

**Annual Report
on the
Automobile Inspection and Readjustment Program**



**Colorado Department
of Public Health
and Environment**

July 1, 2007

Annual AIR Program Report

I. EXECUTIVE SUMMARY

The Air Quality Control Commission is the regulatory board that regulates Colorado's Automotive Inspection and Readjustment (AIR) Program. By C.R.S. 42-4-306(9) the Commission is required to continuously evaluate this program to ensure compliance with the state implementation plan and federal law. The evaluation includes assessments of:

- The cost-effectiveness, air pollution control-effectiveness;
- A determination of the number of vehicles that fail to meet the applicable emissions standards after adjustments and repairs, and;
- Assessment of the methods of controlling emissions from model year 1981 or later that are equipped with On-Board Diagnostic (OBD) systems;
- An assessment of in-use vehicle emissions performance levels by random testing of a representative sample of at least one-tenth of one percent of the vehicles subject to the enhanced emissions program requirements.

During 2006, approximately 1.2 million initial emissions inspections were performed with 750,000 inspections in the enhanced area and 340,000 in the basic area. Approximately 520,000 vehicles in the fleet were exempted from inspection due to the new vehicle exemption for the first four model years.

Vehicles in the enhanced program had a failure rate of 5.7% for the IM 240 inspection test procedure and 12.6% for the enhanced idle test procedure. The rate of failure in the basic program areas of Larimer, El Paso, and Weld counties was 7.8%. The net cost of the total program during 2006 was estimated to be approximately 31.8 million. Estimates of the cost-effectiveness of the enhanced program, based on various methodologies, range from \$200 to \$700 for each ton of carbon monoxide eliminated by the program.

In February of 2005 the Commission voted to discontinue the basic program in Larimer, El Paso, and Weld counties. This element of the program was discontinued as scheduled on January 1, 2007. This action was based on long-term compliance with the National Ambient Air Quality Standards for carbon monoxide in those areas.

To improve motorist convenience, the state administers a remote sensing clean screen program in the North Front Range and Denver metropolitan I/M areas. In 2006, approximately 36,000 vehicles were clean-screened and received I/M passes in the North Front Range and Denver metropolitan areas. With program changes this number is expected to increase in future years.

The Commission estimates the program carbon monoxide benefit ranges from 10% to 16%, depending on the measurement methodology used. Remote sensing studies estimate a 10% benefit, 10% based on MOBILE 6.2, to 16% from inspection lane data.

II. AIR POLLUTION CONTROL EFFECTIVENESS OF THE AIR PROGRAM

The purpose of the AIR Program is to reduce automotive emissions through the detection and repair of excessively emitting vehicles. Vehicles that fail a vehicle emissions test must pass a subsequent retest in order to operate within the program area, unless they qualify for a waiver. The effectiveness of Colorado's AIR Program is based on the emissions reductions resulting from the repair of vehicles that exceed established standards for carbon monoxide, hydrocarbons, and oxides of nitrogen. The program benefit is derived from the effective repair of failing vehicles. To improve motorist convenience, the State administers a remote sensing clean screen program in the North Front Range I/M and Denver metropolitan areas. Vehicles demonstrating clean emissions when monitored through remote sensing are eligible to receive an I/M pass, and do not need to undergo further I/M inspection.

There are four ways to measure the air pollution reductions that may be attributed to the AIR Program. They are: 1) measurements of ambient air quality data; 2) on-road emission measurements using remote sensing; 3) IM240 inspection lane data; and 4) estimates using EPA's MOBILE model. Ambient air quality studies have not been able to quantify the ambient carbon monoxide (CO) benefit attributable to the AIR Program. On-road remote sensing measurements have measured benefits of 10% for CO and no benefits for hydrocarbons and nitrogen oxides. EPA's MOBILE 6 model estimates an overall benefit of 10% for CO that can be attributable to the AIR Program.

The air pollution control effectiveness of the AIR Program may be reduced in several ways. First, motorists may register their vehicle outside the program area. Second, approximately 21% of the vehicles that failed the IM240 test procedure did not pass a subsequent retest; some or all of these vehicles may continue to operate in the program area without repairs. Third, there is little enforcement of the prohibition against smoking vehicles. Fourth, repairs as measured in the inspection lanes may not be effective or long lasting. Finally, statutory exemptions and waivers knowingly allow some high-emitting vehicles to operate in the program area. For example, motor vehicles registered as collector's items are exempt from periodic inspection requirements, and high-emitting vehicles that cannot be repaired effectively are entitled to a Certification of Emissions Waiver if the owner spends the required amount (\$715) on appropriate repairs.

The air pollution control effectiveness of the AIR Program may be increased in other ways. Additional emissions reductions may be derived as a result of motorists performing maintenance on their vehicles to avoid failing an inspection; or by retiring older, problematic vehicles. However, this may also occur absent any emissions testing program. The benefits of these potential emission reductions have not been quantified in this report.

A. Inspection and Repair Effectiveness

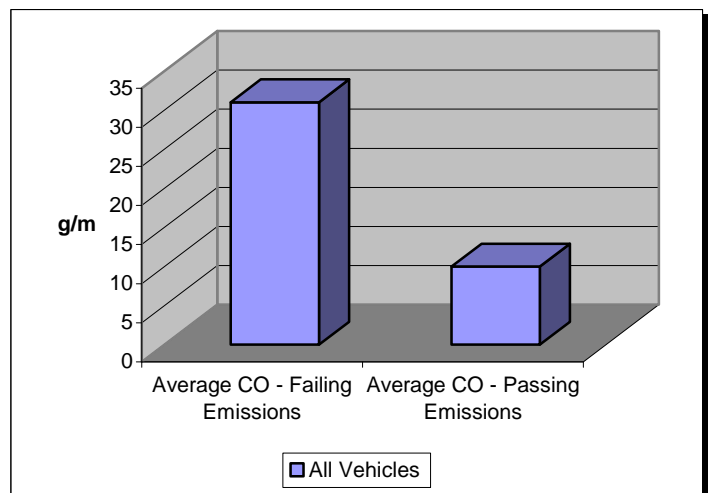
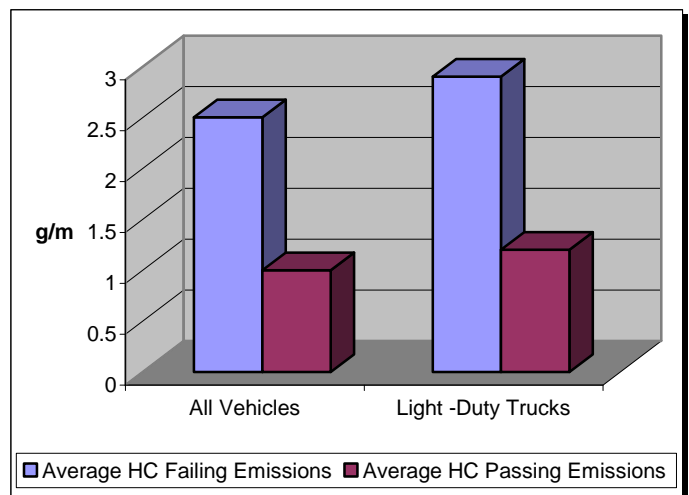
The AIR Program uses regularly scheduled emissions tests to identify vehicles with emissions greater than the prescribed standards. The IM240 test is used on 1982 and newer light-duty motor vehicles in the Denver metropolitan enhanced program area. The idle test is used on 1981 and older vehicles and all heavy-duty motor vehicles in the enhanced program area. The idle test is also used on all vehicles in the basic program areas.

In 2006, 754,319 vehicles underwent IM240 testing in the enhanced program area. Of these, 44,215 vehicles failed their first emissions test, resulting in a failure rate of 5.9%. Also in 2006 76,641 vehicles underwent the two-speed idle test in the enhanced program area. Of these, 9,687 failed their initial test, resulting in a failure rate of 12.6%. There were 337,277 initial idle test inspections performed in the basic area (Colorado Springs, Greeley, and Fort Collins areas), resulting in 26,105 initial failures for an average failure rate of 7.7%.

1. Repair Effectiveness

The inspection station data show that motor vehicle repairs reduce emissions of hydrocarbons. Hydrocarbons are a group of pollutants that contribute to ground level ozone pollution. Vehicles that failed their initial IM240 test (44,215) emitted an average of 2.5 grams of hydrocarbons per mile. Upon passing a retest, these same vehicles emitted an average of 1 gram of hydrocarbons per mile. This is a 60% reduction in the amount of hydrocarbons emitted by these vehicles. Light-duty trucks that failed their initial test emitted an average of 2.9 grams of hydrocarbons per mile. On a passing retest these same vehicles emitted an average of 1.2 grams per mile. This is a 59% reduction in the amount of hydrocarbons emitted by these vehicles. Vehicles that passed the IM240 test on the initial attempt emit an average of 0.4 grams of hydrocarbons per mile.

Inspection station data indicate that repairs to failing vehicles significantly reduced the emissions of carbon monoxide. Vehicles that failed their initial IM240 test emitted an average of 31 grams of carbon monoxide per mile. On a passing retest these same vehicles emitted an average of 10 grams of carbon monoxide per mile. This is a 68% reduction in the amount of carbon monoxide emitted by these vehicles.



Light-duty trucks that failed their initial test emitted an average of 35 grams of carbon monoxide per mile. On a passing retest these same vehicles emitted an average of 13 grams per mile. This is a 63% reduction in the amount of carbon monoxide emitted by these vehicles. Vehicles that passed the IM240 test on the initial attempt emit an average of 5 grams of carbon monoxide per mile.

Vehicles that initially fail and subsequently pass a retest are assumed to have been repaired. Their average IM240 measured CO emissions reductions are given above. When remote sensing is used to measure similar vehicles, typically the measured I/M CO benefit is one-half of that measured by the IM240 test.

The inspection station data also show that vehicles passing a retest have increased emissions of oxides of nitrogen. This result is expected because many repairs that reduce carbon monoxide and hydrocarbon emissions tend to increase the emissions of oxides of nitrogen. Oxides of nitrogen are another pollutant that contribute to the formation of ground level ozone pollution but under some conditions may potentially cause a decrease in ozone.

2. Vehicles That Fail to Pass the Test after Required Repairs

Section 42-4-306(9)(b), C.R.S. requires a determination of the number of motor vehicles that fail to meet the applicable emission standards after the required repairs are made. During 2006, 793 waiver applications, which include 46 “Hardship” waivers, were qualified and approved for an emissions waiver. These vehicles emit approximately 1.1 excess tons of carbon monoxide daily or 398 tons per year.

3. Methods of Controlling Emissions from Vehicles Equipped with Microprocessor-Based Emissions Control Systems and On-Board Diagnostic Systems

On-board-diagnostic and illuminated malfunction indicator lamp checks have been required for 1981 and newer vehicles. The inspection procedure for these vehicles includes a visual check to ensure that the overall system integrity is intact. In October of 2002, the Commission made these inspections advisory-only checks. In making this decision, the Commission considered the air pollution control effectiveness of continuing to fail computer-equipped vehicles for an illuminated Malfunction Indicator Lamp (MIL), and the air pollution control effectiveness of the On Board Diagnostic (OBD II) system used on 1996 and later light-duty vehicles.

B. Improving the Air Pollution Control-Effectiveness of the Program

The Commission believes that a broader application of remote sensing technology will improve the air pollution control-effectiveness of the program. Remote sensing is a method for monitoring vehicle emissions while simultaneously photographing the license plate when a vehicle passes through infrared and ultraviolet beams of light.

Remote sensing technology provides a means for the Department to identify on-road high-emitting vehicles. It also helps to determine whether motorists are continuing to drive vehicles in the program area after failing an emissions test, or if a malfunction has occurred since the last inspection. This technology can identify motorists who avoid the program by illegally registering high-emitting vehicles outside the program area.

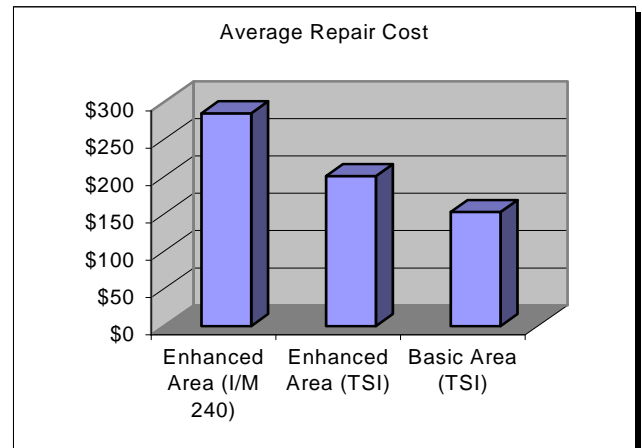
Rapid identification and repair of smoking vehicles is another way to improve the air pollution control-effectiveness of the program. Smoking vehicles produce fine particles, which are a major contributor to the "brown cloud" observed in the Denver area. Each month, the Department receives more than 500 complaints about smoking vehicles. More effective enforcement, additional utilization of training resources for law enforcement and/or environmental officers, and increased penalties will reduce the number of smoking vehicles. Training to detect and repair smoking vehicles is available through the Department.

III. COST EFFECTIVENESS OF THE PROGRAM

The Commission estimates that the entire program cost was approximately 31.8 million for 2006. This figure reflects the costs of both the enhanced program and the basic program. The Denver enhanced component of the program cost 22.6 million in 2006.

A. Calculation of Program Costs

The cost of the AIR Program consists of inspection costs, repair costs, and registration renewal fees used to fund administrative costs. Calculation of program costs does not include the expense of motorists' time and mileage necessary to demonstrate compliance with the program. The biennial fee for the IM240 inspection in the enhanced area is \$25. The annual fee for the idle test has an upper limit of \$25, but varies by test provider. Registration renewal fees include a \$2.20 fee to offset the cost of enforcing and administering the program.



The average cost of repairs for vehicles failing the IM240 inspection is \$272. The average cost of repairs for a vehicle failing the idle test in the enhanced area is \$162. The average cost of repairs for vehicles failing the two-speed idle test in basic areas is \$155. These repair costs are based on a sampling by survey of individual vehicles that required repairs. The cost of the program is partially offset by increased fuel economy to repaired vehicles. In these calculations, fuel economy improvements and repairs are assumed to last for two years. Information from other states suggests that EPA's fuel economy improvement rates may be slightly high.

B. Cost-Effectiveness

The Commission has estimated the cost-effectiveness of the program based on remote sensing, inspection station data, and computer modeling. Each method yields different results. The cost-effectiveness estimates range from \$200 to \$700 per ton of carbon monoxide reduction, reflecting the uncertainties associated with the estimates used to derive emission reductions associated with the program.

C. Improving the Convenience and the Cost-Effectiveness of the Program

The Commission believes that it is not cost-effective or necessary to inspect all vehicles in order to locate the relatively small number of excess emitting vehicles that need to be repaired. A clean or dirty screen program can reduce the number of motor vehicles that must be tested at inspection stations. A clean or dirty screen program requires inspections for only those vehicles that are identified to be producing emissions greater than the standards. Clean screening vehicles can consist of remote sensing, emissions profiling, and model year exemptions. A clean or dirty screen program would be more convenient for the public and should be less costly than the current program configuration.

Participation in the remote sensing clean screen program is voluntary. The following table gives a general summary of that program for calendar year 2006.

North Front Range and Denver Metropolitan Clean Screen Program 2006	
Number of “plate-matched” RSD records.	2,662,306?
Number of matched vehicles meeting clean screen requirements, notified, and completing the clean screen process.	36,000

Legislation passed in 2006 provided impetus to find successful solutions to motor vehicle emission controls with a minimum impact on the public. HB06-1302 mandates the increased use of remote sensing, including a high-emitter identification program in the Denver-metro area. A plan implementing the program was presented to the Air Quality Control Commission in December 2006 that included an expanded remote sensing program in Denver.

A regulatory hearing before the Air Quality Control Commission will occur in October 2007 for the purpose of adding a pilot program to identify high-emitting vehicles.

IV. ANNUAL REPORT FROM THE COLORADO DEPARTMENT OF REVENUE

2006 Program Performance

The Department of Revenue operated the enhanced centralized emissions test system in the Denver metro area in 2006 for the twelfth consecutive year of the program. It was also the twelfth year that two different programs and two different emissions test procedures were utilized at the same time within Colorado's Front Range.

Audits Performed:

Performance Audits -	1875
Equipment Audits -	846
Covert Audits -	319
Clean Screen Audits -	145
Record Audits -	151

Revenues Collected:

In 2006, the Department of Revenue collected \$350,871 from the sale of AIR Program documents that was transferred to the AIR account.

Waivers:

In 2006, 793 waiver applications were submitted and processed by the Department of Revenue. Of those applications, 358 or 45% met statutory requirements and were approved. The major causes for waiver rejection were as follows:

- **Improper repairs to the vehicle** - repairs performed that did not address the cause of the emissions failure.
- **No after repairs failing retest** - vehicle had not completed the required after repairs test indicating the vehicle continues to fail after completion of necessary repairs.
- **Minimum waiver limits for dollars spent to repair the vehicle had not been met** - vehicle owner had not incurred the minimum \$715 in repair costs attempting to bring the vehicle into compliance

In 2006, Department of Revenue issued an additional 46 hardship waivers to vehicle owners as a result of an economic hardship qualified by documented public assistance or welfare.

Complaints:

During 2006, the Department of Revenue received a total of 540 complaints. The contractor had 483 of these complaints filed against them. Independent emission stations and licensed motor vehicle dealers had 57 complaints filed against them. The contractor complaints included wait time issues, improper inspections, test procedures, improper VIN inspections, body damage, and engine and transmission damage. The percentage of complaints about the contractor that were proven to be unfounded or inconclusive is 50%.

Complaints concerning independent stations and licensed dealers included personnel issues, emissions requirements when selling vehicles, repair effectiveness, and test procedures. The percentage of independent stations and motor vehicle dealer complaints that were proven to be

unfounded or inconclusive is 36% of the time. A total of \$114,954 was returned to motorists as a result of complaint negotiations conducted by the Department of Revenue.

Hearings:

The Department of Revenue conducted 208 hearings in 2006 for violations of program law or regulations. The contractor was involved in 146 administrative hearings, 72 station violations, and 74 inspector violations. The independent stations were involved in 62 hearings, 31 station violations, and 31 mechanic violations.

V. ADDITIONAL REPORTS

In addition to this summary report, the following detailed reports are available upon request:

Report	Objective
Initial Inspection Report	Identify and report AIR Program initial inspection pass/fail statistics including average emissions results for overall total, passing and failing inspections by model year and vehicle class.
Initial Failure Report	Identify and report AIR Program initial inspection failure statistics including average emissions results for inspections which failed for both exhaust and visual components, exhaust only, and visual only by model year and vehicle class.
Initial Exhaust Failure Report	Identify and report AIR Program initial exhaust failure statistics by model year and vehicle class.
Initial Visual Failure Report	Identify and report AIR Program initial visual failure statistics by model year and vehicle class.
Retest Pass Reduction Report	Identify and report AIR Program passing retest inspection statistics by model year and vehicle class.
Retest Waiver Reduction Report	Identify and report AIR Program waived retest inspection statistics by model year and vehicle class.
Retest Frequency Report	Identify and report AIR Program retest inspection statistics including multiple retests frequency and emissions repair reductions to emissions standards.
Basic Test Reports	Various reports on the basic (two-speed idle) test system including numbers of vehicles tested by model year, repair costs, mean emissions for both passing and failing vehicles, and smoking vehicles failures.