ATLANTA'S AIR QUALITY
& DISTRIBUTED GENERATION

Susan Jenkins
Manager, NOx Permitting Unit
Georgia Air Protection Branch
(404)363-7143
Susan_jenkins@dnr.state.ga.us

Overview

- How & Why We Regulate Air Quality (2)
- National Ambient Air Quality Standard (NAAQS) for Ozone (2)
- Atlanta's Air Quality (5)
- Regulation of Distributed Generation Sources and Other NOx Sources (11)

Why We Regulate Air Quality

Donora, PA at noon on Oct. 29, 1948 as deadly smog envelops the town. (Pittsburgh Post-Gazette Photo)

Why We Regulate Air Quality, Cont.

- 1952, Over 4000 deaths attributed to "Killer Fog – or SMOG" in London, England. Smoke is so thick that it stops traffic. Buses run only with a person on foot leading them while holding a lantern.
- 1965, Reliable ozone measurements begin in CA. The maximum 1-hr concentration in L.A. is 580 parts per billion (almost 5 times greater than 1-hr NAAQS).
- 1948, Air pollution episode in Donora, PA kills 20 people and makes 40% of town's inhabitants ill.

Atlanta – September 11, 2002

How Air Quality is Regulated

- EPA Adopts NAAQS
  - NAAQS are set at levels that the EPA judges necessary to protect public health with an adequate margin of safety.
  - Currently there are standards for ozone, particulate matter, carbon monoxide, nitrogen dioxide, sulfur dioxide, and lead.
- EPA Adopts emission standards for specific pollution sources.
- States develop plans (SIPs) to implement emission standards and to attain and maintain NAAQS.

What Is Ozone?

- A gas that is not emitted directly but forms in the atmosphere
- VOCs + NOx [Sunlight / Heat] = Ozone
- Emission sources of ozone precursors (NOx and VOCs) include motor vehicle exhaust, industrial emissions, gasoline vapors and chemical solvents
- Ground-level ozone causes urban “smog” which affects human health and environment

Ground-Level Ozone Formation

Volatile Organic Compounds (VOCs) + Nitrogen Oxides (NO_x) → Ozone (O_3)

Paints, Solvents, Fuels, Vegetation

Combustion Processes

Old Ozone Standard

- Old standard based on 1-hour period (0.12 ppm)
- Applies to 13 counties in Atlanta area
- A single exceedance at any monitor on any day constitutes a violation
- Standard is attained when we have no more than 3 violations averaged over three consecutive years

Atlanta Controls Under Old Ozone Standard

- Pre-1999
  - Enhanced vehicle emissions inspection and maintenance
  - Low volatility gasoline
  - Gasoline vapor recovery
  - 13 county open burning ban
  - NOx and VOC controls on major industries
  - Smog Alert Program – Clean Air Campaign

- 1999
  - *150 ppm sulfur gasoline in 25 counties*
  - *Georgia Power NOx reductions*
  - *Stricter power plant permitting rules in 45 counties*
  - *New peaking generator and boiler rules in 45 counties*

Atlanta Controls Under Old Ozone Standard

- 2001-02
  - Annual, stricter vehicle emissions inspections
  - Open burning ban in 45 counties
  - Georgia Power phasing in NOx controls

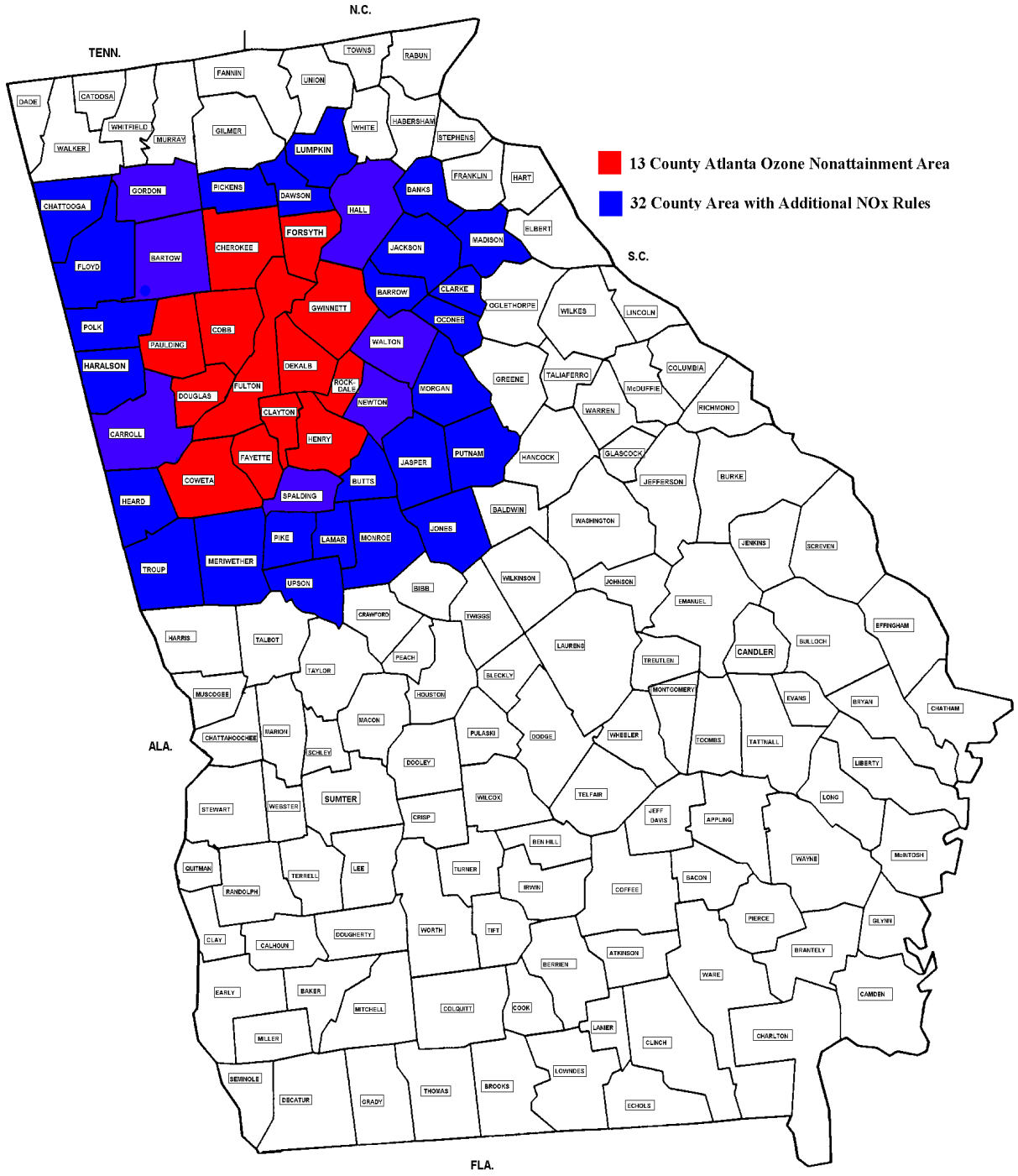
- 2003
  - *90 ppm sulfur gasoline in 45 counties (goes to 30 ppm this September)*
  - *Georgia Power plants achieve NOx reduction in 45 counties*
  - *Stricter peaking generator rule*
  - *Large industrial source NOx reductions*

Regulation of Distributed Generation Sources & Other Sources of NOx

- In 1999 EPD adopted a number of new rules and revised some existing rules to reduce NOx emissions in order to attain the 1-hr ozone standard.
- Two of the rules EPD adopted were:
- -Rule regulating NOx emissions from stationary IC engines
- -Rule regulating NOx emissions from industrial boilers.

Other Stationary Source Rules for NOx Emissions

- Rules regulating NOx emissions from both new and existing large power plants (>25 MW) in 45 county area.
- Rules regulating NOx emissions from large industry (> 100 tpy) in 32 county area.
- Rule regulating NOx emissions from large power plants, large industrial boilers, large IC engines at nat. gas pipelines, and cement kilns in northern 2/3 of state.


N.C.
TENN.
S.C.
ALA.
FLA.
13 County Atlanta Ozone Nonattainment Area
32 County Area with Additional NOx Rules
DADE
CATOOSA
WALKER
WHITFIELD
MURRAY
FANNIN
GILMER
UNION
TOWNS
RABUN
WHITE
HABERSHAM
STEPHENS
HART
FRANKLIN
ELBERT
MADISON
BANKS
JACKSON
BARROW
CLARKE
OGLETHORPE
WILKES
LINCOLN
GREENE
TALIAFERRO
WARREN
McDUFFIE
COLUMBIA
RICHMOND
GLASCOCK
JEFFERSON
BURKE
HANCOCK
WASHINGTON
JENKINS
SCREVEN
BALDWIN
WILKINSON
JOHNSON
EMANUEL
EFFINGHAM
BULLOCH
CANDLER
TREUTLEN
LAURENS
TWIGGS
BLECKLY
PULASKI
DODGE
WHEELER
TOOMBS
TATTNALL
EVANS
BRYAN
CHATHAM
LIBERTY
LONG
APPLING
JEFF DAVIS
WAYNE
McINTOSH
GLYNN
BRANTLEY
CAMDEN
CHARLTON
PIERCE
BACON
COFFEE
BEN HILL
IRWIN
TURNER
TIFT
WORTH
DOUGHERTY
ATKINSON
BERRIEN
WARE
LANIER
CLINCH
COOK
COLQUITT
MITCHELL
BAKER
EARLY
CALHOUN
CLAY
RANDOLPH
TERRELL
LEE
QUITMAN
STEWART
WEBSTER
SUMTER
CRISP
WILCOX
TELFAIR
DOOLEY
SCHLEY
MACON
HOUSTON
PEACH
TAYLOR
CRAWFORD
SIBB
TALBOT
HARRIS
MUSCOGEE
CHATTAHOOCHEE
MARION
MILLER
SEMINOLE
DECATUR
GRADY
THOMAS
BROOKS
LOWNDES
ECHOLS
TROUP
MERIWETHER
PIKE
LAMAR
MONROE
UPSON
JONES
PUTNAM
JASPER
BUTTS
SPALDING
HEARD
COWETA
FAYETTE
HENRY
CARROLL
CLAYTON
DOUGLAS
FULTON
ROCKDALE
NEWTON
MORGAN
OCONEE
WALTON
DEKALB
GWINNETT
FORSYTH
HALL
DAWSON
LUMPKIN
PICKENS
GORDON
CHATTOOGA
FLOYD
BARTOW
CHEROKEE
COBB
PAULDING
POLK
HARALSON

Relative NOx Emission Rates from Various Sources of Electricity

- Diesel Generator (uncontrolled) 37 lb/MW-hr
- Diesel Generator (@160 ppm) 5.4 lb/MW-hr
- Ave. GA Power Coal-fired Boiler (1999) 4.5 lb/MW-hr
- Ave. GA Power Coal-fired Boiler (2003) 1.3 lb/MW-hr
- Small new Combustion Turbine (@30 ppm) 1.3 lb/MW-hr
- Large Simple Cycle CT subject to BACT (‘99) 0.79 lb/MW-hr
- Large Comb. Cycle CT subject to BACT (‘99) 0.10 lb/MW-hr
- Fuel Cell ~ 0.0 lb/MW-hr

Rules Reducing NOx from Mobile and Area Sources

- Ban on open burning in 45 county area.
- Cleaner burning gasoline in 45 county area (and later nationwide).
- Inspection and Maintenance (I/M) Program on automobiles in 13 county ozone nonattainment area.
- Federal rules on cleaner cars, trucks, and off-road mobile engines.

New Rule: NOx Emissions from Stationary Gas Turbines and Stationary Engines used to Generate Electricity

- Georgia Rule 391-3-1-.02(2)(mmm)
- Applicability - 100 kW up to 25 MW
- Applies in 45 county area around Atlanta

NOx Emissions from Peaking and Peak Shaving Generators

- EPD Estimates that NOx emissions in 1999 from peaking and peak shaving generators was more than 30 tons per day on some high electrical demand days.
- These high electrical demand days are also high ozone days.
- Most (>90%) IC engines are diesel fired. However, new units are more likely to be natural gas fired.

Internal Combustion Engines - Permitting

- Previously, exempt from permitting if peaking and/or peak shaving operation were less than 200 hours per year (this exemption still applies in rest of state).
- Now, IC Engines over 300 kW within 45 county area must get a permit if used for peaking or peak shaving for any amount of time.

Internal Combustion Engines - NOx Limits

- 160 ppm, 15% O2, dry basis
  - Installed before April 1, 2000
  - Compliance date = May 1, 2003
- 80 ppm, 15% O2, dry basis
  - Installed on or April 1, 2000
  - Compliance demonstrated upon startup
- Limits apply May 1 through Sept. 30 each year

IC Engines - Complying With the NOx Limits

- For new or existing diesel generators, selective catalytic reduction (SCR).
- For new or existing nat. gas fired generators, non-selective catalytic reduction (NSCR) or SCR.
- Affected sources must choose between 1) potentially expensive and challenging to maintain retrofit controls and more favorable power rates; 2) relegate IC engines to emergency backup and pay less favorable power rates; and 3) decrease power consumption.
- EPD has already permitted ~ 5-10 IC diesel engines w/ SCR and a few IC natural gas engines w/ NSCR.

Rule (mmm) Exemptions

- Emergency Use Only. Emergency means when electricity is NOT available (i.e. outage has occurred) from local utility. Routine testing & maintenance also OK.

NOx Emissions from Fuel Burning Equipment (i.e., Boilers)

- Georgia Rule 391-3-1-.02(2)(lll)
- Applicability – 10 MMBtu/hr to 250 MMBtu/hr
- Permitted AND Installed on or after May 1, 1999.
- Applies in 45 county area around Atlanta.

New Boilers

- NOx limit = 30 ppm, 3% oxygen, dry basis.
- NOx limit applies May 1 through September 30 of each year.
- Can comply using Low NOx Burners (may include Flue Gas Recirculation).

New Ozone Standard

- New standard based on 8-hour period (0.08 ppm)
- Applies to ? Counties (to be determined)
- More than three exceedances at any monitor in a year constitutes a violation
- Standard is attained when the 3-year average of the 4^{th} highest value is less than 0.085 ppm

Industrial Source Classification: Major vs. Minor Source Status

- In the 13-county Atlanta ozone nonattainment area, the major source threshold is 50 tpy.
- Atlanta will be classified as a severe ozone nonattainment area as of January 1, 2004 – the major source threshold is 25 tpy.
- Industry is subject to much less regulation if they can limit emissions below the major source threshold.

8-Hour Ozone Schedule

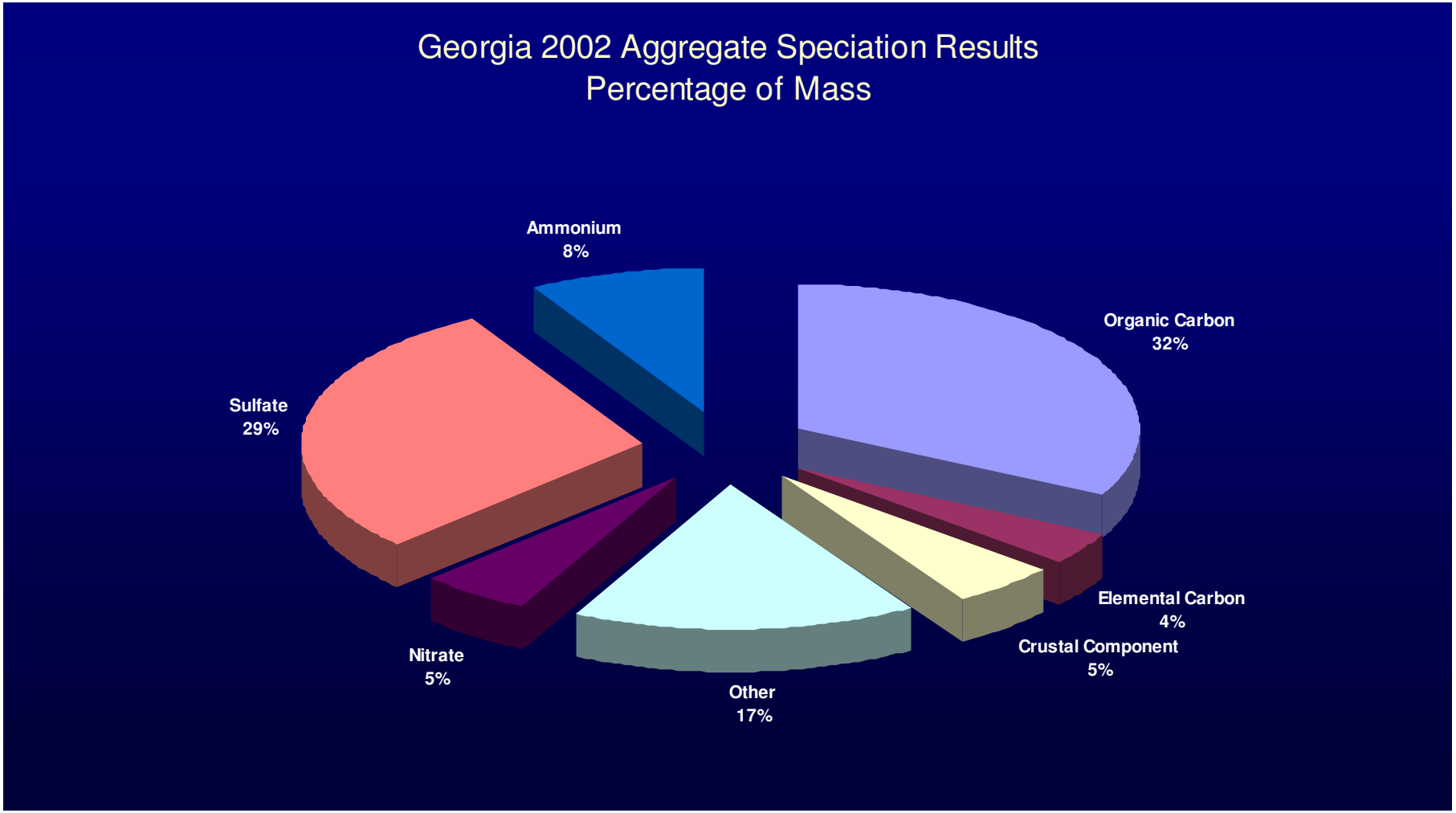
June 2, 2003	EPA proposed the 8-hour ozone implementation rule
July 15, 2003	States submit designation recommendations
December 2003	EPA finalizes the 8-hour ozone implementation rule
April 2004	EPA finalizes designations; establishes 8-hour ozone nonattainment areas
April 2005	Transportation conformity applies to 8-hour ozone nonattainment areas
April 2007	State Implementation Plans (SIPs) submitted to EPA for nonattainment areas
2007 - 2010	Range of attainment dates for various nonattainment areas in Georgia

National Ambient Air Quality Standards (NAAQS) – Fine Particulate Matter

- EPA previously regulated particulate matter below 10 microns. Georgia is in compliance with this standard.
- In 1997, EPA adopted a more stringent particulate matter standard that focuses on smaller particles (i.e., below 2.5 microns) that are of greater health concern.

NAAQS – Fine Particulate Matter Cont'd

- The monitors for this pollutant are relatively new, however, based on available data, some areas of the state may be out of compliance with the new standard.


Georgia 2002 Aggregate Speciation Results
Percentage of Mass
Ammonium
8%
Organic Carbon
32%
Sulfate
29%
Elemental Carbon
4%
Crustal Component
5%
Nitrate
5%
Other
17%

Timeline for $PM_{2.5}$ Implementation

Sep 2003	EPA issues proposed implementation plan
Feb 15, 2004	State recommendations due for designations (2000-2002 monitoring data)
July 2004	EPA notifies States concerning any modifications to their recommendations
Sep 2004	EPA issues final implementation rule
Dec 15, 2004	EPA issues final designations (2001-2003 monitoring data)
Dec 2007	SIPs due from States for nonattainment areas
Dec 2009 – 2014	Attainment date for nonattainment areas (allows an extension up to 5 years with adequate demonstration)

Web Sites

- Smog Forecast and Ozone Readings: www.air.dnr.state.ga.us/amp

- Air Protection Rules and Forms: www.air.dnr.state.ga.us/sspp