

# **WHITE PAPER**

## Additional Potential Short-Term Ozone Reduction Strategies January 7, 2008

Potential strategies suggested by Regional Air Quality Council members. Analysis prepared by Regional Air Quality Council staff, with technical assistance from the Colorado Department of Public Health and Environment's Air Pollution Control Division.



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## Summary of Costs and Benefits of Board-Adopted Short-Term Measures in 2008

Proposed Measure	Estimated Costs (2008)	Potential Emission Benefits (2008)	Assumptions/ Comments
<b>HB 1302 High-Emitter Program</b>	\$160,000	0.09 tpd VOC 0.53 tpd CO	Based on repairing 380 vehicles. Does not include fuel economy savings to vehicle owner
<b>High-Emitter Vehicle Scrappage Program</b>	\$135,000	0.17 tpd VOC 0.6 tpd CO	Based on retiring 135 vehicles. Additional funding will result in additional vehicles.
	\$500,000	0.63 tpd VOC 2.2 tpd CO	
<b>Continued fleet turnover to Tier 2 standards</b>	\$100-350/vehicle + \$.02/gal	5.8 tpd VOC 9.6 tpd NOx	
<b>Statewide Oil and Gas Regulations</b>	\$2.0 million/yr*	15.4 tpd VOC** 3.3 tpd VOC**	* Tanks -- \$1.5 million; dehydrators -- \$500,000 -- **statewide estimates
<b>RICE Controls Statewide</b>	Not available	Not available	
<b>Small and nonroad engine fleet turnover</b>	\$20-56/engine + \$.02/gal	2.6 tpd VOC 2.8 tpd NOx	
<b>Diesel retrofit program</b>	\$1.9 million	0.65 tpd VOC 0.07 tpd NOx 6.2 tpd CO	Based on current funding for RAQC's diesel retrofit program
<b>Ozone Outreach Program</b>	\$500,000/yr.	0.5 tpd	4-year program estimated to result in 1.9 tpd benefit in final year.
<b>Promote E85 in Flex-Fuel Vehicles</b>	\$470,000	Uncertain	
<b>Voluntary RVP Reduction</b>	\$750,000-\$3 mm	1.0 tpd VOC	--Based on reduction of 0.5 psi RVP in 30% of gasoline sold
	\$2.5-\$10 million	3.5 tpd VOC	--0.5 psi reduction for 100% of gasoline sold
<b>7.8 RVP in North Front Range</b>	\$100,000-150,000 for 3-month season \$1,000-\$1,500/day	0.4 tpd VOC if all gasoline is 7.8	
<b>Oil and Gas Valve Replacements</b>	\$150-\$1350 per valve depending on service life	0.5 tpd VOC	Emission reduction based on 10% valve replacement
<b>Green Completions</b>	Uncertain	Uncertain	
<b>Mower Trade-Out Program</b>	\$30,000	0.027 VOC, 0.055 CO tpd	Based on replacement of 150 mowers
	\$100,000	0.082 tpd VOC, 0.167 tpd CO	Based on replacement of 500 mowers
<b>Landscaping Pilot Program</b>	Not available	0.17 tpd VOC	Based on full changeout of equipment in one medium-sized city
<b>Lower I/M Cutpoints</b>	Not available	0.15 tpd VOC 2.1 tpd CO 0.5 tpd NOx	Benefits for 2-year cycle are 0.9 tpd VOC, 12.7 tpd CO, and 3.0 tpd NOx
<b>Expand Regulation No. 3 VOC requirements to Larimer &amp; Weld counties</b>	Not available	Not available	

## Summary of Costs and Benefits of Additional Potential Short-term Measures in 2008

Potential Measure	Estimated Costs	Potential Emission Benefits	Assumptions/ Comments
<b>Collector Vehicle Requirements</b>	\$900,000	0.38 tpd VOC 7 tpd CO	Based on testing 16,000 vehicles at full-scale implementation after five years. Benefit in summer 2008 would be minimal.
<b>Expand I/M Program to North Front Range</b>	\$3.6 million for expansion of enhanced program	1 tpd VOC 16.5 tpd CO 0.3 tpd NOx	Full emission reduction benefit would only be realized after two-year implementation cycle. Benefit in summer 2008 could be minimal.
<b>Voluntary High-Emitter Efforts in North Front Range</b>	\$100,000, 2008	0.05 tpd HC, 0.3 tpd CO, 0.002 tpd NOx	Based on repair of 200 vehicles
	\$500,000, long term	0.24 tpd HC, 1.4 tpd CO, 0.01 tpd NOx	Based on repair of 1,000 vehicles
<b>Voluntary Idling Reduction Program</b>	\$7/sign, staffing & training costs (no estimates at this time)	0.1 tpd VOC 2.3 tpd CO 0.03 tpd NOx	Based on 130,000 motorists eliminating 2 minutes of idling per day, May through August
<b>Coordinated Tree Planting Program</b>	No cost estimates at this time	Emission benefits cannot be determined at this time	Research on costs and benefits in the Denver-metro area are in early stages; more data needed to make determinations
<b>Green Completions</b>	APCD staff to provide data at meeting	APCD staff to provide data at meeting	
<b>Mandatory Expansion of Leak Detection and Repair for Fugitive Leaks</b>	APCD staff to provide data at meeting	APCD staff to provide data at meeting	
<b>Green Plus Fuel Catalyst Technology</b>	No cost data available from Green Plus	11 to 40% reported reduction in VOC per vehicle, based on limited testing	
<b>HB1302 High-Emitter – Accelerated Implementation</b>	\$75,000	0.04 tpd VOC, 0.25 CO, 0.002 NOx	Based on doubling the number of vehicles notified from June to August from 75 / month to 150 / month.

## **Collector Vehicle Requirements**

### **Program Description**

Currently vehicles can apply for collector license plates if the vehicle is older than 25 years. A passing emissions test is required upon registration of the vehicle. Re-registration of collector vehicles is once every five years and does not require a new emissions test for the current vehicle owner. However, a new passing emissions test is required if the collector vehicle is sold or transferred to a new owner. There are approximately 58,000 vehicles registered as collector vehicles in the Denver Metro Area (DMA). These vehicles represent nearly 3% of the Denver-metropolitan area light duty fleet.

Collector plates were designed for use by car collectors to signify the value of their collector vehicle. Because of lax requirements, many vehicles that are not collector vehicles apply for and receive collector plates. Many of these vehicles do so to avoid the current emissions testing requirements in the DMA. Since these older vehicles have higher emissions, stakeholders have asked that more stringent requirements be imposed on vehicles that are truly not collector vehicles.

There are approximately 58,000 collector vehicles registered in the DMA. It is assumed a large percentage of these vehicles are 25 years old, have little collector value and are only avoiding the I/M program. One improvement that could be made to the program is including a valuation of vehicles applying for collector plates. This would eliminate a large percentage of the old vehicles avoiding the I/M program. The Old Car Council of Colorado has indicated it may support an effort to tighten collector plate requirements to stop cars with no collector value from getting collector plates.

### **Program Costs**

Program cost is estimated at a maximum of approximately \$900,000 annually. This cost includes testing fees and assumes that the repair costs will be offset by vehicle fuel savings after repairs. Final program cost will depend on how many vehicles are determined to be non-collector vehicles avoiding the I/M program.

### **Air Quality Benefit**

Determining how many of the current 58,000 collector plated vehicles are truly valuable collector vehicles is not possible. However, the Air Pollution Control Division estimates that a maximum of 16,000 additional vehicles could fail their emission tests annually if changes were made to the collector plate requirements (the actual number would likely be much lower). Annual testing of all these vehicles would not occur for five years since collector registrations are currently valid for five years. Therefore, as registrations needed renewal, a vehicle valuation could be performed and those that are not collector items would require emissions testing at registration renewal.

A change in the current collector plate requirements could require previously exempt vehicles that are model 1981 and older to undergo annual two-speed idle testing. Because the two-speed idle test measures emissions on a concentration basis, estimating the mass of emission reductions from eliminating the current exemption based on actual testing data from these vehicles would be extremely difficult. Therefore, emissions benefits were developed by using the oldest vehicle model year for which there are mass based emission testing data (model year 1982). Based on this data, testing and repairing 16,000 vehicles could reduce an estimated 0.38 tons per day (TPD) HC and 7 tpd CO at full-scale implementation after five years. Since legislative and regulatory action would be needed to implement changes in the collector plate requirements, there would be limited benefit in the summer of 2008.

## **Expand Enhanced I&M Program and High-Emitter Remote Sensing Efforts to the North Front Range**

### **Program Description**

Expanding the current enhanced IM Program and remote sensing efforts to the former Basic I/M program area of the NFR is being investigated as both a short-term and long-term ozone reduction strategy. Below, expansion of a mandatory Enhanced I/M program with remote sensing based high-emitter identification is investigated.

Beginning emissions testing on vehicles operating in the NFR would provide ozone reduction benefits. At this time, APCD estimates the number of I/M eligible vehicles for the NFR area is approximately 250,000 1982 and newer vehicles. However, expansion prior to the 2008 ozone season depends on addressing a number of issues related to program implementation.

According to current statute, the AQCC has the authority to expand the Enhanced I/M program with remote sensing based high-emitter identification into the former basic program area along the NFR. Expanding the program to the NFR would require AQCC regulatory action. The earliest that a regulation could be proposed is February 2008 with a hearing in May 2008.

There are also contractual issues that would need to be resolved to implement a mandatory program as the current contract with Envirotest does not allow for the provision of I/M services in the NFR. It is unclear at this point whether the contract could simply be modified to expand the area of coverage or if the state would take the project to competitive bid. Additionally, once a contract is in place the I/M240 lane infrastructure would have to be built for the NFR and resources would have to be hired and trained to operate the stations and remote sensing vans.

### **Program Costs**

Program cost is estimated at approximately \$3.6 million annually for expansion of the enhanced program to the NFR. This amount includes test fees, additional registration fees, repair costs and fuel savings.

### **Air Quality Benefit**

Mobile6 estimates that the benefits for expanding the current Enhanced I/M program into the NFR area are approximately 1 tpd HC, 16.5 tpd CO and 0.3 tpd NOx upon full implementation after two years. This does not include any incremental benefit from high-emitter identification remote sensing efforts. Since this effort requires several months for regulatory action and contract implementation, and two years for full motorist implementation, the program would show limited benefit in 2008.

## Voluntary High-Emitter Remote Sensing Efforts in the North Front Range

### Program Description

If a mandatory I/M program could not be implemented, there is the possibility that a voluntary remote sensing based high-emitter identification program could be developed for the summer of 2008. This program could operate similar to the voluntary Repair Your Air Campaign (RYAC) operated over the past 5 years in the DMA.

A number of implementation issues need to be resolved prior to program start-up. For a remote sensing program to function, any vehicle identified by remote sensing as a high-emitter requires a compliance test to confirm it is a high-emitter. There are currently no Envirotest stations in the area for compliance testing. In addition, more remote sensing vans would have to be secured.

For voluntary programs to be successful, an incentive should be offered to repair the vehicle. Throughout the operation of the RYAC these incentives included repair assistance of \$500 - \$1,000, free emissions testing and a free rental vehicle while the vehicle was in the repair facility. Even with these incentives, initial program participation was less than 15%. Fundraising efforts would be needed to provide these incentives.

The City of Fort Collins attempted a voluntary project similar to this in 2006. Overall, a small number of vehicle owners participated in the program. Two issues limited program success. One, without an operating emissions testing program there was little incentive to repair a vehicle beyond concern for the environment. The City also noted that remote sensing van coverage should be increased for the program to be more successful. CDPHE, DOR, Envirotest and the RAQC could work with stakeholders in the NFR to develop a more robust voluntary program.

### Program Costs

Fundraising efforts should target a minimum of \$500,000 to implement a voluntary high-emitter program in the NFR. Of this amount, \$400,000 would be directed towards repairs and other incentives with the remainder dedicated to program development and implementation.

If a program were implemented in May 2008, a maximum of approximately 200 vehicles could be repaired during the 2008 summer ozone season for approximately \$100,000.

### Air Quality Benefit

If \$400,000 were provided for repairs, up to 1,000 vehicles could be repaired at \$400 per vehicle. However, program start-up probably could not occur until May 2008 since all available resources are dedicated towards the HB1302 High-Emitter Program. Therefore, a maximum of 50 vehicles could be repaired per month between May and August 2008 for a total of 200 vehicles. This would provide reductions of 0.05 HC tpd, 0.3 tpd CO and 0.002 tpd NOx.

Table x – NFR Voluntary High-Emitter Program Benefits Summer 2008

	HC	CO	NOx	Vehicles
Pre-Repair Emissions	7.2	43.5	1.9	200
Post Repair Emissions	1.2	9.5	1.6	
Emissions Benefit Per Vehicle (gr/mile)	6.0	34.0	0.3	
Emissions Benefit Per Vehicle Per Day (lb/day)	0.5	2.8	0.0	
TPY (200 vehicles)	17.8	101.0	0.9	
TPD	0.05	0.28	0.002	

At full-scale implementation, the program could repair up to 1,000 vehicles. This would provide reductions of 0.24 HC tpd, 1.4 tpd CO and 0.1 tpd NOx.

Table x – NFR Voluntary High-Emitter Program Benefits at Full Implementation

	HC	CO	NOx	Vehicles
Pre-Repair Emissions	7.2	43.5	1.9	1000
Post Repair Emissions	1.2	9.5	1.6	
Emissions Benefit Per Vehicle (gr/mile)	6.0	34.0	0.3	
Emissions Benefit Per Vehicle Per Day (lb/day)	0.5	2.8	0.0	
TPY (1,000 vehicles)	89.1	504.9	4.4	
TPD	0.24	1.38	0.012	

## **Vehicle Scrappage Program Fund Raising**

### **Program Costs**

Staff will work on fundraising for vehicle scrappage efforts. Currently the RAQC has \$135K from a supplemental environmental program (SEP) dedicated towards this effort with a goal of \$500,000.

Additional program funding could come from a number of sources that include:

- Fundraising from foundations;
- Private funding from corporations or individuals; and
- SEPs from private companies that have been fined for violations of state and federal regulations (SEP funding must be proposed by the fined company).

Funding could not be utilized from:

- Congestion Mitigation and Air Quality (CMAQ) funding through the Federal Highway Administration (FHWA). These funds have a specific prohibition against using funding for scrapping older vehicles.

## **Voluntary Idling Reduction Program**

### **Program Description**

Idling reduction programs have been a key component of the RAQC's voluntary emissions reduction strategy for many years. While idling, the vehicle's emissions system may not function properly and exhaust emissions may be higher than normal. In addition, engines that idle for excessively long periods may not cool properly causing mechanical damage to the engine. Some municipalities around the country, including the City and County of Denver, have enacted "no idling" laws that prevent drivers from idling for more than a certain amount of time.

Hard data are difficult to find but some information indicates that turning off a newer fuel injected vehicle after 30 – 60 seconds of idling is cost-effective and won't harm engine components. It is estimated that a fuel injected vehicle will use 3 to 10 seconds worth of idling fuel to restart. However, it takes more gas to start a carbureted engine than letting it idle for 3 minutes.

Current RAQC programs focus on educating motorists through the Let's Take Care of Our Summer Air Ozone Program. In addition, local school district and public works fleets are educated about idling reduction and grant monies are used to purchase idling reduction technologies through the Clean Air Fleets Program. Significant idling reduction is achieved through these two programs.

However, there is opportunity to expand RAQC idling reduction programs in the future. Expanding idling reduction zones, policies, signage and enforcement similar to the City of Toronto could have emissions and health benefits. The program in Toronto focuses on adding signage around areas that have been identified as high idling zones that include schools, convention centers and sporting arenas. The City installs signage at these venues and educates citizens on the harmful effects and costs of idling. In addition, the City provides enforcement in those no idling zones.

There may be opportunity to work with the City and County of Denver and other local governments to implement a similar idling reduction effort in the DMA focusing on schools and the Democratic National Convention (DNC). At this time, the EPA and the DNC transportation committee are also interested in collaborating on such a program. This could reduce idling emissions around sensitive populations that include school children.

A suggestion has been made to reduce idling in drive-thru lanes at private fast food companies, coffee shops, other businesses and railroad crossings through voluntary signage and an education program. This would be a significant undertaking that could be met with resistance. There are potentially thousands of drive-thrus in the DMA. Some are owned by large corporate chains but many are franchises operated by single owners. Outreach to such a large, diverse group would be expensive and require significant staff resources.

There could also be resistance from these companies since their business model is based on high-volume through their drive-thrus and having customers through the lanes in less than two minutes. Having a customer shut off their vehicle in these lanes, or come into the store, could hamper business operations.

### **Program Costs**

Without further definition of the scope of this effort, program costs are difficult to estimate. However, signage is approximately \$7 per sign placed (based on an order of 1,000 signs). Other costs could include staffing and training.

### **Air Quality Benefit**

EPA idling emission factors for light-duty gasoline vehicles (LDGV) indicate an average idling vehicle emits 0.35 grams of HC per minute. To put this in perspective, assuming a vehicle idles for two minutes, 130,000 vehicles would need to be targeted to reduce hydrocarbon emissions by 0.10 tons per day.

Table x – Idling Emissions Per 130,000 Vehicles

	HC	CO	NOx
Idling Emissions (LDGV gr/min)	0.35	8.12	0.10
2 Minute Idling Emissions Per Vehicle (grams)	0.70	16.24	0.21
Vehicle Idling Reductions (lbs. per day)	201.59	4650.22	58.99
Tons per Day	0.10	2.33	0.03

## **Coordinated Tree Planting Programs**

### **Program Description**

Although studies to determine sources and magnitude of emissions from trees have been conducted elsewhere, current information is tentative and should be treated with caution. The development of data for estimating air quality benefits and costs in the north Front Range of Colorado is in the very early stages. A 2006 study of the tree population in Golden, CO estimated a net benefit of 10 tons per year (0.027 tons per day) reduction in volatile organic compounds (VOC). The study used locally collected land cover and tree data and i-Tree/UFORE, a resource analysis model. The value of the reduction to the community is estimated to be \$70,000.

There is general agreement in the field that there is potential to influence air quality if you plant correctly considering location/layout, meteorology and ozone forming potential. A computer simulation of the Los Angeles basin estimated that increased planting of low-emitting VOC trees would lower ozone concentrations, while increased planting of medium- to high-emitting VOC trees would increase ozone concentrations.

The mechanism for reduction of VOC emissions (and therefore ozone reduction) is based on temperature reduction which is achieved by shade and transpiration. Cooler temperatures reduce evaporative emissions, the air conditioning requirements for buildings and the heat island effect of pavement, concrete etc. All trees emit VOC, namely isoprene and monoterpenes; however the emissions rate can vary by 10,000 times by species and meteorological conditions. It is generally assumed that faster growing trees have higher VOC emissions than slower growth trees.

While development of a list of appropriate trees for planting in the northern Front Range to address ozone pollution is an important step, an equally important step is the development of a baseline state of the urban forest in this northern Front Range region.

Most tree planting activities are conducted by developers, building owners and home owners. Most municipalities have ordinances covering tree selection, size and location/layout. A survey of local ordinances, including Denver, Aurora and Fort Collins, does not demonstrate direct consideration of the pollution reduction/potential of trees.

### **Program Costs**

Cost cannot be quantified at this time.

### **Air Quality Benefit**

Although potential for an air quality benefit exists, it cannot be estimated at this time.

In terms of a 2008 reduction program, assuming selection of appropriate low-emitting trees for planting, little would likely be achieved in the short term. Young or growing low-emitting (slow growing) species do produce less emissions than the same species with mature foliage. However, the full benefits of shade/transpiration from mature foliage would be delayed until some reasonable height was achieved, and by definition (selection of slower growing trees) could not be expected in the first growing season.

## **Green Completions**

Staff from the Colorado Department of Public Health and Environment's Air Pollution Control Division will provide information on green completions at the upcoming RAQC Board Meeting.

## **Mandatory Expansion of Leak Detection and Repair for Fugitive Leaks**

Staff from the Colorado Department of Public Health and Environment's Air Pollution Control Division will provide information on the mandatory expansion of leak detection and repair for fugitive leaks at the upcoming RAQC Board Meeting.

## **“Green Plus” Fuel Catalyst Technology**

### **Program Description**

A representative of Biofriendly Corporation addressed the RAQC Board during the public comment portion of the regular monthly meeting on December 6, 2007. The Biofriendly representative brought to the attention of the Board a fuel additive, Green Plus, which is a patented technology of the Biofriendly Corporation. The Board expressed interest in learning more about this product.

In response to RAQC staff's initial request for information, staff was referred to the corporate web site, [www.biofriendly.com](http://www.biofriendly.com), to obtain information about the product.

The web site notes that the company Green Plus is “*more than a fuel additive - it is a true catalyst*” and states the product achieves reductions in criteria pollutants and increases efficiency in engines when Green Plus is added to diesel and gasoline fuels at a very low dilution rates (50 parts per million). The Biofriendly web site further indicates “*Green Plus is a patented technology, working at the molecular level to slightly ‘unbundle’ complex hydrocarbon molecule clusters to enable oxygen to reach the fuel and react with the fuel more easily*”. The constituents of Green Plus are undisclosed on their web site, but a Material Safety Data Sheet (MSDS) is circulating on the web that indicates the product is about 95% isopropyl alcohol.

Green Plus is a registered (#1832-002) fuel additive with the U.S. Environmental Protection Agency (EPA). However, EPA staff notes that the registration looks at the additive's chemistry, not its emissions performance. There are currently over 6,000 additives registered with EPA.

### **Program Costs**

No cost data is provided on the company's web site.

### **Air Quality Benefit**

Tests data provided on one gasoline vehicle (1991 Cadillac) in California indicated a 40% reduction in hydrocarbon (HC) emissions. A single gasoline vehicle test in Beijing, China indicated a 28% reduction in HC emissions. A single diesel truck test in California indicated an 11% reduction in HC.

Green Plus was given conditional approval (August 2005) for use in the Texas Low Emissions Diesel (TxLED) program based on a single engine “proof on concept” study. Conditional approval was rescinded in January-February 2006, for failure to complete verification testing suggested by the EPA and required by the TxLED despite the fact that Biofriendly had an \$830k grant from TxLED to complete the testing and report. Questions were raised by EPA relative to the “proof of concept” testing because it appeared that the engine tested was not operating to specifications prior to testing – it was a high emitting (dirty) engine.

The TxLED program is defined in Texas regulation and applies to 110 counties in Texas. It is clean diesel fuel program targeting NO<sub>x</sub> which requires the diesel fuels from local refiners and importers to provide one of the following equivalents:

- a specified clean diesel fuel
- CA diesel fuel
- alternative formulations (approved additives, of which there are currently 9)
- an alternative emissions reduction plan (only available through 2010) with equivalent NO<sub>x</sub> reduction.

## HB1302 High-Emitter Identification Program – Accelerated Implementation

### Program Description

Accelerating implementation of the HB1302 High-Emitter pilot program has been suggested as an option for achieving additional VOC reductions during the summer of 2008. Over the past six months, CDPHE, the Colorado Department of Revenue (CDOR), RAQC and Envirotest have constructed a methodical plan for implementing the HB1302 High-Emitter program based on lessons learned under the RAQC's Repair Your Air Program.

During the RYAC program, fluctuations in weekly high-emitter volume through the State's Emissions Technical Centers (ETC) overwhelmed staff and reduced program effectiveness. Based on this lesson learned, motorist notifications under the HB 1302 pilot program will be held at 50 – 75 notifications per month until program response rate, I/M240 compliance rates, cutpoints, noncompliance and resource implications are determined in the May timeframe. If the initial months of the program are successful, notifications could double from 75 vehicles per month to 150 in early summer.

### Program Costs

Assuming 180 additional vehicles would be repaired in the summer of 2008 under an accelerated program, repair costs are estimated at approximately \$75,000. Average repair costs per vehicle are approximately \$410 per vehicle (\$300 median cost).

Costs for Department of Revenue enforcement activities and costs to the motorist are not included in this analysis. Additional fuel savings to the motorist for repaired vehicles, estimated at 8 percent, are also not included in this analysis.

### Air Quality Benefit

For the 3 months June through August in the summer of 2008, an increase from 75 to 150 notifications will yield 225 additional high-emitter notifications. Of these, 180 (80%) vehicles are estimated to be eligible for repair and 45 (20%) vehicles are estimated to be eligible for salvage. The table below indicates this will equate to an estimated 0.04 tpd HC, 0.25 tpd CO and 0.007 tpd NOx.

**Table x –HB1302/RYAC Emissions Benefits – Additional Vehicles**

	HC	CO	NOx	Vehicles
Pre-Repair Emissions	7.2	43.5	1.9	180
Post Repair Emissions	1.2	9.5	1.6	
Emissions Benefit Per Vehicle (gr/mile)	6.0	34.0	0.3	
Emissions Benefit Per Vehicle Per Day (lb/day)	0.5	2.8	0.0	
TPY	16.0	90.9	0.8	
TPD	0.04	0.25	0.002	

## **CLARIFICATION: Residential Mower Trade-Out Program**

NOTE: Please note the emission benefit for this strategy has been clarified and refined, as demonstrated below.

The Regional Air Quality Council will work with a number of partners in its 2008 residential mower trade out program. The goal of the program is to offer free or deeply discounted earth friendly mowers when citizens permanently recycle gasoline-powered mowers. In addition, the program will raise awareness about the many available alternatives to gasoline-powered equipment available today.

### **Program Description**

The RAQC will seek to work with a number of diverse partners in order expand the reach of this program to its full capacity. Citizens can take advantage of the program throughout the course of the spring and summer months online at OzoneAware.org. This program will help secure media coverage throughout the spring and summer months, which will coincide with the activities of the OzoneAware outreach and education campaign.

> Online at OzoneAware.org

The RAQC will use the comprehensive web pages that were developed in 2007 as part of the Mow Down Pollution mower trade out program. The web pages provide a list of participating manufacturers that offer deep discounts on earth friendly lawn equipment. In addition, the web pages include information on the lawn equipments' contribution to summer ozone pollution and subsequent health effects. Information on recycling gasoline-powered equipment, pricing and extra rebates offered through the RAQC also will be included on the pages.

### **Program Costs**

Currently, the RAQC has \$20,000 for a program in Weld County. In addition, the StEPP Foundation has dedicated \$12,900 for a program covering the metro-Denver region. The retail cost of earth-friendly mowers, similar to the ones offered during the 2007 program, range from \$400 to \$450. If the RAQC subsidizes each mower at \$200, the \$32,900 will subsidize a total of 165 mowers. If additional funding is secured the program can be greatly expanded, which would yield a greater benefit. If a total of \$100,000 was secured, the program could subsidize 500 mowers.

### **Air Quality Benefit**

Based on a \$32,900 program, it is estimated that this program will permanently recycle 165 gasoline-powered mowers. This will achieve an approximate 0.027 ton per day (tpd) reduction in volatile organic compounds (VOCs). A larger funded program would recycle 500 mowers, yielding a 0.082 tpd reduction in VOCs.

The original reductions quoted in the initial staff paper were based on a long standing per use emissions factor. For a given program length we would estimate the number of uses and seasonalize the emissions reduction to obtain a per day reduction number. Unfortunately, the staff paper presented a per use emissions reduction and did not reflect a per day emissions reduction.

Since the initial staff paper we have researched what others around the country were using and found an EPA approved emissions factor (0.3283 VOC pounds per summer day/mower) used for a similar voluntary program in Oregon that was incorporated into their SIP. The above quoted emissions reductions are based on the EPA approved emissions factor used in Oregon.