

VI. INCREASING PROGRAM EFFECTIVENESS

As the previous chapters show, the Smog Check II program is not achieving the SIP-required emission reductions. It does not meet the SIP emission reduction targets because we have not implemented final cut points, some stations are not fully or properly repairing vehicles that fail inspection, the anticipated evaporative emission test cannot be used because it is not reliable, the program exempts older vehicles that would benefit from repair, and some aspects of the program we assumed in the SIP are not being executed in practice.

This chapter identifies a set of options for improving the Smog Check II program. If the full set of options is implemented, the program can meet the legal emission reduction target in the SIP and satisfy the federal requirements for program performance. Improving the Smog Check II program to achieve the full emission reductions anticipated in the SIP would help areas attain the federal ozone standards on time. It would also allow transportation agencies to find that their transportation programs conform to the SIP, thereby avoiding the loss of federal transportation funding. The full combination of improvement options is needed to meet the SIP target in all Enhanced I/M areas of California in all years.

Because the roadside data analysis in Chapter III provides only a snapshot of program performance, that methodology cannot be used to estimate the benefits in future years of options for improving the program. As discussed in Chapter IV, EMFAC2000 model predictions compare relatively well with the results of the roadside analysis. It also provides the capability to project program performance under various scenarios. Therefore, the analyses in this chapter are based on the ARB-approved version EMFAC2000, and then translated into emissions “currency” that can be compared to the SIP.

A. Public Comments On Program Improvement Options

When the draft report was released in April 2000, we asked for input on ways to improve the Smog Check II program. ARB and BAR held a public workshop on May 2, 2000 to present the draft report. We also held numerous meetings with interested stakeholders and solicited written comments. Based on these comments, we have expanded our discussion of options for improving the Smog Check II program. The suggestions we received from the public for program improvements fall into five general categories:

- ***Improve identification of gross polluters and require more stringent repairs along with state-funded repair incentives*** – A majority of the written and verbal comments we received addressed ways to better identify and repair high-emitting vehicles. Remote sensing was promoted by many commenters as a useful method for identification of high emitters and non-compliant vehicles. Several commenters also felt that we needed to be sure that state-funded repair incentives were adequate to help mitigate the financial impact on vehicle owners.

- ***Send more vehicles to Test-Only stations*** – We received a range of recommendations on the need to increase the number of vehicles sent to Test-Only stations. Requiring inspections at Test-Only stations was acknowledged to produce emission benefits, but some commenters were concerned about the economic impact such a change would have on Test and Repair stations.
- ***Implement more stringent inspection standards*** – There was support for tightening cut points and requiring “full” repairs to all vehicles as a rapid and efficient means of increasing program effectiveness. However, the same commenters also cautioned that tightening cut points too far could lead to diminishing returns.
- ***Expand the number of areas in the Enhanced I/M program*** – At the workshop, there was discussion of increasing the number of vehicles subject to the Enhanced I/M program. We also received written comments recommending expansion of the Enhanced I/M program to additional areas and vehicles.
- ***Eliminate the 30-year rolling exemption*** – We received a range of comments on the rolling exemption. Some were in favor of continuing the exemption because of the impacts on older cars. However, others suggested that we should eliminate both the rolling exemption and the exemption for 1973 and older vehicles. Other commenters suggested annual testing of older vehicles as is currently done in other states.

B. Improvements That Are Already Underway

Some improvements to the Smog Check program are already underway. As discussed in Chapter II, ARB and BAR are working closely with the DMV to identify and correct administrative loopholes that allow vehicles to evade Smog Checks. BAR has also recently enhanced its Consumer Assistance Program, decreasing the required consumer co-payments, while increasing the amount the state will pay for repair assistance and to retire a vehicle that cannot pass Smog Check.

In addition, ARB is working with BAR to bring additional areas in the San Joaquin Valley into the Enhanced I/M program. In 1999, the San Joaquin Valley formally requested that BAR add six additional communities to the Enhanced I/M program: Lodi, Merced, Visalia, Manteca, Tracy, and Turlock. The San Joaquin Valley relied upon Enhanced I/M benefits from these communities in their 1997 SIP for the federal particulate matter standard. Smog Check II is not currently in place in these six communities. Because the San Joaquin Valley failed to meet its 1999 federal ozone attainment date and is now required to identify and implement new emission reduction measures, it is particularly crucial to implement Enhanced I/M in these areas as expeditiously as possible. The expected emission reductions from implementing the current Enhanced I/M program are shown below. Any program improvements would increase the benefits of adding these areas.

**Table VI-1
Potential Emission Reductions from Adding Areas Greater than 50,000 Population
in San Joaquin Valley in 2005¹**

	HC	NOx
Tons per day reductions	0.3	0.9

¹Assumes Lodi, Merced, Visalia, Manteca, Tracy, and Turlock are added to the current Enhanced I/M program, and that the Enhanced program is fully implemented in these areas by 2005. Any program improvements would increase the benefits of adding these areas.

C. Program Improvement Options

Based on the comments we received and our analyses, ARB and BAR have identified the most significant options that we expect would have direct, quantifiable emission benefits. These options, which include many of the elements suggested by commenters, are:

- Improve evaporative emission testing;
- Send more vehicles to Test-Only or high performing Test and Repair stations;
- Implement more stringent inspection standards;
- Implement loaded-mode testing for heavy-duty gasoline trucks;
- Use remote sensing;
- Extend the program to all eligible vehicles registered in a nonattainment region already subject to Smog Check II, beyond the subset of “urbanized” areas (populations above 50,000) currently included in the program; and
- Eliminate the 30-year rolling exemption.

To facilitate comparison of the options, most of the emission reductions in this Section are shown for one year and one area – 2005 in the South Coast Air Basin. We chose this year for comparison purposes because it is the first SIP milestone year in which it is feasible to completely implement all the options discussed in this Section – that is, for a full two-year cycle of vehicles to have been subject to that option. Some of the options below can be implemented by 2002, however, because of the two-year lead-time needed to obtain the **full** benefits of smog check improvements, few options will be completely implemented by 2002.

We show the benefits in the on-road motor vehicle inventory of the applicable SIP for the South Coast, EMFAC7G. The calculations assume that each option has been fully implemented by 2005. Options that apply specifically to other areas are evaluated for those regions. We will provide detailed information about how improvements to the Smog Check program will impact conformity findings directly to local transportation agencies. For comparison purposes, the benefits of the current Enhanced I/M program in the South Coast for the year 2005 are shown in the table below. Please note that all of the numbers presented in this Section are for an

individual area. As a result, these numbers cannot be compared to the statewide performance numbers presented in the Executive Summary.

**Table VI-2
Emission Benefits of Current Smog Check Program
South Coast Air Basin in 2005**

	HC	NOx
SIP commitment	32.9	18.0
Tons per day reductions	27.1	14.1
Percent Toward SIP Target	82%	79%

It is important to note that the year 2005 in the South Coast represents the best scenario for the Smog Check II program. Although the analyses shown in this Section may indicate that implementing a particular group of options will achieve more than 100 percent of the Smog Check II commitment for the South Coast in 2005, that same group of options may still leave other areas short. For example, the Sacramento area has a critical need for NOx reductions and will need all of the options identified, plus additional measures to meet its 2005 attainment demonstration. In addition, the benefits of implementing a combination of options may not be strictly additive – if emissions are lowered by “Option A,” then the benefits of “Option B” may be lower than estimated here.

1. *Improve Evaporative Emission Testing*

Description: The emission reduction commitments in the 1994 SIP assumed evaporative emission reductions equivalent to U.S. EPA’s pressure/purge test. Subsequent evaluation indicated that a complete pressure/purge test can induce evaporative system leaks, thus BAR never implemented the complete pressure/purge test. Instead, BAR implemented a gas cap check (in both Enhanced and Basic areas), however, it is less effective than the pressure/purge test and thus we fall well short of achieving the evaporative emission reductions needed to meet SIP goals. To achieve additional emission reductions, we must improve testing and repair of evaporative emission system failures.

Additional evaporative emission reductions may be achieved through a low pressure test. Arizona has implemented a low pressure test, which may be feasible for California as well. Although the results in Arizona seem promising, ARB and BAR are evaluating the system to determine if induced leaks (due to pinching or damaging of hoses during testing) are a problem. An alternative test that will be evaluated uses smoke injected into the vehicle’s evaporative control system. The vehicle is then visually inspected for leaks indicated by escaping smoke.

As discussed in the draft report, the cost and inconvenience associated with a new evaporative emission test could be offset by requiring only vehicles of a certain age (expected to have evaporative system failures based on field studies conducted by

BAR) to obtain the evaporative test in lieu of one of the biennial tailpipe inspections. This modification would require a legislative change.

A source of evaporative emissions not previously recognized involves liquid gasoline leaks. BAR has already taken the first step to reduce these emissions, initiating a pilot program to assess whether visual inspection can detect liquid leaks. We will also evaluate whether other inspections can be implemented that will more effectively identify liquid leaks.

Further improvements to evaporative testing are particularly critical for the South Coast Air Basin. With the Smog Check shortfalls, it is difficult for the local transportation plan to show conformity with the HC budget in the SIP. Although the cut points for HC are already relatively strict, the evaporative test is significantly underperforming as compared to what we assumed in the SIP, leaving an HC shortfall.

Adding a more thorough evaporative system test would likely increase the inspection test failure rate. However, we expect that many vehicles that fail the more thorough evaporative test would be poorly maintained vehicles that already would be expected to fail the current Smog Check inspection. For these vehicles, the additional evaporative test would only increase the repairs needed to pass the test.

Responsible Agency	BAR to implement test; ARB to assist in developing test
Regulatory Changes Necessary?	Yes to incorporate new test procedures in regulation
Statutory Changes Necessary?	No to implement new evaporative tests Yes to substitute the new evaporative test for an existing tailpipe test
Timing for Implementation	3 months to implement liquid leak check 1 to 2 years to implement low pressure test

**Table VI-3
Potential Emission Reductions from Improved Evaporative Testing
South Coast Air Basin in 2005¹**

	HC	NOx
Tons per day reductions	3.8	0
Additional percent toward SIP target	12%	0%

¹ Assumes full implementation by 2005.

2. Send More Vehicles To Test-Only and/or Higher-Performing Test and Repair Stations

Description: The SIP assumed that 36 percent of vehicles would be directed to Test-Only stations. Currently, about 15 percent of vehicles subject to Smog Check are inspected at Test-Only stations (about 750,000 vehicles per year after being directed by the state for inspection at these stations). Many commenters suggested sending more vehicles to Test-Only stations as a way to improve the benefits of the Enhanced Smog Check program. Existing statutes permit BAR to increase the percentage of vehicles directed to Test-Only stations if emission reductions fail to meet SIP requirements.

A recent BAR report, *“Smog Check Station Performance Analysis”* (dated June 27, 2000), concluded that greater emission reductions are recorded when a vehicle is directed to a Test-Only station for a Smog Check II inspection instead of being allowed to get an inspection at a Test and Repair station. The report shows that for failing vehicles, the emissions after the inspection and repair are 33 percent lower for those vehicles that went to a Test-Only station compared to those that went to a Test and Repair station for initial inspection. (All repairs occur at Test and Repair stations, as Test-Only stations cannot perform emission system repairs.)

From the customer’s perspective, Test-Only stations can be inconvenient. If your car fails Smog Check at a Test-Only station, you must then take the car to be repaired, and then return to the Test-Only station to be re-tested and certified. On the other hand, if your car fails at a Test and Repair station, that single location can test, repair, re-test, and certify the vehicle. (Vehicles identified as gross polluters at Test and Repair stations must go to Test-Only stations to be re-tested and certified.) To determine if we could obtain the benefits associated with Test-Only stations while minimizing inconvenience to consumers, BAR also analyzed the roadside data to determine if there were Test and Repair stations that recorded the same emission reduction benefits as Test-Only stations.

BAR developed a methodology for ranking stations by relative performance – using the profile of vehicles tested at each station to develop an “expected” failure rate and then comparing the station’s actual failure rate to that “expected” rate. BAR used roadside data to compare the top 25 percent of ranked stations to the performance of Test-Only stations. As shown in Table VI-4, the top 25 percent of the Test and Repair stations (e.g., not necessarily the current Gross Polluter Certification pilot stations) achieve the same emission reductions as the Test-Only stations.

**Table VI-4
Comparison of Emissions Measured at Different Types of Stations
ASM 2525 Test for Hydrocarbons; 1980-1991 Vehicles**

	Before Smog Check	After Smog Check	% Reduction
All Test and Repair Stations	82 ppm	69 ppm	17%
Top 25% of Test and Repair Stations	98 ppm	55 ppm	44%
Test-Only	98 ppm	57 ppm	42%

The Test-Only number is a weighted average calculated from Table 5 in BAR's station performance report, dated June 27, 2000. The Test and Repair numbers come from Table 7.

If high-performing stations were allowed to perform the same functions as Test-Only stations, it would triple the number of stations eligible to test directed vehicles. Directing more vehicles with suspected high emissions to high performing inspection stations, whether they are Test-Only or the best performing Test and Repair stations, would result in greater emission reductions.

It is not possible to accurately estimate the impact of this program change on reported vehicle failure rates because it is anticipated that many vehicles will be pre-inspected or pre-repaired prior to the official smog inspection. However, more vehicles would be expected to fail the smog inspection and receive better repairs than under the current program. Our assessment of the potential benefits is shown in Table VI-5.

Responsible Agency	BAR to implement
Regulatory Changes Necessary?	No regulatory changes to direct additional vehicles to Test-Only stations or high performing Test and Repair stations. Regulations needed to establish criteria for high performing Test and Repair stations.
Statutory Changes Necessary?	No
Timing for Implementation	4 months to direct vehicles to Test-Only stations 6-18 months to complete regulations to establish criteria for high performing Test and Repair stations.

**Table VI-5
Potential Emission Reductions from
Directing Additional Vehicles to Test-Only and High-Performing Stations
South Coast Air Basin in 2005¹**

	HC	NOx
Tons per day reductions	0.8	2.5
Additional percent toward SIP target	2%	14%

¹Assumes full implementation by 2005

3. *More Stringent Inspection Standards*

Description: The SIP assumed that vehicles would be inspected using more stringent inspection standards, or “cut points,” than are currently in place. Increasing cut point stringency would increase the number of high emitting vehicles identified and repaired. Some commenters recommended tightening cut points, however others cautioned that California may soon reach the point of diminishing returns – when the emission benefits from failing additional vehicles is outweighed by the large number of vehicles failed.

Implementation of cut points at approximately halfway between the current levels and the final cut points envisioned in the 1994 SIP would provide a significant increase in program effectiveness for controlling NOx emissions. Going to interim cut points would cause a small increase in the vehicle failure rate. This increase is minor because we expect more car owners to pre-inspect and pre-repair their vehicles as cut points are tightened – minimizing the failure rate at smog stations. Increases in failure rates are also likely to increase repair costs by an unknown amount. From a program implementation perspective, this is an easy and low cost option to implement. BAR could reduce cut points electronically in one day. Current regulations allow a 30 percent reduction in the cut points in place now. The interim cut points could be implemented under this regulation. Minor modifications would be needed to implement the final SIP cut points.

More stringent NOx cut points are especially critical to the Sacramento area. Over half of the smog-forming emissions in the Sacramento area are from mobile sources, and the need for NOx emission reductions is acute. With the Smog Check II shortfall, it is particularly difficult for the local transportation plan to show conformity with the NOx budget in the approved SIP. Tighter NOx cut points are critical for the Sacramento area to demonstrate conformity this summer to remain eligible for federal highway funding.

The draft report discussed an alternative way to implement tighter cut points, requiring those vehicles that are failed to be fully repaired. That is, the cut points following repair would be more stringent than the standards used initially to inspect the vehicle. For example, the pass/fail cut points for the *initial test* could be set at the interim cut points described above, but those vehicles that fail the initial inspection could

be required to be *fully repaired* to the tighter, final cut points. This option would obtain additional emission reductions without increasing the vehicle failure rate. This approach has advantages, such as achieving additional emission reductions from those vehicles already failing Smog Check, thus increasing repair but not inspection costs. However, because of the longer lead-time needed to implement this alternative, at this time we are focusing on reducing cut points to interim levels as a first step.

Responsible Agency	BAR to implement new inspection standards; ARB to assist in developing new inspection standards
Regulatory Changes Necessary?	No for interim cut points Yes for final cut points
Statutory Changes Necessary?	No
Timing for Implementation	60 days for interim cut points

**Table VI-6
Potential Emission Reductions from Increasing Cut Point Stringency
South Coast Air Basin in 2005¹**

		HC	NOx
Interim NOx Cut Points (halfway between current & SIP)	Tons per day reductions	0	2.2
	Additional percent toward SIP target	0%	12%
SIP Cut points	Tons per day reductions	0.5	3.3
	Additional percent toward SIP target	2%	18%

¹Assumes full implementation by 2005

4. Loaded-Mode Testing for Heavy-Duty Gas Trucks

Description: The emission reduction commitments in the 1994 SIP assumed that all gasoline-powered heavy-duty trucks with a gross vehicle weight between 8,500 to 14,000 pounds would be tested under loaded-mode conditions on a dynamometer. BAR has legal authority to test heavy-duty gas trucks on dynamometers, but currently performs only two-speed idle testing because inspection standards for heavy-duty trucks have not yet been developed. The inspection test equipment in use now is designed to handle most vehicles up to 14,000 pounds gross vehicle weight, including personal vehicles. Some large vehicles, especially some motor homes and commercial vehicles with a large fixed load, may be too wide or too heavy for the dynamometer and would continue to be tested with the existing two-speed idle test.

To implement this measure, ARB and BAR will need to develop cut points and test protocol to use in testing the applicable heavy-duty trucks, and BAR will also need to modify their regulations to incorporate the cut points.

Responsible Agency	BAR to implement and adopt regulations; ARB to assist in developing cut points
Regulatory Changes Necessary?	Yes to incorporate cut points into regulation
Statutory Changes Necessary?	No
Timing for Implementation	12 to 18 months

**Table VI-7
Potential Emission Reductions from Loaded-mode
Testing of Heavy-Duty Gasoline Vehicles
South Coast Air Basin in 2005¹**

	HC	NOx
Tons per day reductions	0.6	3.0
Additional percent toward SIP target	2%	17%

¹Assumes full implementation by 2005

5. Remote Sensing

Description: Many commenters suggested a role for remote sensing in the Smog Check program, particularly to identify high-emitting vehicles. Remote sensing is a technology that can be used to measure emissions as a vehicle drives by a fixed roadside sensor. The technology has been shown to be useful in assessing emissions of the fleet as a whole. However, earlier pilot evaluations identified limitations and uncertainties regarding its ability to correctly identify individual, higher-emitting cars. Two uses have been postulated which could improve the benefits and cost effectiveness of Smog Check II. The first involves using remote sensing to identify the very high-emitting vehicles and require that they obtain an inspection and repair. The presence of remote sensing could also encourage good maintenance habits and deter tampering with emission controls. The second use is to clean screen vehicles, which could be exempted from their next inspection. A large-scale pilot program is needed to validate the use of remote sensing for these purposes. The pilot would be designed to provide a quantification of the benefits as well as addressing the impact on vehicle owners.

Responsible Agency	BAR to conduct pilot study
Regulatory Changes Necessary?	No
Statutory Changes Necessary?	No
Timing for Implementation	6-12 months to initiate pilot program 18-month pilot program

Because the pilot study will help determine the most appropriate way to use remote sensing as part of the Smog Check program, at this time it is not possible to estimate the emission reduction benefits from this option. Depending upon how remote sensing will be incorporated into the Smog Check program, statutory and regulatory changes may be needed in the future.

6. Extend the Program to All Eligible Vehicles Registered in a Nonattainment Region Already Subject to Smog Check II

Description: Because only “urbanized” areas are subject to Enhanced I/M, only a portion of the vehicles in each nonattainment area are directed to loaded-mode testing. This creates inequities within the nonattainment area, particularly if many vehicles registered in the non-urbanized portion of the county commute into urban centers on a daily basis. This situation is particularly acute in the Sacramento nonattainment area because although the SIP assumed that 100 percent of the vehicles are subject to Enhanced I/M, in reality only the 79 percent within the Sacramento urbanized area are directed to loaded-mode testing. Some commenters, including the Sacramento Metropolitan Air Quality Management District, suggested including all vehicles within a nonattainment area in the Enhanced I/M program. The other area which would significantly benefit from this proposal would be the San Joaquin Valley. Currently only 69 percent of the vehicles in the San Joaquin Valley nonattainment area are directed to loaded-mode testing. The estimated benefits shown in Table VI-8 assume that the current Smog Check II program is extended to the entire Sacramento federal ozone nonattainment area. Any improvements to the program will increase the benefits of this option.

Responsible Agency	BAR
Regulatory Changes Necessary?	Yes
Statutory Changes Necessary?	Yes
Timing for Implementation	18 months after effective date of legislation

**Table VI-8
Potential Emission Reductions from
Adding Remaining Portions of Nonattainment Area
Sacramento in 2005¹**

	HC	NOx
Tons per day reductions	0.2	0.7
Additional percent toward SIP target	4%	10%

¹Assumes full implementation by 2005

7. Eliminate the 30-Year Rolling Exemption

Description: In 1997, the Legislature modified the Smog Check II program to exempt pre-1974 vehicles from the program. Beginning in January 2003, this legislation exempts motor vehicles 30 or more model-years old from all Smog Checks. Because older vehicles contribute a disproportionate amount of emissions (despite their relatively low numbers and use) excluding older vehicles from the program reduces the effectiveness of the Smog Check program.

The impact of exempting only the pre-1974 vehicles would diminish over time due to vehicle retirement. However, the 30-year rolling exemption essentially institutionalizes the loss in emission reductions. If the rolling exemption were repealed, as pre-1974 vehicles become an ever smaller part of the fleet through retirement, the impact of exempting only these vehicles would become negligible.

There are two approaches to “recover” the lost emission benefits: repeal the 1973 and older vehicle exemptions, or repeal the rolling exemption. Since the pre-1974 vehicles have been exempted since 1997, reintroduction of these vehicles into the biennial inspection cycle might result in relatively high failure rates and associated high repair costs. In addition, consumers owning pre-1974 vehicles might feel like something has been taken away from them and strongly oppose the change. On the other hand, repeal of the rolling exemption may not generate the same level of opposition because the approximately 400,000 vehicles that would be affected (1974 and newer) are currently included in the biennial inspection cycle. Because they have not been exempted yet, nothing would be taken away by repealing the exemption. Eliminating the 30-year rolling exemption would require a statutory change.

Responsible Agency	DMV to mail smog inspection notices
Regulatory Changes Necessary?	No
Statutory Changes Necessary?	Yes
Timing for Implementation	Immediate once statutory changes are effective

**Table VI-9
Potential Emission Reductions from
Eliminating the 30-Year Rolling Exemption
South Coast Air Basin in 2010¹**

	HC	NOx
Tons per day reductions	0.7	0.3
Additional percent toward SIP target	2%	3%

¹Emission reductions are shown for the year 2010 (in South Coast) because the 30-year rolling exemption does not take effect until 2003.