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March 26, 2004

Ms. Judith Katz
Air Protection Division
U.S. Environmental Protection Agency
1650 Arch Street
Philadelphia PA 19103-2029

RE: Final Ozone Early Action Plan
Ozone Early Action Compact
Eastern Panhandle Region of West Virginia

Dear Ms. Katz:

I am submitting the enclosed Final Ozone Early Action Plan (EAP) on behalf of the Eastern Panhandle Air Quality Task Force, the City of Martinsburg, and the Counties of Berkeley and Jefferson in West Virginia. This EAP has been adopted by the three participating local governments. Copies of their resolutions of adoption are attached to this package.

This submittal includes the final list of local emissions control measures that will be implemented according to the Early Action Compact protocol and a schedule for that implementation. In addition, all other required documentation including detailed summaries of public and stakeholder involvement activities and non-modeled emissions reductions estimates are part of this submittal.

Required photochemical modeling and documentation will be submitted to you under separate cover from the Virginia Department of Environmental Quality.

We appreciate the opportunity to participate in the Early Action Compact process and are committed to begin implementation of local emissions reduction strategies as quickly as possible.

If you have any questions, please contact me at (304) 267-4144.

Sincerely,

Bob Crawford
Executive Director
Berkeley County Development Authority

cc: Mr. John A. Benedict, Director – WV DEP

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Final
Ozone Early Action Plan

For

Eastern Panhandle WV Ozone Early Action Compact Area

March 31, 2004

City of Martinsburg, Berkeley and Jefferson Counties, WV

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Introduction & Project Background

In 1997, the United States Environmental Protection Agency (EPA) established a new 8-hour ozone National Ambient Air Quality Standard (NAAQS). This standard was the result of a review of ground level ozone and related health impacts, and was designed to replace the older 1-hour standard. The creation of this new standard was meant to address the cumulative impact of ozone exposure at lower levels for a longer period of time. As such, the new standard is set at a lower level (0.08 parts per million) than the previous standard (0.120 parts per million) and is more protective of human health.

As part of the implementation of the new standard, states submitted area designation recommendations to the EPA in June of 2000 that identified potential ozone nonattainment areas based on air quality data during 1997 to 1999. The Eastern Panhandle area of West Virginia (Berkeley and Jefferson Counties) was identified at that time as one of the potential nonattainment areas, mainly based on the fact that the area is currently part of the Baltimore-Washington DC Metropolitan Statistical Area (MSA). No monitors were present in either Berkeley or Jefferson Counties during this period.

A number of concerns were raised by the potential nonattainment areas about the adverse impacts of a possible nonattainment designation. In response, the Eastern Panhandle area and West Virginia Department of Environmental Protection (WV DEP) began to investigate possible voluntary actions that could be implemented proactively to improve air quality and lessen the possible impact of a formal nonattainment designation in areas that marginally exceed the new standard.

The most promising of the options explored was the EPA's ozone Early Action Compact (EAC) program. The EAC concept was originally developed by several areas in Texas in early 2002 and subsequently endorsed and expanded by the EPA as national voluntary program.

EACs are voluntary agreements by the localities, states, and the EPA to develop Early Action Plans (EAPs) to reduce ozone precursor pollutants and improve local air quality in a proactive manner, and in a shorter time than what would occur through the traditional nonattainment area designation and planning process. These plans must include the same components that make up traditional State Implementation Plans (SIPs). This includes emissions inventories, control strategies, schedules and commitments, and a demonstration of attainment based on photochemical modeling.

The goal of an EAP is to develop a comprehensive strategy that will bring an area into attainment of the 8-hour ozone standard by 2007. This goal is to be

achieved by selecting and implementing local ozone precursor pollutant control measures that when combined with other measures on the state and national level, are sufficient to bring the area into compliance with the standard. If the area is successful in developing a plan that demonstrates attainment of the 8-hour ozone standard by 2007 and continued attainment through 2012, the EPA will defer the effective date of the nonattainment designation for the area. This deferral will remain in place as long as certain milestones are met, such as implementation of local controls by 2005. If all interim milestones are met and the area demonstrates attainment of the standard during the period from 2005 to 2007 through air quality data, then the nonattainment designations will be withdrawn by EPA, without further regulatory requirements. If an area fails at any point in the process, it will revert back to traditional nonattainment status, with all the associated requirements of such a designation.

The Eastern Panhandle area of West Virginia has entered into an Early Action Compact which includes both Berkeley and Jefferson Counties. This Compact was signed by all the parties involved and then submitted to the EPA by the required date (December 31, 2002). The area has subsequently established and empowered the Eastern Panhandle Air Quality Task Force to coordinate the development of the ozone early action plan for the area. This Task Force has a diverse and knowledgeable membership, which will greatly aid in the development of a comprehensive plan.

The Eastern Panhandle area, as well as the neighboring Winchester – Frederick County area in Virginia and Washington County area in Maryland, have many similarities including a common geographic location and characteristics, marginal nonattainment air quality levels, and common influences of ozone transport and other external factors. It is extremely important that air quality planning in the Eastern Panhandle be coordinated with Frederick and Washington Counties.

The remainder of this status report describes the project area, the significant events and progress made thus far, efforts to encourage public participation in the process, and the technical support activities that have been conducted to support the selection of the final local emissions control measures.

Air Quality Status of the Eastern Panhandle Region

U.S. EPA has entered a consent decree to finalize 8-hour ozone designations by April 15, 2004. Further, the agency has published guidance wherein it presumes that any potential nonattainment area will have boundaries which coincide with those of the associated MSA or Consolidated MSA (CMSA) based upon the 1999 definitions from the federal Office of Management and Budget. States are expected to address eleven factors including air emissions, growth, traffic and

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monitoring data, among others, to counter this presumption and exclude any portions of a CMSA or MSA from the boundaries of a nonattainment area.

Berkeley and Jefferson Counties are now considered part of the Washington (DC) MSA as well as the Baltimore (MD)-Washington (DC) CMSA. The WV DEP-Division of Air Quality (DAQ) previously provided a rationale for excluding Berkeley and Jefferson Counties from potential 8-hour ozone nonattainment areas associated with the CMSA (June 29, 2000). The conclusions of that analysis remain valid. However, since the contribution to the Washington MSA is proportionately greater than the contribution to the entire CMSA, an updated analysis (submitted to EPA in July 2003) focuses on the former and demonstrates that Berkeley and Jefferson Counties contribute very small percentages to emissions, population and traffic to the Washington MSA. As a logical consequence they contribute even smaller percentages to the entire CMSA. Hence, the rationale for removing those counties from the MSA applies to removal from the CMSA also.

Historically, there had been little reason to site an air pollution monitor in the West Virginia portion of the area due to its relatively low population and agricultural nature. Subsequent growth in Berkeley and Jefferson Counties has largely been residential in character with few new large air pollution sources. Nevertheless, the DAQ set up and began operating an ozone monitor in Berkeley County (Martinsburg, WV) in calendar year 2000 with complete quality assured ozone season data becoming available starting in 2001. The most recent data (2001-2003) from Martinsburg, considered representative of Berkeley and Jefferson Counties (BJC), yields a three year design value of 86 parts per billion (ppb), which does not meet the 8-hour ozone standard. The State of West Virginia believes that the correct designation of this area should be "nonattainment – deferred", pursuant to the Early Action Compact. Based on an analysis of the pertinent factors outlined below, we strongly believe these counties should be excluded from any potential Baltimore-Washington 8-hour ozone nonattainment area even in the absence of the EAC. That is, as long as the EAC requirements are being met, the nonattainment status for BJC should be deferred. However, if critical deficiencies occur and the area is designated nonattainment, then the area should remain separate from the Washington, DC MSA for air quality planning purposes.

Highlights of the July 2003 analyses include:

- BJC contributes less than 4% of the MSA total ozone precursors.
- BJC contributes only 2.4% of the MSA population (Census 2000).

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- Excluding the Baltimore and Washington primary cities, the CMSA central cities have an average population nearly 7 ½ times that of the WV Eastern Panhandle cities and an average population density over 62% percent higher.

- The WV Eastern Panhandle will continue to be a negligible fraction (2.4%) of the Washington DC MSA population with expected growth through 2010.

- Mobile source emissions, including highway vehicle emissions in BJC are 3.0% or less of the total mobile emissions in the MSA for the ozone precursor pollutants.

- The negligible VMT percentage for BJC vs. the MSA (2.1%) will remain approximately the same through the year 2030 even with growth.

- The meteorological analyses indicate that, on its high ozone days, the WV Eastern Panhandle generally was not a significant contributor to the Baltimore and Washington metropolitan areas.

Adopted Local Control Measures

The City of Martinsburg and Berkeley and Jefferson Counties in West Virginia entered into an Ozone Early Action Compact in December of 2002. Discussions with county officials and local economic development authorities continued through the beginning of calendar year 2003. Representatives from the area also participated in Air Improvement Task Force meetings with neighboring Winchester – Frederick County in Virginia.

In late April, the Berkeley County Economic Development Authority, on behalf of Berkeley and Jefferson Counties, procured the professional services of Wilbur Smith Associates, a transportation/air quality planning firm to assist in facilitating Air Quality Task Force meetings and developing the required consensus-based documents for the June 16th and 30th submittals to US EPA.

A broad-based group of stakeholders was brought together in April 2003 which became the Eastern Panhandle Air Quality Task Force. The first meeting of the group was held in Martinsburg on April 23, 2003 with approximately 27 in attendance. The Task Force members include local government representatives from both counties and the City of Martinsburg, local business and industries, healthcare interests and environmental interests. State Departments of Transportation and Environmental Protection are also participants. (A complete listing of Air Quality Task Force Members is included as Attachment A.)

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Meetings of the Eastern Panhandle Air Quality Task Force have continued throughout 2003, and into 2004. The Air Quality Task originally focused on educational and informational activities so that members could understand the complexity of the air pollution issues facing the region. Task Force activities during fall 2003 focused on evaluating the specific emissions control strategies that might be appropriate for the region. During this period, the Task Force after examining a compilation of over 100 potential emissions control strategies selected 25 measures for an initial screening for potential feasibility. Environ Corporation, sub-consultant to Wilbur Smith Associates, performed the initial screening for the Task Force. The criteria used by the consultant for the screening were technical feasibility, potential emissions reductions, timeframe considerations, and potential US EPA acceptance, in terms of quantifiable and enforceable reductions. (A detailed discussion of the initial screening of measures is included in the attached Environ Final Report.)

The Task Force spent a considerable amount of time evaluating the information provided by Environ and questioned Environ Managing Principal, David Souten extensively regarding the evaluation. Environ went on to recommend the "top ten" emissions reduction strategies, strictly from a scientific standpoint. The group evaluated these recommendations and then with a few modifications, requested that Environ perform more in-depth analysis on 11 measures.

Further analysis of the 11 remaining measures was performed by Environ and the results provided to the Air Quality Task Force. It was further decided that the measures would be divided into two categories for further consideration. The primary category of measures would be those that would be implemented as quickly as possible, but no later than 2005. The contingency category of measures would be those that would be considered for future implementation after the results of the modeling for the attainment demonstration is finished.

After submittal of the December 31st Progress Report, base-case and future case photochemical modeling was finished by the Virginia Department of Environmental Quality (VDEQ). That modeling has indicated that the Eastern Panhandle area will attain the 8-hour ozone standard by 2007 with the implementation of national and state control measures. Table 1 contains a complete listing of these measures. VDEQ was completing additional analyses of the impacts of the selected local control measures at the writing of this report. Detailed results of the photochemical modeling will be provided to US EPA by VDEQ and the WV DEP.

On March 9, 2004 the Executive Committee of the Eastern Panhandle Air Quality Task Force met to finalize selection of local emissions control measures and to discuss implementation of those measures. At the March 9th meeting it was decided that all previously identified primary control measures should be

implemented, with the exception of lower Reid Vapor Pressure (RVP) gasoline. This measure was removed from the primary list of measures and added to the contingency list of measures.

Table 1 below includes the complete list of adopted primary local control measures for the Eastern Panhandle of WV Early Action Plan. These measures have been carefully selected based on stakeholder consultation and taking into consideration available resources and political constraints. These measures are realistic and have received broad public support.

Table 1
Ozone Early Action Compact
Eastern Panhandle of West Virginia (Berkeley-Jefferson Counties)

Final List of Emission Reduction Strategies

Local Control Measures	Description of Measure	Non-Modeled Estimate of Emissions Reduction (Tons per Day)	Proposed Date for Implementation	Local Government Implementation
Primary Measures				
Ozone Action Days Program	A two-pronged program aimed at reducing emissions on days where ozone levels are likely to be high; Program would be geared to both the general public and employers.	0.09 NOx 0.32 VOC	7/1/2004	Berkeley County Jefferson County
Public Awareness Program	A two pronged program focusing on increasing the public's understanding of air quality issues in the region and increasing support for actions to improve the air quality.	0.88 NOx 0.72 VOC	7/1/2004	Berkeley County Jefferson County City of Martinsburg
Bicycle and Pedestrian Measures	A series of measures designed to promote bicycling and walking including both promotional activities and enhancing the environment for these activities.	0.12 NOx 0.20 VOC	9/1/2005	Berkeley County Jefferson County City of Martinsburg
Reduce Engine Idling	Voluntary program to restrict heavy duty diesel engine idling times for both truck and school buses.	0.17 NOx 0.01 VOC	7/1/2005	Berkeley County Jefferson County City of Martinsburg
Voluntary Partnership with Ground Freight Industry	A voluntary program using incentives to encourage the ground freight industry to reduce emissions.	0.84 NOx 0.07 VOC	7/1/2005	Berkeley County Jefferson County
Increase Compliance with Open Burning Restrictions	Increase public awareness of the existing open burning restrictions and work with communities to increase	0.0005 NOx 0.0054 VOC	7/1/2004	Berkeley County Jefferson County
School Bus Engine Retrofit	Have existing school bus engines retrofitted to lower emissions.	0.02 NOx 0.001 VOC	7/1/2004	Berkeley County Jefferson County City of Martinsburg

* Initial steps to implement the school bus retrofit program have already begun and will continue through 2004 with reductions scheduled for May 5, 2005.

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Implementation of Final Measures

Local officials have enthusiastically embraced the recommendations of the Air Quality Task Force. The City of Martinsburg and the Counties of Berkeley and Jefferson have officially adopted the final list of local control measures as their Early Action Plan. Detailed discussions have begun on the sharing and funding of responsibilities for various implementation activities among EAP participants.

The local governments, as well the Economic Development Authorities from each county have come together in the spirit of cooperation to provide funding for implementation of the EAP. The participating entities have already pledged $220,000 for continuing work on the Early Action Plan and its implementation. Work has also begun on the writing of a job description for an Air Quality Coordinator to be charged with program implementation.

Ozone Action Days – The program will be initiated by July 1, 2004 and phased in throughout the following calendar year. The focus of the 2004 program will be educational and setting up the administrative processes needed for successful implementation. Program activities will be expected to increase for the 2005 ozone season, with the additional of participant employers.

Public Awareness Program – The public awareness program will begin concurrently with the Ozone Action Days program. The focus of this program will be broader than Ozone Action Days, including information on the health impacts of air pollution and how changes in everyday behaviors can positively impact the air we breathe. The public awareness program will also be expanded incrementally throughout 2005.

Bicycle and Pedestrian Measures – This program will actually start prior to the September 2005 date listed in the EAP. Early activities will include promotion of bicycling and walking, particularly on Ozone Action Days. The second portion of this measure will be the review of each county's comprehensive plan to identify opportunities for changes that would support bicycling and walking. The issues for review will include but not be limited to sidewalk ordinances, mixed use development, bicycle accommodation of streets, pavement markings, future bicycle trails etc.

Reduce Engine Idling – This voluntary measure will be implemented by July 2005 and will be a measure that is coordinated with other EAC areas in the I-81 corridor. During the coming year, the details of this strategy will be fleshed out with neighboring jurisdictions.

Voluntary Partnership with Ground Freight – This measure will not be implemented until July 2005, allowing time for discussions and negotiations with

the members of the ground freight industry with operations in the Eastern Panhandle area.

Increase Compliance with Open Burning Restrictions – Both counties have open burning restrictions now in place. However, these restrictions have not yet received much public attention. A program to bring about a higher level of compliance with the existing regulations will be begun this summer with the goal of impacting the 2004 ozone season. This measure will be part of both the general public awareness campaign as well as specifically targeted on Ozone Action Days. The counties will also work with local developers, construction companies and other entities that are impacted by these restrictions.

School Bus Engine Retrofit – The WV DEP is currently finalizing the grant application for funding for this program and is expected to have it completed by the end of April 2004. The draft schedule calls for the participating school systems to choose vendors by July 2004 and to implement reductions by May 2005, if funding is available on schedule. A complete package of application materials and other supporting data are included as an attachment.

On-going Public and Stakeholder Involvement

The Eastern Panhandle Air Quality Task Force was instrumental in evaluating and selecting the final local emissions control measures for the Early Action Plan. Local officials believe that this group should continue to meet and also become involved with the implementation of the measures. The cornerstone of the Eastern Panhandle program is public education and awareness. Air Quality Task Force members represent a broad range of interests and perspectives in the region and as such they can play an important role is raising the general level of awareness and stimulate voluntary actions to improve air quality. The new Air Quality Coordinator will meet with the Task Force on a periodic basis, keeping them informed on progress implementing control measures and identifying opportunities for “hands-on” participation. Members of the Air Quality Task Force will also provide important feedback from community interests on the acceptance and success of control measures. (A current listing of Task Force Members is attached.)

Maintenance for Growth

One of the requirements for an Early Action Plan is that there be provision for potential growth of emissions in the future. The purpose of this requirement is to ensure that areas will remain in attainment beyond December 31, 2007. The Eastern Panhandle Air Quality Task Force will work closely with the WV DEP to

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establish an annual review of growth in the area (especially mobile and stationary source). This review will help ensure that assumptions on the level and type of growth occurring are still accurate and that existing control measures and adequate.

Part of the annual review process will be coordination with the WV DEP on periodic updates of planning assumptions and modeled data. Modeling updates by WV DEP and VDEQ will consider:

- All relevant actual new point sources;
- Impacts from potential new source growth; and
- Future transportation patterns and their impact on air quality in a manner that is consistent with the most current Long Range Transportation Plan and most current trend and projections of local motor vehicle emissions.

If review of growth indicates that adopted national, state and local control measures are going to be inadequate to maintain attainment in the future, additional measures will be considered for implementation.

The Eastern Panhandle region has already given considerable thought to continuing maintenance of effort and has identified a series of contingency measures that will be evaluated for inclusion in the Early Action Plan, should the need arise.

Table 2
Contingency Measures

Local Control Measures	Description of Measure	Non-Modeled Estimate of Emissions Reduction (Tons per Day)	Proposed Date for Implementation	Local Government Implementation
Contingency Measures				
WVDEP RACT (Reasonably Available Control Technology) and RACM (Reasonably Achievable Control Measures)*	Adoption of state requirements for control of volatile organic compounds (VOCs) in nonattainment areas.	1.29 VOC	Undetermined	Berkeley County Jefferson County City of Martinsburg
Alternative Fuels Program	Work with fleet owners to encourage use of alternative fuels.	Not Estimated	Undetermined	Berkeley County Jefferson County
Truck Stop Electrification	Develop a program to encourage the electrification of truck stops to discourage engine idling.	0.17 NOx 0.01 VOC	Undetermined	Berkeley County Jefferson County
Lower RVP Gasoline	Require sale of lower Reid Vapor pressure gasoline in the area.	0.94 VOC	Undetermined	Berkeley County Jefferson County

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Final Report

EVALUATION OF EMISSION CONTROL STRATEGIES UNDER CONSIDERATION FOR THE BERKELEY-JEFFERSON COUNTIES EARLY ACTION PLAN

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1. INTRODUCTION

BACKGROUND

The Eastern Panhandle Region (EPR) of West Virginia (Berkeley-Jefferson Counties) voluntarily entered into the Ozone Early Action Program (OEAP) on December 20, 2002, and signed an Early Action Compact (EAC) that sets measurable milestones for developing and implementing an Early Action Plan (EAP), with a goal to reduce ground-level ozone concentrations in the EPR that would comply with the 8-hour ozone standard by December 31, 2007, and to continue to maintain the standard until at least 2012. The key milestone dates for the Eastern Panhandle Region EAC are shown in Table 1-1.

Table 1-1. Key milestone dates for the Eastern Panhandle Region EAC.

Date	Item
December 31, 2002	Signed EAC
May 31, 2003	Initial modeling emission inventory completed Conceptual modeling completed Base case modeling completed
June 16, 2003	Identify and describe local strategies being considered for inclusion in local clean air plans
June 30, 2003	Semi-annual status reports to begin
October 31, 2003	Future year emission inventory modeling completed Emissions inventory comparison and analysis completed Future year modeling completed
January 31, 2004	Attainment maintenance analysis completed One or more modeled control cases completed Local emission reduction strategies selected Submission of preliminary EAP to WVDEP-DAQ and EPA
March 31, 2004	Final revisions to modeled control cases completed Final revisions to local emission reduction completed Final revisions to attainment maintenance analysis completed Submission of final EAP to WVDEP-DAQ and EPA
December 31, 2004	EAP adopted and incorporated into the SIP, SIP submitted to EPA
December 31, 2005	Local emission reduction strategies implemented no later than this date
June 30, 3006	Semi-Annual status reports on implementation of measures and assessment of air quality improvement begin on this date
December 31, 2007	Attainment of the 8-hour standard no later than this date

Since signing the EAC, the EPR Air Quality Task Force has held several meetings including one to prepare and discuss a master list of potential control strategies for the EAPs considerations.

As part of the EAP preparation, ENVIRON has been contracted by Wilbur Smith Associates (WSA) to review, evaluate and prioritize this master list of potential emission control strategies.

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SCOPE OF WORK

The scope of work for ENVIRON in this project is to:

- Perform a preliminary screening on all emission control measures in the emission control strategies list by ranking the control measures based on their approximate contribution levels to the VOC and/or NOx emission inventories, and past experience in program effectiveness and feasibility for these measures;

- Prepare a technical memo presenting the ranking of the emission control strategies, as well as documenting the data, methodology and assumptions used in developing the ranking after completing the initial screening of control strategies;

- Recommend the top ten emission control strategies from the emission control strategies list to perform further cost-effectiveness analyses, using in-house data and information, as well as relevant data obtained from technical publications related to those selected emission control strategies to assess the cost-effectiveness and implementation feasibility of the strategies. The cost and emission benefits associated with each control strategy used in the cost-effectiveness analysis will be based on the best available data and engineering estimates, and the feasibility assessment will be based on past program experience and engineering judgment;

- Prepare a report presenting the results of the cost-effectiveness analysis and feasibility assessment of the selected control strategies, as well as documenting the data, methodology, and assumptions used in the cost-effectiveness analysis and feasibility assessment.

REPORT ORGANIZATION

Following this introductory section, Section 2 of this report presents the results of the initial screening analysis that was submitted to WSA as a technical memorandum on October 22, 2003. Section 3 presents the results of the cost-effectiveness analyses and feasibility assessments of the final selected control strategies. Section 4 lists the references for the report.

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2. SCREENING ANALYSIS OF CONTROL STRATEGIES[1]

INTRODUCTION

This section presents the results of an initial screening of the emission control strategies for the Berkeley-Jefferson County's Ozone Early Action Plan (EAP), and recommends the top ten control strategies for performing further cost-effectiveness analyses based on the screening assessment, as outlined in ENVIRON's work plan submitted to WSA on September 24, 2003 (ENVIRON, 2003).

SCREENING APPROACH

Preliminary screening was performed on a list of emission control strategies under consideration for the Berkeley-Jefferson Counties that was provided by WSA. The emission control strategies list, dated September 3, 2003, consists of a total of 20 emission control strategies, including one VOC strategy, two fuel strategies, nine transportation control measure strategies, five heavy-duty vehicle strategies, one area source strategy, and two land-use strategies.

To the extent that data and/or information were available, ENVIRON estimated the approximate range of potential emission impacts for the control strategies based on their emission contribution and control effectiveness or efficiency. Further work, carried out in the next phase of this effort and reported in Section 3, provides improved emissions estimates for those measures where broad estimates are given in this section, and also provided estimates for those measures identified in this section for which inadequate information currently exists to give an emissions reduction potential estimate.

The screening criteria for the control strategies were based on their approximate contribution levels to the VOC and/or NOx emission inventories[2], and past experience in program effectiveness and feasibility for these measures. The criteria included technical feasibility, potential emission reductions, timeframe consideration, and EPA acceptance, in terms of quantifiable and enforceable emission reductions.

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[1] This section was based on a technical memorandum to WSA, dated October 22, 2003, that was prepared as an interim deliverable of the project to document the results of the initial screening analysis of the emission control strategies, as well as recommended the top ten control strategies for further cost effectiveness analysis.

[2] Although it is well established that both oxides of nitrogen (N0x) and certain volatile organic compounds (VOCs) contribute in the complex photochemical formation of ozone in the lower atmosphere, it is very often much more cost effective to control one of these ozone precursors rather than the other or both. This is because one of these two precursors can be the limiting component, and thus reductions of that one component will be more effective than reductions of the other or both. The determination of whether N0x or VOCs are limiting in a certain situation depends upon many factors, and can be determined with some confidence only through complex photochemical modeling. Since such modeling was not done priority to this study (although it is currently underway by Virginia Department of Environmental Quality, who is assisting WVDEP in doing the air quality modeling effort for the EAC), and thus such insight not available, ENVIRON was directed to treat both NOx and VOC as equally important in the emissions reductions and in the cost effectiveness evaluations. In reality this may not be the case.

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Ranking ranges from Good, Fair or Poor for EPA Acceptance, Timeframe, and Cost-Effectiveness criteria, and ranges from High, Medium or Low for Emission Impact and Final Ranking criteria[3]. After assigning the ranking for each control strategy, ENVIRON recommended the top ten control strategies based on their overall Ranking criterion of "High" and "Medium".

EMISSION INVENTORY

The WVDEP provided the calendar year 1999 emission inventories. These emission inventories were used in the screening analysis and in the cost-effectiveness analyses because the calendar year 2007 emission inventories are not available for this study as WVDEP has not generated these data. The summarized 1999 emission inventory for the BJC is shown in Table 2-1, and detailed emission inventories are provided in Appendix A.

Table 2-1. 1999 Emission inventory for the BJC

SOURCE	VOC	NOx
Point	0.75	11.29
Mobile	7.00	10.72
Area	14.80	2.18
Nonroad	1.57	5.26
TOTAL	**24.12**	**29.45**

RELATED STUDIES AND REFERENCES

Information on past experience of control measures was based on the EPA Transportation Control Measure and Congestion Mitigation Air Quality Program reports, the Sacramento Air Quality Management District (SMAQMD)'s Clean Air Plan Updates report, and EAP's for San Antonio and Dallas-Fort Worth, Texas, Triad, North Carolina, Tulsa, Oklahoma, and Tennessee, as well as emission control options that are being considered in Los Angeles, San Joaquin Valley, and San Francisco, CA.

SCREENING RESULTS

Detailed initial screening results for the control strategies are provided in Appendix B. Each of the control strategies is discussed and ranked as follows:

[3] For example, if a particular control strategy is technically feasible/real, quantifiable, permanent, enforceable and surplus, the control strategy is then ranked "Good" on the EPA Acceptance criterion. If a particular control strategy will provide substantial emission reduction based on the emission contribution for the affected source and control effectiveness or efficiency, the control strategy is then ranked "High" on the Emission Impact criterion. If a particular control strategy was implemented and achieved emission reductions meeting the EAC's timeframe, the control strategy is then ranked "Good" on the Timeframe criterion. If the cost-effectiveness of a particular control strategy is less than $50K per ton of NOx and/or VOC emissions reduced, the control strategy is then ranked "Good" on the Cost-Effectiveness criterion. Finally, the overall ranking, Ranking criterion, is based on the rankings for all the other criteria.

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BJC 1: WVDEP RACT & RACM VOC Regulations

Adopting state requirements, for controlling VOC in non-attainment areas or West Virginia Rule 45CSR21, would reduce the area source VOC emissions, which is estimated to be about 14.8 tons per day in the Berkeley-Jefferson Counties. The Rule 45CSR21 is basically a "catch all" rule that requires Reasonable Available Control Technology (RACT) for VOC emission control for small and medium emission sources, including, but not limited to, surface coatings, petroleum and petroleum product storage and transport, solvent cleaning, degreasing etc. All of the non-attainment areas in West Virginia are already subject to this rule. So, the control technologies are commercially available and have been implemented elsewhere. The potential VOC emission reductions vary from a few percent to more than 90%, based on the sources and applicable standards.

EPA Acceptable:	Good
Emission Impact:	Medium
Timeframe:	Good
Cost-Effectiveness:	Fair to Good
Ranking:	High

BJC 2: Alternative Fuel Fleet Program

Working with fleet operators to convert their fleets to alternative fuel vehicles would reduce some of the emissions contributed by the on-road mobile source, which is estimated to be about 7.00 tons per day for VOC emissions, and 10.7 tons per day for NOx emissions in the Berkeley-Jefferson Counties. The effectiveness of the control strategy varies depending on the technologies used.

EPA Acceptable:	Good
Emission Impact:	High
Timeframe:	Good
Cost-Effectiveness:	Poor to Fair
Ranking:	Medium

BJC 3: Lower RVP Gasoline

Reducing the reid vapor pressure (RVP) in gasoline from 9.0 to 7.8 would reduce the volatile of the gasoline, which in turn reduces the evaporative VOC emissions from the gasoline storage and refueling facilities, fuel transportation, and from the vehicle fuel tanks. The area source VOC emission for the petroleum and petroleum product storage is estimated to be about 2.21 tons per day for the Berkeley-Jefferson Counties.

EPA Acceptable:	Good
Emission Impact:	Medium
Timeframe:	Good
Cost-Effectiveness:	Good
Ranking:	Medium

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BJC 4: Ozone Action Days – Employer-based Program

Establishing an Ozone Action Days Program to discourage unnecessary trips, and promote transit usage and other actions in the Berkeley-Jefferson Counties would potentially reduce some of the emissions contributed by light-duty vehicles and trucks, which are estimated to be about 6.4 tons of VOC and 4.3 tons of NOx per day. Depending on the level of company participation and district mandates, some studies estimated about 10 to 15% emission reductions at a cost-effectiveness value of about $3.5k to 5.5k per ton of VOC+NOx emissions.

EPA Acceptable:	Fair
Emission Impact:	Fair
Timeframe:	Good
Cost-Effectiveness:	Good
Ranking:	Medium

BJC 5: Public Awareness Program

Establishing a program to educate the public regarding the health effects of air pollution and actions they can take to help reduce it would potentially reduce some emissions, mostly mobile and area source emissions. The potential emissions impact for this control strategy is generally low, and the benefits are difficult to quantify and enforce.

EPA Acceptable:	Fair
Emission Impact:	Low
Timeframe:	Good
Cost-Effectiveness:	Good
Ranking:	Low

BJC 6: School-Based Public Awareness Programs

Similar to BJC 5, establishing a program for use in local schools to educate children and their parents regarding air pollution would potentially reduce some emissions, mostly mobile and area sources emissions. The potential emissions impact for this control strategy is generally low, and the benefits are difficult to quantify and enforce.

EPA Acceptable:	Fair
Emission Impact:	Low
Timeframe:	Good
Cost-Effectiveness:	Good
Ranking:	Low

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BJC 7: Promotion of Bicycling and Walking

Establishing a program to promote bicycling and walking as alternatives to short single occupant trips would potentially reduce some of the emissions contributed by light-duty vehicles and trucks, which are estimated to be about 6.4 tons of VOC and 4.3 tons of NOx per day. The potential emissions impact for this control strategy is generally low, and the benefits are difficult to quantify and enforce.

EPA Acceptable:	Fair
Emission Impact:	Low
Timeframe:	Good
Cost-Effectiveness:	Good
Ranking:	Low

BJC 8: Establishment of Ridesharing Program

Establishing and promoting a rideshare program via adding park and ride facilities would potentially reduce some of the emissions contributed by light-duty vehicles and trucks, which are estimated to be about 6.4 tons of VOC and 4.3 tons of NOx per day. The potential emissions impact for this control strategy is generally low, and the benefits are difficult to quantify and enforce. Some studies reported about 2.5% effectiveness at an estimated cost-effectiveness value of $20k per ton of VOC+NOx emissions.

EPA Acceptable:	Fair
Emission Impact:	Low
Timeframe:	Good
Cost-Effectiveness:	Good
Ranking:	Low to Medium

BJC 9 – BJC 12: Bicycle & Pedestrian Measures

Adopting a policy of accommodating bicycle and pedestrian usage in street design and modernization, developing a regional bicycle plan, providing bicycle racks to promote usage, building additional bicycle paths and/or lanes, and investigating improving pedestrian facilities would potentially reduce some of the emissions contributed by light-duty vehicles and trucks, which are estimated to be about 6.4 tons of VOC and 4.3 tons of NOx per day. The potential emissions impact for this control strategy is generally low, and the benefits are difficult to quantify and enforce. Some studies estimated a cost-effectiveness value of $130k per ton of VOC+NOx emissions.

EPA Acceptable:	Fair
Emission Impact:	Low
Timeframe:	Fair
Cost-Effectiveness:	Poor
Ranking:	Low

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BJC 13: Engine Idling Restrictions

Adopting truck and school bus engine idling restrictions would reduce some of the emissions contributed by the heavy-duty vehicles and school buses, which is estimated to be about 0.3 tons of VOC, and 5.7 tons of NOx per day in the Berkeley-Jefferson Counties. Some studies reported that about 2 to 4% emission reductions could be achieved via engine idling restrictions, at an estimated cost-effectiveness value of $10k to $300k per ton of VOC+NOx emissions, depending on retrofitting technologies used.

EPA Acceptable:	Good
Emission Impact:	Medium
Timeframe:	Good
Cost-Effectiveness:	Fair to Good
Ranking:	High

BJC 14: Speed Limit Enforcement

Increasing the speed limit enforcement on heavy-duty vehicles on ozone action days would potentially reduce some of the emissions contributed by the heavy-duty vehicles, which is estimated to be about 0.3 tons of VOC, and 5.7 tons of NOx per day in the Berkeley-Jefferson Counties. The potential emissions impact for this control strategy is generally low, and the benefits are difficult to quantify and enforce.

EPA Acceptable:	Fair
Emission Impact:	Low
Timeframe:	Good
Cost-Effectiveness:	Good
Ranking:	Low

BJC 15: School Bus Retrofit

Retrofitting school buses with emission control technologies, such as EGR systems, aftertreatment devices, cleaner engines or fuels would reduce some of the emissions contributed by the heavy-duty vehicles, which is estimated to be about 0.3 tons of VOC, and 5.7 tons of NOx per day in the Berkeley-Jefferson Counties. The effectiveness of control technologies varies from 5 to 30% for NOx reduction, 10 to 50% or more for VOC reduction, and 5 to 90% or more for PM reduction.

EPA Acceptable:	Good
Emission Impact:	High
Timeframe:	Good
Cost-Effectiveness:	Fair to Good
Ranking:	Medium

BJC 16: Voluntary Partnership with Ground Freight

Developing an initiative partnership program to encourage voluntary emission reductions with industries related to ground freight would reduce some of the emissions contributed by the

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heavy-duty vehicles, which is estimated to be about 0.3 tons of VOC, and 5.7 tons of NOx per day in the Berkeley-Jefferson Counties. The effectiveness of control technologies varies from 5 to 30% for NOx reduction, 10 to 50% or more for VOC reduction, and 5 to 90% or more for PM reduction.

EPA Acceptable:	Good
Emission Impact:	High
Timeframe:	Good
Cost-Effectiveness:	Fair to Good
Ranking:	High

BJC 17: Truck Stop Electrification

Similar to BJC 13, developing incentives to encourage electrification at truck stops would reduce some of the emissions contributed by the heavy-duty vehicles, which is estimated to be about 0.3 tons of VOC, and 5.7 tons of NOx per day in the Berkeley-Jefferson Counties. Some studies reported that about 2 to 4% emission reductions could be achieved via engine idling restrictions, at an estimated cost-effectiveness value of $10k to $300k per ton of VOC+NOx emissions, depending on retrofitting technologies used.

EPA Acceptable:	Good
Emission Impact:	Medium
Timeframe:	Good
Cost-Effectiveness:	Fair to Good
Ranking:	High

BJC 18: Open Burning Restrictions

Establishing open burning regulations for land clearing activities would potentially reduce the other combustion sources in the emission inventories, which are 0.0213 tons of VOC per day, and 0.00190 tons of NOx per day. However, the potential emissions impact for this control strategy is low, and the benefits are difficult to quantify and enforce.

EPA Acceptable:	Fair
Emission Impact:	Low
Timeframe:	Good
Cost-Effectiveness:	Good
Ranking:	Low

BJC 19: Mixed Use Development

Developing a plan to encourage mixed use and compact development that is conducive to walking, biking and transit use would potentially reduce emissions contributed by light-duty vehicles and trucks, which are estimated to be about 6.4 tons of VOC and 4.3 tons of NOx per day. The potential emissions impact for this control strategy is generally low, and the benefits are difficult to quantify and enforce.

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EPA Acceptable: Fair
Emission Impact: Low
Timeframe: Poor
Cost-Effectiveness: Good
Ranking: Low

BJC 20: Green Space Preservation

Developing a plan to preserve green space within the county and city would potentially reduce emissions contributed by light-duty vehicles and trucks, which are estimated to be about 6.4 tons of VOC and 4.3 tons of NOx per day. The potential emissions impact for this control strategy is generally low, and the benefits are difficult to quantify and enforce.

EPA Acceptable: Fair
Emission Impact: Low
Timeframe: Poor
Cost-Effectiveness: Good
Ranking: Low

PRELIMINARY RECOMMENDED CONTROL STRATEGIES FOR COST-EFFECTIVENESS ANALYSIS

Based on the screening assessments, ENVIRON recommended the following control strategies for performing further cost-effectiveness analysis based on the technical merits, which particularly eliminated most of the TCM and ozone action days strategies, as outlined in the screening approaches (i.e. potential emission reduction, technically feasible/real, quantifiable, permanent, enforceable and surplus etc.)

BJC 1: WVDEP RACT & RACM VOC Regulations
BJC 2: Alternative Fuel Fleet Program
BJC 3: Lower RVP Gasoline
BJC 4: Ozone Action Days – Employer-based Program
BJC 8: Establishment of Ridesharing Program
BJC 13: Engine Idling Restrictions
BJC 15: School Bus Retrofit
BJC 16: Voluntary Partnership with Ground Freight
BJC 17: Truck Stop Electrification
BJC 18: Open Burning Restrictions

The final selected control strategies are, however, different from these recommended strategies as WSA and the EPR Air Quality Task Force requested ENVIRON to include some TCM and ozone action days control strategies. The final selected control strategies and the results of the cost-effectiveness analyses of these selected strategies are presented in Section 3.

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3. COST-EFFECTIVENESS ANALYSIS OF FINAL SELECTED CONTROL STATEGIES

INTRODUCTION

After presenting and discussing the results of the screening analysis and the recommended control strategies, WSA and EPR Air Quality Task Force requested that ENVIRON include a few ozone action days, public awareness and TCM control strategies in the final selected control strategies, and to perform further cost effectiveness analyses.

The final selected control strategies are divided into two groups, namely the primary and contingency control measures. Also, the first three primary control strategies, namely **BJC-P1: Ozone Action Days Program**, **BJC-P2: Public Awareness Program**, and **BJC-P3: Bicycle Pedestrian Related Measures,** combine several measures that were analyzed previously as individual measures. The results of the cost effectiveness analyses for these final selected control strategies are presented in this section.

PRIMARY MEASURES

BJC-P1: Ozone Action Days Program
- General Public
- Employer-based

BJC-P2: Public Awareness Program
- General Public
- School based

BJC-P3: Bicycle Pedestrian Related Measures
- Promote Bicycling/Walking
- Bicycle "friendly" Policies

BJC-P4: Restrict Engine Idling

BJC-P5: Voluntary Partnership with Ground Freight Industry

BJC-P6: Enforce Open Burning Restrictions

BJC-P7: Lower RVP Gasoline

BJC-P8: School Bus Engine Retrofit

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CONTINGENCY MEASURES

BJC-C1: Local adoption of VOC RACT, RACM rules

BJC-C2: Alternative Fuels Program

BJC-C3: Truck Stop Electrification

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BJC P1: Ozone Action Days Program

Control Measure Description

This control strategy consists of employer-based and area sources ozone action days programs. These ozone action days programs would reduce some of the emissions mostly contributed by light-duty vehicles and trucks for the employer-based programs, and by area sources for the area sources program. The emission inventories for light-duty gasoline vehicles and trucks were estimated to be about 6.37 tons of VOC and 4.31 tons of NOx per day, in the Berkeley-Jefferson Counties. For area sources, the emission inventories were estimated to be about 14.80 tons of VOC and 2.18 tons of NOx per day. The potential emissions impact for this control strategy is generally low, and the benefits are difficult to quantify and enforce. This is consistent with the conclusions of the Tennessee EAC, San Francisco Bay Area MTC (Tennessee, 2003), and data from Sacramento Air Quality Management District (SMAQMD)'s Clean Air Plan Update (SMAQMD, 2003).

As part of its Clean Air Plan Update, SMAQMD evaluated some ozone action days control strategies. In general, the estimated emission benefits from these programs were lower, ranging from 1 to 2%. The reported cost associated with ozone action days programs range from $50,000 to $100,000 per program, and the cost-effectiveness values for these type of programs range from $3,000 to $5,500 per ton of VOC + NOx emissions reduced (SMAQMD, 2003).

Targeted Emission Inventory (Calendar Year 1999)

BJC - P1: Ozone Action Days Program	Source	Estimated EI (tpd)	
		VOC	NOx
Employer-based Program	Mobile; LDVs/Ts	6.37	4.31
Area source Program	Area	14.80	2.18

Emission Reductions (in Calendar Year 1999)

BJC - P1: Ozone Action Days Program	Control %		NOx Impact	VOC Impact
	High	Low		
Employer-based Program	2%	1%	0.06	0.10
Area source Program	2%	1%	0.03	0.22

Implementation

Implementing Agency: WVDEP, local governments, and general public and industries.

Barriers	Opportunities
Difficult to quantify benefits	High visibility
Limited level of participation	Good public relation
Participation is voluntary	
Do not guarantee changes	

Timeframe

2005 or Earlier	Post 2005

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X	

Cost Effectiveness

BJC - P1: Ozone Action Days Program	Cost Effectiveness
Employer-based Program	$3.5 to 5.5k/ton VOC+NOx
Area source Program	NA

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BJC P2: Public Awareness Program

Control Measure Description

This control strategy consists of general public and school based awareness programs. Establishing awareness programs to educate the public regarding the health effects of air pollution and actions they can take to help reduce it, as well as to be use in local schools to educate children and their parents regarding air pollution, would potentially reduce some of the area and mobile source emissions. The emission inventories for light-duty gasoline vehicles and trucks were estimated to be about 6.37 tons of VOC and 4.31 tons of NOx per day, in the Berkeley-Jefferson Counties. For area sources, the emission inventories were estimated to be about 14.80 tons of VOC and 2.18 tons of NOx per day. Similar to most ozone actions day programs (BJC P1), the potential emissions impact for this control strategy is generally low, and the benefits are difficult to quantify and enforce. Again, this is consistent with the conclusions of the Tennessee EAC, San Francisco Bay Area MTC (Tennessee, 2003), and data from Sacramento Air Quality Management District (SMAQMD)'s Clean Air Plan Update (SMAQMD, 2003).

In it's Clean Air Plan Update, SMAQMD evaluated some general public and school-based awareness programs, such as providing public education on ozone emission in schools and small businesses, conducting community outreach, providing education on fueling practices and information on fuel costs. Again, in general, the estimated emission benefits from these programs were lower, ranging from 1 to 2%, and the reported cost associated with these programs ranged from $50,000 to $100,000 per program, and the cost-effectiveness value for these types of programs was about $3,000 per ton of VOC + NOx emissions reduced (SMAQMD, 2003).

Targeted Emission Inventory (Calendar Year 1999)

BJC - P2: Public Awareness Program	Source	Estimated EI (tpd)	
		VOC	NOx
Public Awareness Program	Multiple	24.12	29.45
School based Program	Multiple	24.12	29.45

Emission Reductions (in Calendar Year 1999)

BJC - P2: Public Awareness Program	Control %		NOx Impact	VOC Impact
	High	Low		
Public Awareness Program	2%	1%	0.44	0.36
School based Program	2%	1%	0.44	0.36

Implementation

Implementing Agency: WVDEP, local governments, and general public and industries.

Barriers	Opportunities
Difficult to quantify benefits	High visibility
Limited level of participation	Good public relation
Participation is voluntary	
Do not guarantee changes	

Timeframe

2005 or Earlier	Post 2005
X	

Cost Effectiveness

BJC - P2: Public Awareness Program	Cost Effectiveness
Public Awareness Program	$3k ton VOC+NOx
School based Program	$3k ton VOC+NOx

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BJC P3: Bicycle Pedestrian Related Measures

Control Measure Description

This control strategy consists of promoting bicycling and walking, and bicycle "friendly" policies to reduce VMT traveled. Establishing programs to promote bicycling and walking as alternatives to short single occupant trips, developing plans to encourage mixed use and compact development that is conducive to walking, biking and transit use, and/or adopting bicycle "friendly" policies, such as street design and modernization, regional bicycle plans, providing bicycle racks, building additional bicycle paths and/or lanes, and improving pedestrian facilities, would reduce the emissions from light-duty vehicles and trucks resulted from a reduction in VMT traveled. The emissions contributed by light-duty vehicles and trucks in the BJC were estimated to be 6.4 tons of VOC and 4.3 tons of NOx per day.

Like most TCMs, the potential emission impact for this control strategy is generally low, and the benefits are difficult to quantify and enforce. Again, in general, the estimated emission benefits from these programs range from 1 to 2%. In terms of cost-effectiveness, SMAQMD estimated a cost-effectiveness value of $130,000 per ton of VOC+NOx emissions reduced for the type of strategy (SMAQMD, 2003).

A report by Hagler Bailey for the EPA, documenting a review of costs and emissions information for 24 congestion mitigation and air quality (CMAQ) improvement program (CMAQ). The CMAQ report presented the cost of emission reductions from two bicycle and pedestrian projects in Philadelphia, PA and in Illinois, and reported that the cost effectiveness values for these programs ranged from $21,000 to $102,000 per ton of VOC+NOx emissions reduced (CMAQ, 1999).

For strategies related to land-use planning and development for VMT traveled reduction, SMAQMD study estimated that the cost effectiveness for these types of strategies were about 11 million dollars per ton of VOC+NOx emissions reduced (SMAQMD, 2003).

Targeted Emission Inventory (Calendar Year 1999)

BJC - P3: Bicycle Pedestrian Related Measures	Source	Estimated EI (tpd)	
		VOC	NOx
Promotion of Bicycling, Walking	Mobile; LDVs/Ts	6.37	4.31
Bicycle "Friendly" Policies	Mobile; LDVs/Ts	6.37	4.31

Emission Reductions (in Calendar Year 1999)

BJC - P3: Bicycle Pedestrian Related Measures	Control %		NOx Impact	VOC Impact
	High	Low		
Promotion of Bicycling, Walking	2%	1%	0.06	0.10
Bicycle "Friendly" Policies	2%	1%	0.06	0.10

Implementation

Implementing Agency: WVDEP, local businesses and governments, department of transportation and general public.

Barriers	Opportunities
Difficult to quantify benefits	Good social and community values
Limited level of participation	Long term environmental impact and associated social benefits for better land-use and bicycle/pedestrian programs
Participation is voluntary	Potential on energy conservation and security
Do not guarantee changes	Improved bicycle and pedestrian safety

Timeframe

2005 or Earlier	Post 2005
X	

Cost Effectiveness

BJC - P3: Bicycle Pedestrian Related Measures	Cost Effectiveness
Promotion of Bicycling, Walking	$21 to 130k/ton of VOC+NOx
Bicycle "Friendly" Policies	$21 to 130k/ton of VOC+NOx

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BJC P4: Restricted Engine Idling

Control Measure Description

Adopting truck and school bus engine idling restrictions would reduce some of the emissions contributed by heavy-duty vehicles and school buses, which was estimated to be 0.29 tons per day for VOC emissions, and 5.7 tons per day for NOx emissions in the Berkeley-Jefferson Counties.

Implementation of this control strategy would require the use of idling reduction devices. The idle-limiting devices could range from systems that automatically shut down an engine after a specific time, to stop/start systems that automatically stop and start the engine as necessary to maintain engine and cab temperature and battery voltage within pre-set limits. This control could also incorporate the use of alternative power systems, such as auxiliary power units, thermal storage systems, and truck stop electrification, to supply power for cab and on-board appliance functions as necessary (see **BJC C3: Truck Stop Electrification**).

Idling emissions from HD diesel vehicles are generally from intercity tractor-trailers that are parked at truck stops, rest areas, ports, and to a lesser extent, distribution centers, if idling emissions are not regulated. Even though it is not encouraged or even illegal, extensive truck idling can be found at some truck stops or rest areas for heating or cooling cab/sleeper compartments, powering cab/sleeper appliances or auxiliary devices, and in some ports for waiting in line to deliver or pick-up goods. Many studies reported that intercity tractor-trailers idle an average of about 6 hours per day. However, most engine manufacturers recommend that engines run for roughly 3 to 5 minutes for engine warm-up and cool down.

Many states have adopted some kind of anti-idling regulations (see Appendix C). Adopting anti-idling rules to all diesel vehicles would reduce some idling emissions from these vehicles. In most cases, idling longer than 5 minutes is expected to be eliminated reducing idling emissions by 50 to 75%. CARB estimated that vehicle idling is responsible for about 3 to 5% of exhaust emissions, so a reduction of 50 to 75% would result in about a 2 to 4% reduction.

The average cost of an automatic shut-off installation is expected to be about $1,200 to $2,000, which includes automatic restart or a pre-heater feature for winter operation to prevent engine block freezing (CARB, 2003). The cost for auxiliary power units range from $1,000 to $3,000 for direct-fired heaters (providing heat only), to $5,000 to $7,000 for auxiliary power units that provide combined cab heat/AC, electric power, and heat to engine and fuel (CARB, 2003 and http://www.epa.gov/otaq/retrofit/idlingtech.htm).

However, the U.S. EPA estimated that a truck driver could save more than $3,600 per year in fuel and $300 per year in maintenance costs by eliminating truck stop idling (http://www.epa.gov/otaq/retrofit/idling.htm).

For about 2 to 4% emission reduction, the estimated cost-effectiveness value was about $45,000 per ton of VOC+NOx emissions reduced.

Targeted Emission Inventory (Calendar Year 1999)

	Source	Estimated EI (tpd)	
		VOC	NOx
BJC - P4: Restricted Engine Idling	Mobile; HDDTs	0.29	5.70

Emission Reductions (in Calendar Year 1999)

	Control %		NOx Impact	VOC Impact
	High	Low		
BJC - P4: Restricted Engine Idling	4%	2%	0.17	0.01

Implementation

Implementing Agency: WVDEP, local governments and businesses, truck stop operators, West Virginia Department of Transportation, and fleet operators.

Barriers	Opportunities
To be an effective program, regulations or laws need to be developed most effectively at the State level to enable and fund such a program and effectively enforce it	Reducing ozone precursor emissions, as well as particulate emissions, in congested city streets; reducing school children exposure to diesel pollutants; reducing truck drivers exposure to diesel pollutants
	Fuel saving and energy conservation

Timeframe

2005 or Earlier	Post 2005
X	

Cost Effectiveness

	Cost Effectiveness
BJC - P4: Restricted Engine Idling	$45k/ton VOC+NOx

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BJC P5: Voluntary Partnership with Ground Freight Industry

Control Measure Description

Developing an initiative partnership program to encourage voluntary emission reductions with industries related to ground freight would reduce some of the emissions contributed mostly by the heavy-duty vehicles, which is estimated to be about 0.3 tons of VOC, and 5.7 tons of NOx per day in the Berkeley-Jefferson Counties.

Retrofit control technologies that are commonly used to reduce emissions from in-use HDDVs are EGR systems, aftertreatment devices, cleaner engines or fuels. This control strategy includes encouraging fleet owners and operators to reduce emissions from their vehicles by retrofitting emission-reduction devices, or re-powering with cleaner engines, or using cleaner fuels.

For retrofit devices, the primary purpose of these devices is to significantly reduce NOx and VOC emissions but often PM retrofit devices are included in many NOx or VOC retrofit devices.

The strategies available today to reduce NOx emissions from mobile sources include retarded engine timing modification, Exhaust Gas Recirculation (EGR), lean NOx catalyst, and Selective Catalytic Reduction (SCR). Examples of verified and demonstrated emission reduction effectiveness are shown in the following table.

Emission Control Device	NOx Control Effectiveness
Retard timing (Example Vendor: Cleaire's Flash and Catch)	25%
EGR (Example Vendor: STT Emtec System)	Up to 50%
Lean NOx reduction catalyst (Example Vendor: Cleaire's Longview)	25%
SCR (Example Vendors: Extengine's ADEC; Argillon's SiNOx)	90%

The NOx control retrofits will not by themselves reduce PM emissions and may increase PM emissions. Often a NOx control device is accompanied by a particulate control device in a package offered by the vendor. This is especially true for retard timing and EGR NOx control technologies.

The major control cost for these NOx retrofit devices includes both capital costs and operational costs. The capital cost for installation of these systems is shown in the table below, based on vendor and contract information available from State incentive programs.

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Emission Control Device	NOx Capital Cost
Retarded timing (Cleaire's Flash and Catch)	$13,000 *
EGR (STT Emtec System)	$15,000 to $21,000 *
Lean NOx reduction catalyst (Cleaire's Longview)	$5,000 to $10,000 *
SCR	$10,000 to $45,000 **

*Includes a particulate filter and thus requires low sulfur fuel. These methods also include a fuel economy penalty of less than 5% with a lower penalty for EGR than retarded timing or lean NOx catalysts.
** Not including a particulate filter, but requires area refueling not included in this cost.

For some retrofit strategies, it is required to have low sulfur fuel, so the cost of low sulfur fuel needs to be included in the cost of the strategy.

SMAQMD estimated that the cost-effectiveness values for this control strategy was about $12,000 to $15,000 per ton of VOC+NOx emissions reduced (SMAQMD, 2003).

For the fleet modernization program by accelerating the retirement of older, high emitting diesel engines via re-powering with cleaner engines or vehicle replacement, the SMAQMD study estimated that the cost was about $30,000 per vehicle with cost-effectiveness values ranged from $6,000 to $32,000 per ton of VOC+NOx emission reduced (SMAQMD, 2003).

Targeted Emission Inventory (Calendar Year 1999)

	Source	Estimated EI (tpd)	
		VOC	NOx
BJC - P5: Voluntary Partnership with Ground Freight Industry	Mobile; HDDTs	0.29	5.58

Emission Reductions (in Calendar Year 1999)[1]

	Control %			
	High	Low	NOx Impact	VOC Impact
BJC - P5: Voluntary Partnership with Ground Freight Industry	50%	30%	0.84	0.07

Implementation

Implementing Agency: WVDEP, local governments and businesses, and fleet operators.

Barriers	Opportunities
Funding issue - the method used to implement these control strategies included funded incentive programs using both special funds (e.g. Texas Emission Reduction Program and the California Carl Moyer Program) and the use of Congestion Mitigation and Air Quality funds available for retrofit and clean vehicle purchases.	Reducing ozone precursor emissions, as well as particulate emissions, in congested city streets; reducing school children exposure to diesel pollutants; reducing truck drivers exposure to diesel pollutants
Participation is voluntary	

[1] Emission reduction was estimated based on the use of aftertreatment devices, with an assumption of 50% fleet vehicle would participate in the program.

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Timeframe

2005 or Earlier	Post 2005
X	

Cost Effectiveness

	Cost Effectiveness
BJC - P5: Voluntary Partnership with Ground Freight Industry	$12k -$15k/ton NOx+VOC

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BJC P6: Open Burning Restrictions

Control Measure Description

This control strategy would require establishing open burning regulations for land clearing activities. This strategy would potentially reduce the other combustion sources in the emission inventories, which were about 0.030 tons of VOC per day, and 0.002 tons of NOx per day. The potential emissions benefit for this control strategy is low, and the benefits are difficult to quantify and enforce. Assuming that 20% of the other combustion sources are contributed by open burning, the potential emission reductions would be about 0.0005 tons for NOx emissions, and 0.005 tons for VOC emissions. SMAQMD estimated that the cost-effectiveness for control open burning during ozone season to be about $200 per ton of VOC+NOx emissions reduced (SMAQMD, 2003).

Targeted Emission Inventory (Calendar Year 1999)

	Source	Estimated EI (tpd)	
		VOC	NOx
BJC - P6: Open burning restrictions	Area	0.027	0.002

Emission Reductions (in Calendar Year 1999)

	Control %			
	High	Low	NOx Impact	VOC Impact
BJC - P6: Open burning restrictions	100%	100%	0.0005	0.0054

Implementation

Implementing Agency: WVDEP, local governments and businesses, and general public.

Barriers	Opportunities
Difficult to quantify benefits	Reduce fire related hazards or accidents
Need to develop and implement rule	Reduce visible smoke
Difficult to enforce, especially in rural areas	Encourage proper disposal of hazardous wastes

Timeframe

2005 or Earlier	Post 2005
X	

Cost Effectiveness

	Cost Effectiveness
BJC - P6: Open burning restrictions	$200/NOx+VOC ton

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BJC P7: Lower RVP Gasoline

Control Measure Description

Reducing the reid vapor pressure (RVP) in gasoline from 9.0 to 7.8 psi would reduce the volatile of the gasoline, which in turn reduces the evaporative VOC emissions from the gasoline storage and refueling facilities, fuel transportation, and from the vehicle fuel tanks. The area source VOC emission for the petroleum and petroleum product storage was estimated to be about 2.21 tons per day, and the VOC emissions from the gasoline vehicles was estimated to be about 6.7 tons per day, in the Berkeley-Jefferson Counties.

The RVP requirement for the conventional gasoline sold in the State of West Virginia is 9.0 psi all year round (see Appendix D). This control strategy would require the gasoline suppliers, either through mandatory or voluntary agreement, to reduce the RVP of gasoline provided to stations in the Berkeley-Jefferson Counties. For such a strategy to be effective, at least the counties around the Berkeley-Jefferson Counties, if not counties for the whole state, to be provided the same gasoline fuel with 7.8 psi.

Texas Commission on Environment Quality (TCEQ) has adopted this control strategy in its State Implementation Plan (SIP), and it estimated that reducing the RVP in the gasoline from 9.0 to 7.8 psi would reduce at least 14% of the VOC evaporative emissions (TCEQ, 2000).

As for the cost-effectiveness for this strategy, the Oklahoma EAC report cited cost-effectiveness values ranged from $2,200 to $4,000, based on a survey by the Ohio EPA of Ohio's major gasoline marketers (Oklahoma, 2003).

Targeted Emission Inventory (Calendar Year 1999)

	Source	Estimated EI (tpd)	
		VOC	NOx
BJC - P7: Lower RVP Gasoline	Mobile; LDGVs/HDGVs	6.70	NA

Emission Reductions (in Calendar Year 1999)[2]

	Control %		NOx Impact	VOC Impact
	High	Low		
BJC - P7: Lower RVP Gasoline	14%	14%	NO	0.94

[2] The reduction in VOC emissions from the Petroleum Product Storage category in the area source emission inventory was not estimated as the reduction can vary by the types and control technologies on tanks (e.g. floating, fixed), storage facilities (e.g. vapor recovery systems used), portable gasoline containers, etc.

Implementation

Implementing Agency: WVDEP, fuel distributors/suppliers, gas stations and local governments.

Barriers	Opportunities
Need to develop, implement and enforce rule/voluntary program	Energy conversation
Need to implement rule/voluntary program across counties/cities/state to minimize influx of non-compliance gasoline	

Timeframe

2005 or Earlier	Post 2005
X	

Cost Effectiveness

	Cost Effectiveness
BJC - P7: Lower RVP Gasoline	$2k-$4k/ton of VOC

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BJC P8: School Bus Retrofit

Control Measure Description

Similar to the retrofit option in the **BJC P5 : Voluntary Partnership with Ground Freight Industry**, retrofitting school buses with emission control technologies, such as EGR systems, aftertreatment devices, cleaner engines or fuels would reduce some of the emissions contributed by the school buses, which was estimated to be about 0.01 tons of VOC, and 1.1 tons of NOx per day in the Berkeley-Jefferson Counties.

This control strategy includes encouraging school districts to retrofit emission-reduction devices to reduce VOC and NOx diesel exhaust emissions. The primary purpose of these devices is to significantly reduce NOx and VOC emissions but often PM retrofit devices are included in many NOx or VOC retrofit devices.

The control strategy consists of adding a retrofit device to in-use school buses. The strategies available today to reduce NOx emissions from mobile sources include retarded engine timing modification, Exhaust Gas Recirculation (EGR), lean NOx catalyst, and Selective Catalytic Reduction (SCR). Examples of verified and demonstrated emission reduction effectiveness are shown in the following table.

Emission Control Device	NOx Control Effectiveness
Retard timing (Example Vendor: Cleaire's Flash and Catch)	25%
EGR (Example Vendor: STT Emtec System)	Up to 50%
Lean NOx reduction catalyst (Example Vendor: Cleaire's Longview)	25%
SCR (Example Vendors: Extengine's ADEC; Argillon's SiNOx)	90%

The NOx control retrofits will not by themselves reduce PM emissions and may increase PM emissions. Often a NOx control device is accompanied by a particulate control device in a package offered by the vendor. This is especially true for retard timing and EGR NOx control technologies.

The major control cost for these NOx retrofit devices includes both capital costs and operational costs. The capital cost for installation of these systems is shown in the table below, based on vendor and contract information available from State incentive programs.

Emission Control Device	NOx Capital Cost
Retarded timing (Cleaire's Flash and Catch)	$13,000 *
EGR (STT Emtec System)	$15,000 to $21,000 *
Lean NOx reduction catalyst (Cleaire's Longview)	$5,000 to $10,000 *
SCR	$10,000 to $45,000 **

*Includes a particulate filter and thus requires low sulfur fuel. These methods also include a fuel economy penalty of less than 5% with a lower penalty for EGR than retarded timing or lean NOx catalysts.

** Not including a particulate filter, but requires area refueling not included in this cost.

For some retrofit strategies, it is required to have low sulfur fuel, so the cost of low sulfur fuel needs to be included in the cost of the strategy.

SMAQMD estimated that the cost-effectiveness values for this control strategy was about $12,000 to $15,000 per ton of VOC+NOx emissions reduced (SMAQMD, 2003).

Targeted Emission Inventory (Calendar Year 1999)

	Source	Estimated EI (tpd)	
		VOC	NOx
BJC - P8: School Bus Retrofit	Mobile; HDDTs	0.01	0.11

Emission Reductions (in Calendar Year 1999)

	Control %			
	High	Low	NOx Impact	VOC Impact
BJC - P8: School Bus Retrofit	50%	30%	0.02	0.001

Implementation

Implementing Agency: WVDEP, local governments and businesses, and fleet operators.

Barriers	Opportunities
Funding issue - the method used to implement these control strategies included funded incentive programs using both special funds (e.g. Texas Emission Reduction Program and the California Carl Moyer Program) and the use of Congestion Mitigation and Air Quality funds available for retrofit and clean vehicle purchases. Clean School Bus USA Program is also one of the funding sources for this strategy.	Reducing ozone precursor emissions, as well as particulate emissions, in congested city streets; reducing school children exposure to diesel pollutants; reducing truck drivers exposure to diesel pollutants
Participation is voluntary	

Timeframe

2005 or Earlier	Post 2005
X	

Cost Effectiveness

	Cost Effectiveness
BJC - P8: School Bus Retrofit	$12k -$15k/ton NOx+VOC

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BJC C1: Local Adoption of VOC RACT, RACM Rules

Control Measure Description

Adopting state requirements, for controlling VOC in non-attainment areas or West Virginia Rule 45CSR21, would reduce the area source VOC emissions, which is estimated to be about 14.8 tons per day in the Berkeley-Jefferson Counties. The Rule 45CSR21 is basically a "catch all" rule that requires Reasonable Available Control Technology (RACT) for VOC emission control for small and medium emission sources, including, but not limited to, surface coatings, petroleum and petroleum product storage and transport, solvent cleaning, degreasing, etc. All of the non-attainment areas in West Virginia are already subject to this rule. So, the control technologies are commercially available and have been implemented elsewhere. The potential VOC emission reductions vary from a few percent to more than 90%, based on the sources and applicable standards.

Some of these VOC emission control options have been developed as model rules by the Ozone Transport Commission (OTC) (http://www.otcair.org/), and many of these model rules have been adopted or being considered by its member states. The most commonly adopted OTC VOC control measures are the Portable Fuel Container Rule, Architectural/Industrial Maintenance Coatings Rule, Mobile Equipment Repair and Refinishing Rule, and Solvent Cleaning Operations Rule. The potential emission reductions and cost-effectiveness for these rules are assessed here for this VOC RACT, RACM control strategy.

OTC Portable Fuel Container - The OTC portable fuel container spillage control model rule is designed to reduce the amount of VOC emissions emitted into the environment from portable fuel containers either through spillage or permeation losses. According to CARB, portable fuel containers used for refueling lawn and garden equipment and other devices are a significant source of VOC emissions (http://www.arb.ca.gov/pfc/facts/sep99_facts.htm).

Petroleum and petroleum product transport contributes to about 1.42 tons per day of VOC emissions in the Berkeley-Jefferson Counties. Establishing or specifying performance standards for portable fuel containers and/or spouts would reduce VOC emissions from storage, transport, and refueling activities. CARB estimated that the incremental cost for portable fuel containers and/or sprouts that are equipped with an automatic shut-off device was about $6 to $11. Significant reduction of about 75% could be achieved with the use of these portable fuel containers at an estimated cost-effectiveness value of about $5,000 per ton of VOC emissions reduced. Assuming that one quarter of the petroleum transport VOC emissions is contributed by portable fuel containers, a 75% control would provide a VOC emissions reduction of 0.27 tons per day in the BJC.

OTC Architectural/Industrial Maintenance Coatings Rule - This strategy requires reformulated coatings to meet lower VOC content limits than the current federal rule. Once it is adopted, the rule requires that manufacturers assume the primary responsibility to produce coatings that meet or exceed VOC content limits for sale and use at the retail and wholesale levels.

This strategy regulates the volatile organic compound content in coatings applied to stationary structures and their appurtenances (e.g., bituminous coatings and mastics, metallic pigmented coatings, quick-dry primers, sealers and undercoaters, non flat coatings, roof coatings non bituminous, and specialty primers, sealers and undercoaters etc.).

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Solvent utilization for surface coatings contributes to about 2.15 tons per day of VOC emissions in Berkeley-Jefferson Counties. Requiring reformulated coatings to meet lower VOC content limits than the current federal rule would reduce VOC emissions in this source by about 20%. A 20% reduction in VOC emissions due to surface coating would provide about 0.43 tons per day of VOC emission reduction in the BJC.

The SMAQMD study estimated the cost effectiveness for this strategy ranged from $6,000 to $20,000 per ton of VOC emissions reduced.

OTC Mobile Equipment Repair and Refinishing Rule - This strategy requires lower VOC content for paints and use of improved transfer efficiency application and cleaning equipment. Once it is adopted, the rule would apply to mostly small businesses that apply refinishing materials to a variety of mobile equipment repair and refinishing facilities.

Mobile equipment repair and refinishing is part of solvent utilization for surface cleaning. The fraction for this source should be fairly small as compared to architectural/industrial maintenance coating. For this case, VOC emissions contributed by mobile equipment repair and refinishing was assumed to be 10% or 0.21 tons per day of the total VOC emissions from the surface coatings.

Requiring lower VOC content for paints and the use of improved transfer efficiency applications and cleaning equipment would reduce some VOC emissions. The OTC estimated that the use of high volume-low pressure spray guns or equivalent equipment could reduce paint use by about 50%, and the use of enclosed spray gun cleaners would reduce VOC emissions more than 80%.

Using an average percentage reduction of 65%, this strategy would reduce VOC emissions from mobile equipment repair and refinishing by about 0.14 tons per day.

The SMAQMD study estimated that the cost effectiveness value for this strategy was about $800 per ton of VOC emissions reduced (SMAQMD, 2003)

OTC Solvent Cleaning Operations Rule - This measure requires establishing hardware and operating requirements for vapor cleaning machines used to clean metal parts and volatility restrictions for cold cleaning solvents.

Degreasing and solvent cleaning operations are performed by many commercial and industrial facilities. Solvents are used for surface preparation for further processing and cleaning after manufacturing. Degreasing is widely used by automotive repair and maintenance facilities and by manufacturing facilities. Solvent is also used by coating operations for cleaning of coating application equipment such as spray guns, brushes, etc (OTC Mobile Equipment Repair and Refinishing Rule).

Solvent cleaning operations contribute to about 0.70 tons per VOC emissions as part of the degreasing solvent utilization source in Berkeley-Jefferson Counties. Establishing hardware and operating requirements for vapor cleaning machines used to clean metal parts would reduce about 60 to 70% of this emission source, or about 0.45 tons per day.

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The SMAQMD study estimated that the cost effectiveness value for this strategy was about $800 per ton of VOC emissions reduced (SMAQMD, 2003).

Targeted Emission Inventory (Calendar Year 1999)

	Source	Estimated EI (tpd)	
		VOC	NOx
BJC - C1: Local Adoption of VOC RACT, RACM Rules	Area	14.80	NA
OTC Portable Fuel Container Rule	Petroleum Product Storag	1.42	NA
OTC Architectural/Industrial Maintenance Coatings Rule	Sulface Coating	2.15	NA
OTC Mobile Equipment Repair and Refinishing Rule	Sulface Coating	0.21	NA
OTC Solvent Cleaning Operations Rule	Degreasing	0.70	NA

Emission Reductions (in Calendar Year 1999)

	Control %			
	High	Low	NOx Impact	VOC Impact
BJC - C1: Local Adoption of VOC RACT, RACM Rules	90%	5%	No	Vary
OTC Portable Fuel Container Rule	75%	75%	No	0.27
OTC Architectural/Industrial Maintenance Coatings Rule	20%	20%	No	0.43
OTC Mobile Equipment Repair and Refinishing Rule	80%	50%	No	0.14
OTC Solvent Cleaning Operations Rule	70%	60%	No	0.45

Implementation

Implementing Agency: WVDEP, local governments,

Barriers	Opportunities
Difficult to quantify benefits	Reduce gasoline spillage
Need to develop, implement and enforce rule	Reduce water contamination
Difficult lead time to phase out old containers or sprouts	Reduce potential fire hazards
Need to implement rule across counties/cities/state to minimize influx of non-compliance products	Reduce exposure to VOC and associated toxic emissions

Timeframe

2005 or Earlier	Post 2005
X	

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Cost Effectiveness

BJC - C1: Local Adoption of VOC RACT, RACM Rules	Cost Effectiveness
	Vary
OTC Portable Fuel Container Rule	$5k/ton VOC
OTC Architectural/Industrial Maintenance Coatings Rule	$6k to 20k/ton of VOC
OTC Mobile Equipment Repair and Refinishing Rule	0.8k/ton of VOC
OTC Solvent Cleaning Operations Rule	0.8k/ton of VOC

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BJC C2: Alternative Fuels Fleet Program

Control Measure Description

Working with fleet operators to convert their fleets to alternative fuel vehicles would reduce some of the emissions contributed by the on-road mobile source, which is estimated to be about 7.00 tons per day for VOC emissions, and 10.7 tons per day for NOx emissions in the Berkeley-Jefferson Counties.

Texas has adopted a mandatory clean fleet program in the Houston-Galveston, Dallas-Fort Worth and El Paso nonattainment areas (http://www.tnrcc.state.tx.us/air/ms/tcf.htm#background). The Texas Clean Fleet (TCF) program covers all local government fleets with more than 15 vehicles, private fleets with more than 25 fleet vehicles, and mass transit fleets operating primarily in the Dallas-Fort Worth, Houston-Galveston and El Paso nonattainment areas.

For the North Central Texas Council of Governments, ENVIRON estimated that the cost-effectiveness values for a clean fuel fleet were about $7,000 to $30,000 per ton of NOx emissions reduced, with light-duty, CNG vehicles as alternative fueled vehicles (ENVIRON, 2000).

For the San Antonio EAC study (AACOG, 2003), the Alamo Area Council of Governments provided some emission reductions and cost-effectiveness estimates for different alternative fuel vehicle types for converting a fleet of 5000 vehicles, and the estimates are provided in the following table. As shown in the table, the VOC emission reductions ranged from 0.051 to 0.186 tons per day, and the NOx emission reductions ranged from –0.006 to 0.107 tons per day[3]. The cost-effectiveness values ranged from $4,000 to $75,000 per ton of VOC emissions reduced, and ranged widely from $1,000 to $3,000,000 per ton of NOx emissions reduced.

Clean Fuel Fleet Strategies: San Antonio EAC (per 5,000 vehicles)						
	Emission Reduction		Cost Effectiveness Values ($k/ton)			
	VOC	NOx	VOC		NOx	
Fuels	tpd		Low	High	Low	High
LPG	0.098	0.000	4	42	0	0
CNG	0.186	0.027	15	22	1300	2000
Electric	0.140	0.107	19	70	450	1600
Ethanol	0.056	0.065	25	75	1	3000
Biodiesel	0.051	-0.006	0	0	0	0

Targeted Emission Inventory (Calendar Year 1999)

	Source	Estimated EI (tpd)	
		VOC	NOx
BJC - C2: Alternative Fuels Fleet Program	Mobile	7.00	10.72

[3] The use of biodiesel fuel would increase the NOx emissions.

Emission Reductions (in Calendar Year 1999)

	Control %			
	High	Low	NOx Impact	VOC Impact
BJC - C2: Alternative Fuels Fleet Program	vary	vary	vary	vary

Implementation

Implementing Agency: WVDEP, local governments and businesses, and fleet operators.

Barriers	Opportunities
Funding issue - the method used to implement these control strategies included funded incentive programs using both special funds (e.g. Texas Emission Reduction Program and the California Carl Moyer Program) and the use of Congestion Mitigation and Air Quality funds available for retrofit and clean vehicle purchases.	Reducing ozone precursor emissions, as well as particulate emissions, in congested city streets; reducing school children exposure to diesel pollutants; reducing truck drivers exposure to diesel pollutants
Participation is voluntary	

Timeframe

2005 or Earlier	Post 2005
X	

Cost Effectiveness

	Cost Effectiveness
BJC - C2: Alternative Fuels Fleet Program	vary

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BJC C3: Truck Stop Electrification

Control Measure Description

Similar to **BJC P4: Restricted Engine Idling**, truck stop electrification would reduce some of the emissions contributed by heavy-duty vehicles and school buses, which is estimated to be 0.29 tons per day for VOC emissions, and 5.58 tons per day for NOx emissions in the Berkeley-Jefferson Counties. This control strategy could incorporate the use of truck stop electrification to supply power for cab and on-board appliance functions as necessary.

Idling emissions from HD diesel vehicles are generally from intercity tractor-trailers that are parked at truck stops, rest areas, ports, and to a lesser extent, distribution centers, if idling emissions are not regulated. Even though it is not encouraged or even illegal, extensive truck idling can sometimes be found at some truck stops or rest areas, mainly for heating or cooling cab/sleeper compartments, powering cab/sleeper appliances or auxiliary devices, and in some ports for waiting in line to deliver or pick-up goods. Many studies reported that intercity tractor-trailers idle an average of about 6 hours per day. However, most engine manufacturers recommend that engines run for roughly 3 to 5 minutes for engine warm-up and cool down.

Many states have adopted some kind of anti-idling regulations (see Appendix C). Adopting an anti-idling rule to all diesel vehicles would reduce some idling emissions from these vehicles. In most cases, idling longer than 5 minutes is expected to be eliminated reducing idling emissions by 50 to 75%. CARB estimated that vehicle idling is responsible for about 3 to 5% of exhaust emissions, so a reduction of 50 to 75% would result in about a 2 to 4% reduction.

One of the truck stop electrification technologies is that provided by IdleAire[4]. The IdleAire truck stop electrification system provides a cooling or heating ventilation connection to the truck cab through the passenger side window. Based on the Tennessee EAP study, the initial capital cost of a truck stop parking space, for 100 HD diesel trucks, that is equipped with an IdleAire truck stop electrification system in Knox County, Tennessee, was about one million dollars (Tennessee, 2003). The estimated cost effectiveness value for that program was about $1,700 per ton of NOx emission reduced (Tennessee, 2003).

Targeted Emission Inventory (Calendar Year 1999)

	Source	Estimated EI (tpd)	
		VOC	NOx
BJC - C3: Truck Stop Electrification	Mobile; HDDTs	0.29	5.58

Emission Reductions (in Calendar Year 1999)

	Control %		NOx Impact	VOC Impact
	High	Low		
BJC - C3: Truck Stop Electrification	4%	2%	0.17	0.01

[4] http://www.epa.gov/otaq/retrofit/idlingtech.htm

Implementation

Implementing Agency: WVDEP, local governments and businesses, truck stop operators, West Virginia Department of Transportation, and fleet operators.

Barriers	Opportunities
To be an effective program, regulations or laws need to be developed most effectively at the State level to enable and fund such a program and effectively enforce it	Reducing ozone precursor emissions, as well as particulate emissions in truck stops; reducing truck drivers exposure to diesel pollutants
	Fuel saving and energy conservation

Timeframe

2005 or Earlier	Post 2005
X	

Cost Effectiveness

	Cost Effectiveness
BJC - C3: Truck Stop Electrification	1.7k/ton of NOx

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APPENDIX A

Detailed 1999 Emission Inventories for BJC

Table A-1. Area source emission inventories.

Sum of dblEmissionNumericValue						strPollutantCode	
strStateFIPS	strCountyFIPS	SCC3_DESC				NOX	VOC
54	**Berkeley**	Commercial/Institutional				0.1335	0.0035
		Degreasing					0.4471
		Dry Cleaning					0.0210
		Food and Kindred Products: SIC 20					0.2555
		Graphic Arts					0.1352
		Industrial				0.9338	0.0259
		Miscellaneous Industrial					0.0876
		Miscellaneous Non-industrial: Consumer and Commercial					0.8151
		Open Burning				0.3583	1.0599
		Other Combustion				0.0196	0.0941
		Petroleum and Petroleum Product Storage					1.0185
		Residential				0.2492	4.2844
		Rubber/Plastics					0.0269
		Surface Coating					1.3630
		TSDFs					0.0011
		Wastewater Treatment					0.0062
	003 Total					1.6944	9.6449
	Jefferson	Commercial/Institutional				0.0785	
		Degreasing					0.2485
		Dry Cleaning					0.0106
		Graphic Arts					0.0751
		Industrial				0.1318	0.0029
		Industrial Processes: NEC					0.0056
		Miscellaneous Industrial					0.0565
		Miscellaneous Non-industrial: Consumer and Commercial					0.4530
		Open Burning				0.1280	0.4443
		Other Combustion				0.0068	0.0326
		Petroleum and Petroleum Product Storage					0.3971
		Residential				0.1386	2.6398
		Rubber/Plastics					0.0047
		Surface Coating					0.7841
	037 Total					0.4837	5.1548
54 Total						2.1781	14.7997

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Table A-2. Year 1999 On-road source emission inventories.

Sum of dblEmissionNumericValue(tons)		strPollutantCode	
strCountyFIPS	Vehicle Class	NOX	VOC
Berkeley	HDDV	4.4130	0.2165
	HDGV	0.5310	0.2475
	LDDT	0.0074	0.0059
	LDDV	0.0055	0.0028
	LDGT1	0.9262	1.3178
	LDGT2	0.3954	0.7171
	LDGV	1.6635	2.3542
Total		7.9420	4.8618
Jefferson	HDDV	1.2837	0.0767
	HDGV	0.1631	0.0826
	LDDT	0.0033	0.0026
	LDDV	0.0024	0.0013
	LDGT1	0.4115	0.5932
	LDGT2	0.1757	0.3227
	LDGV	0.7411	1.0619
Total		2.7808	2.1410
Grand Total		10.7228	7.0028

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Table A-3. Year 1999 Non-road lawn and garden emission inventories.

FIPS	SOURCE CATEGORY	Sum of NOX	Sum of VOC
Berkeley	Agricultural Equipment	0.1519	0.0243
	Commercial Equipment	0.0451	0.0688
	Construction and Mining	0.2687	0.0508
	Industrial Equipment	0.1898	0.0227
	Lawn and Garden Equipr	0.0180	0.2067
	Pleasure Craft	0.0018	0.0260
	Railroad Equipment	1.8401	0.0743
	Recreational Equipment	0.0076	0.2915
54003 Total		2.5232	0.7651
Jefferson	Agricultural Equipment	0.1865	0.0299
	Commercial Equipment	0.0152	0.0232
	Construction and Mining	0.1856	0.0350
	Industrial Equipment	0.0997	0.0119
	Lawn and Garden Equipr	0.0233	0.1899
	Pleasure Craft	1.3427	0.1796
	Railroad Equipment	0.8727	0.0391
	Recreational Equipment	0.0076	0.2915
54037 Total		2.7333	0.8001
Grand Total		**5.2565**	**1.5652**

Table A-4. Year 1999 Point source emission inventories.

County FIPS	Site ID	NOX	VOC
Berkeley	0001	0.0211	0.0369
	0003	0.0009	0.0006
	0004	0.0000	0.0000
	0006	9.5639	0.0491
	0008	1.2381	0.0216
	0012	0.0829	0.0574
	0018	0.0033	0.1045
	0026	0.0068	0.0000
	0036	0.0000	0.0491
	0041	0.0008	0.1374
	0042	0.0134	0.0293
003 Total		10.9312	0.4859
Jefferson	0007	0.3080	0.0016
	0009	0.0146	0.1474
	0013	0.0363	0.0084
	0015	0.0000	0.0025
	0061	0.0005	0.1032
037 Total		0.3594	0.2631
Grand Total		11.2906	0.7490

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APPENDIX B

Detailed Results for the Initial Screening Analysis

The results of the screening analysis for the control strategies are presented in Tables B-1 to B-3. Table B-1 presents information or data on parameters such as control sources, estimated emission inventories, feasibility, quantifiable, enforceable, and timeframe consideration for the control strategies. Table B-2 presents information or data on the emission reduction impacts, and estimated/reported cost-effectiveness values for the control strategies. Table B-3 provides some references on studies and reports that are relevant to the control strategies.

Table B-1. Preliminary screening results of the control strategies for the Berkeley-Jefferson Counties' EAP (Part 1).

Eastern Panhandle of West Virginia (Berkeley-Jefferson Counties)								
Measure Code	**Measure Under Consideration**	**Source**	**Estimated EI (tpd)**		**Feasibility**	**Quantifiable**	**Enforceable**	**Timeframe**
			VOC	**NOx**				
BJC – 1	**WVDEP RACT (**Reasonably Available C	Area	14.7997	2.18	Yes	Yes	Yes	Yes
	and RACM (Reasonably Achievable Control Measures) *							
Fuels Measures								
BJC – 2	Fleet Program	Mobile	7.00	10.72	Yes	Yes	Yes	Yes
BJC – 3	Lower RVP Gasoline	Area	2.7873	NA	Yes	Yes	Yes	Yes
Episodic Measures								
BJC – 4a	Ozone Action Days	Mobile; LDVs/Ts	6.3671	4.3135	Yes	No	No	Yes
BJC – 4b		Multiple	NA	NA	Yes	No	No	Yes
Public Information and Education								
BJC – 5	Public Awareness Program	Multiple	NA	NA	Yes	No	No	Yes
BJC – 6	School based Program	Multiple	NA	NA	Yes	No	No	Yes
BJC – 7	Promotion of Bicycling, Walking	Mobile; LDVs/Ts	6.3671	4.3135	Yes	No	No	Yes
Ridesharing/Carpooling								
BJC – 8	Establish a ridesharing program	Mobile; LDVs/Ts	6.3671	4.3135	Yes	No	No	Yes
Bicycle/Pedestrian Measures								
BJC - 9	Bicycle Accommodation	Mobile; LDVs/Ts	6.3671	4.3135	Yes	No	No	Yes
BJC – 10	Regional Bicycle Plan	Mobile; LDVs/Ts	6.3671	4.3135	Yes	No	No	Yes
BJC – 11	Bicycle Storage/Rack Promotion	Mobile; LDVs/Ts	6.3671	4.3135	Yes	No	No	Yes
BJC –12	Walkable Communities Program	Mobile; LDVs/Ts	6.3671	4.3135	Yes	No	No	Yes
Heavy Vehicle Measures								
BJC – 13	Engine Idling Restrictions	Mobile; HDDTs	0.2931	5.6967	Yes	Yes	Yes	Yes
BJC – 14	Speed Limit Enforcement	Mobile; HDDTs	0.2931	5.6967	Yes	No	Yes	Yes
BJC – 15	School Bus Retrofit	Mobile; HDDTs	0.2931	5.6967	Yes	Yes	Yes	Yes
BJC – 16	Voluntary partnership with ground freigh	Mobile; HDDTs	0.2931	5.6967	Yes	Yes	Yes	Yes
BJC - 17	Truck Stop Electrification	Mobile; HDDTs	0.2931	5.6967	Yes	Yes	Yes	Yes
Area Source Measures								
BJC – 18	Open burning restrictions	Area	0.5085	0.1223	Yes	No	No	Yes
Land Use Measures and Energy Efficiency								
BJC – 19	Mixed Use Development	Mobile; LDVs/Ts	6.3671	4.3135	Yes	No	No	No
BJC – 20	Green space preservation	Mobile; LDVs/Ts	6.3671	4.3135	Yes	No	No	No

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Table B-2. Preliminary screening results of the control strategies for the Berkeley-Jefferson Counties' EAP (Part 2).

Eastern Panhandle of West Virginia (Berkeley-Jefferson Counties)

Measure Code	Measure Under Consideration	Source	NOx Impact	VOC Impact	PM Impact
BJC – 1	**WVDEP RACT (**Reasonably Available C **and RACM (**Reasonably Achievable Control Measures) *	Area	No	Yes; vary	Yes
Fuels Measures					
BJC – 2	Fleet Program	Mobile	Yes	Yes	Yes
BJC – 3	Lower RVP Gasoline	Area	NO	Yes	No
Episodic Measures					
BJC – 4a	Ozone Action Days	Mobile; LDVs/Ts	Yes; vary (10-15%)	es; vary (10-15%	Yes; small
BJC – 4b		Multiple	Yes - small	Yes - small	Yes - small
Public Information and Education					
BJC – 5	Public Awareness Program	Multiple	Yes - small	Yes - small	Yes - small
BJC – 6	School based Program	Multiple	Yes - small	Yes - small	Yes - small
BJC – 7	Promotion of Bicycling, Walking	Mobile; LDVs/Ts	Yes - small	Yes - small	Yes - small
Ridesharing/Carpooling					
BJC – 8	Establish a ridesharing program	Mobile; LDVs/Ts	Yes; 2.5%	Yes; 2.5%	Yes - small
Bicycle/Pedestrian Measures					
BJC - 9	Bicycle Accommodation	Mobile; LDVs/Ts	Yes - small	Yes - small	Yes - small
BJC – 10	Regional Bicycle Plan	Mobile; LDVs/Ts	Yes - small	Yes - small	Yes - small
BJC – 11	Bicycle Storage/Rack Promotion	Mobile; LDVs/Ts	Yes - small	Yes - small	Yes - small
BJC –12	Walkable Communities Program	Mobile; LDVs/Ts	Yes - small	Yes - small	Yes - small
Heavy Vehicle Measures					
BJC – 13	Engine Idling Restrictions	Mobile; HDDTs	Yes; vary (2-4%)	Yes; small	Yes; vary (2-4%)
BJC – 14	Speed Limit Enforcement	Mobile; HDDTs	Yes - small	Yes - small	Yes - small
BJC – 15	School Bus Retrofit	Mobile; HDDTs	Yes; vary	Yes; vary	Yes; vary
BJC – 16	Voluntary partnership with ground freight i	Mobile; HDDTs	Yes; vary (2-4%)	Yes; small	Yes; vary (2-4%)
BJC - 17	Truck Stop Electrification	Mobile; HDDTs	Yes; vary (2-4%)	Yes; small	Yes; vary (2-4%)
Area Source Measures					
BJC – 18	Open burning restrictions	Area	Yes - small	Yes - small	Yes - small
Land Use Measures and Energy Efficiency					
BJC – 19	Mixed Use Development	Mobile; LDVs/Ts	Yes - small	Yes - small	Yes - small
BJC – 20	Green space preservation	Mobile; LDVs/Ts	Yes - small	Yes - small	Yes - small

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Table B-3. Preliminary screening results of the control strategies for the Berkeley-Jefferson Counties' EAP (Part 3).

Eastern Panhandle of West Virginia (Berkeley-Jefferson Counties)

Measure Code	Measure Under Consideration	Source	Cost Effectiveness	Proposed Dat for Implementation	Related Measures*
BJC – 1	**WVDEP RACT (**Reasonably Available C **and RACM (**Reasonably Achievable Control Measures) *	Area	Vary	May-05	SMAQMD D-6, 7, 8, 26 & 28; SN-17 57, 58 & 122; SCAQMD
Fuels Measures					
BJC – 2	Fleet Program	Mobile	Vary	May-05	SMQAMD: ONMS-255v2, 63 & 65; San Antonio, Texas EAP
BJC – 3	Lower RVP Gasoline	Area	Vary	May-05	TRIAD EAC- N2; San Anotonio, Texas EAP Measure 24
Episodic Measures					
BJC – 4a	Ozone Action Days	Mobile; LDVs/Ts	$3.5 to 5.5k/ton VOC+NOx	Jun-04	SMAQMD: TCM-159, TCM-46, TCM-104v2; Traid, North
BJC – 4b		Multiple	NA		
Public Information and Education					
BJC – 5	Public Awareness Program	Multiple	$3.5 to 5.5k/ton VOC+NOx	Jun-04	SMAQMD: TCM-113, TCM-195; SCAQMD AQMP2003
BJC – 6	School based Program	Multiple	$3.5 to 5.5k/ton VOC+NOx	Jan-05	SMAQMD: TCM-145
BJC – 7	Promotion of Bicycling, Walking	Mobile; LDVs/Ts	$3.5 to 5.5k/ton VOC+NOx	Jan-05	SMAQMD: TCM-201v2; CARB Clean Air Plan; EPA S980
Ridesharing/Carpooling					
BJC – 8	Establish a ridesharing program	Mobile; LDVs/Ts	$19k/ton VOC+NOx	Jan-05	SMAQMD: TCM-174
Bicycle/Pedestrian Measures					
BJC - 9	Bicycle Accommodation	Mobile; LDVs/Ts	$129k/ton VOC+NOx	Jun-04	SMAQMD: TCM-201v2; EPA S98002; Traid, North Carolir
BJC – 10	Regional Bicycle Plan	Mobile; LDVs/Ts	$129k/ton VOC+NOx	Jun-05	EPA S98002
BJC – 11	Bicycle Storage/Rack Promotion	Mobile; LDVs/Ts	$129k/ton VOC+NOx	Jun-05	SMAQMD: TCM-314; EPA S98002
BJC –12	Walkable Communities Program	Mobile; LDVs/Ts	$129k/ton VOC+NOx	Sep-04	SMAQMD: TCM-201v2; CARB Clean Air Plan; EPA S980
Heavy Vehicle Measures					
BJC – 13	Engine Idling Restrictions	Mobile; HDDTs	$10k -$300k/ton VOC+NOx	Jan-05	SMAQMD: ONMS-45; South Coast Air Plan; Traid, North
BJC – 14	Speed Limit Enforcement	Mobile; HDDTs		Jun-04	Texas EAP - measure 32
BJC – 15	School Bus Retrofit	Mobile; HDDTs	vary	Contingent on	SMAQMD: ONMS-52v2, ONMS-61, ONMS-62; South Coa
BJC – 16	Voluntary partnership with ground freight i	Mobile; HDDTs	Vary	To Be Determined	
BJC - 17	Truck Stop Electrification	Mobile; HDDTs	$10k -$300k/ton VOC+NOx	Jun-05	SMAQMD: ONMS-45; Traid, North Carolina EAC- i7
Area Source Measures					
BJC – 18	Open burning restrictions	Area	$200/NOx+VOC ton	Jun-04	SMAQMD: SN-54; SMAQMD 501/Placer Rule 102; Traid,
Land Use Measures and Energy Efficiency					
BJC – 19	Mixed Use Development	Mobile; LDVs/Ts	$10,000K/ton VOC+NOx	Jan-05	SMAQMD: TCM-201v2
BJC – 20	Green space preservation	Mobile; LDVs/Ts	NA	Jan-06	SMAQMD: LU-219; Traid, North Carolina EAC- F4

* Footnotes
SMAQMD: Sacramento Air Quality Management District
TNRCC - Texas Natural Resources Conservation Commission (is now called Texas Commission on Environmental Quality or TCEQ)

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APPENDIX C

Anti-Idling in the States

US EPA ARCHIVE DOCUMENT

Summary of State Anti-Idling Regulations

EPA420-S-03-002
February 2003

State	Citation	Applicability	Idling Time Limit	Exemptions	SIP
AZ	AZ ST § 11-876	Heavy duty diesel vehciles >14,000 lbs.	5 minutes	• Emergency vehicles • Traffic conditions • Need for driver to sleep in vehicle • Necessary for equipment (refrigeration)	Not in SIP
CA	CA HLTH & S § 40720	Marine terminals or ports processing 100,000+ containers/year	30 minutes	• Acts of God • Strikes • State/Federal emergencies • Unavoidable/unforseeable event	Not in SIP
CO (Denver)	Denver Municipal Code Sec. 4-43	Any motor vehicle	10 minutes in any one hour	• Ambient temperature <20º F for previous 24 hours • Ambient temperature <10º F • Emergency vehicles • Traffic conditions • Vehicle is being repaired/serviced • Take-off power for auxiliary uses • Vehicles engaged in traffic operations	Not in SIP
CT	Sec. 22a-174-18(a)(5)	Mobile source engine	3 consecutive minutes	• Traffic conditions • Mechanical difficulties • Heating/cooling when necessary • Bring engine to OEM recommended operating temperature • Ambient temperature <20º F • Vehicle is being repaired/serviced • Aircraft, locomotives, marine vessels, lawnmowers, snow blowers, and small home appliances	In SIP

Source: California Air Resources Board and EPA

US EPA ARCHIVE DOCUMENT

State	Citation	Applicability	Idling Time Limit	Exemptions	SIP
CT	Non regulatory school bus policy	School buses	Shut off engine immediately unless leaving within 3 minutes; AM start-up idling restricted to time recommended to reach engine operating temperature or defrost windows	• To operate safety equipment • To maintain safe temperature for children with special needs • Ambient temperature <20º F	Not in SIP
HI	§ 11-60.1-34	All motor vehicles	No specified time	• Vehicle is being repaired/serviced • Necessary for auxiliary equipment built onto vehicle • Loading/unloading passengers - not to exceed 3 minutes • Build up op pressure/cooling down of engine - not to exceed 3 minutes	Not in SIP
MD	§ 22-402	Motor vehicles	5 minutes	• Traffic conditions • Mechanical difficulties • Necessary for auxiliary equipment installed on vehicle • To bring vehicle up to OEM's recommended engine operating temperature	In SIP
DC	Title 20, Reg 900.1	Diesel/gasoline vehicles	3 minutes	• Necessary for auxiliary equipment installed on vehicle • To operate AC for 15 minutes on bus with 12 or more people • To operate heating equipment when temperature is <32º F	Not in SIP
MA	Chapter 90, Sec. 16A	Motor vehicles	5 minutes	• Vehicle is being repaired /serviced • Delivery vehicles in which engine power is necessary • Vehicles in operation for which associate power need is required	In SIP

Source: California Air Resources Board and EPA

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State	Citation	Applicability	Idling Time Limit	Exemptions	SIP
MN	§ 123B.885	Diesel school buses	N/A (must minimize to extent practical the idling of school bus engines)	None	Not in SIP
MN (St. Cloud)	Section 706	Motor vehicles (within specified 2 block area of city)	5 minutes	N/A	Not in SIP
MO (St. Louis)	Ordinance 64749D	Motor vehicles	10 minutes	• Emergency vehicles	Not in SIP
MT (Lewis & Clark county)	Rule 3.101	Diesel or locomotive engine operating when health department declares air quality is poor	2 hours in any 12 hour period	• When a Board of Health variance is granted	Not in SIP
NV	NAC 445B.576	Diesel truck or bus	15 minutes	• When a variance is issued • Emergency vehicles • Removal of snow • Used to repair or maintain other vehicles • Traffic conditions • During repair/maintenance • Emission is treated and contained by method approved by commission • Engine must idle to perform a specific task (e.g., drilling)	Not in SIP
NH	Env-A 1101.05	Diesel/gasoline vehicle	5 minutes >32º F 15 minutes >-10º F & <32º F No limit <-10º F and no nuisance created	• Traffic conditions • Emergency vehicles • Takeoff power for auxiliary uses • Vehicle is being repaired/serviced • Operated solely to defrost windshield	Not in SIP

Source: California Air Resources Board and EPA

US EPA ARCHIVE DOCUMENT

State	Citation	Applicability	Idling Time Limit	Exemptions	SIP
NJ	7:27-14.2	Diesel powered motor vehicles	3 minutes 30 minutes for permanent vehicle at business 15 minutes for vehicle stopped for >= 3 hours	• Emergency vehicles in an emergency situation • Emergency vehicle of GVWR >18,000 lbs transporting property on public road • Diesel bus while loading/unloading • Traffic conditions • When auxiliary power is needed for other equipment or climate control • Being inspected by State/Federal inspector • Vehicle is being repaired/serviced • Detach/exchange trailer • Light duty diesel vehicles	In SIP
NY	§ 217-3.2, 3.3	Diesel bus or truck	5 minutes	• Traffic conditions • If regulation already exists to maintain conditions for passenger comfort • During maintenance • To provide power for auxiliary purpose • Emergency vehicles • Mining/quarrying on own property • Temperature <25° F if motionless for 2 hours • Diesel waiting to undergo a roadside emission inspection • Hybrid electric engine charging batteries	Not in SIP
NY (NYC)	NYC Code § 24-163	Motor vehicles	3 minutes	• Emergency motor vehicles • Loading/unloading • Temperature <40° F	Not in SIP
PA	52 P.S. & 701-223-A	Diesel powered equipment	N/A	None	Not in SIP

Source: California Air Resources Board and EPA

US EPA ARCHIVE DOCUMENT

State	Citation	Applicability	Idling Time Limit	Exemptions	SIP
PA (Philad.)	Reg. IX	Heavy duty diesel vehicles >8,500 lbs, or passenger carrying capacity >12	2 minutes 0 minutes for layovers 5 minutes <32º F 20 minutes <20º F 20 minutes for buses with AC and non-openable windows and >75º F	None	Not in SIP
TX (Houston/ Galveston)	Sec 114.500-114.509	Diesel/gasoline motor vehicles GVWR >14,000 lbs	5 minutes April 1 - Oct 31 30 minutes for heat/AC for transit and school buses	• Traffic conditions • Vehicle is being repaired/serviced • Solely to defrost windshield • Power source necessary for mechanical operation other than propulsion • Airport ground service equipment • Emergency vehicles • Owner of vehicle rented or leased to another who is not employed by the owner	In SIP
UT (Salt Lake City)	Health Dept. Reg. #28.6.8	Diesel vehicles	15 minutes	• Supply power to a refrigeration unit • Supply heat/AC to sleeper cab • Emergency vehicles	Not in SIP
VA	§ 46.2-1224.1, 9 VAC 5-40-5670B&C	Buses when unattended, parked, or stopped	10 minutes	• Traffic conditions • Vehicle is being repaired/serviced • School buses • Public transit buses	In SIP

Source: California Air Resources Board and EPA

US EPA ARCHIVE DOCUMENT

APPENDIX D

Gasoline RVP Guide and Gasoline Requirement

U.S. Environmental Protection Agency
EPA420-B-03-002
March 2003

Guide on Federal and State Summer RVP Standards for Conventional Gasoline Only

This guide is intended for quick reference purposes only. Federal volatility regulations (40 CFR 80.27) apply to "designated volatility nonattainment areas" and to "designated volatility attainment areas," as defined in 40 CFR 80.2(cc) and 80.2(dd), respectively. For this quick reference guide, we have listed RVP limits by county, which may not coincide precisely with the borders of a nonattainment or attainment area. We have not listed RVP limits which may apply through voluntary agreements for supply of lower RVP fuel than what is otherwise required for an area. For a brief description of the federal fuel volatility regulations, see the last page of this guide. For specific information regarding borders, please consult your respective EPA regional office.

State	County/ Parish	City	Month & RVP PSI Max				
			May	June	July	Aug	Sept 1-15
AL	Jefferson	Birmingham	9.0	7.0**	7.0	7.0	7.0
AL	Shelby		9.0	7.0**	7.0	7.0	7.0
AL	All Others		9.0	9.0	9.0	9.0	9.0
AR	All counties		9.0	9.0	9.0	9.0	9.0
AZ	Maricopa (part)	Phoenix	9.0	7.0**	7.0	7.0	7.0 (Sept. 30)
AZ	All others		9.0	9.0	9.0	9.0	9.0
CA	(See EPA RFG list)***						
CO	6-County CMSA (See 'Notes' for county names and status of proposed change of 7.8 psi standard to 9.0 psi)	Denver/Boulder	9.0	7.8	7.8	7.8	7.8
CO	All others		9.0	9.0	9.0	9.0	9.0
CT	(See EPA RFG list)***						
DC	(See EPA RFG list)***						
DE	(See EPA RFG list)***						
FL	Broward		9.0	7.8	7.8	7.8	7.8

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State	County/ Parish	City	Month & RVP PSI Max				
			May	June	July	Aug	Sept 1-15
FL	Dade	Miami	9.0	7.8	7.8	7.8	7.8
FL	Duval		9.0	7.8	7.8	7.8	7.8
FL	Hillsborough		9.0	7.8	7.8	7.8	7.8
FL	Palm Beach		9.0	7.8	7.8	7.8	7.8
FL	Pinellas		9.0	7.8	7.8	7.8	7.8
FL	All others		9.0	9.0	9.0	9.0	9.0
GA	See 'Notes' for list of 45 counties affected	Atlanta area	9.0	7.0**	7.0	7.0	7.0
GA	All others		9.0	9.0	9.0	9.0	9.0
ID	All counties		9.0	9.0	9.0	9.0	9.0
IL	Madison	E. St. Louis	9.0	7.2**	7.2	7.2	7.2
IL	Monroe		9.0	7.2**	7.2	7.2	7.2
IL	St. Clair		9.0	7.2**	7.2	7.2	7.2
IL	All other conventional gasoline counties		9.0	9.0	9.0	9.0	9.0
IL	(See EPA RFG list)***						
IN	Clark		9.0	7.8**	7.8	7.8	7.8
IN	Floyd		9.0	7.8**	7.8	7.8	7.8
IN	All other conventional gasoline counties		9.0	9.0	9.0	9.0	9.0
IN	(See EPA RFG list)***						
IA	All counties		9.0	9.0	9.0	9.0	9.0
KS	Johnson	Kansas City	9.0	7.0**	7.0	7.0	7.0
KS	Wyandotte		9.0	7.0**	7.0	7.0	7.0
KS	All others		9.0	9.0	9.0	9.0	9.0
KY	All conventional gasoline counties		9.0	9.0	9.0	9.0	9.0
KY	(See EPA RFG list)***						
LA	Ascension		9.0	7.8	7.8	7.8	7.8
LA	Beauregard		9.0	7.8	7.8	7.8	7.8

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State	County/ Parish	City	Month & RVP PSI Max				
			May	June	July	Aug	Sept 1-15
LA	Calcasieu		9.0	7.8	7.8	7.8	7.8
LA	E Baton Rouge		9.0	7.8	7.8	7.8	7.8
LA	Grant		9.0	7.8	7.8	7.8	7.8
LA	Iberville		9.0	7.8	7.8	7.8	7.8
LA	Jefferson		9.0	7.8	7.8	7.8	7.8
LA	Lafayette		9.0	7.8	7.8	7.8	7.8
LA	Lafourche		9.0	7.8	7.8	7.8	7.8
LA	Livingston		9.0	7.8	7.8	7.8	7.8
LA	Orleans	New Orleans	9.0	7.8	7.8	7.8	7.8
LA	Point Coupee		9.0	7.8	7.8	7.8	7.8
LA	St Bernard		9.0	7.8	7.8	7.8	7.8
LA	St Charles		9.0	7.8	7.8	7.8	7.8
LA	St James		9.0	7.8	7.8	7.8	7.8
LA	St Mary		9.0	7.8	7.8	7.8	7.8
LA	W Baton Rouge		9.0	7.8	7.8	7.8	7.8
LA	All others		9.0	9.0	9.0	9.0	9.0
MA	(See EPA RFG list)***						
MD	All conventional gasoline counties		9.0	9.0	9.0	9.0	9.0
MD	(See EPA RFG list)***						
ME	Androscoggin		7.8**	7.8	7.8	7.8	7.8
ME	Cumberland	Portland	7.8**	7.8	7.8	7.8	7.8
ME	Kennebec	Augusta	7.8**	7.8	7.8	7.8	7.8
ME	Knox		7.8**	7.8	7.8	7.8	7.8
ME	Lincoln		7.8**	7.8	7.8	7.8	7.8
ME	Sagadahoc		7.8**	7.8	7.8	7.8	7.8
ME	York		7.8**	7.8	7.8	7.8	7.8
ME	All others		9.0	9.0	9.0	9.0	9.0
MI	Livingston		9.0	7.8**	7.8	7.8	7.8
MI	Macomb		9.0	7.8**	7.8	7.8	7.8
MI	Monroe		9.0	7.8**	7.8	7.8	7.8

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State	County/ Parish	City	Month & RVP PSI Max				
			May	June	July	Aug	Sept 1-15
MI	Oakland		9.0	7.8**	7.8	7.8	7.8
MI	St. Clair		9.0	7.8**	7.8	7.8	7.8
MI	Washtenaw	Ann Arbor	9.0	7.8**	7.8	7.8	7.8
MI	Wayne	Detroit	9.0	7.8**	7.8	7.8	7.8
MI	All others		9.0	9.0	9.0	9.0	9.0
MN	All counties		9.0	9.0	9.0	9.0	9.0
MT	All counties		9.0	9.0	9.0	9.0	9.0
MO	(See EPA RFG list)***						
MO	Clay	Kansas City	9.0	7.0**	7.0	7.0	7.0
MO	Jackson		9.0	7.0**	7.0	7.0	7.0
MO	Platte		9.0	7.0**	7.0	7.0	7.0
MO	All other conventional gasoline counties		9.0	9.0	9.0	9.0	9.0
MS	All counties		9.0	9.0	9.0	9.0	9.0
NC	Davidson		9.0	7.8	7.8	7.8	7.8
NC	Davie (part)		9.0	7.8	7.8	7.8	7.8
NC	Durham		9.0	7.8	7.8	7.8	7.8
NC	Forsyth		9.0	7.8	7.8	7.8	7.8
NC	Gaston		9.0	7.8	7.8	7.8	7.8
NC	Granville (part)		9.0	7.8	7.8	7.8	7.8
NC	Guilford		9.0	7.8	7.8	7.8	7.8
NC	Mecklenburgh	Charlotte	9.0	7.8	7.8	7.8	7.8
NC	Wake	Raleigh	9.0	7.8	7.8	7.8	7.8
NC	All others		9.0	9.0	9.0	9.0	9.0
NE	All counties		9.0	9.0	9.0	9.0	9.0
NH	All conventional gasoline counties		9.0	9.0	9.0	9.0	9.0
NH	(See EPA RFG list)***						
NJ	(See EPA RFG list)***						
NM	All counties		9.0	9.0	9.0	9.0	9.0
ND	All counties		9.0	9.0	9.0	9.0	9.0

US EPA ARCHIVE DOCUMENT

State	County/ Parish	City	Month & RVP PSI Max				
			May	June	July	Aug	Sept 1-15
NV	Washoe	Reno	9.0	7.8	7.8	7.8	7.8
NV	All others		9.0	9.0	9.0	9.0	9.0
NY	All conventional gasoline counties		9.0	9.0	9.0	9.0	9.0
NY	(See EPA RFG list)***						
OH	All counties		9.0	9.0	9.0	9.0	9.0
OK	All counties		9.0	9.0	9.0	9.0	9.0
OR	Clackamas		9.0	7.8	7.8	7.8	7.8
OR	Multnomah	Portland	9.0	7.8	7.8	7.8	7.8
OR	Washington		9.0	7.8	7.8	7.8	7.8
OR	Marion (part)	Salem	9.0	7.8	7.8	7.8	7.8
OR	Polk (part)		9.0	7.8	7.8	7.8	7.8
OR	All others		9.0	9.0	9.0	9.0	9.0
PA	Allegheny	Pittsburgh	9.0	7.8**	7.8	7.8	7.8
PA	Armstrong		9.0	7.8**	7.8	7.8	7.8
PA	Beaver		9.0	7.8**	7.8	7.8	7.8
PA	Butler		9.0	7.8**	7.8	7.8	7.8
PA	Fayette		9.0	7.8**	7.8	7.8	7.8
PA	Washington		9.0	7.8**	7.8	7.8	7.8
PA	Westmoreland		9.0	7.8**	7.8	7.8	7.8
PA	All other conventional gasoline counties		9.0	9.0	9.0	9.0	9.0
PA	(See EPA RFG list)***						
RI	(See EPA RFG list)***						
SC	All counties		9.0	9.0	9.0	9.0	9.0
SD	All counties		9.0	9.0	9.0	9.0	9.0
TN	Davidson	Nashville	9.0	7.8	7.8	7.8	7.8
TN	Rutherford		9.0	7.8	7.8	7.8	7.8
TN	Shelby	Memphis	9.0	7.8	7.8	7.8	7.8
TN	Sumner		9.0	7.8	7.8	7.8	7.8
TN	Williamson		9.0	7.8	7.8	7.8	7.8

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State	County/ Parish	City	Month & RVP PSI Max				
			May	June	July	Aug	Sept 1-15
TN	Wilson		9.0	7.8	7.8	7.8	7.8
TN	All others		9.0	9.0	9.0	9.0	9.0
TX	Eastern Texas (see 'Notes' section for 95 counties affected)		7.8**	7.8	7.8	7.8	7.8 (Oct 1)
TX	El Paso	El Paso	9.0	7.0**	7.0	7.0	7.0
TX	Hardin		9.0	7.8	7.8	7.8	7.8
TX	Jefferson		9.0	7.8	7.8	7.8	7.8
TX	Orange		9.0	7.8	7.8	7.8	7.8
TX	All other conventional gasoline counties		9.0	9.0	9.0	9.0	9.0
TX	(See EPA RFG List)***						
UT	Davis		9.0	7.8	7.8	7.8	7.8
UT	Salt Lake	Salt Lake City	9.0	7.8	7.8	7.8	7.8
UT	All others		9.0	9.0	9.0	9.0	9.0
VA	All conventional gasoline counties		9.0	9.0	9.0	9.0	9.0
VA	(See EPA RFG List)***						
VT	All counties		9.0	9.0	9.0	9.0	9.0
WA	All counties		9.0	9.0	9.0	9.0	9.0
WV	All counties		9.0	9.0	9.0	9.0	9.0
WI	All conventional gasoline counties		9.0	9.0	9.0	9.0	9.0
WI	(See EPA RFG List)***						
WY	All counties		9.0	9.0	9.0	9.0	9.0

Notes to Federal and State RVP Standards

* Indicates change or proposed change in federal standard not yet federally approved.

** State run program with federally-approved State Implementation Plan (SIP).

*** Indicates there are counties or areas in counties in the state which have reformulated gasoline (RFG) requirements. See EPA's "List of Federal Reformulated Gasoline Program Areas," January, 2002. RFG areas must meet a VOC emissions performance reduction standard per 40 CFR 80.4l.

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Denver/Boulder: The applicable federal volatility standard from June 1 to September 15 is 7.8 psi. EPA has proposed changing this to 9.0 psi, and is preparing a final rule responding to the comment received on this proposal. We expect the final rule to be issued and effective beginning with the 2003 ozone season. CMSA counties include: Adams (partial), Arapahoe (partial), Boulder (partial), Denver, Douglas, and Jefferson.

Atlanta area counties include: Banks, Barrow, Bartow, Butts, Carroll, Chattooga, Cherokee, Clarke, Clayton, Cobb, Coweta, Dawson, DeKalb, Douglas, Fayette, Floyd, Forsyth, Fulton, Gordon, Gwinnett, Hall, Haralson, Heard, Henry, Jackson, Jasper, Jones, Lamar, Lumpkin, Madison, Meriwether, Monroe, Morgan, Newton, Oconee, Paulding, Pickens, Pike, Polk, Putnam, Rockdale, Spalding, Troup, Upson, and Walton.

Eastern Texas Counties include: Anderson, Angelina, Aransas, Atascosa, Austin, Bastrop, Bee, Bell, Bexar, Bosque, Bowie, Brazos, Burleson, Caldwell, Calhoun, Camp, Cass, Cherokee, Colorado, Comal, Cooke, Coryell, De Witt, Delta, Ellis, Falls, Fannin, Fayette, Franklin, Freestone, Goliad, Gonzales, Grayson, Gregg, Grimes, Guadalupe, Harrison, Hays, Henderson, Hill, Hood, Hopkins, Houston, Hunt, Jackson, Jasper, Johnson, Karnes, Kaufman, Lamar, Lavaca, Lee, Leon, Limestone, Live Oak, Madison, Marion, Matagorda, McLennan, Milam, Morris, Nacogdoches, Navarro, Newton, Nueces, Panola, Parker, Polk, Rains, Red River, Refugio, Robertson, Rockwall, Rusk, Sabine, San Jacinto, San Patricio, San Augustine, Shelby, Smith, Somervell, Titus, Travis, Trinity, Tyler, Upshur, VanZandt, Victoria, Walker, Washington, Wharton, Williamson, Wilson, Wise, and Wood.

Federal Fuel Volatility Regulations at 40 CFR 80.27:

Standards for May are maximum standards for all regulated parties except retailers and wholesale purchaser-consumers.

Standards for June l to September 15 are maximum standards for all regulated parties including retailers and wholesale purchaser-consumers.

Gasoline alcohol blends meeting 80.27(d) have l.0 psi waiver of applicable federal RVP standard.

Alaska, Hawaii, and U. S. territories are exempted from federal volatility regulations.

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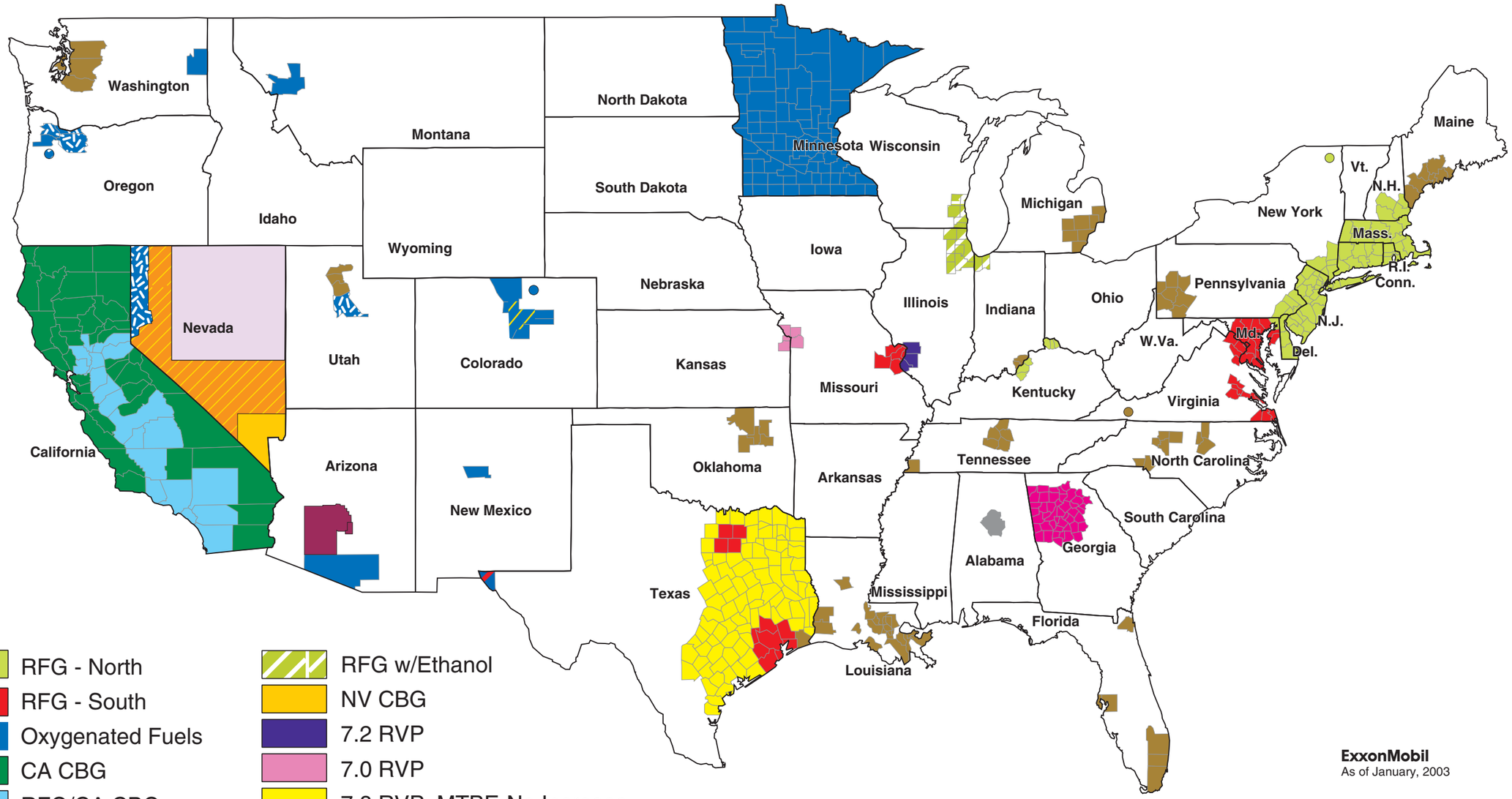
U.S. Gasoline Requirements



- RFG - North
- RFG - South
- Oxygenated Fuels
- CA CBG
- RFG/CA CBG
- AZ CBG
- Oxy Fuels/7.8 RVP
- Oxy Fuels/7.0 RVP
- Oxy Fuels/8.5 RVP
- Conventional
- RFG w/Ethanol
- NV CBG
- 7.2 RVP
- 7.0 RVP
- 7.8 RVP, MTBE-No Increase
- 7.8 RVP
- 7.0 RVP, 150 ppm S
- 7.0 RVP, 30 ppm S
- 300 ppm S
- 800 ppm S

ExxonMobil
As of January, 2003

This map is not intended to provide legal advice or to be used as guidance for state and/or federal fuel requirements, including but not limited to oxy fuel or RFG compliance requirements. ExxonMobil makes no representations or warranties, express or otherwise, as to the accuracy or completeness of this map.

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