

Report to the California Legislature

Accelerated Light-Duty Vehicle Retirement Program

Date: May 2004

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Executive Summary

In his *Action Plan for California's Environment*, Governor Arnold Schwarzenegger highlighted the need to address the problem of dirty cars – pledging to “expand innovative market-based mechanisms such as ‘scrappage’ systems” and promising that the “state will lead by example – identifying and permanently retiring those heavily used vehicles that do the greatest harm to our air quality.” Scrap or voluntary vehicle retirement programs can be a cost-effective way to immediately reduce emissions from older vehicles, and is the only way to reduce emissions from the 30-year and older vehicles that are exempt from California’s biennial Smog Check program.

This report is based on our experience with a small-scale pilot scrap program and scrap programs operated by local air districts, as well as a larger-scale scrap program operated by the Bureau of Automotive Repair as a Consumer Assistance Program for the Smog Check program. Our conclusions are summarized below:

- **Older vehicles contribute a disproportionate amount of air pollution.** Because new cars are extraordinarily low-emitting, older cars contribute a significant portion of emissions from cars. For example, in 2010, about 30 percent of cars are 12 years old and older. These cars account for 25 percent of the miles driven by cars, but they are responsible for 75 percent of the pollution from cars.
- **Voluntary scrap programs have been a cost-effective means to reduce emissions from in-use vehicles.** The cost-effectiveness of current, small-scale scrap programs operated by local air districts has been between \$1.50 and \$4.50 per pound of smog-forming pollutants. This compares favorably to other in-use emission reduction programs, such as Smog Check, and the projected cost of future mobile source air pollution control measures in California. Larger-scale scrap programs will also be cost-effective, although less so than the small scale programs, because of the need to expand the eligible model years to include newer old cars that will cost more to procure.
- **Scrap is an important component of California’s clean air plan.** California’s current clean air plan, known as the State Implementation Plan, acknowledges the need to continue pursuing funding for future car scrap programs, and commits to bring a scrap measure to the Air Resources Board (ARB), if it is found to be feasible. Car scrapping is also a key feature of Smog Check’s Consumer Assistance Program, providing both a safety valve for consumers who cannot afford to repair their vehicles and emission reductions to improve air quality.
- **Enhancing voluntary scrap programs would clean the air.** California should build on our existing scrap programs to obtain the maximum possible clean air benefits. Increased statewide funding could expand local district programs, as well as provide additional opportunities for motorists to scrap vehicles outside of when they fail their biennial Smog Check. A program of \$35 million per year for three years would provide reductions of 7-10 tons per day of smog-forming pollutants.

- **Technology can enhance future scrap programs.** Remote sensing devices (RSD) have the potential to identify gross-polluting vehicles on-the-road. A future scrapping program linked with RSD could improve the effectiveness by focusing scrapping efforts not just on older vehicles, but on older, *gross-polluting* vehicles.

This report fulfills ARB's obligation to report on the progress of high polluter removal and repair programs under Health and Safety Code sections 44100(e)(1), 44104.5(b), and 44104.5 (c). Under these sections, ARB must evaluate the performance of these programs and report to the Governor and the Legislature with recommendations for meeting the emission reduction requirements of the 1994 State Implementation Plan for Ozone.

Introduction

In his *Action Plan for California's Environment*, Governor Arnold Schwarzenegger highlighted the need to address the problem of dirty cars – pledging to “expand innovative market-based mechanisms such as ‘scrappage’ systems” and promising that the “state will lead by example – identifying and permanently retiring those heavily used vehicles that do the greatest harm to our air quality.”

California's interest in car scrap programs has grown since programs were first introduced in the early 1990's. By 1994, interest was so great that the Air Resources Board (ARB or the Board) included a commitment to voluntarily scrap over 75,000 vehicles a year in California's clean air plan. As envisioned, the program would encourage the early retirement of older vehicles by providing owners of eligible vehicles with a monetary incentive to retire their older vehicles sooner than would have occurred naturally. Since then, ARB has conducted a pilot program, and many local districts have operated scrap programs using local funds. However, sufficient funding has never been identified at the state level to fulfill the 1994 clean air plan commitment. Because of this, the 2003 revision of California's clean air plan does not include an explicit commitment for vehicle scrap programs. Nevertheless, vehicle scrap programs continue to offer a cost-effective means of immediately reducing emissions from older vehicles. In fact, scrap programs are one of the few ways to immediately reduce emissions from older vehicles, and the best way to address emissions from the 30-year and older vehicles that are exempt from California's biennial Smog Check program.

This report provides background on vehicle scrap and an overview of the existing vehicle scrap program. The report concludes that increased funding for car scrap programs would help maximize the clean air benefits from in-use vehicles.

Background

Air pollution is a serious problem for California – over 90 percent of Californians live in areas that have unhealthy air at times. Air pollution has been tied to serious health impacts. Research in Southern California shows that children exposed to unhealthy levels of ozone, or smog, suffer decreased lung function growth and increased asthma. In addition, recent evidence has, for the first time, linked the onset of asthma to exposure to elevated ozone levels in exercising children.

The emissions that cause smog come from a multitude of sources – cars, trucks, and industrial sources, as well as hairspray, lawnmowers, and paints. One of the prime contributors to air pollution in California is the automobile. Although new cars are over 97 percent cleaner than their uncontrolled predecessors, in 2010, almost one-third of the smog-forming emissions in the Los Angeles area will still be caused by cars, minivans, pick-up trucks, and sport-utility vehicles. A disproportionate amount of these emissions are from older, high-emitting vehicles. By 2010, even though vehicles that are 12 years and older only account for 30 percent of the fleet (and one-quarter of the

miles traveled by cars), these older vehicles will be responsible for about 75 percent of the smog-forming emissions from cars. ARB's inventory, which is based on information from the Department of Motor Vehicles, estimates that about half of cars live to 15 years old, and one-quarter of cars live to 20 years old. However, it is interesting to note that of those cars that do survive to 20 years, about 40 percent of those will survive at least 10 more years.

Eventually, these older vehicles will be retired, permanently removing their emissions. However, in order to meet our federally-mandated deadlines for clean air, ARB has developed programs to accelerate the retirement of older vehicles. Although voluntary accelerated vehicle retirement (VAVR) programs operate throughout California, they have never achieved their full potential because they have not been funded at the originally anticipated levels.

State Implementation Plan

The State Implementation Plan (SIP) is California's roadmap to clean air. Based on photochemical modeling, the SIP estimates the emission reductions needed to reach national ambient air quality standards. The SIP also describes the control measures and strategies we expect to rely on to reduce emissions, and achieve healthful air. Once the SIP is approved by the U.S. Environmental Protection Agency (U.S. EPA), it is enforceable by the federal government. Under federal law, if California fails to implement the SIP, the State can be sanctioned – putting billions of dollars of federal transportation funds in jeopardy, and making it harder to site or expand industrial facilities.

The 1994 Ozone SIP was a comprehensive plan to meet the one-hour federal ozone standard. This SIP included a measure, known as "M1," that called for the voluntary accelerated retirement of a large number of older, higher-emitting cars in the South Coast Air Basin (Los Angeles-area). This strategy was originally proposed by a broad-based coalition of business and industries led by the Western States Petroleum Association and the California Chamber of Commerce. The Board approved the coalition's recommended measure in the adopted SIP, provided that the coalition secure the funding to implement the measure.

In October 2003, the ARB approved a new SIP, entirely replacing the State and federal strategy (including measure M1) adopted in 1994. ARB submitted this updated SIP to U.S. EPA in January 2004, and is awaiting final federal approval. Because sufficient funds have not been secured for vehicle scrap programs, the 2003 SIP has no explicit commitment for light-duty scrap programs. There is no longer an M1 commitment for scrap programs in the SIP. However, the new SIP acknowledges the need to continue pursuing funding for future scrap programs. As part of the 2003 SIP, ARB has committed to evaluate the potential emission benefits, technical feasibility, cost-effectiveness, socioeconomic impacts, environmental justice considerations, and funding and legal constraints of a scrap program by 2005. If found to be feasible, in

consideration of all these factors, ARB staff will bring a scrap measure to the Board for consideration in 2007.

Regulatory and Legislative History

In October 1995, Governor Wilson signed SB 501 (Calderon), adding sections 44100 et seq., Article 10, to the California Health and Safety Code. This Bill was backed by the business and industry coalition that advocated adding the scrap measure to the 1994 SIP. Article 10 requires ARB to operate a pilot program to assess the cost and emission reduction benefits of the scrap program, adopt regulations to govern light-duty scrap programs statewide, and report to the Legislature to evaluate the overall performance of the program. SB 501 provided a funding mechanism for the implementation of measure M1 – the High Polluter Repair or Removal Account (HPRRA). However, subsequent legislative changes eroded the portion of the HPRRA allocated to M1 to \$1 million a year for fiscal years 1997/1998 and 1998/1999. No additional funding sources have been identified. As a result, no state funding currently exists to conduct a large-scale scrap program or purchase emission reductions from scrapped vehicles as envisioned by SIP Measure M1 and the Legislature.

The ARB conducted the pilot program and adopted light-duty scrap regulations, as described below. In addition, this report serves as a required update to the Legislature on the scrap program. However, it should be noted, that since the lack of adequate funding prevented a large-scale scrap program from being conducted, some of the analysis and comparisons originally requested in the statute are no longer applicable.

The ARB Pilot Program

The ARB's pilot program operated from November 1998 to November 1999 in Southern California. One thousand and one vehicles were scrapped with a \$500 cash incentive for each vehicle. The pilot program confirmed that almost all motorists who scrap a vehicle replace that vehicle with a newer, cleaner car. The scrapped vehicles ranged from about 9 to 34 years old, with the average being about 18 years old. Follow-up surveys found that about 60 percent of vehicle sellers purchased a replacement vehicle, and about one-third replaced the scrapped vehicle with another vehicle they already owned. The remainder, about seven percent, turned to alternative transportation modes such as transit, bicycle or carpooling.

The average replacement vehicle, regardless of whether it was purchased or already in the household, was about 10 years old – or about eight years newer than the average scrapped vehicle. Because the average car on the road is about nine years old, vehicle sellers replaced their scrapped vehicles with vehicles that are about average in age. For additional information about the pilot program, please see the Appendix.

ARB Regulations

In 1998, as required by statute, ARB adopted regulations governing VAVR programs. These regulations provide for privately-operated, market-based VAVR enterprises to purchase and retire eligible vehicles in order to generate mobile source emission reduction credits. These credits may be retired for a clean air benefit, or used by businesses and industries as an alternative compliance option. Local air pollution control or air quality management districts that allow mobile source emission reduction credits to be generated from scrap programs must use ARB's regulations. Under the provisions of SB 501 and the regulation, the State of California will compete in the open market (if funds are available) to purchase scrap credits to meet the emission reduction goals of the 1994 SIP in the Los Angeles area.

The ARB regulations assure that the emission reductions generated from accelerated retirement are real, surplus, quantifiable, and enforceable. The regulations are intended to ensure that the scrapped vehicles were fully operational vehicles that would not otherwise have been immediately retired. Toward this goal, scrapped vehicles must meet registration, and functional and equipment eligibility criteria. In addition, because the emission reduction credits generated from the ARB scrap program can be traded to stationary sources and used in lieu of complying with local rules, the ARB regulations ensure the credits meet the highest possible standard to avoid unintentional increases in net emissions from permitted sources. To ensure this high degree of certainty, the ARB regulation requires that vehicles scrapped for credits must have passed their last biennial Smog Check inspection.

Vehicle scrap enterprises participating in the ARB/district scrap program must notify the local air district of their intention to commence operations, and demonstrate their ability to comply with the regulatory provisions. Local air districts are responsible for approving and issuing emission reduction credits generated from vehicle scrap enterprises. Under the regulation, local districts can initiate any enforcement or remedial action necessary against noncompliant enterprises.

As discussed below, the Board approved minor revisions to the ARB's scrap regulations in 2002 that largely align the vehicle eligibility criteria for the ARB/district scrap programs with the eligibility criteria for a consumer assistance scrap program operated by the Bureau of Automotive Repair (BAR).

Program Performance

This section discusses existing scrap programs, including programs operated under the ARB regulations and BAR's consumer assistance scrap program.

ARB/Local District Scrap Programs

To date, four local air districts have incorporated ARB's regulations and operate light-duty scrap programs – the Santa Barbara County Air Pollution Control District (APCD),

the San Diego County APCD, the San Francisco Bay Area Air Quality Management District (AQMD), and the South Coast AQMD.

Table 1 shows the number of vehicles retired under ARB/district programs. The variation in the number of vehicles scrapped on an annual basis reflects variations in funding as well as the impact of program advertising. In addition, the scrap component of BAR's Consumer Assistance Program, which operated from 2000 through 2001, may have influenced scrap rates for district programs.

Table 1: Vehicles Retired Under ARB/District Regulations
Calendar Years 2000 through 2003

District	2000	2001	2002	2003
Bay Area AQMD	3,887	2,938	3,389	3,576
South Coast AQMD	2,626	1,428	716	1,351
Santa Barbara APCD	249	191	120	0
San Diego APCD	172	84	158	214
Total	6,934	4,641	4,379	5,141

As seen in the table, the scope of the district programs varies widely. For example, the Bay Area AQMD has allocated over \$13 million to vehicle scrap programs since 1996. These funds are allocated from the Bay Area AQMD's Transportation Fund for Clean Air, which is funded by a \$4 per vehicle surcharge on vehicle registration. In contrast, the Santa Barbara County APCD has earmarked \$500,000 in penalty fees for their smaller-scale vehicle scrap program.

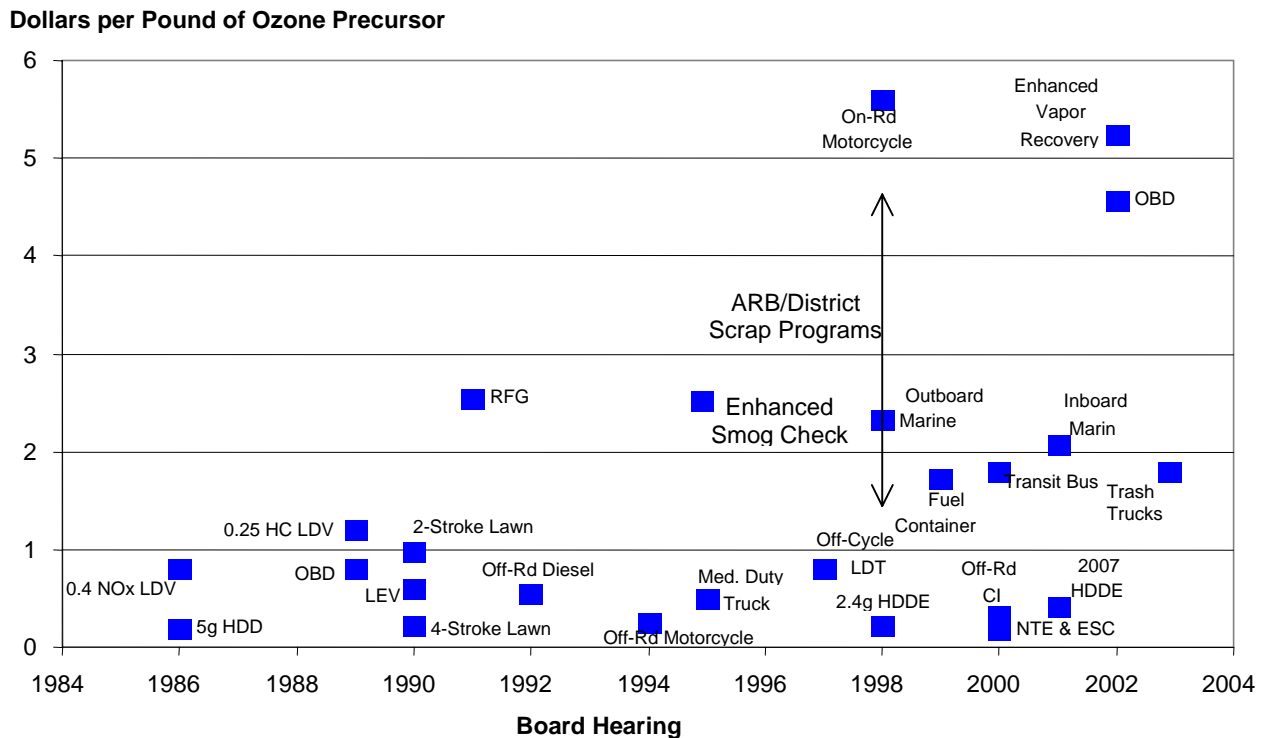
The price paid per scrapped vehicle is relatively consistent among the districts – between \$500 and \$600. Under the ARB's credit calculation guidelines, only 1984 and older vehicles were eligible for the scrap program, until early 2004 when ARB released updated credit calculation tables. Some local districts have opted to limit the scrap program to an older subset of vehicles, for example, 1981 and older vehicles.

In three of the four districts, the light-duty vehicle scrap program depends on district funds. These districts retire all of the emission benefits for clean air. In contrast, in the South Coast AQMD program, district funds are not used to purchase vehicles for scrap, except for contracts awarded under the Rule 2202 Air Quality Investment Program. Private vehicle scrap enterprises purchase and scrap eligible vehicles to generate emission reduction credits. These credits are discounted by 17 percent (to provide a clean air benefit), and can then be purchased by businesses to comply with certain South Coast AQMD rules. The South Coast AQMD regulation includes provisions to address potential toxic and criteria pollutant "hot spots" from use of these emission reduction credits.

The cost-effectiveness of the ARB/district scrap programs varies depending upon the age of the scrapped vehicles. Based on the most recent data reported by the local air districts, the ARB/district scrap programs provide emission reductions at a cost of

approximately \$1.50 to \$4.50 a pound of ozone precursors (reactive organic gases plus nitrogen oxides). Some districts have included administrative and overhead costs in these cost-effectiveness estimates. For comparison, Figure 1 shows the cost-effectiveness of selected mobile source regulations – largely new emission standards. The district/ARB scrap programs are in the mid- to high range as compared to these regulations. However, the cost-effectiveness of scrap programs is comparable to other programs that target in-use light-duty vehicles. For example, the Enhanced Smog Check program, operated by BAR, has an estimated cost-effectiveness of about \$2.50 a pound of ozone precursors.

Figure 1: Cost-Effectiveness of Selected Mobile Source Regulations



BAR Scrap Program

Concurrent with the ARB/district scrap programs, BAR operated a scrap program from July 1, 2000 to December 31, 2001. As one component of their Consumer Assistance Program, BAR offered a scrap program for vehicles that failed the biennial smog inspection. This program provided a safety valve for motorists with failing vehicles who may have had difficulty affording repairs or deemed repair too costly. The important distinction between the ARB/district program and the BAR program is that the ARB/district programs generate mobile source emission reduction credits that can be retired for clean air, or traded and sold. In contrast, the BAR scrap program was not used to generate tradable emission credits. During this time, BAR retired 34,003 vehicles at a total disbursement cost of about \$38 million. In a 2002 demonstration that

California was meeting its SIP goals, ARB took credit for about 1.5 tons per day of emission reductions associated with BAR's scrap program.

Because the price paid to consumers for their vehicles was initially similar at first, the two scrap programs complimented each other. However, when BAR more than doubled the price paid to retire a vehicle from \$450 to \$1,000 per vehicle, concerns about competition with the ARB/district program began to surface. At the time, many stakeholders noted that that BAR vehicle eligibility requirements were less stringent than the ARB/district requirements. In response, in 2001, ARB conducted a fact-finding study, and in 2002 modified the regulations to largely align the vehicle eligibility requirements with the BAR requirements, and allow limited parts recovery of non-emission-related and non-drivetrain parts.

BAR plans to restart their consumer assistance-based vehicle retirement program in 2004, again targeting vehicles that have failed Smog Check. At this time, it is anticipated that BAR will offer approximately \$500 per scrapped vehicle.

Future Scrap Programs

A large-scale scrap program – as envisioned in the original M1 SIP commitment – is still a viable, cost-effective clean air strategy today. In fact, older vehicles will continue to be a significant and increasing portion of the total motor vehicle emissions problem, and a voluntary scrap program is one of the few available methods of obtaining emissions benefits from these vehicles. The ARB has estimated the emission benefits of a voluntary large-scale program that scrapped 1990 and earlier model-year vehicles. Such a program, funded at a level of \$35 million per year for three years, would provide reductions of 7-10 tons per day of smog-forming pollutants (reactive organic gases and oxides of nitrogen). ARB estimates that this type of large-scale program would have a cost-effectiveness of about \$4.50 to \$7.50 per pound of ozone precursors, depending upon program design.

As we consider large-scale scrap programs, we have the opportunity to incorporate advanced technology into the structure of the program. One technology being evaluated is a remote sensing device (RSD), which has the potential to identify gross-polluting vehicles on-the-road. RSD units project a beam of light through the exhaust plume of a vehicle. Because the exhaust plume distorts the light, the sensor receiving the beam of light can infer the pollutant concentration of the exhaust. RSD units generally use a camera to automatically snap a photo of the vehicle license plate. In coordination with BAR, the ARB is in the process of a statewide evaluation of RSD systems and their ability to be incorporated into the Smog Check and scrap programs. This evaluation is due to be completed by the end of 2004. The evaluation program is intended to determine the ability of these systems to accurately identify gross polluters as well as "clean-screen" vehicles that are so clean they can be excused from their biennial Smog Check.

As ARB considers ramping-up statewide scrap programs, we recognize that large-scale scrap programs may encounter issues that have not yet emerged in the relatively small-scale programs thus far. For example, scrapping a high percentage of older vehicles in a particular region may induce migration of older vehicles to fill an economic niche. The program must be designed to consider the impact of an influx of older vehicles, especially those from out-of-state. In addition, large-scale scrap programs may increase prices of older vehicles, affecting the cost-effectiveness of the program as well as possibly affecting low income motorists without other transportation options. Larger-scale programs will also likely need to expand the eligible model years to include newer old cars, lowering the cost-effectiveness of the program. In summary, as we fully develop and implement a large-scale scrap program, it must be designed to ensure the emission benefits are real, and that the unintended consequences are mitigated.

Conclusions

- **Voluntary scrap programs can be a cost-effective means to reducing emissions from in-use vehicles.** Although the cost-effectiveness of local air district scrap programs varies, generally these programs have a current cost-effectiveness of between \$1.50 and \$4.50 per pound of smog-forming pollutants. This compares favorably to other in-use emission reduction programs, such as Smog Check. Larger-scale programs will also be cost-effective, although less so because of the need to expand the eligible model years. Even though these newer old cars still contribute significantly to air pollution, they may be more expensive to purchase. Despite the potential decrease in cost-effectiveness, car scrap remains one of the best ways to reduce emissions from the in-use vehicle fleet.
- **Scrap is an important component of California's clean air plan.** California's current clean air plan, known as the State Implementation Plan, acknowledges the need to continue pursuing funding for future car scrap programs, and commits to bring a scrap measure to ARB, if it is found to be feasible. Car scrapping is also a key feature of Smog Check's consumer assistance program, providing both a safety valve for consumers who cannot afford to repair their vehicles and emission reductions to help improve air quality.
- **Enhancing voluntary scrap programs would clean the air.** California should build on our existing voluntary scrap programs to obtain the maximum possible clean air benefits. Increased statewide funding could expand local district programs, as well as providing additional opportunities for motorists to scrap vehicles outside of when they fail their biennial Smog Check. A large-scale scrapping program can also take advantage of the latest technology to identify a gross-polluting vehicle while it is driving on-the-road and improve the effectiveness of the overall program. A program of \$35 million per year for three years would provide reductions of 7-10 tons per day of smog-forming pollutants.

Appendix: Description of Pilot Program

Description of Pilot Program

Section 44100 et seq of the Health and Safety Code requires the Air Resources Board (ARB) to operate a pilot program to assess the cost and emission reduction benefits of a light-duty scrap program. ARB contracted with Sierra Research to conduct this pilot program in the South Coast Air Basin (Los Angeles area). Between November 1998 and November 1999, a Sierra Research subcontractor procured 1,001 vehicles in Southern California. Vehicles obtained during the program ranged from the 1965 to 1990 model year, with the average being the 1981 model year. About ten percent of the vehicles were 1975 or older vehicles, and about 50 percent were 1981 or older models.

Although it had originally been believed that the offering price would need to be increased during the course of the program, the \$500 per vehicle offering price proved high enough (in the 1998/1999 timeframe) to attract vehicles in sufficient quantities. When advertising, labor and overhead costs were included, and a credit for scrap metal value was applied, the total cost averaged about \$835 per vehicle scrapped. This includes administration of the pilot program.

The pilot program confirmed that almost all motorists who scrap a vehicle replace that vehicle with a newer, cleaner car. Follow-up surveys found that about 60 percent of vehicle sellers purchased a replacement vehicle, and about one-third replaced the scrapped vehicle with another vehicle they already owned. The remainder, about seven percent, turned to alternative transportation modes such as transit, bicycling or carpooling. The average replacement vehicle, regardless of whether it was purchased or already in the household, was about ten years old – or about eight years newer than the average scrapped vehicle.

Sierra Research and their subcontractors performed Inspection and Maintenance-type exhaust emission tests on all scrapped vehicles (which did not have performance issues that prevented testing). In addition, about 80 of the replacement vehicles were obtained for exhaust emission testing. Replacement vehicles had, on average, about half the emissions of the retired vehicles. A subset of the scrapped vehicles also underwent more comprehensive exhaust testing, and evaporative emission testing. Because no replacement vehicles participated in this testing, the report draws no conclusions about the evaporative emission benefits of scrap programs. ARB repaired and retested a subset of these scrapped vehicles. For the vehicles procured through the pilot program, the average repair cost (parts and labor) was \$290. The average reduction in hydrocarbon emissions was 60 to 75 percent while the average reduction in oxides of nitrogen emissions was 40 to 50 percent.

For additional details about the pilot program, please refer to “Operation of a Pilot Program for Voluntary Accelerated Retirement of Light-Duty Vehicles in the South Coast Air Basin” prepared by Sierra Research in September 2000 for the ARB.