Four Main Parts of a PSD Application

1. Control Technology Review (BACT)
2. Air Quality Analysis
   - NAAQS
   - PSD increments
3. Additional Impacts Analysis
4. Class I Area Analysis

Additional assessments may be required

1

Part 1: Best Available Control Technology (BACT) Review

2

What is BACT?

"...an emissions limitation...based on the maximum degree of reduction for each pollutant... which the [permitting authority]...on a case-by-case basis, taking into account energy, environmental, and economic impacts...determines is achievable..." [40 CFR 52.21(b)(12), Rule 62-210.200(32), F.A.C.]

3

BACT Defined

- BACT emission limits can not contribute to violation of NAAQS or PSD Increment
- Must meet emission limitations contained SIP, NSPS, and NESHAPs (for the same or similar pollutants)
- BACT emission limits must be practically enforceable
  - Averaging time consistent with test method
  - Method of compliance delineated in permit (testing, monitoring, recordkeeping, and reporting)
  - Assumptions of BACT analysis incorporated into limits and/or compliance methods
  - Design, equipment, or work practice standards may be used in lieu of emission limits if compliance with emission limits infeasible

4

BACT Emission Unit Applicability

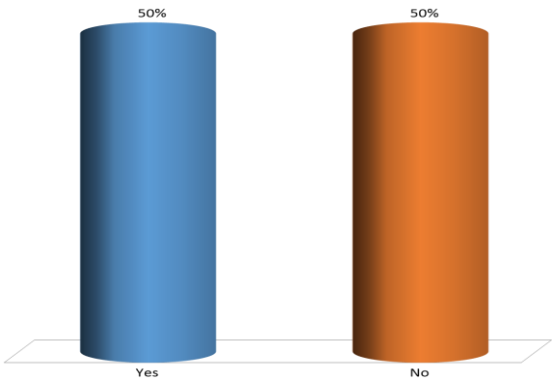
- Each new and/or modified "emissions unit" at which a net emission increase occurs (NEI>0)
  - Emissions Unit: "Any part of a stationary source that emits…."
- BACT must be reviewed and modified for "phased" construction projects (i.e., BACT must be justified within 18 months of commencement of construction of each independent phase of a project)

5

Company A receives a PSD permit to construct a PSD major source facility. The facility consists of two identical operating lines. The first line is constructed within a year and begins operating. Company A determines the second line is not needed immediately, and delays construction for another year. Two years after receiving the PSD permit, Company A decides to begin constructing the remaining operating line (Line 2). Is a separate BACT review for Line 2 required?

✔A. Yes

B. No



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BACT Pollutant Applicability

- BACT applies to each pollutant subject to PSD review (i.e., for each pollutant regulated under the CAA for which there is a significant increase in emissions at the source that are not netted out)

- Like PSD, BACT is evaluated on a pollutant-by-pollutant basis.
  - Pollutants for which there is NOT a significant increase in emissions are not subject to BACT review.

7

BACT Assessment Elements

- Review of proposed BACT against 5 performance elements:
  1. Capture Efficiency
  2. Emission Reduction/Emission Level
  3. Reliability
  4. On-stream time
  5. Enforceability

- Review the proposed emission reduction options
  - Pollution Prevention Options
  - Equipment Specification/Monitoring
  - Add-on Abatement Equipment
  - Good Engineering Practice/Best Management Practice

8

BACT Assessment Elements

- Generally, the emission reduction options have been successfully demonstrated in the United States (not international standards)
- The complexity of the BACT assessment/determination will depend on factors such as:
  - Number of plants in the same industry
  - Quantity of emissions
  - Emission reduction options considered
  - Length of time since the last permit review (for the same or similar emission unit/source type)

9

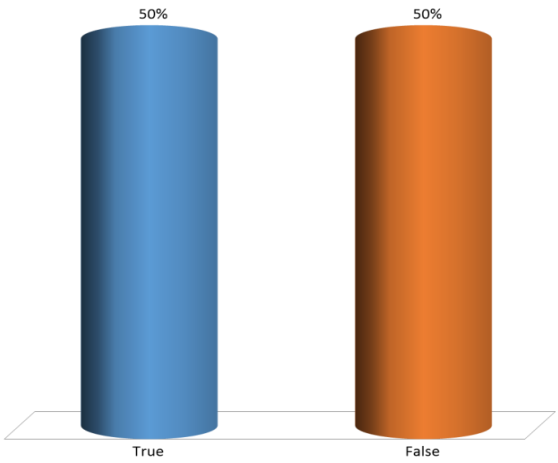
BACT Assessment Elements

- The overall emission reduction performance level of a BACT proposal must be compared to the emission reduction performance levels that have been previously accepted as BACT in recent reviews for the same industry
- A specific BACT proposal may be different than those accepted as BACT in recent permit reviews
- Generally, the proposal must have an overall emission reduction performance that is at least equivalent to those previously accepted as BACT.

10

The overall emission reduction performance level of a BACT proposal must be compared to the emission reduction performance levels that have been previously accepted as BACT in recent reviews across industries.

A. True
✓ B. False



11

How is BACT Selected?

- Step 1: Identify available control options
- Step 2: Eliminate technically infeasible control options
- Step 3: Rank remaining control options by effectiveness
- Step 4: "Top-down" evaluation of control options based on the three E's (energy, environmental, and economic impacts)
- Step 5: Select BACT

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BACT Analysis Procedure – Step 1

- Step 1. Identify all "available" control options
  - Available control technologies are those with a "practical potential" for application to the emission unit and regulated pollutant

- Available control technologies include:
  - Existing controls for source category
  - Technology transfer from similar source categories
  - Production process modifications
  - Combinations of control/process options
  - Non-U.S. technologies
  - LAER determinations

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BACT Analysis Procedure – Step 2

- Step 2. Eliminate technically infeasible control options
  - Is technology available?
    - Reached licensing and commercial development stage
  - Is technology applicable based on physical, chemical, and engineering principles?
  - Applicant may consider lower level of control if permitted levels have not been achieved

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BACT Analysis Procedure – Step 3

- Step 3. Rank remaining technologies
  - Environmental impacts (non-air quality impacts and hazardous air pollutants)
    - Control efficiency (% control)
    - Expected emission rate (tpy, lb/hr)
    - Expected emissions reduction (tpy)
  - Energy impacts
  - Economic impacts (cost effectiveness)

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BACT Evaluation - Environmental Impacts

- Determine impacts
  - Will other emissions occur due to option?
  - Will other effects occur?
- Concentrate on non-air quality impacts
  - Water
  - Solid and hazardous waste
  - Visibility

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BACT Evaluation - Energy Impacts Analysis

- Determine energy penalties or benefits
- Consider availability of fuels
- For new sources, BACT is evaluated on a facility-wide basis, including energy efficiency
  - 40 CFR 52.21(b)(7)
- For existing sources, BACT applies to new or modified emissions units, and not necessarily to energy-consuming equipment
  - Encourages permitting agencies to consider energy efficiency measures nonetheless

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BACT Evaluation - Energy Impacts Analysis

"While energy efficiency can reduce emissions of all combustion-related emissions, it is a particularly important consideration for GHGs since the use of add-on controls to reduce GHG emissions is not as well-advanced as it is for most combustion-derived pollutants."

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BACT Evaluation – Economic Analysis

- Annualized capital costs
  - Interest Rate
  - Equipment life
- Estimate annual operating costs
  - Consider costs of labor, materials, and utilities
- Deviations allowed but must be justified

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BACT Evaluation – Economic Analysis

- Criteria to use are:
  - average cost effectiveness ($/ton)
  - incremental cost effectiveness ($/ton)
- Costs ($/ton removed) should be compared to costs of recent BACT decisions for that type of source
- An option can be eliminated if costs are disproportionately high compared to recent BACT determinations
- Typical ranges $5,000 to $15,000/ton

20

BACT Evaluation – Economic Analysis

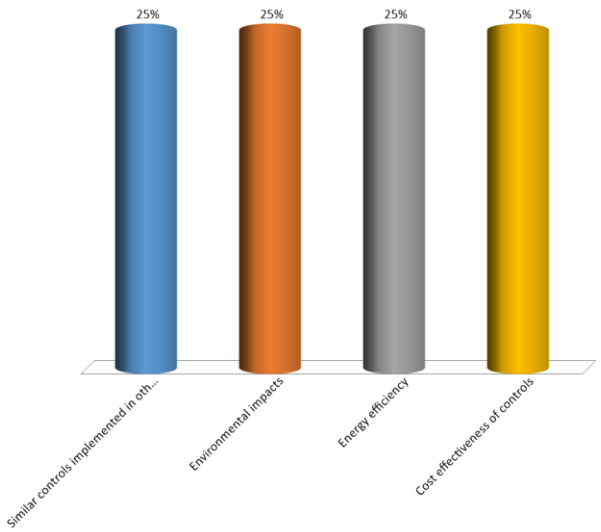
- Average Cost Effectiveness = $\frac{\text{total annualized costs of control}}{\text{annual emission reductions}}$

- Comparing multiple control options:
  - Incremental CE = $\frac{\text{total costs of Option A}}{\text{Option B emission rate} - \text{Option A emission rate}}$
  - Comparison is conducted on an annualized basis (i.e., annualized costs, annualized emission rates)
  - Used in Step 4

21

Which of the following is **NOT** a consideration when ranking BACT options?

✓A. Similar controls implemented in other states
B. Environmental impacts
C. Energy efficiency
D. Cost effectiveness of controls



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BACT Analysis Procedure – Steps 4 and 5

- Step 4. Evaluate most effective controls and emission limits achievable
  - Eliminate economically and environmentally infeasible control options
- Step 5. Evaluate best remaining control technologies, and select BACT
  - Cost data relatively objective
  - Other impact evaluations subjective
  - Option selected cannot cause NAAQS or increment exceedance

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BACT Evaluation – Choosing Emission Limits

- Express limits in terms of production to compare emissions for different size units
- For add-on controls that can achieve a range of control (depending on potentially many operating and non-operating variables), what performance level to choose?
  - Reasonable and customary designs
  - Vendor recommendations
  - Comparable to other recent permit actions

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Choosing Emission Limits for Complicated Operations and Emissions Units

- Multi-level (operating scenarios) BACT limits.
  - Normal Operations
  - Start-up (normally frequency/time and fuel use limitations). Examples:
    - Initial heating (unit and control device)
    - Refractory Soak and Seal Phase
    - Flame Stabilization Phase
  - Limit(s) During Malfunctions
  - Limit(s) During Maintenance
  - Limit(s) During Low Production Rates
  - Permitted work practices for shut-down procedures

25

Revising existing BACT limits in permits?

- Three main criteria (all three must be met):
  - The source was constructed in conformity with the permit (see 40 CFR 52.21(r)(1))
  - The permitted BACT levels are inappropriate as a result of errors, faulty data, or incorrect assumptions contained in the permit application
  - The source investigated all available options to reduce emissions and demonstrated that compliance cannot be achieved.

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Part 2: Air Quality Analysis

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Ambient Air Quality Analysis

- Air Dispersion Modeling is required to determine:
  - if pre-construction monitoring is required
  - compliance with the NAAQS and PSD increments
- Modeling must conform to EPA's "Guideline on Air Quality Models" (40 CFR 51, Appendix W)

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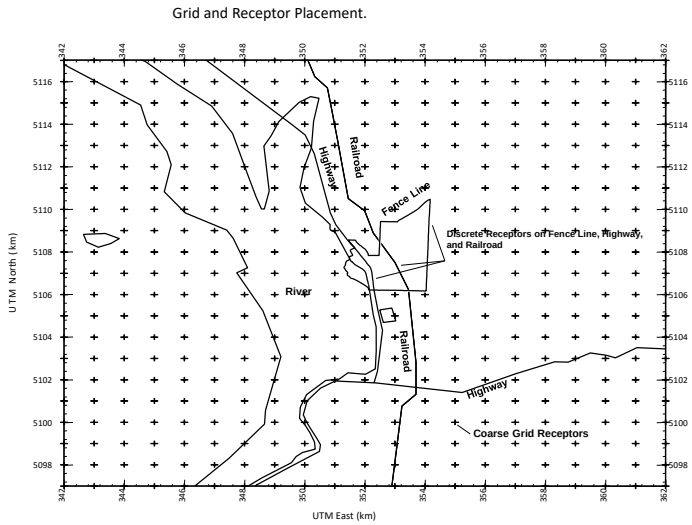
Ambient Air Quality Analysis



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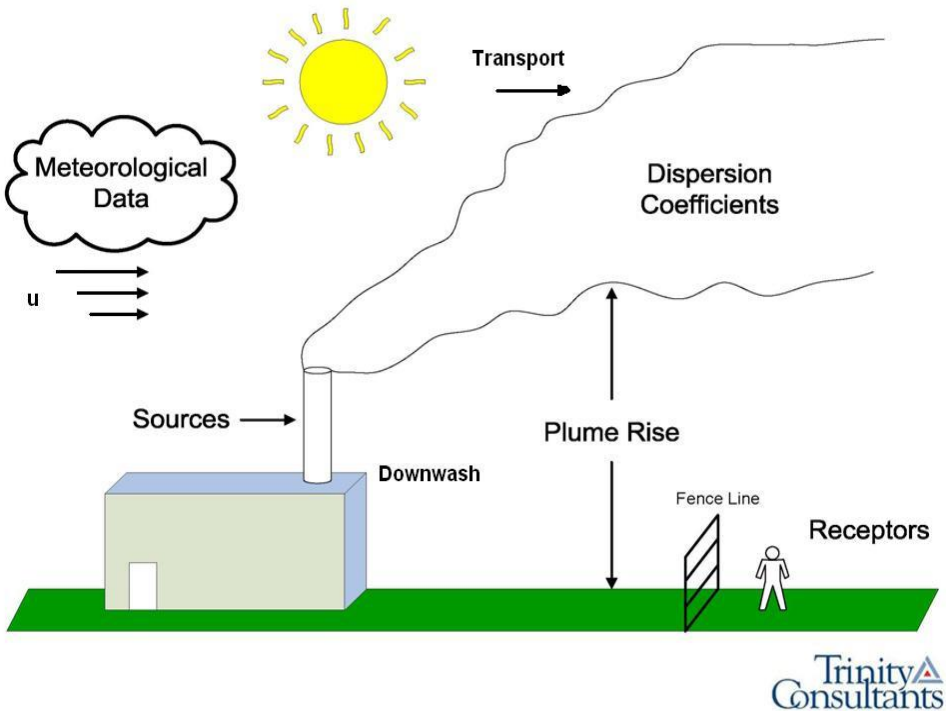

30

Four Basic Steps - PSD Modeling Analysis

1. Identify pollutants subject to review based on emissions (overall PSD applicability for the project)
   - Significant increase level (tpy) or
   - Regulated pollutant increase > 1 mg/m^3 , 24-hour average, if within 10 km of a Class I area
2. Identify radius of impact for each pollutant/averaging period
3. Develop source inventory (NAAQS and PSD increments)
4. Perform full impacts analysis to demonstrate compliance with NAAQS and PSD increments

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Additional Analysis

- When modeled impacts are > SIL, the following two additional analyses are required:
  - National Ambient Air Quality Standards (NAAQS) Analysis
  - PSD Increment Analysis
- Under certain circumstances, the NAAQS and PSD Increment analyses may be required whether or not the SIL is exceeded in the significance assessment

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PSD Increments

- Only PM (now $PM_{10}/PM_{2.5}$), SO_2, and NO_2 have established increment limits
- Emissions units that have been modified or added **since** the baseline date may have an effect on the increment and must be addressed in the PSD application
- The baseline date for emissions units located at major sources is the same everywhere and is only dependent upon the pollutant (1/6/75 for PM_{10} and SO_2; 2/8/88 for NO_2, 10/20/10 for $PM_{2.5}$)

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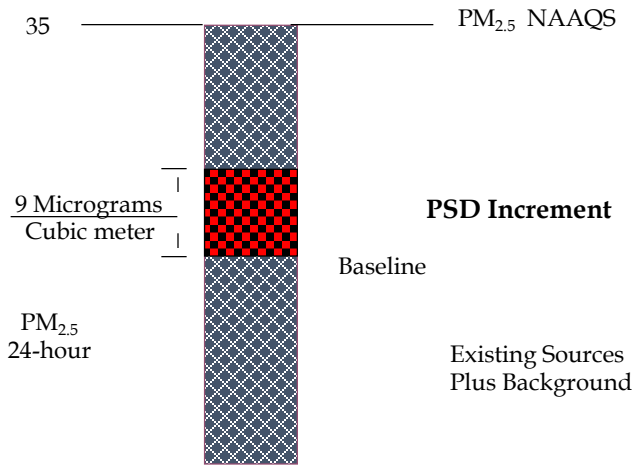
PSD Increment Limited



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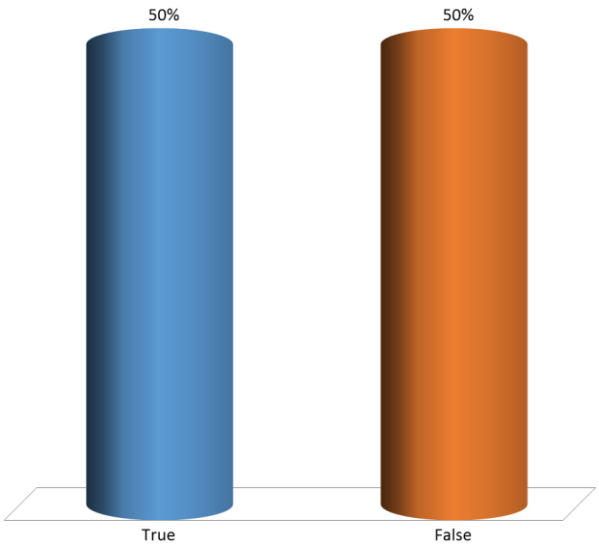
In the PSD Increment analysis, existing units which have been modified since the baseline date at other facilities must be addressed?

✔A. True

B. False



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Baseline Concentration Includes (Rule 62-210.200(30), F.A.C.

- Actual emissions from sources in existence on the minor source baseline date
- Except:
  - Actual emissions from a major source commencing construction after the major source baseline date
  - Actual increases and decreases at any source after the minor source baseline date
  - Allowable emissions of major sources which commenced construction before the major source baseline date but were not in operation by the applicable minor source baseline date

36

Increment Consumption

The following modifications consume increment:

- Actual emissions from major sources commencing **construction** after the major source baseline date
- Actual emission **increases** at **any** stationary source occurring after the minor source baseline date (must include secondary sources)

37

Increment Creation

The following modifications create increment:

- Reductions in emissions from sources included in the baseline concentration
- Physical changes that reduce ground-level impacts (i.e., stack height increases)

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Increment Summary

- In general, units emitting SO_2, PM, and/or NOx are either "in the baseline" sources (constructed/operated prior to the baseline date) or "increment consuming" sources (constructed/operated after the baseline date).

- Changes at emission units (emissions and/or structural elements such as buildings and stack heights) since the baseline date can complicate the increment assessment

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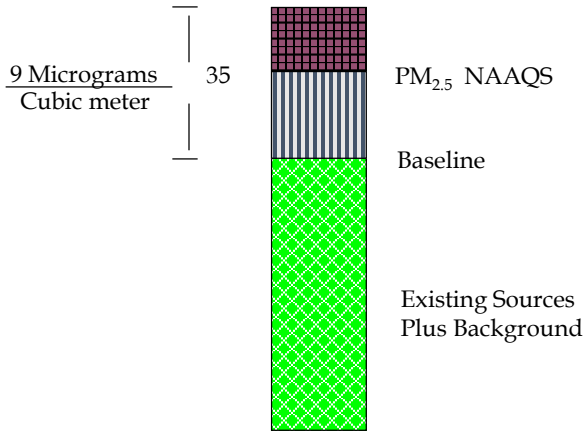
NAAQS Limited



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PSD Modeling

1. Perform net emissions increase calculations for each pollutant
2. Perform significance analysis, modeling for all pollutants that exceed the PSD SERs.
   - The emission rate can take into account proposed limits and control equipment
3. Compare results to the Modeling Significance Levels (MSLs) and Significant Impact Levels (SILs).

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Class I Areas - Modeling Significance Levels

Pollutant	Annual SIL ($\mu g/m^3$)	24-hour SIL ($\mu g/m^3$)	8-hour SIL ($\mu g/m^3$)	3-hour SIL ($\mu g/m^3$)	1-hour SIL ($\mu g/m^3$)
$PM_{2.5}$	0.05	0.27	-----	-----	-----
PM_{10}	0.16	0.32	-----	-----	-----
SO_2	0.08	0.2	-----	1	-----
NO_2	0.1	-----	-----	-----	-----

- Class I SILs for pollutants/averaging periods with increment standards only. NAAQS compliance is assumed in Class I areas if demonstrated near the facility. Revised $PM_{2.5}$ SILs of 0.27 $\mu g/m^3$ (24-hour) and 0.05 $\mu g/m^3$ (annual) recommended by EPA on April 17, 2018.

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Class II Areas Near the Facility - SIL

Pollutant	Annual SIL (µg/m³)	24-hour SIL (µg/m³)	8-hour SIL (µg/m³)	3-hour SIL (µg/m³)	1-hour SIL (µg/m³)
$PM_{2.5}$	0.2**	1.2	-----	-----	-----
PM_{10}	1	5	-----	-----	-----
SO_2	1	5	-----	25	7.8*
NO_2	1	-----	-----	-----	7.5*
CO	-----	-----	500	-----	2,000

- * Interim values
- ** EPA allows states to use alternate SILs if properly justified, but does not allow a value higher than 0.3 µg/m³ (Annual) or 1.2 µg/m³ (24-hour). See Handout 7-H.

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NAAQS Analysis (Class II Area)

- NAAQS analysis is based on the total estimated air quality – the sum of ambient estimates resulting from existing sources
- Consists of the following:
  - Existing modeled sources
  - Measured background concentrations
  - Modeled ambient impact of proposed source emissions increase

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NAAQS Analysis

1. Determine the Radius of Impact for each pollutant that exceeded SIL (may be different for each averaging period)
   - Impact area is a circular area with a radius extending from the source to the most distant receptor where a significant impact will occur (impact > SIL)

2. Modeling domain for NAAQS and Increment modeling will be defined by Radius of Impact or 50 km, whichever is less (Appendix W Section 8.1)

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NAAQS Analysis

3. Model the facility's potential emissions and the inventory of "nearby" sources of emissions
   - "Nearby" sources – model potential emissions or actual emissions based on past 2 years of operations where available.

4. Compare the results to the NAAQS standards
   - Primary NAAQS – established for protection of public health
   - Secondary NAAQS – established for protection of public welfare

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Primary NAAQS

Pollutant	Calendar Quarter (µg/m³)	Annual (µg/m³)	24-hour (µg/m³)	8-hour (µg/m³)	3-hour (µg/m³)	1-hour (µg/m³)
PM_{10}	-----	~~50~~	150	-----	-----	-----
$PM_{2.5}$	-----	12	35	-----	-----	-----
SO_2	-----	~~80~~	~~365~~	-----	-----	196
NO_2	-----	100	-----	-----	-----	188
CO	-----	-----	-----	10,000	-----	40,000
Lead	0.15	-----	-----	-----	-----	-----
Ozone	-----	-----	-----	137	-----	~~235~~

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Secondary NAAQS

Pollutant	Calendar Quarter (µg/m³)	Annual (µg/m³)	24-hour (µg/m³)	8-hour (µg/m³)	3-hour (µg/m³)	1-hour (µg/m³)
PM_{10}	-----	~~50~~	150	-----	-----	-----
$PM_{2.5}$	-----	12	35	-----	-----	-----
SO_2	-----	-----	-----	-----	1,300	-----
NO_2	-----	100	-----	-----	-----	-----
CO	-----	-----	-----	-----	-----	-----
Lead	0.15	-----	-----	-----	-----	-----
Ozone	-----	-----	-----	137	-----	~~235~~

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Part 3: Additional Impacts Analysis

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Additional Impacts Analysis

- Required in all PSD applications
- Scope of analysis depends on sensitivities in the area around the proposed new source or modification (e.g., Class I Area)
- Analysis tends to be qualitative (in most applications)
  - Potential adverse impacts can often be discerned against secondary NAAQS (public welfare, including environment)
  - Non-air quality assessments can be considered

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Additional Impacts Analysis

- Analyzes impairment to visibility, soils, and vegetation that occurs as a result of:
  - The new source or modification; and
  - General commercial, residential, industrial, or other growth associated with the source or modification.

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Additional Impacts Analysis

- 1980 EPA Guidance – A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals presents a 7 step procedure:
  1. Estimating Maximum Concentrations
  2. Screening for Direct Impacts
  3. Calculating Deposited Soil Concentrations
  4. Calculate Increase over Endogenous Soil Concentration
  5. Calculate Potential Concentrations in Plant Tissue
  6. Screen for Potential Adverse Impacts from Trace Elements
  7. Consider Effects of Solubility
- Focus is on impacts to plants and soils

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Applicable Acts - Addressed Case-by-Case

- Addressed on a location-by-location basis:
  - Fishery Conservation and Management Act (1976)
    - The Act provides for management of fish and other species in the Economic Exclusion Zone (EEZ)
      - Coastal waters
      - Plans drawn up by Regional Councils and reviewed and approved by the Secretary of Commerce
  - Endangered Species Act (1973)
    - Biological Assessments
      - Protected Species
      - Protected Habitats
  - National Historic Preservation Act (1966)
    - Cultural Resources
    - National Register of Historical Places
    - Archeological Assessments

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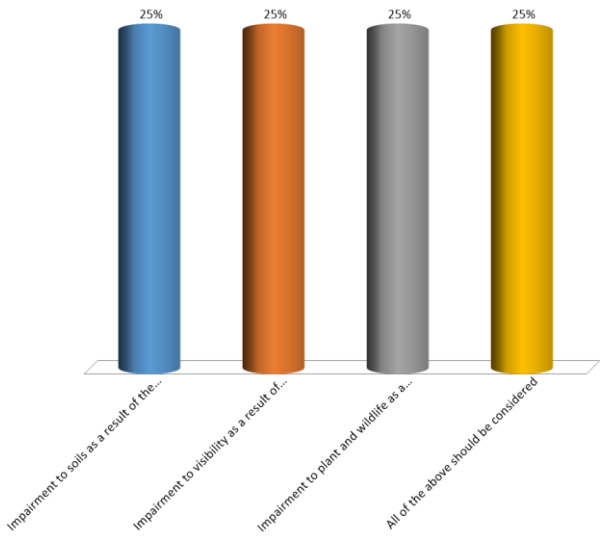
Which of the following would not be addressed in the additional impacts analysis?

A. Impairment to soils as a result of the project

B. Impairment to visibility as a result of the project

C. Impairment to plant and wildlife as a result of the project

✔D. All of the above should be considered



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Part 4: Class I Area Analysis

55

Air Quality Area Classifications

- **Class II Area:** areas of the country protected under the Clean Air Act, but identified for somewhat less stringent protection from air pollution damage than a Class I area, except in specified cases.
- **Class I Area:** the following areas that were in existence as of August 7, 1977:
  - National parks over 6,000 acres;
  - National wilderness areas and national memorial parks over 5,000 acres; and
  - International parks.

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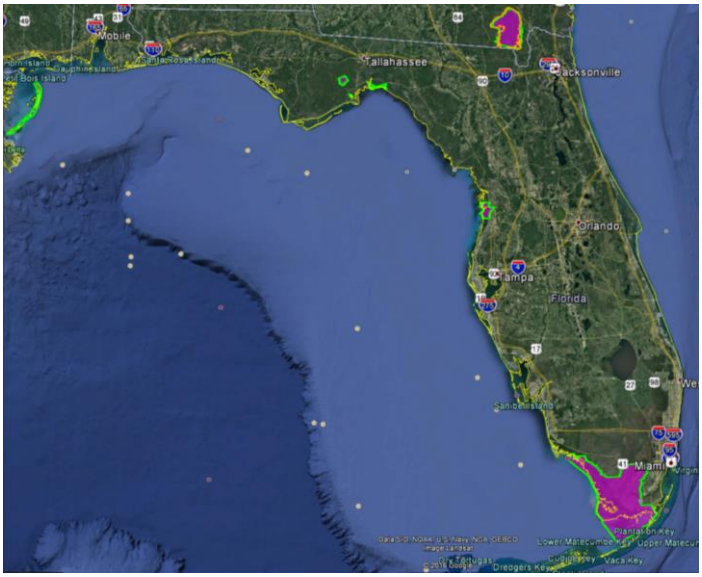
Florida Class I Areas



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Class I Areas

- The PSD rules provide Class I area protection in two ways
  - Class I PSD Increment
  - Air Quality Related Values (AQRV)

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Class I Area Increment Analysis

- Analyses of Class I Increment and AQRV are typically required if the location of the source is less than 100 kilometers from the closest edge of the nearest Class I Area
  - smaller sources *may* be exempted from AQRV assessments based on Q/D criteria
  - larger sources beyond 100 kilometers must be evaluated against the Q/D criteria

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Class I Area AQRV – FLAG Process

- Focus of FLAG
  - Define sensitive AQRVs
  - Criteria for adverse impacts
  - Standard methods for PSD air quality analyses
  - Terrestrial effects of ozone
  - Aquatic and terrestrial effects of wet and dry pollutant deposition
  - Visibility
  - Process and policy issues

60

Nonattainment NSR Overview

61

Nonattainment Areas

- Nonattainment areas are areas where modeled or monitored violations of the National Ambient Air Quality Standards exist
- Attainment and nonattainment designations are made by the US EPA and are published in 40 CFR Part 81

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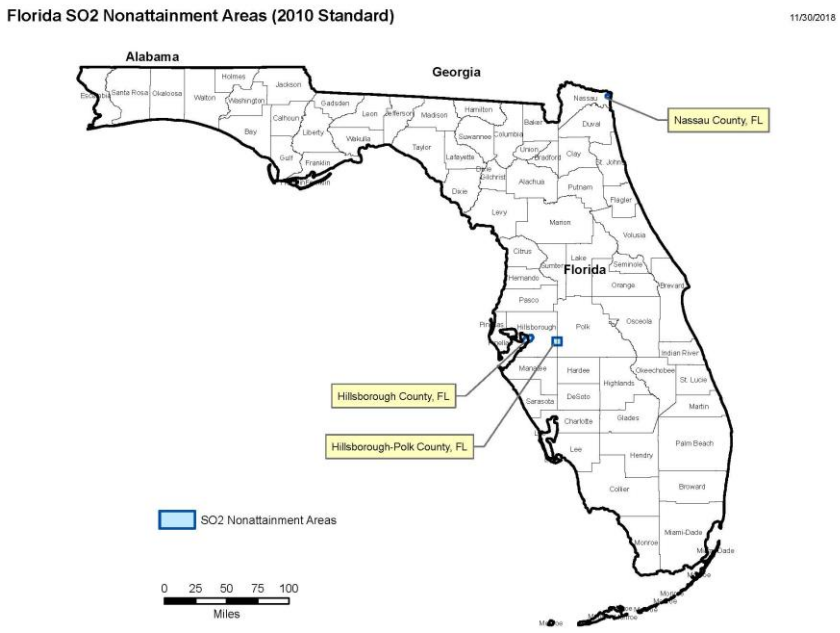

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Nonattainment NSR Applicability

Similar PSD applicability criteria apply:

- "Actual-to-Potential" and "BAE to PAE" applicability criteria for new and modified emission units, respectively
- Hybrid Test – sum of emissions increases for a project involving new and modified units is compared to SERs to determine NA-NSR applicability
- "Netting" can be applied in a similar manner

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Nonattainment NSR Applicability

- The NA contemporaneous period is the same as PSD (5 years) is defined in the SIP and under Rule 62-212.500, F.A.C.
- Significant emission rates (SER) remain the same as PSD
- Major Stationary Source thresholds remain the same (>250 tpy of >100 tpy for List of 28)
  - A source can be major for a nonattainment pollutant and minor for attainment pollutants and vice versa
- Fugitive emissions are included or excluded based on the same criteria (industry type) as PSD

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Lowest Achievable Emission Rate (LAER)

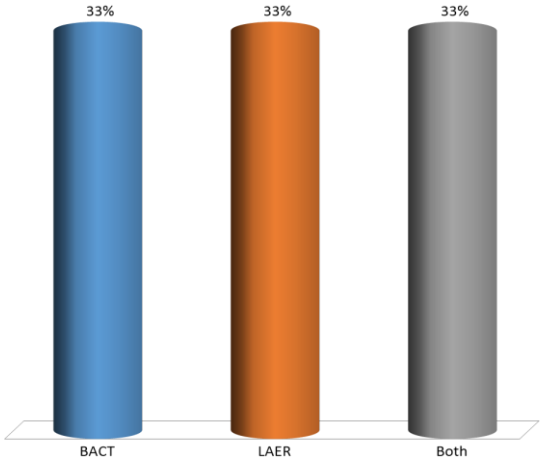
Equivalent to BACT for PSD with key differences:

1. Most stringent emission limitation contained in **any** SIP or achieved in practice
2. LAER is the emission rate (not technology) that can be achieved by any or all of the following:
   - Add-on control technology
   - Process changes
   - Changes in raw materials
   - LAER may be a work practice
3. Applicant can not use economic, energy, or other environmental factors to disqualify a process/technology

66

A facility is a PSD major source and located in a nonattainment area for SO_2. The facility applies for a permit for a project which would result in a net emissions increase of 45 tons of NO_X and 35 tons of SO_2. The SERs for both NO_X and SO_2 are 40 tpy. Which of the following is triggered by the project?

✓A. BACT
B. LAER
C. Both



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LAER Process

- Determine what the most stringent SIP limit is for emission unit in question (anywhere in country)
  - Disqualify SIP limits for which no emission units in source category could meet
- Verify no units have achieved more stringent emission limits
- Evaluate new or emerging technologies for application

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