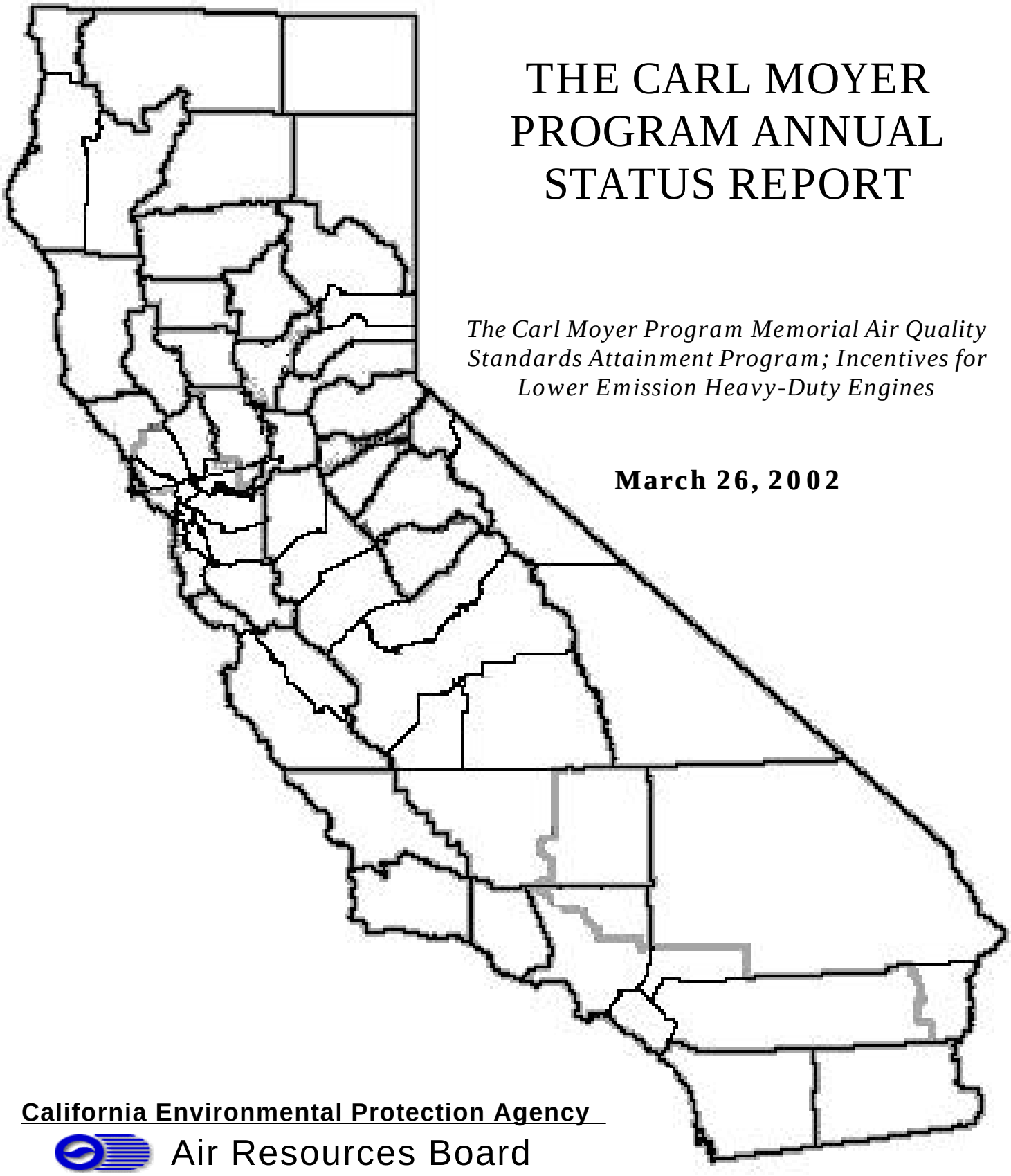

THE CARL MOYER PROGRAM ANNUAL STATUS REPORT

The Carl Moyer Program Memorial Air Quality Standards Attainment Program; Incentives for Lower Emission Heavy-Duty Engines

March 26, 2002

California Environmental Protection Agency

Air Resources Board

In memory of Dr. Carl Moyer

(1937 – 1997)

This program is named in honor of the late Dr. Carl Moyer, whose extraordinary dedication, hard work, vision and leadership made this program possible. He created and masterminded this program, in a noble effort to unite business and government in the name of public interest to improve California's air quality.

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EXECUTIVE SUMMARY

More than 1.2 million diesel engines operate in California. Trucks, agricultural and construction equipment, marine vessels, and locomotives rely primarily upon diesel power to transport goods and people to keep our society functioning. Diesel engines also contribute an inordinate amount to California's smog and toxic air pollution problems. The Carl Moyer Program is providing a positive near-term solution to this challenge.

The Carl Moyer Program is a grant program that funds the extra capital cost of cleaner than required vehicles and equipment in order to provide air quality benefits. It has been successful in getting a large number of clean vehicles on the road today. This includes over 1900 alternative-fueled vehicles, especially transit buses and refuse trucks. The program has also replaced nearly 2000 older diesel engines with new, cleaner diesel engines, primarily in marine vessels, off-road equipment, and agricultural irrigation pumps.

Diesel engines emit a complex mixture of air pollutants that includes oxides of nitrogen (NOx) and particulate matter (PM). NOx emissions are a precursor to smog and although diesel vehicles comprise only a small percentage of the number of on-road vehicles in California, they are responsible for more than 70 percent of the NOx emissions. PM emissions from diesel-powered engines have been identified by the Air Resources Board (ARB) as a toxic air contaminant. One study has estimated that over 70 percent of the risk from toxic air contaminants in the South Coast Air Basin is due to diesel PM emissions.

In its first three years, the Carl Moyer Program has provided reductions of 14 tons per day of NOx and about 800 pounds per day of PM. Most of these emissions benefits will occur for five years (the minimum project life). However, some large engine projects will be providing emission benefits for 20 years or more. In general, the Carl Moyer Program has provided a very cost-effective means of achieving these reductions, averaging below $5,000 per ton of NOx reduced.

California has made progress in reducing the emissions from new diesel engines and significantly more progress will be made over the next ten years. However, this progress will be tempered by large increases in the number of heavy-duty vehicles (12 percent statewide and 23 percent in the South Coast Air Basin between 2000 and 2010). In addition, diesel engines tend to operate for 20 years or more, making a clean air strategy unreliable if it relies solely on new engine standards.

The State Implementation Plan (SIP) is California's long-range plan to achieve clean air. This federally-enforced Plan includes near-term emission reductions from heavy-duty diesel engines in order to achieve our overall air quality commitments. The Carl Moyer Program provides these critical near-term emission reductions to help California meet its air quality obligations.

The Carl Moyer Program's ability to expedite the replacement of diesel engines has made it ARB's key near-term heavy-duty engine emission reduction program. Through the first three years of the program, local air districts and ARB have participated in a variety of conventional outreach methods, including solicitations, brochures and workshops, to attract participants. In the third year of the program, ARB and districts took additional action to attract emission reduction projects that would directly reduce air contaminants or public health risks in communities which were most significantly exposed to air contaminants. These new activities include advertisements in various languages in numerous local newspapers, publications, community newsletters, as well as targeted one-on-one outreach to small businesses in impacted communities.

Beginning with the fourth year of the program, Section 43023.5 of the Health and Safety Code requires districts that contain more than one million inhabitants to spend at least fifty percent of the state funding, until January 1, 2007, in communities most significantly exposed to air contaminants, including communities of minority or low-income populations, or both. ARB staff is currently working with districts to implement this important new criterion and the results will be reported in the next annual report.

The California Energy Commission (CEC) received funding in the second and third years of the program for infrastructure demonstration and advanced technology development projects. Infrastructure funding is a critical component to the success of the Carl Moyer Program. Local air districts and project proponents have leveraged CEC funds to establish natural gas fueling facilities capable of fueling hundreds of vehicles. The Advanced Technology Development Section helps finance the development of advanced emission-reducing technologies for heavy-duty engines, including add-on and retrofit technologies.

To date, the Governor and the Legislature have appropriated a total of $114 million over the last four fiscal years to fund this important program. Local air districts have provided an additional $41 million in matching funds. Of this funding, CEC administers $9 million for infrastructure demonstration and advanced technology development projects.

This report updates the status of the statewide program for the first three years as required by Health and Safety Code Section 44295. The report also contains information on progress in implementing third year funds (2000/2001 fiscal year). Detailed information is provided regarding local air district programs, which include the status of state funds expended under the program, the types of projects and number of engines funded, and the emission benefits for each local program. Finally, the report addresses how the Carl Moyer Program has reduced public exposure to toxic diesel particulate matter.

I.

BACKGROUND

Diesel-fueled engines, a major source of air pollution, power most trucks, buses, many types of off-road equipment, locomotives, and ships. Diesel-fueled engines emit a complex mixture of thousands of gases, vapors, and particles. These include smog-forming oxides of nitrogen (NOx), fine particles less than 10 microns in size (PM_{10}), as well as more than forty substances currently listed by the Air Resources Board (ARB) as toxic air contaminants. This chapter describes current statewide NOx and PM emissions and explains the need for incentive programs to assist California in reducing emissions from heavy-duty diesel engines.

A. Total NOx And PM Emissions

Although heavy-duty engines and vehicles account for less than five percent of California's vehicle population, they produce approximately 40 percent of the state's NOx emissions, a smog-forming pollutant. Furthermore, fine particulate matter exhaust from heavy-duty diesel engines has been identified as a toxic air contaminant that can cause cancer. Total statewide emissions of NOx and PM_{10} are about 3600 tons per day and 2300 tons per day, respectively (2000 inventory). Statewide NOx and PM_{10} emissions from selected categories of heavy-duty engines are shown in Table I-1.

Table I-1
Statewide Annual Average Emissions from Selected Heavy-Duty Engine Categories
Tons/day

Source Category		On-road Heavy-Duty Vehicle [a]	Off-Road Equipment [b]	Locomotive	Marine	**Total**
2000	**NOx**	631	585	145	101	**1462**
	PM_{10}	16	39	3	8	**66**
2005	**NOx**	566	511	106	105	**1288**
	PM_{10}	13	36	3	9	**61**
2010	**NOx**	423	404	78	109	**1014**
	PM_{10}	9	29	3	9	**50**

a) Emissions from heavy-duty trucks and buses over 14,000lbs GVWR. Emissions based on EMFAC2001 v2-8.
b) Emissions from all off-road compression-ignition (Diesel) Engines in the current OFFROAD emissions model.

B. State Implementation Plan (SIP)

In 1994, ARB, along with interested industries, environmental groups, other government agencies, and air quality experts, created a long-term plan designed to clean up California's air. That long-term plan, known as California's 1994 SIP for ozone, relies upon various measures to meet California's clean air goals.

The SIP calls for more stringent emission standards for both on-road and off-road heavy-duty engines in California. For categories where California is preempted by federal law from setting emission regulations, the SIP calls for new national or international emission standards. California is preempted from setting emission standards for new farm and construction equipment less than 175 horsepower (hp), marine vessels, new locomotives and new engines used in locomotives, and aircraft.

The state has made significant progress in setting the emissions standards specified in the SIP. In 1995 and 1996, ARB, U.S. EPA, and manufacturers of diesel engines signed agreements to reduce emissions from on- and off-road heavy-duty diesel engines. In 1997, based on the agreement with on-road heavy-duty diesel engine manufacturers, U.S. EPA established a more stringent national standard for heavy-duty truck emissions beginning with the 2004 model year. ARB approved a similar standard in 1998. As part of a settlement among engine manufacturers, U.S. EPA and ARB, the majority of the engine manufacturers have agreed to achieve 2004 standards in 2002. U.S. EPA and ARB have established even tighter emission standards for heavy-duty trucks starting in 2007. The U.S. EPA and ARB have also adopted more stringent emissions standards for off-road heavy-duty equipment. These Tier 3 standards for hydrocarbon and NOx will be phased in beginning in 2006.

U.S. EPA has adopted more stringent emission standards for off-road diesel equipment, including locomotives and marine engines. In 2000, the International Maritime Organization (IMO) adopted a protocol, which, if ratified by the member nations, will reduce emissions from new ships, and will be retroactive to January 1, 2000. Other actions include a Vessel Speed Memorandum of Understanding (MOU) between the Ports of Los Angeles and Long Beach, the shipping industry, ARB, the SCAQMD and U.S. EPA. This MOU calls for ocean-going ships to voluntarily limit their speeds while entering or leaving the participating ports. The preliminary MOU was implemented on May 1, 2002 as a demonstration project. The full implementation of the MOU is expected to result in regulations to limit emissions from domestic vessels. MOUs with two railroads will further reduce in-use emissions from locomotive engines in the SCAQMD non-attainment area, and a pending MOU will reduce emissions from airport ground support equipment and local ports in the SCAQMD.

In addition to more stringent emission standards, the SIP also calls for emission reductions

from market-based measures. SIP Measure M4, for example, calls for incentives for the early (pre-2004) introduction of lower-emission heavy-duty trucks and buses. Other measures focus on incentives as part of the strategy to meet long-term emission reduction commitments in the SIP. The majority of future reductions (80 to 90 percent) will be achieved through emission standards for new engines and MOUs, and not through incentives. However, emission reductions must occur in the early years for California to meet its SIP commitments. Table I-2 shows total SIP commitments for reducing NOx emissions for selected categories of heavy-duty engines in the South Coast Air Basin using the emission inventory at the time the SIP was developed.

Table I-2
NOx Emission Reduction Commitments in the SIP
(South Coast Air Basin)

Source Category	2005 NOx (tpd)	2010 NOx (tpd)
On-road heavy-duty vehicles[a]	35	62
Off-road equipment	15	64
Marine vessels	11	15
Locomotives	11	17
Longer-term commitments	0	9

a. Based on EMFAC 7G model, which was used to develop the 1999 South Coast SIP.

The draft 2002 Clean Air Plan is ARB's vision of continued progress towards this goal, through a combination of established and new air quality programs. Under state law, ARB is responsible for coordinating the efforts of all levels of government to attain and maintain health-based air quality standards. The Plan is an agglomeration of strategic plans aimed at reducing California's air pollution and meeting ARB's obligations under state law. More specifically, the Plan will help ARB work with environmental justice communities to develop near-term actions to reduce the health risk from air pollution, identify new measures to reduce emissions by 2005 to help attain the federal ozone and inhalable particle standards in the San Joaquin Valley, seek opportunities to reduce exposure to diesel particles statewide, meet the federal one-hour ozone standard in the Los Angeles area, and continue to reduce the adverse health impacts of air pollution beyond 2010.

C. The Role of Incentive Programs in California's Clean Air Commitments

Retrofits, repowers, and alternative fuel technology can be very cost-effective for a particular project. However, in the near term they may not be technically feasible and cost-effective for a broad enough segment of the market to justify a regulation. As such,

incentives are needed to take advantage of cost-effective reductions by paying a vehicle or equipment operator for going beyond what is required.

Stringent emission standards will result in significant emission reductions. However, many of the regulated categories are dominated by large diesel engines that last a long time and are typically rebuilt two to three times over their service lifetime. To meet the impending federal attainment deadlines, California must retrofit or repower to reduce emissions from existing engines, and introduce new technology (like alternative fuels) in markets where opportunities exist.

II.

THE GENERAL PROGRAM

The purpose of the Carl Moyer Program is to reduce NOx emissions by providing grants to cover the incremental cost of cleaner heavy-duty vehicles and equipment, thereby reducing toxic PM emissions as well. This chapter includes a discussion of the overall requirements and the administration of the Carl Moyer Program.

A. The Administrative Role of ARB, CEC, and Participating Districts

The Carl Moyer Program provides funds for three types of projects: engine projects, Infrastructure Demonstration projects, and Advanced Technology Development projects.

1. The Administrative Role of ARB

ARB oversees the development and administration of the largest portion of the Carl Moyer Program that covers engine projects. ARB works with the public, local air districts, port authorities, industry, and environmental groups to develop and refine program guidelines. The guidelines describe the types of eligible projects and the criteria to qualify those projects, while providing formulas to calculate the emission benefits and cost-effectiveness. ARB also provides on-going assistance to local air districts with program administration and technology status. In addition, ARB reviews and monitors the progress of local districts' implementation of the program.

2. The Administrative Role of CEC

CEC develops guidelines and oversees two key portions of the program: Infrastructure Demonstration and Advanced Technology Development Sections. CEC received $4 million in the 1999-2000 FY budget and $5 million in the 2000-01 FY budget for these portions of the program. The Infrastructure Demonstration portion of the Carl Moyer Program helps provide districts with the means to fund alternative fuel infrastructure to fuel Carl Moyer funded vehicles. The Advanced Technology Development Section supports the development of advanced emissions-reducing heavy-duty technologies. CEC issues a formal solicitation for both programs. Districts implement projects in the Infrastructure Demonstration Section and CEC administers the Advanced Technology Development projects.

3. The Administrative Role of Participating Districts

Participating local air districts implement the program according to ARB and CEC guidelines. Implementation includes program outreach, project solicitation, project

evaluation, award of grants, and project monitoring to ensure the emission reductions are actually achieved. During the first year of the program (fiscal year 1998/1999), sixteen air districts implemented local programs. In the second year (fiscal year 1999/2000) twenty districts implemented local programs. Projects funded in the first and second year were selected on the criteria outlined in the Carl Moyer Program Guidelines, approved by the Board in February 1999. In the third year (fiscal year 2000/2001) twenty-two districts applied to implement local air programs. Projects funded with third year funds follow criteria outlined in the modified guidelines approved by this board on November 16, 2000.

Private companies or public agencies that operate heavy-duty engines in California may apply to local air pollution control or air quality management districts for engine or infrastructure grants. ARB developed the guidelines to provide each district the ability to design a program to meet specific local air pollution challenges. Each district has the option to set more stringent criteria than those listed in the guidelines, such as limiting funds for certain engine applications. Commonly, districts issue one or more formal solicitations for engine/vehicle and infrastructure projects. Companies and agencies that manufacture engines, advanced control technology, or retrofits for engines apply to CEC for advanced technology development grants. Under the Infrastructure Demonstration Section of the Program, CEC must solicit applications for a broad mix of fueling and electrification infrastructure projects. CEC issues a solicitation to local air districts who, in turn, fund specific infrastructure projects. The Advanced Technology Development Guidelines required applicants to provide market projections reflecting a fully commercialized product.

B. Funding

The Governor and the Legislature have appropriated annual funds to the Carl Moyer Program over three fiscal years (1998/1999, 1999/2000, and 2000/2001) which total $98 million dollars.

1. State Funds

In the first year, ARB received $25 million to fund engine projects that met Board approved program guidelines. ARB encumbered the first year funds through subventions to 16 local air pollution/air quality management districts that applied to administer the program. The local air districts expended these funds to cover the incremental costs of heavy-duty engine projects that are cleaner than required by any federal, state, or local government. In the second year (1999/2000), $23 million was appropriated to fund an expanded Carl Moyer Program, which included infrastructure demonstration and advanced technology development sections. Of these funds, $19 million was designated for ARB and local air districts to pay for engine projects. The remaining $4 million was designated for CEC for infrastructure demonstration and advanced technology development projects.

In the second year of the Program, ARB and the Carl Moyer Program Advisory Board submitted separate reports to the Governor and the Legislature pertaining to the status and success of the Carl Moyer Program. The Governor and the Legislature responded by appropriating $50 million for the third year - $45 million to fund engine projects and $5 million to fund infrastructure and advanced technology development projects.
Enacted in 2001, Section 43023.5 of the Health and Safety Code requires participating districts, containing one million or more inhabitants, to expend no less than 50 percent of the funding the district receives from the state until January 1, 2007, in communities most significantly exposed to air contaminants, including communities of minority populations or low-income populations, or both. Districts affected by this section include San Diego APCD (SDAPCD), SCAQMD, San Joaquin Valley APCD (SJVAPCD), Bay Area AQMD (BAAQMD), and Sacramento Metro AQMD (SMAQMD). Each district is responsible for incorporating the requirements of this section into its program solicitation and administration. ARB assists in this effort by providing information on pollution levels and areas of risk throughout the state. In addition, ARB conducts outreach efforts in affected communities to inform citizens about ARB incentive programs.

2. District Matching Funds

The third year program operated under the Carl Moyer Program Guidelines, dated November 16, 2001. In the first three years, state funds for the program totaled $98 million - $25 million for the first year, $23 million for the second year, and $45 million for the third year. During the first two years, districts provided $1 in match funding for every $2 of Carl Moyer Program funding for engine incentives. Program funds in the first two years, including districts' matching funds for infrastructure, totaled about $71 million. State funds for the third year program were increased to $50 million. At the increased funding level, districts would not have been able to provide increased matching funds. Hence, the matching fund requirement for the third year was capped at $12 million statewide. This is equivalent to a match of about $1 for every $3.68 received from state funds.

Districts and port authorities are required to provide matching funds in order to receive state funding to implement a local program. Of those match funds, districts and port authorities may use up to 15 percent as in-kind contributions (i.e., administrative costs). The matching fund requirement is crucial, because it obligates those responsible for program selection, monitoring, and enforcement to make a monetary commitment to the project.

C. Program Criteria

The program is still in the process of administering the third year funds. A total of twenty-one air districts applied for third year funding. Third year projects will be evaluated according to the Carl Moyer Program Guidelines, dated November 16, 2000.

1. Eligible Heavy-Duty Engine Categories

The engine portion of the Carl Moyer Program, administered by ARB and the local districts, funds the incremental cost of cleaner heavy-duty vehicles and equipment in the following categories:

- On-road motor vehicles over 14,000 pounds gross vehicle weight rating
- Off-road equipment over 50 horsepower
- Marine vessels
- Auxiliary Power Units (APUs)
- Locomotives
- Stationary agricultural pump engines
- Forklifts
- Airport ground support equipment

The program is not intended to fund engine research and development, certification testing, training, or operational controls.

2. Replacement Engines

The types of replacement engines vary by project category. For some categories, the only technology currently available that can achieve significant, cost-effective emission reductions is alternative-fuel technology. For other categories, baseline (pre-project) emission levels are very high, and substantial emission reductions can be achieved with new diesel engines. In the first three years of the program about 3,867 engines (both on- and off-road) were funded statewide. Of those engines, 1,809 were alternative fuel engines, 209 were electric motors, and the remaining 1,653 were diesel-to-diesel repowers. Chapter III contains a detailed explanation of the projects funded through each local air district.

The program is designed to provide districts with flexibility to work with project proponents to submit heavy-duty engine projects that are not included in the guidelines for ARB's consideration on a case-by-case basis. ARB evaluates those projects based on technological feasibility, the potential for real, quantifiable emission reductions, cost-effectiveness, and the likelihood of other applicants going forward with that type of project. ARB's Executive Officer has the authority to determine whether the project is eligible for funding.

3. Infrastructure and Fuel Costs

District-funded infrastructure projects qualify as matching funds for the Carl Moyer Program. Funds used to purchase or upgrade infrastructure must support equipment and vehicles meeting the Carl Moyer Program criteria. In addition, CEC administers the Carl

Moyer Infrastructure Demonstration Section of the Program. Air districts apply directly to CEC to receive those funds. If a district receives funds from CEC to pay for infrastructure, those funds would not qualify as district matching funds to implement the Carl Moyer Program.

Under the Carl Moyer Program the local air districts are allowed to pay for the incremental fuel costs of alternative fuels or alternative diesel, provided those funds come from the air district's budget. Any funds that a district uses to pay for incremental fuel costs count as matching funds. Incremental fuel costs are considered as the increase in cost of alternative fuels or alternative diesel over diesel. District funds would pay for those increases in fuel costs that occur as a result of a conversion or new purchase of an engine that qualifies for Carl Moyer Funds.

4. Cost-Effectiveness Criterion

Each project must meet a specific cost-effectiveness level – an allowable cost per ton of pollutant reduced. The cost-effectiveness level is based solely on Moyer program funds and those motor vehicle registration fees that are used to pay for the engine. In the first two years of the program, the cost-effectiveness limit was $12,000 per ton of NOx reduced. In 2000, the limit was increased to $13,000 per ton to account for cost of living adjustments since program implementation. In general, districts have funded projects that were well below the required cost-effectiveness limit. In the first two years of the program, cost-effectiveness averaged $5,000 per ton of NOx reduced. In the third year the average cost-effectiveness for a NOx ton reduced was $4,000.

D. Program Changes

In October 1999, the Carl Moyer Program was codified into the Health and Safety Code. Section 44297 of the Health and Safety Code established a thirteen-member Carl Moyer Program Advisory Board (Advisory Board) with the responsibility of making recommendations on the need to continue the program, the amount and source of continued funding, and program modifications, if necessary. The Advisory Board recommended that the program continue at an increased funding level through 2010 and that the district match fund requirement be capped consistent with the requirements at the $25 million funding level. The Governor and the Legislature responded by amending Health and Safety Code section 44287 (f), to allow ARB to modify districts' matching fund requirement. The Advisory Board also recommended that a 25% PM reduction target be set for the statewide program, with a 25% local program requirement on air districts designated as non-attainment for the federal PM standard.

The Board approved modifications to the February 1999 guidelines on November 16, 2000 (http:www.arb.ca.gov/msprog/moyer/approved.htm). The revised

guidelines include recommendations that the Advisory Board made to the Governor and the Legislature and technical modifications based on ARB's and local air districts' experiences with the first two years of the program. The new guidelines affect projects funded with third year funds and beyond.

The revised guidelines included various changes to the program:

- A 25 percent PM emission reduction requirement for local programs in districts that are designated as serious non-attainment for the federal PM standard

- A 25 percent PM emission reduction target for the statewide program

- A new cost-effectiveness limit of $13,000 per ton of NOx reduced. The cost-effectiveness limit was adjusted to account for cost of living increases over three years

- The removal of a funding "cap" on off-road and stationary agricultural irrigation pumps

- A new funding category – Auxiliary Power Units (The Carl Moyer Program funds will pay for the installation costs of auxiliary power units on on-road trucks, up to $1,500 per unit for conventional technologies and up to $3,000 for fuel cell APUs.)

- A $12 million cap over the statewide matching funds if state budget appropriated program funds exceed $25 million in a particular fiscal year

- Baseline emission factors were modified to account for adjustments made in the inventory based on new approved ARB on-road and off-road models

- Allowance of district funding for incremental fuel cost for alternative fuels and alternative diesel fuels on a case-by-case basis

III.

DISTRICT HEAVY-DUTY ENGINE PROGRAMS

The Board approved the original Carl Moyer Program Guidelines in February 1999. To date, the program has received and administered $98 million to fund the program for three years. Of those funds, over 95 percent has been allocated to pay for engine projects. Over the three years of the program, twenty-two air quality management/air pollution control districts applied to implement local programs. First and second year funds were distributed to districts to implement local programs in June 1999, and April 2000, respectively. ARB distributed the third year funds to districts in January 2001. This section of the report describes ARB's efforts in administering the statewide program, along with a brief description of the program requirements met by each of the local district programs. This section also provides the status of each district's program, the types of engines funded, and the estimated emission reductions.

A. District Participation Solicitation

During the development and implementation of the Carl Moyer Program, ARB established the Incentive Program Implementation Team (IPI Team). The IPI Team is a working group of representatives from local air districts, CEC, U.S. EPA and ARB. The IPI Team meetings provide ARB and districts with an opportunity to exchange ideas that will encourage district participation and facilitate local program implementation. These meetings also provide districts the opportunity to discuss potential projects, receive assistance and direction with outreach, and share technical challenges pertaining to projects in each district. The IPI Team meets several times each year in different districts throughout California.

ARB solicits district participation in the Carl Moyer Program through formal written invitations. Formal solicitations were sent - each representing the year of funding (Year I - $25 million, Year 2 - $19 million, and Year 3 - $45 million).

ARB staff evaluates each district application to ensure that adequate match funding was committed and that already funded matching projects meet the guidelines for each program year. Upon application approval, ARB staff provides each district with a Grant Award and Authorization Form for the district to sign and return to ARB authorizing the districts' participation in the Carl Moyer Program. Each district is authorized to receive an initial disbursement of 10 percent or $100,000 (the larger of the two amounts). As districts provide ARB staff with documentation showing the need for additional funds, along with a disbursement request, ARB staff provides the districts with additional funds. Table A -1 in appendix A illustrates ARB's schedule for solicitations, grant awards, and program

evaluations.
ARB staff considered several methods of public outreach to inform Californians about the Carl Moyer Program. ARB designed a statewide brochure describing the agency's mobile source incentive programs and has made it available to the public at conferences and public requests. ARB staff also attends conferences, such as the Tulare Farm Show, the California Trucking Association annual meeting, and the Pacific Maritime Association Convention promoting the program throughout California. At the request of local air districts, ARB staff attends local air district workshops to educate the public on how the Carl Moyer Program would benefit their local community. ARB has also made an effort to conduct workshops in various locations throughout California. ARB staff individually met with districts during the summer of 2001 to discuss each district's specific program needs. In 2001, ARB began a significant effort designed to inform fleets, local government agencies, and others about the opportunities available through the Carl Moyer Program and other state and local incentive programs. This effort is targeted at those communities most severely impacted by air pollution.

B. Participating Districts

A total of twenty-three districts applied and received funding from ARB to implement the Carl Moyer Program in the first three years, as described in Table III-1. Over the course of three years the annual number of participating districts has increased from 16 to 22.

Since the program began, one district has opted to withdraw from the program. Kern County APCD declined second year funding and part of the first year funding. Northern Sonoma APCD missed the second year application deadline, but has since resumed its participation. Overall, the Carl Moyer Program has seen a steady increase in district participation.

Table III-1 Participating Districts
Antelope Valley APCD
Bay Area AQMD
Butte County AQMD
Colusa County APCD
Feather River AQMD
Glenn County APCD
Imperial County APCD
Kern County APCD
Mendocino County AQMD
Mojave Desert AQMD
Monterey Bay Unified APCD
North Coast Unified AQMD
Northern Sierra AQMD
Northern Sonoma County APCD
Placer County APCD
Sacramento Metropolitan AQMD
San Diego County APCD
San Joaquin Valley APCD
San Luis Obispo APCD
Santa Barbara County APCD
Shasta County APCD
South Coast AQMD
Tehama County APCD
Ventura County APCD

C. Program Requirements Met By Local District Programs

In order to administer the Carl Moyer Program locally, districts must meet the following three general program requirements:

- Districts must provide match funding for any Carl Moyer Program funding received from ARB.

- District-funded match projects must meet the project criteria for the respective source category as described in the Carl Moyer Program Guidelines.

- Projects funded before December 31, 2000 had to meet a maximum cost-effectiveness criterion of $12,000/ton of NOx emissions reduced. Projects funded after December 31, 2000 must meet the maximum cost-effectiveness of $13,000/ton of NOx reduced.

D. District's Program and Match Funding

For three years of the program, ARB has distributed a total of $87.2 million (24.5 million – 1st year, $18.6 million – 2nd year, $44.1 million) to the participating districts to fund engine projects. The remaining $1.78 million (two percent of $87.2 million) was appropriated to ARB to administer the statewide program. The funds for each district were allocated based on population and the districts' SIP incentive based commitments. Table III-3 lists the districts that have participated in the Carl Moyer Program and the funds allocated to each district by program year.

Table III-2
Final Program Funding

District Name	Allocation Year I	Allocation Year II	Allocation Year III
South Coast AQMD	$11,275,591	$8,349,769	$19,745,849
San Joaquin Valley APCD	$ 4,399,801	$3,187,452	$ 7,644,979
Bay Area AQMD	$ 2,500,000	$1,880,000	$ 4,306,133
Sacramento Metropolitan AQMD	$ 1,927,791	$1,677,042	$ 3,909,604
San Diego County APCD	$ 1,085,661	$ 809,498	$ 1,850,344
Ventura County APCD	$ 860,220	$ 645,561	$ 1,543,561
Mojave Desert AQMD	$ 845,791	$ 635,678	$ 1,535,530
Antelope Valley APCD	$ 302,571	$ 225,000	$ 450,000
Santa Barbara County APCD	$ 302,571	$ 225,000	$ 450,000
Kern County APCD	-	$ 225,000	Funds Declined
Monterey Bay Unified APCD	$ 265,800	$ 145,183	$ 450,000
San Luis Obispo APCD	$ 157,800	$ 83,196	$ 176,750
Imperial County APCD	$ 134,800	$ 69,993	$ 176,750
Northern Sierra AQMD	$ 127,700	$ 52,692	$ 176,750
Northern Sonoma County APCD	$ 113,900	-	$ 150,000
North Coast Unified AQMD	$ 100,000	$ 73,255	$ 176,750
Glenn County APCD	$ 100,000	$ 53,743	$ 150,000
Butte County AQMD	-	$ 77,842	$ 176,750
Shasta County APCD	-	$ 72,977	$ 176,750
Feather River AQMD	-	$ 69,101	$ 176,750
Placer County APCD	-	-	SMAQMD will Administer
Mendocino County AQMD	-	$ 62,018	$ 150,000
Tehama County APCD	-	-	$ 150,000
Inter-district Projects			$ 376,750
Colusa County APCD	-	-	-
TOTAL	**$24,500,000**	**$18,620,000**	**$44,100,000**

In the first three years of the Carl Moyer Program, matching funds statewide totaled roughly $33.6 million. In the third year, program funds exceeded $25 million. The Carl Moyer Program Guidelines cap the statewide matching funds at $12 million. Each district had to provide $1 in matching funds for every $3.68 received from ARB in the third year of the program.

Table III-3
Required Matching Funds[a]

District Name	Source	Year I	Year II	Year III
SCAQMD	MSRC, Clean Fuels Fund	$ 5,637,796	$4,174,884	$5,373,020
SJVAPCD	DMV_b Fund, $CMAQ_c$	$ 2,199,901	$1,593,726	$ 2,080,266
BAAQMD	DMV Fund	$ 1,250,000	$ 940,000	$ 1,171,737
SMAQMD	DMV Fund, Measure A_d	$ 963,896	$ 838,521	$ 1,063,838
SDCAPCD	DMV Fund	$ 542,831	$ 404,749	$ 503,495
VCAPCD	DMV Fund, District Fees	$ 430,111	$ 322,780	$ 420,017
MDAQMD	DMV Fund, CMAQ	$ 422,896	$ 317,839	$ 417,831
AVAPCD	DMV Fund	$ 151,286	$ 112,500	$ 122,449
SBCAPCD	DMV Fund, Mitigation Fee	$ 151,286	$ 112,500	$ 122,449
KCAPCD	DMV Fund, Excess Emission Fees	-	$ 112,500	-
MBUAPCD	DMV Fund	$ 132,900	$ 72,591	$ 122,449
SLOAPCD	DMV Fund, Private Funding	$ 78,900	$ 41,598	$ 48,095
ICAPCD	DMV Fund	$ 67,400	$ 34,996	$ 48,095
NSAQMD	DMV Fund	$ 63,850	$ 26,346	$ 48,095
NSCAPCD	DMV Fund	$ 56,950	-	$ 40,817
NCUAQMD	DMV Fund	$ 50,000	$ 36,627	$ 48,095
GCAPCD	DMV Fund, Settlement Actions, and General Fund	$ 50,000	$ 26,871	$ 40,817
BCAQMD	DMV Fund	-	$ 38,921	$ 48,095
Shasta County AQMD	DMV Fund	-	$36,488	$ 48,095
FRAQMD	DMV Fund	-	$ 34,550	$ 48,095
MCAQMD	DMV Fund	-	$ 31,009	$ 40,817
TCAPCD	DMV Fund	-	-	$ 40,817
Inter-district Projects		-	-	-
Total		**$12,250,003**	**$9,309,996**	**$12,000,001**

a. The district funding commitment may include up to 15 percent of its match funds as in-kind administration to implement the Carl Moyer Program locally.
b. Department of Motor Vehicles. Many districts receive funds from a surcharge on motor vehicle registration fees.
c. Congestion, Mitigation, and Air Quality Fund
d. A ballot measure which allocates half a cent of local sales tax in Sacramento for transportation improvements in the county.

Districts may use heavy-duty engine projects, alternative fuel infrastructure, and in-kind

administration (up to 15 percent of matching funds) as match funding projects. However, settlements, mitigation, and other funds have been used as well. Most districts use these funds as match funding for the Carl Moyer Program. In fact, several districts have established programs to fund grants for lower-emission on-road and off-road motor vehicle projects with the motor vehicle fee money. The Carl Moyer Program funding augments these existing programs. Many districts receive funds from a surcharge on motor vehicle registration fees (a.k.a. AB 2766, AB 434, and AB 4355 funds).

E. Project Types Funded Statewide

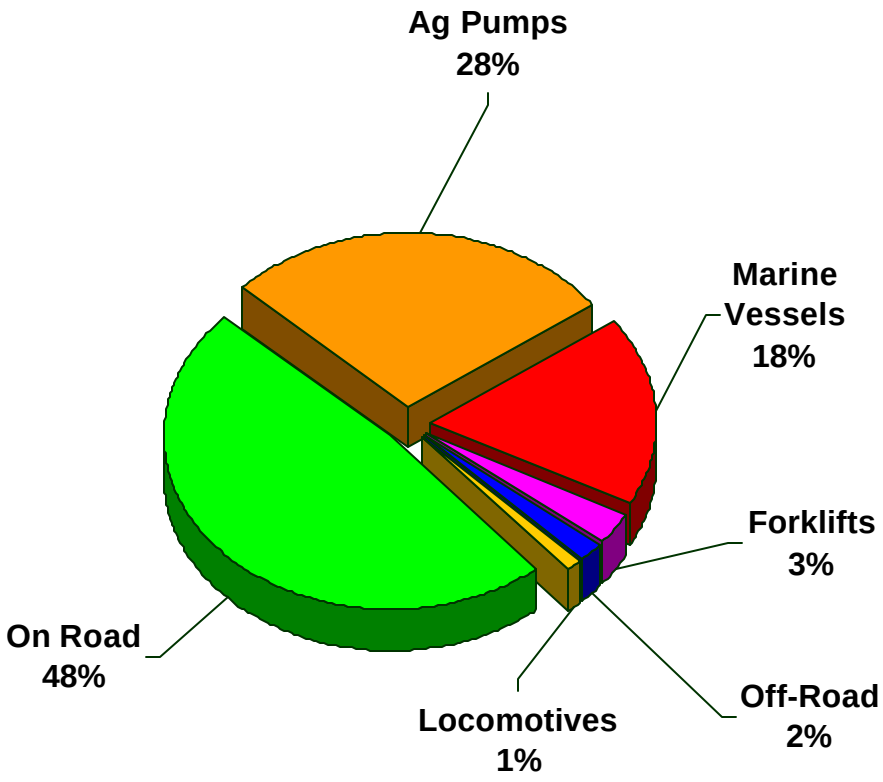
To date, districts have paid for engines for almost every source category under the Carl Moyer Program. Engines were funded for heavy-duty line-haul trucks, urban transit buses, school buses, waste haulers, delivery trucks, off-road equipment, agricultural pumps, marine vessels, locomotives, and forklifts. The types of projects included new diesel engines, new alternative fueled engines and electric motors. Two categories eligible for funding under the Carl Moyer Program which, to date, have not received funding are auxiliary power units (APUs) and ground support equipment (GSE). On-road trucks that would benefit from an APU typically operate in more than one district, hence they have been difficult to fund. ARB hopes to fund APUs through the inter-district solicitation. A pending Memorandum of Understanding (MOU) with the major airports in South Coast, and expansion mitigation requirements for other large airports, have inhibited applications for GSEs. Of the funds spent to date, 50 percent paid for alternative fuel projects, 26 percent for agricultural irrigation pump projects, 16 percent for marine vessel projects, 4 percent for forklifts, and 4 percent other on-/off-road diesel repowers. Table III-5 lists the types of projects funded, the number of engines funded by fuel type, and the amount of funds spent. Figure III-1 shows the percentage of funds spent by project type.

Table III-4
Types and Number of Engines Funded Statewide
Years I & II & III

Source Category/ Equipment Type	Number of Engines		Total Funds	
	Alt Fuel	Diesel	Alt Fuel	Diesel
On-Road:				
Heavy-Duty Line Haul		32		$ 788,661
Refuse Haulers	511	62	$16,023,480	$ 735,077
Urban Transit Buses	850		$11,323,140	-
School Buses	20		$ 374,542	-
Other	327	106	$ 5,025,363	$ 1,862,823
Off-Road Equipment:				
Agricultural		52	-	$ 535,492
Construction		42	-	$ 1,066,286
Other	18	42	$ 194,545	$ 375,603
Locomotives:	2		$ 820,000	-
Marine Vessels:		182	-	$ 14,162,390
Agricultural Irrigation Pumps:	23	1878	$ 362,563	$ 20,414,223
Forklifts (electric):	209		$ 2,083,527	-
Total	**1960**	**2396**	**$36,207,160**	**$39,940,555**

Figure III-1

Percent Funding By Project Type



F. Environmental Justice Efforts

State law defines environmental justice as the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementations, and enforcement of environmental laws, regulations, and policies. On December 13, 2001, the Board approved Environmental Justice Policies and Actions (Policies) that lay out ARB's plan to incorporate environmental justice issues, consistent with the law, into all of ARB's programs. The Policies focus primarily on the ARB as an organization, but also call for the collaboration of air districts to ensure that environmental justice policies are met.

In addition to these Policies of the ARB, the Health and Safety Code Section 43023.5 requires districts containing more than one million inhabitants to spend at least fifty percent of the state incentive funds, such as the Carl Moyer Program funds, to reduce or eliminate the disproportionate impacts of air pollution on low-income and minority populations. This requirement begins in FY 2001/2002 and impacts the air districts in Los Angeles (SCAQMD), San Francisco (BAAQMD), Sacramento Valley, (SMAQMD), San Joaquin Valley (SJAPCD), and San Diego, (SDAQPCD).

Pursuant to these requirements, SCAQMD adjusted its FY2001/2002 program criteria to ensure it allocates at least half of its Carl Moyer Program state funds to projects directly benefiting areas that are most significantly impacted by air pollution, including low income communities or communities of color, or both. To ensure that they will meet legal requirements, SCAQMD will evaluate all its fourth year projects according to poverty level, PM exposure, and air toxic exposure. SCAQMD has defined its areas of poverty in areas where at least 10 percent of the population falls below the Federal poverty level. The district will also give consideration to all projects operating in areas with the highest fifteen percent of PM concentration. SCAQMD grants all projects operating within areas where the cancer risk occurs at a rate of at least 1,000 per million inhabitants. Those projects that fall under all these criteria will be considered projects directly benefiting areas of environmental justice. Other districts are reviewing the SCAQMD methodology and discussing the environmental justice criteria with ARB staff.

Although the Section Code Section 43023.5 only applies to the few largest districts with a population of over one million inhabitants, other participating districts have reviewed the challenges they need to address to best define their areas of environmental justice. The issue of what variables to include to determine the boundaries around communities of environmental justice was a common theme among the less densely populated districts. Many of the less populated areas have small-disbursed communities whose demographics are hard to define. These disbursed small clusters can be either homogenous with the entire districts or too diverse in population to categorize as an environmental justice area.

Unlike more densely populated districts, smaller communities do not have defined property

value depending on their location or neighborhood. This presents a problem when a district uses income or dwelling value as a variable to determine areas of environmental justice. These districts face a dilemma of whether to classify these areas as environmental justice areas or to exclude them. In these less densely populated areas, there may be homes of various values (i.e., a luxury home, a mobile home, and a middle–class home). Hence, the average house value of the community may not be representative of the community's needs.

The second issue less populated districts face is that some districts are extremely demographically homogenous. The low population count and similarity in occupations in some districts devoid them of defined areas of diversity. For example, unlike more populated districts that can establish the minority ratio of certain communities, smaller districts' minority population is small and well distributed throughout the district. Hence the concentration or ratio of minority residents within a community is similar throughout the district. Therefore, depending upon how narrow or broad they interrupt the level of poverty or ethnicity ratio, district officials can find that their entire district is considered an environmental justice area or their entire district is devoid an environmental justice community.

Despite these challenges, the Carl Moyer Program is an ideal program to address disproportionate air pollution in impoverished and minority communities. By design, a significant amount of projects occur in traditionally industrialized and pollution-impacted area. Urban transit buses usually operate in areas where people cannot depend upon personal transportation. A considerable number of alternative fueled transit buses have been funded through the Carl Moyer Program, significantly reducing exposure on inner-city corridors. Street sweepers and refuse trucks that operate daily in the community are also good candidates for replacement of older polluting engines. Citizens of small, rural communities and those who earn their living working in agricultural are exposed to harmful emissions from agricultural equipment. Districts such as San Joaquin Valley APCD have replaced hundreds of older engines in agricultural pumps, tractors and harvesters and other off-road equipment.

IV.

Carl Moyer Program Inter-District Projects

A. Background

Section 44286 of the Health and Safety Code gives ARB authority to reserve up to ten percent of the program's funding for qualifying projects operating in more than one district. Every district is distinct in its methods of administration and operation of the Carl Moyer Program. Within the criteria of the guidelines, districts have found it difficult to coordinate funding a multi-district project. This is particularly true for truck APU projects. Trucks that could benefit from the APUs typically traverse the state, crossing through several air districts. Therefore, ARB created an inter-district projects category with $501,750 in funding.

B. Solicitation

ARB released the solicitation for the Carl Moyer Program Inter-District Projects on December 21, 2001. This solicitation was sent to more than 4,000 interested parties. Staff placed the solicitation on the web and announced it via the list serve/interested parties list. The solicitation was open to three types of Carl Moyer Program qualifying projects: locomotives, on-road vehicles, and marine vessels. Projects must operate at least 30 percent of the time outside of the home districts. Evaluation will be based on a combination of significant impact, administration and evaluation plan, significant emission reductions, cost-effectiveness, project schedule, and the project's ability to reduce or eliminate the disproportionate impacts of air pollution on low-income and minority populations.

C. Inter-District Solicitation Application Schedule

February 15, 2002 was the last day for interested parties to submit their applications to ARB. ARB received nine applications and has begun the evaluation process. Staff anticipates it will begin distributing award letters as early as May 2002.

V.

CEC ADMINISTERED SECTIONS

Sections 44284 and 44285 of the Health and Safety Code direct CEC to administer Fueling Infrastructure Demonstration and Advanced Technology Development Sections under the Carl Moyer Program. CEC received a total of $4.5 and $4.2 million in the 1999-2000 and 2000-2001 FY budget for the respective sections. This chapter explains CEC's administration of these sections and the status of the projects.

A. The Infrastructure Demonstration Section

The Infrastructure Demonstration portion of the Carl Moyer Program was designed to provide districts with the means for funding infrastructure for engine projects, other than standard gasoline or diesel, which would qualify for Carl Moyer vehicle funds. The program guidelines can be obtained on CEC's website at **www.energy.ca.gov**. CEC must solicit applications for a broad mix of fueling and electrification infrastructure projects. The program solicitation is directed to the local air districts. Districts respond to the solicitation with specific project proposals. Funded facilities must dispense a minimum of 14,280 million Btus per year or 4,000 kWh of electricity per charger annually. Vehicles used to meet these thresholds must meet the Carl Moyer Program criteria for vehicles and equipment.

1. Infrastructure Demonstration Section Status

CEC developed program criteria and guidelines (criteria) for implementing the Carl Moyer Fuel Infrastructure Program. The criteria were released for public review in August 1999 and public workshops were held in San Diego and Sacramento during September 1999. The criteria were approved at a CEC Business Meeting in November 1999. Under the CEC program, funds are distributed to air districts which solicit applications and expend funds in accordance with the criteria. This approach allows districts to coordinate funding for infrastructure that correlates to heavy-duty engine projects also funded under the Carl Moyer Program. CEC allocated $2 million for the Infrastructure Demonstration Section in 1999-2000.

A Program Opportunity Notice (PON) was released to all California air districts in November 1999, but was canceled in March 2000, because of a lack of qualifying proposals representing critical, non-attainment air quality areas in California.
A second PON was reissued in March 2000, and awards for fueling infrastructure totaling $2 million were made to eight qualifying districts. Those qualifying districts and the amount of funds requested and received are listed in Table V-1, below.

Table V-1
Infrastructure Funding Requests and Allocations
1999-2000

Applicant	Funding Requested	Funding Received
SCAQMD	$2,522,000	$ 900,000
SJVAPCD	$ 700,000	$ 350,000
BAAQMD	$ 200,000	$ 200,000
SMAQMD	$ 200,000	$ 150,000
SDCAPCD	$ 100,000	$ 100,000
VCAPCD	$ 200,000	$ 100,000
AVAPCD	$ 100,000	$ 100,000
MDAQMD	$ 100,000	$ 100,000
Total	**$4,122,000**	**$2,000,000**

When completed, these fuel sites will furnish compressed natural gas (CNG), and liquefied natural gas (LNG) to more than 160 new Moyer-qualified trucks and dispense more than 304,000 million Btus of fuel annually. It is estimated that the projects proposed for funding will reduce NOx emissions annually by over 169 tons. Table V-2 lists the applicants in each district, number of vehicles per site, total Btu's dispensed, and estimated NOx reductions.

$2 million was committed to support infrastructure implementation in 1999/2000, which was matched with more than $7 million from project participants. This means that every dollar of state funding was matched by over three dollars from program participants.

Table V-2
Infrastructure Projects
1999-2000

Air District	Site	Trucks	Fuel	NOx [a]	Btu [b]	CEC	Cost Share
SCAQMD						$ 900,000	$1,500,000
	Pickens/Waste Mgt LA	20	CNG	93	90,072		
	Pickens/Waste Mgt San Gabriel	20	CNG	93	30,024		
	Pickens/USA Biomass	20	CNG	131	44,671		
	Pickens/Calmet	27	CNG	229	35,466		
	Pickens/Sunline Trans.	10	LNG	47	30,024		
	Burrte Riverside		LNG				
SJVAPCD	Reviewing PONs						
BAAQMD	County Waste Srv.	24	CNG	23	16,329	$ 200,000	$4,900,000
SMAQMD	City of Sacramento	50[c]	L/CNG	12		$ 200,000	$ 400,000
SDCAPCD	Oceanside USD						
VCAPCD	GI Rubbish	14	LNG	52	18,639	$ 100,000	$ 300,000
AVAPCD	Waste Management	14	LNG	91	16,058	$ 100,000	$ 425,111
MDAQMD	City of Victorville		CNG		36,500	$ 100,000	$ 255,000
Total		**164**		**826**	**317,783**	**$1,400,000**	**$7,096,975**

a. NOx reduction over life of project
b. Projected Btus to be consumed annually
c. Includes 20 School Buses

Under the third year of the Carl Moyer Program, CEC allocated $2.5 million to pay for infrastructure demonstration projects. CEC issued a PON in October 2000, with proposals due December 1, 2000. CEC received a total of about $5,289,000 in funding requests for infrastructure. CEC awards for seven local air districts were approved in March 2001. Districts are currently in the process of finalizing agreements with applicants who have qualified for funds. The awarded districts and funding amounts are listed below in Table V-3.

Table V-3
Infrastructure Program Awards
2000-2001

District	Funding Amounts
SCAQMD	$1,188,710
SJVAPCD	$ 450,000
BAAQMD	$ 250,000
SMAQMD	$ 216,130
VCAPCD	$ 135,080
Shasta County AQMD	$ 135,080
MDAQMD	$ 125,000
TOTAL	**$2,500,000**

Table V-4
Infrastructure Projects
2000-2001

Air District	Site	Trucks	Fuel	CEC	Cost Share
BAAQMD	Pending				
Shasta CAQMD	Pending			$ 135,080	
VCAPCD	Pending			$ 135,080	
SJVUAPCD	D.O.N. Investment Inc.	16	LNG	$ 300,000	
SMAQMD	Sacramento County		LNG	$ 216,000	$ 234,000
MDAQMD	ENGR		CNG	$ 125,000	$ 248,000
SCAQMD				$1,188,710	
	County of LA	20	CNG		
	UCLA	60	CNG/EV		
	Desert Sands USD	34	CNG		
	City of Glendale	52	LNG		
	Capistrano USD	20	CNG		
Total		**200**		**$2,099,870**	**$ 482,000**

2. Infrastructure Demonstration Section Challenges

Air districts have had difficulty identifying project participants who are able to meet the requirements of the Carl Moyer Infrastructure Demonstration Section. It was anticipated that public and private fleets would take advantage of the Carl Moyer Program when purchasing new trucks and buses which met ARB's optional NOx emission standard. This has not been the case. Lower NOx emission factors for refuse vehicles as specified in the November 2000 Carl Moyer Program Guidelines, and higher incremental cost for the lowest NOx emitting vehicles combine to make it difficult for fleets to qualify for Carl Moyer new vehicle funding. In addition, the statutory fuel throughput requirement of 14,280 million Btus annually requires a fleet to make a significant up-front monetary commitment in vehicle purchases before they can qualify for Carl Moyer Infrastructure Demonstration Section funding.

Cost sharing of infrastructure projects by itself is not enough to convince fleets and individuals to purchase new vehicles that meet ARB's optional low NOx standard. Those vehicles, which are able to meet the most stringent ARB emission requirements, do have a higher cost associated with them. That higher cost should also be considered in the cost-effectiveness calculation for fueling facilities in an effort to get the cleanest technology available on the road in the shortest possible time. Often, the fleets that purchase this clean technology are also the fleets operating late model or post-1987 vehicles. Their purchase of an optional low NOx vehicle to replace one of their late model vehicles could also create a secondary market or resale market for those replaced late model vehicles. As more of these late model vehicles come to the secondary market, an operator of a pre-1987 high emission vehicle would have an opportunity to purchase a cleaner, mechanically-sound late model vehicle at a reasonable price instead of continuing to repair and operate an older truck.

3. Need for Additional Infrastructure Demonstration Funding

Based on CEC's experience with the infrastructure programs, there is a need for continued infrastructure funding. Once infrastructure is established, there is opportunity to increase the number of alternative fuel vehicles by the host fleet and by other nearby fleets. Eventually, a network of stations can be established. This increases flexibility of the fleet for vehicle deployment and provides the opportunity to utilize alternative fuel trucks throughout a region and the state. Without continued funding, a number of infrastructure projects may never be started and additional clean low emission heavy-duty vehicles may never be purchased.

B. Advanced Technology Development Section

The Advanced Technology Development Section helps support the development of advanced emission-reducing technologies for heavy-duty engines, including add-on and

retrofit technologies. The Health & Safety Code also requires that each project show a strong commercialization plan to bring the technology from development to full commercialization. The CEC received a total of $4.2 million to fund advanced technology projects under the Carl Moyer Program.

1. Program Status

The CEC received a total of $4.2 million ($2 million for 1999/2000 and $2.2 million for 2000/2001) to fund advanced technology development projects under the Carl Moyer Program. The California Legislature has not provided additional funding for future advanced technology development program solicitations.

The CEC released Program Opportunity Notices (PONs) in November 1999 and November 2000 to solicit project applications. The PONs are solicitations for development of new and retrofit or add-on applications of both diesel and alternative fuel low emission technologies. CEC funded three projects with fiscal year 1999/2000 funds.

Table V-5
Advanced Technology Development Section Grants
FY 1999-2000

Recipient	Proposal Description	Grant Amount
Ceryx, Inc.	Quad CAT Converter for NOx Reduction	$632,653
Delphi Energy and Chassis Systems	Development of HD Non-Thermal Plasma Aftertreatment	$583,090
Engelhard Corp.	Development of an EGR with DPX catalysts	$284,257

The CEC awarded an additional $500,000 to the South Coast AQMD as part of a joint solicitation with the Department of Energy's (DOE) National Renewable Energy Laboratory (NREL) to help fund the development of low-emission heavy-duty natural gas engines (Table V-6).

Table V-6
Low-Emission Heavy-Duty Natural Gas
Engine Development Grants
FY 1999-2000

Recipient	Proposal Description
Detroit Diesel Corporation	0.5 g/bhp-hr NOx Advanced Fuel Control Natural Gas Engine Development
Cummins/Westport	0.5 g/bhp-hr NOx High Pressure Direct Injection Natural Gas Engine Development

The Detroit Diesel Corporation 0.5 g/bhp-hr NOx natural gas engine project will result in a heavy-duty engine certified specifically for the transit market. This engine, announced for sale to transit agencies starting in October 2002, will introduce lean-an advanced burn technology that provides significant NOx emission benefits. NOx reductions for a typical transit bus will be over one-third of a ton per year. The Cummins Westport 0.5 g/bhp-hr NOx natural gas heavy-duty engine is also being developed. This engine will include high-pressure direct-injection (HPDI) technology that provides diesel engine-like power and efficiency. Applications include transit buses, refuse trucks, and over the road trucks.

The second PON solicited applications for FY 2000/2001. CEC received 12 qualifying applications, of which 4 were funded. A description of these projects is detailed in Table V-7. Appendix B contains a description of the program schedule and project description.

Table V-7
Advanced Technology Development Section Grants
FY 2000-2001

Recipient	Proposal Description	Grant Amount
ISE Research Corp.	Development and Demonstration of Turbine-Driven Hybrid Electric Buses	$485,826
SCAQMD/Detroit Diesel Corp.	Development of Very-Low NOx HD Natural Gas Engine Reliability Augmentation Project	$200,000
Sorbent Technologies Corp.	Demonstration of a Retrofit NOx Filter for HD Stationary and Mobile Diesel Engines	$440,000
SCAQMD/NREL	Development and Demonstration of GTL-powered HD Vehicles Retrofitted with Control Technologies for Reduced NOx and PM	$400,000

The CEC awarded $250,000 to CaTIS to emission test CalTrans clean diesel service and the remaining $447,174 to the South Coast AQMD to fund a joint solicitation with NREL for the Next Generation Natural Gas Vehicle Program. Cummins Westport, Inc. was awarded two separate grants..

Table V-8
Low-Emission Heavy-Duty Natural Gas
Engine Development Grants
FY 1999-2000

Recipient	Proposal Description
Cummins Westport Inc.	Review and Development of Technologies for Next Generation Class 3-6 CNG Fueled Engines
Cummins Westport Inc.	Preliminary Vehicle Design Development Proposal for the NREL Next Generation Natural Gas Vehicle

2. Project Commercialization

The Advanced Technology Development Guidelines required applicants to provide market projections reflecting a fully commercialized product. Based on these projections, the estimated California NOx reductions for 1999/2000 projects total over 41 thousand cumulative tons by 2005, and for 2000/2001 projects total over 24 hundred cumulative tons by 2005. The estimated reductions for 1999/2000 projects has been adjusted to reflect the loss of the Ceryx project, which filed for Chapter 11 protection in November 2001.

The successful development of NOx reduction technologies and their commercial ions will determine the actual NOx reductions. The final NOx emission reductions will depend upon: the availability of future Carl Moyer incentive funding to support projects using the technologies, the success of the Carl Moyer program and technology suppliers in supporting the marketing of NOx reduction technologies to individual customers, and customer use patterns with the vehicles or equipment that incorporate these technologies.

3. Additional Funding For Advanced Technology Development Projects

As future emission regulations become increasingly stringent, there will be a continuing need to foster the development of low-emission heavy-duty engine technology. The more stringent standards adopted for 2004 and 2007 engines reduce the emission benefits from existing low-emission engines and reduce their cost-effectiveness for prospective customers. Continued development of technologies that provide emission levels lower than required by regulation, or in advance of regulatory requirements, can provide a range of cost-effective options that qualify for Carl Moyer Program incentives.
However, engine and vehicle manufacturers need outside financial support to justify

continued development and commercialization of such technology options due to limited market demand.

There is a provision in the engine portion of the Carl Moyer Program to fund add-on equipment or retrofits. This type of technology can provide significant cost-effective reductions. However, there is a lack of available technology. The Advanced Technology Development component of the Carl Moyer Program provides a level of financial assistance to technology developers to reduce the risk in developing these types of innovative technologies.

VI.

ESTIMATED BENEFITS OF THE CARL MOYER PROGRAM

The Carl Moyer Program was primarily designed to substantially reduce NOx, a smog-forming pollutant. Although PM reductions were also expected, they were not required to qualify for funding under the Carl Moyer Program. However, based on the Carl Moyer Program Advisory Board's recommendations and the designation of PM as a toxic air contaminant, the Program now targets PM reductions as well. This chapter explains ARB's estimate of air quality and public health benefits from the Carl Moyer Program.

A. Statewide Program NOx Benefits

All participating districts are required to provide program reports to ARB in June of each program year. That report must include estimated NOx and PM reductions and cost-effectiveness using the emission factors provided in the Carl Moyer Program Guidelines. ARB staff evaluates reports provided by districts and confirms the estimates of NOx and PM emission reductions. Staff also evaluates annual September 30th reports on the status of districts' current year programs.

Districts have funded a variety of projects, with project life for each project varying from five to 20 years. In the first year, total NOx reductions were about 1466 tons per year (or about 4 tons per day). Once all of the third year program funds are obligated, ARB anticipates the program will reduce NOx emissions by about 14 tons per day.

Because many projects last 10 or more years, ARB expects emission reductions to benefit air quality into the next decade. Table VI-1 lists the amount of funds each of the districts obligated in the first three years, resulting in annual NOx emission reductions and cost-effectiveness over the first three years. Table VI-2 describes NOx emission reductions and cost-effectiveness by project category.

Table VI-1
Program NOx Reductions and Cost-Effectiveness
Year I, Year II and Year III [a]

District	State Funds Obligated To Date[b]	Estimated Annual NOx Reductions (tons/year) [c]	Estimated Average Cost-Effectiveness ($/ton)
SCAQMD	$34,259,436	1110	$5,492
SJVAPCD	$10,915,638	1340	$3,307
BAAQMD	$ 10,710,923	596	$1,962
SMAQMD	$ 8,950,401	610	$4,534
SDCAPCD	$ 4,146,976	130	$5,422
VCAPCD	$ 2,090,869	90	$2,878
MDAQMD	$ 1,379,652	32	$5,570
AVAPCD	$ 1,161,513	17	$8,991
SBCAPCD	$ 950,899	38	$4,455
MBUAPCD	$ 467,092	8	$7,231
MCAPCD	$ 88,876	5	$3,545
SLOAPCD	$ 416,504	12	$5,326
ICAPCD	$ 350,600	31	$1,638
NSAQMD	$ 288,030	12	$6,634
NSCAPCD	$ 243,900	9	$5,264
NCUAQMD	$ 381,138	21	$5,454
GCAPCD	$ 99,662	11	$3,007
BCAPCD	$ 75,780	5	$3,043
FRAQMD	$ 245,851	29	$3,072
SCAQMD	$ 61,800	6	$3,478
TCAPCD	$ 176,750	17	$2,208
KCAPCD	$ 35,958	3	$4,182
Total	**$77,498,248**	**4,132**	**$4,006**

Notes: a. Some of the remaining project funds were not enough to fund one project, so the district combined funds to pay for a complete project.

b. NOx reductions have been estimated based on obligated funds only.

c. Average statewide program cost-effectiveness

Table VI-2
Statewide Benefits by Project Category
Year I, II and III

Source Category/ Equipment Type	NOx (tons/year)	Cost-Effectiveness ($/ton)
On-Road:		
Heavy-Duty Line Haul	41	$ 2,570
Refuse Haulers	432	$ 6,563
Urban Transit Buses	413	$ 4,715
School Buses	4	$10,039
Other	116	$ 5,756
Off-Road:		
Farm Equipment	36	$ 4,179
Construction	54	$ 3,627
Other	52	$ 3,587
Locomotives:	22	$ 1,160
Marine Vessels:	698	$ 3,044
Agricultural Irrigation Pumps:	1767	$ 2,353
Forklifts (electric):	163	$ 5,057

B. Statewide Program Diesel Particulate Reductions

The Carl Moyer Program was designed to assist California in meeting the NOx emission reduction goals in the 1994 SIP. Although the program does not focus on PM reductions, many of the funded technologies, such as electric motors, engine repowers and alternative fueled engines also reduce PM. Based on findings regarding the health implications of diesel PM, it has become more critical to include PM reductions in the Carl Moyer Program. The 2000 revised Carl Moyer Program guidelines set a statewide program goal to achieve a 25 percent emission reduction for PM for the third and future year program. Local air districts such as SCAQMD and SJVAPCD, which are in serious non-attainment for the federal PM standard, are required to meet a 25 percent PM emission reduction for the local program.

In SCAQMD alone, more than 1700 alternative fueled engines were funded (in the first three years) which resulted in substantial PM emission reductions. Based on local program data (from the first three years) provided by the districts, ARB estimates PM reductions from the Carl Moyer Program to be about 146 tons per year. Table VI-3 lists the PM emission reductions for the first three years, by district.

Table VI-3
Program PM Reductions
Year I & II & III[a]

District	PM (tons/year)
SCAQMD	71
SJVAPCD	55
BAAQMD	32
SMAQMD	23
SDCAPCD	9
VCAPCD	2
MDAQMD	2
AVAPCD	0.4
SBCAPCD	1
MBUAPCD	1.6
SLOAPCD	4.3
ICAPCD	1.4
NSAQMD	1.3
NSCAPCD	0.5
NCUAQMD	2
GCAPCD	0.7
BCAPCD	0.2
FRAQMD	0.3
MCAQMD	0.89
TCACPD	1.1
SCAQMD[a]	0.4
KCAPCD	0.1
Total	**212.3**

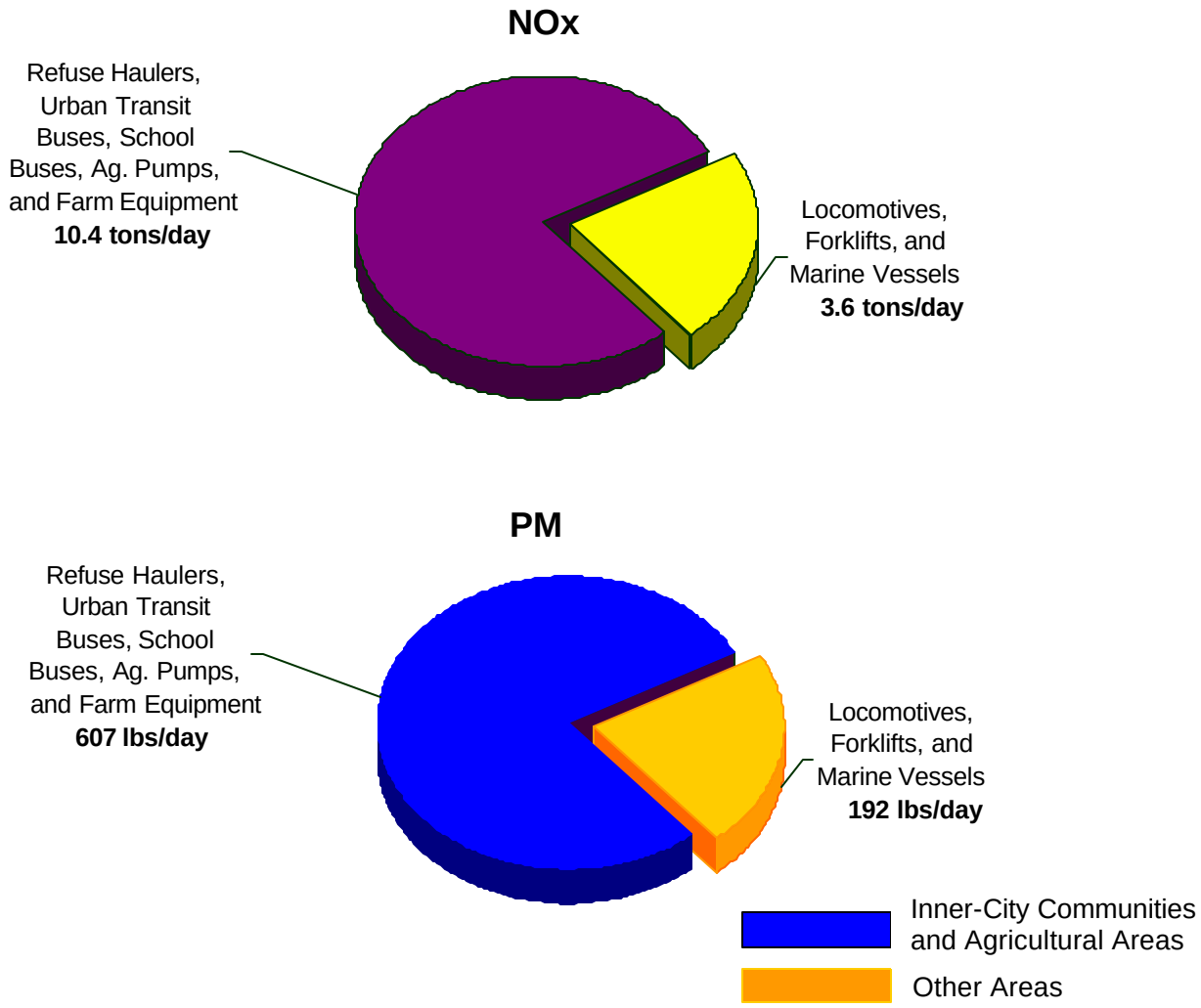
a. Shasta County Air Quality Management District

C. Environmental Justice Benefits

Emission projects reductions from projects such as refuse haulers, urban transit and school buses, and agricultural irrigation pump engines and other agricultural equipment will benefit both inner-city and agricultural communities. Staff estimates that these projects provide NOx and PM emission reductions of about 10 tons per day and 600 pounds per day, respectively. ARB sponsored targeted outreach is ongoing to enhance participation and ensure that emission reductions from this program are realized in areas that are often disproportionately impacted by air pollution.

Figure VI-1

Potential NOx & PM Emission Reductions for Projects That Operate Throughout Inner-City & Agricultural Communities



VII.

SUMMARY AND RECOMMENDATIONS

A. Summary

The Carl Moyer Program is providing near-term emission reductions that help reduce the adverse health consequences of California's air pollution. This program has resulted in hundreds of tons of NOx reductions, as well as PM reductions. Emission reductions generated through the Carl Moyer Program will continue to provide air quality benefits into the next decade.

The Carl Moyer Program has paid for the replacement of heavy-duty diesel engines that power urban transit buses, school buses, refuse trucks, and agricultural irrigation pumps. In fact, more than 70 percent of the projects funded fall into these categories. These vehicles and equipment operate in inner-city and agricultural communities where the majority of the air quality benefits from this program will be realized.

B. Fourth Year Funding

For fiscal year 2001/2002 the Governor and the Legislature allocated a total of $16 million dollars. All but 2 percent, which will go to ARB administration, will be allocated to engine replacement projects. Since the fourth year funds were less than $25 million, the ratio of state to matching funds reverted to 2:1. A combination of match and Moyer funds will provide $23.5 million dollars for engines replaced in the fourth year.

The formal solicitation was released in December 2001. The seven largest districts have already received their allocations. The remaining districts will receive their grants by the end of March. Colusa County APCD joined the program's fourth year and Mojave Desert APCD declined fourth year funds to ensure the district could spend their current funds. Mojave Desert plans to reapply for any future funding. ARB asks that participating districts, which are affected by Section 43023.5 of the Health and Safety Code, submit a description of their environmental justice guidelines and program implementation along with the Carl Moyer Program annual report due June 30, 2003.

C. Funding Beyond the Fourth Year

Currently, funds for the Carl Moyer Program are not included in the Governor's proposed budget for fiscal year 2002/2003. Proposition 40 was placed on the March ballot when the Governor signed Assembly Bill 1602. A sum of $50 million dollars in bonds was set aside for ARB for grants to air districts, for projects that reduce air pollution in state and local park and recreation areas. Eligible projects shall meet the requirements of Section 16727 of the Government Code and shall be consistent with Section 43023.5 of the Health and

Safety Code, the same section of the code which established the Carl Moyer Program. Each district will be eligible for grants of not less than $200,000 dollars. Five percent of the funds allocated to a district may be used to cover the costs associated with implementing the grant program.

D. Need For Continued Funding

Air districts statewide must continue to reduce emissions to meet federal air quality deadlines, meet and maintain healthful air quality levels, and reduce public exposure to toxic air contaminants. Incentive programs, such as the Carl Moyer Program, assist districts in achieving the necessary NOx and PM emission reductions to meet these objectives and requirements. Without an incentive program, emission reductions would have to be obtained from industry and other sources - reductions not typically as cost-effective - or through regulatory measures. In return, the program has provided a reduction of over a pound of smog-forming pollutants per person as well as significant reductions of toxic particles.

The Carl Moyer Program reduces the economic and societal cost of NOx and PM pollution for all people of California in an efficient, environmentally sound, and equitable way. The $98 million in program funding for the first three years of this program cost California less than $1 per person per year for the 33 million people of California.

Continued funding would help create a sustainable market for low-emission engines and chassis, enabling fleets to continue to have access to these technologies earlier than required. A continuing market also encourages manufacturers to expand their product offerings.

The vision of the 2002 Clean Air Plan is to attain and maintain health-based air quality standards, reduce emissions of identified air toxins to the lowest level achievable, and systematically attack the serious problem caused by motor vehicles. The Carl Moyer Program is a noteworthy part of this strategic plan.

E. Staff Recommendations

Staff recommends that the Board

- Approve this report on the Carl Moyer Program for transmittal to the Governor and the Legislature; and

- Continue support for the Carl Moyer Program and efforts to identify continuing funding for the program.

APPENDIX A
DISTRICT PROGRAMS

TABLE OF CONTENTS

TABLES

This Appendix describes each district's program including, by project category, the number of engines funded, the amount of funds granted, overall program NOx reductions and cost-effectiveness for statewide funds granted under the Carl Moyer Program. The subsections also describe each district's process for selecting projects as well as the schedule for accepting applications.

Table A-1
ARB's Solicitation Schedule

District Name	1998/1999 Year I	1999/2000 Year II	2000/2001 Year III	2001/2002 Year IV
Guidelines Approved	2/99	Same as Year I	11/00	Same as Year 3
Solicitation for Program App.	5/99	11/99	11/00	12/01
Application Evaluations	6/99	12/99	1/01	½
Funds Awarded	7/99	1/00 – 4/00	2/01	11/01-1/02
District Program Report to ARB	9/30/99	9/30/00	9/30/01	9/30/01
ARB Evaluation of Status Reports	10/99	10/00	10/01	10/01
District Annual Report to ARB	6/30/00	6/30/01	6/30/02	6/30/03
ARB Evaluation of Annual Reports	6/30/00 – 3/1/01	6/30/01 – 3/1/02	6/30/02 – 3/1/03	6/30/03 – 3/1/04
District Final Report Due	7/31/2001	7/31/2002	7/31/2003	7/31/2004

Table A-2
Participating Districts

District Name	1998/1999 Year I	1999/2000 Year II	2000/2001 Year III	2001/2002 Year IV
Antelope Valley APCD	✓	✓	✓	✓
Bay Area AQMD	✓	✓	✓	✓
Butte County AQMD		✓	✓	✓
Colusa County APCD				✓
Feather River AQMD		✓	✓	✓
Glenn County APCD	✓	✓	✓	✓
Imperial County APCD	✓	✓	✓	✓
Kern County APCD		✓		
Mendocino County AQMD		✓	✓	✓
Mojave Desert AQMD	✓	✓	✓	
Monterey Bay Unified APCD	✓	✓	✓	✓
North Coast Unified AQMD	✓	✓	✓	✓
Northern Sierra AQMD	✓	✓	✓	✓
Northern Sonoma County APCD	✓		✓	✓
Placer County APCD			Applied Only	
Sacramento Metropolitan AQMD	✓	✓	✓	✓
San Diego County APCD	✓	✓	✓	✓
San Joaquin Valley APCD	✓	✓	✓	✓
San Luis Obispo APCD	✓	✓	✓	✓
Santa Barbara County APCD	✓	✓	✓	✓
Shasta County APCD		✓	✓	✓
South Coast AQMD	✓	✓	✓	✓
Tehama County APCD			✓	✓
Ventura County APCD	✓	✓	✓	✓

1. South Coast Air Quality Management District (SCAQMD)

In the first three years of the Carl Moyer Program, SCAQMD received $39,371,209 in state funding and matched more than $15,185,700. South Coast has obligated more than 75 percent of their third year funds and has been allocated $7,055,564 from the fourth year program.

The SCAQMD program announcement has been sent to more than 15,000 businesses, government agencies, and interested industries annually. Criteria for selecting projects are based on the current Carl Moyer Program Guidelines, with priority given to alternative fuel projects. The amount of funding requested in the first and second year of the program totaled about $72 million, exceeding the amount of funds that SCAQMD has available to fund projects in the first three years of the program. All funds in the first and second years of the program have been spent and SCAQMD released its RFP on January 19, 2001 to select projects under the third year program. South Coast has released a Request for Proposals (RFP) in December 2001 to request projects for the remaining $4.5 million in funding from the third year funds along with their $7 million from the fourth year funding.

SCAQMD's program has been very successful. The district has funded more than 1,500 engines in the first three years. Some of the project participants that received funds in the South Coast during the first three years include Waste Management, Burrtec Waste Industries, Sunline, Omnitrans, Los Angeles County Metropolitan Transit Authority, Lucky Stores, Marine Terminals, Homebase, Lowe's HIW, Avery-Dennison, and Harbor Distributors. Table A-1 lists the types of projects paid for with funds received from the ARB, the number of engines funded, and an estimate of funds obligated by project category.

The staff of ARB estimates that SCAQMD's program, using funds allocated by the state, will result in a total of approximately 1100 tons of NOx reduced annually, with an average cost-effectiveness of about $5,500 per ton of NOx reduced. ARB anticipates that approximately 71.4 tons of PM will also be reduced.

Participating districts with one million inhabitants are required, by Section 43023.5 of the Health and Safety Code, to allocate at least fifty percent of the state funding to projects directly benefiting areas that are most significantly impacted by air pollution, including low income communities or communities of color, or both. In order to comply with this law, SCAQMD will evaluate all its fourth year projects according to poverty level, PM exposure, and air toxic exposure. SCAQMD has defined its regions of poverty where at least 10 percent of the population falls below the Federal poverty level. The district will also give

consideration to all projects operating in areas with the highest fifteen percent of PM concentration. Those projects that contain the above criteria will be considered projects directly benefiting areas of environmental justice.

Table A-3
Types and Number of Engines Paid For In the SCAQMD
Carl Moyer Funds Allocated by ARB

Source Category/ Equipment Type	Number of Engines Year I		Number of Engines Year II		Number of Engines Year III		Funds Total	
	Alt Fuel	Diesel	Alt Fuel	Diesel	Alt Fuel	Diesel	Alt Fuel	Diesel
On-Road:								
Refuse Haulers	86		66		291	25	$12,771,037	$390,683
Transit Buses	117		117		507		$9,908,906	
Other			38		269	33	$4,573,170	$592,777
Off-Road Equipment:								
Other	12						$174,745	
Marine Vessel Engines:		6						$1,841,190
Forklifts (electric):	105				104		$2,083,527	
Total	**320**	**6**	**221**		**1171**	**58**	**$29,511,385**	**$2,824,650**

2. San Joaquin Valley Air Pollution Control District (SJVAPCD)

Over the first three years of the Carl Moyer Program, SJVAPCD has received $15,232,232 in state funding. SJVAPCD has matched this amount with $5,873,893 in district funds. Currently, the district has obligated funds for the first, second, and third years.

The district's initial RFP was designed to solicit project applications on a first-come-first-served basis until both first and second year funds were obligated. Criteria for selecting projects were based on the Carl Moyer Program Guidelines approved February 1999. For third year funds, SJVAPCD released its formal call for projects (CFP) on January 4, 2001 to select projects, and received more than $25 million in funding requests. The district has a waiting list of applicants.

SJVAPCD's program has proven to be a great success, based on the projects that the district has funded in the first three years. The SJVAPCD program has been extremely popular with area farmers. Some of the types of projects that the district paid for include: agricultural pump engines, refuse haulers, street sweepers, tractors, line-haul trucks, and delivery trucks. Table A-4 lists the types of projects paid for using Carl Moyer Program funds allocated by the state, the number of engines funded, and an estimate of funds obligated by project category. ARB estimates that with three years of funding, SJVAPCD will achieve approximately 1,341 tons of NOx and more than 55 tons of PM reductions annually, over the life of the projects. Based on the amount of funds that the district received from ARB, the district's program cost-effectiveness averages about $3,300/ton of NOx reduced.

The vast majority of SJVACPD projects benefit farming communities. Many migrant workers work directly or in close proximity to the irrigation pumps. The emissions reduced benefit these migrant workers and their families.

Table A-4
Types and Number of Engines Paid For In the SJVAPCD
Carl Moyer Funds Allocated by ARB

Source Category/ Equipment Type	Number of Engines Year I		Number of Engines Year II		Number of Engines Year II		Funds Total	
	Alt Fuel	Diesel	Alt Fuel	Diesel	Alt Fuel	Diesel	Alt Fuel	Diesel
On-Road:								
Heavy-Duty Line Haul		29						$ 712,950
Refuse Haulers		6		19				$ 165,542
Other	3	1					$26,567	$ 21,300
Off-Road Equipment:								
Agricultural		7		18				$240,915
Agricultural Irrigation Pumps:	12	306	2	239		538	$179,551	$13,006,079
Total	**15**	**349**	**2**	**276**		**538**	**$206,118**	**$14,146,786**

3. Bay Area Air Quality Management District (BAAQMD)

Over the first three years of the Carl Moyer Program, BAAQMD received $8,686,133 in state funding, matched with $3,361,737 in district funds. The district's program was a competitive process focusing on cost-effectiveness. The district program focused on paying for locomotives, marine vessels, off-road agricultural equipment and irrigation pumps. To date, 100 percent of first and second year funds have been awarded to projects and the district is in the process of completing contracts for the third year of the program.

ARB estimates that state funds obligated by BAAQMD to date will produce approximately 597 tons of NOx and 33 tons of PM reductions annually, during the life of the projects. The district's program cost-effectiveness for those funds averages about $2,000/ton of NOx reduced. Some of the types of projects that the district funded include marine vessels, on-road engines, one off-road project, and two locomotives. Table A-5 lists the types of projects funded, the number of engines funded, and an estimate of funds obligated by project category.

Table A-5
Types and Number of Engines Paid For In the BAAQMD
Carl Moyer Funds Allocated by ARB

Source Category/ Equipment Type	Number of Engines Year I		Number of Engines Year II		Number of Engines Year III		Funds Total	
	Alt Fuel	Diesel	Alt Fuel	Diesel	Alt Fuel	Diesel	Alt Fuel	Diesel
On-Road						13		$231,000
Off-Road					1			$ 19,800
Locomotives	2						$820,000	
Marine Vessels		32		14		25		$7,705,323
Total	**2**	**32**		**14**	**1**	**38**	**$820,000**	**$7,956,123**

4. Sacramento Metropolitan Air Quality Management District (SMAQMD)

For the first three years of the program, SMAQMD received $7,514,437 in state funding matched with $2,866,255 in district funding. Since that time, the district has had an on-going heavy-duty incentive program in place and it has incorporated the Carl Moyer Program into that program. The district's program is designed to select the most cost-effective projects to yield the greatest NOx reductions to meet Sacramento's much-needed conformity and air quality plans.

To date, SMAQMD has obligated and awarded both first and second year funds and is working to finalize the contracts from the third year. The vast majority of Sacramento's funds went to agricultural irrigation pumps and agricultural off-road vehicles. The district also funded off-road equipment.

ARB estimates that state funds granted to the district will provide approximately 611 tons of NOx, and 23 tons of PM reductions annually over the life of these projects. Overall, the district's program cost-effectiveness averages about $4,500/ton of NOx reduced. Table A-6 lists the types of projects funded, the number of engines funded, and an estimate of funds obligated by project category.

Table A-6
Types and Number of Engines Paid For In the SMAQMD
Carl Moyer Funds Allocated by ARB

Source Category/ Equipment Type	Number of Engines Year I		Number of Engines Year II		Number of Engines Year II		Funds Total	
	Alt Fuel	Diesel	Alt Fuel	Diesel	Alt Fuel	Diesel	Alt Fuel	Diesel
On-Road:								
School Buses	4						$120,000	
Off-Road:								
Agricultural:						17		$246,312
Construction:						30		$725,704
Other:						7		$116,364
Agricultural Irrigation Pumps:		200		165	3	300	$77,390	$6,025,611
Total	**4**	**200**		**165**	**3**	**354**	**$197,390**	**$7,113,991**

5. San Diego County Air Pollution Control District (SDCAPCD)

In the first three years of the Carl Moyer Program, SDCAPCD received $3,745,503 in state funding and matched $1,451,075 in district funds.

To date, SDCAPCD has obligated all of the first and second year funds, and is completing the implementation of its third year funds. The types of projects funded by SDCAPCD include alternative fuel urban transit and school buses, waste haulers and diesel marine vessel repowers.

ARB estimates that in the first three years, SDCAPCD will reduce approximately 130 tons of NOx, and 9.2 tons of PM annually, over the life of the projects. Overall, the district's program cost-effectiveness averages about $5,500/ton of NOx reduced. Table A-7 lists the types of projects funded, the number of engines funded, and an estimate of funds obligated by project category.

Table A-7
Types and Number of Engines Paid For In the SDCAPCD
Carl Moyer Funds Allocated by ARB

Source Category/ Equipment Type	Number of Engines Year I		Number of Engines Year II		Number of Engines Year III		Funds Total	
	Alt Fuel	Diesel	Alt Fuel	Diesel	Alt Fuel	Diesel	Alt Fuel	Diesel
On-Road								
Refuse Haulers			9			1	$234,051	$20,872
Urban Transit Buses	50		16				$677,920	
School Buses	3		5				$195,640	
Other						23		$564,350
Marine Vessels		8		3		17		$1,971,015
Total	**53**	**8**	**30**	**3**		**41**	**$1,107,611**	**$2,556,237**

6. Ventura County Air Pollution Control District (VCAPCD)

In the first three years of the program, VCAPCD received $3,049,342 in state funding and matched these funds with $1,172,908 in district funds. VCAPCD has received project applications for agricultural pump engines, marine vessel engines, and on-road engine repowers. VCAPCD estimated that the funding requests totaled more than $5.5 million, which exceeds the amount of Carl Moyer Program funds that the state allocated to VCAPCD to implement its program over three years.

To date, VCAPCD has obligated all of its first and second year funds and has allocated about sixty percent of its third year funds. The types of projects that the district has funded include alternative fuel refuse haulers, street sweepers, agricultural irrigation pumps, and marine vessels.

The staff of ARB estimates that in the first three years of VCAPCD's program, the district will reduce 90 tons of NOx and 2.1 tons of PM emission annually, over the life of the projects. Overall, the district's program cost-effectiveness averages about $2,900/ton of NOx reduced. Table A-8 lists the types of projects funded, the number of engines funded, and an estimate of funds obligated by project category.

Table A-8
Types and Number of Engines Paid For In the VCAPCD
Carl Moyer Funds Allocated by ARB

Source Category/ Equipment Type	Number of Engines Year I		Number of Engines Year II		Number of Engines Year II		Funds Total	
	Alt Fuel	Diesel	Alt Fuel	Diesel	Alt Fuel	Diesel	Alt Fuel	Diesel
On-Road:								
Refuse Haulers	8		9		2		$1,390,353	
Off-Road:								
Other		5						$ 74,070
Agricultural Irrigation Pumps		4				3		$ 71,876
Marine Vessels		15		12		9		$1,498,029
Total	**8**	**24**	**9**	**12**	**2**	**12**	**$1,390,353**	**$1,643,975**

7. Mojave Desert Air Quality Management District (MDAQMD)

In the first three years of the Carl Moyer Program, MDAQMD has received $3,016,999 in state funding to which it matched $1,158,507 in district funding. In the first two years, MDAQMD issued a CFP. The district mailed solicitations to the following industries: fuel distributors/utilities, railroad industry, transit agencies, school districts, alternative fuel vehicle/engine providers/associations, city/county state government fleets, public/private fleets, commercial delivery/distributions/associations, consultants, construction, Chambers of Commerce, waste haulers, manufacturing facilities, and military facilities. MDAQMD's process for selecting projects is based on the total dollar amount of funding requests received in the first five business days following the release of the CFP. If funding requests did not exceed the amount of funds available in the district, projects were selected based on a first-come-first-served basis. If the total funding requests exceeded the money available, projects were reviewed and selected on a competitive basis.

To date, MDAQMD has obligated all of its first year funds to fund 19 natural gas refuse haulers. Under the second year of the program, MDAQMD anticipates funds will be obligated to projects by June 30, 2002 for various on and off-road projects. MDAQMD is in the process of allocating its third year funds. MDAQMD has elected not to participate in the fourth year of the program.

The ARB staff estimates that the first two years of MDAQMD's program will result in approximately 32 tons of NOx reductions and 2.1 tons of PM reductions. Overall, the district's program cost-effectiveness averages about $5,500/ton of NOx reduced. Table A-9 lists the types of projects funded, the number of engines funded, and an estimate of funds obligated by project category.

Table A-9
Types and Number of Engines Paid For In the MDAQMD
Carl Moyer Funds Allocated by ARB

Source Category/ Equipment Type	Number of Engines Year I		Number of Engines Year II		Funds Total	
	Alt Fuel	Diesel	Alt Fuel	Diesel	Alt Fuel	Diesel
On-Road:						
Refuse Haulers	19				$ 845,791	
Other			16		$ 394,976	
Off-Road				3		$ 34,678
Total	**19**		**16**	**3**	**$1,240,767**	**$ 34,678**

8. Antelope Valley Air Pollution Control District (AVAPCD)

AVAPCD has participated in three years of the Carl Moyer Program. It has received a total of $977,571 in state funding from the first three years of the program, which it has matched with $386,235 in district funding. AVAPCD will receive $210,149 from the fourth year funds. In the past, AVAPCD has sent out a CFP to solicit applications for program funding.

To date, AVAPCD has obligated all of its first and second year funds, and will finish executing its third year funds by June 2002. AVAPCD's program has primarily funded alternative fueled refuse vehicles. The NOx and PM reductions benefit residential neighborhoods as well as refuse workers who are directly impacted by the trucks' emissions.

Staff of ARB estimates that the first three years of AVAPCD's program will result in a total of approximately 17 tons of NOx and 700 pounds of PM in annual reductions. Overall, the average cost-effectiveness for the district's program is about $9,000/ton of NOx reduced. Table A-10 lists the types of projects funded, the number of engines funded, and an estimate of funds obligated by project category.

Table A-10
Types and Number of Engines Paid For In the AVAPCD
Carl Moyer Funds Allocated by ARB

Source Category/ Equipment Type	Number of Engines Year I		Number of Engines Year II		Number of Engines Year III		Funds Total	
	Alt Fuel	Diesel	Alt Fuel	Diesel	Alt Fuel	Diesel	Alt Fuel	Diesel
On-Road:								
Refuse Haulers	9	1	6		2		$701,034	$17,490
Off-Road								
Construction						7		**$**287,802
Total	**9**	**1**	**6**		**2**	**7**	**$701,034**	**$305,292**

9. Santa Barbara County Air Pollution Control District (SBCAPCD)

SBCAPCD received a total of $977,571 in Carl Moyer Program state funds, to which it has matched $386,235 in district funds. To date, SBCAPCD has obligated all of its first, second and third year funds to pay for marine vessel repowers, on-road projects such as the Clean Air Express Commuter Bus CNG Repower Project, and agricultural pump engines.

ARB staff estimates that in the first three years, SBCAPCD's program has produced more than 38 tons of NOX and 1.25 tons of annual PM reductions, for the life of the projects. The district's average cost-effectiveness was about $4,500/ton of NOx reduced. Table A-11 lists the types of projects funded, the number of engines funded, and an estimate of funds obligated by project category.

Table A-11
Types and Number of Engines Paid For In the SBCAPCD
Carl Moyer Funds Allocated by ARB

Source Category/ Equipment Type	Number of Engines Year I		Number of Engines Year II		Number of Engines Year III		Funds Total	
	Alt Fuel	Diesel	Alt Fuel	Diesel	Alt Fuel	Diesel	Alt Fuel	Diesel
On-Road:								
Urban Transit Buses	3						$169,749	
Refuse Haulers					4	2	$81,214	$40,410
Other				1				$20,818
Agricultural Irrigation Pumps					4	6	$97,622	$138,213
Marine Vessels		5		6		4		$412,728
Total	**3**	**5**		**7**	**8**	**12**	**$169,749**	**$341,004**

10. Kern County Air Pollution Control District (KCAPCD)

KCAPCD participated for the second year of the program only. In the second year KCAPCD was allocated $225,000 and requested $100,000 in program funds to pay for one project that the district selected. KCAPCD notified ARB that the district would only use $100,000 of second year funds and not participate in the third year program, for which the district had been allocated $450,000. This district's remaining funds from the second and third year were reallocated to the interdistrict solicitation, which was sent out by the ARB on December 21, 2001. The staff of ARB estimates that KCAPCD will produce about 2.9 tons of NOx and 160 pounds of PM reductions, with an average cost-effectiveness of $4,200/ton of NOx reduced.

11. Monterey Bay Unified Air Pollution Control District (MBUAPCD)

Over the first three years of the program MBUAPCD has a total of $860,093 in state funding, which it has matched with $327,940 in district funding. Traditionally, the district separated its funds into three amounts. This allowed each of the three counties under MBUAPCD's jurisdiction to benefit from projects paid for under the program. These counties include Monterey, Santa Cruz, and San Benito. Funding amounts were determined using the population in each of these counties. Projects were selected on a first-come-first-served basis. MBUAPCD issued an RFP for the third year of their program in June of 2001. MBUAPCD's program has been extremely successful, with more than 100 applicants seeking funds. MBUAPCD is currently completing the allocation of its third year funds.

In compliance with Section 43023.5 of the Health and Safety Code, MBUAPCD has analyzed its district to find areas of environmental justice. MBUAPCD performed a case study to determine the areas to concentrate its environmental justice efforts. MBUAPCD defined its environmental justice areas as a function of diesel toxicity risk, low income and minority populations. Using these three criteria, MBUAPCD was able to plot communities in need. MBUAPCD determined that more than 80 percent of the district was disproportionately impacted. MBUAPCD will apply these criteria to projects for fourth year funds.

To date, MBUAPCD has obligated all of its first and second year funds, and about seventy-six percent of its third year funds. The staff of ARB estimates that in the first three years of MBUAPCD's program, the district was able to reduce 8.5 tons of NOx and more than 1.6 tons of PM annually over the life of the projects. The district's average cost-effectiveness is $7,200 per ton of NOx reduced. Table A-12 lists the types of projects funded, the number of engines funded, and an estimate of funds obligated by project category.

Table A-12
Types and Number of Engines Paid For In the MBUAPCD
Carl Moyer Funds Allocated by ARB

Source Category/ Equipment Type	Number of Engines Year I		Number of Engines Year II		Number of Engines Year III		Funds Total	
	Alt Fuel	Diesel	Alt Fuel	Diesel	Alt Fuel	Diesel	Alt Fuel	Diesel
On-Road:								
Urban Transit Buses	8						$265,800	
Agricultural Irrigation Pumps						3		$131,715
Marine Vessels				6		10		$436,623
Total	**8**			**6**		**13**	**$265,800**	**568,338**

12. San Luis Obispo County Air Pollution Control District (SLOCAPCD)

SLOCAPCD has participated since the beginning of the Carl Moyer Program. In the first three years of the program, SLOCAPCD received a total of $417,746 in state funding and matched $168,593. In the first year of the program, the district allocated all its funds to the Hearst Castle Historical Monument. The Carl Moyer Program funding helped to replace 15 full size diesel buses and a diesel para-transit bus with a new fleet of CNG buses. In the second year, SLOCAPCD issued an RFP and accepted applications on a first-come-first-served basis. SLOAPCD is in the process of obligating its third year funds, which the district expects to complete by June 30, 2002. Thus far SLOAPCD has obligated third year funds to an LNG school bus, a concrete delivery truck and three marine vessel engines.

The staff of ARB estimates that from its first two years, SLOCAPCD's program will reduce 12.2 tons of NOx and 4.32 tons of PM annually for the life of the projects. Overall, the average cost-effectiveness for the district's program is about $5,300/ton of NOx reduced. Table A-13 lists the types of projects funded, the number of engines funded, and an estimate of funds obligated by project category.

Table A-13
Types and Number of Engines Paid For In the SLOCAPCD
Carl Moyer Funds Allocated by ARB

Source Category/ Equipment Type	Number of Engines Year I		Number of Engines Year II		Number of Engines Year III		Funds Total	
	Alt Fuel	Diesel	Alt Fuel	Diesel	Alt Fuel	Diesel	Alt Fuel	Diesel
On-Road:								
Urban Transit Buses	16						$ 157,800	
School Buses					1		$8,902	
Other					1		$30,650	
Agricultural Irrigation Pumps			2					$8,000
Marine Vessel			3			3		$206,482
Total	**16**		**5**		**2**	**3**	**$197,352**	**$214,482**

13. Imperial County Air Pollution Control District (ICAPCD)

ICAPCD has participated in Carl Moyer Program since its start in Fiscal year 1998/1999. Over the first three years of the program, ICAPCD has received $381,543 that it matched with $150,491 in district funds. The district distributed applications through the Agricultural Commissioner's Office, the Farm Bureau, and through a direct mailing and distribution effort. The types of industries notified include firms with agricultural and earthmoving equipment, on-road equipment operators, farmers, trucking companies, hay processors, and agricultural irrigation pump operators. ICAPCD accepted applications on a first-come-first-served basis and conducted evaluations based on cost-effectiveness.

To date, the district has obligated all of its first and second year funds, and about 20 percent of its third year funds to pay for agricultural irrigation pumps and off-road tractors. The district is completing its contracts for third year funds. The staff of ARB estimates that in ICAPCD's first three program years, it will generate approximately 31.3 tons of NOx and 1.4 tons of PM annually for the life of the projects. Overall, the average cost-effectiveness for the district's program is about $1,600/ton of NOx reduced. Table A-14 lists the types of projects funded, the number of engines funded, and an estimate of funds obligated by

project category.

Table A-14
Types and Number of Engines Paid For In the ICAPCD
Carl Moyer Funds Allocated by ARB

Source Category/ Equipment Type	Number of Engines Year I		Number of Engines Year II		Number of Engines Year III		Funds Total	
	Alt Fuel	Diesel	Alt Fuel	Diesel	Alt Fuel	Diesel	Alt Fuel	Diesel
Off-Road				4				$ 45,000
Agricultural Irrigation Pumps		13				3		$168,800
Total		**13**		**4**		**3**		**$213,800**

14. Northern Sierra Air Quality Management District (NSAQMD)

NSAQMD has participated in the Carl Moyer Program since the 1998/1999 fiscal year. For the first three years of the program, NSAQMD received $357,142 in state funding, which it matched with $132,291 in district funds. NCAQMD's outreach efforts include news releases, mailings, and radio advertisements. The district accepted applications on a first-come-first-served basis.

To date, the district has obligated all of its first and second year funds, and 60 percent of its third year funds to pay for on- and off-road engines. The staff of ARB estimates in the first three years, NSAQMD's program will result in more than 12.1 NOx tons and 1.3 tons of PM emission reductions annually, for the life of the projects. Overall, the average cost-effectiveness for the district's program is about $6,600/ton of NOx reduced. Table A-15 lists the types of projects funded, the number of engines funded, and an estimate of funds obligated by project category.

Table A-15
Types and Number of Engines Paid For In the NSAQMD
Carl Moyer Funds Allocated by ARB

Source Category/ Equipment Type	Number of Engines Year I		Number of Engines Year II		Number of Engines Year III		Funds Total	
	Alt Fuel	Diesel	Alt Fuel	Diesel	Alt Fuel	Diesel	Alt Fuel	Diesel
On-Road								
Refuse Haulers		6		2		1		$120,952
Urban Transit Buses			1					$9,065
Other		1		1		3		$130,922
Off-Road Equipment:								
Other		2						$34,000
Total		**9**	**1**	**3**		**4**		**$294,939**

15. Northern Sonoma County Air Pollution Control District (NSCAPCD)

NSCAPCD participated in the first year of the program, but did not participate in the second year. The district rejoined in the third year and will be receiving funds for the fourth year as well. In the first and third year of the program, NSCAPCD received a total of $263,900, which it matched with $97,767 in district funds. NSCAPCD has been allocated $75,000 from the fourth year funds.

In the first year of the program the district sent out an RFP to agricultural industries, farms, transportation associations, school districts, and government agencies. NSCAPCD is in the process of allocating its third year funds to projects. The district has allocated some third year money to alternative fuel school and urban transit buses, and one diesel marine vessel.

To date, the district has obligated all of its first year funds to pay for on- road and marine vessel engines. The staff of ARB estimates that the two years of NSCAPCD's Carl Moyer Program produced approximately 9.6 NOx tons and 1080 pounds of PM emission reductions annually, for the life of the projects. Overall, the average cost-effectiveness for the district's program is about $5,300/ton of NOx reduced. Table A-16 lists the types of projects funded, the number of engines funded, and an estimate of funds obligated by project category.

Table A-16
Types and Number of Engines Paid For In the NSCAPCD
Carl Moyer Funds Allocated by ARB

Source Category/ Equipment Type	Number of Engines Year I		Number of Engines Year II		Funds Total	
	Alt Fuel	Diesel	Alt Fuel	Diesel	Alt Fuel	Diesel
On-Road						
Urban Transit Buses	7		8		$133,900	
School Buses			7		$50,000	
Marine Vessels		2		1		$60,000
Total	**7**	**2**	**15**	**1**	**$183,900**	**$60,000**

16. Glenn County Air Pollution Control District (GCAPCD)

Glenn County has participated in the Carl Moyer Program since the first year. In the three years of the program, Glenn County has received $303,743, which the district has matched with $117,688. In the first and second years of the program, the district solicited applications through an RFP in November 1999 and September 2000, respectively. Projects operating within the county received 90 percent of incremental costs, while those operating outside the county received 85 percent of incremental costs. GCAPCD is completing the contract execution of second year funds. The district will begin allocation of its third year funds at the end of March 2002. GCAPCD will participate in the fourth year of the program, from which it will receive a total of $75,000.

To date, the district has obligated all of its first and second year funds received by the state to pay for agricultural irrigation pump engines, and off-road agricultural engines. From the first year alone, ARB estimates GCAPCD will reduce emissions by 11.5 tons of NOx and 1480 pounds of PM annually over the life of the projects. The staff of ARB estimates that GCAPCD's program will result in a total of approximately 63 tons of NOx reductions and 3.2 tons of PM reductions. Overall, the average cost-effectiveness for the district's program is about $3,000/ton of NOx reduced. Table A-17 lists the types of projects funded, the number of engines funded, and an estimate of funds obligated by project category.

Table A-17
Types and Number of Engines Paid For In the GCAPCD
Carl Moyer Funds Allocated by ARB

Source Category/ Equipment Type	Number of Engines Year I		Number of Engines Year II		Funds Total	
	Alt Fuel	Diesel	Alt Fuel	Diesel	Alt Fuel	Diesel
Agricultural Irrigation Pumps		14		7		$199,337
Total		**14**		7		**$210,700**

17. North Coast Unified Air Quality Management District (NCUAQMD)

NCUAQMD has participated in the Carl Moyer Program since the first year of the program. In three years of participation, NCUAQMD has received a total of $350,005 in state funding which the district matched with $126,722. NCUAQMD accepted applications on a first-come-first-served basis. The district is in the process of allocating its third year funds, which it plans to complete by June 2002.

To date, the district has obligated all of its first and second year funds, and about 85 percent of its third year funds for on-road, off-road, and marine vessel engines. The staff of ARB estimates that NCUAQMD's first and second and third year program will result in a total of approximately 21 tons of NOx and 2 tons of PM reductions per year with an average cost-effectiveness of about $5,500/ton of NOx reduced. Table A-18 lists the types of projects funded, the number of engines funded, and an estimate of funds obligated by project category.

Table A-18
Types and Number of Engines Paid For In the NCUAQMD
Carl Moyer Funds Allocated by ARB

Source Category/ Equipment Type	Number of Engines Year I		Number of Engines Year II		Number of Engines Year III		Funds Total	
	Alt Fuel	Diesel	Alt Fuel	Diesel	Alt Fuel	Diesel	Alt Fuel	Diesel
On-Road								
Line Haul		2						$64,648
Other		4		4		7		$230,572
Off-Road Equipment								
Construction		3				2		$52,780
Marine Vessels		1						$31,000
Total		**10**		**4**		**9**		**$379,000**

18. Butte County Air Quality Management District (BCAQMD)

BCAQMD began participating in the second year of the program. In the second and third years of the program, BCAQMD received a total of $254,592 in state funding and provided $87,016 in match funding. The district accepted applications on a first-come-first-served basis.

The district has obligated all of its second year funds for agricultural irrigation pump engines. BCAQMD expects to allocate the funds for its third year program by June 2002. ARB staff estimates that BCAQMD's program will result in a total of approximately 4.7 tons of NOx reductions and 480 pounds of PM reductions annually for the life of the projects from its second year funding. Overall, the average cost-effectiveness for the district's program is about $3,000/ton of NOx reduced. BCAQMD will participate in the fourth year of the program, in which it will receive $75,000. Table A-19 lists the types of projects funded, the number of engines funded, and an estimate of funds obligated by project category.

Table A-19
Types and Number of Engines Paid For In the BCAQMD
Carl Moyer Funds Allocated by ARB

Source Category/ Equipment Type	Number of Engines Year II		Funds Total	
	Alt Fuel	Diesel	Alt Fuel	Diesel
On-Road				
Off-Road				
Agricultural Irrigation Pumps		6		$75,781
Total		**6**		**$75,781**

19. Shasta County Air Quality Management District (Shasta County AQMD)

Shasta County AQMD entered the second year of the Carl Moyer Program. In the second and third years of the program, Shasta County AQMD received a total of $249,727 in state funding which it matched with $84,583 in district funding. In the second and third years of the program the Shasta County AQMD solicited project applicants through local newspapers, mailings, and through engine and equipment dealers. For its first two years of participation, Shasta County AQMD staff made a noteworthy outreach effort. The district was even successful in having their program featured in the local news.

To date, Shasta County AQMD has spent all of its second year funds and is in the process of allocating its third year funds, with projects having an average cost-effectiveness of $3,500 per NOx ton reduced. Shasta County AQMD combined a portion of their second and third year funds in an effort to fully fund the most cost-effective projects. With its second year funds, Shasta County AQMD was able to reduce emissions by more than 6 tons of NOx and 720 pounds of PM per year over the life of the projects. Table A-20 lists the types of projects funded, the number of engines funded, and an estimate of funds obligated by project category.

Table A-20
Types and Number of Engines Paid For In the SCAQMD
Carl Moyer Funds Allocated by ARB

Source Category/ Equipment Type	Number of Engines Year II		Funds Total	
	Alt Fuel	Diesel	Alt Fuel	Diesel
On-Road		2		$19,000
Off-Road		3		$27,800
Agricultural Irrigation Pumps		1		$15,000
TOTAL		**6**		**$61,800**

20. Feather River Air Quality Management District (FRAQMD)

FRAQMD began participating in the second year of the Carl Moyer Program. FRAQMD received a total of $245,851, which it matched with $82,645 to implement the Carl Moyer Program in its district. FRAQMD has based its program on a first-come first -served basis. In the first and second years of district participation, FRAQMD funded several agricultural pumps, an on-road line haul truck, and various off-road tractors , reducing emissions by 30 tons of NOx and more than 640 pounds of PM per year, with an average cost-effectiveness of $3,000/ton of NOx reduced. Table A-21 lists the types of projects funded, the number of engines funded, and an estimate of funds obligated by project category.

Table A-21
Types and Number of Engines Paid For In the FRAQMD
Carl Moyer Funds Allocated by ARB

Source Category/ Equipment Type	Number of Engines Year II		Number of Engines Year III		Funds Total	
	Alt Fuel	Diesel	Alt Fuel	Diesel	Alt Fuel	Diesel
On-Road:						
Line-haul				1		$11,063
Off-Road:						
Agricultural				10		$48,265
Other				1		$12,550
Agricultural Irrigation Pumps		9		25		$223,676
TOTAL		**9**		**37**		**$295,554**

21. Mendocino County Air Quality Management District (MCAQMD)

MCAQMD began participating in the second year of the program. MCAQMD received $212,018 in the second and third years of the program, which it matched with $71,825. MCAQMD was able to fund projects from four categories during its first year of participation, which include on-road, off-road, agricultural pump and marine vessel engines. With its second year funds, MCAQMD will produce approximately 5.3 tons of NOx reductions and more than 1,540 pounds of PM reductions, with an average cost-effectiveness of $3,500/ton of NOx reduced. The district is currently accepting applications on a first-come-first-served basis for third year funds. MCAQMD is currently working to allocate the remainder of its 2000/2001 fiscal year funds and anticipates third year funds will be obligated by June 30, 2002. Table A-22 lists the types of projects funded, the number of engines funded, and an estimate of funds obligated by project category.

Table A-22
Types and Number of Engines Paid For In the MCAQMD
Carl Moyer Funds Allocated by ARB

Source Category/ Equipment Type	Number of Engines Year II		Funds Total	
	Alt Fuel	Diesel	Alt Fuel	Diesel
On-Road		2		$28,615
Off-Road		1		$10,000
Agricultural Irrigation Pumps		1		$7,824
Marine Vessel		2		$15,000
Total		**6**		**$61,439**

22. Tehama County Air Pollution Control District (TCAPCD)

TCAPCD participated in the third year of the program, in which it received $150,000 in state funds and matched $40,817. The district did not participate in the first or second year of the program. In the third year of the program, TCAPCD mailed applications to local trucking firms, repair shops and farms and accepted applications on a first-come first-served basis. The district began receiving completed applications on June 1, 2001, is currently in the process of completing its third year program and has applied for fourth year funds. From its third year funds, TCAPCD was able to fund 17 agricultural pumps. These projects will reduce NOx by 21.19 tons per year, and PM by 1.1 tons per year, with an average cost-effectiveness of $2,200/ton of NOx reduced. TCAPCD was allocated $75,000 from fourth year funding and will match these funds with $37,500. Table A-23 lists the types of projects funded, the number of engines funded, and an estimate of funds obligated by project category.

Table A-23
Types and Number of Engines Paid For In the TCAPCD
Carl Moyer Funds Allocated by ARB

Source Category/ Equipment Type	Number of Engines Year III		Funds Total	
	Alt Fuel	Diesel	Alt Fuel	Diesel
Agricultural Irrigation Pumps		17		$150,000
Total		**17**		**$150,000**

23. Colusa County Air Pollution Control District (CCAPCD)

Colusa County Air Pollution Control District has applied for fourth year Carl Moyer Program funding. This will be the first year for CCAPCD to participate in the program. The district is slated to receive $75,000 in state funds, for which they will be required to match $37,500.

APPENDIX B
ADVANCED TECHNOLOGY DEVLEOPMENT PROJECTS

A. Advanced Technology Development Section Program Schedule

CEC received $2 million dollars for fiscal year 1999/2000 and $2.2 million for fiscal year fiscal year 2000/2001 for the Advanced Technology Development Section of the Carl Moyer Program. Table B-1 illustrates the schedule for the solicitations.

Table B-1
Advanced Technology Program Schedule

Milestone	1999/2000	2000/2001
PON Release	November 1999	November 21, 2000
Workshop	January 17, 2000	January 17, 2001
Application Deadline	February 15, 2000	February 13, 2001
Notice of Proposed Award	April 5, 2000	April 4, 2001
Commission Business Meeting	May 31, 2000	May 30, 2001
Award Start Date	June 1, 2000	May 31, 2001

B. PROJECT DESCRIPTIONS/STATUS:

1. FY 1999/2000 Funded Projects

Ceryx proposed to build and demonstrate its QuadCAT Four-Way Catalytic Converter device to reduce oxides of nitrogen (NOx), particulate matter (PM), hydrocarbons (HC), and carbon monoxide (CO) emissions from diesel engines. It was estimated that the proposed technology would reduce NOx by at least 45%, and PM, CO and HC by more than 90%. This technology does not require low sulfur fuel. Ceryx projected over 50,000 tons of NOx would be reduced by 2010 at a cost-effectiveness of $5,604 per NOx ton reduced. The project came to a halt when the company encountered financial difficulty and ultimately declared bankruptcy.

Delphi Energy & Chassis Systems proposed to develop a heavy-duty diesel truck exhaust aftertreatment system using non-thermal plasma technology to reduce NOx by 80%, particulate matter by 90%, and achieve these goals without increasing fuel consumption by more than 3%. The project is proceeding with the following five tasks:

1) develop a durable plasma reactor,
2) identify a durable catalyst system,
3) develop an on-board power supply/controller to energize the reactor,

4) develop an inexpensive lean NOx sensor and closed-loop control system, and
5) design the overall electrical system to avoid electromagnetic interference with or by other vehicle systems.

Engelhard proposed to collaborate with National Renewable Energy Laboratory (NREL) and ARCO to develop a retrofit kit to reduce NOx using an Exhaust Gas Recirculation (EGR) system and a patented catalyzed soot filter (DPX™). The performance targets of 50% NOx reduction, 90% PM reduction, and 80% HC+CO (FTP cycle) would be demonstrated with ARCO's EC-Diesel ultra-low-sulfur diesel fuel. Phase I is the design and construction of a prototype kit for fleet trial installation. Phase II is a fleet demonstration to monitor vehicles in use and perform chassis dynamometer testing.

Detroit Diesel proposed a major redesign of its Series 50G 8.5 liter natural gas engine, primarily marketed for transit buses, based on the Series 50 and Series 60 diesel engines. The redesign involves improvement in cylinder head and piston bowl configurations and particularly air-fuel ratio control to optimize combustion stability, efficiency, and extend the lean misfire limit. These improvements are intended to allow certification to ARB's alternative 0.5 g/bhp-hr NOx standard with no increase above the current PM level of 0.01 g/bhp-hr. The project is proceeding and DDC has announced commercial availability in
Fall 2002.

Cummins Westport, Inc. proposed the further development of its HPDI (high-pressure direct-injection) natural gas version of the Cummins 1.5 liter ISX diesel engine to attain 0.5 g/bhp-hr NOx emissions. The HPDI system injects a pilot quantity of diesel fuel (= 10%) to initiate combustion and then injects the main charge of natural gas, providing the performance and fuel efficiency of a conventional diesel engine. The further development involves the addition of exhaust gas recirculation and a variable geometry turbocharger (to be provided on the diesel base engine to meet October 2002 emission requirements) and recalibration for the higher level of EGR flows tolerable with natural gas to further reduce NOx emissions. The project is proceeding.

2. FY 2000/2001 Funded Projects

ISE Research Corp. proposed to develop and demonstrate a 60 kW Capstone MicroTurbine integrated into propane-powered series electric hybrid 30 ft. transit buses operated by the Los Angeles Department of Transportation. Prototypes of this new engine have achieved emission test results below the 2007-2010 standards of 0.20 g/bhp-hr NOx. The engine is being developed to use diesel fuel, propane, or natural gas. The project is proceeding.

Sorbent Technologies Corp. proposed to further develop a technology originally developed to reduce NOx emissions from jet-engine test facilities, and demonstrate the technology on heavy-duty stationary diesels and large truck engines. The technology

involves adsorption of NOx followed by desorption and Selective NOx Recirculation back into the engine, reducing NOx emissions by up to 90%. The project is proceeding.

SCAQMD and NREL proposed to demonstrate heavy-duty vehicles fueled with Fischer-Tropsch "GTL" synthetic diesel and retrofitted with aftertreatment systems to reduce NOx and PM emissions.

Cummins Westport, Inc. proposed to develop an upgraded B Series Gas engine for truck classes 3-6 with emissions at or below 0.5 g/bhp-hr NOx and 0.01 g/bhp-hr PM. The project will initially upgrade the B5.9G with technologies involving a diesel engine computer system and computer diagnostics that is expected to reach 1.2 g/bhp-hr NOx. This version is expected to be commercialized, followed by evaluation of NOx adsorber aftertreatment technology from Goal Line Environmental Technologies. The addition of the NOx absorber is expected to result in 0.5 g/ bhp-hr NOx for possible production in 2004, followed by further development to reach 0.2 g/bhp-hr NOx levels for 2007. The project is proceeding.

Cummins Westport, Inc. separately proposed with PACCAR Inc. to develop a Class 3-6 vehicle designed primarily for CNG, and a Class 7-8 vehicle designed primarily for LNG. The project will involve careful screening of vocations, chassis, and engines, with life cycle cost modeling and customer input, to determine business cases for the final choices. The project is proceeding.