



Economic Impact Analysis Virginia Department of Planning and Budget

9 VAC 5-91 – Regulations for the Control of Motor Vehicle Emissions in Northern Virginia Area

Air Pollution Control Board

July 13, 2001

The Department of Planning and Budget (DPB) has analyzed the economic impact of this proposed regulation in accordance with Section 9-6.14:7.1.G of the Administrative Process Act and Executive Order Number 25 (98). Section 9-6.14:7.1.G requires that such economic impact analyses include, but need not be limited to, the projected number of businesses or other entities to whom the regulation would apply, the identity of any localities and types of businesses or other entities particularly affected, the projected number of persons and employment positions to be affected, the projected costs to affected businesses or entities to implement or comply with the regulation, and the impact on the use and value of private property. The analysis presented below represents DPB's best estimate of these economic impacts.

Summary of the Proposed Regulation

The Air Pollution Control Board proposes over 140 amendments to the current regulations for motor vehicle emissions in northern Virginia. The most significant changes are the following:

- Exemption from emissions testing will be changed from 1968 and older model year vehicles to 25-year-old and older vehicles.
- On-board diagnostic system test will replace the other emissions tests and diesel vehicles will be subject to the emissions inspection.
- Two-speed-idle emissions test standards will be tightened.
- Acceleration-simulation emissions test standards will be relaxed, and procedural requirements for the testing will be removed.

- Remote sensing emissions test standards will be relaxed, and the agency will be provided more flexibility in using various pollutants as test criteria.

Estimated Economic Impact

Vehicle owners in northern Virginia, as well as regular commuters into the area are subject to the emissions inspection/maintenance (I/M) program. Vehicle emissions contain pollutants that contribute to the formation of ozone such as hydrocarbons (HC) and nitrogen oxides (NO_x), and other pollutants such as carbon monoxide (CO). The emissions originate from the exhaust when the car is running, and from the fuel system when the fuel evaporates due to high temperatures during the day or vapor escapes during refueling. Four general approaches to reduce emissions from motor vehicles include improvements in motor vehicle technology, improvements in fuels, transportation controls, and I/M programs. (Calvert et al., 1993) These regulations describe the procedures and set standards for the Virginia I/M program.

The effectiveness of the current I/M programs has been subject to debate. Early evidence indicates that the large number of vehicles, varying emission characteristics of vehicles, the behavior of drivers who have an incentive to avoid regulations, and the costs of the program limited its effectiveness in reducing actual emissions. (Harrington et al., 1999:1, Hubbard, 1997, Anderson, 1992, McConnel, 1990) However, there is a general agreement that the effectiveness of the I/M programs can be improved significantly by new technology such as on-board diagnostic systems and remote sensing.

Vehicles are a significant source of emissions. (Anderson, 1990, Rueff, 1992) Most of the nearly 1.2 million affected vehicles in northern Virginia have emissions control equipment. Newer vehicles are typically much cleaner than the old ones. The total amount of vehicle emissions in northern Virginia is decreasing very slightly.¹ This is because the increase in the number of vehicle miles traveled on highways offsets much of the technological progress in vehicle emissions control over the same two decades.

The emissions inspection program helps ensure that vehicles operate as cleanly as possible. The program identifies vehicles that have high emissions as a result of one or more malfunctions and requires repairs. Minor malfunctions in the emissions control system can increase emissions significantly. The average car can emit three to four times the carbon

monoxide and hydrocarbons, and NO_x allowed by the new standards if emission control systems are malfunctioning. It is usually not obvious which vehicles have malfunctions as the emissions themselves may not be noticeable and emission control malfunctions do not necessarily affect vehicle drivability. The program provides a way to check whether the emission control systems on a vehicle are working correctly. The program is designed to ensure that vehicles stay clean during actual use. This, in turn, can substantially reduce the amount of pollutants emitted to the air, thereby reducing the formation of ozone and contributing toward attainment of the ambient air quality standards.

The Virginia program covers 24-year-old or newer gasoline-powered cars and trucks, with up to 10,000 pounds gross vehicle weight rating. Exempt vehicles from the inspection include diesels, motorcycles, registered antique vehicles, and fire and rescue equipment. An emissions inspection is required every two years at a permitted inspection station. The station may charge up to \$20. In addition, the Department of Motor Vehicles (DMV) collects a \$2 per year administrative fee at the time of registration. This fee is used to cover the administrative costs of the program including program staff salaries, computer equipment and support, emissions inspector and technician training, program evaluation studies, and pilot projects. Thus, the inspection cost to the vehicle owners associated with the test is approximately \$24 every two years. Most inspections take at least 13 minutes, which does not include the time spent waiting in line or traveling to and from the inspection station. The inspector issues a vehicle inspection report after the appropriate tests are performed. If the vehicle does not pass the inspection, necessary repairs are required. After the repairs, the vehicle must be re-inspected. Re-inspection is free if performed within 14 days at the facility that performed the initial inspection. The owner of a vehicle that does not pass the re-inspection may obtain a waiver if a specified amount; i.e., currently \$460, has been spent on emissions-related repairs for the vehicle.

Currently, two types of tests are used to measure emissions. The acceleration simulation mode (ASM) test is required from most 1981 and newer vehicles with a gross vehicle weight rating up to 8,500 pounds. ASM test is performed on the majority of vehicles subject to the emissions inspection program. This test is performed on a dynamometer or a treadmill, which

¹ Source: The agency

allows the inspector to run the vehicle at 15 mph and 25 mph. Some vehicles may not be able to receive the ASM test due to mechanical features such as all-wheel drive, full-time four-wheel drive, or traction control that cannot be turned off. These vehicles are tested using the two-speed idle (TSI) test. TSI test is required for 1980 and older model year vehicles, and all vehicles with a manufacturer's designated gross vehicle weight rating of 8,501 to 10,000 pounds. This test measures emissions when the vehicle is idle and at 2,500 rpm.

Most vehicles receive an emissions control component inspection and a visible smoke check as a part of each inspection. The inspector checks for emissions control systems that were originally installed on the vehicle by the manufacturer and visible smoke. Also, most vehicles receive a gas cap pressure test to detect excessive vapor leakage. In addition, random testing of vehicles will be accomplished in near future using either roadside pullovers or a remote sensing device next to the roadway.

The proposed amendments make a number of revisions to conform to changes in Virginia law and federal regulations, as well as to conform to current testing procedures and to enhance program enforcement.

Change in the Model Year Coverage:

One of the main changes affecting the vehicle owner is a change in the model year coverage: from the testing of model year 1968 and newer to a rolling exemption for vehicles 25 years and older. This change actually has been in effect since July 1, 2000 in accordance with the changes in the Virginia statute. The impact of this change has been and will be a decrease in the number of cars required to have an emission inspection. The Department of Environmental Quality (the agency) estimates that about 12,042 vehicles in 2000 would not have required testing had the exemption been in effect throughout the whole year, and about 15,725 vehicles in 2002 and 19,408 vehicles in 2004 will no longer be required to be inspected. Estimates are not available for the years beyond 2004. The agency expects this number to increase because each year another model year will be added to the exempted vehicles. Since the inspection costs about \$24 biennially, it is indicated in Table 1 that the owners will experience approximately

Table 1: Expected Benefits

Benefit Category	2000	2002	2004	Total
Savings in Test Fees	\$298,008	\$377,400	\$465,792	\$1,132,200
Savings in Travel Time	\$75,865	\$99,067	\$122,270	\$297,202
Savings in Vehicle Operating Costs	\$31,670	\$41,357	\$51,043	\$124,070
Savings in Waiting Time at the Station	\$75,865	\$99,067	\$122,270	\$297,202
Savings in Repair Costs	\$370,832	\$968,660	\$1,195,502	\$2,534,994
Total Quantified Savings	\$843,240	\$1,585,551	\$1,956,877	\$4,385,668
Savings in Travel Time for Repairs and Retest	na	na	na	na
Savings in Vehicle Operating Costs for Repairs and Retest	na	na	na	na
Savings in Waiting Time at the Repair Facility and the Station for Retest	na	na	na	na

\$1,132,200 until 2004 in emissions test cost savings and are likely to continue to realize similar savings beyond 2004.²

The affected vehicle owners will no longer be required to travel to and from the inspection station, and to wait for the inspection. Based on the reports in Harrington et al., 1999:2, it is assumed that round trip travel to the station is about 9 miles, and completed in 27 minutes.³ Motorist's travel time can be valued by the average wage rate in Virginia manufacturing sector, which was \$14 in December of 2000.⁴ Thus, as Table 1 indicates, about \$297,202 is likely to be saved by affected vehicle owners by 2004, and similar savings are expected to be realized beyond that. Based on the same report, vehicle-operating cost is assumed 29 cents per mile, or \$2.63 in current dollars per round trip.⁵ It is expected that the vehicle owners will realize about \$124,070 by 2004 and will keep realizing similar vehicle operating cost savings beyond 2004. The affected vehicle owners will also not wait for the inspection, which include the time waited in line and the time it takes to complete the test. It is reported that the average total waiting time at the station is about 27 minutes. (Harrington et al., 1999:2)

² Figures in Table 1 are not discounted.

³ These estimates may vary slightly for northern Virginia due to geographic differences.

⁴ Source: Virginia Economic Indicators, Fourth Quarter 2000 Data.

⁵ Reported 25 cents in Harrington et al., 1999:2 is adjusted for Consumer Price Index.

These savings in waiting time may represent an additional \$297,202 cost savings to the vehicle owners by 2004.

Older vehicles are more likely to fail the emission test and repair costs are likely to be higher relative to newer vehicles. (Ando et al., 1999) Of the newly exempt vehicles about 2,408 have failed the test since July 2000 and the agency expects that 40 percent will fail the test and incur additional repair costs.⁶ This means 2,408 vehicles in 2000 avoided repair costs, and about 6,290 vehicles in 2002, and 7,763 vehicles in 2004 will not require additional repair costs.⁷ Thereafter, some vehicles will continue to avoid repair costs, but an estimate is not available. The agency expects the fail rate for exempt vehicles to remain the same. The Virginia data indicate that the fail rate remains constant for vehicles over 20 years old. According to Ando et al., 1999, average cost of repairs for failing 14-year-old vehicles is \$154 in current dollars.⁸ ⁹ Thus, with the proposed changes, the owners of these vehicles will realize about \$2,534,994 from 2000 to 2004 in repair cost savings and are likely to continue similar savings beyond 2004.¹⁰ In addition, the owners of vehicles failing the test are expected to save in travel time, vehicle operating costs, and waiting time associated with repairs and retests. Expected cost savings for these items are not available at this time. However, it is reported that the costs associated with retests are approximately 8 percent of the total smog check costs in California. (Schwartz, 2000)

There may be additional benefits to the local governments in northern Virginia and additional costs to adjacent localities from this exemption. The research indicates that dirty vehicles move outside the I/M region to avoid costs associated with inspection and repairs. (Stedman et al., 1998) The proposed exemption is expected to eliminate the incentive to move vehicles to adjacent counties outside the northern Virginia nonattainment area. The motor vehicle property taxes are collected by the locality where the vehicle is registered. Thus, the

⁶ The probability that a vehicle will fail the test monotonically increases with the age. Ando et al., 1999 report that failure rate for 14-year-old vehicles were 45.4% in Arizona. Since the proposed amendments provide an exemption for vehicles between the ages 25 and 32, the failure rate is expected to be even higher. Thus, there is a chance that 40 percent expected failure rate may be biased downward and may underestimate expected cost savings.

⁷ Some of the owners may repair their vehicles even if it is not required. The estimates provided here do not account for these cases.

⁸ The estimated \$132 in 1995 dollars is adjusted for Consumer Price Index to convert into current dollars. No adjustments are made for potential cost of repair differences between Arizona and Virginia.

⁹ Repair costs are generally higher for older vehicles. Using the estimates for 14-year-old vehicles for 25 to 32 year old vehicles may underestimate expected costs.

property taxes collected in northern Virginia may increase while a corresponding reduction may take place in adjacent localities if these taxes remain in place.

Also, very small savings are expected in the agency's administrative costs due to handling less data.

The increased number of exempted vehicles will result in increased emissions from those vehicles. The emissions from exempted vehicles are likely to contribute to lower air quality because vehicles will not be required to meet emission standards. The agency estimates that HC emissions will increase by approximately 0.55 tons per day in 2002, or approximately 201 tons of HC emissions annually from exempting vehicles 25 years and older. This is approximately 3.5% of the total HC emission reductions expected from the program. The potential impact on CO emissions cannot be calculated because the northern Virginia region is in attainment for CO emissions and the necessary information on CO inventory does not exist. However, CO emissions will also increase and that represents additional costs. No loss in reductions is calculated for NO_x emissions because the TSI inspection performed on all vehicles 1980 and older does not test NO_x emissions. However, beginning in 2005 vehicles subject to the ASM test will become exempt and there will be a loss in expected NO_x reductions as well. The agency expects emissions to slightly increase because of the vehicles exempted each year.

Other costs of the proposed changes will accrue directly to the vehicle owners. The improvements in fuel economy resulting from emission repairs are expected to be forgone. It is reported that improvements in fuel economy average about 3.5% compared to pre-repair levels. (Harrington et al., 1999:2) Estimated dollar effect of fuel improvement is about \$40.95 in current dollars per vehicle repaired over two years.¹¹ Thus, the vehicle owners are expected to forgo \$98,608 between 2000 and 2002, \$257,576 between 2002 and 2004, and \$317,895 between 2004 and 2006 in fuel economy savings.¹² Similar losses are expected beyond 2006. Moreover, the repairs are likely to extend vehicle life, improve the overall performance of the vehicle, and provide some satisfaction to the owner. These forgone improvements in performance and

¹⁰ Some repairs may be covered by manufacturers warranty.

¹¹ Reported \$35 in 1995 dollars is adjusted for Consumer Price Index.

¹² The vehicle owner may always choose to repair the car even if it is not required. These estimates do not account for these cases.

vehicle life span should be counted as costs to the vehicle owners, but no reliable estimate of the economic value of these forgone improvements is available at this time.

On-Board Diagnostic Systems:

Another major change is related to the implementation of on-board diagnostic systems (OBD) testing. OBD devices are made of sensors, computer diagnostics, and warning lights to alert the driver and the inspection personnel for emission problems. An OBD check consists of a visual check of the dashboard indicators and an electronic examination of the OBD computer itself. The requirement for OBD testing is not new. As currently written, OBD testing was to be started as an additional test along with the other two emissions tests beginning January 3, 2000. Failing an OBD test will result in mandatory repairs even if the other tests are passed. EPA now recommends doing only the OBD test in lieu of the ASM or TSI tests.

According to EPA, the OBD test is more effective in achieving emission reductions. The effectiveness of OBD testing is generally accepted. Due to the technical problems, OBD testing has not started yet. In accordance with changes in federal regulations, proposed amendments will require OBD testing for vehicles of model year 1996 and newer beginning January 1, 2002. However, the agency may not be able to implement this testing by the specified date because of the availability of the equipment. The proposed amendments postpone the implementation until the agency deems appropriate. This will allow the agency time to conduct a pilot test to evaluate OBD testing in conjunction with ASM testing. According to the agency, EPA anticipates that once the fleet turns over and most vehicles are equipped with the correct equipment, OBD tests will eliminate the need for TSI or ASM testing. The proposed changes will substitute OBD test for ASM or TSI emission tests when the agency completes transition.

Substitution of OBD test for other tests is likely to have significant economic consequences. About 397,595 vehicles in 2002, and 569,634 vehicles in 2004 are expected to use OBD testing in lieu of ASM or TSI test. Beyond 2004, more vehicles are expected to phase into OBD testing requirements as new models being produced with OBD equipment. The vehicle owner will still be required to go to the inspection station. In most cases an emission problem does not affect the drivability of a vehicle. The owners may keep using their vehicles when the OBD system indicates an emission problem. The proposed inspection requirement will prevent the emission problems from extending beyond two years. The current test fee will apply

to OBD tests and no changes in costs associated with inspection such as vehicle operating costs, travel time, waiting for inspection are expected.

Proposed changes will remove the requirement for the other two tests. On average vehicle service time for ASM test is about 8.7 minutes.¹³ Thus, it is expected that about 57,651 hours in 2002, and about 82,597 hours in 2004 will be realized in timesaving not only by the vehicle owner but also by the inspection station. This will be a considerable advantage to both the vehicle owner and the inspection station. When quantified by the wage rate in Virginia manufacturing sector, the projected timesaving represent \$1,614,236 in 2002, and \$2,312,714 in 2004 for 392 inspection stations and the affected vehicle owners combined.

Under the current regulations, diesel powered vehicles are not subject to OBD testing. With the proposed amendments, OBD testing will also be required for diesel-fueled vehicles so equipped; model year 1997 and newer, using the same testing equipment used for gasoline-powered vehicles. Diesel vehicles have not been tested in the program in the past because such testing requires completely different equipment. However, beginning with model year 1997, all light duty diesel vehicles certified for sale in the U.S. are required to be equipped with OBD systems similar to that of gasoline fueled vehicles. OBD test is capable of measuring emissions from both diesel and gasoline powered vehicles. OBD testing of light duty diesel vehicles is expected to include only two passenger vehicle models, Volvo and Mercedes, and some light duty diesel trucks. Most diesel-powered trucks are believed to have GVWR greater than 8,500 lbs. and would be exempt from testing.

Diesel powered vehicles will be subject to OBD testing two years after these regulations become effective. About 1,514 diesel-fueled vehicles in 2004 are expected to be subject to emission tests in addition to all other vehicles. Beyond 2004, more diesel vehicles are likely to be subject to emission testing. Thus, the owners of these vehicles are expected to incur about \$36,336 in test and registration fee costs biennially. As for the gasoline powered vehicle owners, associated costs categories are the same for the owners of diesel powered vehicle owners. Extrapolating the results from gasoline-powered vehicles provides a rough estimate for some of the cost categories. These are summarized in Table 2, which indicates about \$59,394 additional costs to diesel vehicle owners in 2004. Similar, but probably higher, costs are expected to be

¹³ Source: Harrington et al. 1999:2.

Table 2: Expected Costs in 2004

Cost Category	Estimate
Test Fees	\$36,336
Travel Time	\$9,538
Vehicle Operating Costs	\$3,982
Waiting Time at the Station	\$9,538
Total Quantified Costs	\$59,394
Repair Costs	na
Travel Time for Repairs and Retest	na
Vehicle Operating Costs for Repairs and Retest	na
Waiting Time at the Repair Facility and the Station for Retest	na

realized by affected vehicle owners beyond 2004 due to a larger number of vehicles with OBD equipment.

Data for diesel vehicle OBD failures is not available since OBD equipped diesel vehicles are still relatively new, limited to model year 1997 and newer, and there is no data for these vehicles. However, the fail rate is expected to be small.¹⁴ Thus, some vehicles will fail the test and be required to spend some money and time for repairs and for retests. These additional costs are likely to provide incentives to register the vehicles out of the nonattainment area.

The impact on emissions is expected to be beneficial because emissions from failing vehicles will be reduced, but no data is available to estimate the size of the emission reductions. The owners of vehicles failing the test are likely to realize additional benefits in terms of improved fuel efficiency, longer vehicle life, and improved vehicle performance.

Two Speed Idle Test:

Emissions standards for TSI test will be tightened for some vehicles of 1990 vintage and newer. According to the agency, the revised standards were determined by an analysis of fail rates in the Virginia program and a review of standards from other state programs. The revised standards reflect the advanced technology of 1990 and newer vehicles. Previously these vehicles only had to meet the standards set for 1981 vehicles. Currently, vehicles with known faults can pass the existing standards and that poses a problem for proper program operation. The agency expects that about five percent of the total vehicle population will be subject to reduced cut points for TSI emission test. There will be no change in the testing costs for the owners. Of the

five percent, a larger number of vehicles are expected to fail this test due to stricter standards. The agency estimates that about 548 additional vehicles in 2002, and about 800 additional vehicles in 2004 will fail the test and will have to incur repair costs. Thereafter, the fail rates are expected to increase since the vehicles will be older, but an estimate is not available. This means about \$84,392 in 2002, and about \$123,200 in 2004 in additional repair costs are likely to be incurred by vehicle owners. In addition to that, time losses, and operating costs associated with repairs and retests should be considered as additional costs. On the other hand, required repairs are expected to increase fuel efficiency, extend vehicle life, and improve overall performance of the vehicle. The proposed change will also reduce the emissions by a small amount from these affected vehicles and improve air quality.

Acceleration Simulation Mode Test:

For the ASM test, the regulation is being revised to allow the agency to have the flexibility to set standards less stringent than the federal "final" ASM standards. Currently the regulation allows only either EPA phase-in standards or EPA final standards. The revised language will allow the agency to determine standards based on an analysis of fail rates. This would enable the agency to set stricter standards than the current levels in order to meet EPA emission reduction requirements. But these standards are expected to be less stringent than the final levels. Currently, ASM test standards are being phased into more stringent levels. The agency believes that the final ASM standards might be too strict for some vehicle classes and will result in these vehicles being difficult or impossible to repair to the standards. According to the agency, EPA is also aware of this possibility and have been warning states about final standards for failing tests falsely. The agency indicated that the ASM test standards are being proposed to be lowered relative to the current phase in levels, but increased relative to the current standards. In other words, the proposed standard is more stringent than the current level but not as much as what it would be in the final stage if phase in continues.

According to the agency, the change in the standards is likely to reduce the number of failures by 18,607 vehicles in 2002, and by 24,097 vehicles in 2004. Thus, the proposed changes are likely to reduce repair costs for vehicle owners by \$2,865,478 in 2002, and \$3,710,938 in

¹⁴ Source: The Agency

2004. In addition to these the vehicle owners will realize timesaving and vehicle operating cost savings associated with repairs and retests.

On the other hand, the proposed changes are expected to allow higher emissions, which will contribute to air quality problems. However, the agency expects only minor increases in emissions because the proposed standards are expected to affect mainly those vehicles that would be difficult or impossible to repair. These vehicles likely would have received a waiver and continue to emit the same amount of pollutants.

In addition, changes have been made to ASM testing procedures. According to the agency, the ASM test is complicated and the test results depend on factors such as vehicle type, weight, etc. The proposed amendments eliminate many procedural requirements during the test. The agency believes that these requirements were instructing the owners specifically how to do the elements of the test, which are not related to the amount of emissions released from the exhaust. For example, a specific level of tire pressure is required prior to performing the test. The agency indicated that the recent scientific evidence shows no relationship between the tire pressure and the amount of emissions released. Once allowed, technicians are expected to perform the emission tests in the most efficient manner given their resources.

Remote Sensing:

The current regulations include standards for remote sensing. Remote sensing works by reading the emissions of a passing vehicle through a sensor. If a vehicle's emissions are found to be above the standards at least twice within 90 days than the vehicle owner may be required to have an out-of-cycle emissions test; i.e. the owner may have to get an additional test before the next scheduled biennial emissions test. The agency believes that the standards for remote sensing are too strict and increase the chance that a vehicle fails the test falsely. There is a great deal of uncertainty associated with appropriateness of standards used in remote sensing. Not only the readings from remote sensing equipment are believed to be less accurate, but also the actual emissions from a vehicle on road are found to be above the emissions produced during an inspection. (Harrington et al., 1999:1, Calvert et al., 1993) Emissions on actual use may vary significantly due to road conditions, location, speed etc. Thus, the assessment of the true standards for remote sensing is a difficult task.

When a vehicle fails the test falsely, the owner incurs additional costs for the vehicles that have no emission problems. Thus, the determination of the appropriate standards with adequate margin of error is critical for this program. The proposed changes revise the remote sensing standards table to be less stringent and provide flexibility to allow the agency to use CO or HC or any combination as criteria for remote sensing. Due to the uncertainty on the appropriateness of the current remote sensing standards, it is not known whether false failures would be prevented, or vehicles with emission problems would go unnoticed. The agency plans to conduct a pilot program before fully implementing the remote sensing program. The pilot program is likely to provide necessary information to evaluate potential problems and appropriate solutions. The proposed changes will allow incorporation of some of the additional information into criteria for remote sensing.

If appropriate remote sensing criteria are established, considerable benefits may be realized because this is a very cost effective program. It is reported that costs per measurement are considerably low; i.e. lower than 50 cents. (Harrington et al., 1999:1, Hubbard, 1997, Rueff, 1992) Appropriate implementation of the standards is expected to avoid false failures and help identify truly dirty vehicles. In addition, remote sensing with correct standards will help identify vehicles that pass the inspection but may in fact be dirty due to tampering with the emission systems after the inspection, the test may be done by incompetent inspectors, or the system may start failing right after the test due to misfueling. In the past, use of cheap or leaded gas instead of unleaded gas was common. (Calvert et al., 1993) A few tankfuls of leaded gasoline has the potential to poison the catalyst and make its use obsolete.

The remote sensing has not yet been performed in Virginia while the enhanced inspection maintenance program has been in effect. Thus, no data is available either to estimate the impact on air quality or to estimate the number of vehicles that may avoid falsely failing the test, and the associated benefits from avoiding potential false failures. However, costs may include increase in HC and CO emissions while benefits may include timesavings, travel cost savings, and savings in additional fees associated with out-of-cycle tests.

Other Changes:

Implementation of the evaporative system pressure test will be left to the agency's discretion. The pressure test is a physical test to measure fuel evaporation between the fuel tank

and the engine to ensure that the emissions are not released into the ambient air. This is a very difficult task and is to be conducted during a regular emissions inspection. Under the current language, pressure test should have been implemented in 1998, but it has not been due to technical problems. The proposed changes delay the implementation to a future date to be determined by the agency and require the agency to notify the station owners one year in advance if the test is to be implemented. The agency does not believe that this test is a necessary component to have the program approved by EPA. In addition, evaporative tests have not been found workable and cost effective. (Harrington et al., 1999:1) Thus, allowing the agency to implement the test at its discretion is likely to avoid potential problems that may arise if the agency is unprepared and forced to implement the test. Such a case would almost certainly produce costs exceeding benefits associated with this test.

It is proposed to remove the requirement for the purge test which measures the instantaneous purge flow from the canister to motor intake manifold. Under the current language, the purge was to be performed in conjunction with ASM test starting in 1999. The agency has never enforced this test because EPA has determined that the test may be damaging to vehicles and no longer requires enforcement. Given this information, this change is expected to be beneficial.

Changes have been made with respect to the testing of federal fleet vehicles. Under the current language, there are compliance reporting requirements for the federal fleets, but not for private fleets. The requirement that federal fleet administrator make sure fleet vehicles comply with the emission standards and submit reports to the agency will be removed. The regulation will be amended to treat federal fleets the same as private fleets as required by the statute and impose new reporting requirements for all fleets. The agency has been provided the compliance information for the private fleets. Thus, there will be no changes in reporting requirements for federal or private fleets. The proposed changes will have an impact on federal fleets as the agency has been receiving \$2 per vehicle per year from this category. The agency will no longer receive the two-dollar fee from 20,000 federal fleet vehicles not registered with DMV. This will translate into \$40,000 revenue losses for the agency annually.

For reciprocity of vehicles that received an emissions inspection in another state, a waiver will no longer be sufficient. If a vehicle owner has a waiver from another state, he will be

required to take the test first, and if the vehicle cannot pass the test, the owner will be required to get repairs or obtain a waiver from the Commonwealth. The agency does not know how many vehicles are in this category. Some of the repair expenditures that would have taken place in other states are expected to take place in Virginia. Also, it is likely that the repair costs incurred by the vehicle owners moving into nonattainment area will increase. There may be small air quality benefits from the additional repairs.

Non-conforming vehicles, which are not manufactured for sale in the United States to conform emission standards, may be granted an exemption at the agency's discretion. According to the agency non-conforming vehicles are required to have a permission to enter the United States. The agency stated that the permission issued by EPA to enter into the country, in general, justifies the permission to enter the Commonwealth. The agency's records indicate that there have been less than five such cases in the past.

It is proposed that sensitive mission vehicle emissions fleet inspection stations will be allowed to apply for an inspection station permits. This proposed change will allow certain agencies such as the Central Intelligence Agency, the Federal Bureau of Investigation to establish inspection stations of their own. This change is not likely to have an impact on emissions, but is likely to contribute to the national security efforts, which may indirectly benefit the Commonwealth.

Proposed changes allow the inspection station to use internet in lieu of required reference material to make a determination for the proper test type. This represents an additional option for the station owner to reach information and is likely to be used by the owners who anticipate savings from this option.

Summary of Monetary Effects:

This section intends to summarize the monetary impact on affected entities without completely considering all associated benefits and costs that may accrue to somebody else. For example, figures in Table 3 do not take into account any air quality benefits and costs. The table identifies the monetary savings and losses from the perspective of an individual entity. The net monetary impact of proposed changes on different entities will be different and is difficult to measure due to the unquantified items. However, quantified components can be netted out and a qualitative assessment can be provided to understand the impact.

All of the items affecting inspection stations are quantified. It appears from Table 3 is that the net impact on stations are negative in 2000 but move into positive territory in 2002 and probably beyond. Losses in test revenues due to exempting older vehicles are increasing over time and the increase in time savings due to OBD testing for diesel-powered vehicles does not start until 2004. The reason driving the savings up relative to losses for the station owners is the large timesavings from the OBD testing.

Repair facilities are likely to bear the most of the negative impact. Only two items affecting these facilities are not quantified. These items include the expected increases in repair expenditures in Virginia due to new diesel OBD failures and due to no longer accepting waivers from other states. Although these two items are likely to increase revenues of repair facilities and help mitigate the overall losses, it is unrealistic to expect a large impact. The jump in the losses in 2002 and beyond is because of lowering ASM standards. Less stringent standards will reduce the failures and consequently repair costs.

The agency's losses are composed of losing \$2 administrative fee from newly exempt older vehicles and changes associated with federal fleets. Although expected fees from diesel vehicles in 2004 represent an increase, the expected sum from that category is not nearly as much.

The numbers summarizing the effect on the vehicle owner does not include three categories. The first category includes the value of traveling time, vehicle operating costs, and waiting time associated with repairs. The second category includes the value of fuel economy changes, performance changes in vehicle operation, and changes in vehicle life span. Note that these two categories are not quantified in this analysis, but they tend to balance each other. Other items not included are the expected additional expenditures for repairs associated with diesel-powered vehicles and eliminated reciprocity waiver. Additional repair expenditures are likely to take out some of the projected savings from vehicle owners, but unlikely to reverse the direction of the overall impact. The repair cost savings from lower ASM failure rates, and from exemption of older vehicles from testing, and time savings from OBD testing are the three major factors for the significant jump in 2004 and beyond.

Table 3: Quantified Monetary Effects

Entity	2000	2002	2004
Inspection Stations	-\$238,840	\$494,620	\$800,481
Repair Facilities	-\$368,832	-\$3,747,744	-\$4,781,236
The Agency	-\$46,168	-\$100,898	-\$109,572
Vehicle Owners	\$745,632	\$4,956,179	\$6,363,683

Businesses and Entities Affected

Approximately 1.2 million vehicles are subject to the I/M program in the Northern Virginia area. There are currently 392 permitted emissions inspection stations, 1690 licensed emission inspectors, 440 certified emission repair facilities and 1226 certified emission repair technicians.

Localities Particularly Affected

The localities participating in the program are in northern Virginia and include the counties of Arlington, Fairfax, Loudoun, Prince William and Stafford, and the cities of Alexandria, Fairfax, Falls Church, Manassas and Manassas Park.

Projected Impact on Employment

This analysis indicates that the inspection stations and repair facilities are likely to demand less labor because the number of required tests and repairs are expected to decrease, and OBD testing will reduce the required labor from the inspection stations. On the other hand reduced testing and repairs, and timesavings from OBD testing are likely to increase the vehicle owners' leisure time. Some of this ample time are likely to be supplied in the labor market. Lower labor demand combined with higher labor supply will have an indeterminate effect on employment.

Effects on the Use and Value of Private Property

It is expected that the proposed changes will have a positive impact on inspection stations in and after 2002, but a negative impact on repair stations. To the extent the changes in

operating costs and revenues affect the profitability, a small increase in the value of inspection stations and a decrease in the value of emission repair business are expected.

The price of affected vehicles is likely to reflect the expected costs or savings from emissions repairs. For example, expected repair savings from test exemption are likely to increase the price of older vehicles while expected repair costs for diesel vehicles are likely to reduce the price.

Although it is highly uncertain what the overall air quality impact would be, noticeable changes are likely to be reflected in property prices in northern Virginia.

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