Economic Impact Analysis
Virginia Department of Planning and Budget

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

Department of Environmental Quality

March 9, 2004

The Department of Planning and Budget (DPB) has analyzed the economic impact of this proposed regulation in accordance with Section 2.2-4007.G of the Administrative Process Act and Executive Order Number 21 (02). Section 2.2-4007.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

§46.2-1176 through §46.2-1187.3 of the Code of Virginia authorizes the State Air Pollution Control Board to promulgate regulations for the control of motor vehicle emissions and for emissions testing including remote sensing. §46.2-1177 of the Code of Virginia mandates that the Department of Environmental Quality administer an emissions inspection program. The program is to require biennial inspections of motor vehicles at permitted emissions inspection stations and could require additional inspections of motor vehicles that have been shown by on-road testing to exceed established emissions standards. §46.2-1178 of the Code of Virginia lays out the administration and scope of the emissions inspection program. The State Air Pollution Control Board is authorized in §46.2-1178.1 of the Code of Virginia to promulgate regulations establishing on-road motor vehicle emissions testing requirements and in §46.2-1179 of the Code of Virginia to adopt emissions standards necessary to implement the emissions inspection program.

The proposed regulation was adopted with minor differences as an emergency regulation on January 1, 2004. The proposed regulation (1) establishes new and updated remote sensing exhaust emission standards, (2) requires that vehicles in or operating primarily in the program area be subject to remote sensing emission standards not only for carbon monoxide and hydrocarbons, but also for nitric oxide, (3) defines the phrase "operate primarily" for the purposes of remote sensing as a vehicle recorded in the program area by remote sensing equipment at least three times in a two-month period with no less than 30 days between the first and last reading, (4) establishes that vehicles exceeding the standards two days in any 120-day period will be determined to have violated emissions standards, (5) allows for vehicles that have a high emitter index of greater than 75 and that exceed established standards once to be determined to have violated the emissions standards starting January 1, 2005, (6) requires remote sensing measurements used to determine if a vehicle exceeds emissions standards to be taken at valid sites and only under conditions when the vehicle specific power indicator is between 3 and 22, (7) amends the vehicle clean screening requirements of the existing regulation, and (8) modifies operating procedures and the application of civil charges when a vehicle is determined to have violated emissions standards.

The proposed regulation also makes a number of Code required changes such as establishing a program to subsidize the repair costs of some vehicles identified by remote sensing and expanding the model year coverage for vehicles subject to remote sensing to include 1968 and newer model vehicles. The regulation also includes additional language intended to clarify various aspects of the regulation.

Estimated Economic Impact

Description of the Regulation:

The proposed regulation makes amendments to the existing regulation for the control of motor vehicle emissions in the Northern Virginia area (covering the counties of Arlington, Fairfax, Loudoun, Prince William, and Stafford and the cities of Alexandria, Fairfax, Falls Church, Manassas, and Manassas Park). The current regulation requires vehicles in or operating primarily in the area to report for biennial emissions inspections at permitted emissions inspection stations. Vehicles that fail the test are denied registration until they pass a retest or spend at least $450 on emissions-related repairs. The current program also allows for the

random testing of vehicles through roadside pullovers or remote sensing devices. Failing vehicles are required to report to an emissions inspection station for an out-of-cycle test.

The proposed regulation updates the remote sensing emissions standards used to determine whether a vehicle is in violation. According to the Department of Environmental Quality (DEQ), remote sensing emissions standards in the existing regulation are approximately ten years old. The new standards being proposed are based on new technology that has become available since then and on information collected through two remote sensing pilot studies conducted in Virginia. The standards being proposed include exhaust emission standards for nitric oxide. The existing regulation established remote sensing standards for carbon monoxide and hydrocarbons. The northern Virginia area has been classified by the Environmental Protection Agency (EPA) as a severe ozone non-attainment area. Ozone is formed by a chemical reaction between volatile organic compounds, nitrogen oxides, and sunlight. Thus, by including standards for nitric oxide, the proposed regulation is intended to identify vehicles emitting high amounts of nitric oxide, require them to receive an out-of-cycle inspection, and make the required repairs.

The new standards apply to all vehicles in or operated primarily in the northern Virginia area. The regulation defines operated primarily for the purposes of the remote sensing program as a vehicle recorded in the program area by remote sensing equipment at least three times in a two-month period, with no less than 30 days between the first and last reading. For the purposes of the biennial inspection, operated primarily is defined as a vehicle being recorded (through remote sensing and on-road testing) in the area at least three times in a two-week period. According to DEQ, applying the definition for biennial inspections would reduce the effectiveness of remote sensing in identifying dirty vehicles. Remote sensing would observe a very small sample of vehicles (and an even smaller sample of unique vehicles) three times in a two-week period. DEQ believes that expanding the time-period to two months will allow for the effective identification of high emitting vehicles and better enable the remote sensing program to meet its emissions reduction goals.

Vehicles will be determined to be in violation of the emissions standards if they exceed these standards two days in any 120-day period. Under the existing regulation, vehicles were determined to be in violation if they exceeded the standards two days in a 90-day period. The

increase in time-period was based on concerns similar to those mentioned in the above paragraph. DEQ believes that requiring two reading exceeding the standards in a 90-day period reduces the effectiveness of the remote sensing program in identifying high emitters. Increasing the time-period to 120 days will allow for more effective identification of high emitters and more effective implementation of the remote sensing program. Starting January 1, 2005, the regulation allows DEQ to consider vehicles exceeding the standards once and with a high emitter index of above 75 to be in violation of the emissions standards. The high emitter index categorizes the probable emissions inspection failure rates of engine families and is calculated based on historical failure rates once vehicles have been identified through remote sensing. The decision to include this provision was based on the fact that, starting January 1, 2005, DEQ would have a full year's worth of data on which to based the high emitter index. According to DEQ, research shows that the high emitter index combined with remote sensing is very reliable in terms of identifying potential failures.

Remote sensing measurements that are used to determine whether a vehicle is in violation of emission standards are to be taken only under conditions when the vehicle specific power indicator is between 3 and 22. The vehicle specific power indicator adjusts remote sensing measurements for factors such as vehicle speed, acceleration, drag coefficient, tire rolling resistance, and roadway gradient. Not adjusting for these factors could result in readings that temporarily exceed established standards. Thus, use of the vehicle specific power indicator will reduce the number of false positives (i.e., the number of vehicles identified as high emitters through remote sensing who subsequently pass the confirmation test) and allow for more efficient identification of high emitting vehicles.

The proposed regulation amends the clean screen requirements in the existing regulation. Starting January 1, 2005, the proposed regulation allows up to 5% of vehicles measured during a 30-day to be identified as candidates for clean screening. These vehicles will not be required to report for their next biennial inspection. Based on conversations with DEQ, the clean screen requirements are to be further modified following public comment. (i) The agency plans to clean screen only vehicles of the 1995 model year and older. Vehicles of 1996 model year and newer are deemed unsuitable for clean screening as there is a high probability that some of them will qualify for clean screening when in fact the malfunction indicator light is illuminated due to an emissions-related problem being detected. Based on remote sensing data from Illinois, clean

screening 5% of 1996 and newer vehicles would lead to 3% of on-board diagnostic failures being exempted from the biennial inspection requirement. (ii) Moreover, the agency intends to provide clean screens for up to 5% of the cleanest cars in each model year group observed during a 30-day period. These vehicles would have to be recorded at least three times on three different days during a 120-day period, with each measurement not exceeding any of the established standards. At the end of each year, if the emissions reduction loss due to clean screening is less than 10% of total program emissions reduction, the percentage of cars clean screened will be raised. If, on the other hand, the emissions reduction loss due to clean screening is more than 10% of total program emissions reduction, the percentage will be reduced appropriately.

The proposed regulation also modifies operating procedures and the application of civil charges when a vehicle is determined to have violated emissions standards. For example, motor vehicle owners will be required to furnish proof that their vehicle passed a confirmation test or received a waiver within 30 days of a notice of violation of remote sensing emission standards in order to avoid paying civil charges. The existing regulation allows 90 days between the notice of violation and the imposition of the civil charge. Other changes to the operating procedures and the application of civil charges include changes to how the degree of violation and hence the civil charges are calculated and a provision allowing DEQ to require 1996 and newer model year vehicles to pass an exhaust test in addition to the on-board diagnostic test.

Finally, the proposed regulation also makes a number of Code required changes. It establishes a financial assistance program to subsidize the repair costs of some vehicles identified by remote sensing. Qualified individuals will be able to receive up to 50% of the cost of emissions-related repairs or 50% of the waiver amount, after a minimum co-payment of $100. It also expands the model year coverage for vehicles subject to remote sensing to include 1968 and newer model vehicles.

Estimated Economic Impact:

The proposed change is likely to impose additional costs on vehicle owners and emissions inspection stations in terms of requiring increased inspections. Apart from the regular biennial emissions inspection, vehicles identified through remote sensing as high emitters will be required to report for an out-of-cycle confirmation test at a permitted emissions inspection station (vehicles required to report for the biennial inspection within 90 days of the remote

sensing violation or vehicles that have received a waiver in the 12 months prior to the violation will not be required to report for an out-of-cycle emissions test). The cost of the confirmation test is to be borne by the emissions inspection station or the vehicle owner depending on whether the vehicle passes or fails the test. If a vehicle identified as a high emitter through remote sensing passes the confirmation test, the cost is to be borne by the emissions inspection station. If, on the other hand, a vehicle fails the confirmation test, the cost of the test is to be borne by the vehicle owner. According to DEQ, most service stations currently charge $28 for an emissions inspection (the Code of Virginia caps the inspection fee at $28).

Based on the 2002 remote sensing pilot study conducted in Virginia, it is estimated that approximately 2% of all vehicles observed through remote sensing are likely to meet the definition of operated primarily and be determined to violate the emission standards. DEQ expects that between 250,000 and 300,000 unique vehicles per year are likely to be remote tested. Assuming 300,000 vehicles are remote tested each year and 2% of them are required to report for an out-of-cycle test, approximately 6,000 vehicles per year will be required to report for an out-of-cycle emissions test. Of these, approximately 9% (or 540 vehicles) are likely to be registered outside the northern Virginia area and not subject to the biennial inspection program.[1] Of the remaining 5,460 vehicles, we can expect 12.5% to be due for a biennial inspection in the 90-day period following the remote sensing violation and thus be exempt from reporting for an out-of-cycle emissions inspection.[2] The number of vehicles applying and qualifying for waivers is not known. Assuming all vehicles registered outside the northern Virginia area and determined to be violating the remote sensing standards are required to report for an out-of-cycle inspection (540 vehicles) and 87.5% of all vehicles registered in the northern Virginia area and determined to be violating the remote sensing standards are required to report for an out-of-cycle inspection (4,778 vehicles), the proposed regulation will result in approximately 5,318 vehicles being required to report for an out-of-cycle inspection and additional inspection costs of $148,904.

According to a study conducted by California, it is estimated that 8% (or 425 out of 5,318) of vehicles identified as high emitters through remote sensing are likely to pass the

[1] The 2002 Virginia remote sensing pilot study estimated that approximately 9% of vehicles operating primarily in the northern Virginia area were registered outside the control area.

confirmation test.[3] Thus, emissions inspection stations are likely to incur additional inspection costs of $11,900 per year (the cost of 425 inspections at $28 per inspection) and vehicles owners are likely to incur additional inspection costs of $137,004 per year (the cost of 4,893 inspections at $28 per inspection).

In addition to the cost of additional inspections, the proposed regulation is likely to impose additional repair costs on vehicle owners. Owners whose vehicles fail the confirmation test will be required to make appropriate repairs or undertake $450 (in 1990 dollars) in repairs in order to qualify for a waiver. According to DEQ, the average cost of these repairs is approximately $250. In the absence of this regulation, vehicles registered in the northern Virginia area would have to make these repairs during the course of the regular biennial inspection. By requiring the repairs to be made earlier, the proposed change is likely to impose some additional cost on vehicle owners. Repairs worth $250 made a year early would cost the vehicle owner an additional $11.35 (based on the average 1-year treasury rate over the past ten years of 4.54%). In the absence of this regulation, vehicles registered outside the northern Virginia area would not be required to make any emissions-related repairs. These vehicle owners will now have to incur the additional cost of making these repairs. As estimated above, approximately 540 (or 9%) of the 6,000 high emitting vehicles identified through remote sensing are likely to be registered outside the control area. Assuming an 8% rate of false positives, 497 of the 540 vehicles are likely to fail the confirmation test and be required to make appropriate repairs.[4] Thus, the additional repair-related cost imposed by the regulation is $49,895 on vehicles registered in northern Virginia (an average cost of $11.35 on 4,396 vehicle owners) and $124,250 on vehicles registered outside northern Virginia (an average cost of $250 on 497 vehicle owners).

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[2] The 12.5% estimate is based on the assumption that the distribution of vehicles requiring inspections during any two-year period is uniform.

[3] The 2002 Virginia remote sensing pilot study estimated the percentage of false positives at 35%-40%. However, this estimate is likely to overstate the number of false positives. Vehicles violating the remote sensing standards were not immediately given an emissions test. Instead, the estimate was based on the pass/fail rate on emissions tests conducted in the six months following a vehicle's remote sensing violation. Factors such as vehicles being repaired or receiving engine tune-ups prior to taking the emissions test are likely to have raised the number of false positives. The California estimate is likely to be more reliable as it is based on the pass/fail rate of vehicles on exhaust emissions test administered immediately following a vehicle's violation of the remote sensing standards.

[4] In making these estimates, it is assumed that vehicles registered outside the northern Virginia area are just as likely to be identified as high emitters and fail the confirmation test as vehicles registered in the area. However, it is likely that vehicles that have not been inspected on a biennial basis are more likely to be high emitters than those that are required to report for regular emissions testing.

The proposed regulation will also impose additional costs on the state. DEQ estimates that the remote sensing program will cost approximately $300,000 per year for data collection. This includes the cost of obtaining and setting up the remote sensing units, hiring trained operators, analyzing data, and providing the Department of Motor Vehicles with the requisite information. DEQ is also likely to incur additional costs in terms of staff time and resources in overseeing the program. DEQ expects that one full-time position will be dedicated to the remote sensing and economic assistance program.

The proposed regulation is also likely to produce economic benefits. The adoption of this rule is likely to reduce emissions of ozone-causing compounds in the Northern Virginia area. According to DEQ, the proposed changes are estimated to reduce hydrocarbons and nitrogen oxide emissions by one-half of a ton per day during the high ozone summer months. Apart from identifying high emitting vehicles registered in the northern Virginia area and requiring them to be fixed in a timely fashion, the proposed regulation will also help identify high emitters who are not registered in the northern Virginia control area but are operating primarily in the control area. As mentioned above, the 2002 Virginia remote sensing pilot study estimated that 9% of all vehicles falling under the definition of operated primarily were registered outside the control area. These vehicles do not fall under the biennial inspection program and would not be required to be emissions tested. Thus, the proposed regulation is likely to reduce emissions by identifying approximately 497 high emitting vehicles registered outside the northern Virginia but operating primarily in the area and requiring them to be fixed.

The emissions reductions are likely to be beneficial to public health and welfare. According to EPA, exposure to ozone at the ground level can cause a number of respiratory problems such as irritation of the respiratory system, reduced operation of the lungs, inflammation and damage to the cells lining the lungs, and aggravation of existing lung problems. Repeated ozone exposure can cause permanent damage to children’s developing lungs and accelerate the decline in lung function with age in adults. According to the U.S. Global Change Research Program, the best estimate of human health effects of ground-level ozone in the United States over the past 15 years is approximately $7 billion per year. Thus, reducing the level of ozone will provide economic benefits in the future in terms of respiratory

health problems and fatalities prevented (reflected in lower health care and other costs) and increased productivity.

The emissions reductions achieved by the implementation of this rule would also help Virginia avoid federal sanctions that would be imposed for violating the SIP (state implementation plan) provisions of the Clean Air Act. Effective March 23, 2003, the northern Virginia area was classified by EPA as a severe ozone non-attainment area as a result of emissions from both industrial sources and motor vehicles. The changes being proposed are additional measures to be incorporated into the SIP to bring emissions to a level at or below the ozone standard. Failure to prepare such a plan and/or failure to obtain EPA approval for such a plan could result in sanctions including the loss of federal funds for highways and other projects and/or more restrictive requirements for new industries. Moreover, the lack of an acceptable plan to get emissions below national ambient air quality standards could result in EPA promulgating and implementing an air quality plan for Virginia. Implementing the proposed rule would produce economic benefits by allowing Virginia to continue to receive federal funds and letting the state run its own air quality program.

The proposed change is also likely to produce additional benefits in terms of improved fuel efficiency and enhanced vehicle life. In the absence of the proposed regulation, vehicles identified as high emitters that are registered in the northern Virginia area would most likely have made the required repairs during the biennial inspection. Vehicles identified as high emitters that are registered outside the northern Virginia area would most likely not have made the required repairs until there were other problems that surfaced. According to DEQ, these repairs increase fuel efficiency and vehicle life. Thus, by requiring vehicles identified as high emitters to report for an out-of-cycle test and undertake all the necessary repairs in a timely manner, the proposed regulation is likely to provide economic benefits to vehicle owners.

Finally, the clean screen provisions in the proposed regulation are likely to produce economic benefits. The clean screen provision is likely to result in fewer vehicles requiring biennial testing. Vehicles that are clean screened will not be required to report for the next biennial inspection following their clean screen notice. This will result in savings for vehicle owners. DEQ intends to issue clean screens to up to 5% of vehicles in each model year group. Based on the 2002 remote sensing pilot study conducted in Virginia, approximately 12% of

vehicles observed through remote sensing (or 36,000 vehicles out of 300,000 unique vehicles observed in a year) were seen three or more times in a 60-day period.[5] Assuming 12% of vehicles are observed three or more times during a 120-day period (a conservative assumption) and 5% of these vehicles that are registered in northern Virginia are clean screened (assuming none of the measurements exceed established standards), it would result in 1,800 cars being exempted from the biennial inspection. Savings to vehicle owners would be $50,400 per year. Moreover, to the extent that clean screening saves vehicle owners potential repair expenses and the time and effort spent in getting their vehicle emissions tested, the proposed change is likely to produce significant economic benefits. For example, the clean screen program operated by Missouri in the St. Louis area charges a clean screen fee that is equal to the emissions inspection fee. Despite this, Missouri had a clean screen notice redemption rate of 78% in 2002.

The proposed regulation will also result in a transfer of resources between vehicle owners and the state. The subsidy program provided for under the proposed regulation will result in the state subsidizing a portion of the cost of repairs incurred by qualifying vehicle owners. If emissions-related repairs are made under the biennial inspection program, vehicle owners are not be eligible for a subsidy. However, if the repairs are made under the remote sensing program, the state is required to provide a subsidy to qualified vehicle owners. The subsidy is up to 50% of the amount spent on emissions-related repairs or up to 50% of the waiver amount, after a $100 co-payment. DEQ has currently budgeted between $300,000 and $350,000 for the subsidy program. The subsidy will defray some of the additional cost imposed on vehicle owners by the proposed regulation.

The net economic impact of the proposed change will depend on whether the additional costs of meeting the requirements of the proposed regulation are greater than or less than the benefits of doing so. The proposed regulation is likely to impose additional costs on vehicle owners, emissions inspection stations, and the state. Owners of vehicles registered in the northern Virginia area can expect to pay a total $172,983 per year in additional inspection and repair-related costs. Owners of vehicles registered outside the northern Virginia area can expect to pay a total $138,166 per year in additional inspection and repair-related costs. Some of the cost of emissions-related repairs will be subsidized by the state. Inspection stations are likely to

[5] In order to be eligible for a clean screen, vehicles are required to have been observed by remote sensing at least

incur additional costs of $11,900 per year due to false positives. The state is likely to incur costs of $300,000 per year and the cost of one full-time position in administering and implementing the remote sensing program. However, the proposed regulation is also likely to produce economic benefits. It is likely to reduce ground-level ozone in the northern Virginia area and reduce some of its negative human health effects. It is likely to ensure that the state avoids federal sanctions and continues to receive federal funds and run its own air quality program. It is also likely to produce economic benefits for vehicle owners through enhanced fuel efficiency and vehicle life and through clean screening. A precise estimate of these benefits, and hence of the net economic impact of the proposed change, is not available at this time.

Businesses and Entities Affected

The proposed regulation is likely to affect vehicle owners who operate primarily (as defined by the regulation) in the northern Virginia area. Owners whose vehicles are registered in the northern Virginia area are likely to incur additional costs of $172,983 per year in inspection and repair-related expenses. However, some of these owners are likely to receive clean screens, producing cost savings of over $50,400 per year. Owners whose vehicles are registered outside the northern Virginia area are likely to incur additional costs of $138,166 per year in additional inspection and repair-related costs. Qualifying vehicle owners registered in and outside the northern Virginia area will be eligible to receive a subsidy (currently budgeted at between $300,000 and $350,000 per year) to defray some of the cost of emissions-related repairs. Finally, by making emissions-related repairs, vehicle owners are likely to benefit from improved fuel efficiency and enhanced vehicle life.

The proposed regulation is likely to affect permitted emissions inspection stations. Inspection stations are likely to incur additional costs of $11,900 per year due to false positives. In addition, they are also likely to incur losses of approximately $50,400 through the clean screen program. However, permitted emissions inspection stations are likely to receive additional revenues of approximately $311,149 in inspection and repair-related services.

DEQ expects the remote sensing program to measure 300,000 vehicles a year, with an expected failure rate of 2% (or 6,000 vehicles). Of these, approximately 4,396 vehicles are likely to be registered

three different times on three different days during a 120-day period.

outside the northern Virginia area. Moreover, DEQ estimates that there are currently 392 permitted emissions inspection stations.

Localities Particularly Affected

The proposed regulation will affect the northern Virginia area covering the counties of Arlington, Fairfax, Loudoun, Prince William, and Stafford and the cities of Alexandria, Fairfax, Falls Church, Manassas, and Manassas Park. The localities are not expected to incur any additional costs in implementing the proposed regulation.

Projected Impact on Employment

The proposed regulation is not likely to have a significant impact on employment, especially as the labor market is not likely to be very slack in the northern Virginia area. To the extent that the proposed regulation encourages emissions inspection stations to hire more people, it is likely to some shift of workers into these jobs and away from other jobs.

Effects on the Use and Value of Private Property

The proposed regulation is likely to increase the costs associated with operating motor vehicles in the northern Virginia area. However, some of these costs are likely to be counter-balanced by the clean screens allowed for under this regulation, the provision of subsidies for low-income vehicle owners, improved fuel efficiency, and enhanced vehicle life. The proposed regulation is likely to have a positive effect on the use and value of emissions inspection stations. While it is likely to impose some additional costs on emissions inspection stations, the estimated increase in revenue through increased vehicle inspections and repairs is likely to outweigh the increased costs. Finally, the proposed regulation is also likely to have a positive effect on the use and value of property in the northern Virginia area. By lowering the amount of ground-level ozone and improving air quality, the proposed regulation is likely to raise property values in the northern Virginia area. The net effect of the proposed change on the use and value of private property cannot be precisely estimated at this time.