OZONE WHITE PAPER

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Colorado Springs, Colorado
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Attachment 1

Ozone White Paper
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Glossary of Terms

Attainment area: A geographic area in which levels of a criteria air pollutant meet the health-based National Ambient Air Quality Standard for that specific pollutant.

Clean Air Act: Originally passed in 1963, the current national air pollution control program is based on the 1970 version of the law. Substantial revisions were made by the 1990 Clean Air Act Amendments.

Major source: A stationary facility that emits a regulated pollutant in an amount exceeding the threshold level (100 or 250 tons per year, depending on the type of facility).

Mobile sources: Moving objects that release regulated air pollutants, (e.g., cars, trucks, buses, airplanes, trains, motorcycles, and gas-powered lawn mowers).

National Ambient Air Quality Standards: Permissible levels of criteria air pollutants established to protect public health and welfare. Established and maintained by EPA under authority of the Clean Air Act.

NOx: Nitrogen oxides. One of the six criteria pollutants. The term used to describe the sum of nitric oxide (NO), nitric dioxide (NO2), and other oxides of nitrogen, which plays a major role in the formation of ozone. The major sources of man-made NOx emissions are high temperature combustion processes, such as those occurring in automobiles and power plants.

Nonattainment area: A geographic area in which the level of a criteria air pollutant is higher than the level allowed by the federal standards. For NAAQS, where the pattern of "violations of standard" is sufficient to require remedial action; a boundary is determined around the location of the violations. The area within that boundary is designated to be in non-attainment of the particular NAAQS standard and an enforceable plan is developed to prevent additional violations.

NSR: New Source Review. Federal air program that establishes control technologies and emission limits for new major sources and for major modifications at existing sources.

Point source: a source of pollution that is point-like in nature. An example is the smoke stack of a coal-fired power plant or smelter.

Prevention of Significant Deterioration: A program established by the Clean Air Act that limits the amount of additional air pollution that is allowed in Class I and Class II areas.

SIP: State Implementation Plan; a detailed description of the measures a state will use to carry out its responsibilities under the Clean Air Act.

Smog: A mixture of air pollutants, principally ground-level ozone, produced by chemical reactions involving smog-forming chemicals.

Stationary source: A fixed source of regulated air pollutants (e.g., industrial facility).

OZONE WHITE PAPER

Executive Summary

This ozone white paper will focus on ground level ambient ozone and provides background information on the current ozone problem in the Colorado Springs Region. The paper also describes current and future programs and technological improvements that will affect future ozone concentrations along with possible strategies that can be considered in the future. This paper will also look at growth in population, vehicle miles traveled, travel behavior and possible effects that this will have on ozone concentrations.

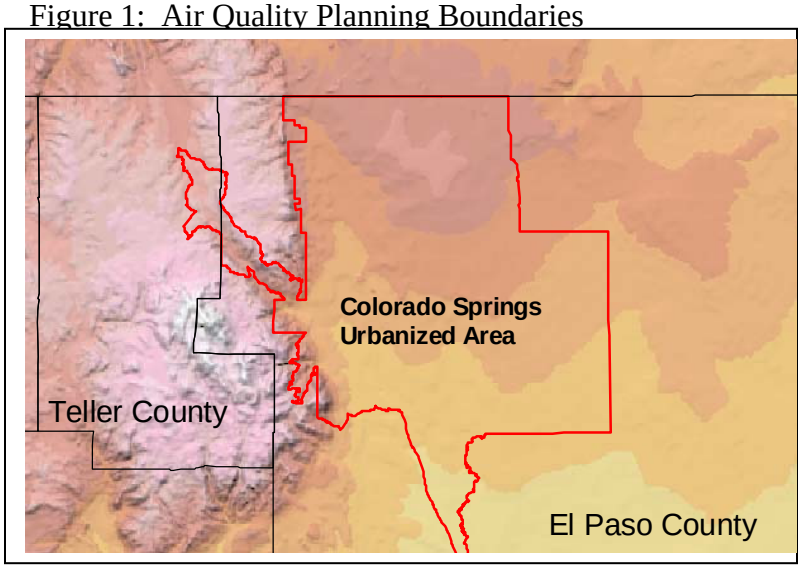
Background

Ozone is a component of smog and the "brown cloud" and causes health problems. Unlike carbon monoxide, ozone is not emitted directly as a pollutant, but forms when sunlight causes a chemical reaction between hydrocarbons (VOCs) and nitrogen oxide. VOCs are emitted from motor vehicles, gasoline vapors, dry cleaners, refiners, factories, trees, and consumer and commercial products. Nitrogen oxide, another ozone precursor, is emitted from motor vehicles, power plants and other sources of combustion.

Because ozone comes from so many different sources and it takes time for the reaction to occur, the reacting compounds can spread over a large area, producing a regional problem. Depending on the meteorological conditions, winds can carry ozone, and the pollutants that form it, hundreds of miles away from the original sources. Peak ozone levels typically occur during hot, dry, stagnant summertime conditions. In Colorado Springs and in other communities along the Front Range the typical ozone season is from May to September and the highest levels are typically in June and July.

The ozone classification boundaries for the Colorado Springs Urbanized Area are shown below in Figure 1. The boundaries include all of Colorado Springs along with portions of El Paso and Teller Counties.

Figure 1: Air Quality Planning Boundaries



Ozone formation

The three main factors that influence ozone concentrations are:

- Meteorology –The major weather factors that affect ozone formation include fronts, pressure, wind direction, wind speed and circulation.
- Topography – Mountain valleys tend to trap ozone and make it more difficult to dissipate.
- Chemistry and physics – Ozone formation is complex and research is still being conducted

Human and Environmental Health Effects of Ozone

Short-term (1-3 hours) and prolonged (6-8 hours) exposure to ambient ozone has been linked to a number of harmful health effects. Exposures to ozone can make people more susceptible to respiratory infection, result in lung inflammation, and aggravate pre-existing respiratory diseases, such as asthma. Other health effects include a decrease in lung function and increased respiratory conditions such as chest pain and cough. These effects usually occur when individuals are actively exercising, working or playing outdoors. Ozone can aggravate existing health problems for people with heart disease and breathing related diseases such as asthma and emphysema. It can be especially hard on young children and elderly.

Ground-level ozone interferes with the ability of plants to produce and store food, so that growth, reproduction and overall plant health are compromised. Ground-level ozone has been shown to reduce agricultural yields for many economically important crops. The effects of ground-level ozone on long-lived species such as trees are believed to add up over many years so that whole forests or ecosystems can be affected. Ground level ozone can kill or damage leaves so that they fall off the plants too soon or become spotted or brown. These effects can significantly decrease the natural beauty of an area.

Ozone Standards and Current Trends

Ozone has two standards, based on different time frames:

- 1-hour standard of 0.12 ppm, averaged over 1-hour; and
- 8-hour standard of 0.08 ppm., averaged over 8-hours

The 8-hour ozone standard was issued by the EPA in July 1997, based on information demonstrating that the 1-hour standard was inadequate for protecting public health. Colorado Springs is currently in compliance with both the 8-hour and 1-hour standards. These health standards were set by the US EPA to protect public health and welfare and have been adopted by the State of Colorado.

Currently, ozone concentrations in the Colorado Springs Region are measured at the US Air Force Academy and Manitou Springs Monitoring Stations. The Manitou Springs Monitoring Station was installed in March 2004 at the Manitou Springs Public Works facility. Monitoring locations correspond to modeling which shows that the two ozone precursor pathways, corridors where concentrations of nitrogen oxide and hydrocarbons tend to be the highest, are in the Monument and Fountain Creek drainage basins.

Ozone concentrations in the Colorado Springs Region have been measured at the US Air Force Academy Station since 1996 and the Manitou Springs Monitoring Station since April 2004. Levels at the US Air Force Academy Station have increased steadily since monitoring for the new 8-hour ozone standard began in 1996. A violation of the new 8-hour ozone standard occurs if the 3-year average of the annual 4th highest daily maximum concentration exceeds .085 ppm (although the standard is 0.080 ppm, violations do not occur until levels exceed 0.085 ppm due to truncation to two significant decimal points).

Ozone levels in our urbanized area have increased from 69 percent of the standard in 1998 to 86 percent of the standard in 2006. Table 1 shows the four highest ozone concentrations, referred to as 1st Max through 4th Max, recorded at the U.S. Air Force Academy Monitoring Station and the Manitou Springs Monitoring Station (installed in April 2004 at the Public Works Facility), during the 2006 Ozone Season. Ozone concentrations in 2006 were lower than 2005 at the U.S. Air Force Academy Monitoring Station and about the same at the Manitou Springs Monitoring Station. As shown in Figure 2, ozone concentrations during 2006 at the Manitou Springs Monitoring Station were consistently higher this year than at the U.S. Air Force Academy. This trend is the reverse of last year.

Table 1

2006 Ozone Season - Four Highest Ozone Concentrations

	1st Max	2nd Max	3rd Max	4th Max
U.S. Air Force Academy	0.073	0.073	0.072	0.071
Manitou Springs	0.079	0.078	0.077	0.076

Note: All concentrations are in parts per million (ppm)

Figure 2: Annual 4th Max Ozone Values

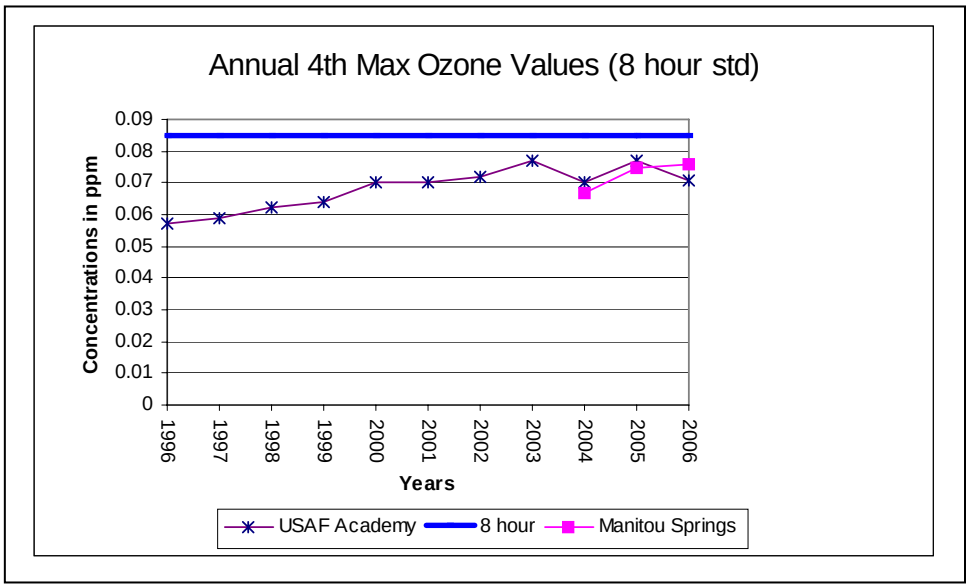
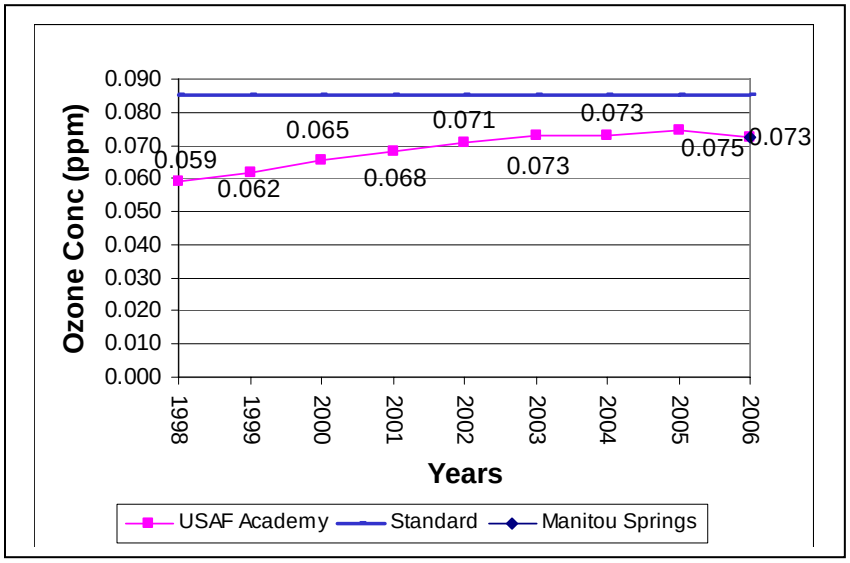


Figure 3 shows the three year average of the 4th Max ozone concentrations since 1998. Because ozone concentrations have only been measured in Manitou Springs since 2004, there is only one monitoring point shown on this graph. For ozone, the individual 4th Max values for each year are not compared directly to the standard to determine a violation, but averaged over a three-year period to determine a violation. The Federal and State 8-hour ozone standard of .085 parts per million (ppm) is shown as the thick solid line across the graph.

Figure 3: Ozone Trends using 3-year Average of 4th Max Readings



Future Ozone Standards and Trends

On January 31, 2007 the EPA Staff completed several documents that are part of the agency's on-going review of the National Ambient Air Quality Standards for ground-level ozone (Appendix A). This staff paper presents the final staff conclusions and recommendations for the EPA administrator to consider when deciding whether to retain or revise the existing primary (health based) and secondary (welfare-based) ozone standards. EPA staff states "that the overall body of evidence provides strong support for considerations of an ozone standard that would provide greater health protection for sensitive groups, including asthmatic children and older people with lung disease, healthy children and older adults." This document is available at: http://www.epa.gov/ttn/naaqs/standards/ozone/s_o3_cr_sp.html. One of EPA staff recommendations is to consider a standard between 0.060 and 0.080 ppm. EPA has proposed action to revise or retain the current ozone standards by June 20, 2007 and take final action by March 12, 2008.

A summary of the research that has been conducted on increasing and decreasing ozone concentrations is shown below.

The VOC inventory that was done for El Paso County shows slowly decreasing VOC levels from 2005 to 2012. Two of the primary reasons why hydrocarbons and nitrogen oxide emissions are expected to decrease in the future are:

- Federal Tier 2 emission standards begin in 2004 with full implementation of the Tier II program beginning in 2007. The Federal Tier 2 standards apply more stringent numeric emission limits, and the regulation introduces changes that make the standard more stringent for larger vehicles. Under Tier 2, the same emission standards apply to all vehicle weight categories. The Tier 2 standards are structured into 8 certification levels of different stringency and an average fleet standard for NO_x emissions. The average NO_x emissions of the entire vehicle fleet sold by each manufacturer will have to meet the average NO_x standard of 0.07 grams/mile.

  The Tier 2 regulations also bring new requirements for fuel quality. Cleaner fuels will be required by advanced emission treatment devices that are needed to meet the regulations. Research shows that when fully implemented that these standards could reduce hydrocarbon emissions by 97% (from 0.31 grams/mile to 0.01 grams/mile) and nitrogen oxide emissions by 97% (from 0.6 grams/mile to 0.02 grams/mile). Achieving this benefit will require the use of low sulfur fuel.

- Research also show that as older cars get circulated out of the fleet mix and replaced by new cars that hydrocarbon and nitrogen oxide emissions will go down. Newer vehicles release less hydrocarbon emissions than older cars. The average fleet mix in El Paso County is 6 years old, so for 2006 the average vehicle model year was about 2000.

The population in El Paso County is forecasted to increase from 520,571 in 2000 to 762,879 in 2020 (Colorado State Demographer's Office). This is also projected to be accompanied with an increase in vehicles miles traveled. This translates to more people and more cars driving further. What effect this will have an ozone is unknown until a model can be conducted to determine what influence emissions from cars and trucks are influencing ozone production in the region.

Ozone Emission Sources

A partial emission inventory was developed for VOCs and NOx. This emission inventory was done for 2007 and 2012 and is shown in Appendix B. Emission Inventory is based on projected population growth and vehicle miles traveled. This emissions inventory was completed in 2003 by the Air Pollution Control Division for Denver's Ozone early Action Compact (EAC) to identify sources the could contribute to the ozone problem in Denver.

Implications of a Violation

A violation of the ozone standard would initiate a non-attainment designation for the Colorado Springs area which would require PPACG to develop an emissions inventory of hydrocarbons and nitrogen oxide, as well as a plan to reduce emission levels of these pollutants. It is not known at this time which techniques would be identified to control these pollutants. Depending on the severity of the ozone problem, federal highway

funding could also be withheld for a failure to implement ozone reduction strategy programs.

Non-attainment designation would lead to more stringent permitting requirements and possible revisions to the State of Colorado Air Quality Regulations regulating major and minor stationary sources. Non-attainment designation will affect the ability to permit new sources or make major modifications to existing sources. The more stringent permitting requirements for minor sources will decrease the emission trigger levels and increase the number of minor source permits. State of Colorado Air Quality Regulation revisions may affect the type of equipment that Colorado Springs Utilities can install, how it maintains current equipment, and how it maintains the vehicle fleet. Non-attainment designation will affect the cost of conducting business within the Colorado Springs area.

Major sources under non-attainment will have more stringent emission requirements, due to EPA's New Source Review (NSR) program. Under EPA's NSR program, if a company is planning to build a new plant or modify an existing plant such that air pollution emissions will increase by a large amount, then the company must obtain a Prevention of Significant Deterioration (PSD) permit. The PSD permit is a construction permit which requires the company to minimize air pollution emissions by changing the process to prevent air pollution and/or installing air pollution control equipment. The terms "RACT," "BACT," and "LAER" are acronyms for different program requirements under the NSR program.

- RACT, or Reasonably Available Control Technology, is required on new or existing sources in areas that are not meeting national ambient air quality standards (i.e., non-attainment areas).
- BACT, or Best Available Control Technology, is required on major new or modified sources in clean areas (i.e., attainment areas).
- LAER, or Lowest Achievable Emission Rate, or pollution offsets are required on major new or modified sources in non-attainment areas.

BACT, LAER, offsets and sometimes RACT are determined on a case-by-case basis, usually by State or local permitting agencies. For more information on the NSR program, go to www.epa.gov/ttn/nsr.

Major and minor sources under non-attainment will have lower trigger limits for which to file Air Pollution Emission Notices (APEN) and Construction Permits. Permitting requirements changes for minor stationary sources of air pollution are illustrated in Figure 4.

Figure 4: Changes to the Permitting Requirements for Minor Sources

	Attainment	Non-Attainment
Minor Source – APEN reporting limits	2 tons any pollutant	1 ton any pollutant
Minor Source – Construction Permit required if emissions exceed limits	VOC – 5 tons PM10 – 5 tons TSP – 10 tons CO – 10 tons SO2 – 10 tons NOx – 10 tons	VOC – 2 tons PM10 – 1 tons TSP – 5 tons CO – 5 tons SO2 – 5 tons NOx – 5 tons

Ozone Strategy Evaluation Options

Future strategies were evaluated regarding their potential to reduce ozone concentrations in the Colorado Springs Region. This list does not include a analyses of the emission reduction potential of the strategies, cost and economic impact and implementation constraints and feasibility. Future strategies will be evaluated based on ease of implementation and funding availability. Strategies were broken out into 7 categories.

1. Public Outreach and Education to Reduce Ozone Precursors

Background

Typically, ozone outreach encourages citizens, businesses and organizations to take steps to reduce ozone forming pollutants by providing information about the associated benefits. Along Colorado's Front Range, attention is focused on reducing volatile organic compounds, rather than nitrogen oxides because while there is some uncertainty, it is generally accepted that urban front range ozone formation is for the most part limited by VOC's, not nitrogen oxides. This means that the concentration of ozone depends on the amount of VOC's in the atmosphere. This would mean that controlling VOC's would reduce ozone concentrations.

Ozone public outreach and education can take many forms. Examples are:

- Public presentations, pamphlets/brochures, the Internet, advertisements, holding special events.
- Ozone Action Alerts.
- TV and radio messaging.
- Stop at the Click Sticker Campaign
- Billboard, bus and CDOT variable message signs.
- Gas cap pressure tests and replacement program to replace missing or defective gas caps.
- Use of Smart Signs to educate motorists about tailpipe emission levels.
- Encourage use of alternative fuels that reduce VOCs through education, use of current incentives, and voluntary fleet purchase programs.
- Promote alternatives to single occupancy vehicle driving.

- Voluntary restrict the availability of solvent based paints in June and July, reschedule the use of solvent based paints to another time of year and encourage the use of low VOC water based paint products.
- Promote a gas can changeout program that will replace portable gas containers with non-spill lower-polluting cans and nozzles.

Existing Activities

PPACG developed a pamphlet entitled Ozone Pollution in the Pikes Peak Region. This pamphlet describes what ozone is and how it affects your health and it gives strategies to reduce ozone. PPACG also develops and distributes annual addendums to an Air Quality Trends Report which tracks ozone concentrations.

Implementation Considerations and Discussion

Public outreach is often the strategy of choice when trying to achieve air quality improvements beyond compliance with federal standards. Because public outreach and education programs are voluntary in nature and are usually implemented at the local and regional levels, there are no state regulatory issues that must be addressed.

2. Anti Idling Programs

Background

Vehicles that idle for an extended period of time create more air pollution, waste fuel and money and cause engine wear and tear. Anti-idling programs may focus on passenger vehicles or heavy duty vehicles such as buses and delivery trucks. Citizen anti-idling campaigns encourage motorists not to idle their vehicles unnecessarily. Examples of "unnecessary idling" include extended warm-up on cold winter mornings, leaving an idling vehicle unattended while doing short errands, and idling at railroad crossings while a train is passing. Sources of idling advice include:

Source	Recommendation (Passenger cars)
www.123turnyourkey.com	Idling for more than 10 seconds costs more than turning off your engine.
Daily Grist Sept 23, 2004	60 seconds
Alberta Motor Association http://www.ama.ab.ca/cgi-ebs/advocacy/envt_fuel.jsp	1. Reduce warm up time to a maximum of 30 seconds 2. Turn your car off when stopping for more than 10 seconds, except in traffic.

Other anti-idling campaigns focus on heavy duty vehicles such as delivery trucks or school buses. Awareness-raising through posting signs and/or distributing information to drivers may reduce unnecessary idling of heavy duty vehicles. Some jurisdictions may choose to implement mandatory idling restrictions, either to reduce air pollution or reduce noise intrusions, or both.

The Green Car Congress, reports that over half the country has state or local laws limiting idling of heavy duty trucks and/or busses. Many laws differ from state to state, with time limitations ranging from 3 to 30 minutes. The EPA is now planning an effort to convene

stakeholders nationwide to develop a consensus regarding a heavy-duty vehicle idling ordinance.

Existing Activities

PPACG and communities in Colorado Springs have no existing programs specifically designed to decrease the amount of idling time or idling vehicles. The City of Colorado Springs has an ordinance (10.11.103: Unattended Motor Vehicle) that can be applied to idling vehicle under specific circumstances. This ordinance was enacted and is enforced as an anti-theft measure and is not applied if the vehicle can be locked and keys removed while the vehicle is idling. The ordinance says that "no person driving or in charge of a motor vehicle shall permit it to stand unattended without first stopping the engine, locking the ignition and removing the key, or when standing upon any perceptible grade without effectively setting the brake and turning the front wheels to the curb or side of the highway." (1968 Code §6-11-3; Ord. 75-86; Ord. 01-42)

Implementation Considerations and Discussion

As with public outreach, implementation of voluntary anti-idling campaigns can be considered "easy" because of the voluntary nature of public education. For communities having or considering a mandatory restriction on vehicle idling, finding the resources to conduct enforcement can be a challenge. Convincing local law enforcement and code enforcement personnel that this issue requires increased attention can be challenging.

3. Smoking Vehicles

Background

Gasoline smoking vehicles are visible polluters. Visible smoke is high in hydrocarbons, an important ozone precursor. Many states include their (typically voluntary) smoking vehicle programs among their efforts to reduce ozone precursors, although these programs are usually not part of their official ozone SIP. Colorado State Law (CRS 42-4-412) prohibits visible smoke to be emitted from gasoline vehicles, but enforcement is limited.

Existing Activities

Colorado Springs and the Southern Front Range do not have any ordinances in place regarding smoking vehicles, however, law enforcement officers can issue citations to smoking vehicle owners at any time.

Implementation Considerations and Discussion

A smoking vehicle program could consist of local ordinance changes, state-wide policy changes and/or a voluntary program conducted at the local level. Past experience from the City of Fort Collins suggests that a voluntary smoking vehicle program elicited limited response from motorists. Their pilot test found that of the 75 motorists with allegedly smoking vehicles who were contacted by letter and asked but not required to respond, only 20% responded in any fashion, and only 8% subsequently proved their vehicle was not smoking.

One possibility is expanding a voluntary smoking vehicle hotline by offering a statewide toll-free hotline number. It is the assumption that motorists who are unaware that their vehicle is mildly smoking would take action to address the problem. There is a perception that many citizens are offended by smoking vehicles and would call in if given the opportunity. Costs for the actual hotline would be minimal but there would be expenses associated with collecting the recorded reports, obtaining registration information, and sending out letters.

Ease of implementing mandatory smoking vehicle programs may be considered moderate, because even though local governments have the capability to enact local laws prohibiting visible emissions from gasoline vehicles, it is often difficult to find the resources to provide meaningful enforcement.

4. Clarification of Stage I Vapor Recovery Practices

Background

Stage I vapor recovery is used during the refueling of gasoline storage tanks to reduce hydrocarbon emissions. Vapors in the tank, which are displaced by the incoming gasoline, are routed through a hose into the cargo tanker, instead of being vented to the atmosphere. At the terminal, the vapors are condensed into liquid gasoline or incinerated.

Stage I Vapor recovery is required by Storage Tank Regulations of the Colorado Department of Labor and Employment, Division of Oil and Public Safety, 7 C.C.R. 1101-14 and is included in CDPHE Regulation No. 7. Stage I Vapor Recovery Systems are required in the Denver metro one-hour area.

Responsibility for the installation and enforcement of the use of Stage I equipment is spread over various departments and agencies. The Colorado Department of Labor and Employment, Division of Oil and Public Safety, inspect and enforce Stage I in the Denver area under the Reg. 7 air quality requirement, but they do not conduct enforcement in the North Front Range. In addition, it has been suggested anecdotally but not confirmed that incidents may have occurred where suppliers have by-passed the Stage I vapor recovery systems while refueling underground storage tanks.

Existing Activities

Further investigation needs to be conducted to determine the requirements for Stage I Vapor Recovery Systems in Colorado Springs.

Implementation Considerations and Discussion

More information needs to be obtained from various stakeholders including Colorado Oil and Public Safety and the Colorado/Wyoming Petroleum Marketers and clarify requirements and practices. In addition to fact-finding, general awareness raising articles in stakeholder newsletters about the safety and air quality importance of Stage I systems might be useful.

5. Voluntary Reid Vapor Pressure (RVP) Reduction Program

Background

Reid Vapor Pressure (RVP) is a measure of gasoline volatility. Lowering gasoline RVP reduces hydrocarbon emissions which contribute to ozone formation. Lower RVP fuel is one of the control measures that was implemented as part of the Ozone Early Action Compact (EAC) to reduce hydrocarbon emissions. In 2004, EPA mandated that the Denver metro area receive 7.8 RVP fuel, or 8.8 RVP for an ethanol blend.

The CDPHE measures the fuel volatility of Front Range gasoline each summer to assist in analyzing summertime ozone air quality and in the development of future air quality projections. Hydrocarbon emissions from motor vehicles (both exhaust and evaporative) and evaporative emissions from fuel storage tanks play a role in the development of summertime ozone. Controlling these emissions are important in controlling summertime ozone concentrations.

The CDPHE collected 230 gasoline samples taken from 78 retail gasoline outlets and one governmental refueling site. The samples were randomly collected on a volumetric basis. Analysis of the data indicates that gasoline volatility did not vary substantially throughout the Front Range area. There were 38 gasoline samples collected from 14 stations in the North Front Range area, and 46 gasoline samples collected from 15 stations and one city fleet refueling site in Colorado Springs. The remainder was collected within the seven-county Denver metro area.

The seven-county Denver metro area's gasoline volatility averaged 8.5 lbs. psi, RVP, as did the North Front Range areas of Fort Collins, Loveland, and Greeley, and the gasoline volatility for the Colorado Springs area. While the Denver area summertime RVP standard is set by the U.S. EPA at 7.8 lbs. RVP, the federal rules allow an additional one pound RVP for ethanol blends, i.e. up to 8.8 lbs. RVP. Most fuel refiners and marketers took advantage of this one-pound ethanol waiver. For the rest of the Front Range and Colorado the U.S EPA summertime maximum fuel volatility is set at 9.0 lbs. RVP, with 10% ethanol blends allowed up to 10.0 lbs. RVP.

Ethanol content was more variable for the different Front Range areas, especially the Colorado Springs area. The ethanol-blend market share for the Denver area was 85%. The North Front Range generally tracked the Denver area with approximately 80% of gasoline containing 10% ethanol by volume. The Colorado Springs area had the least amount of ethanol blending, with approximately 60% of gasoline sold containing ethanol, most at the 10% volume level. In this area, a significant percentage of gasoline did not contain fuel ethanol.

Results indicate that suppliers are providing lower RVP fuel outside of the mandated area (Denver metro). It must be noted however, that continued provision of lower RVP gasoline outside the mandated area is at the discretion of the suppliers.

As mentioned previously, the current RVP standard is only enforceable in Denver. CDPHE will continue summertime gasoline sampling to see if the lower RVP requirements are having any spillover effect in Colorado Springs (current RVP is 9.0) and the North Front Range.

Existing Activities
Further investigation needs to be conducted to determine what can be done to supply the region with Low Read Vapor Pressure (RVP) fuel.

Implementation Considerations and Discussion
A voluntary strategy that was successful in the Denver Metro area is to encourage gasoline suppliers to voluntarily reduce gasoline RVP. Such a program would involve developing individual partnership agreements with individual suppliers. Denver's RAQC has had success with this approach of seeking individual voluntary agreements from fuel suppliers in the past.

6. High-Emitter Program

Background
A small percentage of cars and trucks produce most of the emissions. According to Doug Lawson, based on Denver data, about 10% of the cars and trucks produces 77% of the hydrocarbons and 73% of the carbon monoxide emitted by vehicles. Therefore, identifying and repairing only high emitting vehicles would improve program cost-effectiveness and reduce motorist burden. Remote sensing technology can be used to identify high emitting vehicles. The 2003 annual report on the Colorado I/M program states, "The Air Quality Control Commission believes that a broader application of remote sensing technology will improve the air pollution-control cost-effectiveness of the program…. Remote sensing technology provides a means for the Department to identify on-road high-emitting vehicles".

Remote sensing programs tend to target higher mileage vehicles, which are often older vehicles. A high emitter identification program requires appropriate remote sensing equipment to detect vehicles currently operating in a high hydrocarbon emitting mode. Under a mandatory program, the vehicle owner would be notified to bring the vehicle in for a confirmatory test and failing vehicles would be required to get the necessary repairs. Under a voluntary program, motorists would be notified that their vehicle registered high emissions, either via a roadside sign or a letter, and perhaps offered a repair subsidy if their vehicle was confirmed as a high emitter.

Implementation Considerations and Discussion
Many factors must be considered when implementing a voluntary or mandatory remote sensing high-emitter program. Appropriate infrastructure must be developed. Remote sensing equipment and data analysis can be costly. Program design issues (i.e. geographic coverage, site selection, data analysis parameters, etc.) are important too. One of the main issues is dealing with, and ultimately reducing "False Failures", or vehicles that are mistakenly identified as high-emitting but have low emissions at confirmatory test.

There are also human behavior responses to consider. Motorists can easily ignore a voluntary program, and could be highly motivated to avoid monitoring locations associated with a mandatory program. Equity issues are also a concern in the implementation of a high emitter program.

Decisions would have to be made about the point of enforcement for a mandatory program. Options include instant roadside pullover, written notification, or requirement of repair by the next vehicle registration cycle. Any high-emitter would require clarification and further action by the AQCC and possibly the Colorado State Legislature.

Fortunately, Denver's "Repair Your Air" campaign, a joint project of the RAQC, CDPHE, and DOR is gaining valuable experience with roadside remote sensing to identify and repair high-emitting vehicles. Fort Collins also began a small scale high-emitter pilot program in 2006. The feasibility of a voluntary or mandatory high-emitter program can better be assessed after the pilot projects in Denver and Fort Collins have been completed.

7. On Board Diagnostic program (OBD-II)

Background

OBD-II systems periodically evaluate a vehicle's emission control system while the vehicle is running and compares the measured parameters to expected design values. If it detects a situation that has a high probability of causing the vehicle's emissions to exceed 1.5 times the new car standard, it will illuminate the check engine light and store diagnostic codes in the computer. These codes can later be retrieved by repair technicians or emission testers.

OBD-II programs involve vehicles 1996 and newer, since only 1996 and newer light duty vehicles are equipped with OBD-II systems. Currently, over 30 states perform OBD-II inspections. Of those, only Colorado and New Hampshire use OBD-II codes as "advisory"; all other states can fail vehicles on the basis of OBD codes. The national average OBD repair cost is $300/vehicle.

CDPHE staff conducted Mobile6.2 modeling to prepare a screening analysis of the benefit that a mandatory OBD-II program could bring to the "Basic" I/M program area (Colorado Springs, Fort Collins, Greeley). The results are summarized below.

Benefit of an OBD-Only Program in Colorado's Basic I/M Area

Year	OBD Program (% of fleet emissions reduced)		
	HC	CO	NOx
2007	1.5%	2.3%	1.6%
2010	2.9%	3.9%	2.8%
2015	5.2%	5.4%	5.6%

Website links where more information can be found regarding OBD II include http://www.epa.gov/obd/index.htm. http://www.obdiicsu.com/, and http://autocenter.weber.edu/OBD.htm

Implementation Considerations and Discussion

An OBD Program would focus on reduction of carbon monoxide and ozone precursor emissions, and could be mandatory or voluntary. Implementation of an OBD program could require emissions codes to be checked on an annual basis, with the exception of the 2 most recent model years (2 year rolling grace period). It might be possible to develop a program that fails vehicles only for certain codes that are most directly related to elevated emissions.

The following issues must be considered when developing an OBD program:

- Human behavior – will motorists respond to the light?
- Since OBD-II addresses '96 and newer vehicles, it would miss all high-polluting vehicles older than model year 1996.
- What to do with vehicles that can't be tested because their computer connection is broken.
- How to deal with waivers. Under Colorado's current program, waivers are available if emissions-related repairs up to a certain dollar value have already been made. It is nearly impossible to conduct a "partial" OBD repair.
- Would an OBD-only program create an incentive for motorists to retain older, non-OBD vehicles?
- Further guidance is necessary on a "select Code-only" OBD program (only fail for certain codes such as evap, O2 sensor, cat, etc.). A "Select Code Only" program would have to identify specific computer codes that are directly tied to ozone precursor emissions as "hard" failures. Codes suggested for "hard" failures include:
    - Evaporative system
    - Misfire
    - Catalytic converter efficiency
    - ERG-related codes

More information and experience is needed before recommending any large-scale or mandatory program.

Community Based Social Marketing

Voluntary approaches can benefit from the use of community-based social marketing which is an attractive alternative to information intensive campaigns. In contrast to conventional approaches, community-based social marketing has been shown to be very effective at bringing about behavior change. Its effectiveness is due to its pragmatic approach. This approach involves: identifying barriers to a sustainable behavior, designing a strategy that utilizes behavior change tools, piloting the strategy with a small segment of a community, and finally, evaluating the impact of the program once it has been implemented across a community.

Conclusions

Some of the conclusions of the Ozone White Paper are:

- Implementation of mandatory programs would be very difficult due to lack of data, funding, and support.
- Minimal activities, primarily public outreach, are currently being conducted to reduce ozone precursors.
- Regional coordination on ozone outreach will enhance effectiveness. If communities used identical or very similar messages and graphics, the opportunities for message reinforcement increase significantly. A good example of this is the RAQC's coordination of ozone outreach for metro Denver local governments.
- Additional mandatory state programs are not recommended at this time. Ozone concentrations have remained fairly constant and it does not appear that a violation of the ozone standard is imminent.
- More information is needed about a number of potential strategies before final recommendations on them can be developed.

Recommendations

This section provides a list of strategies that Colorado Springs may choose to implement to reduce ozone-forming pollutants and help mitigate possible hydrocarbon increases following termination of the basic emissions testing program on January 1, 2007.

Stakeholder Outreach

- Form a stakeholder group composed of stationary sources to formulate cost effective strategies to reduce NO_x and VOC's in their facilities.

Outreach

- Implement a voluntary ozone reduction program that would focus on a wide range of public education and awareness activities in the public and private sector.
- Develop coordinated public outreach and education approaches by PPACG, City of Fort Collins and North Front Range MPO which would include Stop at the Click Stickers and other strategies.
- Develop programs to encourage gas cap replacement program

Idling

- Investigate the possibility of implementing local policies regarding idling vehicles.
- Encourage businesses, local governments, schools and other organizations to post signs to stop idling vehicles.
- Track EPA's model idling ordinance and encourage local businesses and governments to adopt.

Encourage Lower Gasoline RVP Outside Mandated Area

- Contact individual gasoline suppliers and encourage them to continue delivering lower RVP fuel throughout the Front Range.
- Conduct annual monitoring of RVP levels at gasoline stations in the northern and southern Front Range.

Smoking Vehicle

- Implement a state-wide smoking vehicle hotline and advertise widely
- Pass a local law prohibiting gasoline smoking vehicles, thereby retaining penalty fee within local government (model ordinances available)
- Conduct awareness-raising with law enforcement officials about the importance of smoking vehicle laws and to encourage increased enforcement.

High-Emitter Program

- Address concerns of high-emitter programs such as start-up costs which would be significant in some areas for remote sensing equipment/infrastructure; low participation rates for voluntary programs; false failure rates; and resources needed to operate the program.
- Develop methods of offering greater incentives to owners to fix high-emitting vehicles.
- Implement a high emitter program - this program would require appropriate Remote Sensing (RSD 4000) equipment. This equipment can identify vehicles operating in a high Hydrocarbon emitting mode. The vehicle would be required to come in for a confirmatory test, and if it fails it will be required to be rap aired before it is registered. To determine what the emissions reduction benefit would be a pilot program would have to analyzed. A pilot program is currently being implemented in the Denver Region. This program is currently being implemented in the Denver Region.

Stage I Vapor Recovery

- Obtain more information from Colorado Oil and Public Safety and the Colorado/Wyoming Petroleum Marketers on practices regarding Stage I Vapor Recovery Systems.
- Provide reminders to gasoline delivery drivers and gas station owners about the safety and air quality benefits of Stage I systems
- If warranted, increase enforcement and tracking of potential violations of Stage I Vapor Recovery Systems.

OBD-II

- Develop and implement an OBD-II pilot program in Colorado. Upon completion, evaluate the effectiveness of the program to determine if it should be implemented on a statewide scale. Possible funding could be obtained through CMAQ. Important strategies to consider for a pilot program are:

- Provide incentives for motorists to stimulate participation in the program.
- Provide public outreach and education regarding the benefits of the program. Public outreach and education will focus on the importance of taking cars in to be serviced when OBD-II lights indicate service is required, the need for proper maintenance, and provision of incentives for people to bring cars in so they do not ignore lights when they go off.
- Conduct OBD-II Training sessions for stations that are interested in providing OBD-II testing on a voluntary basis.
- Get grants to purchase OBD II scanner tools.
- Provide names of places to get voluntary OBD-II checks conducted.

Other

- Conduct ozone modeling to determine when the Colorado Springs region will have a violation of the ozone standard in the future. Modeling will help determine what programs would be most effective at reducing future ozone concentrations in the region and future trends in ozone concentration. Among other things ozone modeling will determine how vehicles are contributing to the ozone problem. The modeling can assess the level of emission reductions needed to achieve the ozone standards. Ozone models are used to simulate meteorological conditions and pollutant concentrations during an episode. Because ozone production is so complex, until ozone dispersion modeling has been conducted for Colorado Springs, it is unknown what effect an increase in VOCs would have on ozone levels.

References

Northeast States for Coordinated air Use Management, October 2003. White Paper: Comparing the Emission Reductions of the LEVII Program to the Tier 2 Program, Boston, MA

U.S. Environmental Protection Agency Ozone Control Strategies (http://www.epa.gov/region01/airquality/strategy.html)