Chapter 7

Action Plan for Reducing Emissions with Incentive Funds

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Chapter 7: Action Plan for Reducing Emissions with Incentive Funds

Chapter 7 is an action plan in progress, and it includes the best estimates of possible emissions reductions that can be achieved from potential, future funding. At this point, the District is not taking SIP credit for programs described in Sections 7.6 and 7.7 since they depend on funding that has not yet been secured. The action plan outlined in this chapter reflects the District's attempt in formulating a plan to achieve maximum reductions in the shortest time possible. As we proceed with the legislative process and achieve expected advancements in pollution control technologies, the District will revise this action plan to ensure optimal use of public funds in future revision.

7.1 INTRODUCTION

With this plan, mobile sources and stationary sources will become subject to new and more stringent regulatory requirements. However, even with an aggressive regulatory component as proposed in this plan, regulations alone cannot bring about all the reductions that are necessary to reach attainment. Stationary sources are already heavily controlled, and more stringent tail-pipe standards for new vehicles will not produce reductions until the old engines are replaced with cleaner new engines. With incentives, the full benefit of the new engine standards will be accelerated by several years. Incentive grants can also allow for adoption of cleaner technologies that may otherwise be unaffordable.

As this plan is implemented, over 50% of the San Joaquin Valley's population will see attainment of the 8-hour ozone standard in 2015, with over 90% reaching attainment in 2020. Without the incentive funds called for in this plan, these figures will be reduced to 35% in 2015 and 65% in 2020. Therefore, without the incentive measures proposed in this plan, attainment of the ozone standard will be delayed to after 2020 for over 1,000,000 Valley residents. Furthermore, without the proposed incentives, the San Joaquin Valley may not reach attainment of the PM2.5 federal standard by 2015 as currently mandated by the federal Clean Air Act.

Through incentives, funding is provided for projects that achieve emission reductions to supplement those from rules and regulations. Incentives allow the District to reduce emissions from source categories outside of the District's regulatory authority, as well as source categories where financial hardship would otherwise prevent traditional control strategies from being implemented. Since its inception, the District has awarded over $135 million in matching funds to projects that have resulted in over 52,000 tons of lifetime emission reductions at an average cost-effectiveness of approximately $2,600/ton.

The amount of funding currently available to the District for incentive-based programs is approximately $40 million per year. The primary sources for these funds are the expected revenues from the District's Indirect Source Review Rule, voluntary development mitigation agreements, local DMV surcharge fees, and the state's Carl Moyer Program. This plan calls for a significant increase in incentives to bring a large segment of the San Joaquin Valley population into attainment earlier than otherwise possible and to allow for the application of advanced technologies that will be required for bringing the entire San Joaquin Valley into attainment. To reach this goal, the San Joaquin Valley will need an average of $188 million in incentive funding annually until attainment is reached.

For the San Joaquin Valley to be successful in securing the necessary incentive funding, an advocacy effort with the public sector, business community, environmental community, and the general public, all requesting resources, will be necessary. The District, as well as a number of stakeholders, has begun an advocacy effort at the state and federal levels through a multi-pronged approach. The District is requesting $100 million per year in federal funding with the remainder coming from state and local sources.

This chapter provides a detailed action plan for securing and expending the proposed incentive funds. It is important to point out that, in this plan, we cannot legally take credit for potential reductions from incentive measures until binding commitments (e.g., state and/or federal legislation) securing the proposed funding levels are in place. However, to ensure State Implementation Plan (SIP) creditability once the funding is secured, the District in consultation with the federal EPA, has established the framework for enforcement and accountability. Please refer to section 7.5 for further details on SIP creditability.

7.2 DISTRICT EXPERIENCE TO DATE IN ADMINISTERING AND IMPLEMENTING INCENTIVE PROGRAMS

The District has significant experience in operating successful incentive programs since 1992. The programs have expanded in funding and increased in sophistication over the years. The District is currently operating two incentive programs aimed at reducing precursor emissions: the Heavy-Duty Engine Emission Reduction Incentive Program (Heavy-Duty Engine Program) and the Reduce Motor Vehicle Emissions II (REMOVE II) Program. As opportunities to achieve cost-effective emission reductions present themselves and funding becomes available, the District has been willing to develop new programs and new components for existing programs.

Since 1992, the District has awarded over $135 million to projects that have resulted in over 52,000 tons of lifetime emission reductions at a cost-effectiveness of approximately $2,600/ton. In 2006, the District executed 461 agreements through the incentive programs for a total of $31.1 million. The types of projects funded include diesel agricultural irrigation pump replacements, on-road and off-road vehicle engine replacements, new vehicle purchases, locomotive replacements, vanpools, bicycle path construction and transit pass subsidies. Over the project life, these projects are expected to reduce 8,118 tons of NOx, PM, and VOC.

In developing new incentive programs, District begins by securing funding. Then, in consultation with the California Air Resources Board (ARB) and federal Environmental Protection Agency (EPA), the District develops a proposed framework for the policies and procedures for program administration. These procedures are designed to ensure efficient program administration; applicant and District accountability; and adequate enforcement authority. Typically, new incentive policies and procedures are based on existing ARB guidance documents, such as the Carl Moyer Program Guidelines. The District then presents the proposed framework to the public for comments. Upon receiving comments, District staff refines the framework as appropriate and develops a policies and procedures document for program administration. This document is presented at a public meeting where the ARB, EPA, and public have an opportunity to comment. Finally, the document is presented to the District's Governing Board for approval. Upon approval by the District's Governing Board, the new program is implemented in accordance with the approved policies and procedures document.

7.2.1 Heavy-Duty Engine Emission Reduction Incentive Program

The Heavy-Duty Engine Program is by far the District's largest and most successful incentive program. The Heavy-Duty Engine Program accepts applications for a wide variety of engines that power vehicles or equipment. It provides funding for new purchases (differential cost only, in most cases), engine repowers, or retrofits. Emission reductions are obtained when the project applicant purchases vehicles and engines that are cleaner than required by current emission standards or installs emission certified/verified retrofit kits on existing engines. The District pays a portion of the differential cost of purchasing the lower emitting technology compared to conventional technology up to a cost-effectiveness cap of $14,300 per combined tons of NOx, PM and VOC.

The first projects that were funded began operating in 1998. Since then, each year additional funds have been allocated to the program and additional projects have become operational. Project life varies from 3 to 20 years depending on the application, with an average project life of 5 years based on the mix of projects received to date. Emission reductions are cumulative since additional projects are completed each year. The *2003 PM10 Plan* projected emission reductions utilizing currently available funding would amount to 6.3 tons per day of NOx by 2005. The *2003 PM10 Plan* also indicated that the District expected additional funding would be obtained to allow continued emission reductions in later years.

The most successful component of the program is the replacement of agricultural irrigation pump engines used for water pumping. Approximately 65% of all engines repowered have been uncontrolled diesel agricultural irrigation pump engines that have been replaced with new engines meeting current off-road engine standards or electric motors.

Principal components of the Heavy-Duty Engine Program are the Agricultural Irrigation Pump Engine Component, On-Road Vehicle Component, Off-Road Vehicle Component, Locomotive Component, Marine Vessel Component, Forklift Component, Airport Ground Support equipment, Idle Reduction Component, and Alternative Fuel Infrastructure Component.

7.2.2 REMOVE II Program

The Reduce Motor Vehicle Emissions (REMOVE) Program was the District's first incentive program. It began its first phase in 1992. The District has developed a new, enhanced program (REMOVE II) that was approved by the Governing Board in February 2005. REMOVE II reduces emissions from light- and medium-duty motor vehicles in the District. The purpose of this grant program is to assist the District in attaining air quality standards. This is accomplished by allocating funds to cost-effective projects that have the greatest motor vehicle emission reductions, thereby creating long-term air quality benefits for the San Joaquin Valley. All projects must have a direct air quality benefit to the District. Any portion of a project that does not directly benefit the District within its boundaries is not allowed for funding or in calculating emission reductions.

Principal components of the REMOVE II Program are the Light- and Medium-Duty Vehicle Component, the E-Mobility (Telecommunications) Component, the Bicycle Infrastructure Component, the Public Transportation and Commuter Vanpool Subsidy Component, Accelerated Vehicle Retirement Component and the Alternative Fuel Vehicle Mechanic Training Component.

7.2.3 Light and Medium-Duty Vehicle Incentive Program

In 2002, the District completed a highly successful Light and Medium-Duty Vehicle Incentive Program. The program provided incentives for the purchase of low-emission passenger vehicles, light trucks, small buses, and trucks less than 14,000 pounds gross vehicle weight. The purpose of the program was to encourage the early introduction of low-emission vehicles in the District. The program paid between $1,000 and $3,000 per vehicle depending on the emission certification level and size of the vehicle. Vehicles were required to be powered by alternative fuel, electricity, or hybrid electric engines/motors. Emission reductions from vehicles purchased under this program were claimed under ARB's Low Emission Vehicle program. These types of vehicle projects are now funded through the REMOVE II Program.

7.2.4 Electric Lawnmower Incentives

For the last several years, the District has operated an electric lawnmower exchange incentive program known as the Clean Green Yard Machine Program. The District worked with electric lawnmower manufacturers and local equipment dealers to provide large discounts to people who turned in their gasoline-powered mowers in exchange for electric or push-type lawn mowers. For 2004, District funding provided discount coupons for electric and push-type lawn mowers and 327 mowers were sold in 2004 under the coupon program. In 2005, the District sold 595 electric lawn mowers to District residents who traded-in their old gas-powered mowers. In 2006, the District increased the program and sold 798 electric mowers over the course of five events. This is an example of a new program that will likely be continued in coming years if funding is available.

7.3 EXISTING FUNDING SOURCES IN THE SAN JOAQUIN VALLEY

Current programs use a combination of state and local funds, including ARB's Carl Moyer Program, the District's Department of Motor Vehicles Surcharge Fees (DMV Fees), Indirect Source Review (ISR) fees and Voluntary Developer Mitigation Contract (DMC) fees, as shown in Table 7-1. The District has achieved significant, cost-effective emission reductions from a variety of grant programs and will seek funding for cost-effective programs from all potential sources. Emission reductions claimed for this plan are based on funding already committed, as shown in the table below. The mix of locally generated funding, state funding, and federal funding will vary.

7-1 Existing Funding Sources

Source	Estimated Annual Available Funding*
DMV Surcharge Fees	$11 Million
Moyer Funds	$9.5 Million
ISR/DMC Funds	$19.5 Million
Total	**$40 Million**

* The total available funding can potentially be reduced by approximately $15 million per year beginning in 2016 unless reauthorizations are granted for the Moyer Program and $2 DMV Surcharge Fee (AB 923) funds.

Calculating the reductions expected from incentive programs involves several steps and assumptions. First, although the project life for each project is expected to be ten years, the District conservatively calculates reductions for the first three years of the project under the assumption that if the equipment hadn't been replaced under the grant, then after three years, the old equipment would have been replaced under natural fleet turnover. Therefore, grant funds awarded in 2007 are expected to achieve surplus reductions in 2007, 2008, and 2009. Also, to calculate the total reductions being achieved by incentive programs in 2009, for example, the reductions from funds distributed in 2009, 2008, and 2007 are considered. Second, the cost effectiveness (cost per ton of reductions) for District incentive programs in 2007 is $14,000 per ton. The cost per ton increases over time due to inflation, so the District assumes a 6% increase in cost effectiveness each year. Third, the total secured incentive funding decreases with the expiration of Moyer and part of the total DMV fees in 2015, unless these programs are re-authorized by the California Legislature. The total NOx reductions achieved by incentive programs with secured funding in key years are shown in Table 7-2.

Table 7-2 NOx Reductions Achieved by District Incentive Measures with Assured Funding [1]

Year	NOx reductions (tpd)
2012	1.4
2020	0.7
2023	0.6

[1] Reductions achieved with Moyer incentives are not included in the reductions listed here since ARB takes credit for these reductions in Table B-2.

7.3.1 DMV Surcharge Fees

State law provides air districts that are designated as state non-attainment for a pollutant emitted by motor vehicles to receive revenues from motor vehicle surcharge fees collected and disbursed by the State Department of Motor Vehicles. Legislation (AB 2766) was enacted in 1990 to enable air districts to receive up to a $4 surcharge per vehicle on motor vehicle registration fees. These fees provide air districts with funds to meet their responsibilities mandated under the California Clean Air Act (CCAA) without raising fees on stationary sources. The California Health and Safety Code states that these motor vehicle surcharge fees shall be used to support air district-operated planning, monitoring, enforcement, and technical studies necessary to implement the CCAA, including incentive programs that reduce motor vehicle emissions.

Additional legislation (SB 709) was enacted in 2003 allowing the District to receive an additional $1 surcharge per motor vehicle. The funds generated by this surcharge may only be used to reduce emissions from vehicular sources, including, but not limited to the establishment of a clean fuels program and the adoption and implementation of motor vehicle use reduction measures. The District may utilize up to 2 percent of the funds received for administrative expenses.

In 2004, air districts were allowed to adopt an additional $2 motor vehicle surcharge fee (AB 923). The funds generated by this additional surcharge may be used only to reduce emissions from certain motor vehicle and agriculture sources, including Carl Moyer Program projects, and for the new purchase, retrofit, repower, or add-on equipment for previously unregulated agricultural sources, school buses, and an accelerated vehicle retirement or repair program. The District may utilize up to 5 percent of the funds received for incentive program administrative expenses. This additional surcharge will remain in effect only until January 1, 2015, unless re-authorized by the California Legislature.

It is estimated that approximately $11 million per year will be available for incentive grants from District DMV fees.

7.3.2 Carl Moyer Memorial Air Quality Standards Attainment Program

The Carl Moyer Memorial Air Quality Standards Attainment Program (Moyer Program) is a grant program, implemented by a partnership of the ARB and local air districts, which funds the incremental cost of cleaner-than-required engines, equipment, and other sources of pollution. Eligible project types include on-road heavy-duty vehicles, idle reduction technologies, off-road diesel equipment, transportation refrigeration units, off-road spark-ignited equipment, marine vessels, locomotives, and agricultural engines. Legislative changes enacted in 2004 provide increased and continued funding for the Moyer Program through 2015, unless re-authorized by the California Legislature.

It is estimated that approximately $9.5 million per year will be available to the District for incentive grants from Moyer Program funds.

7.3.3 Indirect Source Review and Voluntary Developer Mitigation Contract Funds

The District's ISR Rule was developed to achieve a number of goals, including the reduction of NOx and PM emissions from new development projects. The rule requires a certain amount of emission reductions from each development project, which can be achieved by utilizing one of several approaches. Paying a fee to fund projects that will reduce emissions off-site is an option for rule compliance. Funds from this option will be used for NOx and PM emission reduction projects through the District's incentive programs. Additionally, funds are also derived from developer mitigation contracts in which certain developers choose to mitigate 100% of the emissions from their development projects. These fees are then used to fund emission reduction projects through the District's incentive programs.

For the purpose of this analysis, it is estimated that approximately $19.5 million per year will be available for incentive grants from ISR and DMC fees.

7.4 POTENTIAL SOURCES FOR ADDITIONAL STATE AND FEDERAL FUNDING

Current state and local funds available to the San Joaquin Valley for incentive-based programs in the District are approximately $40 million per year. The primary sources for these funds are the expected revenues from the District's Indirect Source Review rule, voluntary development mitigation agreements, local DMV surcharge fees, and the state's Carl Moyer program. Additionally, the San Joaquin Valley receives funding that can be utilized for air quality projects that is allocated by agencies other than the District.

The federal transportation funding program provides Congestion Mitigation and Air Quality (CMAQ) funds to non-attainment areas to fund transportation projects that improve air quality. These funds are allocated by the eight county level Metropolitan Planning Organizations (MPOs) in the Valley. While the draft guidance for the allocation of CMAQ funding provides a renewed focus on cost-effective emissions reduction projects, transportation agencies often weigh other criteria, such as congestion relief, when allocating CMAQ funds.

The federal farm bill provides air quality funding through the Environmental Quality Incentives Program (EQIP). EQIP funds are distributed by the Natural Resource Conservation Service (NRCS). San Joaquin Valley agriculture receives approximately $5.5 million per year in EQIP funding. These funds can be utilized for dust control activities and to reduce emissions from agricultural engines. Historically, approximately $1.15 million per year has been utilized to reduce emissions from agricultural engines; however, the program does not require that the funds be utilized for any particular category.

The Environmental Protection Agency (EPA) administers funding from the Diesel Emissions Reduction Account (DERA) to fund projects that reduce emissions from diesel engines. The DERA program is a national program that has been authorized, but never fully funded, at $200 million per year. To date, the San Joaquin Valley has received approximately $700,000 in DERA funding.

7.5 ENHANCING SIP CREDITABILITY OF INCENTIVE BASED EMISSION REDUCTIONS

7.5.1 Introduction

Air quality management agencies use a number of tools to improve air quality, including rules and regulations, alternative compliance, and incentives. Incentive programs use contracts with organizations and individuals to provide all or part of the funds needed to carry out projects that reduce air pollutant emissions and improve air quality. These projects usually involve sources outside agencies' regulatory authority and are focused on reductions above and beyond those required by rule or regulation. Current federal policy limits the use of incentive-based reductions emission reductions to meet FCAA goals in air quality plans. Because the District will depend heavily on incentive-based reductions to meet FCAA requirements in future air quality plans, the District is working with the EPA to identify ways to ensure that emission reductions from incentive programs can be used in air quality plans (State Implementation Plans or SIPs) to meet FCAA requirements. When EPA approves the use of incentive-based reductions in air quality plans (alongside reductions from traditional rules and regulations), the reductions are said to be "SIP creditable." However, the use of incentive-based reductions is limited to known existing funding sources under the fiduciary control of the applying agency.

SIP creditable emission reductions from incentives are essential to the District's future SIPs for a number of reasons, including: they are needed for future plans to meet clean air goals; they historically have been a very cost-effective approach to reduce air pollutant emissions; and they will continue to help generate a demand for future incentive projects that in turn will help insure adequate future sources of incentive funding (in other words, people will want to implement incentive projects if they know that the reductions from the projects will improve air quality and help meet FCAA requirements).

7.5.2 Background

As noted in Chapter 1, air quality in the San Joaquin Valley has improved tremendously in recent years, largely due to the effectiveness of the rules and regulations adopted by the District, supplemented by reductions from state and federal rules and regulations. Recent examples of these improvements include a finding from the EPA that the San Joaquin Valley is in attainment of the National Ambient Air Quality Standards (NAAAQS) for PM10 and a dramatic reduction in the number of days exceeding the 1-hour ozone NAAQS from 1990 to 2005. The District's rules and regulations have reduced NOx and VOC emissions from permitted stationary sources by over 50%. Despite this progress, however, the District still doesn't meet health-based standards for two newly implemented NAAQS: 8-hour ozone and PM2.5.

In developing the 8-hour ozone plan, the District is examining current rules and regulations, and exploring new rules and regulations to identify new emission reductions needed to attain the 8-hour ozone NAAQS and meet other requirements of the FCAA. Because emissions from District-regulated sources are already greatly reduced due to prior successful air pollution control rules and regulations implemented by the District, and because the District only has authority to control a fraction of the emissions causing the 8-hour ozone problem, a limited amount of emission reductions will be available from additional rules and regulations on sources under District control for the 8-hour ozone (and PM2.5) plans. Consequently, the District must turn to emission reduction mechanisms that allow it to affect sources traditionally outside of its regulatory control or that lack the financial wherewithal to reduce emissions. One such mechanism is incentive programs. Emission reductions from incentive programs, in order to be used in SIPs, must meet the following EPA criteria: (a) they must be surplus to reductions required by regulations, (b) they must be quantifiable, (c) they must be enforceable, and (d) they must be permanent for the life of the emission reduction project.

As discussed in Section 7.2, the District has a long and successful history of achieving emissions reductions through incentive programs, and has taken some credit in SIPs for a limited portion of those reductions. The increased importance of incentives in the Valley's emission reduction strategy for meeting FCAA requirements for 8-hour ozone means that the District will need to change certain aspects of how it operates its incentive program in order to be able to maximize the incentive-based emission reductions used to meet federal requirements in SIPs. The District has been working with EPA Region IX since July of 2006 to develop changes to the incentive program that will ensure that all reductions achieved under these program changes will be creditable in SIPs. In August 2006 the District released a Draft Staff Report outlining proposed changes to the incentive program in order to ensure SIP creditability for incentive-based emission reductions. The District plans to use the public comments received during this process to develop the incentive program changes as a separate Governing Board item later in 2007.

The remainder of this section describes mechanisms that will enhance the SIP creditability of emission reductions generated by the District's incentive programs. SIP creditable incentive-based emission reductions can be used alongside rule-based emission reductions to meet FCAA requirements such as demonstrating attainment with the NAAQS at a future date or demonstrating that emission reductions meet reasonable further progress requirements. The mechanisms consist of Protocols, Contracts, and a Tracking/Reporting System. The following sections describe specific commitments that the District will meet for incentive-based reductions that are used to meet federal Clean Air Act requirements. See Appendix Q for a sample resolution with these commitments.

7.5.3 Proposed Changes to Incentive Program Operation

The District's incentive programs already have many elements that contribute to the creditability of emission reductions from the program in SIPs. The changes that are being proposed to enhance the SIP creditability generally deal with increased post-project monitoring, verification of emission reductions and comparison with predicted reductions, real-time reporting of emission reductions with associated preparation of annual reports, and development of program elements such as protocols in a transparent and open process. Specific changes to elements of the District's incentive program are described below.

1. Protocols

   Since 1992, the District has developed and refined specific protocols and procedures for the incentive programs, including procedures for contracting, auditing and enforcement of emission reduction projects. Protocols are the detailed processes that District staff use to calculate emission reductions from incentive-funded air pollution control projects. These protocols have been developed in accordance with all regulatory requirements governing the specific sources of funds used in the incentive programs (e.g., the Carl Moyer Program). See Appendix Q for links to ARB websites that describe established protocols and for examples of the types of calculations used in protocols.

Under the proposed changes to the District's incentive programs, District staff will develop new protocols in an open public process that will provide opportunity for public comment, and these protocols will help ensure that the reductions are SIP creditable. This open public process will include the issuance of a draft protocol, holding at least one workshop on the draft protocol, revising the protocol as needed based on public comment, and adopting the protocol at a duly noticed public hearing of the District Governing Board.

Projects that are being funded with Moyer Program funds will be evaluated according to the existing Moyer Program Guidelines. Emission reductions stemming from incentive contracts awarded in accordance with the Moyer Program Guidelines generally meet the SIP creditability criteria, and no new District protocols will be established for Moyer Program projects. At its discretion the District will use Moyer Program Guidelines to calculate creditable emission reductions for incentive projects funded by other than Moyer Program incentive funds. However, District protocols are needed for other funding sources including DMV surcharge fees, Indirect Source Review fees and Developer Mitigation Contract funds, unless the District chooses to use Moyer for these.

By following the protocols, District staff will be able to quantify the applicable emission reductions, demonstrate the permanency of the reductions for the life of the emission reduction project, and demonstrate that emission reductions from particular types of projects or source categories are surplus (including a description of the process used to determine reductions are surplus).

The proposed changes to District incentive program operation will include protocol development according to the following process:

a. District staff will develop a draft protocol that will be published for stakeholder and ARB comment.
b. District staff will transmit each draft protocol to EPA Region IX staff for review and comment.
c. District staff will summarize and address ARB, EPA and public comments. The comments and responses will be a part of the Governing Board package for the proposed protocol submitted to the Board for consideration for adoption. District staff will not present a draft protocol for approval if EPA expresses objections to the protocol.

The District will update any board-adopted protocol on a regular basis to take into account new SIP provisions, new emission standards and new emission factors in order to ensure surplus reductions and to improve the accuracy of the quantified reductions.

2. Contracts, Audits & Enforcement

The District has developed contract templates for a variety of emission reduction project types. Each contract template includes a detailed description of the project, specific obligations of the District and the participant including auditing procedures, non-compliance penalties, actions that the grantee must take to achieve the reductions, reporting and record keeping.

District staff has developed procedures for the administration of the incentive programs to ensure that the reductions from the projects are quantifiable, surplus, permanent for the life of the project, and enforceable.

Currently, the District verifies that a given funded incentive-based emission reduction project is operational, but does not routinely conduct post-operational inspections to verify that the operational parameters used to calculate the anticipated reductions are being realized for the project.

Under the proposed changes to incentive program operations, the District would conduct periodic inspections of all funded incentive-based emission reduction projects, and use the information gathered in conjunction with the annual report that the District requires from each applicant to make sure that operational parameters used to calculate incentive-based emission reductions used in one or more SIPs are being achieved.

It is important to note that many of the units that will be receiving incentive funding from the District may be permitted or registered through the District, and as such, will be included in the District's inspection and monitoring program.

When non-compliance is documented, notices of violation (NOVs) or notices to comply (NTCs) are issued, per District policy. The District has an existing enforcement program, including an established mutual settlement program that levies fines for NOVs based on the nature, magnitude, and reoccurring nature of infractions. Non-compliance issues that cannot be resolved through the mutual settlement program will be transferred to the District's Legal Department for final disposition.

For projects that do not fall under a District permit or registration requirement, the protocols that are developed will include source-type-specific monitoring, record keeping, and reporting requirements that will ensure that the anticipated incentive-based reductions are successfully and consistently achieved, with much the same approach as taken with registered or permitted equipment. Inspections will be conducted, reports will be completed, civil action will be taken if needed for non-compliance, and summaries of compliance reports will be included with the annual report.

The District would investigate any emission reduction shortfalls that are identified (i.e., actual emission reductions are less than predicted emission reductions) to determine if the shortfall is due to a violation of the terms of the contract on the part of the applicant or due to factors outside of the contract. If contractual factors are the primary cause, the District will use existing legal avenues to correct the problem. If the shortfall is caused by factors outside of the contract, then the District will identify the cause and re-compute anticipated emission reductions. In either case, the District will meet any emission reduction shortfalls remaining after this investigation through mechanisms such as funding more emission reduction incentive projects or adopting rules and regulations.

3. Tracking & Reporting

The District will develop a Project Tracking System that will allow calculation of actual emission reductions based on field data collected during field inspections and from the required annual report, as well as from other sources. The system would be linked to the District's web site to achieve real-time reporting of actual versus predicted emission reductions from categories of incentive projects, as well as a running total of actual versus predicted reductions.

In addition to the real-time reporting of incentive-based emission reductions, the District commits to preparing an annual report on its incentive programs. Major elements of the report include the following:

- Sources of funding
- Expenditures
- Types of projects funded
- Actual versus predicted emission reductions
- Enforcement activities
    - Number and type of inspections conducted on grantees
    - Number of all grantees for whom there is evidence of non-compliance
    - List of enforcement actions taken by the District and the resultant penalties and remedies
- Description of the permanency of the funding sources and ideas for amending the program in the event of reduced funding

If an annual report indicates a shortfall of emission reductions, the District will revise any air quality plan(s) dependent on those reductions to meet requirements and will submit an amended plan to EPA within 12 months of the date of the hearing on the annual report. This plan amendment will have the changes necessary to assure compliance with all applicable FCAA requirements. These changes may include additional regulatory measures or enhanced funding to generate the necessary reductions in the timeline necessary to meet FCAA requirements. As noted in Chapter 5, the annual report on incentives will be part of a larger District annual report on fulfilling Ozone Plan and Particulate Matter Plan commitments.

7.5.4 Conclusions and Next Steps

SIP creditability of emission reductions from incentive programs is critically important for the District to meet FCAA requirements for 8-hour ozone and PM2.5. Historically, incentive-based emission reductions have been a cost-effective way to improve air quality in the San Joaquin Valley.

The District's incentive programs already contain many elements that contribute to the SIP creditability of emission reductions. The changes that are being proposed to enhance the SIP creditability of the District's incentive programs generally deal with increased post-project monitoring, verification of emission reductions and comparison with predicted reductions, real-time reporting of emission reductions with associated preparation of annual reports, and development of program elements such as protocols in a transparent and open public process.

The following sections are provided for information only and are not intended for inclusion in the SIP.

7.6 DISTRICT ACTION PLAN FOR EXISTING AND FUTURE INCENTIVE FUNDS

The District operates incentive programs to assist in attaining air quality standards by providing financial incentives for the early introduction of new technologies and the promotion of alternative transportation measures. Additional significant financial resources from the state and federal governments will be needed to achieve the necessary emission reductions. Existing funding sources will be allocated to the most cost-effective measures in order to maximize the emission reductions per dollar spent. For all incentive-based emission reductions used to meet federal Clean Air Act requirements, the District will take the actions necessary to ensure that reductions are quantifiable, enforceable, and surplus to reductions attributed to the regulatory programs contained in the SIP. To assure SIP creditability, disbursement of the funds would be based on protocols agreed to between ARB, EPA, and the District. The Carl Moyer Program Guidelines will be used as a model for new District Governing Board approved protocols for calculating SIP creditable reductions.

As noted in the previous sections, the District will develop future incentive program protocols through a public process. During this process, EPA will have the opportunity to review and approve the proposed protocols. The District Governing Board will then approve the proposed protocols.

The District will track actual emission reductions from incentive-based programs on an ongoing basis with annual reports to the public, EPA, and the Governing Board. At a minimum, the annual reports will describe the amount of public funds spent, verify the amount of actual emission reductions versus predicted reductions, discuss any quantification or surplus issues that have arisen during the reporting period and how they were resolved, and include or reference publicly available electronic information or records for each grant issued.

The District will also ensure that the emission reductions are permanent and enforceable through pre and post project inspections and ongoing monitoring and record keeping.

7.6.1 Potential Incentive Measures

The following potential incentive measures are being recommended for obtaining the maximum amount of cost-effective emission reductions utilizing existing and additional future state and federal funding sources. The potential incentive measures identify potential emission reductions and the costs associated with realizing those reductions. Each analysis will contain a detailed discussion of the source category for which an Incentive Control Measure is being recommended. These discussions will include information on upcoming regulations, which may impact the availability of surplus reductions, possible control techniques, the associated emission inventory for each source category, as well as potential emission reductions, possible emission reduction strategies and, finally, recommendations. A description of each of the individual Incentive Control Measure section headings, and terms in these sections follows:

Source Category: This section describes in detail the specific targeted sources of emissions. Each source category is comprised of a group or groups of similar emission sources, such as agricultural internal combustion engines or school buses.

Upcoming Regulations: This section discusses any upcoming local, state or federal regulations, which may impact the availability of surplus reductions or the feasibility of certain control techniques for each source category.

- Surplus Reductions: In general, surplus reductions are the emission reductions achieved from the baseline emission rate that exceed the reductions claimed by other entities through rules, regulations, permits, and emission reduction credit programs.

Control Techniques: This section describes the specific methods for controlling emissions from a particular source category.

Emission Inventory and Possible Emission Reductions with no Constraints: This section describes the total emission inventory, by pollutant, for each source category. The emission inventory and associated emission projections was developed jointly by ARB and air districts. The analyses contain the latest emission inventory information that is currently available. If new information becomes available, the emissions inventory section will be updated to reflect these changes. The Potential Emission Reduction Assuming No Financial, Technological, or Logistical Constraints tables for NOx and VOC show the following:

- Projected Inventory with no Incentives: The current ARB and District developed inventory for the source category, assuming no new incentive programs or regulations.

- No Constraints Inventory: The emission inventory if every imaginable control, including those that are not feasible due to financial, technological, or logistical constraints, were implemented.

- No Constraints Reductions: The emission reductions if every imaginable control, including those that are not feasible due to financial, technological, or logistical constraints, ere implemented. These reductions include surplus and non-surplus emission reductions.

Possible Strategies (Scenarios): This section describes and discusses a variety of strategies to control emissions from a particular source category. These scenarios include consideration of financial, technological, and logistical constraints. Generally, several strategies or scenarios are presented and discussed in this section.

Recommendation: This section discusses which of the possible strategies is being recommended by District staff based on feasibility, potential emission reductions and considering all financial, technological and logistical constraints.

Recommended Strategy: This table provides details about the strategy or strategies that are being recommended by District staff, including: the total project cost, grant recipient match, total incentive funds needed, existing available funding and the amount of new funding that would be necessary to implement the recommended strategy. Each specific line item in this table is defined below:

- **Total Project Cost:** This figure represents the total cost to implement the recommended strategy (District Funding + Grant Recipient Match)
- **Grant Recipient Match (percent):** This figure represents the percentage of the total cost of the recommended strategy that would be contributed by the grant recipient, or the total out-of-pocket cost.
- **Grant Recipient Match (Cost):** This figure represents the total cost of the recommended strategy that would be contributed by the grant recipient, or the total out-of-pocket cost.
- **Total Incentive Funds Needed (Cost):** This figure represents the total project cost minus the grant recipient match cost.
- **Existing Available Funding:** This figure represents the amount of existing grant funding that the District can commit to the total project cost.
- **New Funding Required:** This figure represents the current or expected funding shortfall after subtracting the Existing Available Funding and Grant Recipient Match from the Total Project Cost.

On-Road Heavy-Heavy Duty Diesel Trucks (M-TRAN-3)

Source Category:
This category includes all on-road heavy-heavy duty diesel trucks with a gross vehicle rate rating of 33,001 pounds or greater. According to ARB estimates, approximately 67,309 of these trucks operate within the San Joaquin Valley and according to ARB, over 28% of the statewide vehicle miles traveled by these trucks occur within the San Joaquin Valley. By 2020, the vehicle miles traveled is expected to increase by approximately 50% with the number of heavy-duty trucks operating in the San Joaquin Valley increasing to approximately 80,042 vehicles.

Heavy-heavy duty diesel trucks are grouped into categories according to their certified engine emission rating, which refers to a model year group. Currently, there are eight model year groups: pre-1987, 1987-1990, 1991-1993, 1994-1997, 1998-2002, 2003-2006, and 2010 and newer.

POPULATION BY MODEL YEAR GROUPS AT CRITICAL YEARS						
MODEL YEAR GROUP	POPULATION					
	2008	2010	2012	2017	2020	2023
pre-1987	7,087	5,320	3,975	1,729	986	562
1987-1990	7,607	6,028	4,519	2,007	1,217	712
1991-1993	5,834	5,110	4,122	1,886	1,129	692
1994-1997	14,215	13,056	11,500	6,457	3,814	2,254
1998-2002	16,569	16,972	16,375	11,620	8,013	4,947
2003-2006	9,646	10,254	10,699	9,942	7,939	5,892
2007-2009	5,339	8,540	8,832	9,162	8,324	6,695
2010+	0	3,233	10,730	33,726	48,620	61,963
Total	**66,297**	**68,513**	**70,751**	**76,509**	**80,042**	**83,716**

Upcoming Regulations:
ARB has already adopted several Fleet Rules regulating various industries and is currently working on regulations pertaining to on-road heavy-duty diesel trucks. Additional regulations are under development to reduce diesel particulate matter (PM) and other emissions from private fleets of in-use heavy-duty diesel powered trucks operated in California. ARB is in the information-gathering phase for this regulation and conducted its first set of workshops for this measure in April of 2006.

ARB also operates the Heavy-Duty Diesel In-Use Strategies Program, which develops and implements strategies to significantly reduce emissions from all existing on- and off-road diesel engines. However, their program emphasizes the reduction of diesel particulate emissions.

The current emission standard for 2007 trucks is 3.67 grams per mile and will drop to 0.67 grams per mile in 2010. However, no further decreases in truck emission levels are projected. In analyzing various scenarios, engine deterioration rates must be factored into all scenarios to show realistic adjustments.

Control Techniques:
Various options for controlling emissions are listed below:

1. Accelerated Fleet Turnover by replacing older trucks with new trucks, which utilize the cleanest technology available.

2. Retrofitting of trucks through the installation of a retrofit device that reduce one or more pollutants.

3. Engine Repower by replacing the truck engines with new or newer engines.

Emission Inventory and Possible Emission Reductions with no Constraints:
Replace 100% of heavy-duty trucks as soon as the newest technology becomes available. The total cost to replace these 134,467 trucks is approximately $17,953,340,337. Regulated vehicles were removed from the baseline inventory for this analysis.

Potential NOx Emission Reductions Assuming No Financial, Technological, or Logistical Constraints (Tons Per Day)

	2008	2010	2012	2020	2023
Projected Inventory with no Incentives	237.26	213.20	184.13	96.11	81.82
No Constraints Inventory	124.72	37.34	45.21	62.98	65.82
No Constraints Reductions	112.54	175.86	138.92	33.13	15.99

Potential VOC Emission Reductions Assuming No Financial, Technological, or Logistical Constraints (Tons Per Day)

	2008	2010	2012	2020	2023
Projected Inventory with no Incentives	17.08	15.61	13.97	8.36	7.34
No Constraints Inventory	5.56	4.08	4.85	6.18	6.31
No Constraints Reductions	11.52	11.53	9.12	2.18	1.03

Possible Strategies:
Although older trucks have higher emissions, in terms of grams per mile, they are driven less, therefore have less overall emissions. An optimal scenario must identify a group of trucks that can achieve meaningful emission reductions early, while leaving sufficient resources for eventual replacement of trucks with the cleanest control technology, which

will be available in 2010. Here are the emissions in key years per truck model year groups.

NOX EMISSIONS INVENTORY TABLE

	2008		2010		2012		2015		2020	
	# of Trucks	Emissions (tons/day)	# of Trucks	Emissions (tons/day)	# of Trucks	Emissions (tons/day)	# of Trucks	Emissions (tons/day)	# of Trucks	Emissions (tons/day)
pre-1987	7,087	7.83	5,320	4.84	3,975	2.95	2,472	1.36	986	0.39
1987-1990	7,607	15.57	6,028	10.83	4,519	7.09	2,722	3.31	1,217	0.81
1991-1993	5,834	17.89	5,110	13.66	4,122	9.72	2,700	5.24	1,129	1.4
1994-1997	14,215	57.93	13,056	45.6	11,500	34.8	8,566	21.41	3,814	6.84
1998-2002	16,569	94.28	16,972	83.9	16,375	69.71	13,807	47.05	8,013	19.78
2003-2006	9,646	33.7	10,254	34.76	10,699	33.39	10,733	27.91	7,939	14.67
2007-2009	5,339	10.04	8,540	19.37	8,832	13.18	9,184	19.07	8,324	8.82
2010+	0	0	3,233	1.81	10,730	0	24,069	18.02	48,620	38.93

VOC EMISSIONS INVENTORY TABLE

	2008		2010		2012		2015		2020	
	# of Trucks	Emissions (tons/day)	# of Trucks	Emissions (tons/day)	# of Trucks	Emissions (tons/day)	# of Trucks	Emissions (tons/day)	# of Trucks	Emissions (tons/day)
pre-1987	7,087	1.51	5,320	0.98	3,975	0.63	2,472	0.32	986	0.1
1987-1990	7,607	2.53	6,028	1.81	4,519	1.21	2,722	0.58	1,217	0.15
1991-1993	5,834	1.35	5,110	1.07	4,122	0.79	2,700	0.44	1,129	0.13
1994-1997	14,215	4.11	13,056	3.4	11,500	2.7	8,566	1.74	3,814	0.58
1998-2002	16,569	5.49	16,972	5.31	16,375	4.7	13,807	3.39	8,013	1.52
2003-2006	9,646	1.55	10,254	1.86	10,699	1.99	10,733	1.84	7,939	1.06
2007-2009	5,339	0.45	8,540	0.91	8,832	1.15	9,184	1.29	8,324	0.99
2010+	0	0	3,233	0.19	10,730	0.75	24,069	1.85	48,620	3.81

Scenario 1: All heavy-duty trucks are immediately replaced with the cleanest technology available

The table below shows the affect that this type of incentive program would have on the expected NOx emissions in the 2008, 2012, 2020, and 2023 inventory years.

Tons NOx Per Day – Summer Season

Scenario 1	2008	2010	2012	2017	2020	2023
Baseline	237.26	213.20	184.13	120.98	96.11	81.82
Adjusted Baseline	124.72	37.74	45.21	58.69	62.98	65.82
Reductions from Baseline	112.54	175.85	138.92	62.29	33.13	15.99

Tons VOC Per Day – Summer Season

Scenario 1	2008	2010	2012	2017	2020	2023
Baseline	17.08	15.61	13.97	10.05	8.36	7.34
Adjusted Baseline	5.56	4.08	4.85	5.93	6.18	6.37
Reductions from Baseline	11.52	11.53	9.12	4.11	2.18	1.03

Scenario 1	Total Estimated Cost	Vehicles Replaced
Replace 100% of trucks are replaced as the cleanest technology becomes available	**$17,953,340,337**	**134,467**

Advantages:

- Early reductions in emissions, beginning in 2008
- Significant NOx reductions

Disadvantages:

- Manufacturing constraints
- Excessive costs
- Access to trucks may be limited due to trucks registered outside of the District

Scenario 2: Engine Repower (table not included)

Advantages:
- More cost-effective incentive option

Disadvantages:
- Emission reductions are not lasting
- Engine repower is expensive and does not maximize emission reductions
- Money invested in trucks may exceed the value of the truck

Scenario 3: Truck Retrofit Devices (table not included)

Advantages:
- Most cost-effective incentive option

Disadvantages:
- Disinterest by the public in installing retrofit devices
- Retrofits also require expensive maintenance
- Retrofits may impose a fuel penalty

Scenario 4: Replace 75% of 1991-1993 model year trucks in 2008 and 2009 (approximately 3,000 trucks per year) and require a 50% funding match from grant recipient

Tons NOx Per Day – Summer Season

Scenario 4	2008	2010	2012	2015	2017	2020	2023
Baseline	237.26	213.20	184.13	143.46	120.98	96.11	81.82
Adjusted Baseline	233.21	209.16	181.23	142.32	120.68	95.96	81.38
Reductions from Baseline	4.05	4.04	2.90	1.14	0.3	0.15	0.44

Tons VOC Per Day – Summer Season

Scenario 4	2008	2010	2012	2015	2017	2020	2023
Baseline	17.08	15.61	13.97	11.49	10.05	8.36	7.34
Adjusted Baseline	16.60	15.08	13.56	11.27	9.91	8.27	7.24
Reductions from Baseline	0.47	0.53	0.41	0.22	0.13	0.09	0.09

As shown above, this scenario will result in early emission reductions in 2008 and 2009, while leaving most of the funding available for use in later years when the cleanest technology will be available.

Scenario 4	Total Estimated Cost	Trucks Replaced
Replace 75% of 1991-1993	$456,704,988	3,468

model year trucks between 2008 and 2009		

Advantages:
- Early reductions
- Maximizes cost-effectiveness

Disadvantages:
- Initial costs may be high

Scenario 5: In addition to Scenario 4, beginning in 2010, each year replace 10% of the remaining pre-2007 truck fleet that are at least 3 years from replacement and require a 50% match from grant recipients

Tons NOx Per Day – Summer Season

Scenario 5	2008	2010	2012	2015	2017	2020	2023
Baseline	237.26	213.20	184.13	143.46	120.98	96.11	81.82
Adjusted Baseline	233.21	193.70	148.13	104.39	86.37	72.37	70.04
Reductions from Baseline	4.05	19.50	36.00	39.07	34.61	23.74	11.77

Tons VOC Per Day – Summer Season

Scenario 5	2008	2010	2012	2015	2017	2020	2023
Baseline	17.08	15.61	13.97	11.49	10.05	8.36	7.34
Adjusted Baseline	16.60	14.03	11.27	8.59	7.47	6.64	6.48
Reductions from Baseline	0.47	1.58	2.70	2.90	2.58	1.72	0.86

As shown above, this scenario results in reductions beginning in 2010 and continuing through 2023. The estimated total cost involved with this incentive option is highlighted in the table below.

Scenario 5	Total Estimated Cost	Trucks Replaced
Beginning in 2010 replace 10% of the remaining pre-2007 fleet annually, at least 3 years from replacement	$4,174,781,627	28,089

Advantages:
- Cost-effectiveness is retained by focusing only on pre-2007 trucks
- Increased NOx emission reductions are achieved throughout 2010 to 2023

Disadvantages:

- No effect on 2008 and 2012 NOx emission inventories
- 100% participation in 2020 unlikely

Recommendation:
Replace 75% of 1991-1993 model year trucks requiring a 50% match, in 2008 and 2009 (approximately 3,000 trucks per year) and beginning in 2010, each year replace 10% of the remaining pre-2007 truck fleet that are at least 3 years from replacement requiring a 50% match.

Recommended Strategy	
Total Project Cost	$4,174,781,627
Grant Recipient Match (Percent)	50%
Grant Recipient Match (Cost)	$2,087,390,813
Total Incentive Funds Needed (Cost)	$2,087,390,813
Existing Available Funding	$328,338,180
New Funding Required	**$1,759,052,634**

Passenger and Medium Duty Vehicles (M-TRAN-7)

Source Category:
This group includes passenger cars, vans, pick-up trucks, and other trucks less than 8,500 pounds gross vehicle weight. In 2006, this included approximately 1,042,718 passenger vehicles (vehicles less than 3,750 pounds, such as a sedans); 293,572 light-light duty trucks (trucks less than 3,750 pounds, such as small single cab pick-up trucks); 488,116 light-duty trucks (trucks 3,751-5,750 pounds, such as double cab pick-up trucks); and 278,918 medium-duty vehicles (trucks 5,751-8,500 pounds, such as very large heavy duty trucks and large sport utility vehicles).

Out of these approximately 2 million vehicles, approximately 43,000 are classified as gross polluters. A gross polluter is a vehicle that fails a California smog test and is found to emit 50% more CO, VOC, and/or NOx than the California standards for a vehicle of that age. In 2006, gross polluters and cars manufactured before 1986 traveled a total of over 26,255,000 miles in the San Joaquin Valley.

Upcoming Regulations:
ARB has implemented several regulations to reduce emissions from vehicles. From 1994-2003, ARB adopted low emitting vehicle (LEV) standards that required specific percentages of vehicles manufactured or the average emissions from all vehicles manufactured by a company to meet specific emission standards. Due to these standards, the average LEV I vehicle emits about 98% less smog forming hydrocarbons during its lifetime than a 1965 vehicle.

ARB has created regulations/advisories to set new standards (LEV II, Ultra Low Emission Vehicle (ULEV), Super Ultra Low Emission Vehicle (SULEV), Partial Zero Emission Vehicle (PZEV), Advanced Technology Partial Zero Emission Vehicle (AT-PZEV), and Zero Emission Vehicle (ZEV)) to reduce the maximum emission limits for new vehicles; increase the time that manufacturers must design the new vehicles to comply with these standards (durability); tighten and expand the applicability of average emission limits for commercial fleets and for vehicle manufacturers; and expand the applicability of the LEV II standards to include over 90% of the sport utility vehicles, virtually all pickup trucks, and most mini-vans. The average LEV II vehicle manufactured in 2008 emits 80% less smog forming hydrocarbons during its life than a comparable 1998 LEV I vehicle.

Currently, the majority of vehicles manufactured in the United States are at a LEV II or cleaner standard. Therefore, older vehicles are naturally being replaced with cleaner vehicles. Approximately 25% of the new vehicles are at a straight LEV II standard, 65% meet the ULEV standard, and 10% are at a standard more stringent than the ULEV standard. Approximately 8% reduction in NOx and 6% reduction in VOC emissions per year are expected from natural turnover of vehicles in the next year (2007-2008), decreasing slightly each year thereafter. In 2020, approximately 7% reduction in NOx and 3% reduction in VOC emissions per year are expected from natural turnover of vehicles. In 2023, approximately 10% reduction in NOx and over 10% reduction in VOC emissions per year are expected from natural turnover of vehicles due to advances in technology. The emission limits for vehicles have consistently decreased over the years. It is expected that these limits, thus the emission limits for gross polluters, will continue to decrease due to the California Air Resources Board (ARB) regulations.

Control Techniques:
There are several options for the control of emissions from passenger and medium-duty vehicles.

1. Since, in many cases, the repairs required to minimize emissions from gross polluting vehicles exceeds the cost limits of the California Smog Check Program, many of these vehicles are not repaired to the maximum extent. The District could fund the difference between the maximum cost limit of the Smog Check Program and the cost of the repairs necessary to minimize emissions from these vehicles.

2. Since there are various emission standards (pre-LEV I, LEV I, LEV II, ULEV, SULEV, PZEV, AT-PZEV, and ZEV), the District could incentivize the replacement of a vehicle (crush and permanently remove from service) with a vehicle that has a cleaner technology.

3. The District could promote alternatives to driving, such as bicycling and carpooling, by incentivizing the installation of bicycle paths and other items that promote bicycle use; incentivizing use of public transportation systems such as buses; incentivizing use of commercial and private vanpools and carpools; and incentivizing the purchase of telecommunication equipment for projects that promote the reduction of vehicle miles traveled, such as video teleconferencing, internet business transactions for public agencies, telework sites and distance learning.

Emission Inventory and Possible Emission Reductions with no Constraints:
If, beginning in 2008, the District replaced every passenger vehicle that did not meet current model year average emission or more stringent standards with a ULEV vehicle the reductions shown in the table below could be achieved. Under this assumption, the District would pay the entire cost of the 1.6 million vehicles at a cost of over $20 billion. This assumes that some vehicles will be replaced more than once, as technology availability increases.

If, beginning in 2008, the District paid the entire cost of replacing every light-light duty truck that did not meet current model year average emission or more stringent standards with a ULEV vehicle, over 270,000 vehicles would be replaced at a cost of over $3 billion. This assumes that some vehicles will be replaced more than once, as technology availability increases.

If, beginning in 2008, the District paid the entire cost of replacing every light duty truck that did not meet current model year average emission or more stringent standards with a ULEV vehicle, over 450,000 vehicles would be replaced at a cost of over $6 billion.

This assumes that some vehicles will be replaced more than once, as technology availability increases.

If, starting in 2008, the District replaced every medium duty truck that did not meet current model year average emission or more stringent standards with a new passenger vehicle that meets the current year standards every year, an average of 5.0 tons per day of VOC and 5.5 tons per day of NOx could be achieved each day from 2008 to 2023. If the District paid the entire cost of the new vehicles, this would result in over 340,000 vehicles being replaced at a cost of over $5 billion. This assumes that some vehicles will be replaced more than once, as technology availability increases.

Incorporating all of the aforementioned controls would achieve VOC reductions of 28.3 tons per day and NOx reductions of 21.38 tons per day. However, it would involve the replacement of over 2.6 million vehicles (assuming some vehicles will be replaced more than once). It also would cost over $34 billion dollars over the next 15 years and require additional car crushing capacity in the District.

Potential NOx Emission Reductions Assuming No Financial, Technological, or Logistical Constraints (Tons Per Day)

	2008	2012	2017	2020	2023
Projected Inventory with no Incentives	49.4	36.9	24.3	19.4	16.1
No Constraints Inventory	28.3	21.9	15.2	12.4	13.3
No Constraints Reductions	21.1	15.0	9.2	7.0	2.8

Potential VOC Emission Reductions Assuming No Financial, Technological, or Logistical Constraints (Tons Per Day)

	2008	2012	2017	2020	2023
Projected Inventory with no Incentives	53.5	42.4	31.1	27	7.4
No Constraints Inventory	34.1	27.39	20.36	17.86	3.9
No Constraints Reductions	19.4	15.01	10.74	9.14	3.5

Possible Strategies:
Alternative transportation options, including carpooling, were not considered feasible measures for the plan. This is due to the inability to accurately quantify these reductions. There are limited methodologies for calculating reductions from any of these options, all of which tend to overestimate reductions. Even using these numbers, the potential reductions from 2008 to 2023 would only total approximately 205 tons from 2008-2023. This comes at a cost of approximately $16,000 per ton reduced. Additionally, there is minimal interest in many of these options. Less than 14% of the grant applications received from the District are from alternative transportation projects, such as commuter subsidies, bicycle infrastructure, and E-mobility. In order to maximize the emission reductions per dollar spent and minimize staff time spent on

measures with minimal emission reductions, these options were not considered reasonable for inclusion in the Ozone Plan.

Repairing vehicles that did not pass Smog Check is not feasible because approximately 7% of these vehicles do not pass smog check the next time they are tested. Therefore it is not feasible to quantify these reductions.

The above scenarios are also not feasible because there are a limited number of vehicles that can be manufactured per year. Not everyone will want to participate in this program, even with 100% funding, some of the vehicles may be collectors' items or have a personal attachment. The cost-effectiveness of replacing some of these vehicles, particularly those less than 5 years old, would greatly exceed the cost-effectiveness of alternative incentive projects.

Finally, the aforementioned reductions are not reasonable because it is not possible to accurately predict public response and participation in the program or future legislations that may enable another entity to claim these reductions.

Scenario 1: Replacement of 10% of the worst polluting vehicles each year

Gross polluters emit the majority of the NOx and VOC emissions from vehicles, but account for less than 20% of the vehicles. Thus a plausible scenario would be to only replace the highest emitters of the gross polluters with LEV II vehicles (limiting it to LEV II instead of current year models or more advanced technology will allow applicants to take advantage of lower priced used vehicles, while still ensuring emission reductions). This would minimize the number of vehicles replaced and ensure that the maximum average reductions per vehicle replaced were achieved. This option recommends replacing 10% of the vehicles each year from 2008 through 2023. The reductions and costs from this option are shown below. The calculations assume a one-year project life because these vehicles would typically undergo smog testing within 1-2 years. Once a vehicle fails the smog check, the Bureau of Automotive Repair (BAR) likely claims the reductions. In order for the District to claim reductions, these vehicles must be identified and removed from use while off-cycle (1 to 2 years prior to their next smog check).

Tons NOx Per Day – Summer Season

Scenario 1	2008	2012	2017	2020	2023
Baseline	49.4	36.9	24.3	19.4	16.1
Adjusted Baseline 10% of the worst polluting vehicles replaced annually	48.6	36.4	23.9	19.3	15.8
Reductions from Baseline	0.8	0.5	0.4	0.1	0.3

Tons VOC Per Day – Summer Season

Scenario 1	2008	2012	2017	2020	2023
Baseline	53.5	42.4	31.1	27	7.4
Adjusted Baseline 10% of the worst polluting vehicles replaced annually	52.4	41.9	31.0	26.6	6.9
Reductions from Baseline	1.2	0.5	0.1	0.4	0.5

As shown above this scenario results in significant reductions in 2008. However, as shown below the total cost is significant.

Scenario 1	Total Estimated Cost	Cost Effectiveness ($/ton of NOx Reduced)
10% of the worst polluting vehicles replaced annually	$54,922,076	$16,735

Scenario 2: Replace between 1% and 2% each year from 2008 to 2020

This scenario considers replacing 5% of the worst polluting model year 1978-2004 vehicles gradually from 2008 through 2020. In the first two years 1% of the gross polluting vehicles are replaced; in the next two years 2% of the gross polluting vehicles are replaced, in the next eight years three percent of the gross polluting vehicles are replaced. This would mean replacing approximately 5,380 vehicles over a twelve year period. This allows manufacturers, venders, and service providers (e.g. crushers) time to gradually expand their capacity to facilitate the replacements. This assumes a one-year project life because these vehicles would typically undergo smog testing within 1-2 years after which the BAR would claim the reductions.

Tons NOx Per Day – Summer Season

Scenario 2	2008	2012	2015	2017	2020	2023
Baseline	49.4	36.9	31.4	24.3	19.4	16.1
Replace 1% to 4% each year between 2008 and 2020	48.6	36.5	31.1	24.2	19.4	15.8
Reductions from Baseline	0.8	0.4	0.3	0.1	0.1	0

Tons VOC Per Day – Summer Season

Scenario 2	2008	2012	2015	2017	2020	2023
Baseline	53.5	42.4	31.3	31.1	27	7.4
Replace 1% to 4% each year between 2008 and 2020	52.4	41.9	31.1	31.0	27	6.9

Reductions from Baseline	1.1	0.54	0.2	0.12	0.1	0

The reductions in this scenario are less than Scenario 1, however the total cost is significantly less.

Scenario 2	Total Estimated Cost	Cost Effectiveness ($/ton of NOx Reduced)
Replace 1% to 4% each year between 2008 and 2020	$38,445,454	$16,735

Scenario 3: Replace between 10% and 25% of the highest emitting vehicles each year from 2008 to 2020- approximately 2,948 vehicles per year

This scenario considers replacing 10% to 25% of the worst polluting model year 1978-2004 vehicles gradually from 2008 through 2020. The percentage of vehicles replaced each year will vary, but the number will be approximately 2,948 vehicles. This allows manufacturers, venders, and service providers (e.g. crushers) to predict the number of vehicles that will be crushed to allow the expansion of their business infrastructure and staffing accordingly.

Tons NOx Per Day – Summer Season

Scenario 3	2008	2012	2015	2017	2020	2023
Baseline	49.4	36.9	31.4	24.3	19.4	16.1
Replace approximately 2,948 vehicles each year between 2008 and 2020	48.41	36.02	30.49	23.47	18.65	16.1
Reductions from Baseline	0.99	0.88	0.91	0.83	0.75	0

Tons VOC Per Day – Summer Season

Scenario 3	2008	2012	2015	2017	2020	2023
Baseline	53.5	42.4	31.3	31.1	27.0	7.4
Replace approximately 2,948 vehicles each year between 2008 and 2020	52.15	41.19	30.05	29.96	25.97	7.4
Reductions from Baseline	1.35	1.21	1.25	1.14	1.03	0

The reductions in this scenario are less than Scenario 1, however the total cost is significantly less.

Scenario 3	Total Estimated Cost	Cost Effectiveness ($/ton of NOx Reduced)

Replace 1% to 4% each year between 2008 and 2020	$176,900,000	$16,735

Recommendation:
Scenario 3 is recommended. This scenario minimizes the number of incentivized vehicles that, due to natural turnover, would not be present in 2020, one of the key attainment years. It also allows industry to predict the number of vehicles crushed each year and have confidence that this volume will continue for over a decade, thus expanding their business to meet the demand. This scenario would be implemented, provided additional funding becomes available. If funding does not become available, the District would proceed with Scenario 2.

Under this scenario, up to $5,000 will be offered to the owners of high-emitting vehicles for the purchase of qualifying clean vehicles. The recipients will be required to enter into legally binding contracts to ensure the purchase and operation of the clean vehicles for a specified period of time. Alternatively, owners of high emitting vehicles may be offered a clean replacement vehicle if a sufficient pool of such vehicles can be created through tax incentives legislation such as SB23 (Cogdill, 2007).

Recommended Strategy	
Total Project Cost	$176,900,000
Grant Recipient Match (Percent)	30%
Grant Recipient Match (Cost)	$53,070,000
Total Incentive Funds Needed (Cost)	$123,830,000
Existing Available Funding	$26,911,818
New Funding Required	**$96,918,182**

Construction and Mining Equipment (M-IND-5)

Source Category:
This source category includes engines in construction and mining equipment.

Upcoming Regulations:
Regulations requiring reformulation of gasoline and diesel will likely change the emission factors, although the current emission inventory, based on the OFFROAD model, reflects implementation of Phase 3 gasoline and current Tier standards, considering natural fleet turnover.

ARB is considering fleet regulations for construction, material handling, cargo handling, port, and rail yard equipment. Based on the current proposal, by 2013 virtually all off-road equipment would be at the highest Tier level technologically feasible. Idling limiting technology is being proposed to minimize idling time (considering natural turnover, regulated turn-over, and idle time reduction requirements). There are a few, small segments of this category that will have until 2015 or 2020 to comply with control technology requirements, however the emissions from these sources with a longer compliance time are less than 0.1 tons per day. In terms of exemption, virtually every person with more than one piece of equipment will be captured in the definition of medium or large fleets proposed by ARB.

Control Techniques:
There are several options for controlling emissions from construction and mining equipment.

1. Retrofit with a diesel exhaust catalyst or selective catalytic converter.

2. Repower (replace the engine with a cleaner engine).

3. Replace the entire equipment with a newer piece of equipment at a cleaner Tier level (e.g. conversion of a Tier 0 to a Tier 3).

Emission Inventory and Possible Emission Reductions with no Constraints:
If every piece of off-road equipment was replaced every year to the cleanest available technology (highest feasible tier), the following reductions could be achieved. It also assumes that, in any category where it is technologically feasible, the engines are electrified and that some pieces of equipment will be replaced multiple times.

Potential NOx Emission Reductions Assuming No Financial, Technological, or Logistical Constraints (Tons Per Day)					
	2008	2012	2017	2020	2023
Projected Inventory with no Incentives	48.1	37.4	24.8	20.0	16.7
No Constraints Inventory	1.9	1.5	1.0	0.8	0.7
No Constraints Reductions	46.2	35.9	23.8	19.2	16.0

Potential VOC Emission Reductions Assuming No Financial, Technological, or Logistical Constraints (Tons Per Day)					
	2008	2012	2017	2020	2023
Projected Inventory with no Incentives	53.5	42.4	31.1	27	7.4
No Constraints Inventory	7.5	5.9	4.4	3.8	1.0
No Constraints Reductions	46.0	36.5	26.7	23.2	6.4

Possible Strategies:
The aforementioned reductions are not feasible because there are not a sufficient number of Tier 4 engines currently manufactured to accomplish this option. Furthermore, there are not enough trained people to perform the engine replacements to accomplish this option. Also, these reductions may not be SIP creditable and ARB's proposed regulations are expected to claim most of the available reductions. Finally, implementation of the aforementioned incentives is contingent upon funds being available. Therefore, it is likely that the reductions from this measures will be less than those listed in the above table.

Retrofits (e.g. oxidative catalysts, low-NOx catalysts, exhaust gas recirculation, particulate filters, oxidation catalysts) were not considered a viable option because there is not a significant benefit for a person to choose to retrofit an existing piece of equipment, even if the retrofit is completely funded. This is due to the fact that the retrofit device will result in higher fuel and maintenance costs for the end user. Furthermore, there are inconveniences associated with anhydrous ammonia or urea to be used as a reductant for the selective catalytic converter in the District.

Conversion of the equipment to electric is not feasible because there has not been a strong market demand for this option. In many cases, electricity is not a viable energy source, particularly for equipment used for extended periods of time or on rough terrain. Most mining equipment and construction equipment, at some point, operates under these conditions.

Conversion to alternative fuels is not highly demanded. This is because alternative fuels tend to have lower energy content per volume, are less readily available, are harder to transport, are more expensive to store, and are more expensive to dispense.

Early replacement of old engines with newer engines is not feasible in many cases. This is due to the fact that the engine compartment in a piece of equipment with a Tier 0 or 1 engine may not be large enough to hold a Tier II, III, or IV engine. In some cases, the labor cost to repower an old engine is more than the cost to purchase a used or new piece of equipment with a cleaner engine. Another consideration is that thousands of dollars can be spent replacing engines in equipment that are worth less than the cost of the repower.

Finally, replacing equipment is typically not an option due to poor cost effectiveness and high costs. The cost of a new boom is around $975,000 and a used bulldozer with an 850 horsepower engine is over $800,000. Thus, less than 25 replacements could exceed the entire District's incentive program budget for 2006-2007.

Possible Strategies:
Scenario 1: Replacement of 20% of the engines starting in 2008 to the newest available, and technologically feasible, at the time of replacement

The table below shows the numbers associated with this option.

Tons NOx Per Day – Summer Season

Scenario 1	2008	2012	2017	2020	2023
Baseline	49.4	36.9	24.3	19.4	16.1
Adjusted Baseline Replace 20% of engines to the cleanest available beginning in 2008	40.5	30.3	19.9	15.9	13.2
Reductions from Baseline	8.9	6.6	4.4	3.5	2.9

Tons VOC Per Day – Summer Season

Scenario 1	2008	2012	2017	2020	2023
Baseline	53.5	42.4	31.1	27	7.4
Adjusted Baseline Replace 20% of engines to the cleanest available beginning in 2008	48.2	38.2	28.0	24.3	6.7
Reductions from Baseline	5.35	4.24	3.11	2.7	0.74

Scenario 1	Total Estimated Cost	Cost Effectiveness ($/ton of NOx Reduced)
Replace 20% of engines to the cleanest available beginning in 2008	$162,355,000	$10,228

Scenario 2: Replacement of 10 compacters, 10 crawler dozers, 10 earth movers, 10 motor graders, and 10 scrapers each year from 2008 to 2023

The table below shows the numbers associated with this option.

Tons NOx Per Day – Summer Season

Scenario 2	2008	2012	2015	2017	2020	2023
Baseline	48.1	37.4	47.8	24.8	20.0	16.7
Replace 10 compacters, 10 crawler dozers, 10 earth movers, 10 motor graders, and 10 scrapers between 2008 and 2023	47.9	36.1	46.2	23.0	18.1	14.9
Reductions from Baseline	0.3	1.3	1.6	1.8	1.8	1.8

Tons VOC Per Day – Summer Season

Scenario 2	2008	2012	2015	2017	2020	2023
Baseline	53.5	42.4	42.2	31.1	27	7.4
Replace 10 compacters, 10 crawler dozers, 10 earth movers, 10 motor graders, and 10 scrapers between 2008 and 2023	53.5	42.3	42.1	31.0	26.9	7.26
Reductions from Baseline	0.02	0.1	0.1	0.1	0.1	0.1

Scenario 2	Total Estimated Cost	Cost Effectiveness ($/ton of NOx Reduced)
Replace 10 compacters, 10 crawler dozers, 10 earth movers, 10 motor graders, and 10 scrapers between 2008 and 2023	$66,108,900	$5,831

Recommendation:
Scenario 2 is recommended because it targets the most cost-effective replacements. It also spreads the reductions over the entire time period to minimize emissions, thus detrimental heath efforts due to ozone, for the entire 15 year period.

Recommended Strategy	
Total Project Cost	$66,108,900
Grant Recipient Match (Percent)	20%
Grant Recipient Match (Cost)	$13,221,780
Total Incentive Funds Needed (Cost)	$52,887,120

Existing Available Funding	$52,887,120
New Funding Required	**$0**

Compression Ignited Agricultural Engines (S-COM-6)

Source Category:
This source category includes compression ignited agricultural engines greater than 50 horsepower and operated in the District. According to the recent District Rule 4702 staff report, there are approximately 4,542 agricultural engines currently powering irrigation pumps in the District. In 2006, these engines consisted of 1,915 uncontrolled engines, 1,641 Tier 1 engines, 941 Tier 2 engines, and 45 Tier 3 engines. The horsepower ratings of these engines varied from 50 to 750 horsepower and had average annual operating times of 1,000 to 1,500 hours. Due to upcoming regulations, the distribution of these engines throughout the Tier levels will change. The populations of engines at each Tier level, at the critical years, are shown in the table below.

POPULATION BY TIER LEVEL AT CRITICAL YEARS				
MODEL YEAR GROUP	**POPULATION**			
	2012	**2017**	**2020**	**2023**
Uncontrolled	0	0	0	0
Tier 1	1,641	0	0	0
Tier 2	941	0	0	0
Tier 3	1,960	1,960	1,960	1,960
Tier 4	0	2,582	2,582	2,582
Total	**4,542**	**4,542**	**4,542**	**4,542**

Upcoming Regulations:
District Rule 4702 regulates NOx emissions from stationary spark-ignited engines and stationary compression ignited (diesel) engines greater than 50 horsepower. District Rule 4702 requires that non-certified engines, depending on horsepower and hours of operation, must comply with EPA certified Tier 3 or Tier 4 emissions by 2010. EPA certified Tier 1 or Tier 2 engines must comply with Tier 4 standards by 2015 or 12 years after installation date whichever is later.

Control techniques:
The following control techniques are available to reduce NOx emissions below the current emission level:

1. Replacement of existing agricultural diesel engines with cleaner diesel engine and/or electric motor.

2. Replacement of existing agricultural pumps with a new high efficiency pump.

Emission Inventory and Possible Emission Reductions with no Constraints:
The no constraints emission reductions estimated below assume electrification of all agricultural pumps. The total cost is approximately $185, 059,621. The cost-effectiveness of this option is approximately $5,656 per ton of NOx reduced, if all agricultural engines are replaced in 2008.

Potential NOx Emission Reductions Assuming No Financial, Technological, or Implementation Constraints (Tons Per Day)					
	2008	**2012**	**2017**	**2020**	**2023**
Projected Inventory with no Incentives	22.41	15.46	4.64	4.64	4.64
No Constraints Inventory	0	0	0	0	0
No Constraints Reductions	22.41	15.46	4.64	4.64	4.64

Possible Strategies:
Scenario 1: Replace all Tier 0 agricultural engines with Tier 3 diesel engines by 2009 and replace all Tier 1 and Tier 2 engines with Tier 4 by 2014 and electrification of 50% of high use Tier 3 engines between 2020 and 2023. Additionally, implement a pump efficiency replacement for 10% of diesel engines annually beginning in 2008.

- NOx Reduction - 4.13 tons per day in 2008
  - 10.91 tons per day in 2014
  - 1.89 tons per day in 2017
  - 2.07 tons per day in 2023
- Total Cost - $171,518,370

Scenario 2: Electrification of all existing agricultural engines in 2008 (Note: Electrification is not feasible for portable engines. Electrification is also not feasible for many stationary engines due to issues with availability of electricity at certain sites and potential high line extension costs.)

- NOx Reduction - 22.41 tons per day
- Total Cost - $129,541,735

Scenario 3: Electrification of all existing agricultural engines before 2012 by replacing approximately 900 engines each year (Note: Electrification is not feasible for portable engines. Electrification is also not feasible for many stationary engines due to issues with availability of electricity at certain sites and potential high line extension costs.)

- NOx Reduction - 15.46 tons per day

- Total Cost - $141,376,137

Recommendations:
Replace all Tier 0 engines with Tier 3 engines by 2009. Replace all Tier 1 and Tier 2 engines with Tier 4 engines by 2014. Electrify 50% of Tier 3 engines between 2020 and 2023. Implement pump efficiency replacement for 10% of diesel engines annually beginning in 2008.

- All 1,915 Tier 0 diesel-fired agricultural engines could conceivably be replaced with Tier 3 engines within approximately 2 years (2007–2008) of commencing an incentive program.
    - A 2-year replacement timeframe results in approximately 958 diesel-fired agricultural engines per year.
    - The total cost of this 2-year program to the District is estimated to be $35,522,774, with a cost effectiveness of $2,945 per ton and a reduction of 4.13 tons/day.
- All 2,582 Tier 1 and Tier 2 diesel-fired agriculture engines could conceivably be replaced with Tier 4 engines within approximately 2 years (2012–2014) of commencing an incentive program.
    - A 2-year replacement timeframe results in approximately 1,291 diesel-fired agricultural engines per year.
    - The total cost of this 2-year program to the District is estimated to be $64,956,472, with a cost effective analysis of $2,039 per ton and a reduction of 10.91 tons/day.
- 50% of all Tier 3 diesel-fired agriculture engines could conceivably be replaced with electric motors within approximately 3 years (2020-2023) of commencing an incentive program.
    - A 3-year replacement timeframe results in the replacement of approximately 490 diesel-fired agricultural engines per year.
    - The total cost of this 3-year program to the District is estimated to be $53,456,577 with a cost effective analysis of $17,933 per ton and a reduction of 2.04 tons/day.
- 10% of agricultural pumps each year could conceivably be replaced with high efficiency pumps within 10 years (2008–2017) of commencing an incentive program.
    - A 10-year replacement timeframe results in the replacement of approximately 450 existing agricultural pumps per year.

- The total cost of this 10-year program to the District is estimated to be $91,090,420 with a cost effective analysis of $115,775 per ton and a reduction of 1.89 tons/day.

Recommended Strategy	
Total Project Cost	$245,026,243
Grant Recipient Match (Percent)	30%
Grant Recipient Match (Cost)	$73,507,873
Total Incentive Funds Needed (Cost)	$171,518,370
Existing Available Funding	$102,522,774
New Funding Required	**$68,995,596**

Spark-Ignited Agricultural Forklifts Exempt from State LSI Regulations (M-IND-2)

Source Category:
This source category includes forklifts used in agricultural crop preparation services, specifically agricultural spark-ignited forklifts that cannot be retrofitted with a certified emission control device. There are an estimated 800 forklifts within the District that fall into this category, most of them manufactured prior to 1990.

Upcoming Regulations:
ARB has adopted future fleet emissions standards for spark-ignited forklifts; however, agricultural crop preparation service forklifts that cannot be retrofitted with a certified emission control device are exempt from these fleet emission standards.

Control Techniques:
The emission factor for uncontrolled forklifts is estimated to be approximately 10.5 g/bhp-hr. The following emission control technologies are available to reduce NOx emissions below the current emission level:

1. Replacement with a new spark-ignited forklift that is capable of achieving a NOx emissions rate of 3.0 g/bhp-hr.

2. Replacement with an electric forklift.

Emission Inventory and Possible Emission Reductions with no Constraints:
The no constraints emission reductions estimated below are calculated assuming the electrification of all agricultural spark-ignited forklifts. The total cost will be approximately $40,962,400. The cost-effectiveness of this option is approximately $5,656 per ton of NOx reduced if all of the spark-ignited agricultural forklifts are replaced in 2008.

Potential NOx Emission Reductions Assuming No Financial, Technological, or Logistical Constraints (Tons Per Day)

	2008	2012	2017	2020	2023
Projected Inventory with no Incentives	1.23	1.23	1.23	1.23	1.23
No Constraints Inventory	0.0	0.0	0.0	0.0	0.0
No Constraints Reductions	1.23	1.23	1.23	1.23	1.23

Possible Strategies:
Scenario 1: Replacement of all forklifts with electric forklifts by 2011

- All 800 spark-ignited forklifts could conceivably be replaced with electric forklifts by 2011

At an average cost of $47,933 per electric forklift and $3,270 per battery charger, the total cost to convert all of the existing 800 spark-ignited agricultural forklifts to electric forklifts is estimated to be $40,962,400.

While this scenario results in the maximum no constraints reduction of 1.23 tons of NOx per day, the scenario is unlikely to be achieved. Operational needs and electric forklift limitations will prevent most facilities from pursuing electric forklifts. Electric forklifts cannot operate continuously without recharging the forklift batteries. Furthermore, electric forklifts typically have less torque and lifting capability than their spark-ignited counterparts. Therefore, this strategy is not realistic.

<u>Scenario 2</u>: Replacement of all forklifts with new spark-ignited forklifts by 2011

- All 800 spark-ignited forklifts could conceivably be replaced with new spark-ignited forklifts within approximately 3 years of commencing an incentive program
- A 3-year replacement timeframe results in approximately 267 forklifts replaced per year
- At an average cost of $27,000 per new spark ignited forklift, the total cost to replace the 800 existing spark-ignited agricultural forklifts with electric forklifts is estimated to be $21,600,000

This scenario results in an emissions reduction of 0.88 tons of NOx per day. While this Scenario is the least costly of the three Scenarios investigated, some interest in electric forklifts is expected since electric forklifts are less costly to operate and maintain. While this Scenario is more realistic than Scenario 1, it does not allow for the option to install electric forklifts, which further reduces NOx emissions.

<u>Scenario 3</u>: Replacement of 90% of the forklifts with spark-ignited forklifts and 10% of the forklifts with electric forklifts by 2011

- All 800 spark-ignited forklifts could conceivably be replaced within approximately 3 years of commencing an incentive program
- A 3-year replacement timeframe results in approximately 240 forklifts replaced by new spark ignited forklifts per year
- A 3-year replacement timeframe results in approximately 27 forklifts replaced by electric forklifts per year
- At an average cost of $27,000 per spark-ignited forklift, $47,933 per electric forklift and $3,270 per battery charger, the total cost of this 3-year program is estimated to be $23,536,240

Scenario 3 reduces NOx emissions by 0.91 tons of NOx per day and is the most realistic scenario since it allows for replacement with electric forklifts of a portion of the inventory.

Recommendation:
Since electric forklifts are less costly to operate and maintain, some interest in electric forklifts is expected. Furthermore, replacement with electric forklifts results in greater emission reductions than replacement with new spark-ignited forklifts. Therefore, Scenario 3 is the most realistic of the above Scenarios and is recommended.

Recommended Strategy	
Total Project Cost	$23,536,240
Grant Recipient Match (Percent)	50%
Grant Recipient Match (Cost)	$11,768,120
Total Incentive Funds Needed (Cost)	$11,768,120
Existing Available Funding	$3,000,000
New Funding Required	**$8,768,120**

Off-Road Portable Engines Incentives (M-IND-7)

Source Category:
This source category includes facilities that operate portable diesel engines and equipment used in a variety of applications such as well drilling & servicing, power generation, pumping, gas compression, pile driving, cranes, ground support equipment, wood chipping, dredging, abrasive blasting, concrete batching and rock, sand, or gravel processing. Based on information provided by ARB, the following table describes the inventory of off-road portable engines in the District.

Population by Tier Level at Critical Years					
Tier Rating	**Population**				
		2008	**2012**	**2020**	**2023**
Uncontrolled	Tier 0 engines	2050	1004	193	89
Tier 1	Tier 1 engines	2241	1886	491	308
Tier 2	Tier 2 engines	1793	1923	1027	478
Tier 3	Tier 3 engines	818	1707	1185	982
Tier 4	Tier 4 engines	103	535	4093	5284
Total	Total engines	**7005**	**7055**	**6989**	**7141**

Upcoming Regulations:
Tier 1-3 Standards: The first federal standards (Tier 1) for new non-road (or off-road) diesel engines were adopted in 1994 for engines over 37 kW (50 hp), to be phased-in from 1996 to 2000. In 1996, a Statement of Principles (SOP) pertaining to non-road diesel engines was signed between EPA, ARB and engine makers (including Caterpillar, Cummins, Deere, Detroit Diesel, Deutz, Isuzu, Komatsu, Kubota, Mitsubishi, Navistar, New Holland, Wis-Con, and Yanmar). On August 27, 1998, the EPA signed the final rule reflecting the provisions of the SOP. The 1998 regulation introduced Tier 1 standards for equipment under 37 kW (50 hp) and increasingly more stringent Tier 2 and Tier 3 standards for all equipment with phase-in schedules from 2000 to 2008. The Tier 1-3 standards are met through advanced engine design, with no or only limited use of exhaust gas aftertreatment (oxidation catalysts). Tier 3 standards for NOx+HC are similar in stringency to the 2004 standards for highway engines, however Tier 3 standards for PM were never adopted.

Tier 4 Standards: On May 11, 2004, the EPA signed the final rule introducing Tier 4 emission standards, which are to be phased-in over the period of 2008-2015. The Tier 4 standards require that emissions of PM and NOx be further reduced by about 90%.

Such emission reductions can be achieved through the use of control technologies, including advanced exhaust gas aftertreatment, similar to those required by the 2007-2010 standards for highway engines.

Control Techniques:
The following control technique is available to reduce NOx emissions below the current emission level:

1. Replacement of an existing engine, with a lower polluting Tier 3 or 4 engine.

Tier 3 engines will be phased into production between 2006 and 2008. Tier 4 engines are scheduled to be phased into production between 2008 and 2015, with most engine manufacturers beginning production between 2011 and 2015.

Emission Inventory and Possible Emission Reductions with no Constraints:
For each inventory year in the below table, the no constraints reductions are calculated assuming that all engines are replaced with the lowest emitting engines available on the market. The cost for the 2008 no constraints scenario is approximately $170,500,000.

Potential NOx Emission Reductions Assuming No Financial, Technological, or Logistical Constraints (Tons Per Day)

	2008	2012	2017	2020	2023
Projected Inventory	14.0	10.8	7.0	6.0	4.6
No Constraints Inventory	9.0	7.7	2.0	3.0	3.2
No Constraints Reductions	5.0	3.1	5.0	3.0	1.4

Possible Strategies:
Scenario 1: Replace all engines in 2008 with the cleanest engines available

- Approximately 4,661 engines would be replaced in 2008
- The estimated cost to replace all engines with the cleanest Tier level engines available in 2008 is approximately $170,500,000
- This scenario results in an emissions reduction of 5.0 tons of NOx/day in 2008

While this scenario results in the greatest reduction in NOx emissions in 2008, approximately 2.7 tons of NOx/day of the reductions are attributed to replacing Tier 0 engines. Since most of these engines are required to be replaced by 2010 by ARB Air Toxic Control Measure for Portable Diesel Engines, these reductions are already scheduled to occur. Furthermore, this scenario proposes to replace 4,661 engines in a single year. It is unlikely that 4,661 engines could be manufactured and installed in a single year. Furthermore, the total project cost for this scenario is approximately

$170,500,000. This level of funding is unlikely for a single year. Therefore, this scenario is unrealistic.

Scenario 2: Replace all Tier 0 and Tier 1 engines with the cleanest available engines between 2008 and 2012, then replace all Tier 2 engines with Tier 3 engines between 2012 and 2016, and finally replace all Tier 3 engines with Tier 4 engines between 2016 and 2020

- The total project cost for this scenario is estimated to be $178,892,307, with $62,800,000 of the total project cost occurring between 2008 and 2012, $56,988,150 of the total project cost occurring between 2012 and 2016, and the remainder of the project cost occurring between 2016 and 2020
- This scenario results in an emissions reduction of approximately 1.4 tons/NOx per day in 2012, beyond what is required by the ARB Air Toxic Control Measure for Portable Diesel Engines. Additionally, this scenario results in approximately 1.3 tons of NOx/day of reductions in 2015 and 1.4 tons/NOx per day of reductions in 2020

Recommendation:
Scenario 2 results in early reductions, provides compliance assistance for facilities to meet the ARB Air Toxic Control Measure engine deadlines, and spreads the cost over many years. Therefore, staff recommends Scenario 2.

Recommended Strategy	
Total Project Cost	$178,892,307
Grant Recipient Match (Percent)	50%
Grant Recipient Match (Cost)	$89,456,154
Total Incentive Funds Needed (Cost)	$89,456,154
Existing Available Funding	$16,000,000
New Funding Required	**$73,456,154**

Locomotives (M-TRAN-12)

Source Category:
This source category includes line hauling and switching locomotives. There are an estimated 139 line haul locomotives and 59 switching locomotives operating within the SJVAPCD.

Upcoming Regulations:
- The Air Resources Board Memorandum of Understanding (MOU) with the Burlington Northern Santa Fe and Union Pacific rail yards requires the installation of Idling Limitation Devices (ILD) on over 99% of interstate locomotives between June 30, 2006 and June 30, 2008. Additionally, the MOU requires the use of ultra low-sulfur diesel (15 ppm) by January 1, 2007. The MOU includes a phase-out of non-essential idling within 6 months of the MOU inception date and the installation of idling reduction devices on all California-based locomotives within 3 years.
- Tier 3 locomotive engines will become available in 2012, pending EPA promulgation of necessary regulations.
- In September of 2000, ARB approved a comprehensive Diesel Risk Reduction Plan to reduce diesel emissions from both new and existing diesel-fueled engines and vehicles. The goal of the plan is to reduce diesel PM emissions and the associated health risk by 75% in 2010 and 85% in 2020.

Control Techniques:
The uncontrolled NOx emission factors for line hauling and switching locomotives are estimated at 9.5 g/bhp-hr and 14.0 g/bhp-hr respectively. The following control technique is available to reduce NOx emissions below the current emission level:

1. Repower of locomotives with cleaner engines that meet Tier 2 or Tier 3 emissions standards.

Emission Inventory and Potential Emission Reductions with no Constraints:
The projected inventory for locomotives, assuming no incentives are provided, is expected to be nearly constant through 2023. Assuming no financial, technological, or logistical constraints existed, all 198 locomotives could be immediately retrofitted with Tier 2 engines at an estimated cost of $148,500,000. This strategy would result in a reduction of approximately 9.7 tons of NOx per day by 2008.

Another no constraints scenario is to retrofit of all locomotives with Tier 3 engines in 2012, when the engines are expected to be available. At a cost of $297,700,000 and again assuming that no financial, technological, or logistical constraints exist, the projected inventory with no incentives for 2012 and beyond can potentially be reduced by a total of 15.8 tons of NOx per day.

Potential NOx Emission Reductions Assuming No Financial, Technological, or Logistical Constraints (Tons Per Day)					
	2008	**2012**	**2017**	**2020**	**2023**
Projected Inventory with no Incentives	24.8	24.8	24.8	24.8	24.8
No Constraints Inventory	15.1	9.0	9.0	9.0	9.0
No Constraints Reductions	9.7	15.8	15.8	15.8	15.8

Possible Scenarios:
Scenario 1: Repower all Locomotives in the District with Tier II engines by 2012

- All 198 locomotive engines could conceivably be repowered with Tier II engines by 2012
- At an estimated $750,000 per repower, the total project cost for this Scenario is an estimated $148,500,000
- This scenario reduces NOx emissions by 9.7 tons/day

This scenario results in maximum emission reductions in 2012; however, no further emission reductions occur after 2012. Furthermore, the level of funding required to repower all of the locomotives is approximately $148,500,000.

Scenario 2: Repower all locomotives in the District with Tier III engines by 2015

- All 198 locomotives could conceivably be replaced with Tier III engines by 2015
- At an estimated cost of $1.5 million per locomotive, the total cost to repower all 198 locomotives is estimated to be $297,700,000
- This scenario reduces NOx emissions by approximately 15.8 tons/day by 2015

To accomplish this scenario, 65 locomotives must be repowered each year at a total annual cost of approximately 100 million per year.

Scenario 3: Repower 75 percent of all switch locomotives with Tier II engines by 2012, then repower 50 percent of all switch locomotives with Tier III engines by 2015

- Under this scenario, at least 19 switch engines are first repowered to meet Tier II standards, and then later repowered by 2015 to meet Tier III standards
- The total cost of this scenario is estimated to be $77,437,500, with $38,187,500 required by 2012 and another $39,250,000 required between 2012 and 2015
- This scenario reduces NOx emissions by approximately 0.7 tons/day in 2012 and 1.5 tons/day in 2015 and later years

Scenario 4: Repower 25% of line haul locomotives by 2012, repower 50% of line-haul locomotives with Tier III engines by 2015

The total cost of this scenario is estimated to be $130,312,500, with $26,025,000 required by 2012, and an additional $104,287,500 required between 2012 and 2015. This scenario reduces NOx emissions by approximately 4.5 tons/day in 2012 and 9.9 tons/day in 2015 and later inventory years

Since some line haul locomotives operate both within and outside of the San Joaquin Valley Air Basin, co-operation with ARB and other air districts may be necessary to accomplish this scenario. However, there are many short haul locomotives that operate solely within the District that could first be targeted by the incentive program.

Recommendation:
Scenarios 1 and 2 require significant levels of annual funds to accomplish. Both Scenarios 3 and 4 require lower annual funds than Scenarios 1 and 2. Furthermore, Scenarios 3 and 4 both result in significant annual emission reductions by 2015. Therefore, staff recommends simultaneously pursuing both Scenarios 3 and 4.

Recommended Strategy (Scenario #3)	
Total Project Cost	$77,437,500
Grant Recipient Match (Percent)	50%
Grant Recipient Match (Cost)	$38,718,750
Total Incentive Funds Needed (Cost)	$38,718,750
Existing Available Funding	$20,000,000
New Funding Required	**$18,718,750**

Recommended Strategy (Scenario #4)	
Total Project Cost	$130,312,500
Grant Recipient Match (Percent)	50%
Grant Recipient Match (Cost)	$65,156,250
Total Incentive Funds Needed (Cost)	$65,156,250
Existing Available Funding	$28,000,000
New Funding Required	**$37,156,250**

Diesel-Fired Agricultural Tractors (M-IND-1)

Source Category:
This source category includes diesel-fired agricultural tractors. The emissions from diesel-fired agricultural tractors account for approximately 95% of the total NOx emissions from the "Farm Equipment" source category.

Assuming an incentive program is not commenced by 2023 for this category of equipment, ARB estimates the following equipment populations for 2008, 2012, 2017, 2020, and 2023. The equipment is categorized by an emissions Tier level, with Tier 0 corresponding to an uncontrolled, high polluting tractor and Tier 4 corresponding to the least polluting tractor.

Population by Tier Level at Critical Years

Tier Rating	Population				
	2008	**2012**	**2017**	**2020**	**2023**
Uncontrolled	18,789	8,763	2,847	1,587	589
Tier 1	21,138	16,068	6,795	3,557	2,049
Tier 2	23,229	15,469	11,852	7,629	3,657
Tier 3	11,318	28,925	23,393	20,793	17,432
Tier 4	0	4,322	27,503	38,127	47,290
Total	**74,474**	**73,547**	**72,390**	**71,693**	**71,017**

As shown in the table above, many of the higher polluting Tier 0, Tier 1 and Tier 2 tractors are eventually replaced by lower polluting Tier 3 or Tier 4 tractors. The replacement of older Tier 0, Tier 1, and Tier 2 tractors is driven by regulations and by natural turnover, where older equipment is taken out of service and replaced with new equipment.

Upcoming Regulations:
Tier 1-3 Standards: The first federal standards (Tier 1) for new non-road (or off-road) diesel engines were adopted in 1994 for engines over 37 kW (50 hp), to be phased-in from 1996 to 2000. In 1996, a Statement of Principles (SOP) pertaining to non-road diesel engines was signed between EPA, ARB and engine makers (including Caterpillar, Cummins, Deere, Detroit Diesel, Deutz, Isuzu, Komatsu, Kubota, Mitsubishi, Navistar, New Holland, Wis-Con, and Yanmar). On August 27, 1998, the EPA signed the final rule reflecting the provisions of the SOP. The 1998 regulation introduced Tier 1 standards for equipment under 37 kW (50 hp) and increasingly more stringent Tier 2 and Tier 3 standards for all equipment with phase-in schedules from 2000 to 2008. The Tier 1-3 standards are met through advanced engine design, with no or only limited use of exhaust gas aftertreatment (oxidation catalysts). Tier 3 standards for NOx+HC are similar in stringency to the 2004 standards for highway engines, however Tier 3 standards for PM were never adopted.

Tier 4 Standards: On May 11, 2004, the EPA signed the final rule introducing Tier 4 emission standards, which are to be phased-in over the period of 2008-2015. The Tier 4 standards require that emissions of PM and NOx be further reduced by about 90%. Such emission reductions can be achieved through the use of control technologies, including advanced exhaust gas aftertreatment, similar to those required by the 2007-2010 standards for highway engines.

Control Techniques:
Various options for controlling emissions are listed below:

1. Accelerated Fleet Turnover by replacing of older tractors with new tractors, which utilize the cleanest technology available. Tier 3 tractors will be phased into production between 2006 and 2008. Tier 4 tractors are currently scheduled to be phased into production between 2008 and 2015, with most tractor manufacturers beginning production between 2011 and 2015.

2. Retrofitting of tractors through the installation of a retrofit device that reduce one or more pollutants.

3. Engine Repower by replacing the tractor engines with new or newer engines

Emission Inventory and Possible Emission Reductions with no Constraints:
Assuming there are no constraints, such as availability, cost, and participation, the following emission reductions could be achieved. The following table assumes that all tractors (100%) are replaced as soon as the newest technology becomes available.

In other words, 100% of all tractors (54,701 tractors) that currently do not meet Tier 3 or Tier 4 control standards would be replaced with a Tier 3 or 4 tractor in year 2008, and in years 2011, 2012, and 2013 the remaining non Tier 4 tractors would be replaced with Tier 4 tractors (19,611, 19,238, and 5,343 tractors, respectively). The total cost to replace these 98,893 tractors is approximately $9.7 billion dollars.

Potential NOx Emission Reductions Assuming No Financial, Technological, or Logistical Constraints (Tons Per Day)

	2008	2012	2017	2020	2023
Projected Inventory with no Incentives	52.67	42.43	28.83	22.19	16.95
No Constraints Inventory	26.85	18.45	14.09	12.56	11.60
No Constraints Reductions	25.82	23.97	14.74	9.64	5.35

Possible Strategies:
An optimal scenario would have to identify a grouping of vehicles that can achieve meaningful emission reductions early (before 2012) while leaving sufficient resources

for eventual replacement of vehicles with the cleanest control technology, which will be available in 2011 through 2013. The following are the key emissions in key years for the Tier groups.

Emission Inventory Table								
	2008		2010		2012		2020	
	# of Vehicles	Emissions (tons/day)	# of Vehicles	Emissions (tons/day)	# of Vehicles	Emissions (tons/day)	# of Vehicles	Emissions (tons/day)
Tier 0	18,789	20.39	14,087	14.79	8,763	9.25	1,587	1.54
Tier 1	21,138	17.22	18,584	16.50	16,068	14.12	3,557	3.32
Tier 2	23,229	10.92	18,394	10.33	15,469	9.82	7,629	4.75
Tier 3	11,318	4.15	22,948	6.70	28,925	7.81	20,793	6.31
Tier 4	0	0.00	0	0.00	4,322	1.42	38,127	6.27

Scenario 1: Replacement of 100% of eligible tractors as soon as the newest technology becomes available

Replacement of all tractors as soon as the newest technology becomes available is not feasible when considering manufacturing limitations (54,701 tractors alone in 2008). Therefore, more reasonable scenarios will be considered.

Scenario 2: Replacement of all eligible tractors beginning in 2008 with a 10% per year penetration

According to the inventory data, the highest number of tractors to be replaced would take place in 2008, where 5,470 tractors would be replaced with Tier 3 or 4 tractors and the number of tractors to be replaced would gradually decrease with each year.

The table below shows the effect this alternate type of incentive program would have on the expected NOx emissions in the 2008, 2012, 2017, 2020, and 2023 inventory years.

Tons NOx Per Day – Summer Season

Scenario 2	2008	2012	2017	2020	2023
Baseline	52.67	42.43	28.83	22.19	16.95
Adjusted Baseline All Eligible Tractors Replaced	50.08	33.84	19.58	15.16	11.96
Reductions from Baseline	2.59	8.59	9.25	7.03	4.99

As shown above, this scenario results in significant reduction of emissions in 2012, 2017, 2020, and 2023 inventory years. The estimated total cost involved with this incentive option is highlighted in the table below.

Scenario 2	Total Estimated Cost	Cost Effectiveness ($/ton of NOx Reduced)
All Eligible Tractors Replaced	$4,220,875,056	$117,873.78

Advantages:
- Early reductions in emissions, beginning in 2008.
- Significant NOx emission reductions are achieved in 2012, 2017, 2020, and 2023.

Disadvantages:
- Costly ($4.2 billion) option to implement.
- Not a cost-effective ($/ton) option.

Scenario 3: Replacement of only Tier 0 and Tier 1 Tractors beginning in 2008 with a 10% per year penetration

According to inventory data, at a 10% penetration rate for Tier 0 and Tier 1 tractors, the highest number of tractors to be replaced would take place in 2008, where 4,791 Tier 0 and 1 tractors would be replaced with Tier 3 and 4 tractors and the number of tractors to be replaced gradually decreases with each year.

The table below shows the affect this type of incentive program would have on the expected NOx emissions in the 2008, 2012, 2017, 2020, and 2023 inventory years.

Tons NOx Per Day – Summer Season

Scenario 3	2008	2012	2017	2020	2023
Baseline	52.67	42.43	28.83	22.19	16.95
Adjusted Baseline Tier 0 and Tier 1 Replaced	50.46	36.14	25.19	20.15	15.81
Reductions from Baseline	2.21	6.29	3.64	2.04	1.14

As shown above, this scenario results in significant reductions in emissions in 2012, however only slight reductions are achieved in the 2020 and 2023 inventory years. The estimated total cost involved with this incentive option is highlighted in the table below.

Scenario 3	Total Estimated Cost	Cost Effectiveness ($/ton of NOx Reduced)
Tier 0 and Tier 1 Replaced	$1,595,935,513	$64,639.84

Advantages:

- Early reductions in emissions, beginning in 2008.
- Significant NOx emission reductions are achieved in 2012.
- Considerable effect on 2017, 2020, and 2023 NOx emission inventories.

Disadvantages:

- Costly ($1.6 billion) option to implement.
- Not a cost-effective ($/ton) option.

Scenario 4: Replacement of only Tier 1 Tractors beginning in 2008 with a 10% per year penetration

According to inventory data, at a 10% penetration rate for Tier 1 tractors, the highest number of tractors to be replaced would take place in 2008, where 2,114 Tier 1 tractors would be replaced with Tier 3 or 4 tractors and the number of tractors to be replaced gradually decreases with each year.

The table below shows the effect this type of incentive program would have on the expected NOx emissions in the 2008, 2012, 2017, 2020, and 2023 inventory years.

Tons NOx Per Day – Summer Season

Scenario 4	2008	2012	2017	2020	2023
Baseline	52.67	42.43	28.83	22.19	16.95
Adjusted Baseline Tier 1 Replaced	51.78	38.65	26.62	20.46	15.73
Reductions from Baseline	0.89	3.78	2.21	1.73	1.22

As shown above, this scenario results in only slight reductions in the 2012, 2017, 2020, and 2023 inventory years. The estimated total cost involved with this incentive option is highlighted in the table below.

Scenario 4	Total Estimated Cost	Cost Effectiveness ($/ton of NOx Reduced)
Tier 1 Replaced	$1,014,021,525	$72,881.79

Advantages:

- Early reductions in emissions, beginning in 2008.
- Decent effect on 2012, 2017, 2020 and 2023 NOx emission inventories.

Disadvantages:

- Costly ($1.0 billion) option to implement.
- Not a cost-effective ($/ton) option.
- Minimal effect on 2008 NOx emission inventory.

Scenario 5: Replacement of only Tier 0 Tractors beginning in 2008 with a 10% per year penetration

According to inventory data, at a 10% penetration rate for Tier 0 tractors, the highest number of tractors to be replaced would take place in 2008, where 1,879 Tier 0 tractors would be replaced with Tier 3 or 4 tractors and the number of tractors to be replaced gradually decreases with each year.

The table below shows the effect this type of incentive program would have on the expected NOx emissions in the 2008, 2012, 2015, 2017, 2020, and 2023 inventory years.

Tons NOx Per Day – Summer Season

Scenario 5	2008	2012	2015	2017	2020	2023
Baseline	52.67	42.43	33.75	28.83	22.19	16.95
Adjusted Baseline Tier 0 Replaced	51.34	39.51	30.87	26.67	21.07	16.44
Reductions from Baseline	1.33	2.92	2.88	2.16	1.12	0.51

As shown above, this scenario results in only slight reductions in the 2012, 2015, 2017, 2020, and 2023 inventory years. The estimated total cost involved with this incentive option is highlighted in the table below.

Scenario 5	Total Estimated Cost	Cost Effectiveness ($/ton of NOx Reduced)
Tier 0 Replaced	$581,913,987	$49,169.61

Advantages:

- Early reductions in emissions, beginning in 2008.
- Most cost-effective option
- Decent effect on 2008, 2012, 2017, 2020 and 2023 NOx emission inventories.

Recommendation:
Scenario 5 is recommended because it addresses the highest polluting tractors and replaces them with the cleanest technology available. It also provides similar reductions in emissions during the 2017, 2020 and 2023 inventory years at a fraction of the overall total costs when compared to the other scenarios.

Recommended Strategy	
Total Project Cost	$581,913,987
Grant Recipient Match (Percent)	30%
Grant Recipient Match (Cost)	$174,574,196
Total Incentive Funds Needed (Cost)	$407,339,791
Existing Available Funding	$2,000,000
New Funding Required	**$405,339,791**

School Boilers (S-COM-2)

Source Category:
This source category includes approximately 380 boilers with 2-5 MMBtu/hr output located at schools kindergarten through 12th grade.

Upcoming Regulations:
District Rule 4307 sets NOx limits at 30 ppmv effective in 2009. This is approximately 70% NOx control from uncontrolled levels. Units operated at schools kindergarten through 12th grade are exempt.

Control Techniques:
There are several options for controlling emissions.

1. Replace with new Low NOx (30ppm) boiler

2. Retrofit with Low NOx (30 ppm) burner

1. Replace with Ultra Low NOx (15 ppm) boiler

Emission Inventory and Possible Emission Reductions with no Constraints:
Maximum reductions would be achieved by replacing the approximately 380 school boilers with Ultra Low NOx (15ppm) units. Assuming 100% District funding, the total cost of this control is approximately $57,000,000.

Potential NOx Emission Reductions Assuming No Financial, Technological, or Logistical Constraints (Tons Per Day)

	2008	2012	2017	2020	2023
Projected Inventory with no Incentives	0.80	0.80	0.80	0.80	0.80
No Constraints Inventory	0.10	0.10	0.10	0.10	0.10
No Constraints Reductions	0.70	0.70	0.70	0.70	0.70

Possible Strategies:
Scenario 1: Replace all units in the District with Low NOx (30 ppm) boilers.
- NOx reduction – 0.51 tons per day
- Total cost - $24,553,700

Scenario 2: Retrofit all units in the District with Low NOx (30 ppm) burners.
- NOx reduction – 0.51 tons per day
- Total cost - $17,773,500

Scenario 3: Replace all units in the District with Ultra Low NOx (15ppm) boilers.

- NOx reduction – 0.70 tons per day
- Total cost - $57,000,000

Recommendations:
Staff recommends Scenario 1, as this scenario is the most realistic and cost effective. Scenario 2 is not recommended because grant history indicates that participation is higher for programs that offer full replacement as opposed to retrofit. Scenario 3 is not recommended at this time because the Ultra Low NOx boilers are costly and not as readily available as the Low NOx boilers. Scenario 3 may be considered in the future if the units become more common and less costly.

Recommended Strategy	
Total Project Cost	$24,553,700
Grant Recipient Match (Percent)	50%
Grant Recipient Match (Cost)	$12,266,850
Total Incentive Funds Needed (Cost)	$12,266,850
Existing Available Funding	$0
New Funding Required	**$12,266,850**

7.6.2 Recommended Funding Levels for Incentive Control Measures

The following table identifies the recommended incentive program strategies along with the associated funding amounts.

Incentive Control Measures Recommended For Funding						
Incentive Control Measure	**Total Project Cost**	**Number of Units**	**Grant Recipient Match (percent)**	**Total Incentive Funds Needed (Cost)**	**Existing Local Funding**	**New Funding Required**
Passenger and Medium Duty Vehicles Replace 1% to 4% each year between 2008 and 2020	$176,900,000	35,380	30%	$123,830,000	$26,911,818	$96,918,182
Forklifts Replace 90% of forklifts with spark-ignited forklifts and 10% of forklifts with electric forklifts between 2008 and 2010	$23,536,240	800	50%	$11,768,120	$6,500,000	$5,268,120
School Boilers Replace all units in the District with low NOx (30 ppm) boilers beginning in 2015	$24,553,700	380	50%	$12,276,850	$1,800,000	$10,476,850

Incentive Control Measures Recommended For Funding						
Ag Tractor Replace Tier 0 Tractors beginning in 2008 with a 10% penetration per year	$581,913,987	6,997	30%	$407,339,791	$2,000,000	$405,339,791
CI Ag Engines Tier 0 replacement with Tier 3 between 2007 and 2008	$50,746,820	1,915	30%	$35,522,774	$35,522,774	$0
CI Ag Engines Replace Tier 1 and Tier 2 engines with Tier 4 between 2012 and 2014	$92,794,960	2,582	30%	$64,956,472	$32,000,000	$32,956,472
CI Ag Engines Electrify 50% of Tier 3 engines between 2020 and 2023	$76,366,539	980	30%	$53,456,577	$35,000,000	$18,456,577
CI Ag Engines Implement pump efficiency for 10% of pumps between 2008 and 2017	$130,129,171	4,542	75%	$32,532,293	$0	$32,532,293

Incentive Control Measures Recommended For Funding						
Diesel Trucks Replace 75% of 1991-1993 model year trucks between 2008 and 2009; Replace 10% of pre-2007 trucks between 2010 and 2023	$4,174,781,627	28,089	50%	$2,087,390,814	$328,338,180	$1,759,052,634
Construction Equipment Replacement of 10 compactors, 10 crawlers dozers, 10 earth movers, 10 motor graders, and 10 scrapers between 2008 and 2023	$66,108,900	50	20%	$52,887,120	$25,000,000	$27,887,120
Locomotives Repower 40 locomotives with Tier 2 engines by 2012 and repower 30 switch locomotives by 2020	$77,437,500	59	50%	$38,718,750	$20,000,000	$18,718,750
Locomotives Repower 35 line haul locomotives 2012, then repower 70 short line-haulers with Tier 3 engines by 2020	$130,312,500	105	50%	$65,156,250	$28,000,000	$37,156,250

Incentive Control Measures Recommended For Funding						
Off-road portable engines Replace all Tier 0 and Tier 1 replace with Tier 3 between 2008 and 2012	$62,807,157	4,299	50%	$31,403,579	$12,000,000	$19,403,579
Off-road portable engines Replace all Tier 2 with Tier 3 between 2012 and 2016	$56,988,150	1,800	50%	$28,494,075	$2,000,000	$26,494,075
Off-road portable engines Replace all Tier 3 with Tier 4 engines between 2016 and 2020	$59,097,000	1,932	50%	$29,548,500	$2,000,000	$27,548,500
Totals	**$5,646,019,705**	**96,596**		**$2,978,363,782**	**$557,072,772**	**$2,421,291,010**

The following table identifies the necessary funding levels by year to implement the recommended incentive control measures.

Schedule for Funding by Year

Timeline For Funding		
Year	New Funding Required	Existing Funding
2007 and 2008	$137,000,000	$80,000,000
2009	$137,700,000	$40,000,000
2010	$137,700,000	$40,000,000
2011	$137,700,000	$40,000,000
2012	$168,400,000	$40,000,000
2013	$161,800,000	$40,000,000
2014	$161,800,000	$40,000,000
2015	$141,400,000	$40,000,000
2016	$161,800,000	$24,700,000
2017	$156,500,000	$24,700,000
2018	$153,200,000	$24,700,000
2019	$153,200,000	$24,700,000
2020	$167,200,000	$24,700,000
2021	$149,400,000	$24,700,000
2022	$149,400,000	$24,700,000
2023	$149,400,000	$24,700,000
Total	**$2,423,600,000**	**$557,600,000**

Formal SIP revisions will be considered upon the receipt of major blocks of funding.

7.6.3 Incentive Measures for Possible Future Consideration

The following possible incentive measure categories are not candidates for incentive funding at this time, but are being recommended for further analysis and study for future consideration:

- **Large Spark-Ignited Agricultural Engines**
  Replace older agricultural irrigation pump engines with new spark-ignited engines.

- **Inland Port Infrastructure**
  Explore options to provide linkages between ports and other modes of transportations, such as by train for the delivery of goods.

- **Short Sea Shipping**
  Reduce heavy-duty truck and locomotive vehicle miles traveled through the District by transporting goods by sea between northern and southern California.

- **Heavy-Duty Gasoline Trucks**
  Reduce emissions by replacing older heavy-duty gasoline trucks with new trucks.

- **Buses** (other than transit and school buses)
  Replace older buses with new buses.

- **Motorcycles**
  Reduce emissions from older on-road motorcycles.

- **Residential Water Heaters**
  Replace existing water heaters with electric or tankless models.

- **Open Burning**
  Measures to reduce the on-field burning of agricultural waste.

- **Composting Green Waste**
  Reduce emissions by installing an enclosed aerated static pile vented to a biofilter at all green waste facilities.

- **Agricultural Above Ground Gasoline Storage Tanks**
  Reduce evaporative emissions of VOC from above ground storage tanks by increasing heat reflection and installing a pressure vacuum vent valve on the tanks.

7.7 LEGISLATIVE ACTION PLAN FOR SECURING PROPOSED FUNDING

At the federal level, the District is seeking to receive enhanced funding through the establishment of a new designation as an Air Quality Empowerment Zone. The new designation will give the Valley priority for funding through existing programs as well as acting as an umbrella for new funding sources. Specifically, we are requesting that the San Joaquin Valley be given priority in the DERA and EQIP funding allocations, and that these programs be funded at higher levels than they have historically received. Additionally, the District is seeking new federal appropriations as well as tax incentives for the purchase of cleaner lower-emitting equipment.

At the state level, the District is advocating for both near term funding through the Proposition 1B bond funds, and longer-term funding through the establishment of an Air Quality Enterprise Zone that would serve as an umbrella for additional state funding and tax-incentives for new clean equipment purchases.

The passage of Proposition 1B provides $1 billion for emission reductions from activities related to the movement of freight through California's trade corridors. The San Joaquin Valley is the major north/south corridor for movement of freight through the State of California. Additionally, there is a significant trade corridor of agricultural commodities from the San Joaquin Valley to California ports. Over 28% of the state's truck traffic occurs in the District and nearly 80% of the San Joaquin Valley's smog and particulate causing emissions come from mobile sources. The District is seeking 25%, or $250 million, of the Proposition 1B emission reduction funds to mitigate the impact from increased freight movement through the region.

Additionally, Proposition 1B contains $200 million to fund the replacement of Pre-1987 school buses, and the retrofit of new school buses. The District has a disproportionate share of older high emitting school buses with over 30% of the school buses in the District being 1987 or older. Pre-1987 buses expose students to high levels of carcinogens from diesel exhaust and add to the District's ambient air quality pollution. Current funding levels are inadequate to allow school districts to replace these buses. The District is seeking to secure significant Proposition 1B school bus funding to replace and retrofit higher emitting school buses.

The funding requests that are included in this plan are consistent with the recommendations that have been approved by the Air Quality Work Group of the Governor's California Partnership for the San Joaquin Valley. As such, they should be endorsed by the State Government. Additionally, District staff and stakeholders have had a number of meetings with the San Joaquin Valley congressional delegation (Congressman Jim Costa, Dennis Cardoza, George Radanovich, and Devin Nunes) and Senators Feinstein and Boxer to discuss the federal funding strategy. There is agreement amongst our federal representatives that there is a need for $100 million per year in federal incentive funding, and a willingness to work together to obtain additional resources for air quality projects in the San Joaquin Valley.