



# GOVERNOR'S BROWN CLOUD SUMMIT

*Jane Dee Hull, Governor*  
*Ed Phillips, Chairman*

January 16, 2001

The Honorable Jane Dee Hull, Governor  
State of Arizona  
1700 West Washington  
Phoenix, Arizona 85007

Re: Report of the Brown Cloud Summit

Dear Governor Hull:

I am pleased to transmit to you the report of the Brown Cloud Summit, as approved at its meeting on January 16, 2001.

On March 15, 2000, you established the Brown Cloud Summit and told us to "identify strategies to improve visibility in the Valley of the Sun." The community leaders you appointed to the Summit have responded to your call and worked throughout the year to review and evaluate many proposed visibility control measures. With the help of many companies and organizations we were able to make thousands of people aware of the opportunity to comment on the draft report. As a result, more than 6,000 people reviewed the draft report on the Brown Cloud Website, with more than 600 people submitting 1,000 comments. This far exceeds the amount of comment received by previous air quality task forces, and reflects the growing concern about air pollution among Valley residents.

While there is no 'silver bullet' that solves the visibility problem in the Valley of the Sun, the Summit has looked at several measures that together, will improve visibility, as well as the health of Valley citizens. We are pleased to provide you with information developed through this effort and hope that you will find it useful as you work with Arizona's leadership to determine the best approach to our air quality problems.

Thank you for giving me the opportunity to serve as Chairman of the Brown Cloud Summit. Working with this very dedicated group of community leaders has been a rewarding experience. While we did not always agree on some issues, there is no question about the dedication of these individuals to the pursuit of a better quality of life for Arizona.

It is my privilege to present this report to you.

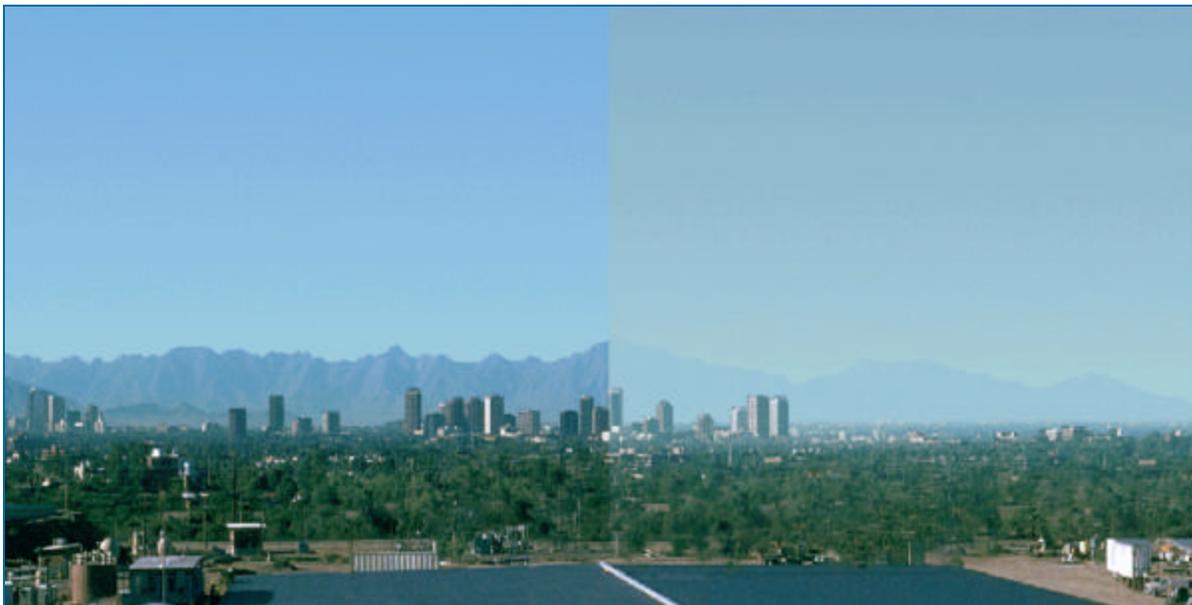
A handwritten signature in cursive script, appearing to read "Ed Phillips".

Ed Phillips  
Chairman



# The Governor's Brown Cloud Summit

*Jane Dee Hull, Governor  
Ed Phillips, Chairman*



1999 Average Best Day Versus Average Worst Day

## Final Report

January 16, 2001

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## The Governor's Brown Cloud Summit Members

Ed Phillips	Chairman
Senator Linda Aguirre	Arizona State Senate
Representative Carolyn Allen	Arizona House of Representatives
Richard L. Boals	Blue Cross Blue Shield
Tim Boncoskey	Arizona Department of Administration
Senator Rusty Bowers	Arizona State Senate
Victor Dugan	Western States Petroleum Association
William Foley	St. Joseph Hospital and Medical
John D. Ford	I-10 International Trucks
Edward Z. Fox	Pinnacle West Capital Corporation
Richard M. Hayslip	Salt River Project
Kevin Knight	Knight Transportation
Supervisor Andrew Kunasek	Maricopa County Board of Supervisors
Representative Leah Landrum	Arizona House of Representatives
Robert Lavinia	Tosco Corporation
Leandra Lewis	Arizona Clean & Beautiful
Skip Martinkovic	Opus West
Diane McCarthy	Westmarc
Victor Mendez	Arizona Department of Transportation
Philip Mole	Interested Public
Jerry Moyes	Swift Transportation
Bill Pfeifer	American Lung Association of Arizona
Dan Pollard	IBEW Local Union 640
Barbara Ralston	Camelback Community Bank
Mayor Skip Rimsza	City of Phoenix
Kevin Rogers	Arizona Farm Bureau
Norm Petersen	Arizona Department of Health Services
P.A. Seitts	Desert Foothills and Land Trust
Supervisor Sandie Smith	Pinal County Board of Supervisors
Charlie Stevens	Western States Petroleum Association
Richard W. Tobin II	Arizona Department of Environmental Quality
Anne Wendell	Motorola

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## List of Appendices

- Appendix 1 Governor's Brown Cloud Summit Subcommittee Processes and Recommended Control Measures
  - Appendix 2 Measuring Visibility
  - Appendix 3 Sources of Fall and Winter Visibility Impairment in Phoenix
  - Appendix 4 Report of the Visibility Standard Subcommittee
  - Appendix 5 Urban Visibility Reading List
  - Appendix 6 Glossary
  - Appendix 7 Responsiveness Summary
  - Appendix 8 Minority Report to the Draft Final Report
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## Introduction and Purpose

The purpose of this document is to communicate to Governor Jane Dee Hull the recommendations of the Brown Cloud Summit. In their many meetings since June, the Summit members have studied what's in the brown cloud, how it has become worse over the past four years, how it makes people sick, and that it makes some people die sooner. They looked all over the country to find examples of pollution controls that could work here to reduce the brown cloud, and developed a group of pollution-fighting measures for citizens to review. Appendix 1 to this Report contains more details on those measures. Cleaning up the brown cloud will need to be an ongoing community effort. No single solution will make this problem better.

During its December 12, 2000, meeting, the Summit approved the Draft Report for Public Review and Comment. The review period began December 13, 2000, and ended January 7, 2001. During that time, over 600 individuals submitted written comments on a wide variety of issues. Many of the comments included thoughtful suggestions that warrant further consideration and the Summit encour-

ages the readers to review the Responsiveness Summary (see Appendix 7). On December 20, 2000, EPA finalized new regulations subjecting heavy-duty trucks and buses to new emission standards beginning with model year 2007. The introduction of low sulfur fuel (maximum 15 ppm) for on-road diesel vehicles, which will be necessary for the new engines to meet the emissions standards, in mid-2006 was also included in the regulation. To account for the emission reductions that will occur under this rule, ADEQ completed a reassessment of the recommended measures. The revised numbers are reflected in the tables at the end of the Final Report and Appendix 1. Finally, two members of the Summit submitted a Minority Report, which is included as Appendix 8.

Additional copies of the Final Report are available from the Arizona Department of Environmental Quality Library or by calling 602-207-2217. Copies of the Final Report and all of the Appendices may also be downloaded from the Arizona Department of Environmental Quality Web site at <http://www.adeq.state.az.us> and clicking on the Brown Cloud Summit icon.

## The Governor's Charge

On March 15, 2000, Governor Jane Dee Hull signed Executive Order 2000-3, establishing the Brown Cloud Summit. Governor Hull gave the Summit a complicated job to:

- ◆ Identify ways to reduce the brown cloud, recognizing that they may also help the Valley's other air quality problems;
- ◆ Keep in mind ongoing work by other groups to improve visibility at national parks and wilderness areas throughout the West;
- ◆ Seek comments from citizens throughout its work; and
- ◆ Develop proposals on how to put the pollution-fighting measures into action and work to get them done.

While the original Executive Order called for the Summit to complete a final report by December 15, 2000, the Governor recognized that additional time was needed to do a thorough job. Adding a month to the schedule helped the Summit members spend more time looking at the pollution causing the brown cloud, the cost of ways to reduce it, and how much improvement could be expected.

The full text of Executive Order 2000-3 can be found at the Web site described in the Introduction to this document.

## What is the Brown Cloud?

For many years we heard weather reports mention “visual range” – how far a dark object could be seen on the horizon. The estimates were made by Weather Service workers, based on how far they could see, and were reported for use by pilots. Because flying is only affected when visual range is less than 10 miles, in recent years, visibility greater than 10 miles was reported as such. Average visual range in metro Phoenix has been about 40 miles; thus, looking back at these reports over the years could not tell us if the brown cloud was getting better or worse.

That’s why, in 1993, ADEQ installed instruments to measure the brown cloud and the air pollution that causes it.

- ♦ A beam of light sent between the roof tops of Phoenix Baptist Hospital, near 19th Avenue and Bethany Home Road, and the Quality Hotel, 2nd Avenue and Osborn, in Central Phoenix, continuously measures the clarity of the air, sometimes referred to as “total light extinction.”
- ♦ Air quality monitors located near 17th Avenue and Campbell, beneath this light beam, measure the pollution in the air so it can be compared with the amount of light extinction.
- ♦ Other monitoring sites in Higley, Tempe, Estrella Park and ASU West continually track what makes up the brown cloud at those locations and collect pollution on particle sample filters.

The pollution on the filters is analyzed by a laboratory and the results are assessed to identify the sources that contribute to the brown cloud.

Measurement of the clarity of the air, or total light extinction, can be represented in several ways. For their work, the Summit members chose the “deciview,” or dV. The deciview is the same type of scale as the decibel index. In other words, zero deciviews would show absolutely clean air, and increases in deciviews mean worse visible air pollution. The average person can perceive a change of one deciview or more.

Measurements taken in 1994 through 1998 show that the brown cloud is getting worse. The dirtiest days, which occur in fall and winter, have become 10 percent worse. In contrast, the cleanest days, typically during spring and summer, have become 64 percent worse. Air quality monitoring done here and around the State tell us that the brown cloud is the effect of pollution created here in the Valley of the Sun. We know that the brown cloud is five times worse here than in places in Arizona with clean air, like Organ Pipe National Monument or Grand Canyon National Park. It’s not dust blowing in from the desert. It isn’t pollution traveling here from Los Angeles. Our activities cause air pollution every day, including driving cars and trucks, maintaining our yards with lawn mowers and leaf blowers, and burning our fireplaces.

## Causes of the Brown Cloud

*“Whereas, carbon particles and nitrogen dioxide gas create the brown color of the haze that hangs over the Valley of the Sun, referred to as the ‘brown cloud’...”*

*From Executive Order 2000-3*

Extremely small particles are the principal cause of the brown cloud. These tiny particles, too small to be seen without a microscope, are

measured in microns, with one micron equal to about one seventieth of the diameter of a human hair. Particulate matter less than 2.5

microns, often referred to as  $PM_{2.5}$ , is a significant cause of haze. Each particle, about the size of a single grain of flour, can float in the atmosphere for days, behaving much like a gas. Over half of the  $PM_{2.5}$  is caused by the burning of gasoline and diesel fuel in vehicles (which are sometimes referred to as on-road mobile sources) and in off-road mobile sources, such as construction equipment like loaders and bulldozers, locomotives, lawn mowers, leaf blowers, and other devices that emit air pollution as they move.<sup>1</sup>  $PM_{2.5}$  particles containing carbon, like soot from tail pipes, are particularly effective in reducing visibility, because they both scatter and absorb light. Appendix 2 describes how visibility is measured and provides information on Phoenix area visibility trends. Appendix 3 to this Report contains a detailed analysis of the sources of the brown cloud.

Nitrogen dioxide and sulfur dioxide gases from burning of fossil fuels also contribute to the brown cloud. Nitrogen dioxide gas is brown, giving that color to the haze. Chemical reactions in the atmosphere convert these gases to fine particles.

Dust, principally from driving on paved roads, is also a contributor. Natural sources, like carbon particles from wild fires and dust from the Salt

River bed, are small contributors to the haze.

Weather conditions, such as temperature, wind speed and humidity make the brown cloud look different on different days. Our nightly temperature inversions, which are stronger in the winter, combined with the fact that we live in the Valley play the biggest role. Every evening after sunset, the surface of the land cools off more rapidly than does the air above. As a result, fine particles and gases from combustion produced that day are trapped under the inversion. At the same time, a mass of cooler air slides down from the mountains, pushing the pollution across the Valley from east to west. That's why, on a relatively calm dirty day, if you look to the west from the top of Squaw Peak right after sunrise, you will see a dense, relatively thin layer of brown haze. If you stay there for several hours, you will see the haze layer get taller, as the inversion lifts and temperatures rise. Around mid-morning, the direction of the air flow in the Valley reverses, as the relatively warmer air makes its way from west to east, moving up toward the mountains. If you stayed on Squaw Peak into the afternoon, you would see that the brown cloud had become better looking to the west, but worse looking east.

## Health Effects

*"Whereas, citizens of the Valley of the Sun have shown an interest in and concern with the brown cloud, and seek action to further protect public health and improve visibility..."*

*From Executive Order 2000-3*

" $PM_{2.5}$ , the prime cause of poor visibility in the Valley, also exacerbates health effects such as asthma attacks and other heart and lung problems that cause people to need to go to hospitals, and is consistently associated with higher than average death rates.<sup>2</sup> Reducing the amount of  $PM_{2.5}$ , will make the view of more distant landmarks clearer and reduce health effects. Improvements in visibility and health

will be directly proportional to the amount of emissions eliminated.

Applying the results of recent health studies to  $PM_{2.5}$  levels measured in the Valley, between 250 and 1,000 additional deaths in the Phoenix area each year are currently caused by  $PM_{2.5}$  air pollution.<sup>3</sup>

<sup>1</sup>Appendix 3, Sources of Fall and Winter Visibility Impairment in Phoenix, page 5-2.

<sup>2</sup>Dr. C. Arden Pope, Professor Brigham Young University, Brown Cloud Summit meeting, July 11, 2000.

<sup>3</sup>Dr. C. Arden Pope, Professor Brigham Young University, personal communication with ADEQ staff, August 30, 2000.

## The Summit's Three-Pronged Approach

The Summit's recommendations revolve around three themes:

- ◆ Citizen-set goals to improve the brown cloud, improve our understanding of the nature of the haze throughout the Valley, and improved monitoring to assess our progress;
- ◆ Long-term, market-driven strategies to help reach the visibility goal and provide health benefits; and
- ◆ Short-term, voluntary and mandatory measures to reduce emissions and improve public health.

Executive Order 2000-3 directed the Summit "to establish options for a visibility standard or other method to track progress in improving visibility in the Phoenix area." The Summit looked at the experience in Denver, Colorado, which adopted a visibility standard in 1990, and found that it was a sound approach for that area. They then set out to make a tracking method suited to the Valley of the Sun. The Summit has chosen a visibility target or Blue Sky Days, to track progress until a public survey can establish a daily index value. We would call a Blue Sky Day any day with at least six daylight hours when visibility is greater than 25 miles. We recommend 250, 260 and 275 Blue Sky Days for 2001, 2002, and 2003, respectively, as targets. Building on the experience in Denver, we recommend conducting a survey in the winter of 2001-2002 to ask citizens and visitors what level of haze is acceptable. The survey results would set a visibility index. The actual level of haze would be reported daily and measured against the index. The Summit recommends continuing and expanding the existing visibility monitoring network to track trends. The Summit also recommends appropriation of adequate funding to support these activities. Appendix 4 to this

Report contains the Report of the Visibility Standards Subcommittee.

Market-based strategies, like the national approach to control the air pollution that causes acid rain, and the Western states' recommendations for a program to reduce haze at parks and wilderness areas, can be effective in reducing pollution levels at about 60 percent of the cost of traditional, regulatory programs. As a long-term approach, the Summit recommends a Voluntary Emissions Banking Program for sources, with periodic, well-defined, declining emission reduction goals to start in the 2004 to 2006 time frame. The goals can be based on either reaching the publicly-established visibility index or by setting a target for emission reductions. If the visibility improvements or reductions in air pollution are not met, the backstop program would automatically begin. It would set a cap on emissions of particulates and oxides of nitrogen and other relevant pollutants that make up the brown cloud. Businesses and industries that could most cost-effectively reduce emissions would get "credits" for reducing emissions more than they needed to, which they could sell to other businesses and industries that did not have opportunities for making cost-effective emissions reductions. Trading of emission reduction credits would help reduce the cost of meeting the pollution reduction goals. The Summit recommends legislation establishing a board of affected members of the public to design and oversee this approach, as well as authority and funding for ADEQ to develop and operate the program.

The Summit recommends the following voluntary short-term control measures:<sup>4</sup>

<sup>4</sup>Unless otherwise stated, all proposed programs would be slated to go into effect in Area A, or the greater Phoenix metropolitan area, including the Apache Junction area and parts of Pinal County near the Town of Queen Creek. (See the map following page 7 of this Report.)

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***Voluntary Vehicle Repair and Retrofit Program Funding for Light Duty Gas Vehicles***

This measure would provide funding to continue the successful program operated by Maricopa County to repair or install emission upgrade kits on high-emitting light duty gasoline vehicles that have failed emissions inspections.

***Clean Fleets and Equipment Businesses Program***

This measure encourages owners or operators of heavy-duty on-road and off-road equipment and diesel vehicles to meet emissions performance standards for a minimum of 51 percent of their older heavy-duty vehicles and equipment (e.g., equipment that doesn't meet EPA's Tier 2 emission standards). Certified businesses would receive "extra" points in bidding on state, county and city contracts. Legislation is necessary to authorize awarding "extra points" to qualifying businesses.

***Voluntary Accelerated Purchase of Tier 2/Tier 3 Diesel Equipment***

This measure encourages accelerated replacement of old off-road diesel equipment with less polluting newer equipment that meets the federal Tier 2 or Tier 3 emissions standards.

***Voluntary On-Road Diesel Repair and Retrofit Program***

This measure would provide funding for installation of retrofit technology (oxidation catalysts and/or particulate filters) on heavy duty diesel trucks 1990 and older. This program would either parallel or enhance the Maricopa County Voluntary Vehicle Repair and Retrofit Program for Light Duty Gas Vehicles.

***Voluntary Early Implementation of Ultra-Low Sulfur Diesel for Use in On- and Off-Road Diesels Retrofitted with Oxidation Catalysts and Particulate Filters***

This measure would encourage the early implementation of ultra-low sulfur diesel for use in centrally fueled diesel vehicle and equipment fleets retrofitted with oxidation catalysts and

particulate filters.

***Truck Bypass on Poor Visibility Days*** This measure would encourage that heavy-duty diesel trucks, light-duty vehicles, and medium-duty trucks traveling through the Phoenix area on Interstate 10 use the Gila Bend bypass on poor visibility days.

***Voluntary Replacement of Airport Ground Support Equipment (GSE)***. This measure encourages the replacement of internal combustion GSE with low- or zero-emission GSE at Sky Harbor Airport with a goal of 30 percent by 2005.

***Air Quality Alert Days*** This measure includes adding visibility pollutants to the current air quality alert system operated by Maricopa County. When a high pollution day is predicted, employers and other citizens are asked to take steps to reduce emissions on the next day.

The Summit also recognizes that there are mandatory pollution-cutting measures that can be put in place relatively quickly to improve the brown cloud and public health. As a result they recommend the following mandatory control measures.

***Ban Leaf Blowers***. Leaf blowers (gasoline and electric) resuspend particulate matter at a rate estimated to be about 2.5 pounds of particulate matter per hour per unit, approximately half of which is PM<sub>10</sub>. Gas powered blowers also generate VOCs and CO emissions. A ban on all leaf blowers would reduce emissions of these pollutants, as well as neighborhood noise. This requires legislative action to provide authority and funding for Maricopa County.

***Arizona's Adoption of California Not To Exceed (NTE) Test Procedures*** This measure would mandate the adoption of California's test procedures for implementing their Not To Exceed (NTE) Standards for

new heavy duty diesel trucks for model years 2005-2006.

**Vehicle Idling Restrictions** This measure would limit the idling time of heavy duty diesel trucks. This requires legislative action to provide authority and funding for Maricopa County. This measure is undergoing further evaluation and modeling.

**Full Implementation of Roadside Diesel Testing** This measure would implement roadside testing of heavy duty diesel trucks. This program would be implemented in Area A. Legislative authority is needed as well as funding for this new program.

**Replace Generators with Electric Power at Construction Sites** This measure would mandate that utility supplied electrical power be provided at Area A residential construction sites in lieu of portable gasoline or diesel generators. This measure only recommends replacement of generators at residential construction sites. It would not affect other types of generators used for other purposes, such as generators on motor homes. This requires legislative action to provide authority and funding for Maricopa County and Pinal County.

**Additional Funding for PM<sub>10</sub> Efficient Street Sweepers** This measure would provide additional funding for political subdivisions in Area A to purchase PM<sub>10</sub> efficient street sweepers. Eligible street sweepers are defined as those which have been certified by the South Coast Air Quality Management District as meeting the PM<sub>10</sub> emission requirements of Rule 1186.

**Increase Funding for Maricopa and Pinal Counties Inspection and Dust Control Programs** This measure adds five additional full time personnel for the enforcement of construction dust control requirements. Four of this personnel would be for Maricopa County, one for Pinal County.

**Dust Control Training For Contractors** This measure would develop and implement a standardized dust control certification training program for construction companies and other stakeholders in Maricopa County to enhance compliance with Maricopa County Rule 310. Participation in the training and certification would be required for a construction company to obtain a county permit.

**Expansion of Area A** This measure would add high growth communities in the West Valley, including Buckeye and Surprise, to the definition of Area A. These areas would have to participate in the following programs which are in place in the metro Phoenix area and Apache Junction: wintertime no burn days, Stage II Vapor Recovery, vehicle maintenance and inspection program, stabilization of roads, alleys, and shoulders, vacuum systems for crack-seal operations, alternative fuel public vehicle fleet plans, trip reduction programs for large employers, parking prohibitions for municipal employees not participating in the VEI program, clean burning fireplace construction and conversion ordinance, traffic light synchronization, alternative fuel vehicle requirements for local governments and school districts, use of on-road diesel fuel for off-road engines, and retirement of pre-1988 heavy duty diesel engines before 2004. This requires a legislative change to the definition of Area A. (See the map following page 7.)

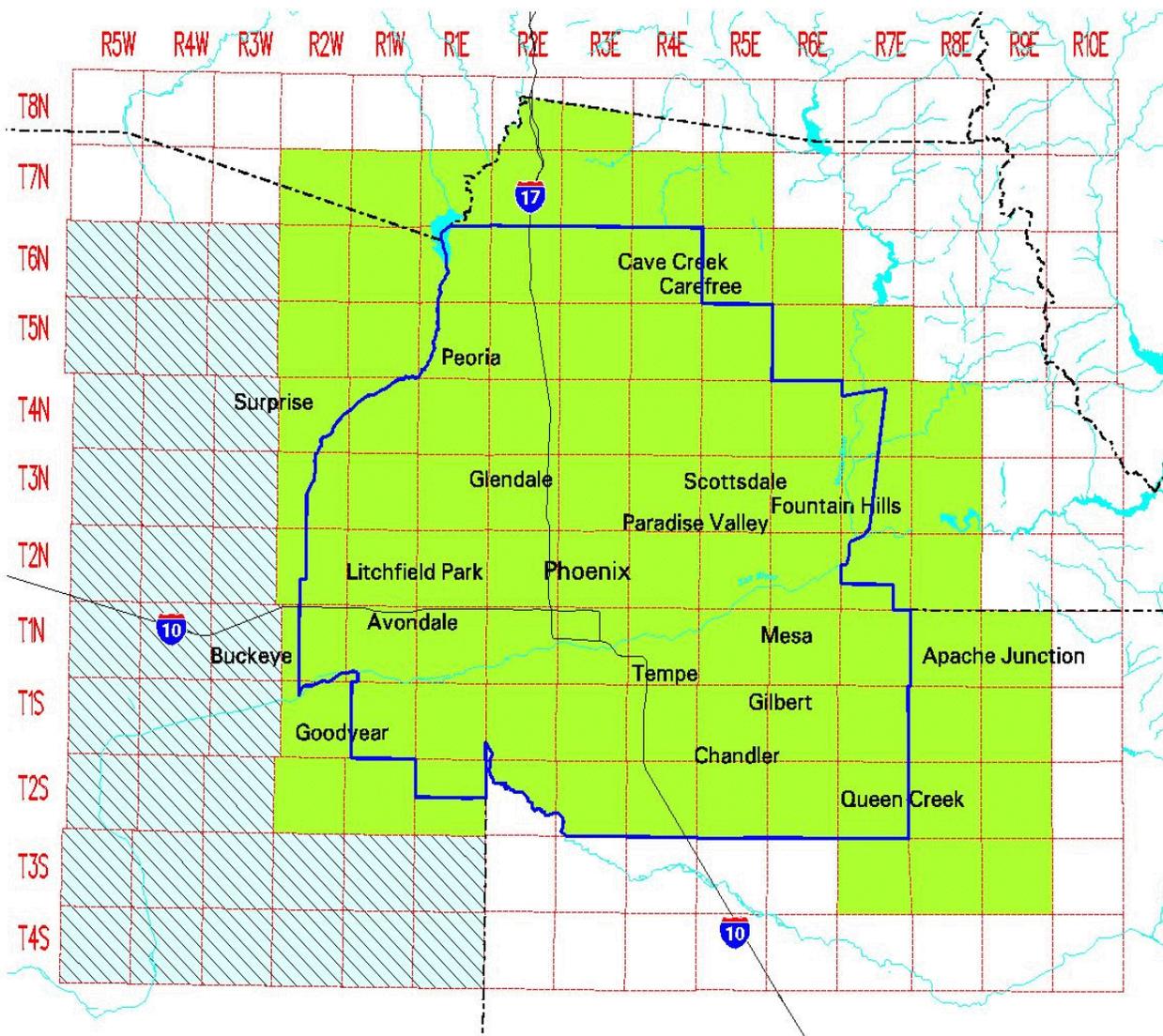
**Mandatory Adoption of CARB Diesel** This measure would require all diesel fuel sold in Area A (on-road and off-road) to conform to the specifications of CARB Diesel.

The tables on the following page compare the costs and benefits of the various measures, and provide more information on estimated emissions reductions by pollutant. Note that most of the measures also reduce carbon monoxide (CO) emissions; however, as CO is invisible, estimated emissions reductions were not calculated and are not available at this time.

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In addition, the Summit is proposing to encourage the Legislature to pass a resolution that would urge EPA to adopt emissions standards for commercial and National Guard aircraft.

If you would like to read more about the brown cloud, visibility studies done in other areas and other related topics, Appendix 5 to this Report includes a list of other reading material.



PHOENIX AREA A AND RECOMMENDED EXPANDED AREA A BOUNDARIES

-  Recommended Expanded Area A Boundary
-  Existing Area A Boundary
-  Previous Area A Boundary
-  U.S. Highways
-  Township and Range Boundaries



For more information about this map contact  
 Air Quality Division, GIS Mapping Staff  
 Arizona Department of Environmental Quality  
 3033 North Central Avenue, Phoenix, Arizona 85012  
 Phone: (602) 207-4482  
 Fax: (602) 207-2366  
 Randy Sedlacek Unit Manager  
 Phone: (602) 207-2362

Disclaimer Information:  
 This map is a (WORKING DOCUMENT), it is designed for presentation and discussion and is subject to change and further refinement.

November, 2000  
 Author: Joe D'Amico, j72@arizona.gov, j72@arizona.gov, j72@arizona.gov, j72@arizona.gov, j72@arizona.gov

Control Measures Recommended for Consideration by the Summit  
In Order of Visibility Improvement

Control Measure	Deciview Improvement in 2020 (worst 20% avg. winter days)
Voluntary Vehicle Repair and Retrofit Program Funding (Light Duty Gas Vehicles)	0.49
Ban Leaf Blowers	0.162
Mandatory Adoption of CARB Diesel	0.134
Voluntary Early Implementation of Ultra-Low Sulfur Diesel for Use in On- and Off-Road Diesels Retrofitted with Oxidation Catalysts and Particulate Filters	0.114 - 0.135
Arizona's Adoption of California Not To Exceed (NTE) Test Procedures	0.119
Clean Fleet and Equipment Program with State and Local Contract Incentives	0.065
Additional Funding for PM <sub>10</sub> Efficient Street Sweepers	0.052
Replace Generators with Electrical Power at Construction Sites	0.048
Voluntary Accelerated Purchase of Tier 2/Tier 3 Diesel Equipment	0.041
Increase Funding for Maricopa and Pinal Counties Inspection and Dust Control Program	0.037
Voluntary Replacement of Airport Ground Support Equipment 30%	0.033
Truck Bypass on Poor Visibility Days	0.014
Dust Control Training For Contractors	0.013
Voluntary On-Road Diesel Repair and Retrofit Program	0.01
Vehicle Idling Restrictions	0.004
Air Quality Alert Days	0.002
Full Implementation of Roadside Diesel Testing	0.001
Expansion of Area A	0.001

Control Measures Recommended for Consideration by the Summit  
In Order of Cost Effectiveness

Control Measure	Cost-Effectiveness in 2020 (\$ Million per Deciview) (worst 20% avg. winter days)	Average Annual Cost (\$ Million)
Clean Fleet and Equipment Program with State and Local Contract Incentives	0.83	0.05
Dust Control Training For Contractors	1.79	0.02
Ban Leaf Blowers	2.24	0.36
Vehicle Idling Restrictions	2.81	0.01
Voluntary Vehicle Repair and Retrofit Program Funding (Light Duty Gas Vehicles)	3.24	1.60
Voluntary Accelerated Purchase of Tier 2/Tier 3 Diesel Equipment	4.54	0.18
Truck Bypass on Poor Visibility Days	9.44	0.13
Voluntary Replacement of Airport Ground Support Equipment 30%	11.76	0.39
Voluntary Early Implementation of Ultra-Low Sulfur Diesel for Use in On- and Off-Road Diesels Retrofitted with Oxidation Catalysts and Particulate Filters	13.89 - 21.38	1.59 - 2.88
Increase Funding for Maricopa and Pinal Counties Inspection and Dust Control Program	18.76	0.69
Additional Funding for PM <sub>10</sub> Efficient Street Sweepers	19.00	0.99
Voluntary On-Road Diesel Repair and Retrofit Program	52.04	0.32
Replace Generators with Electrical Power at Construction Sites	49.95	2.40
Air Quality Alert Days	74.45	0.14
Arizona's Adoption of California Not To Exceed (NTE) Test Procedures	76.10	9.04
Full Implementation of Roadside Diesel Testing	152.61	0.18
Mandatory Adoption of CARB Diesel	170.82	22.89
Expansion of Area A	2,120.26	1.20

Control Measures Recommended for Consideration by the Summit  
Emissions Reduction by Pollutant (tons per day)  
(Average Winter Day in 2020)

Control Measure	PM10	PM2.5	NOx	SOx	VOC	CO*
Voluntary Vehicle Repair and Retrofit Program Funding (Light Duty Gas Vehicles)	0.180	0.180	0.100	0.000	0.080	++
Ban Leaf Blowers	4.601	2.212	0.004	0.000	1.310	+
Mandatory Adoption of CARB Diesel	0.599	0.540	4.238	2.230	2.767	++
Voluntary Early Implementation of Ultra-Low Sulfur Diesel for Use in On- and Off-Road Diesels Retrofitted with Oxidation Catalysts and Particulate Filters	0.771 - 0.890	0.705 - 0.814	0.704 - 1.385	0.658 - 0.758	1.266 - 1.463	++
Arizona's Adoption of California Not To Exceed (NTE) Test Procedures	0.000	0.000	25.700	0.000	0.000	0
Clean Fleet and Equipment Program with State and Local Contract Incentives	0.480	0.347	3.215	0.000	0.000	0
Additional Funding for PM <sub>10</sub> Efficient Street Sweepers	2.944	0.590	0.000	0.000	0.000	0
Replace Generators with Electrical Power at Construction Sites	0.286	0.259	2.185	0.080	0.293	+
Voluntary Accelerated Purchase of Tier 2/Tier 3 Diesel Equipment	0.246	0.219	2.108	0.000	0.322	+
Increase Funding for Maricopa and Pinal Counties Inspection and Dust Control Program	2.764	0.827	0.000	0.000	0.000	0
Voluntary Replacement of Airport Ground Support Equipment 30%	0.203	0.174	1.658	0.043	0.213	+
Truck Bypass on Poor Visibility Days	0.017	0.013	0.581	0.000	N/A	+
Dust Control Training For Contractors	0.948	0.283	0.000	0.000	0.000	0
Voluntary On-Road Diesel Repair and Retrofit Program	0.016	0.014	0.900	0.000	0.000	0
Vehicle Idling Restrictions	0.014	0.013	0.509	0.000	0.271	++
Air Quality Alert Days	0.003	0.002	0.037	0.000	0.052	+
Full Implementation of Roadside Diesel Testing	0.009	0.008	0.000	0.000	0.228	+
Expansion of Area A	0.002	0.002	0.020	0.000	0.065	+

\*Relative magnitude of reduction indicated by “+”