

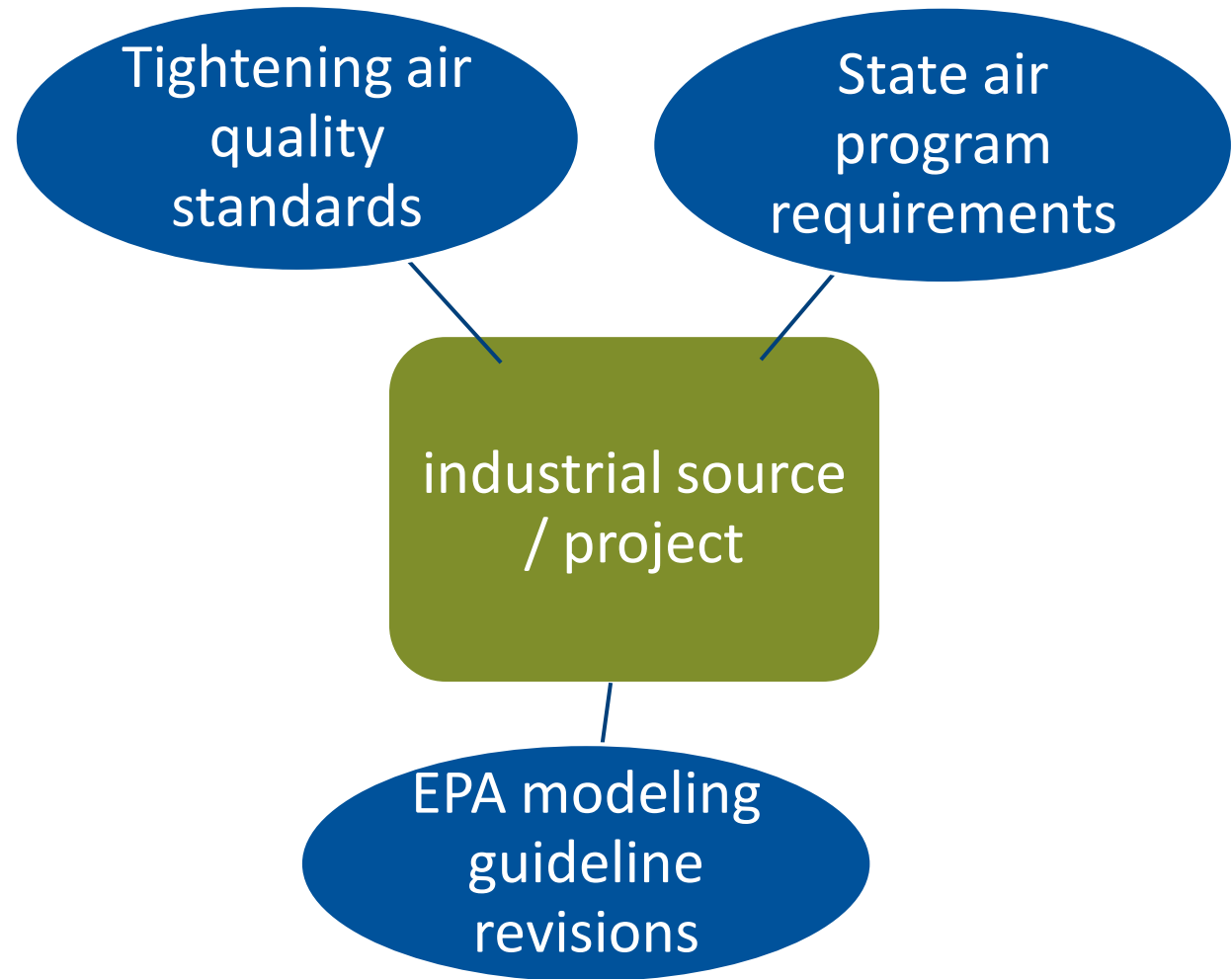
the use of dispersion modeling to enhance operational flexibility

November 3, 2016

Brian Leahy and Jeff Bennett



as air impact requirements evolve, what are the issues that I need to be aware of?

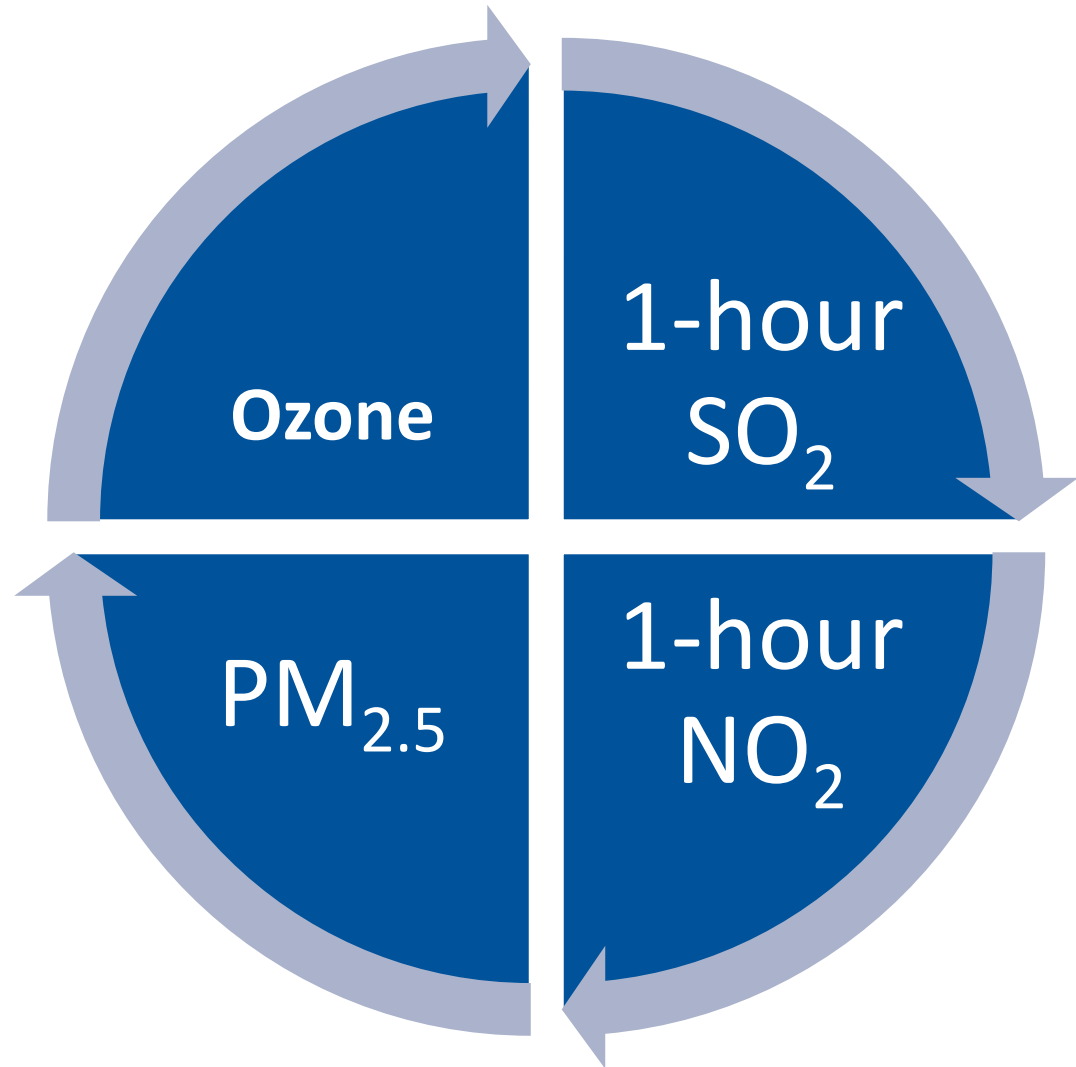


goal of this presentation

- Identify steps that a facility may take to ensure:
 - new or modified processes are afforded the utmost operational flexibility
 - a margin is left or a plan is developed for future changes (e.g., growth, more stringent standards)
- To accomplish this goal:
 - examine changes to air quality standards and modeling guideline
 - try to anticipate EPA's next moves and their potential impact on your facility's operations
 - review the current status of air impact requirements in your state
 - as part of early project planning,
 - determine critical path air quality issues for your project and
 - identify the best approach(es) within the modeling paradigm to find the most cost effective solution

MORE STRINGENT NAAQS

if the
thunder
doesn't
get you,
then the
lightening
will



SO₂ implementation

- June 2, 2010 – EPA establishes 1-hour SO₂ NAAQS for the first time
 - ≤75 ppb (197 µg/m³)
- August 10, 2015 – EPA finalizes the SO₂ Data Requirements Rule (DRR)
 - provided air agencies with flexibility to use monitoring or modeling to designate attainment

SO₂
implementation
(So, what does
this mean for
my plant/
company if I
don't have SO₂
issues?)

- EPA has begun to use air quality modeling instead of monitoring for SO₂ for attainment designations
 - How long before modeling is used for other pollutants as well?
- Nonattainment = more evaluation (\$), more potential controls (\$\$), more scrutiny and oversight

PM_{2.5} implementation

- January 15, 2013 – EPA reduces primary annual NAAQS - 15 $\mu\text{g}/\text{m}^3$ to 12 $\mu\text{g}/\text{m}^3$
- May 20, 2014: EPA issues *“Guidance for PM_{2.5} Permit Modeling”*
 - acknowledged limitations in modeling PM_{2.5}
 - secondary PM_{2.5} formation due to NO_x, SO₂, VOC, or ammonia emissions/reactions
 - states applying guidance to non-major sources
 - assessment requirements determined by direct PM_{2.5} and precursor emissions

O₃

implementation

- December 28, 2015 – EPA reduces primary 8-hour NAAQS from 0.075 ppm to 0.070 ppm
- Draft EPA modeling guideline provides “new” ways to include ozone air quality evaluations in permitting analyses
- Appendix W...

revisions
to the
Guideline
on Air
Quality
Models

- July 29, 2015 – EPA proposes revisions to its Guideline on Air Quality Models
 - updates to current EPA-preferred models
 - analytical techniques to address ozone and secondary PM_{2.5}
- Final Rulemaking expected November 2016
 - roll-out anticipated at Nov. 15 Regional, State, and Local Modelers' Workshop

revisions to the Guideline on Air Quality Models (cont.)

- proposed technical enhancements to EPA's workhorse model (AERMOD)
 - updated Tier 2 and Tier 3 techniques for NO₂ modeling
 - updated algorithms to assess impacts during low wind conditions (adjusted u^*)
- **Note:** these changes improve model accuracy and should be beneficial to regulated sources
 - AERMOD v16216 (coming shortly)
- long-range transport and visibility (CALPUFF – yes/no?)
 - Our guess is that CALPUFF stays as there are no simple alternatives at this point; no confirmation

revisions
to the
Guideline
on Air
Quality
Models
(cont.)

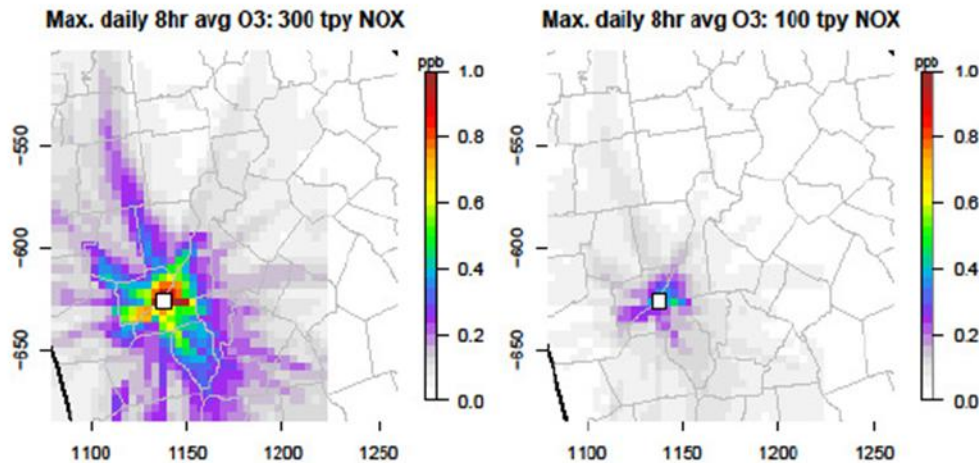
- Ozone and PM_{2.5} modeling
 - Tiered approach:
 - Tier 1 – National Model Emission Rates for Precursors (MERPs)
 - Tier 2 – screening approach based upon “local” emission/impact relationships
 - Tier 3 – photochemical modeling
 - new draft SILs for PM_{2.5} and ozone published by EPA in August 2016; will likely be used as part of above tiered approach
 - Ozone – 1 ppb (8-hour)
 - PM_{2.5} – 1.2 µg/m³ (24-hour)
0.2 or 0.3 µg/m³ (Annual)

What are the MERPs going to be?

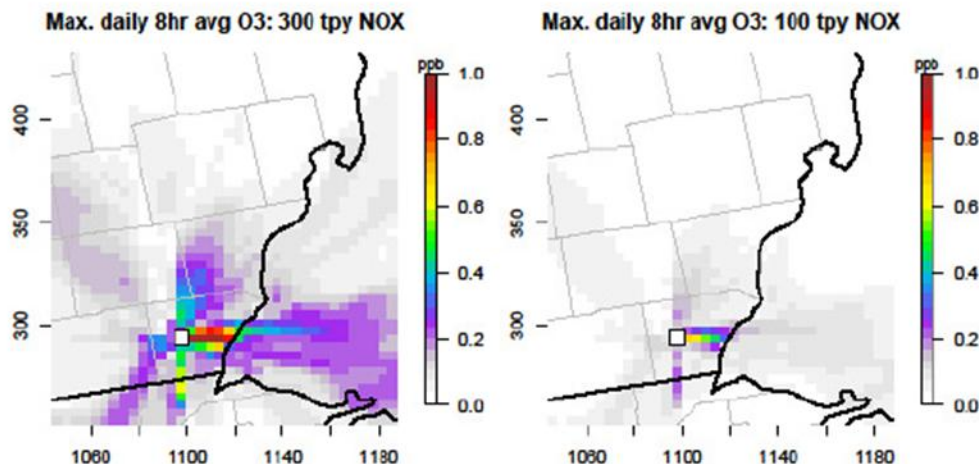
- EPA has been in “lock down” mode prior to the Modeling Conference
- However, previous information can be used to obtain an idea about their approach
- Summary: Significant changes are on the horizon...
 - [Interagency Workgroup on Air Quality Modeling Phase 3 Summary Report: Near-Field Single Source Secondary Impacts, July 2015](#)

What are the MERPs going to be?

Atlanta



Detroit

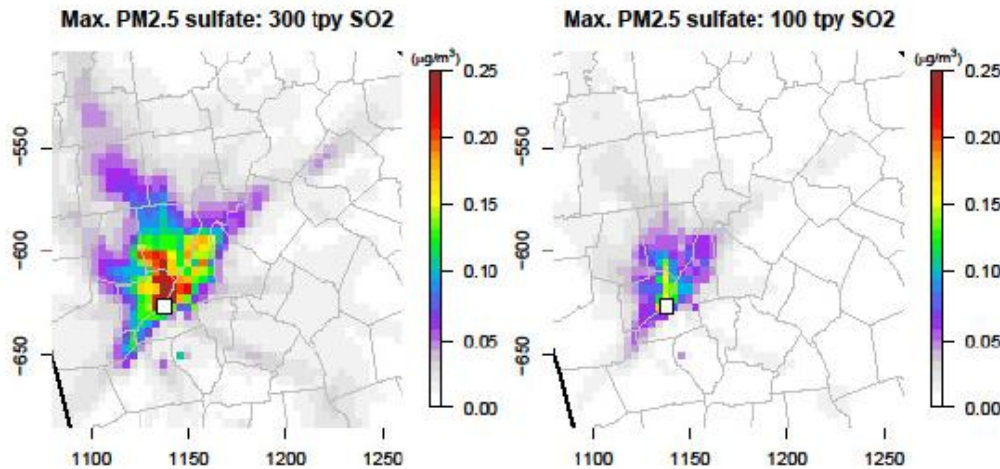


Page 18: Figure 5-4
**100 tons per year
and 300 tons per
year of NOx**

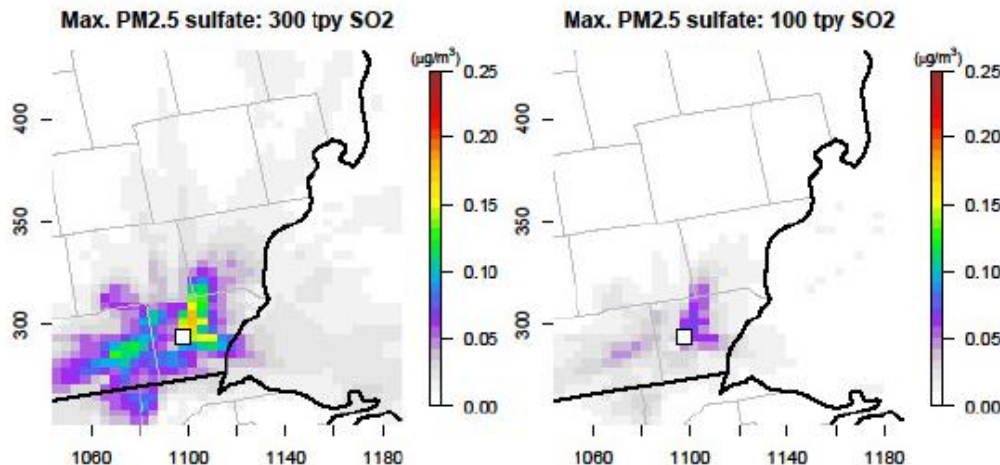
**8-hour ozone SIL
1.0 ppb**

What are the MERPs going to be?

Atlanta



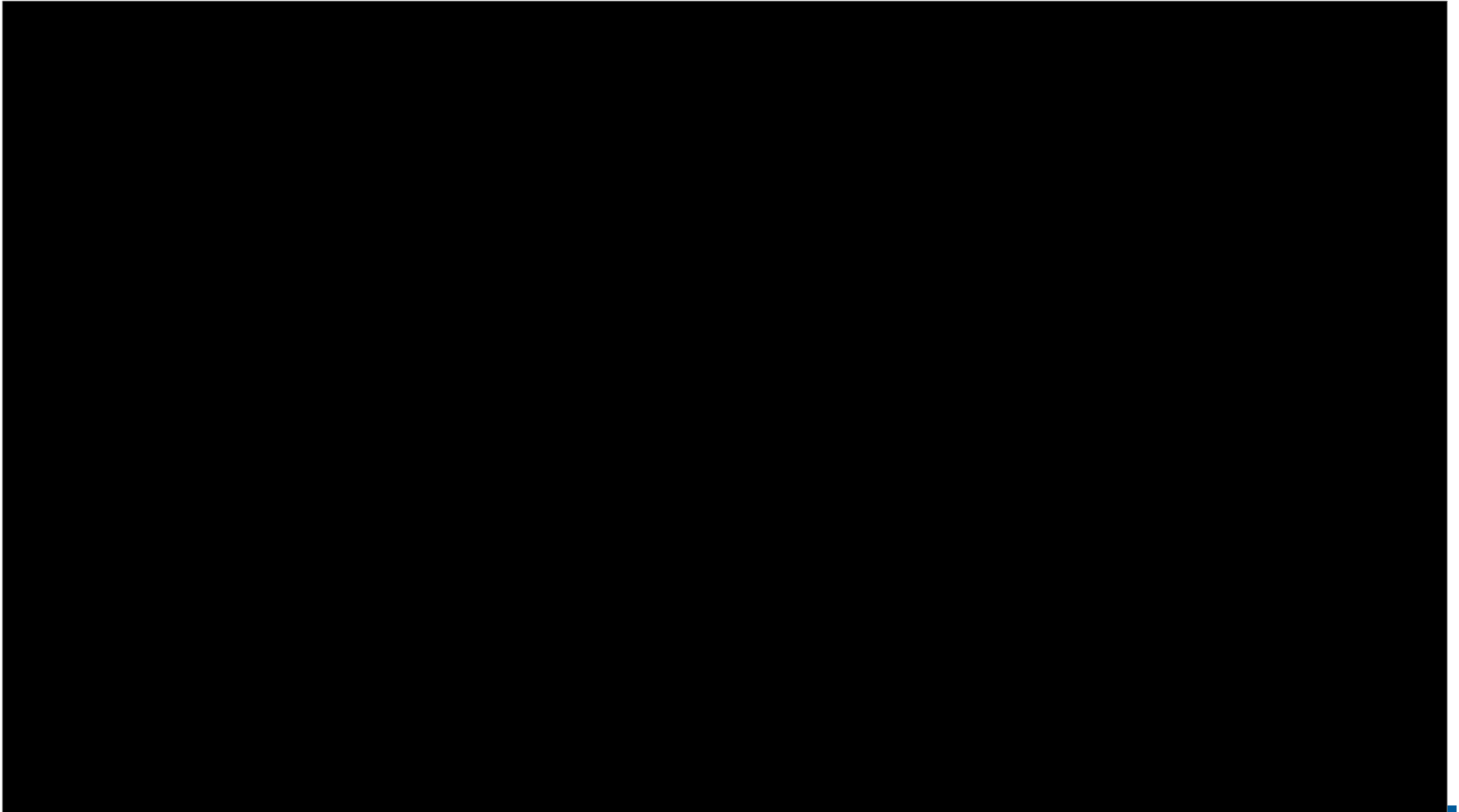
Detroit



Page 16: Figure 5-1
**100 tons per year
and 300 tons per
year of SO₂**

**Annual PM_{2.5} SIL
0.2 or 0.3 $\mu\text{g}/\text{m}^3$**

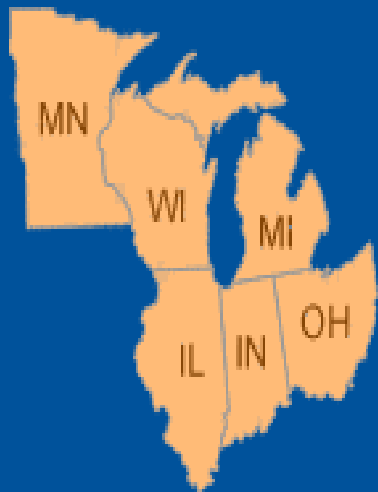
Photochemical Modeling



revisions
to the
Guideline
on Air
Quality
Models
(cont.)

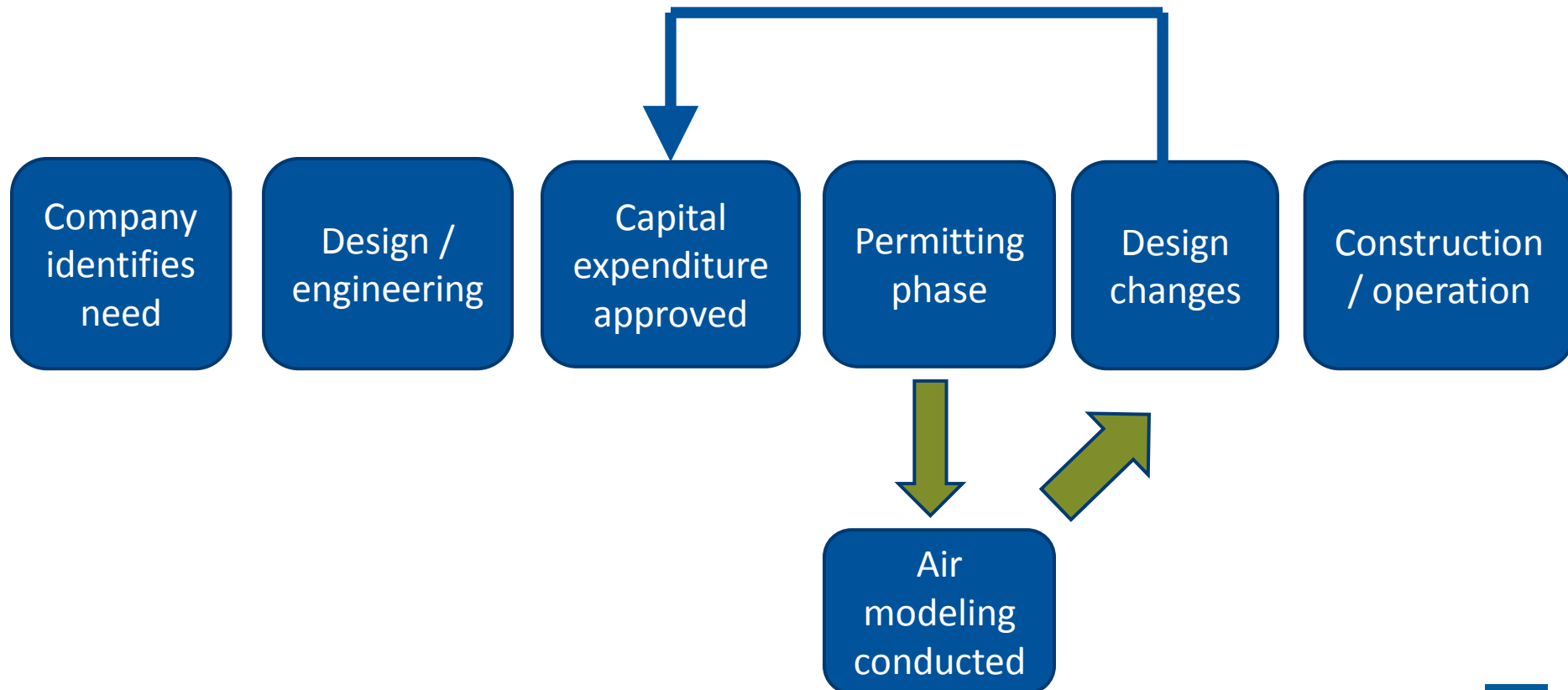
- What do the Appendix W revisions mean to you?
 - modeling techniques becoming more refined (i.e., more complex)
 - EPA continues to provide general guidance, but says –
 - “Agency decisions are based on case-by-case determinations”
 - anticipate possible modeling for ozone (VOC/NO_x) and secondary PM_{2.5} (SO₂/NO_x) using SILs

state- specific modeling guidance

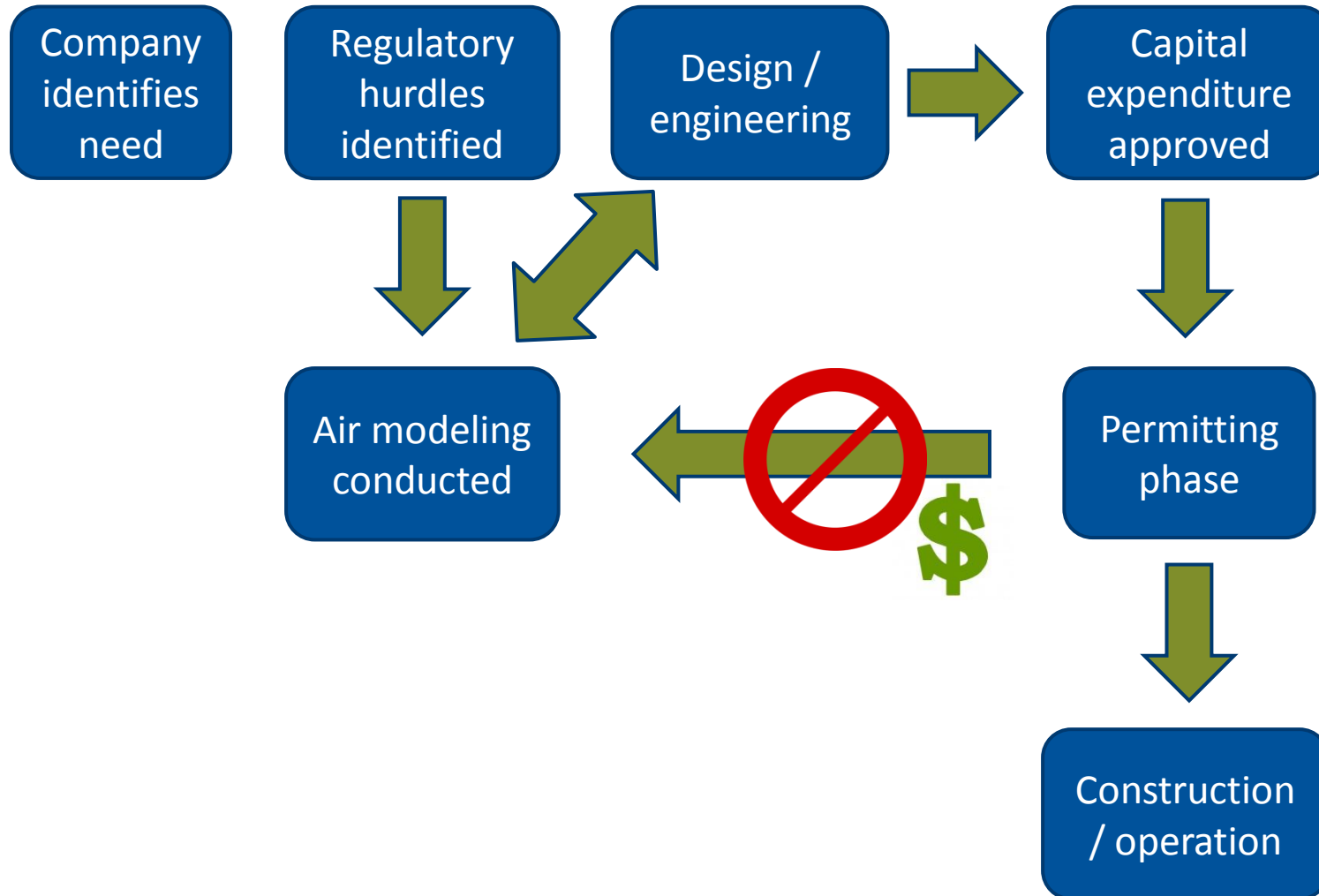


- each Region 5 state has its own guidance for modeling minor sources of criteria pollutants and air toxics
- **example:** Michigan criteria pollutant program
 - March 3, 2015 – MDEQ issues “*Dispersion Modeling Guidance for Federally Regulated Pollutants*”
 - focused on “allowable emissions”
 - new sources/mods excluded if facility-wide PTE < Significant Emission Rate (SER)
 - air impact demonstration required for minor changes to sources with facility-wide PTE > SER unless specified stack/building height criteria are met
- **example:** Ohio air toxic rules
 - include modeling requirements for new/modified sources of air toxic emissions along with specific air quality concentrations (<http://codes.ohio.gov/orc/3704>)
 - using “Review of New Sources of Air Toxic Emissions, Option A”

typical flow for new projects



recommended flow for new projects



tips for optimizing flexibility

- conduct preliminary modeling before committing to a set facility/process design
- identify the most important pollutants and any state-specific requirements
- use all the tools in the toolbox
 - project impacts stay below SILs
 - NO_x-NO₂ conversion techniques
 - meteorological datasets
 - background concentration reductions

tips for optimizing flexibility

- assess the potential impact of anticipated attainment designations (i.e., nearby is close enough)
- track background concentrations and identify “nearby sources” in your area to understand the circumstances you will face if you have to conduct a cumulative analysis
- Bottom line:
 - understand your AQ situation before discussing your project with the permitting agency
 - be prepared for a multi-step evaluation when you have a project that will require air quality analyses

thanks – don't forget to tip your modeler

any questions?

Jeff Bennett (573) 638-5033 (jbennett@barr.com)

Brian Leahy (616) 512-7018 (bleahy@barr.com)