Air Quality – Hot Topics

Florida Chamber's
28th Annual Environmental Permitting
Summer School
July 22-25, 2014
Marco Island, FL

Robert A. Manning

Hopping Green & Sams, P. A.

Robert A. Manning

Hopping Green & Sams
119 S. Monroe Street
Tallahassee, FL 32301
(850) 222-7500
robertm@hgslaw.com

Overview

- Caselaw:
  - GHG
  - CSAPR
  - MATS
  - SSM
  - NAAQS

Caselaw

- GHG
  - Supreme Court (June 23, 2014)
    - PSD/Title V Permitting
      - If project only triggers PSD because of GHGs, then it does not trigger (5-4 vote)
      - If trigger for other pollutants, must apply BACT for GHGs (7-2 vote)
  - DC Circuit (Dec. 20, 2012)
    - Upheld Endangerment Finding and mobile source rule

Caselaw

- CSAPR
  - Supreme Court (April 29, 2014)
    - Overturned vacatur by 6-2 vote (Alito recused)
      - EPA can issue FIP before defining a state's significant contribution
      - EPA may consider costs in defining significant contribution
    - CAIR remains in place
    - Remanded to DC Circuit
      - Motions to Govern pending
      - Related cases involved
      - EPA moved to lift Stay and implement Jan. 1, 2015

Caselaw

- MATS
  - DC Circuit (April 15, 2014)
    - Upheld rule
    - Strong deference to EPA
  - Three Cert Petitions filed
    - NMA, UARG, 23 States

Caselaw

- SSM
  - DC Circuit (April 18, 2014)
    - Vacated affirmative defense in Cement MACT
  - 5th Circuit (March 25, 2013)
    - Upheld affirmative defense in Texas SIP for unplanned SSM events

Caselaw

- SSM
  - EPA SIP Call
    - Extended again
      - Sept. 25 for re-proposal
      - May 15, 2015 for final action
  - Suit filed to remove affirmative defense in all NSPS and NESHAP

Caselaw

- NAAQS
  - SO_2
    - DC Circuit upheld 1-hour standard on July 20, 2012
    - Consent Decree in California regarding implementation
      - Would codify proposed Data Requirements Rule
  - O_3
    - California court ordered EPA to propose revision by Dec. 1, 2014, and finalize by Oct. 1, 2015
  - PM
    - DC Circuit upheld standard on May 9, 2014

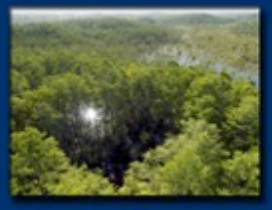
Florida Department of Environmental Protection

Air Quality Hot Topics

Florida Chamber Summer School
July 23, 2014

Paula L. Cobb, Director of Florida's Division of Air Resource Management

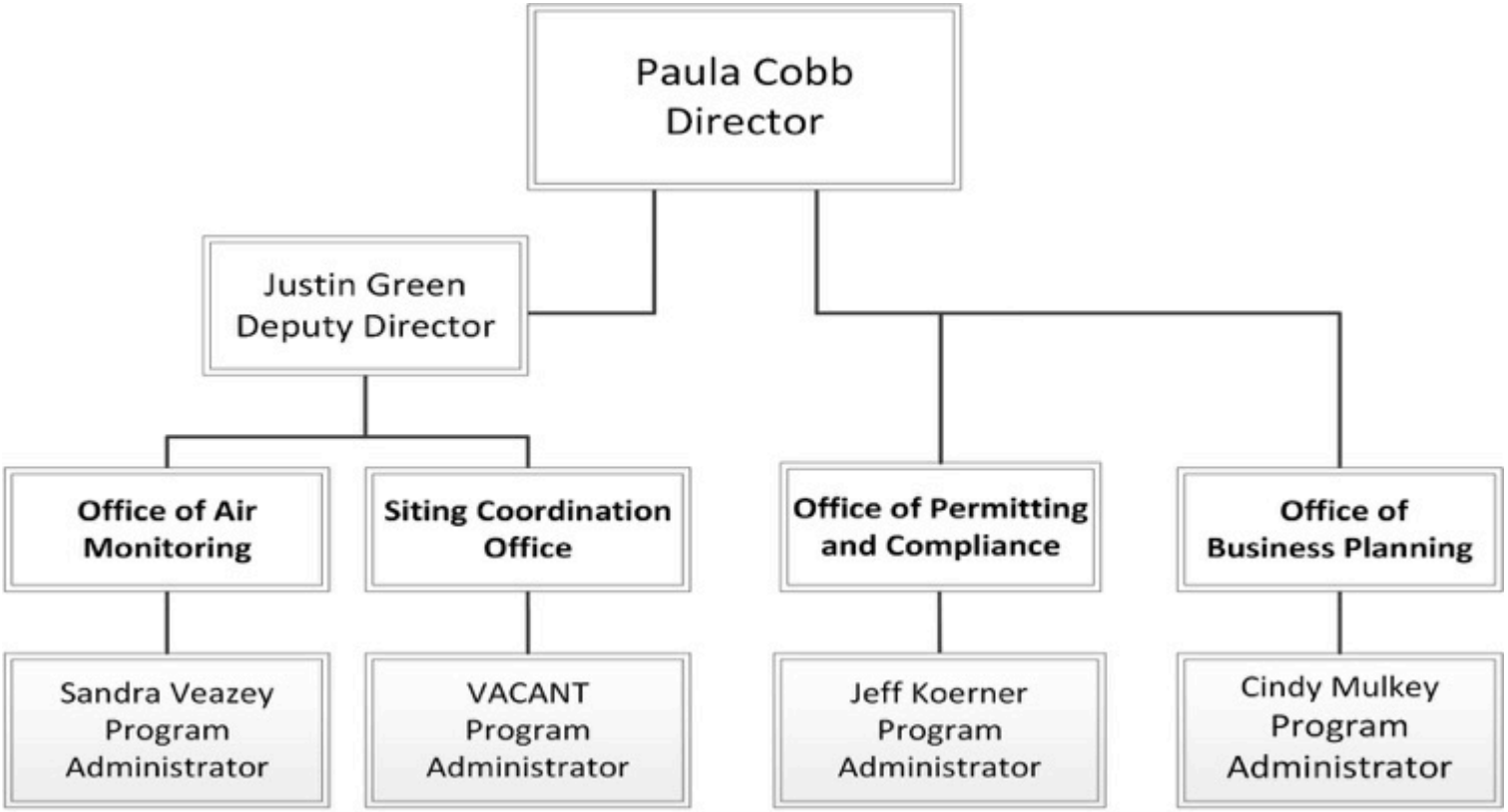




Presentation Outline

- Florida Air Program Update
- Federal Developments
- Priorities

Division of Air Resource Management



Florida Air Program Successes

- Robust air monitoring network
- Lowest emissions
- Greenhouse gas permitting
- Florida Air Inspector Reference training
- Revised Title V fee basis from “allowable” to “actual”
- Emission reporting and fee payment consolidation
- Turkey Point Siting Board approval
- Uniform gasoline blend

Notable Numbers

- Florida's air monitoring network covers over 92% of the state's population.

- Statewide time-to-process air permit applications decreased over 40% since 2010 (from 73 to 43 days).

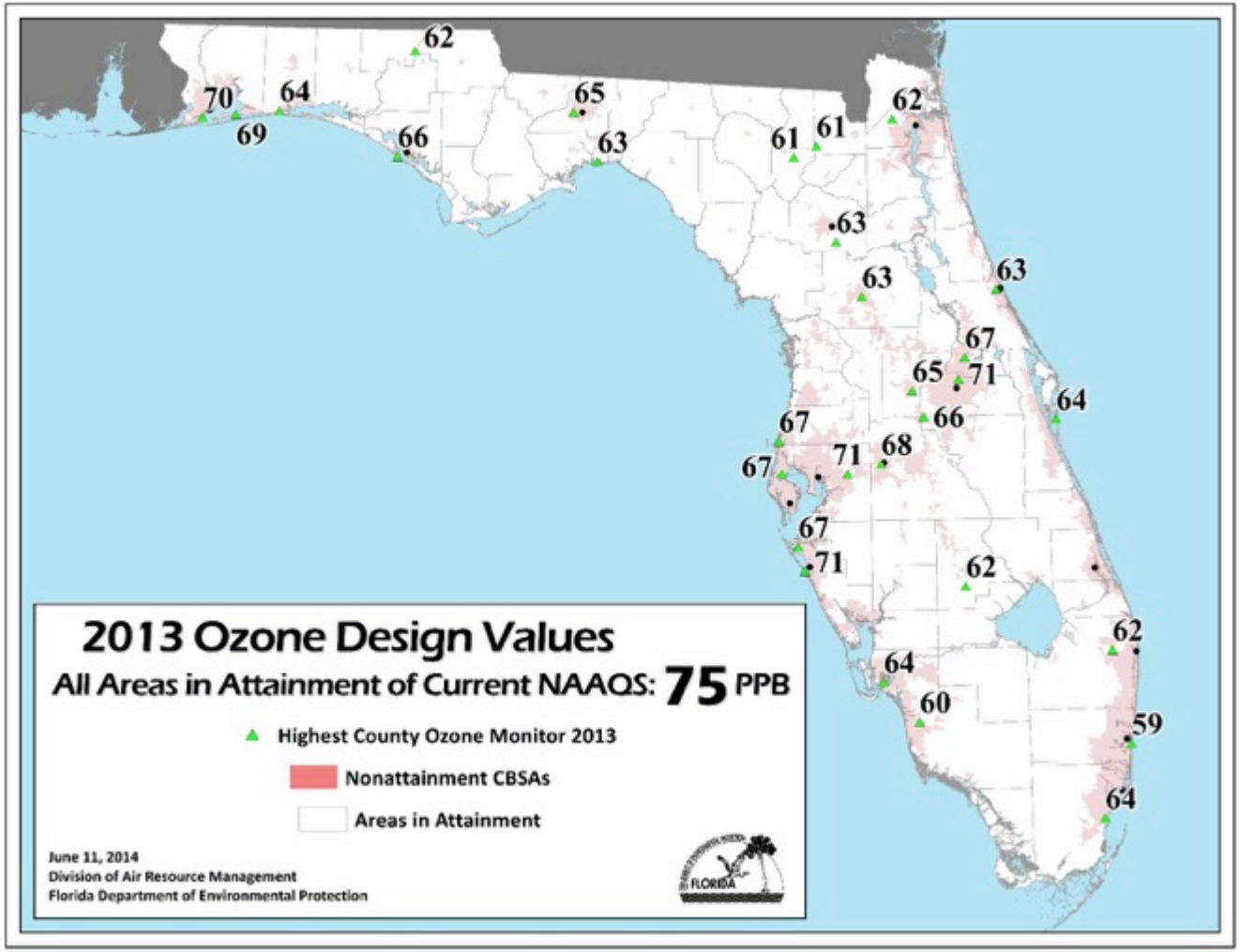
- Nitrogen oxide and sulfur dioxide emissions from power plants have decreased over 80% since 2002, and 37% since 2010.

- On average, it now takes 23% less fuel to produce a megawatt-hour of electricity than in 2002, and 12% less than in 2010.

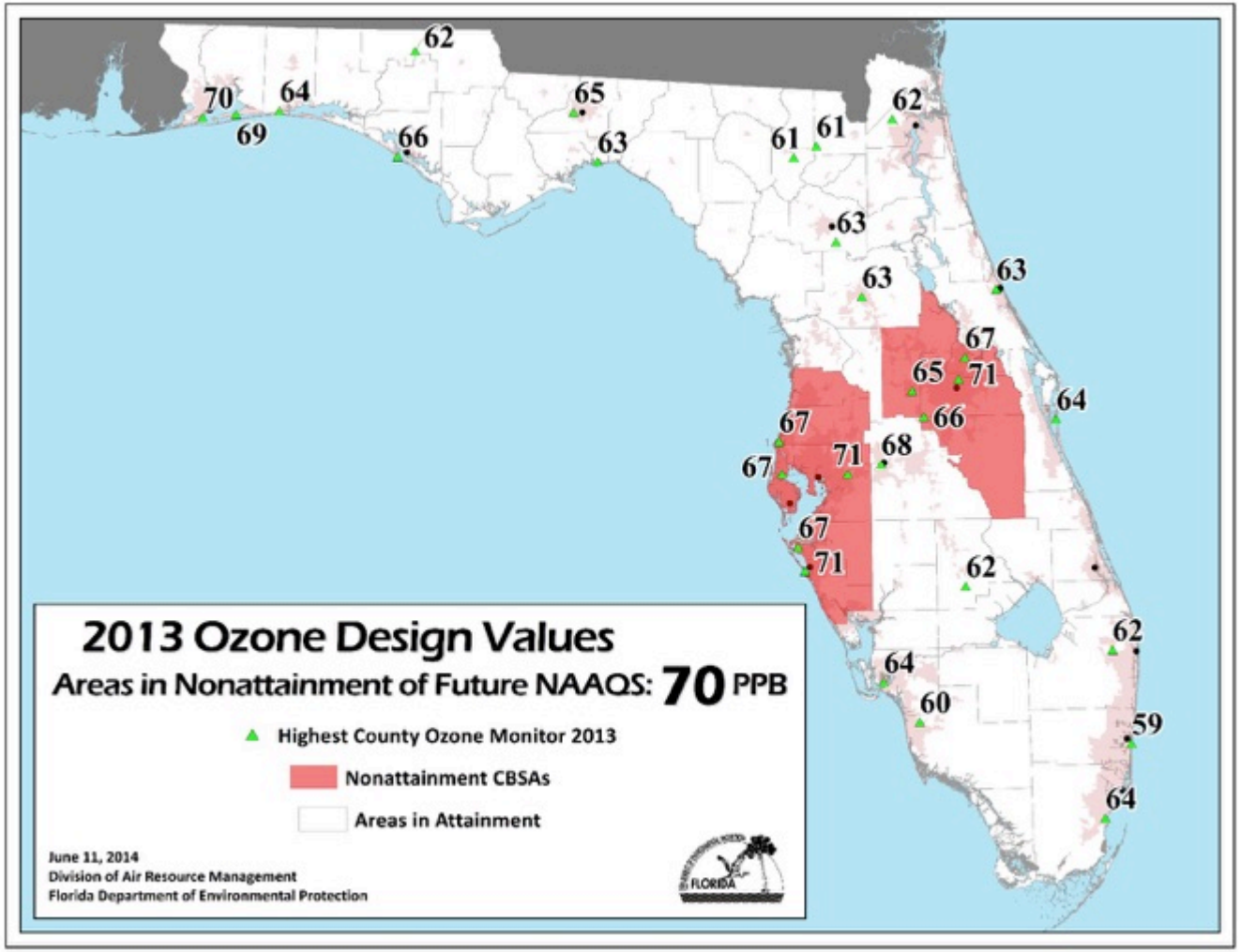
Federal Developments

- Permitting
- Ambient Air Quality Standards
- Interstate Transport
- Emissions Guidelines

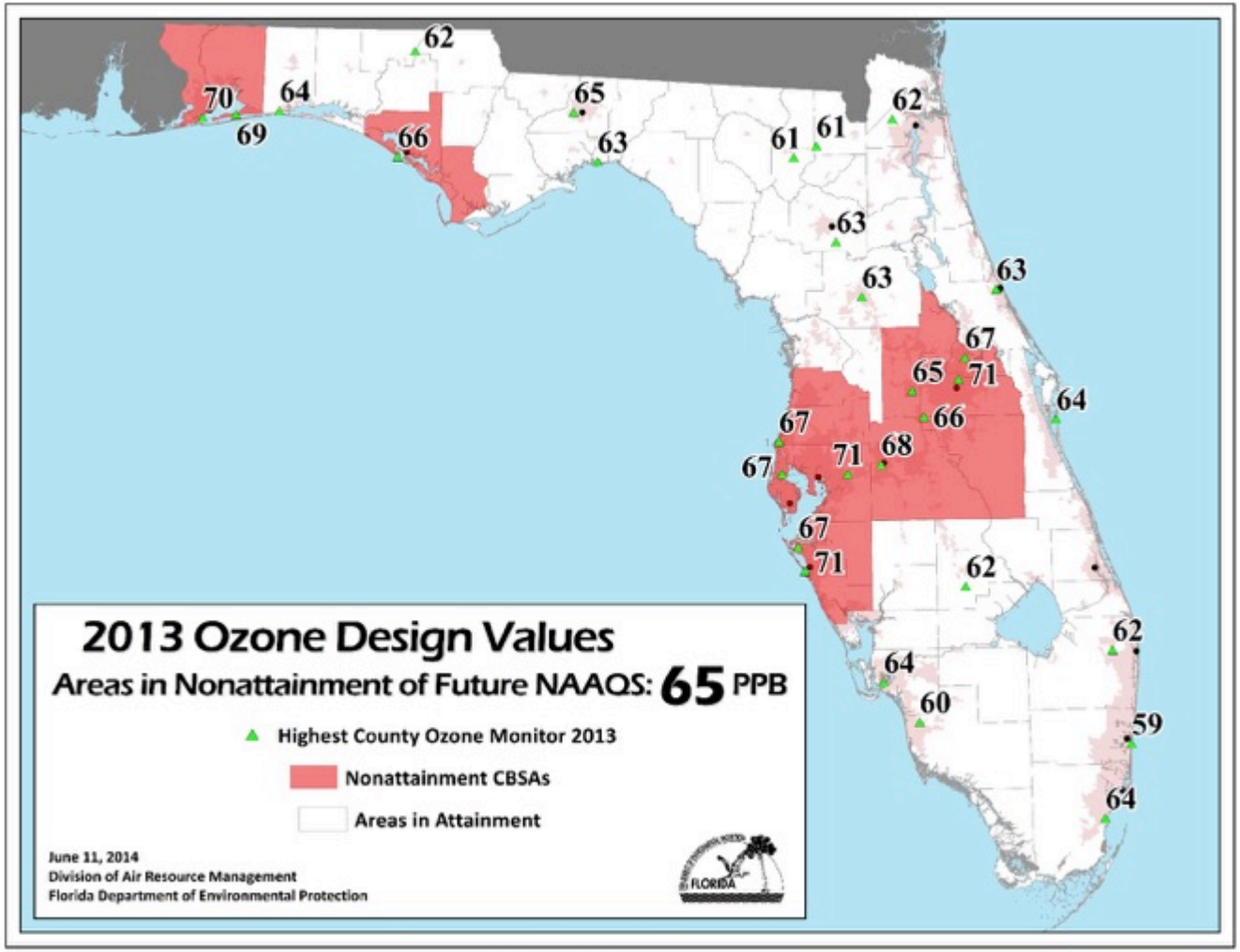
NAAQS – Ozone


2013 Ozone Design Values
All Areas in Attainment of Current NAAQS: 75 PPB
Highest County Ozone Monitor 2013
Nonattainment CBSAs
Areas in Attainment
June 11, 2014
Division of Air Resource Management
Florida Department of Environmental Protection
62
70
64
69
66
65
63
61
61
62
63
63
63
67
65
71
64
66
67
71
68
67
67
71
62
62
64
60
59
64

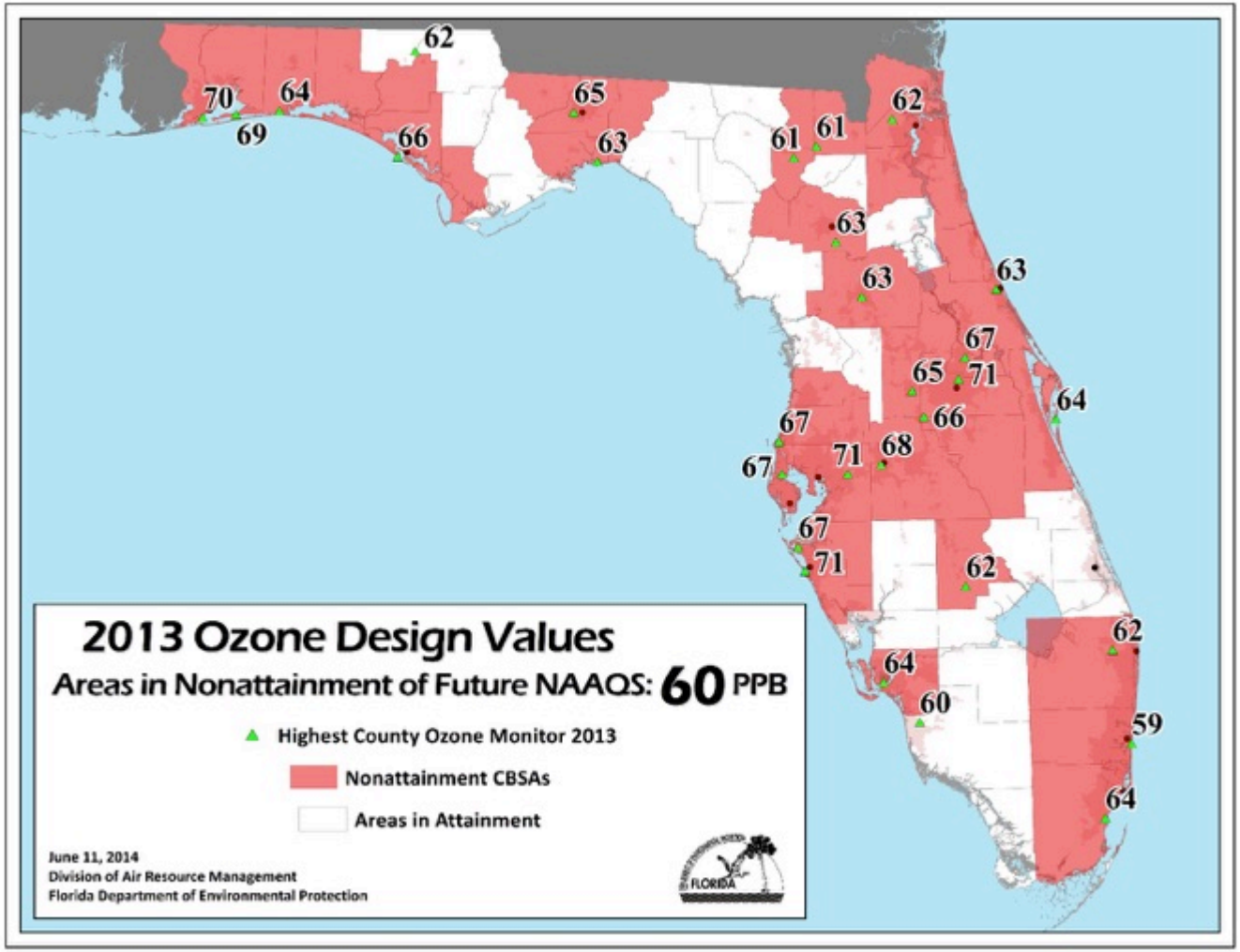
NAAQS – Ozone


2013 Ozone Design Values
Areas in Nonattainment of Future NAAQS: 70 PPB
Highest County Ozone Monitor 2013
Nonattainment CBSAs
Areas in Attainment
June 11, 2014
Division of Air Resource Management
Florida Department of Environmental Protection
62
70
64
69
66
65
63
61
61
62
63
63
63
67
65
71
64
66
67
71
68
67
67
71
62
62
64
60
59
64

NAAQS – Ozone


2013 Ozone Design Values
Areas in Nonattainment of Future NAAQS: 65 PPB
Highest County Ozone Monitor 2013
Nonattainment CBSAs
Areas in Attainment
June 11, 2014
Division of Air Resource Management
Florida Department of Environmental Protection
62
70
64
69
66
65
63
61
61
62
63
63
63
67
65
71
64
66
67
71
68
67
67
71
62
62
64
60
59
64

NAAQS – Ozone


2013 Ozone Design Values
Areas in Nonattainment of Future NAAQS: 60 PPB
Highest County Ozone Monitor 2013
Nonattainment CBSAs
Areas in Attainment
June 11, 2014
Division of Air Resource Management
Florida Department of Environmental Protection
62
70
64
69
66
65
63
61
61
62
63
63
63
67
65
71
64
66
67
71
68
67
67
71
62
62
64
60
59
64

NAAQS – Sulfur Dioxide

Phase 1 Designations

- Two nonattainment areas in Nassau and Hillsborough Counties
- Plan due to EPA in April 2015
- Attainment required as expeditiously as practicable

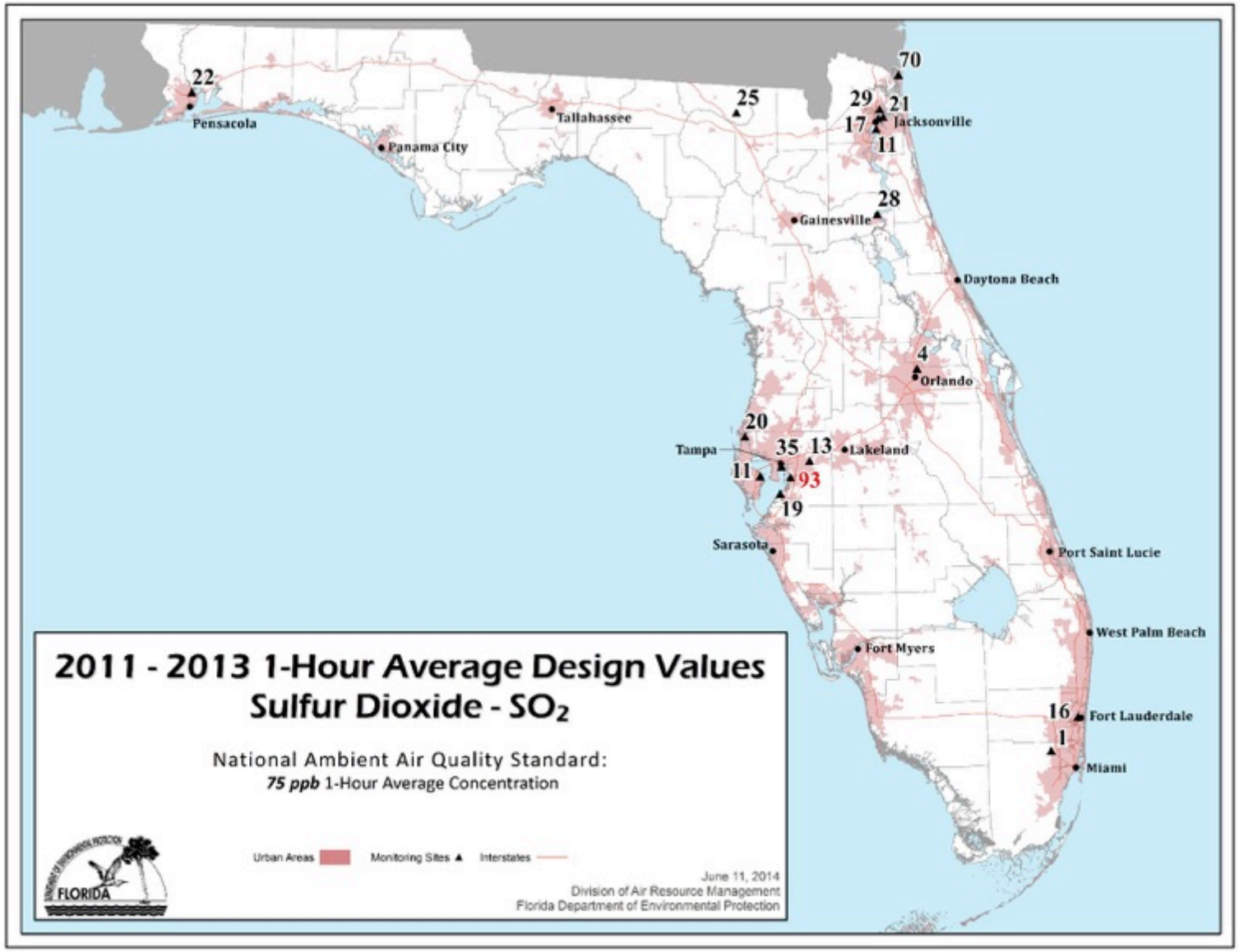
Proposed Consent Decree

- Would require earlier designations near certain coal-fired EGUs.
- EPA estimates 75 facilities in U.S. would be affected, possibly 2 within Florida

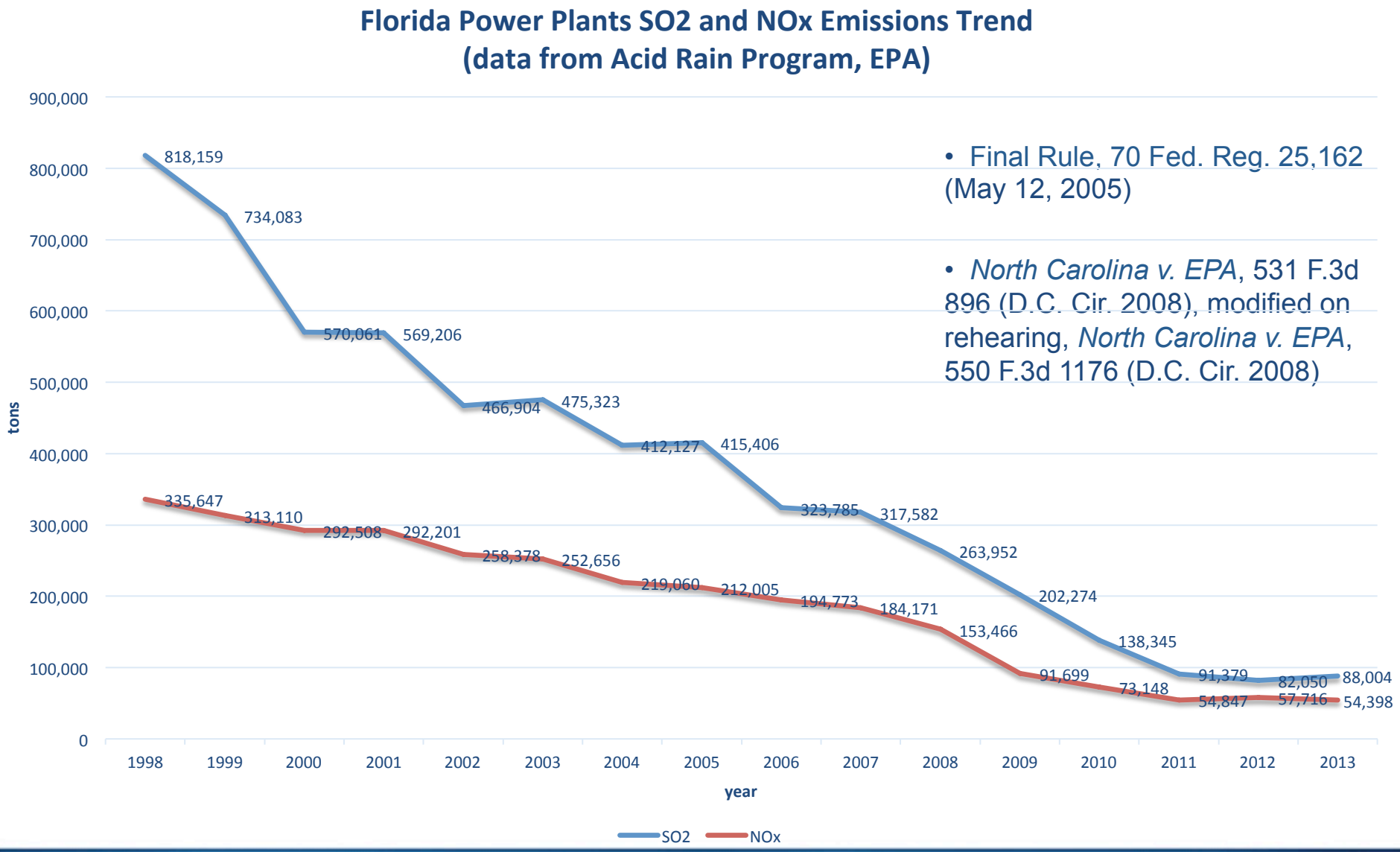
Data Requirements Rule Proposal

- Would capture facilities that emit large amounts of SO_2
- Affects up to 12 facilities in Florida – depending on option adopted
- Key decision for the state: modeling vs monitoring

NAAQS – Sulfur Dioxide



Interstate Transport - Clean Air Interstate Rule (CAIR)



- Final Rule, 70 Fed. Reg. 25,162 (May 12, 2005)
- *North Carolina v. EPA*, 531 F.3d 896 (D.C. Cir. 2008), modified on rehearing, *North Carolina v. EPA*, 550 F.3d 1176 (D.C. Cir. 2008)

Interstate Transport – CSAPR

- Required a NOx ozone season budget for Florida facilities
- Emissions data suggests that state as a whole within the state budget
- Challenged but key components upheld by US Supreme Court; remanded to D.C. Circuit; stay in place (for now)
- Implementation and timing questions

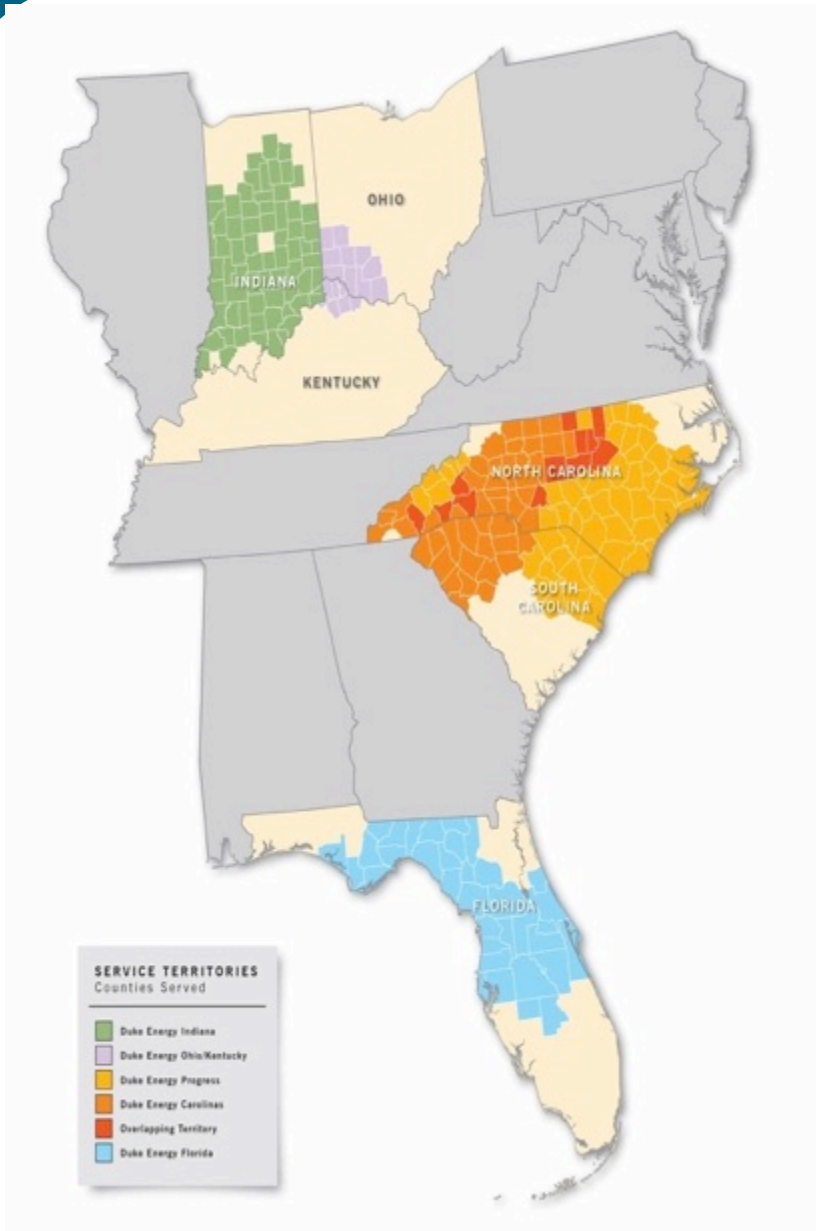
Florida Air Program Priorities

- Statewide Quality
- Investments in Data Systems and Networks
- Attainment and Maintainment
- Communication

New Air Regulations: Impact to Duke Energy Florida

Mike Kennedy, Florida Environmental Affairs Director

About Duke Energy



July 2, 2012 Merger

Largest U.S. Electric Utility

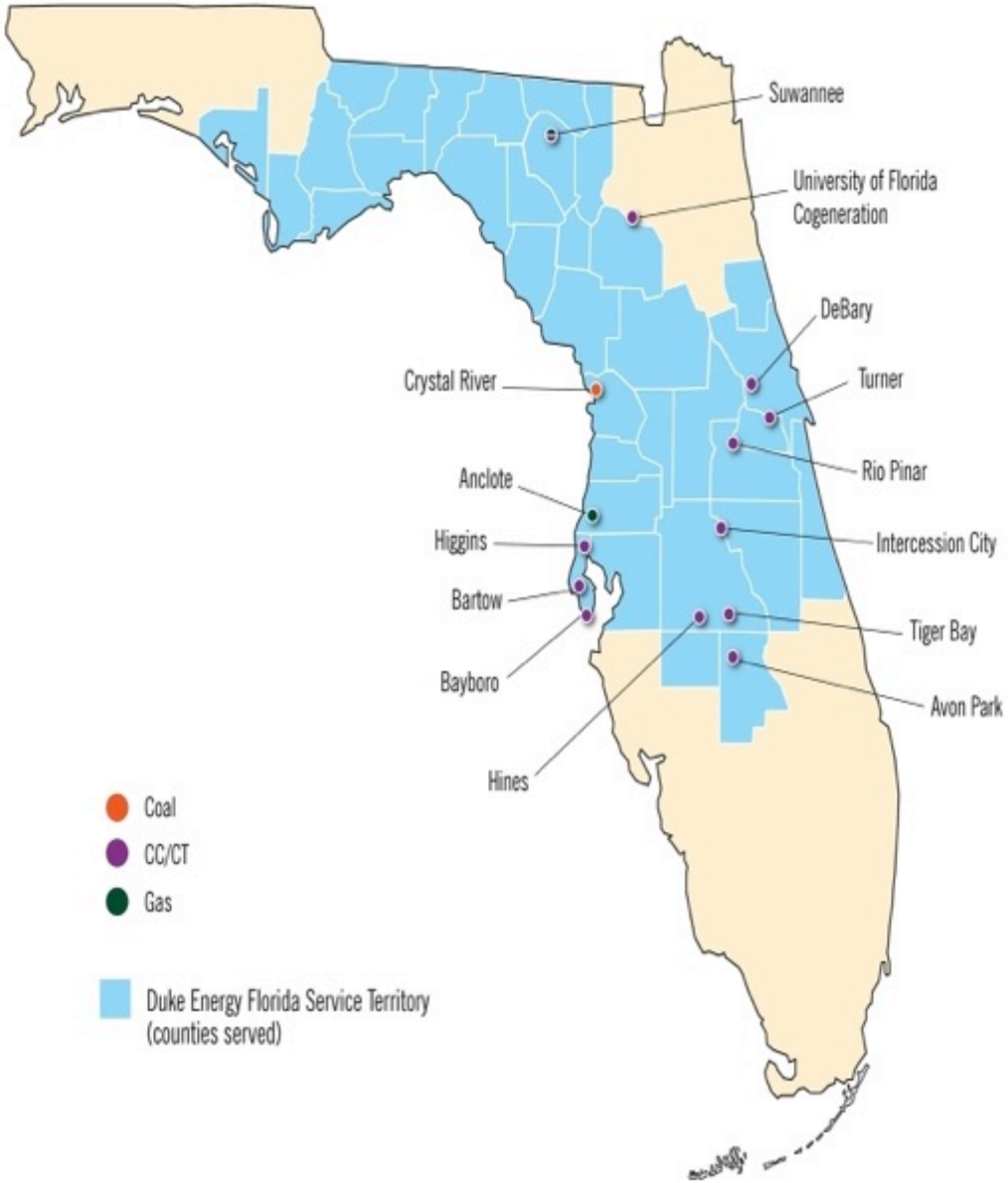
50,000 MW Generating Capacity (Florida: 10,000 MW)

7.2 million Customers (Florida: 1.7 million)

104,000 sq. miles Service Area (Florida: 20,000 sq. mi.)

Diverse mix of coal, oil, natural gas, nuclear, and hydro generating assets

Duke Energy Florida Generating Plants



New Federal Air Regulations

Since 2010, the following have been promulgated or proposed:

- 1-hour ambient air quality standards for NO_2 and SO_2;
- Mercury and Air Toxics Standards (MATS) Rule;
- Cross-State Air Pollution Rule (CSAPR) (vacated by the D.C. Circuit in 2012 and upheld by the U.S. Supreme Court earlier this year);
- Proposed startup, shutdown, and malfunction excess emissions SIP call;
- Proposed CO_2 emissions standards for new units;
- Proposed CO_2 emissions standards for existing units.

Thus far, the single most impactful of these regulations is the MATS, although GHG regulation has the potential to be transformative in the future.

Duke Energy Florida Compliance Example

Crystal River Plant – Units 1 and 2

Unit 1

- Commenced operation in 1966
- Coal-fired with ~400 MW capacity

Unit 2

- Commenced operation in 1969
- Coal-fired with ~500 MW capacity

Compliance Evaluation

Key driver is the MATS rule:

- Standards for mercury, toxic metals (measured as particulate matter), and HCl
- Compliance deadline of April 16, 2015 (potential for 1-year extension)

Other considerations:

- Other regulations (BART, NAAQS, 316(b), Effluent Guidelines, future carbon limits)
- Age of units
- Cost of controls
- Fuel diversity
- Need for additional generating capacity in the future

Compliance Alternatives

- Retire one or both units
  - Unit 3 (900 MW) retired in 2013
  - Retiring Units 1 and 2 would reduce Crystal River's capacity by a total of 1,800 MW
    - Critical part of the state's electrical grid
- Install pollution controls (scrubbers, SCR)
  - Costly (over $1 billion) additions to aging units
  - Space for controls a challenge
- Switch fuel to natural gas
  - Units not designed for gas
  - Loss of efficiency and capacity
- Find interim cost-effective compliance alternative until replacement generating capacity can be built.

Preferred Alternative

Interim cost-effective compliance alternative until replacement generation can be built.

- Combine low-sulfur, low-mercury, low-chloride Western bituminous coal with sorbent and activated carbon injection and enhancements to the electrostatic precipitators.
- Obtain extension of MATS compliance deadline to April 16, 2016 to accommodate compliance projects.
- Replace capacity from Units 1, 2, and 3 with combined-cycle gas-fired generation.
- Retire Units 1 and 2 in 2018 when new gas-fired capacity becomes operational.

Compliance Strategy

Benefits:

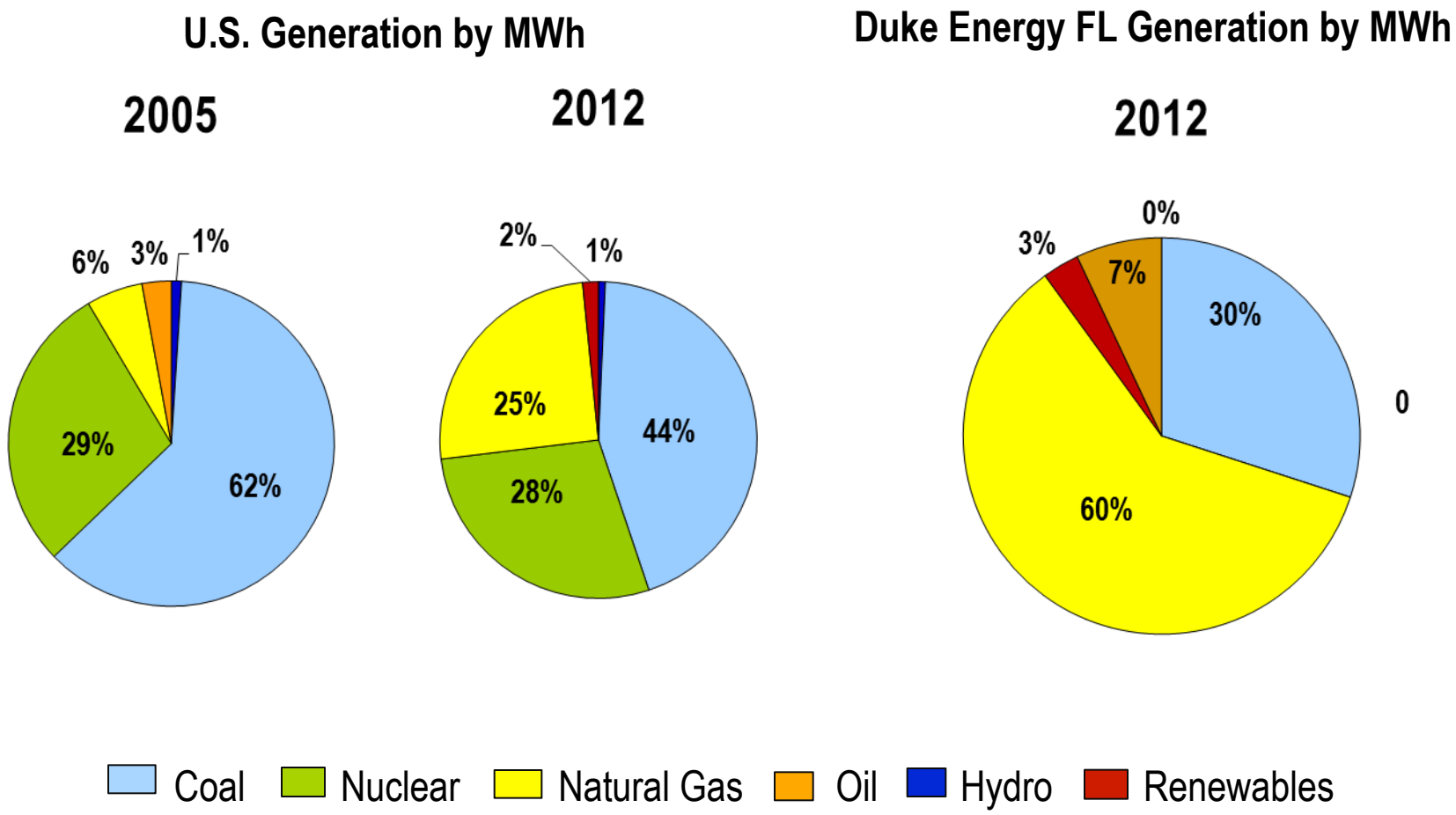
- Ensures reliable electricity supply during transition to new generation resource.
- Much lower cost: $30 million compared to > $1 billion.
- Much higher efficiency and lower emissions (including carbon) when gas-fired capacity becomes operational.

Negatives:

- Increases Florida's already high reliance on one fuel, as shown on the next slide.

Fuel Mix – Diversity Provides Stability

- A diverse fuel mix helps us meet our obligation to provide affordable and reliable electricity for customers.



Fuel Mix – Additional Natural Gas

- In Florida and across the country, coal-fired boilers are being retired and replaced with natural gas-fired plants.
  - Due to market conditions and new, more stringent environmental requirements.
- Additional natural gas and less coal = lower emissions.
- However, less fuel diversity = less price stability.

Questions?

DUKE ENERGY®

Trinity Consultants

trinityconsultants.com

Implications of NAAQS Updates for Major Industrial Sources

Florida Chamber of Commerce

28th Annual Environmental Summer School

Air Quality Hot Topics ♦ July 23, 2014

Brad James, P.E.

Trinity Consultants

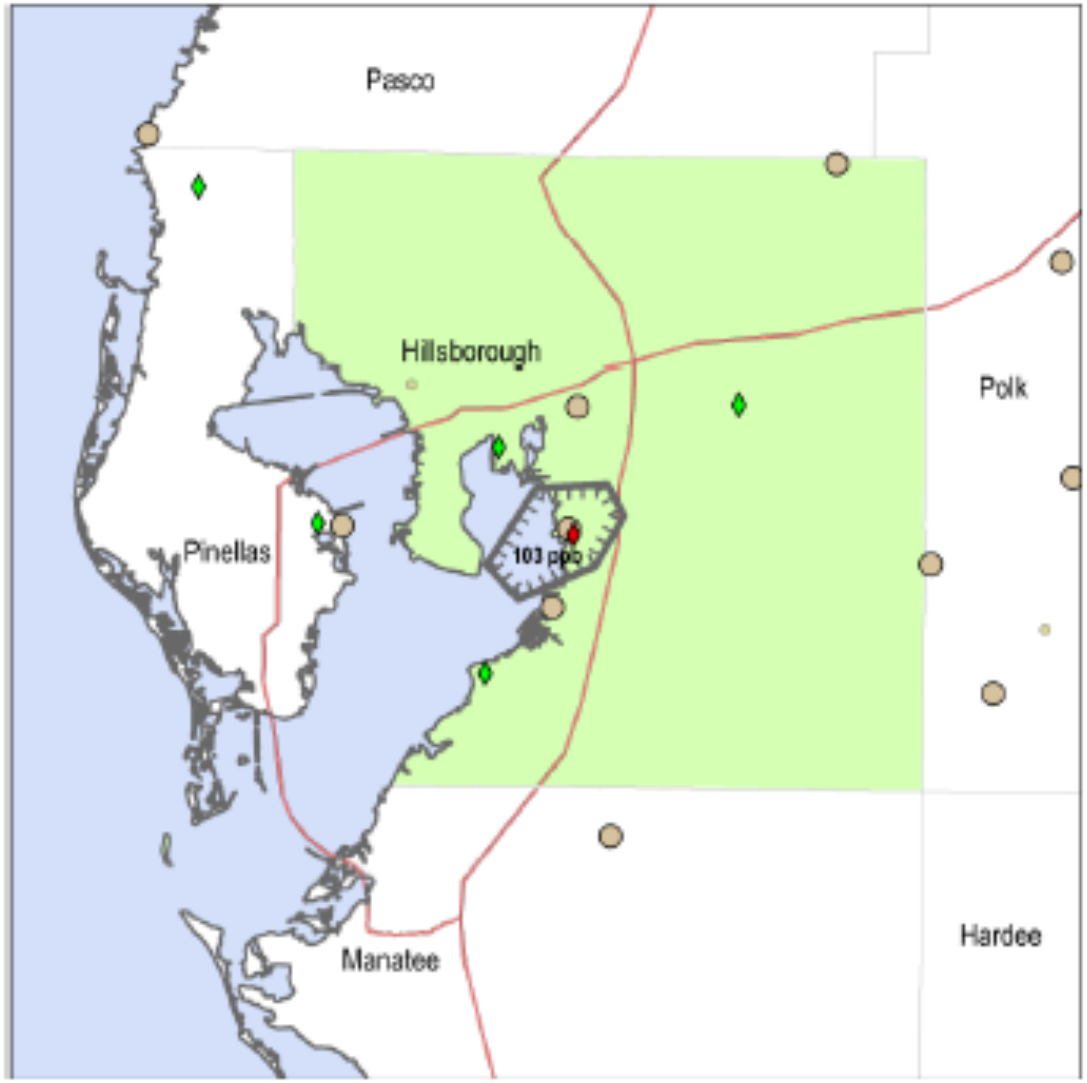
bjames@trinityconsultants.com

SO_2 NAAQS – Nonattainment in FL

- SO_2 1-hr NAAQS – 75 ppb
- State Nonattainment Areas:
  - Hillsborough County (partial)
  - Nassau County (partial)
- How did DEP complete determination?
  - Monitor(s)
  - Modeling – affected, partial county areas

Trinity Consultants

Hillsborough County, FL



Legend

- EPA designated whole county as nonattainment
- EPA designated partial county as nonattainment
- Counties designated as a different SO2 nonattainment area
- Monitor violating 2010 SO2 NAAQS (2009-2011)
- Monitor attaining 2010 SO2 NAAQS (2009-2011)
- EPA's designated SO2 nonattainment area
- Areas of Indian country
- National highway
- Water body

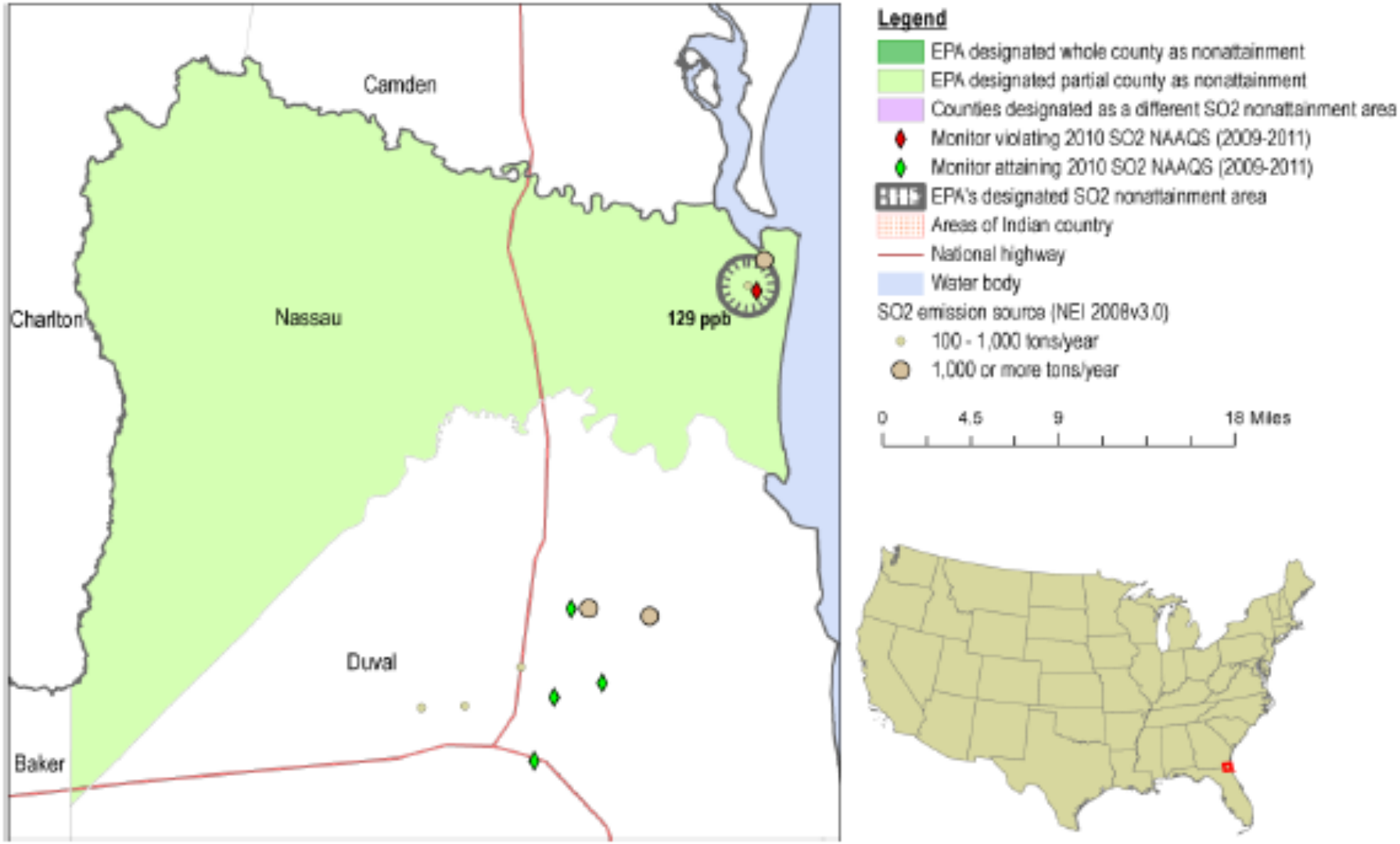
SO2 emission source (NEI 2008v3.0)

- 100 - 1,000 tons/year
- 1,000 or more tons/year

0 5 10 20 Miles

Trinity Consultants

Nassau County, FL



Trinity Consultants

Data Requirements Rule for 1-hr SO_2 NAAQS

FEDERAL REGISTER

Vol. 79 Tuesday,
No. 92 May 13, 2014

Part IV

Environmental Protection Agency

40 CFR Part 51
Data Requirements Rule for the 1-Hour Sulfur Dioxide (SO_2) Primary National Ambient Air Quality Standard (NAAQS); Proposed Rule

- Rule was proposed by EPA on April 17, 2014
- Formally released in the Federal Register on May 13, 2014
- Goal: to assist states in implementing the 1-hr SO_2 NAAQS
- Comment period ended last week

www.gpo.gov/fdsys/pkg/FR-2014-05-13/pdf/2014-09458.pdf

Trinity Consultants

Background of the Proposed Rule

- CAA requires EPA to issue attainment and nonattainment designations after a new NAAQS is set
- 6/2/2010 - 1-hr SO_2 NAAQS
- 9/21/2011 - EPA sought public comment on draft guidance for implementing the NAAQS

Trinity Consultants

Background of the Proposed Rule

- 2/2013 - EPA developed an implementation strategy requiring states to further characterize air quality near large sources of SO_2
- 8/5/2013 – EPA designates 29 areas in 16 states as nonattainment; all based on certified monitoring; areas must develop SIPs
- 1/2014 – EPA released two Technical Assistance Documents (TADs), one for modeling and one for monitoring

Trinity Consultants

Focus of the Proposed Rule

- Allow characterization of non-designated areas for future strategic implementation of the 1-hr SO_2 NAAQS
- Focus on two types of areas:
  - Areas with large sources of SO_2 emissions
  - Areas with smaller SO_2 sources but larger populations
- Why focus on specific SO_2 sources?
- How is the EPA goal achieved?

Trinity Consultants

Proposed Rule Options

TABLE 1—SUMMARY OF SOURCE THRESHOLD OPTIONS [a]

Option	Threshold for sources		Number of sources **	Percent of national emissions † (%)	Plus sources in 2013 desig. nonatt. areas ‡	Total source coverage	Total emissions coverage (%)
	Inside CBSAs greater than 1M	Outside CBSAs greater than 1M					
1*	1,000 TPY	2,000 TPY	443	75	53	496	90
2	2,000 TPY	5,000 TPY	270	66	53	323	82
3	3,000 TPY	10,000 TPY	158	54	53	211	69

[a] The emissions in this table are based on the 2011 National Emissions Inventory (NEI) and differ from the information in the February 2013 Strategy Paper, which was based on the 2008 NEI and preliminary 2011 data. These numbers are also based on the 2013 CBSA definitions.

* Preferred option.

** These do not include sources located in nonattainment areas designated in 2013.

† Total SO_2 emissions in 2011 were 5.8 million tons.

‡ There are 53 sources with annual emissions greater than 1,000 tpy in nonattainment areas designated in 2013.

Trinity Consultants

SO_2 Data Requirements and Implementation Timeline

Up to Jan 16, 2016:	Agencies submit sources + model or monitor
Jan 16, 2016:	Modeling protocols due for sources to be modeled
July 2016:	Monitoring plans due for sources to be monitored
Jan 1, 2017:	SO_2 monitors should be operational
Jan 13, 2017:	Modeling studies should be submitted to RAs
Aug 2017:	States notified of intended designations
Dec 2017:	Final designation date
Aug 2019:	Due date for SIPs - 2017 model-based designations
May 2020:	Certification of 2019 monitoring data
Aug 2020:	States notified of intended designations for remainder of U.S.
Dec 2020:	Finalize all other designations
Aug 2022:	Due date for SIPs for 2020 designations

Trinity Consultants

Implications - SO_2 NAAQS Implementation

- For sources in monitored nonattainment areas, the SIP process is moving ahead now
- For other sources, modeling may be required if:
  - The state chooses modeling
  - The source emits SO_2 > final threshold, or is located near large SO_2 sources
  - Activities should begin in 2015-2016 period
- Sources may end up near a monitor if modeling indicates the need (from modeling above) or the state opts not to conduct modeling
- Modeling required for permitting (by you or nearby facilities)
- Modeling conducted by NGOs may force you to demonstrate compliance with the NAAQS

Trinity Consultants

$PM_{2.5}$ NAAQS – Attainment in FL

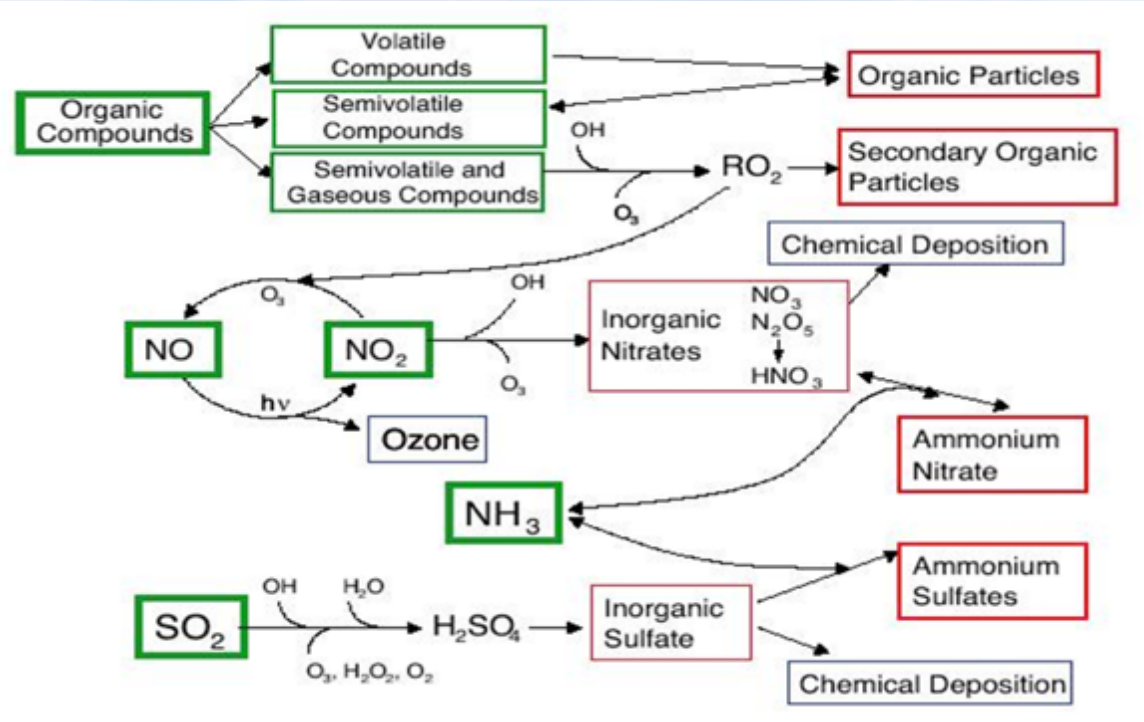
- $PM_{2.5}$ Annual NAAQS – 12 ug/m^3
- $PM_{2.5}$ 24-hr NAAQS – 35 ug/m^3
- State Nonattainment Areas – none
- When will your client/company need to demonstrate compliance with $PM_{2.5}$ annual NAAQS?
  - New major facility
  - Change at existing major facility

Trinity Consultants

$PM_{2.5}$ Background

$PM_{2.5}$ = Particulate Matter < 2.5 µm

- "Primary" $PM_{2.5}$ emissions
  - Directly emitted as $PM_{2.5}$
- "Secondary" $PM_{2.5}$ emissions
  - NOx + SO_2 emitted as precursors
  - Form nitrate and sulfate salts



Source: Particulate Matter Science for Policy Makers – A NARSTO Assessment, 2003.

Trinity Consultants

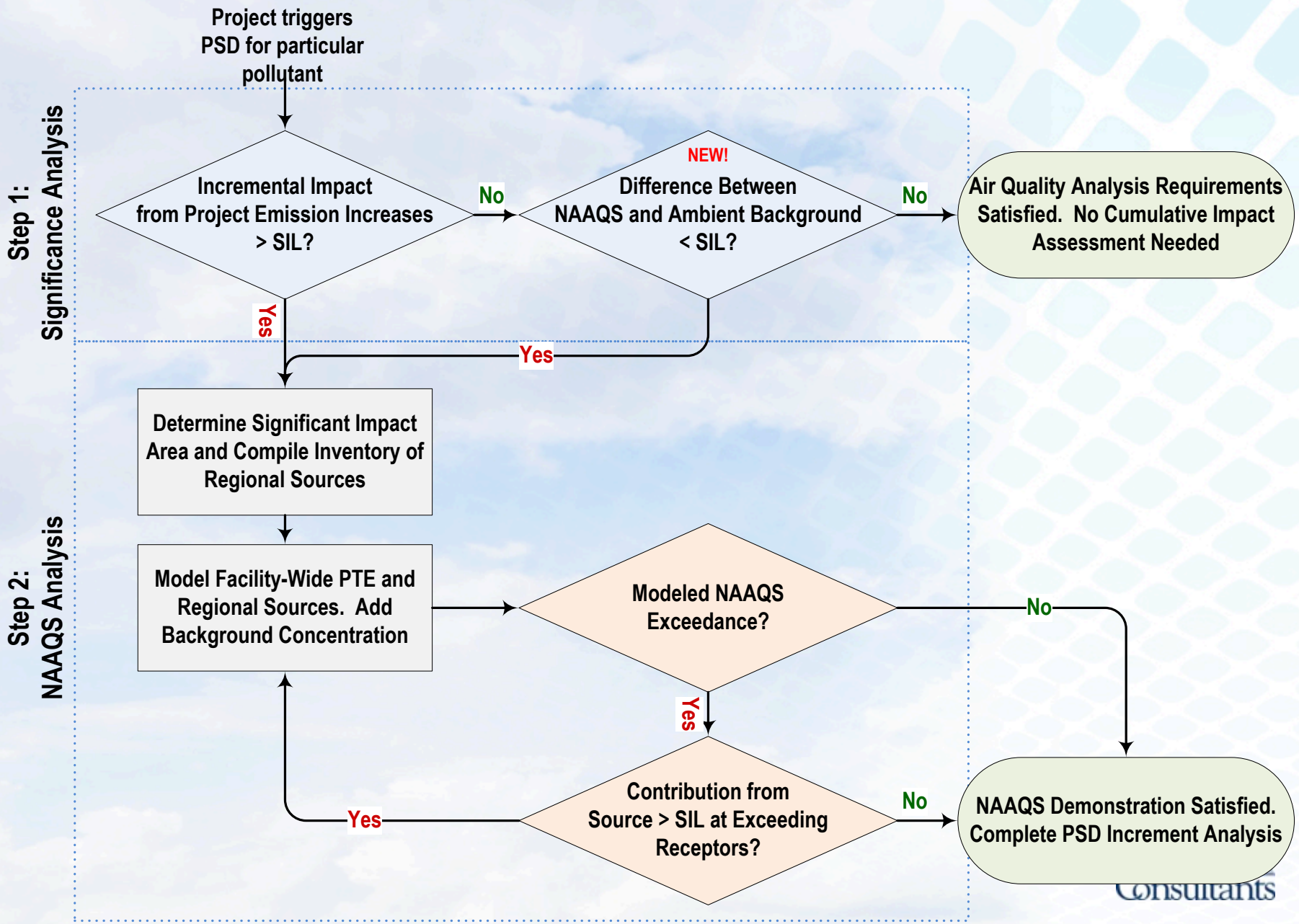
Modeling for Air Permit Actions

- Modeling to demonstrate compliance with NAAQS only required for …
  - New major sources (> 100 or 250 tpy depending on "List of 28" status)
  - Major modifications to existing sources
    - Existing minor sources… emissions increase > 100 or 250 tpy
    - Existing major sources… emissions increase > PSD Significant Emission Rate ("SER"), for example:

PM_{10}:	15 tpy	NO_X:	40 tpy
$PM_{2.5}$:	10 tpy	SO_2:	40 tpy
CO:	100 tpy	VOC:	40 tpy

Trinity Consultants

Modeling Analysis Steps…



Assessment of Incremental Impacts from Project in the "Significance Analysis"

- Compare results to **Significant Impact Levels** (SIL):

Pollutant	Annual ($\mu g/m^3$)	24-hour ($\mu g/m^3$)	8-hour ($\mu g/m^3$)	3-hour ($\mu g/m^3$)	1-hour ($\mu g/m^3$)
$PM_{2.5}$	0.3	1.2†	-----	-----	-----
PM_{10}	1	5	-----	-----	-----
SO_2	1	5	-----	25	7.8*
NO_2	1	-----	-----	-----	7.5*
CO	-----	-----	500	-----	2,000

* Interim values

† Vacated on 12/9/13 but still applied on case-by-case basis

Trinity Consultants

Primary and Secondary NAAQS

Pollutant	Calendar Quarter ($\mu g/m^3$)	Annual ($\mu g/m^3$)	24-hour ($\mu g/m^3$)	8-hour ($\mu g/m^3$)	3-hour ($\mu g/m^3$)	1-hour ($\mu g/m^3$)
PM_{10}	-----	~~50~~	150	-----	-----	-----
$PM_{2.5}$	-----	12	35	-----	-----	-----
SO_2	-----	~~80~~ ~~(30 ppb)~~	~~365~~ ~~(140 ppb)~~	-----	1,300 (500 ppb)	196 (75 ppb)
NO_2	-----	100 (53 ppb)	-----	-----	-----	188 (100 ppb)
CO	-----	-----	-----	10,000 (9 ppm)	-----	40,000 (35 ppm)
Lead	0.15	-----	-----	-----	-----	-----
Ozone	-----	-----	-----	147 (75 ppb)	-----	~~235~~ ~~(120 ppb)~~

Trinity Consultants

NAAQS Analysis (Class II Area)

- NAAQS analysis is based on the total estimated air quality – the sum of ambient impacts resulting from existing sources
- Consists of the following:
  - Existing facility sources
  - Proposed new sources/emissions
  - Existing regional sources contributing to Significant Impact Area (SIA)
  - Measured ambient background concentrations

Trinity Consultants

$PM_{2.5}$ Modeling Realities…

- Very small SER… any project with net emissions increases > 10 tpy triggers need for modeling analysis (at major sources)
- Annual NAAQS Reduced in January 2013
  - 15.0 → 12.0 μg/m^3
- Areas with high Background Values in State
- Very small SIL
  - 0.3 μg/m^3 for annual NAAQS
- Secondary Formation
  - NO_X/SO_2 → $PM_{2.5}$
  - Final permit modeling guidance document in May 2014

Trinity Consultants

Hypothetical Case…

- Project at existing plant involving new combustion or process source
- Consider four project emission increase scenarios:
  - 0.5x SER 5 tpy
  - 1x SER 10 tpy
  - 2x SER 20 tpy
  - 3x SER 30 tpy

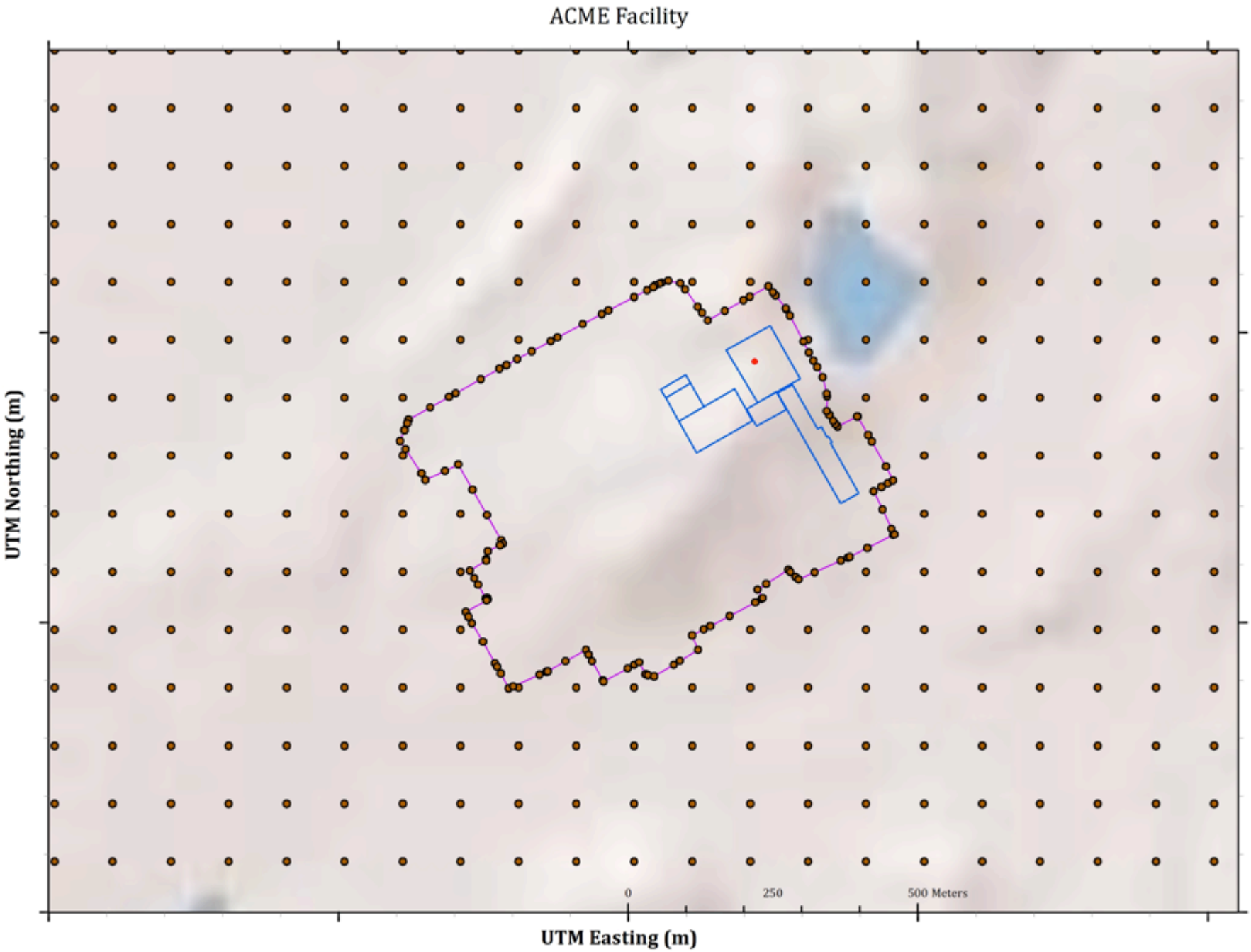
Trinity Consultants

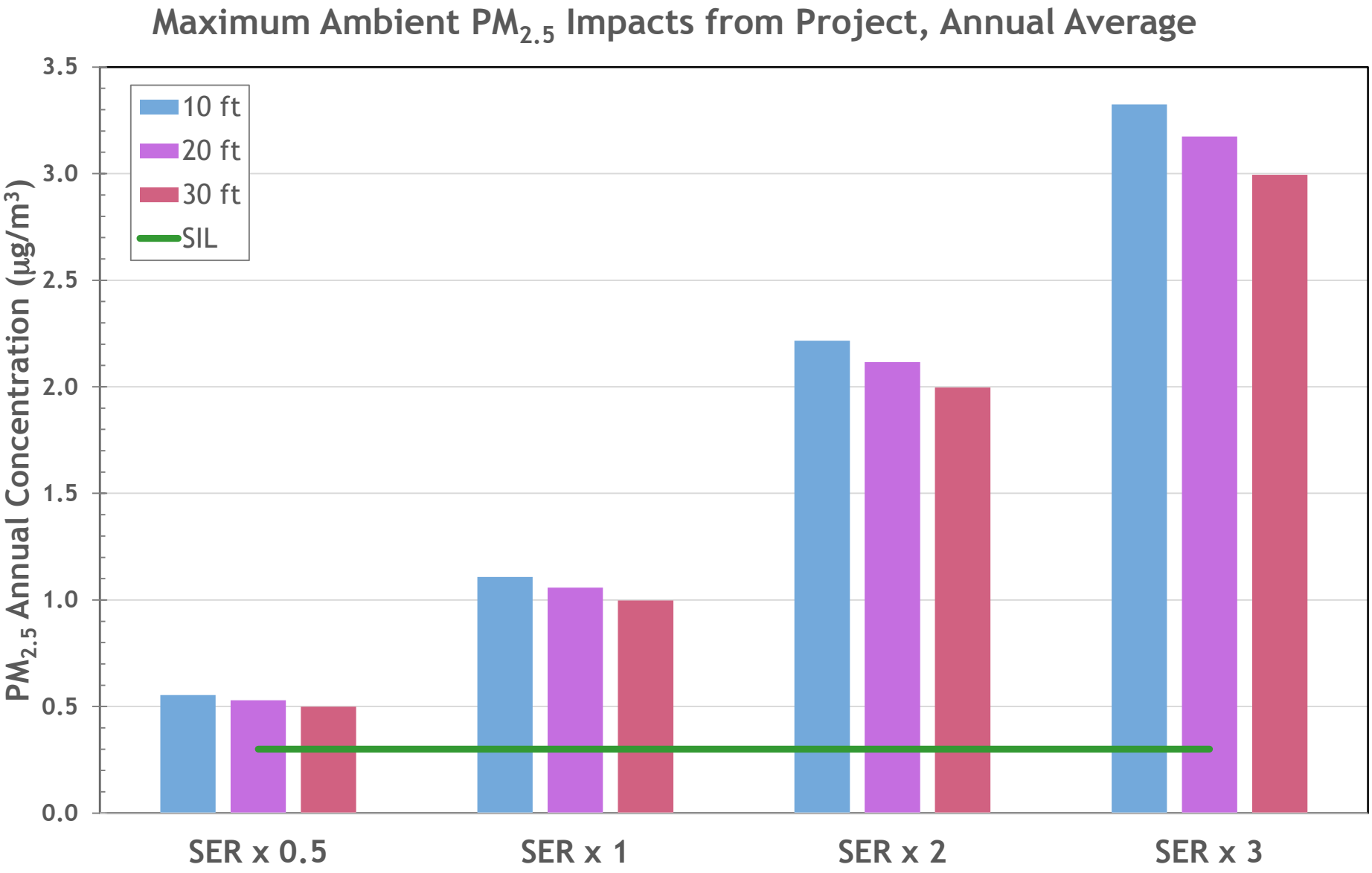
Hypothetical Case…

- Typical facility footprint and building configuration
- Stack parameters:

Building Height	80 ft
Stack Height	10, 20, and 30 ft above roof
Stack Diameter	5 ft
Exit Temperature	500 °F
Exit Velocity	40 ft/s (≈ 26,000 scfm)
Vertically Unobstructed Release	

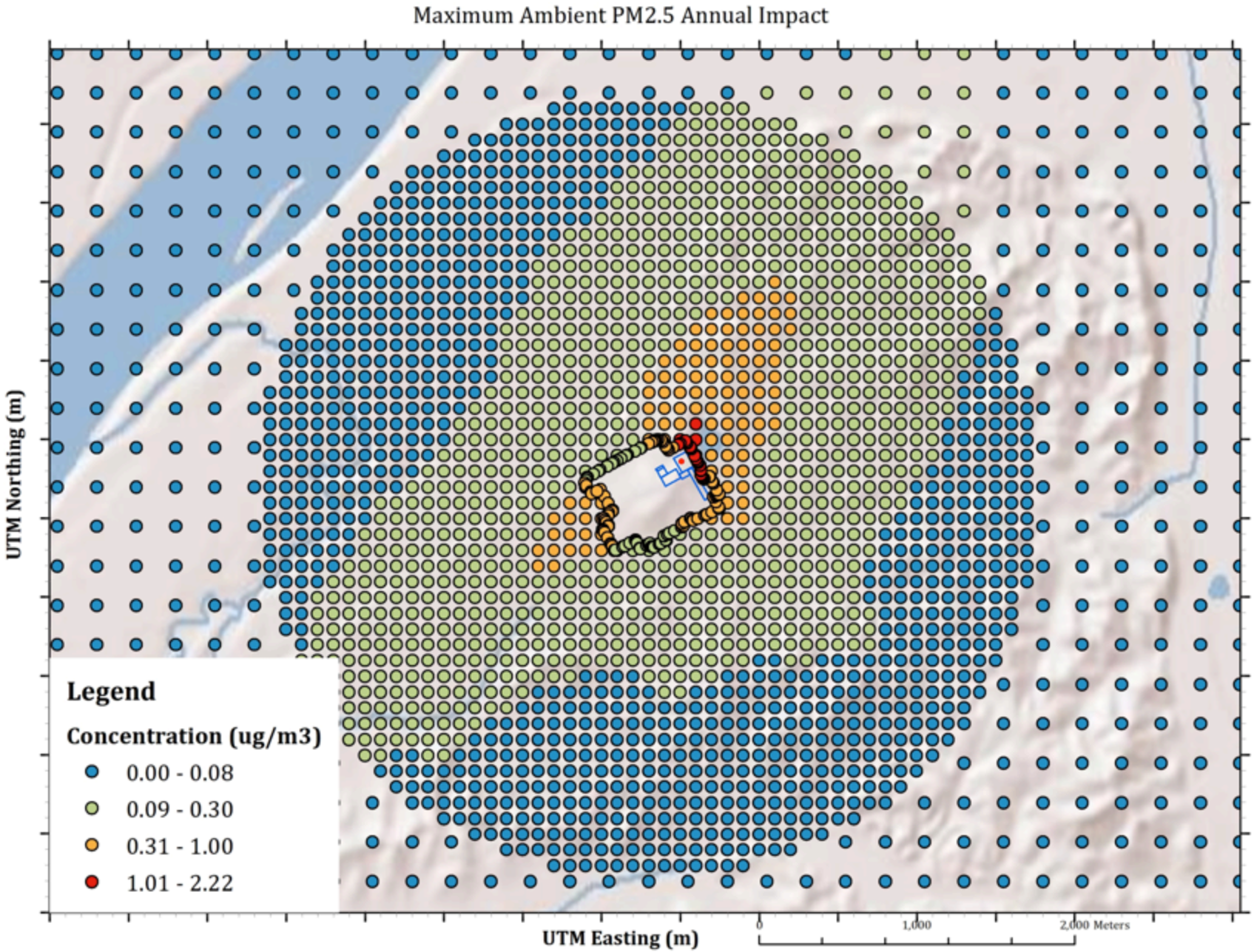
Trinity Consultants


ACME Facility
UTM Northing (m)
UTM Easting (m)
0
250
500 Meters



Color bars are results at different stack heights (height above building roof)

Trinity Consultants



Scenario: 2x SER (20 tpy emissions); Stack 10 ft above roof

Implications of New NAAQS

- Triggering PSD for $PM_{2.5}$ will now almost always involve conducting a full NAAQS (and Increment) analysis
- Spread between current ambient concentrations and NAAQS, combined with conservatism of models, means modeling demonstrations will be challenging
- NAAQS are leading to difficulties in permitting major expansions at existing industrial sites

Trinity Consultants

Air Quality – Hot Topics
Planning for Changes in
Startup, Shutdown and Malfunction

Kennard F. Kosky, P.E., Principal
Golder Associates Inc.

28th Annual Environmental Permitting Summer School
July 22-25, 2013

Golder Associates

Background

- Sierra Club on June 30, 2001 petitioned EPA to find that State Implementation Plans related to excess emissions from startup, shutdown and malfunction were inadequate **under Section 110 of the CAA.**
- Sierra Club's petition specifically identified, among other states, Florida's rules in **62-210.700 F.A.C. Excess Emissions**.
- On February 22, 2013 issued a proposed rulemaking that would grant the Petition with respect to the rules identified and that Florida's SIP with these rules would be substantially inadequate in meeting CAA requirements **(SIP Call).**
- In accordance with **CAA section 302(k),** SIPs must contain emission limitations that "limit the quantity, rate, or concentration of emissions of air pollutants on a continuous basis."

What Rules are affected?

- **Rule 62-210.700 Excess Emissions F.A.C.**
  - (1) Excess emissions resulting from **startup, shutdown or malfunction of any emissions unit shall be permitted providing** (1) **best operational practices** to minimize emissions are adhered to and (2) the duration of excess emissions shall be minimized **but in no case exceed two hours in any 24 hour period** unless specifically authorized by the Department for longer duration.
  - (2) Excess emissions from existing fossil fuel steam generators resulting from **startup or shutdown shall be permitted** provided that best operational practices to minimize emissions are adhered to and the duration of excess emissions shall be minimized

Golder Associates

What Rules are affected?

- (3) Excess emissions from **existing fossil fuel steam generators resulting from boiler cleaning (soot blowing) and load** change shall be permitted provided the duration of such excess emissions shall not exceed 3 hours in any 24-hour period and visible emissions shall not exceed Number 3 of the Ringelmann Chart (60 percent opacity), and providing (1) best operational practices to minimize emissions are adhered to and (2) the duration of excess emissions shall be minimized.

  A **load change** occurs when the operational capacity of a unit is in the 10 percent to 100 percent capacity range, other than startup or shutdown, which exceeds 10 percent of the unit's rated capacity and which occurs at a rate of 0.5 percent per minute or more.

  Visible emissions above 60 percent opacity shall be allowed for not more than 4, six (6)-minute periods, during the 3-hour period of excess emissions allowed by this subparagraph, for boiler cleaning and load changes, at units which have installed and are operating, or have committed to install or operate, continuous opacity monitors.

  Particulate matter emissions shall not exceed an average of 0.3 lbs. per million BTU heat input during the 3-hour period of excess emissions allowed by this subparagraph.
- (4) **Excess emissions which are caused entirely or in part by poor maintenance, poor operation, or any other equipment or process failure which may reasonably be prevented during startup, shutdown, or malfunction shall be prohibited.**

EPA's Position

- These **rules allow for exemptions from the otherwise applicable emission limitations**, and that such exemptions are inconsistent with the fundamental requirements of the CAA with respect to emission limitations in SIPs as required by sections 110(a)(2)(A), 110(a)(2)(C), and 302(k)

- The **state has defined violations in way that would interfere with effective enforcement** by the EPA and citizens for excess emissions during these events as provided in CAA sections 113 and 304.

- For these reasons, the EPA is proposing to find that these provisions are substantially inadequate to meet CAA requirements and thus proposing to issue a **SIP call with respect to Rule 62–210.700(1), Rule 62–201.700(2), Rule 62–210.700(3), and Rule 62–210.700(4)**

Other Rules and Permit Conditions

- Several provisions in Chapter 62-296 F.A.C.
  - 62-296.401(7)(b)(1): Air Curtain Incinerator - startup emissions
  - 62-296.404(1)(a)(2): Kraft Recovery Furnaces - opacity
  - 62-296.404(3)(a)(3): Digester TRS emergency/maintenance emissions
  - 62-296.404(6)(c): Kraft mill excess emissions exemptions
  - 62-296.570(4)(c): NO_x RACT SSM exemption
- **Specific conditions in existing PSD and Title V permits**.
  - **Excess Emissions Allowed**: As specified in this condition, excess emissions resulting from startup, shutdown, fuel switching and documented malfunctions **are allowed** provided that operators employ the best operational practices to minimize the amount and duration of emissions during such incidents.
  - Excess emissions allowed by maintenance activities.

Important Definitions

- FDEP Rule 62-210.200 Definitions:
  - **(**271) "**Startup**" – The commencement of operation of any emissions unit which has shut down or ceased operation for a period of time sufficient to cause temperature, pressure, chemical or pollution control device imbalances, which result in excess emissions.
  - (257) "**Shutdown**" – The cessation of the operation of an emissions unit for any purpose.
  - (175) "**Malfunction**" – Any unavoidable mechanical and/or electrical failure of air pollution control equipment or process equipment or of a process resulting in operation in an abnormal or unusual manner.

Considerations and Information Needs

- **Startups and Shutdowns**:
  - Planned or unplanned?
  - Is there a difference?
  - Can emissions and operating conditions be defined?
  - Are there several startup shutdown conditions?
  - Can the startup and shutdown conditions be enveloped?
- **Malfunctions**:
  - Can these be defined?
- **Emissions and Air Quality must be defined to develop conditions that demonstrate compliance with NAAQS**.
  - Short-term NAAQS are the most critical in planned startup
  - NAAQS: 1-hour SO_2, NO_2 and CO
- **EPA modeling guidance of intermittent sources**

Determining Startup/Shutdown - Example

- Emissions must be determined to determine air quality impacts
- Example of Cold Startup of Combined Cycle Unit with Combustion Turbine (CT) and Steam Turbine (ST) requiring different startup profiles.
- NO_x Emissions without Selective Catalytic Reduction (SCR)

Startup Condition	Duration	NOx		
	(min)	(lb)	(lb/min)	lb/hr
CT Start No Load	28	23.3	0.83	
CT 5% Load	40	70.0	1.75	86.7
CT 20% Load	14	26.8	1.92	108.3
CT Hold-ST Soak	93	178.25	1.92	115.0
CT-Hold-ST Ramp	55	105.4	1.92	115.0
CT Ramp	22	55.0	2.50	127.8

Determining Startup/Shutdown - Example

- Each air pollutant may have a different emission profile during startup cycle.
- Since exhaust conditions are different, demonstration may require different air modeling evaluations.

Startup Condition	Duration	CO		
	(min)	(lb)	(lb/min)	lb/hr
CT Start No Load	28	1341.7	47.92	
CT 5% Load	40	3600.0	90.00	4,558.3
CT 20% Load	14	1143.3	81.67	5,233.3
CT Hold-ST Soak	93	7595.0	81.67	4,900.0
CT-Hold-ST Ramp	55	4491.7	81.67	4,900.0
CT Ramp	22	733.3	33.33	3,836.7

Golder Associates

Example of Air Quality Impacts

- To evaluate compliance of planned startup with NAAQS air modeling is necessary typically with **AERMOD and 5-years of meteorological conditions**.
- Evaluation conservative based on specific stack parameters and emissions profiles.
- Maximum Impacts from model evaluation

Operating Conditon	NO_2	CO
	(% of NAAQS)	
Normal Operation	7.09%	0.13%
Startup Condition 1	89.36%	4.75%
Startup Condition 2	47.87%	2.45%

Example of Air Quality Impacts

- Maximum impacts of startup will likely be much higher than normal operation and may approach NAAQS for some air pollutants.
- EPA guidance for intermittent sources could be used but may require a specific condition.
- **To put impacts into perspective the 99th and 98th percentile concentration can be determined.** Highly dependent on source and meteorology. Example of actual ranges:
  - 99th percentile concentrations can be 50% to 80% of maximum
  - 98th percentile concentrations can be 44% to 77% of maximum

SSM Observations

- General excess emissions rules will be substantially altered to meet CAA requirements.
- Excess emissions PSD and Title V permit conditions could be modified to include emission limits and demonstration that NAAQS would not be exceeded.
- Startup and shutdown operations must be defined.
  - Is there sufficient data to define events?
  - How certain is the data?
  - Will vendor guarantee? (Most likely NO!)
  - Should a margin be added
  - As “envelope” - too conservative? Or, as individual operations.
  - How frequent will these conditions occur?
  - Will these operations change over time?

QUESTIONS?