EPA's New Ozone Standard

Nashville Area Metropolitan Planning Organization

May 7, 2008

Alan Jones

Tennessee Dept. of Transportation

Environmental Policy Office

Overview

- On March 12, 2008, EPA significantly strengthened the National Ambient Air Quality Standards (NAAQS) for ground-level ozone
- Both primary and secondary standards set at
  - 0.075 parts per million (ppm) or
  - 75 parts per billion (ppb)
- Will be a challenge for Tennessee
- ≥ 13-15 counties likely nonattainment
- 2008-2009 monitoring critically important

Ground-level Ozone is

- The primary component of smog
- Often called “bad ozone” to distinguish it from “good”
  - Both types of ozone have same chemical composition (O3)
  - “Good ozone”occurs naturally in upper atmosphere and forms a layer that protects life on earth from sun's harmful rays
  - “Bad ozone”at ground level is harmful to breathe
  - Not emitted directly, but forms when nitrogen oxides (NOx) and volatile organic compounds (VOCs) “cook” in the sun
  - Industrial facilities, electric utilities, motor vehicles, gasoline vapors, and chemical solvents - Major man-made sources of NOx and VOCs
- Mainly a summertime pollutant, because sunlight and hot weather accelerate its formation
- Ozone levels can be high in both urban and rural areas, often due to transport of ozone, or NOx and VOC precursor emissions

Ozone and Health

- Ozone can penetrate deeply into the lungs and can:
  - Make it more difficult for people working or playing outside to breathe as deeply and vigorously as normal
  - Irritate airways, causing coughing, sore or scratchy throat, pain when taking a deep breath, and shortness of breath
  - Increase asthma attacks and use of asthma medication
  - Inflame and damage lining of the lung by injuring the cells that line the air spaces in the lung
  - Increase susceptibility to respiratory infection
  - Aggravate chronic lung diseases such as asthma, emphysema and bronchitis
- Repeated episodes of ozone-induced inflammation may cause permanent changes in the lung
- Ozone may continue to cause lung damage after symptoms have disappeared

Sensitive Populations

- Susceptible and vulnerable groups include:
  - People with lung diseases such as asthma
  - Children
  - Older adults
  - People who are more likely to be exposed, such as outdoor workers

Setting Clean Air Health Standards

- The Clean Air Act requires EPA to set primary and secondary NAAQS for common air pollutants
  - Ground-level ozone
  - Carbon monoxide
  - Nitrogen dioxide
  - Particulate matter
  - Lead
  - Sulfur dioxide
- Two types of ozone standards
  - *Primary standard* to protect public health, including the health of "sensitive" populations
  - *Secondary standard* to protect public welfare and the environment, including sensitive vegetation and ecosystems

Setting Clean Air Health Standards

- EPA must review scientific information and standards for each pollutant ***every five years***
- *EPA must* obtain advice from the Clean Air Scientific Advisory Committee (CASAC) on each review
- Setting NAAQS vs. achieving them
  - Setting NAAQS - health and environmental effects only
  - Achieving NAAQS - account for cost, technical feasibility, time needed to attain
- EPA last revised the ozone standards in 1997

National Progress Toward Clean Air

- Ozone air quality trends have been improving
  - Ozone levels declined 9% between 1990 and 2006
- In the eastern U.S., the cap-and-trade NOx budget program has been very successful
  - 60% decline in ozone season NOx emissions between 2000 (when program began) and 2006
  - 13% decline in eastern O3 concentrations between 2002-2006 alone
- 89 of the original 126 nonattainment areas (1997 standard) met standard in 2004-2006

Ozone Health Effects Science

- More than 1700 new scientific studies - strong evidence of adverse health impacts at 1997 standard and below
- Clinical studies indicate adverse respiratory responses in healthy adults at 0.080 ppm and possibly lower
- Numerous new epidemiological studies strengthen links between exposure and health effects
  - e.g., emergency department visits and hospitalizations for respiratory causes
- Studies now link ozone exposure to other health effects
  - mortality, increased asthma medication use, school absenteeism, and cardiac-related effects
- Studies of people with asthma - larger and more serious responses to ozone that last longer than responses in healthy individuals

EPA's New Ozone Standard

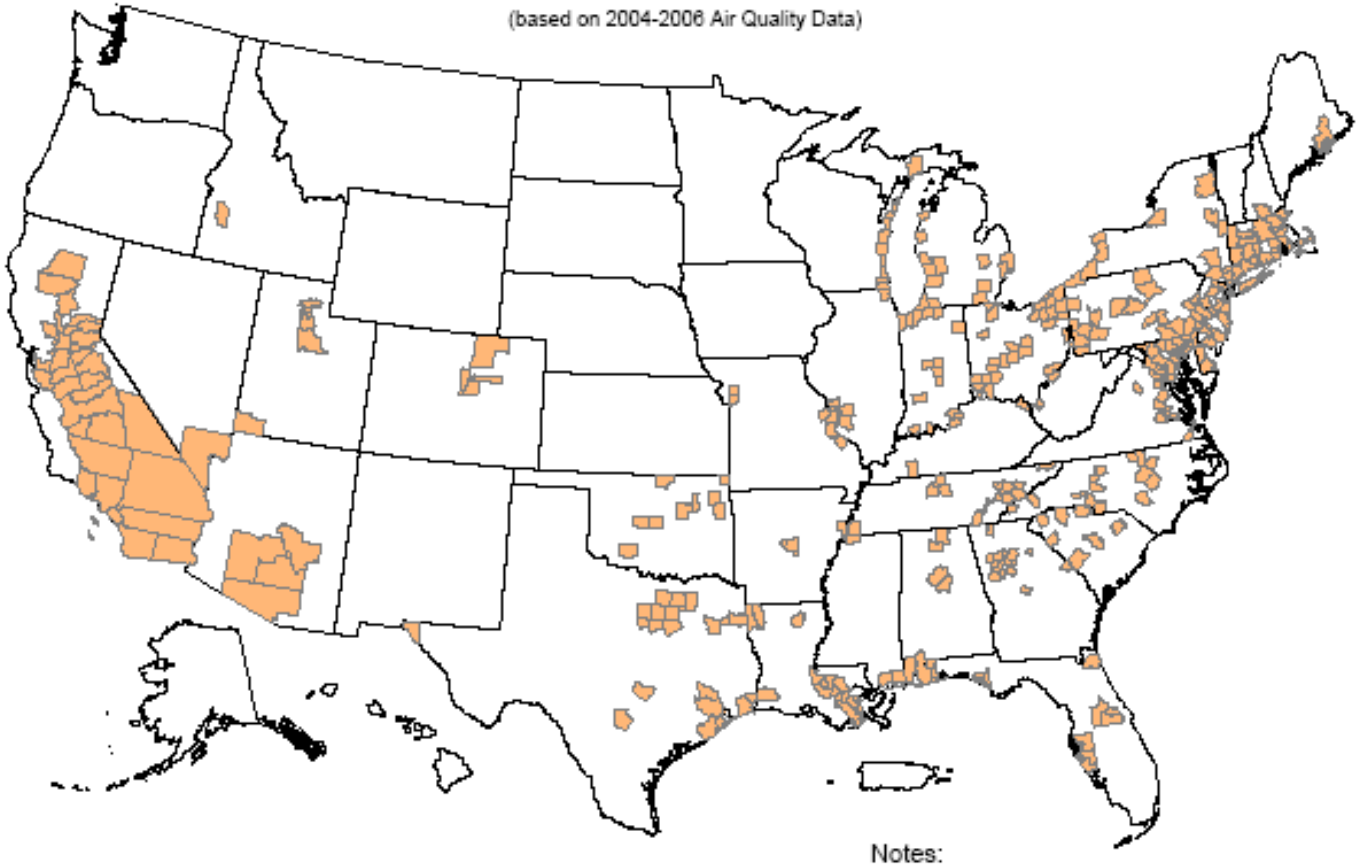
- EPA concluded the 1997 primary standard is not adequate to protect public health with an adequate margin of safety
- Existing 8-hour ozone standard – 0.080 parts per million
  - Effectively 0.084 ppm after rounding
- EPA's CASAC recommended 0.060 to 0.070 ppm
- EPA tightened the 8-hour ozone standard to 0.075 parts per million (ppm)
- The choice of 0.075 ppm eliminated the need for rounding
  - 0.076 ppm exceeds the new standard

United States Environmental Protection Agency

Estimates are based on the most recent data (2004 – 2006). EPA will not designate areas as nonattainment on these data, but likely on data from 2006 – 2008 or later, which we expect to show improved air quality.

Counties with Monitors Violating the 2008 8-Hour Ozone Standard of 0.075 parts per million (ppm)

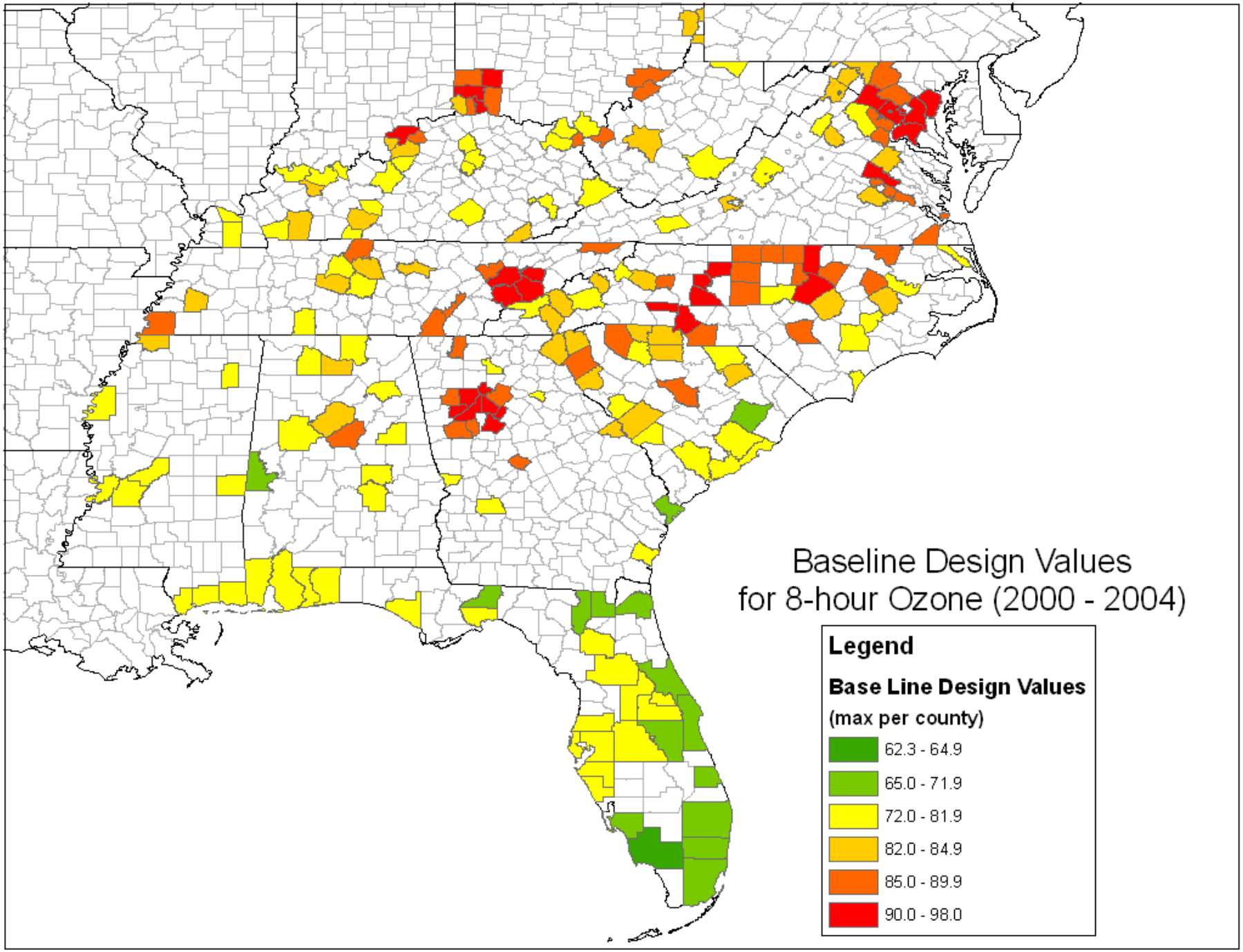
(based on 2004-2006 Air Quality Data)

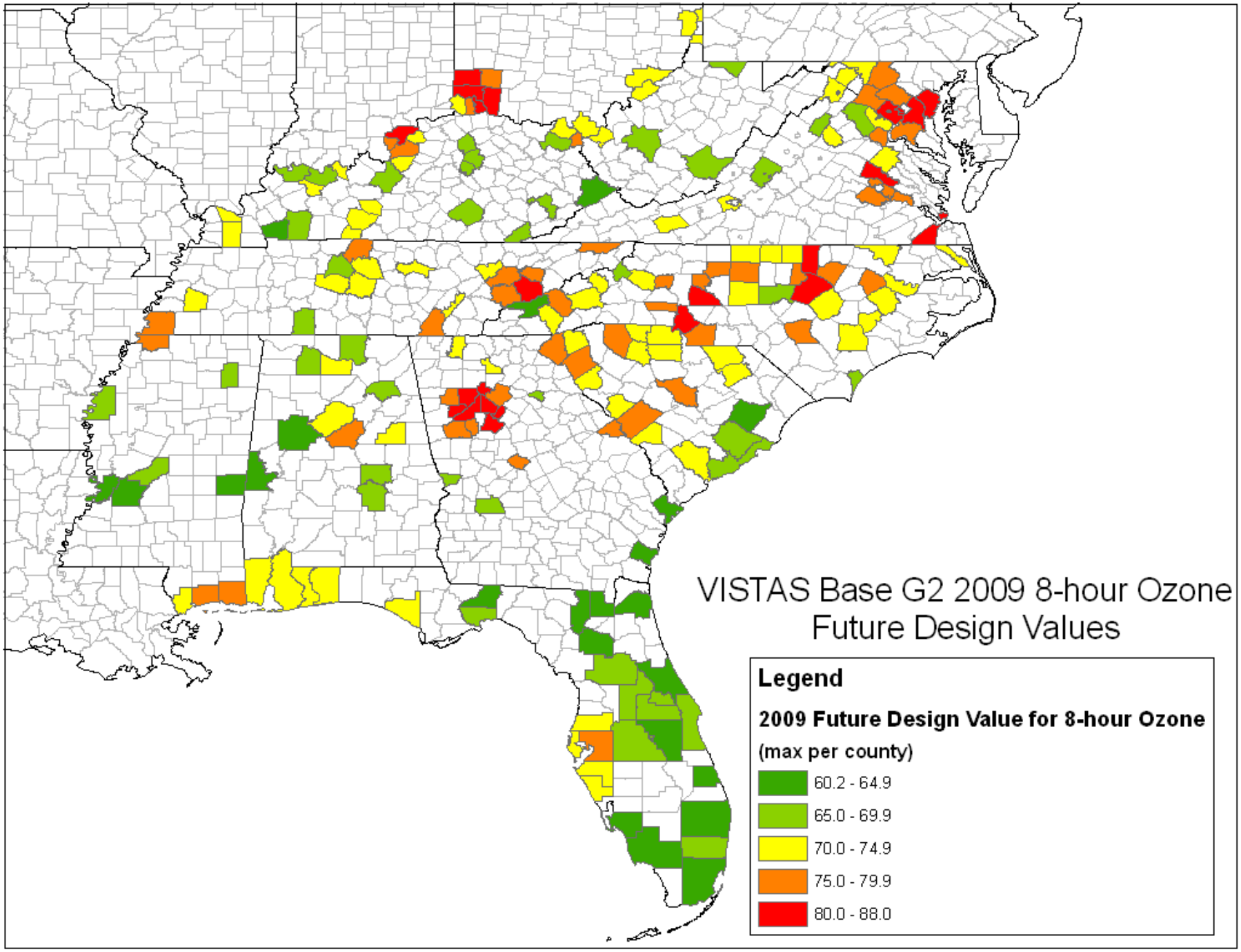


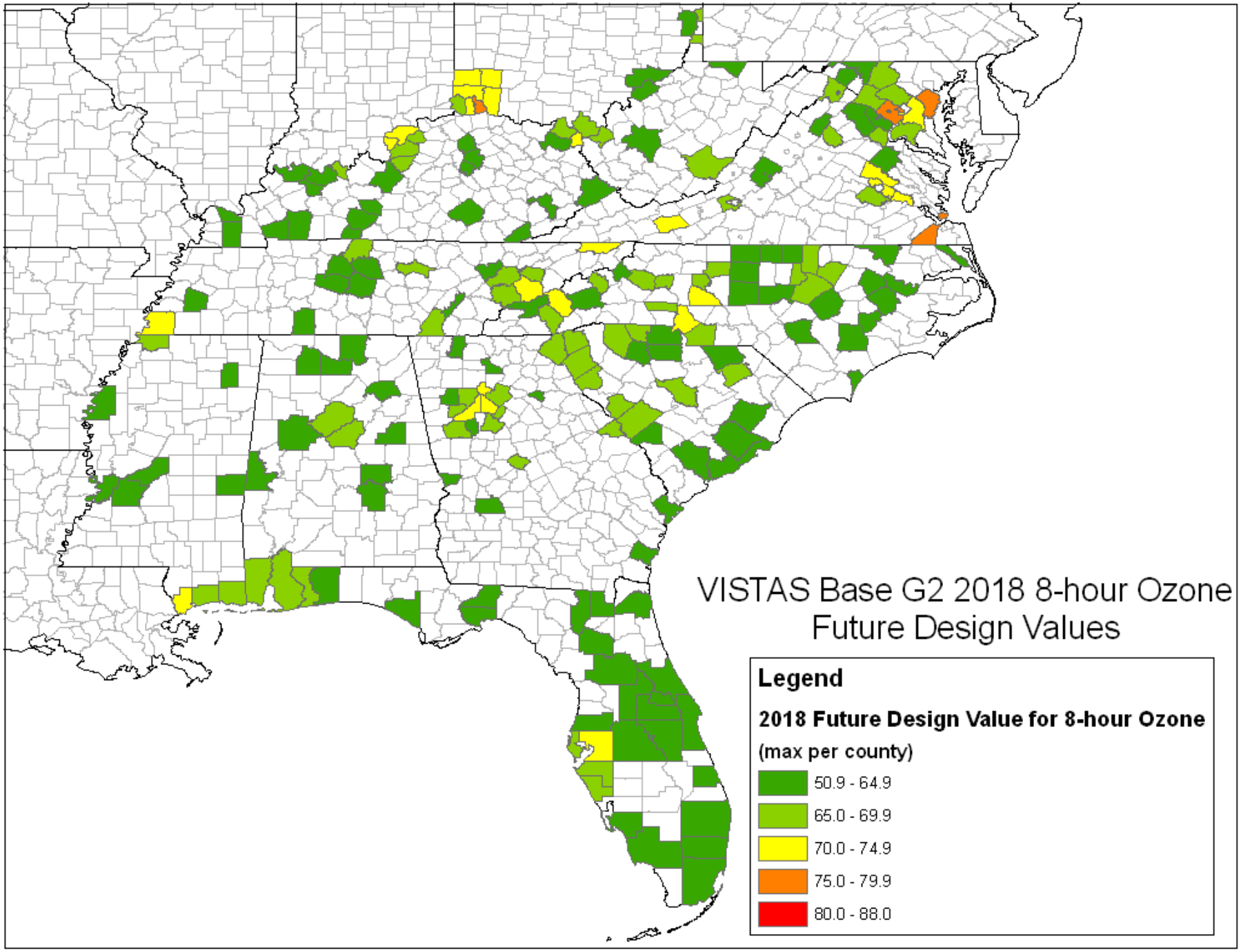
Notes:

[1] 345 monitored counties violate the 2008 8-hour ozone standard of 0.075 parts per million (ppm).

[2] Monitored air quality data can be obtained from the AQS system at http://www.epa.gov/ttn/airsaqs/

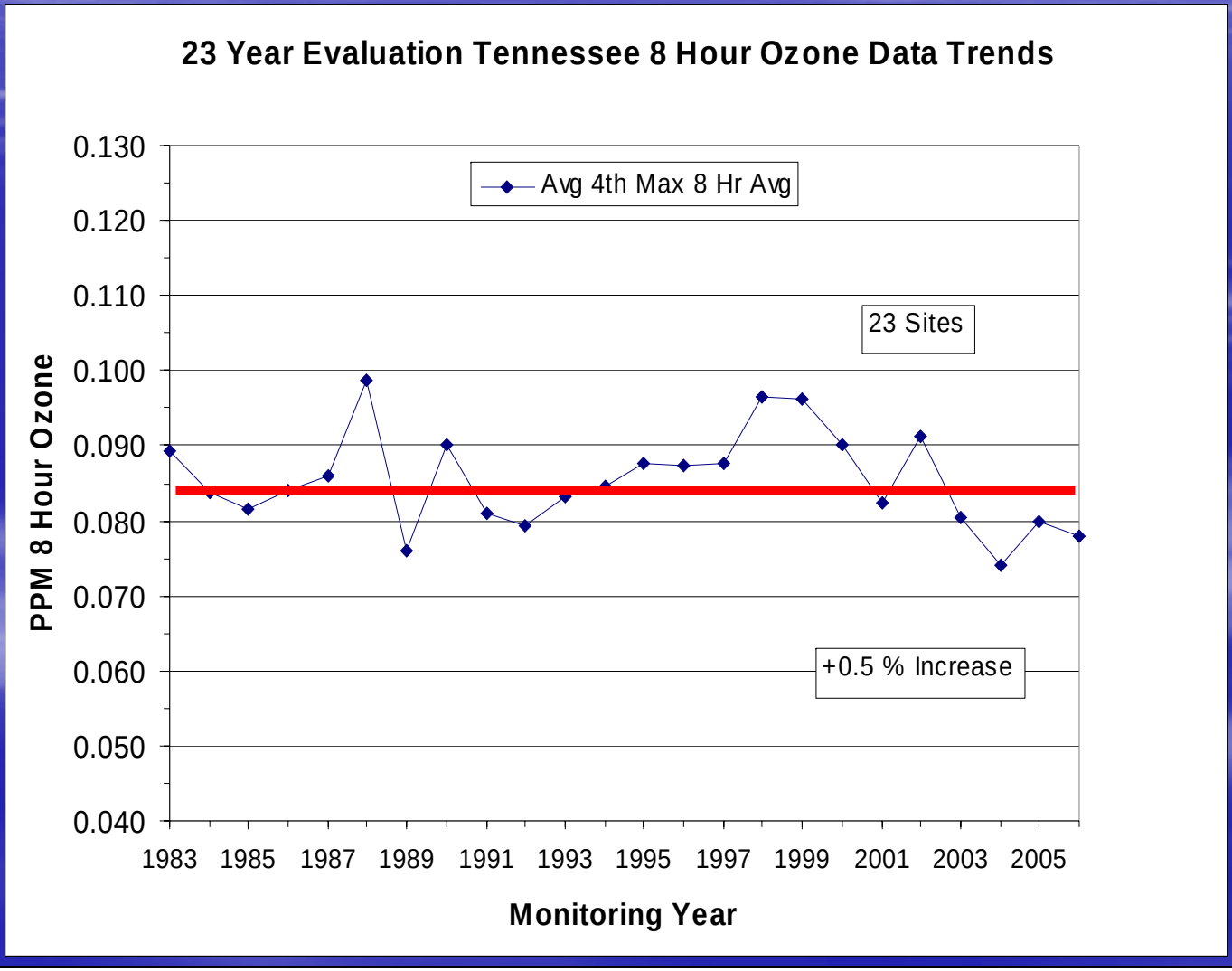

Baseline Design Values
for 8-hour Ozone (2000 - 2004)
Legend
Base Line Design Values
(max per county)
62.3 - 64.9
65.0 - 71.9
72.0 - 81.9
82.0 - 84.9
85.0 - 89.9
90.0 - 98.0


VISTAS Base G2 2009 8-hour Ozone
Future Design Values
Legend
2009 Future Design Value for 8-hour Ozone
(max per county)
60.2 - 64.9
65.0 - 69.9
70.0 - 74.9
75.0 - 79.9
80.0 - 88.0

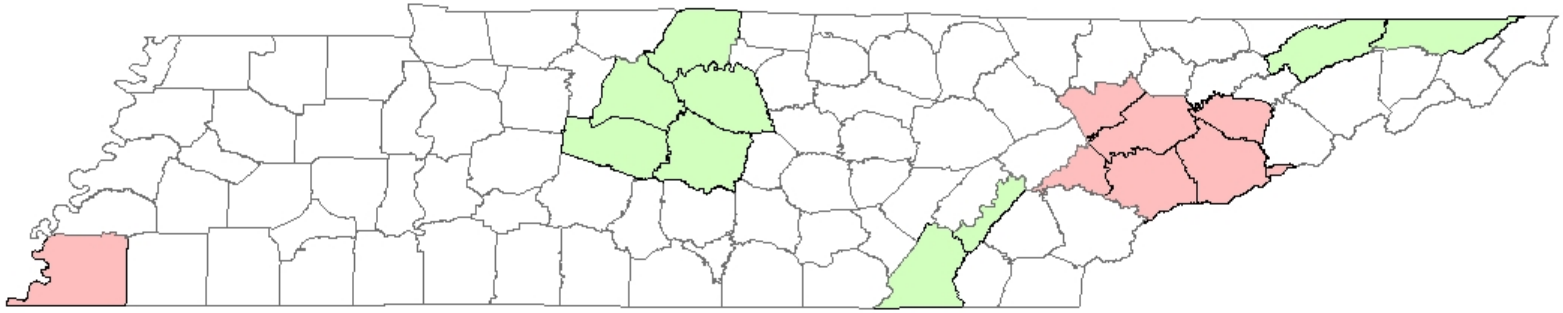

VISTAS Base G2 2018 8-hour Ozone
Future Design Values
Legend
2018 Future Design Value for 8-hour Ozone
(max per county)
50.9 - 64.9
65.0 - 69.9
70.0 - 74.9
75.0 - 79.9
80.0 - 88.0

Historic Ozone Trends In Tennessee

Year	Avg 4th Max 8 Hr Avg	% Difference (Year vs Std.)
1983	0.089	5%
1984	0.084	-1%
1985	0.082	-4%
1986	0.084	-1%
1987	0.086	1%
1988	0.099	16%
1989	0.076	-11%
1990	0.090	6%
1991	0.081	-5%
1992	0.079	-7%
1993	0.083	-2%
1994	0.085	0%
1995	0.088	3%
1996	0.087	3%
1997	0.088	3%
1998	0.096	14%
1999	0.096	13%
2000	0.090	6%
2001	0.082	-3%
2002	0.091	7%
2003	0.081	-5%
2004	0.074	-13%
2005	0.08	-6%
2006	0.078	-8%
Std.	0.085	0.5%



8 Hour Ozone Non-attainment Status
(Based on 2005 to 2007 Final Data)



White Counties are attainment
Green Counties are EAC counties to be named attainment by EPA
Red Counties are nonattainment

Communities in Tennessee Reduce Smog Ahead of Schedule

Release date: 02/01/2008

Contact Information: Dawn Harris-Young, (404) 562-8421, harris-young.dawn@epa.gov

(Atlanta, Ga. – Feb. 1, 2008) Three areas in Tenn. are among 13 areas in the nation that EPA plans to designate as attaining the 1997 8-hour ozone standard under Early Action Compact agreements. EPA is proposing this action because each of the areas has demonstrated that they attained the standard by Dec. 31, 2007.

Early Action Compacts give certain local areas the flexibility to develop their own approach to meeting the 8-hour ozone standard, provided the communities control emissions from local sources earlier than the Clean Air Act would otherwise require. For areas that do not meet the ozone standard, attainment dates range from 2009-2021, depending upon the severity of the ozone problem.

The three Early Action Compact areas that have attained the 8-hour ozone standard are:

Chattanooga area, Tenn.
Nashville area, Tenn.
Johnson City-Kingsport-Bristol area, Tenn.

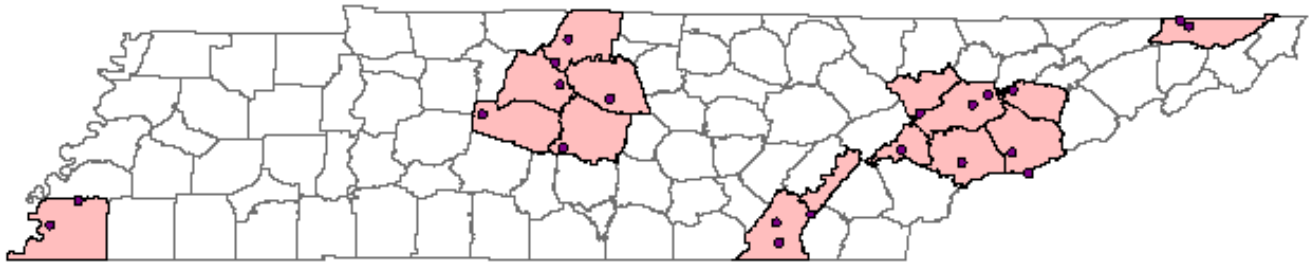
EPA has been working with these areas to reduce ground-level ozone, or smog, as quickly as possible. Together with EPA, these communities entered into agreements called Early Action Compacts. The Early Action Compacts program has provided a strong incentive for state and local governments, civic leaders and business to develop innovative, cost-effective strategies for improving ozone air quality that are tailored to individual communities.

By reducing pollution ahead of schedule, these communities are bringing sustainable health and environmental improvements to their residents sooner than would have been achieved without these agreements.

More information on the Early Action Compact Program: epa.gov/air/eac/

Possible New Ozone Non-attainment Counties Based on Revision to 8 Hour Primary Standard

(Standard Announced 03/12/2008 3 Yr Avg. 4th Highest Daily Max 0.075 PPM)
(2005 - 2007 Actual Ozone Data Including Proposed Exceptional Event Flagged Values)



County	Site Name	MONITOR ID	Final 2005 2007 DV PPM
Anderson Co	Freels Bend Study Area Melton Lake	470010101 - 1	0.080
Blount Co	Great Smoky Mountains Np Look Rock	470090101 - 1	0.086
Davidson Co	Percy Priest	470370026 - 1	0.079
Hamilton Co	6200 Bonny Oaks Drive, Eastside Filter Plant	470654003 - 1	0.084
Hamilton Co	Soddy Daisy H.S., 620 Sequoyah RD.	470651011 - 1	0.083
Jefferson Co	1188 Lost Creek Rd	470890002 - 1	0.084
Knox Co	9315 Rutledge Pike Mascot Tn 37806	470930021 - 1	0.081
Knox Co	4625 Mildred Drive	470931020 - 1	0.088
Loudon Co	130 Webb Drive/Roberts Rd	471050109 - 1	0.085
Meigs Co	8401 Highway 60	471210104 - 1	0.081
Rutherford Co	Eagleville Puckett'S Farm	471490101 - 1	0.080
Sevier Co	Great Smoky Mountain Np Cove Mountain	471550101 - 1	0.082
Sevier Co	Clingsmans Dome, Great Smoky Mtns. Np	471550102 - 1	0.083
Shelby Co	1330 Frayser Blvd	471570021 - 1	0.082
Shelby Co	6855 Mudville Rd. Edmond Orgill Park	471571004 - 1	0.081
Sullivan Co	Hill Road	471632002 - 1	0.083
Sullivan Co	Ketron Middle School On Bloomingdale Rd.	471632003 - 1	0.083
Sumner Co	Rockland Recreation Area-Old Hickory Dam	471650007 - 1	0.084
Sumner Co	Cottontown Wright's Farm	471650101 - 1	0.082
Williamson Co	Fairview Middle School Crow Cut Road	471870106 - 1	0.077
Wilson Co	Cedars Of Lebanon State Park	471890103 - 1	0.082

Legend

- DV 8 Hour Ozone 2005-2007 EPA QL 02282008
- DV Greater Than 0.075 PPM 2005 2007
- Tennessee Counties

Final 2005 – 2007 8 Hr Ozone DV

Tennessee Ozone Data for 2007

County	Site Name	MONITOR ID	2007 4th Max. (QL 02282008)	Final 2005 2007 DV> 0.08 PPM
Anderson Co	Freels Bend_Study Area Melton Lake	470010101 - 1	0.08	**0.08**
Blount Co	Great Smoky Mountains Np Look Rock	470090101 - 1	0.088	**0.086**
Blount Co	Great Smoky Mountains Np - Cades Cove	470090102 - 1	0.074	**0.07**
Davidson Co	1015 Trinity Lane	470370011 - 1	0.076	**0.072**
Davidson Co	Percy Priest	470370026 - 1	0.08	**0.079**
Hamilton Co	6200 Bonny Oaks Drive, Eastside Filter Plant	470654003 - 1	0.089	**0.084**
Hamilton Co	Soddy Daisy H.S., 620 Sequoyah RD.	470651011 - 1	0.085	**0.083**
Jefferson Co	1188 Lost Creek Rd	470890002 - 1	0.085	**0.084**
Knox Co	9315 Rutledge Pike Mascot Tn 37806	470930021 - 1	0.087	**0.081**
Knox Co	4625 Mildred Drive	470931020 - 1	0.092	**0.088**
Loudon Co	130 Webb Drive/Roberts Rd	471050109 - 1	0.088	**0.085**
Meigs Co	8401 Highway 60	471210104 - 1	0.083	**0.081**
Rutherford Co	Eagleville Puckett'S Farm	471490101 - 1	0.089	**0.08**
Sevier Co	Great Smoky Mountain Np Cove Mountain	471550101 - 1	0.088	**0.082**
Sevier Co	Clingsmans Dome, Great Smoky Mtns. Np	471550102 - 1	0.087	**0.083**
Shelby Co	1330 Frayser Blvd	471570021 - 1	0.081	**0.082**
Shelby Co	6855 Mudville Rd. Edmond Orgill Park	471571004 - 1	0.08	**0.081**
Sullivan Co	Hill Road	471632002 - 1	0.09	**0.083**
Sullivan Co	Ketron Middle School On Bloomingdale Rd.	471632003 - 1	0.085	**0.083**
Sumner Co	Rockland Recreation Area-Old Hickory Dam	471650007 - 1	0.083	**0.084**
Sumner Co	Cottontown Wright's Farm	471650101 - 1	0.085	**0.082**
Williamson Co	Fairview Middle School Crow Cut Road	471870106 - 1	0.085	**0.077**
Wilson Co	Cedars Of Lebanon State Park	471890103 - 1	0.085	**0.082**
Christian	Hopkinsville	210470006 - 1	0.089	**0.081**
DeSoto	5 East South	280330002 - 1	0.084	**0.085**
Crittenden	Marion	050350005 - 1	0.084	**0.089**

Updated by ERB 2/28/2008*

Final 2004-2006 8-Hour Ozone Design Values (parts per million)

13 Tennessee Counties with Design Values > 0.075 ppm

- Anderson 0.076
- Blount **0.084**
- Davidson 0.078
- Hamilton 0.080
- Jefferson 0.081
- Knox 0.083
- Loudon 0.081
- Meigs 0.079
- Sevier 0.080
- Shelby 0.080
- Sullivan 0.079
- Sumner 0.083
- Wilson 0.077

Implementation Timeline

Milestone	Date
EPA Final Rule Signed	March 12, 2008
Governor - Designation Recommendations to EPA	No later than March 12, 2009
Final Designations by EPA	March 12, 2010 Up To 1 Extra Year If Unclassifiable
Attainment Demonstration SIPs Due	2013 Up To 1 Extra Year If Unclassifiable
Attainment Dates	2013-2030 Depending Upon Severity Of Problem

Nonattainment Designations

- Governor recommends nonattainment counties by March 12, 2009
  - 4th highest level monitored in 2006, 2007, 2008
  - Average of three years yields design value
- EPA designates nonattainment counties by March 12, 2010
  - Based on 4th highest levels in 2007, 2008, 2009
- Ozone levels in 2008 and 2009 are critical
  - High ozone levels in 2007
- 13 exceedances of new standard April-May 2008 – one in Nashville region

“Contributing” Designations

- A county may also be designated nonattainment for ***CONTRIBUTING*** to the nonattainment of another county
  - Even if that county measures attainment
- Traditionally, EPA looks to the MSA as the starting point for “contributing” designations
- In addition to air quality data, EPA also considers other key factors, including emissions, traffic and commuting patterns, commercial development, population density, and expected growth

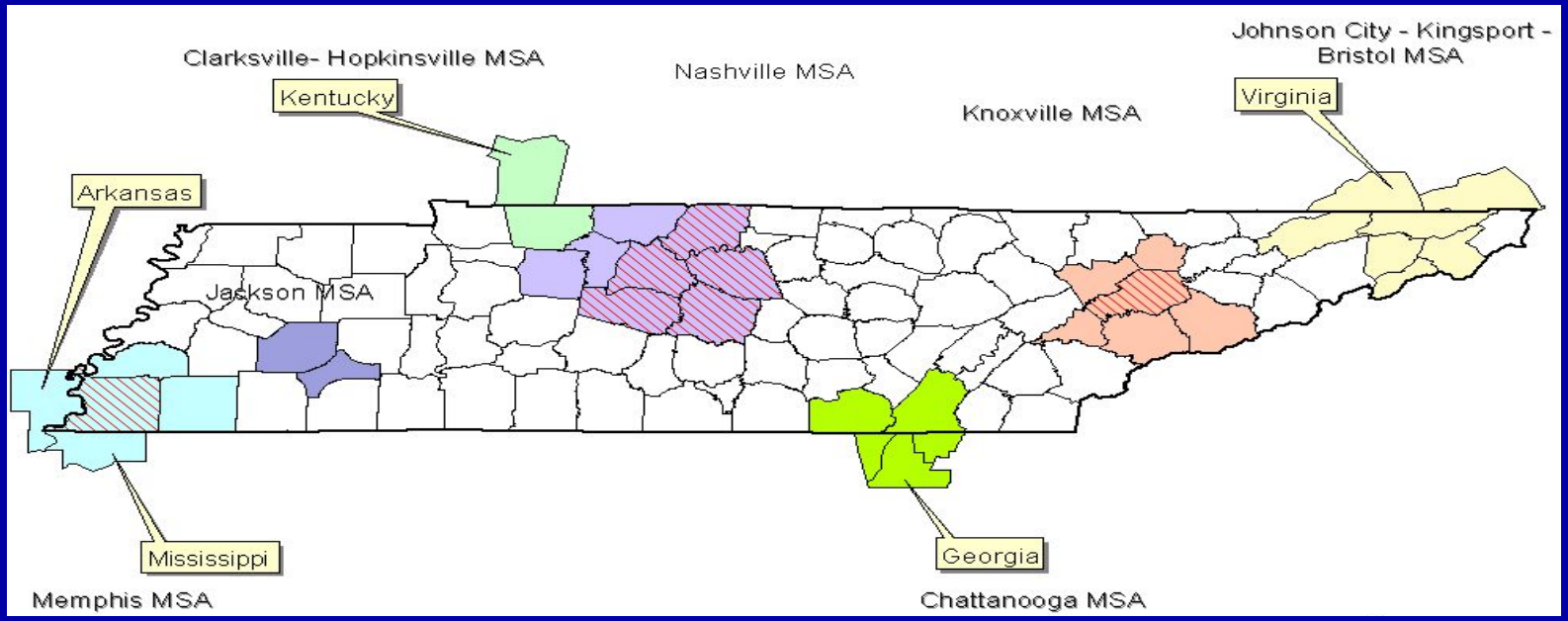
11 Criteria for Evaluating Contributions

- Emissions and air quality in adjacent areas (including adjacent C/MSAs)
- Population density and degree of urbanization including commercial development (significant difference from surrounding areas)
- Monitoring data representing ozone concentrations in local areas and larger areas (urban or regional scale)
- Location of emission sources (emission sources and nearby receptors should generally be included in the same nonattainment area)
- Traffic and commuting patterns

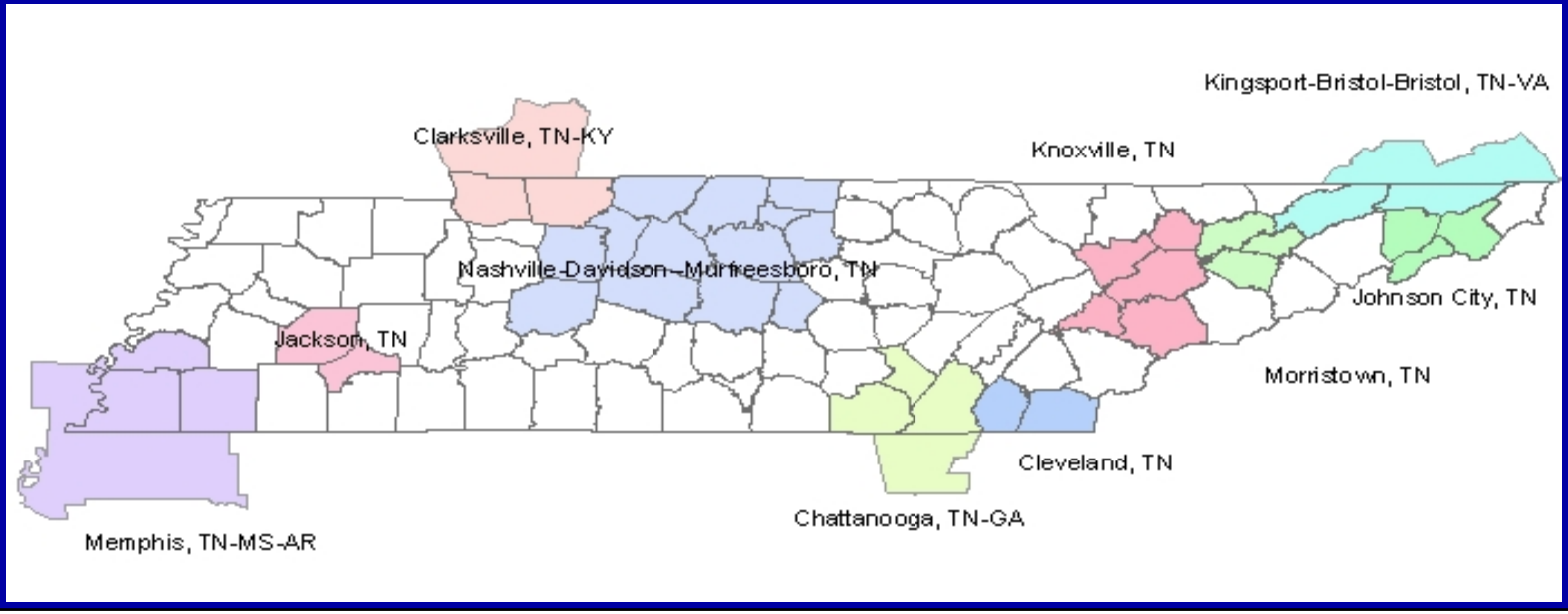
11 Criteria for Evaluating Contributions

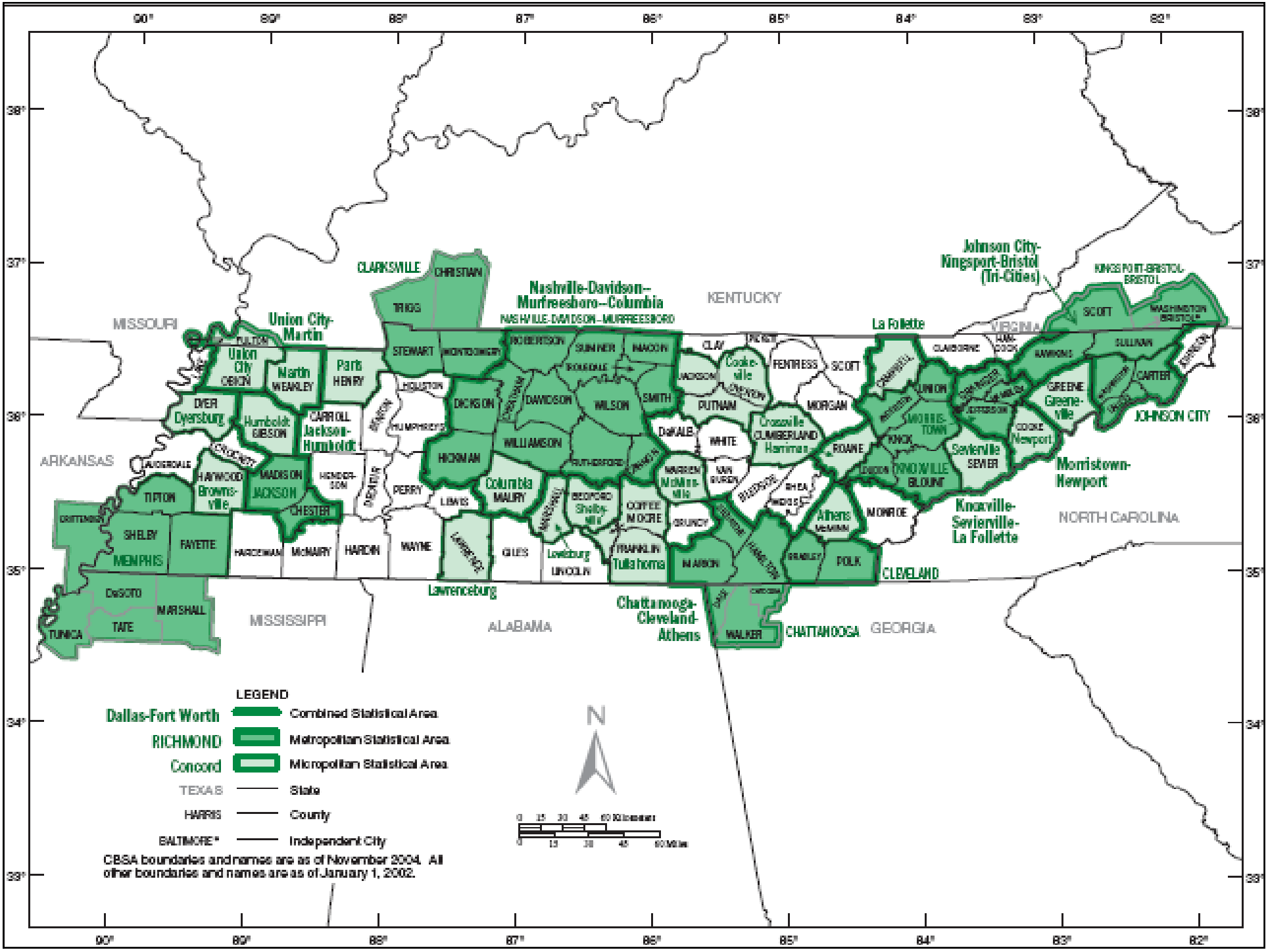
- Expected growth (including extent, pattern and rate of growth)
- Meteorology (weather/transport patterns)
- Geography/topography (mountain ranges or other air basin boundaries)
- Jurisdictional boundaries (e.g., counties, air districts, existing 1-hour nonattainment areas, reservations, etc.)
- Level of control of emission sources
- Regional emission reductions (e.g., NOx SIP call or other enforceable regional strategies)

Old MSAs



New MSAs




MISSOURI
KENTUCKY
VIRGINIA
ARKANSAS
MISSISSIPPI
ALABAMA
GEORGIA
NORTH CAROLINA
Union City-Martin
Nashville-Davidson--Murfreesboro--Columbia
NASHVILLE-DAVIDSON--MURFREESBORO
CLARKSVILLE
La Follette
Johnson City-Kingsport-Bristol (Tri-Cities)
KINGSPORT-BRISTOL-BRISTOL
JOHNSON CITY
Morristown-Newport
Knoxville-Sevierville-La Follette
CLEVELAND
CHATTANOOGA
Chattanooga-Cleveland-Athens
Lawrenceburg
Dyersburg
Humboldt
Jackson-Humboldt
Paris
Martin
Union City
Greeneville
Newport
Sevierville
Cookeville
Crossville
Harriman
Columbia
Shelbyville
Lewisburg
Tullahoma
Athens
Madisonville
Brownsville
Jackson
Chester
Memphis
Fayette
Tate
Marshall
DeSoto
Tunica
Lauderdale
Crockett
Gibson
Henry
Weakley
Carroll
Henderson
Decatur
Perry
Lewis
Wayne
Hardin
McNairy
Hardeman
Giles
Lawrence
Lincoln
Bedford
Coffee
Moore
Grundy
Franklin
Marion
Sequatchie
Hamilton
Bradley
Polk
Meigs
Rhea
Roane
Morgan
Fentress
Scott
Campbell
Anderson
Knox
Blount
Loudon
Monroe
Cocke
Sullivan
Washington
Carter
Johnson
Greene
Hawkins
Sumner
Robertson
Montgomery
Stewart
Christian
Trigg
Dickson
Davidson
Wilson
Williamson
Hickman
Rutherford
Smith
Putnam
Cumberland
Clay
Jackson
Overton
Pickett
Fayette
Shelby
Dyer
Obion
Lake
Weakley
Henry
Houston
Humphreys
Benton
Hardeman
Madison
Haywood
Tipton
Crockett
Lauderdale
Dekalb
White
Warren
Van Buren
Bledsoe
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Dyer
Lake
Shelby
Fayette
Hardeman
Tate
Marshall
DeSoto
Tunica
Memphis
Walker
Dade
Catoosa
Cocke
Hawkins
Sullivan
Washington
Carter
Johnson
Greene
Hancock
Claiborne
Campbell
Anderson
Union
Morgan
Scott
Fentress
Pickett
Clay
Jackson
Overton
Putnam
Cumberland

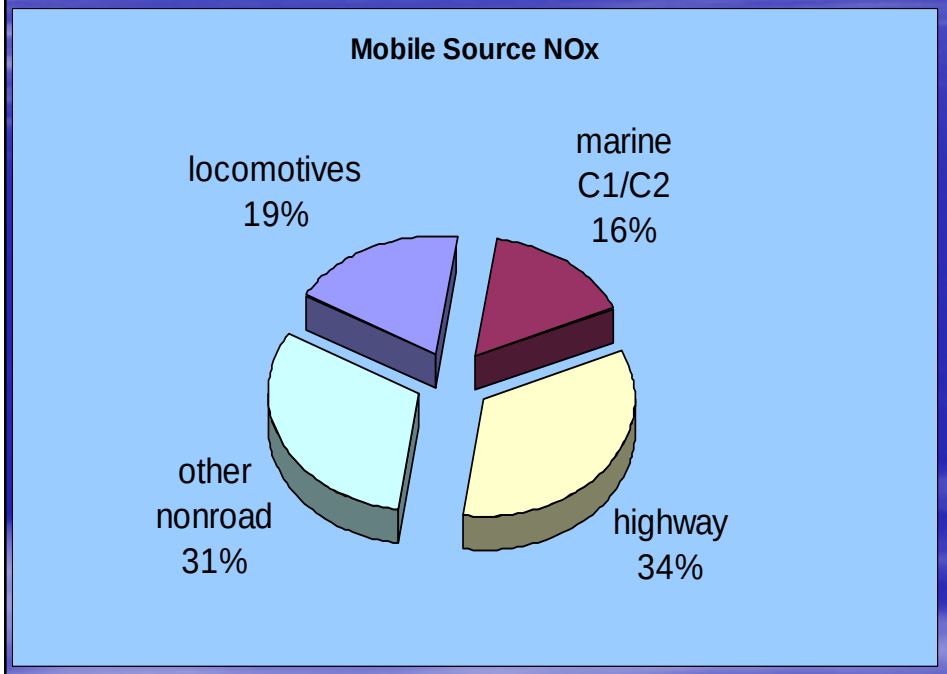
Possible Nonattainment Counties in Middle Tennessee

- Davidson, Rutherford, Sumner, Williamson and Wilson will have difficulty
- Cheatham, Dickson, and Robertson ???
  - Driven by MSA considerations
  - 11 “contributing” criteria
- TDOT will handle traffic forecasting and conformity for new N/A areas
- TDOT would like to contract with MPO to complete this work

U.S. Mobile Source Emissions by Sector

Mobile Source NOx

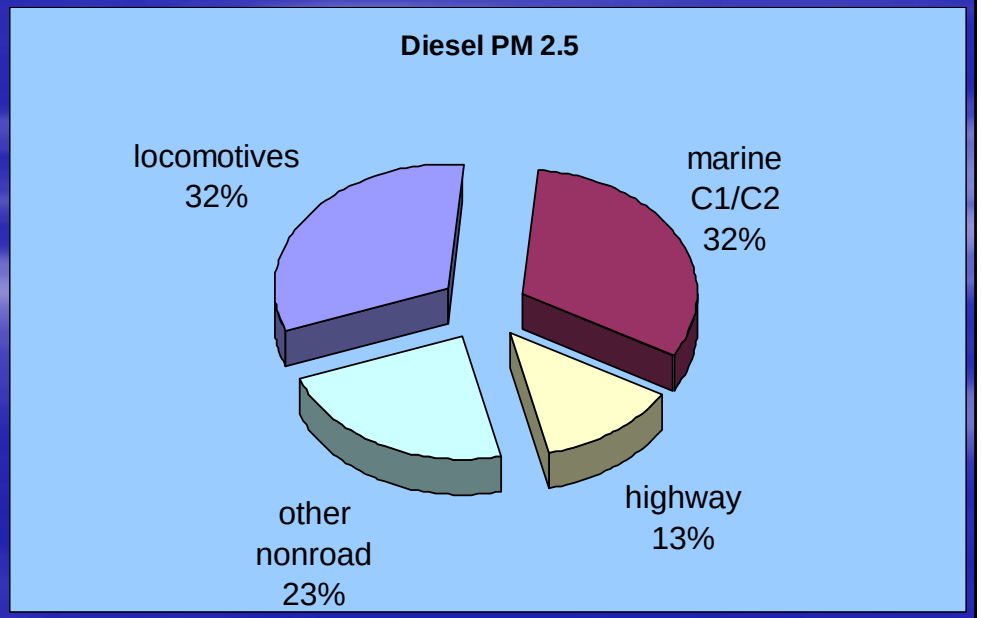
Total = 4,500,000 tons/yr.



Diesel PM 2.5

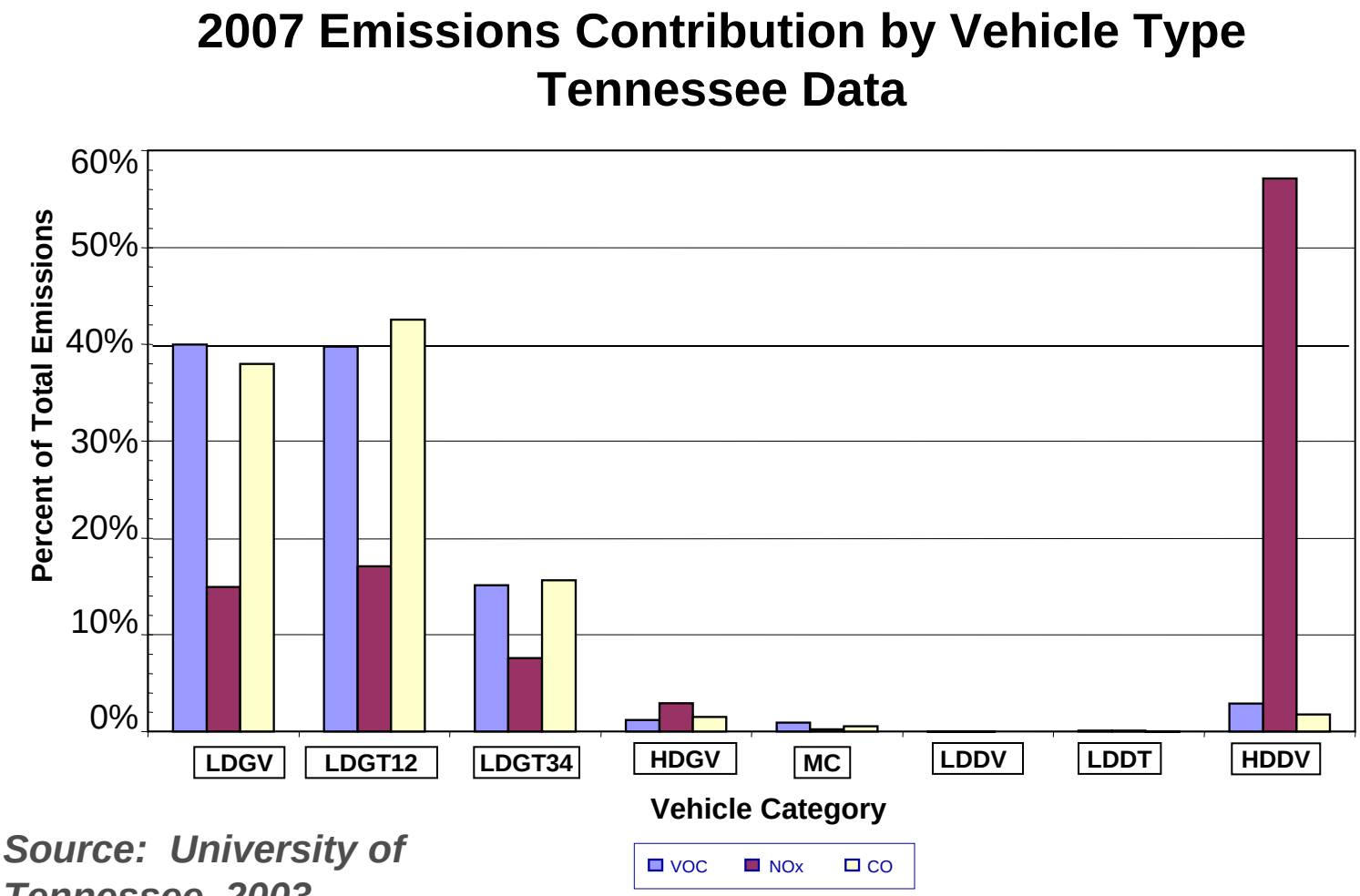
Total = 78,000 tons/yr.

(diesel-fueled engines)

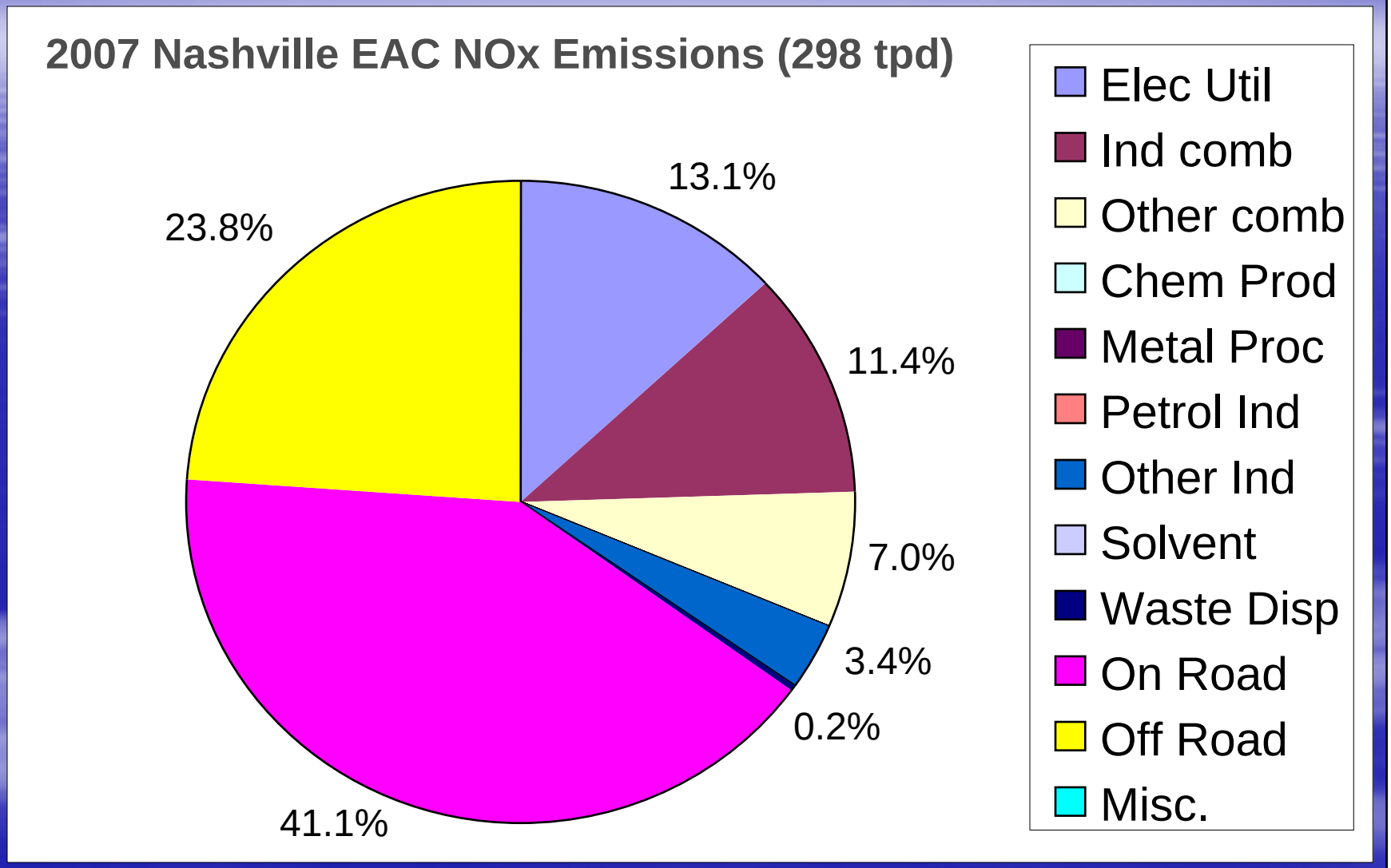


Source – U.S. EPA

Which vehicles emit the most NOx?



Source: University of Tennessee, 2003



Source: University of Tennessee, 2003

Middle Tennessee Ozone Data Summary

County	Address	AQS Site ID	2001 2003 DV	2002 2004 DV	2003 2005 DV	2004 2006 DV	2005 2007 DV
Davidson Co	1015 Trinity Lane	470370011 - 1	0.069	0.067	0.066	0.068	0.072
Davidson Co	Percy Priest	470370026 - 1	0.077	0.076	0.076	0.078	0.079
Rutherford Co	Eagleville Puckett'S Farm	471490101 - 1	0.08	0.078	0.075	0.074	0.080
Sumner Co	Rockland Recreation Area-Old Hickory Dam	471650007 - 1	0.086	0.083	0.082	0.083	0.084
Sumner Co	Cottontown Wright's Farm	471650101 - 1	0.082	0.079	0.076	0.079	0.082
Williamson Co	Fairview Middle School Crow Cut Road	471870106 - 1	0.084	0.082	0.076	0.073	0.077
Wilson Co	Cedars Of Lebanon State Park	471890103 - 1	0.082	0.079	0.077	0.077	0.082

Sites with DV's greater than or equal to 0.085 PPM (Old 1997 NAAQS)

Sites with DV's greater than or equal to 0.076 PPM (New 2008 NAAQS)

Regional Conformity Determination

- Final nonattainment designations by EPA
  - March 12, 2010
  - Based on ozone data from 2007-2009
- Approved conformity determination
  - March 12, 2011
- EPA models predict all Tennessee counties will comply with new standard by 2020

CMAQ and Conformity

- Nashville Early Action Compact a success
- Two major impacts on Nashville Area MPO
  - April 15, 2009
  - Regional conformity requirements end
  - No eligible for new CMAQ projects
- CMAQ projects in TIP by April 15, 2009 may be completed
- No changes in these projects allowed after that date

CMAQ, Conformity and New Ozone Standard

- EPA designates new ozone nonattainment areas by March 12, 2010
- If Nashville counties are designated, CMAQ eligibility and regional conformity requirements will be reinstated
- Conformity determinations for new nonattainment counties must be approved before March 12, 2011

Revised Ozone Air Quality Index

- EPA revised the Air Quality Index (AQI) to reflect the new primary ozone standard
- The AQI is EPA's color-coded tool designed to inform the public about daily air pollution levels in their communities
- EPA adjusted the 100-level, the upper end of the "moderate" category, to equal new 0.075 ppm standard
  - Making proportional changes to other AQI values
- EPA encourages States to use new AQI breakpoints for air quality forecasting by beginning of ozone season
- Tennessee's ozone season began March 1

For More Information

- Ozone NAAQS
  - http://www.epa.gov/groundlevelozone
- CMAQ Program
  - http://www.fhwa.dot.gov/environment/cmaqpgs/
- Regional Transportation Conformity
  - http://www.fhwa.dot.gov/environment/conform.htm