Clean Air Act: Stationary Source Permits and Other Technical Topics

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Ben Holden

- Managing Consultant | Trinity Consultants
  - Mr. Holden has more than fifteen years of experience in Clean Air Act (CAA) environmental consulting. He serves in Trinity's Chemical Sector Services Group and as co-chair of the Arkansas Environmental Federation (AEF) Air Committee.
  - Mr. Holden earned both a Bachelor of Science in Environmental Engineering and Master of Science in Engineering from the University of Arkansas. He holds a Professional Engineer license in Arkansas.

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Trinity Consultants Overview

- Over 1,200 employees
- 60+ offices in North America, the UK, the Middle East, and Asia
- Serve more than 2,000 clients annually
- EHS consulting services
- ISO 9001 quality management system, certified in Dallas HQ
- Headquarters in Dallas, TX
- 1996: Little Rock office established

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Clean Air Act and Permitting Background

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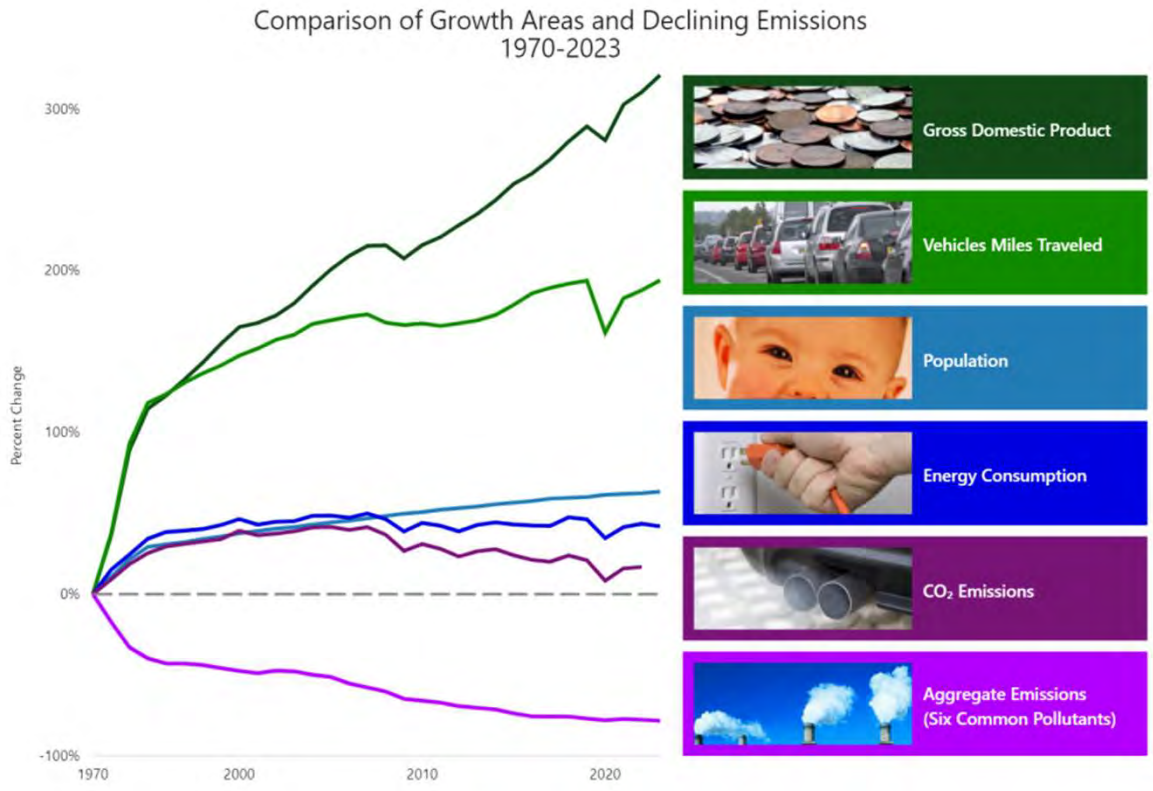
Brief History of Federal Clean Air Act

1967 Air Quality Act, 1970 Clean Air Act, 1977 CAA Amendments, 1990 CAA Amendments (Title V permits, MACT, Acid Rain, etc.), *2009+ Greenhouse Gas Rules & Regulations*

- Title I - Air pollution prevention and control
- Title II - Moving sources
- Title III - General
- Title IV - Acid deposition control
- Title V - Federal operating permits
- Title VI - Stratospheric ozone protection

Note: Titles refer to CAA as amended, not to titles of the 1990 Clean Air Act Amendments

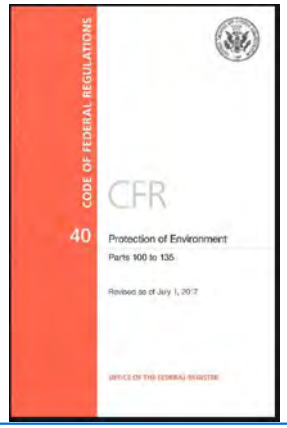
CAA: A Regulatory Success Story



Source: [Accomplishments and Successes of Reducing Air Pollution from Transportation in the United States | US EPA]

Code of Federal Regulations

- CFR is massive set of federal regulations affecting many areas, including environment
- Title 40: Protection of Environment
- Chapter 1, Subchapter C, Parts 50 - 99 contain air regulations
- Arkansas air permittees most directly affected by Part 60 (NSPS), Parts 61 & 63 (NESHAP), and Part 52 (PSD, for largest facilities)



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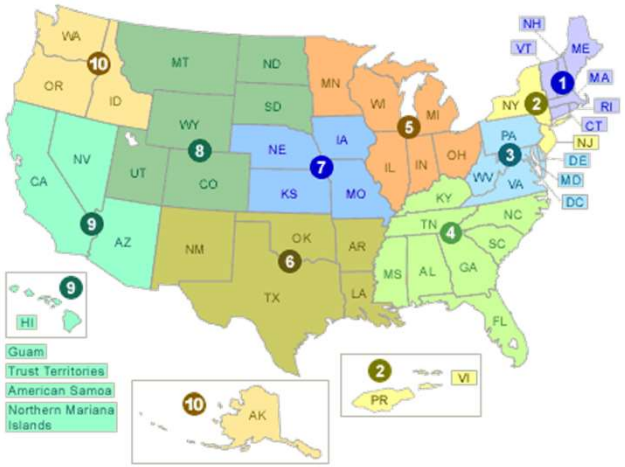
U.S. EPA

- U.S. EPA Headquarters – Ariel Rios Building at Federal Triangle in Washington, D.C.
- 10 Regions in United States
- Region 6 - Dallas
  - Arkansas
  - Louisiana
  - New Mexico
  - Oklahoma
  - Texas



- Federal agency responsible for protecting human health and the environment

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Who Needs an Air Permit?

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Who Needs an Air Permit?

- New or modified "sources" of air emissions
  - "Source" is an entire industrial facility, i.e., power plant, oil refinery, paper mill, sawmill
  - Residential usually excluded
  - Mobile source emissions excluded
  - Commercial/educational/govt sites ARE often regulated
    - E.g., Hospitals, universities, military

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When Must You Get A Permit?

- NEW "greenfield" facility or new air pollution emitting equipment installed at existing facility
- Existing equipment/processes to be physically MODIFIED so that process rates and/or emissions rates increase
- Need to CHANGE LIMIT in an existing air permit (production rates, raw material parameters, new applicable regulation in effect)
- Applicability based on POTENTIAL TO EMIT (PTE)

NOTE: Almost always Almost always, sources must obtain a permit prior to commencement of construction, modification, or operation.

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Air Permit Application Types

- **PSD Preconstruction Permit**
- **Title V – Initial/Renewal**
  - Operational Flexibility (Section 502(b)(10) Change)
  - Off-Permit Changes
  - Administrative Amendments
  - Minor Permit Modifications
  - Significant Permit Modifications
- **Minor NSR**
  - Depend on SIP
- **Arkansas State Only Allowances**
  - Temporary Variance
  - Interim Authority

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What is an Emissions Source?

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Obvious Emissions Sources

- Tall stacks

- Equipment with visible emissions (smoke or dust)

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Not-So-Obvious Sources

- Liquid storage tanks (vented to atmosphere)
- Surface coating operations (painting)
- Cleaning solvents
- Natural gas-fired equipment
- Chemical piping & equipment fugitives
- Wastewater treatment operations
- Dust from plant haul roads

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Is it an Emissions Source?

Rule of thumb definition:

If it smokes, smells, dusts, or burns fuel, then it is probably an emissions source that needs to be addressed in the air permit

- Paraphrased Rule 18 definition:

"Equipment" means any device, except for mobile sources, capable of causing the emission of an air contaminant … and any stack or vent serving the equipment

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What Is An Air Pollutant?

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Federal Air Pollutants

- Several categories of pollutants are regulated for air quality permitting purposes:
  - Federal Criteria Pollutants
    - e.g., NO_2, CO, ozone, SO_2, lead, $PM_{10/2.5}$
    - Regulated through ambient air quality standards and control standards
  - "Other regulated pollutants" (e.g., H_2S, TRS, under various NSPS)
  - Toxic Air Pollutants
    - 186 +/- Hazardous Air Pollutants (HAPs) regulated through NESHAPs control standards
  - Greenhouse Gases (not normally included in air permits)
    - CO_2, CH_4, N_2O, HFCs, PFCs, & SF_6

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Arkansas Air Contaminants

- "Air contaminant" is an Arkansas state regulation term
  - Very broad
  - More broad than federal air pollutants
- Paraphrased Rule 18 Arkansas definition:

"Air contaminant" means any solid, liquid, or gas, ... other than water vapor, oxygen, carbon dioxide, nitrogen, hydrogen, and inert gases

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Common Air Pollutants

COMMON POLLUTANT	TYPICAL SOURCES
PARTICULATE MATTER (DUST & SMOKE) (PM, PM_{10}, $PM_{2.5}$)	MATERIAL HANDLING, FUEL COMBUSTION
SULFUR DIOXIDE (SO_2)	FUEL COMBUSTION, PETROCHEMICAL PLANTS ($S + O_2 + HEAT = SO_2$)
NITROGEN OXIDES (NO_X)	FUEL COMBUSTION ($N + O_2 + HEAT = NO_x$)
CARBON MONOXIDE (CO)	FUEL COMBUSTION ($HC + O_2 + HEAT = CO$)
VOLATILE ORGANIC COMPOUNDS (VOC)	PAINTING & SOLVENT USE OPERATIONS, PETROCHEMICAL PLANTS, GASOLINE STORAGE/TRANSFER
OZONE (O_3)	PRODUCED FROM PRECURSORS ($VOC + NO_X + HEAT/SUNLIGHT = O_3$)
HAZARDOUS AIR POLLUTANTS (HAP)	PAINTING OPERATIONS, PETROCHEMICAL PLANTS
AIR TOXICS: ACETONE, AMMONIA, HYDROGEN SULFIDE, ETC.	POLLUTANTS THAT DON'T FIT IN ANY OTHER CATEGORY
GREENHOUSE GASES (GHGs), MAINLY CO_2 & METHANE – ONLY IN PSD PERMITS	- CO_2 FROM FUEL COMBUSTION - METHANE (CH_4) FROM NATURAL GAS INDUSTRY

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Ambient Air Monitoring

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Pollutant [links to historical tables of NAAQS reviews]		Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide (CO)		primary	8 hours	9 ppm	Not to be exceeded more than once per year
			1 hour	35 ppm	
Lead (Pb)		primary and secondary	Rolling 3 month average	0.15 µg/m^3	Not to be exceeded
Nitrogen Dioxide (NO_2)		primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		primary and secondary	1 year	53 ppb	Annual Mean
Ozone (O_3)		primary and secondary	8 hours	0.070 ppm	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particle Pollution (PM)	$PM_{2.5}$	primary	1 year	9.0 µg/m^3	annual mean, averaged over 3 years
		secondary	1 year	15.0 µg/m^3	annual mean, averaged over 3 years
		primary and secondary	24 hours	35 µg/m^3	98th percentile, averaged over 3 years
	PM_{10}	primary and secondary	24 hours	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO_2)		primary	1 hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year

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Measurement of Ambient Air Pollution

- State and Federal ambient monitoring networks for NAAQS
- "Nonattainment" designations
  - Generally based on 3-years of data
- Areas can move in and out of Nonattainment

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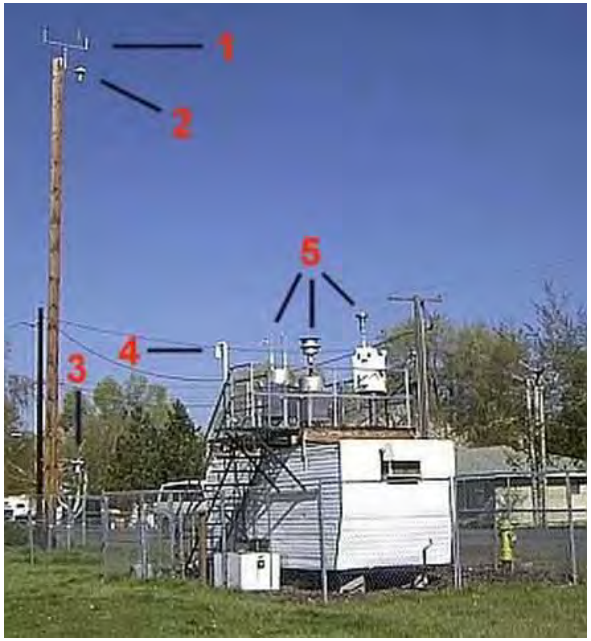
Air Pollution Monitoring Stations



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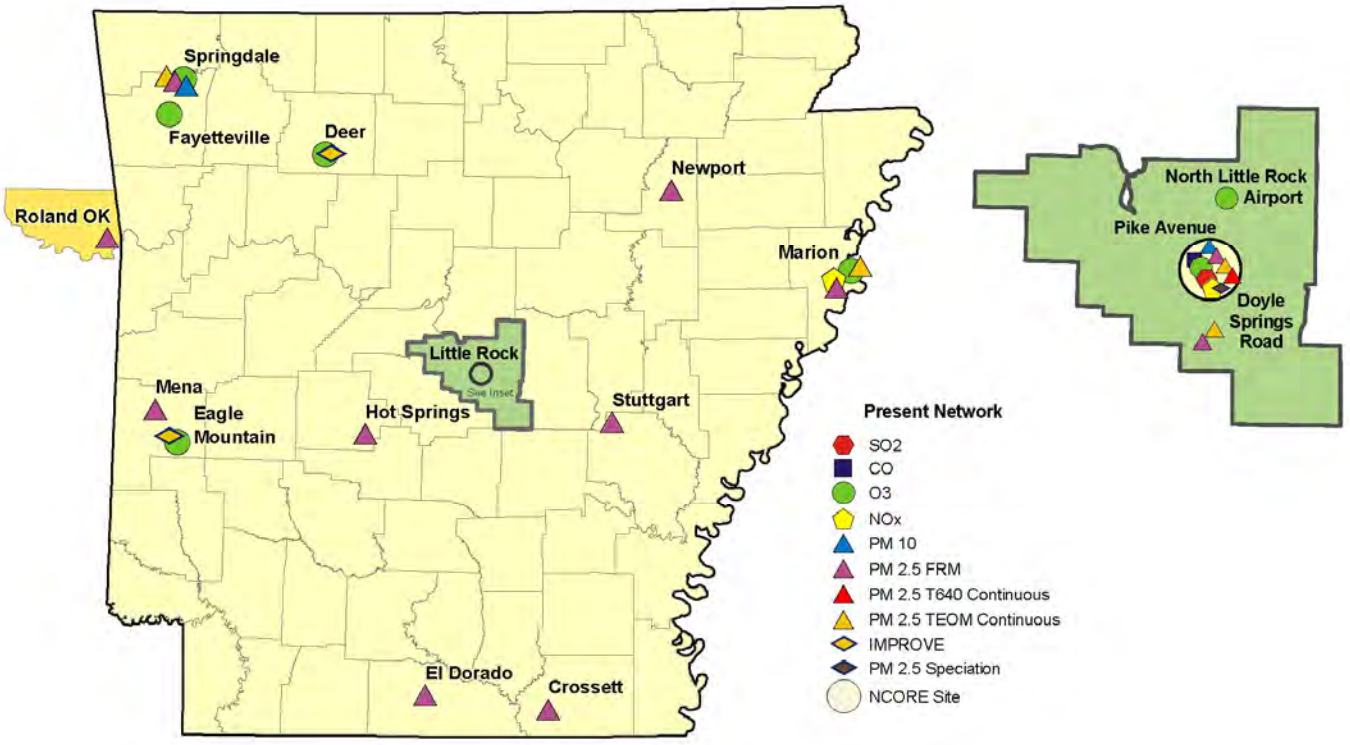
Air Pollution Monitors in Arkansas



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Where Do You Get a Permit

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Who Issues Air Permits?

- Usually State Agencies
- Arkansas DEQ, Georgia EPD, Indiana DEM
- Or City/County Agencies
- Shelby County (TN) Health Dept – Pollution Control Section
- U.S. EPA has Federal lands (Indian Tribes) and oversight on the States

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Arkansas Dept. of Energy & Environment Division of Environmental Quality (DEQ) Office of Air Quality

- Implements most all federally required air permitting regulations
  - Plus state-only air regulations
- Headquartered in North Little Rock, AR
- Multiple Sections in Office of Air Quality
  - Permits
  - Compliance (Field Inspectors)
  - Policy & Planning (regulatory development, emissions inventories)
  - Enforcement and Asbestos

URL: http://www.adeq.state.ar.us

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State vs. Federal Regulations

- Federal regulations only half the story
- Federal regulations implemented fairly consistently across all states
- States are allowed to be more stringent than federal regulations if they so choose
- Each state has own regulations & permitting programs – no two are the same!

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Menu of Arkansas Air Permitting Regulations & Policies

- **Rule 18** – Air Pollution Control Code (state-only enforceable)
- **Rule 19** – Regulations of the Arkansas Plan of Implementation for Air Pollution Control (federally enforceable)
- **Rule 26** – Title V Operating Permit Program (federally enforceable)
- **Rule 31** – Non-Attainment NSR (federally enforceable)
- **Non-Criteria Pollutant Control Strategy** – DEQ policy for air toxics (latest version is dated April 2015) *More information later*
- **DEQ Air Permit Screening Modeling Instructions** – Internal DEQ policy for how/when/who for dispersion modeling (latest version is dated October 2017) *Copy in Appendices*

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Arkansas Permitting

- Single permit system in Arkansas for both construction & operation
  - Many states have two-permit system: a "simple" preconstruction permit followed by more complex operating permit
- Arkansas permit combines federal & state-only requirements in single permit & denotes which is which (via regulatory citation at end of permit condition)

> 73. The permittee shall maintain monthly records of the amount of gasoline received at SN-37. These records shall be kept on site, made available to Department personnel upon request and shall be submitted in accordance with General Provision 7. [Reg.19.705, and 40 C.F.R. Part 52, Subpart E]

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DEQ Permitting Classifications

De Minimis Emissions (no permit or registration required)	Registration Program Ranges (based on actual emissions)	Minor Source Permit Thresholds (Rule 18 or 19 permit) (actual emissions)	Title V Thresholds (Rule 26 permit) (based on permitted emissions
< 40 tpy CO < 25 tpy NO_x, SO_2, VOC < 15 tpy PM < 10 tpy PM_{10} < 1 tpy single HAP < 3 tpy total HAP …. and not specifically required to have permit under Rule 18.301(B)	40-75 tpy CO 25-40 tpy NO_x, SO_2, VOC 15-25 tpy PM 10-15 tpy PM_{10} 1-2 tpy single HAP 3-5 tpy total HAP …. and not specifically required to have permit under Rule 18.301(B)	≥ 75 tpy CO ≥ 40 tpy NO_x, SO_2, VOC ≥ 25 tpy PM ≥ 15 tpy PM_{10} ≥ 10 tpy $PM_{2.5}$ ≥ 0.5 tpy lead ≥ 2 tpy single HAP ≥ 5 tpy total HAP ≥ 25 tpy other pollutant	≥ 100 tpy federal pollutant ≥ 10 tpy single HAP ≥ 25 tpy total HAP … or specifically required to have a Title V permit under NSPS or NESHAP

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PART 70/TITLE V
OPERATING PERMIT PROGRAM REQUIREMENTS

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Title V Permits

- Most state programs began ~1995-1998
- Required ALL major sources to obtain federally approved, state administered operating permits
- All CAA “applicable requirements” in one document
- Requires annual compliance certifications & semi-annual compliance monitoring reports
- Renewed every 5 years
- Synonyms
  - “Part 70 Permit”
  - “Title V Permit”
  - “Major Source Operating Permit”

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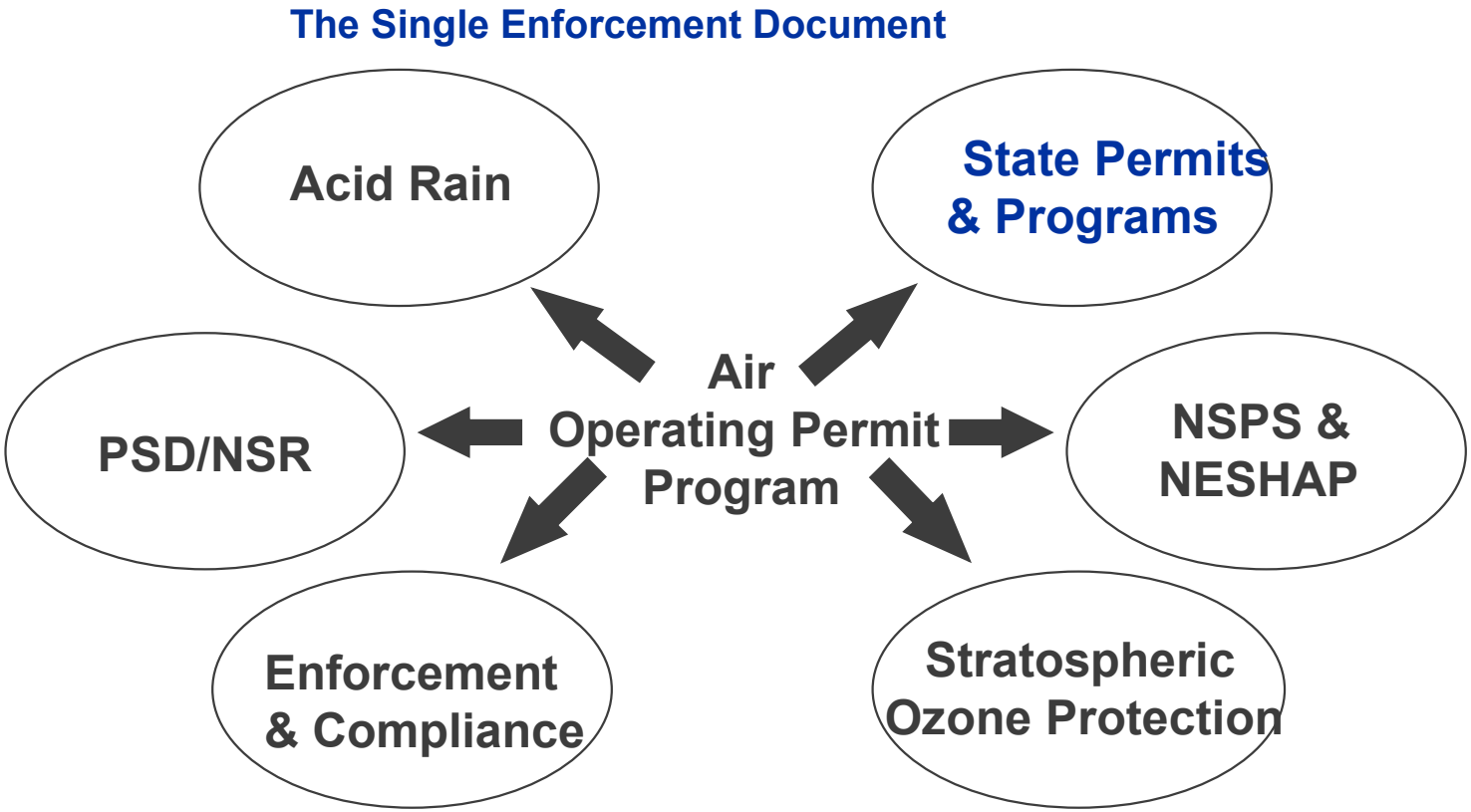
Title V Operating Permit



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When?
Major vs. Minor Sources

- "Major Source" status based on facility total emissions (per pollutant)
- NSR/PSD Major: PTE >250 tpy of any NSR regulated pollutant or 100 tpy if listed source type (e.g., pulp mill, chemical plant, refinery)
- HAP Major: PTE >10 tpy any HAP or >25 tpy of combined HAPs
- Title V/Part 70 Major: PTE >100 tpy of any regulated pollutant, or HAP Major
- Minor = Anything that's not major
- Existing (or future) permits can synthetically "limit" your PTE

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Prevention of Significant Deterioration (PSD)
(also called major New Source Review [NSR])

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Major New Source Review (NSR) Permitting Program

- Air permitting for construction of new major sources or major modifications to existing sources
  - Prevention of Significant Deterioration (PSD)
  - Nonattainment Area Review
- Most every state also has a Minor NSR Permit Program
  - As defined in their SIP and SIP Regulations

PSD Factoids

- Long lead times for application and permit (12-18 months)
- PSD logic is not the same as routine air permitting logic!
- Is well worth avoiding if at all possible
  - PSD “avoidance” exercises a big part of air permitting for PSD major stationary sources
- Volumes of guidance issued by EPA
- More gray areas than black & white
- The most painful of all permitting programs!

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"List of 28" (100 tpy PSD Major Source Threshold)

Threshold for all other source categories is 250 tpy

- *Mainly the old "smokestack" industries*

1. Fossil-fuel fired steam electric plants of >250 MMBtu/hr heat input
2. Coal cleaning plants (with thermal dryers)
3. Kraft pulp mills
4. Portland cement plants
5. Primary zinc smelters
6. Iron and steel mills
7. Primary aluminum ore reduction plants
8. Primary copper smelters
9. Municipal incinerators capable of charging > 250 tons of refuse/day
10. Hydrofluoric acid plants
11. Sulfuric acid plants
12. Nitric acid plants
13. Petroleum refineries
14. Lime plants
15. Phosphate rock processing plants
16. Coke oven batteries
17. Sulfur recovery plants
18. Carbon black plants (furnace process)
19. Primary lead smelters
20. Fuel conversion plants
21. Sintering plants
22. Secondary metal production facilities
23. Chemical process plants
24. Fossil-fuel boilers of >250 MMBtu/hr
25. Petroleum storage and transfer facilities with capacity exceeding 300,000 barrels
26. Taconite ore processing facilities
27. Glass fiber processing plants
28. Charcoal production facilities

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PSD Major Modification Thresholds for Existing Major Sources

- Carbon monoxide: 100 tons per year (tpy)
- Nitrogen oxides: 40 tpy
- Sulfur dioxide: 40 tpy
- Particulate matter: 25 tpy
- PM_{10}: 15 tpy
- $PM_{2.5}$: 10 tpy
- Ozone: 40 tpy of volatile organic compounds or nitrogen oxides
- Lead: 0.6 tpy
- If another pollutant is triggered, then GHGs: 75,000 tpy CO_2e

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PSD Major Mod Thresholds for Existing Major Sources (cont'd)

- Fluorides: 3 tpy
- Sulfuric acid mist: 7 tpy
- Hydrogen sulfide (H_2S): 10 tpy
- Total reduced sulfur (including H_2S): 10 tpy
- Reduced sulfur compounds (including H_2S): 10 tpy

Note: There are also several limits for municipal waste combustor and landfill emissions

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Existing Facilities – PSD Applicability Steps

- PSD triggered for modification if there is a "significant emissions increase" and a "significant net emissions increase":
  - STEP 1: emissions changes specifically associated with project (includes debottlenecking components) > PSD major mod thresholds, AND
  - STEP 2: "net" emissions increases (within 5+ year time window) > PSD major mod thresholds
- Complex procedures allow netting out of PSD review if certain emissions decreases offset proposed emissions increases
- Netting ("contemporaneous") window is 5+ years
- Volumes of EPA guidance dedicated to the subject, lots of nuance

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What Goes Into An Air Permit Application?

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Permit Application Elements

- Site plans, process description, and equipment information
- Emission estimates
- Applicable CAA regulations
- Control Technology Evaluation (BACT), if req'd
- Air Quality Analysis (Monitoring and/or Modeling), if req'd
- Toxics Evaluation, if required by agency
- State Forms and Certification by Responsible Official

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What's in an Application? A lot!

Checklist

Review the checklist below for items to include in your registration or application.

Included in Application?	Item	Registration	Initial Permit (New or existing Facility)	Renewal[2]	Significant, De Minimis or Minor Modifications	Administrative Amendment
☐	Applicant Information	Yes	Yes	Yes	Yes	Yes
☐	Certificate of Good Standing, Domestic and Foreign	Yes	Yes	Yes	Yes	No
☐	Disclosure Statement Form	Yes	Yes	Yes	No	No
☐	General Information	Yes	Yes	Yes	Yes	Yes
☐	Registration Information	Yes	No	No	No	No
☐	Title V Information	No	Title V Only	Yes	Title V Only	No
☐	Compliance Plan and Schedule	No	Title V Only	Yes	Title V Only	No
☐	Title V Permits - CAM Plan	No	No	Yes	No	No
☐	Title V Permits - 112(g) info	No	Maybe	Maybe	Maybe	No
☐	USEPA Acid Rain Forms	No	Maybe	Maybe	Maybe	No
☐	CSAPR Forms	No	Maybe	Maybe	Maybe	No
☐	PSD Information	Yes	Yes	Yes	Yes	Yes
☐	Request for Applicability of Class I Area Modeling Analysis Form	No	PSD Only Email to: AirPermits@adeq.state.ar.us	No	PSD Only Email to: AirPermits@adeq.state.ar.us	No
☐	Applicable Federal Regulations	Yes	Yes	Yes	Yes	No
☐	Detailed NSPS and NESHAP/MACT Requirements	Yes	Yes	Yes	Yes	No
☐	Process Description	Yes	Yes	Yes	Yes	No
☐	Process Flow Diagram	Yes	Yes	Yes	Yes	No
☐	Operating Scenarios	No	Yes	Yes	Yes	No
☐	Plot Plan	No	Yes	Yes	Maybe[1]	No
☐	USGS (Area) Map	No	Yes	Yes	Maybe[1]	No
☐	Property Description	No	Yes	Yes	No	No
☐	Calculations	Yes	Yes	Yes	Yes	Maybe
☐	Emission Rate Table Forms	No	Yes	Yes	Yes	No
☐	HAP Emission Rate Table Forms	No	Yes	Yes	Yes	No
☐	List of Insignificant Activities Forms	No	Yes	Yes	Yes	Maybe
☐	Internal Combustion Engine Summary Forms	No	Yes	Yes	Yes	No
☐	Control Equipment Operating Parameters Forms	No	Yes	Yes	Yes	Not Applicable
☐	Storage Tank Summary Forms	No	Yes	Yes	Yes	Yes
☐	Equipment Specifications	Yes	Yes	Yes	Maybe[1]	No
☐	Additional Information	No	Yes	Yes	Yes	No
☐	Certification of Application Form	Yes	Yes	Yes	Yes	Yes
☐	Certification of Compliance Form	No	Title V Only	Yes	Title V Only	Title V Only
☐	Certification of Minor Modification Form	No	No	No	Minor Mod Only	No
☐	Original Signed Application and Meets the Definition of a Responsible Official	Yes	Yes	Yes	Yes	Yes

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What Are Air Pollutant Emissions Controls?

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Emissions Controls

- Not all equipment is required to have add-on emissions controls
  - Required by Federal Rule
    - CAM, NSPS, NESHAP
    - Reasonable Available Control Technology (RACT)
    - Generally Available Control Technology (GACT)
    - Best Available Control Technology (BACT)
    - Lowest Achievable Emission Rate (LAER)
  - Required to meet Federal or State ambient air standard (i.e., modeling)
  - Required to maintain permit status (e.g., NSR minor source)
  - Can be voluntary (i.e., not driven by CAA or state rules).

Particulate or Metal HAP Control

- Wet Gas Scrubber
- Electrostatic Precipitator
- Baghouse/Fabric Filter
- Mist Eliminators
- Cyclone
- Low Sulfur Fuel
- Enclosure

Figure 14. Pulse Jet Fabric Filter

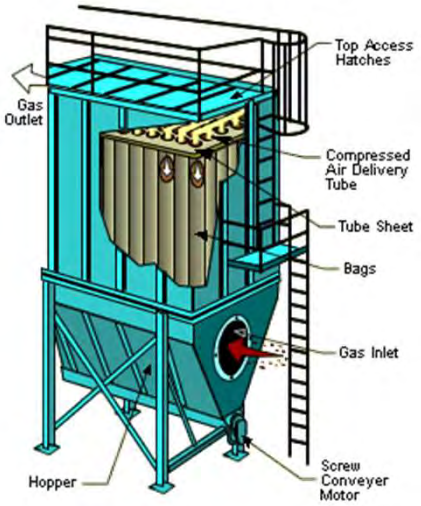
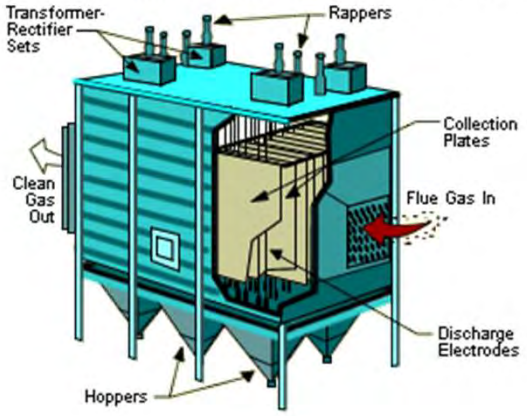


Figure 9. Conventional Electrostatic Precipitator



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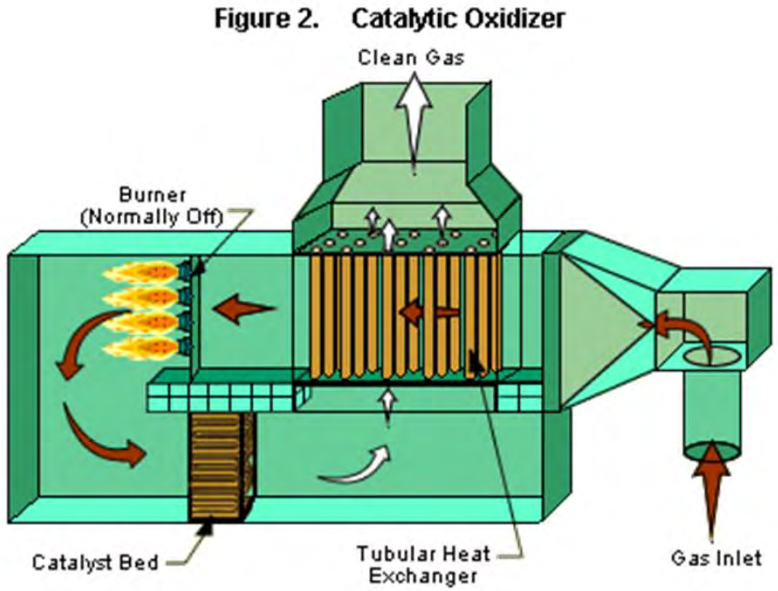
CO Controls

- Catalytic Oxidation
- Thermal Oxidation
- Good Combustion Practices



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NOX Controls

- Low NOX Burners
- Flue gas recirculation (FGR)
- Selective Catalytic Reduction (SCR)
- Selective Non-Catalytic Reduction (SNCR)
- Water/Steam Injection

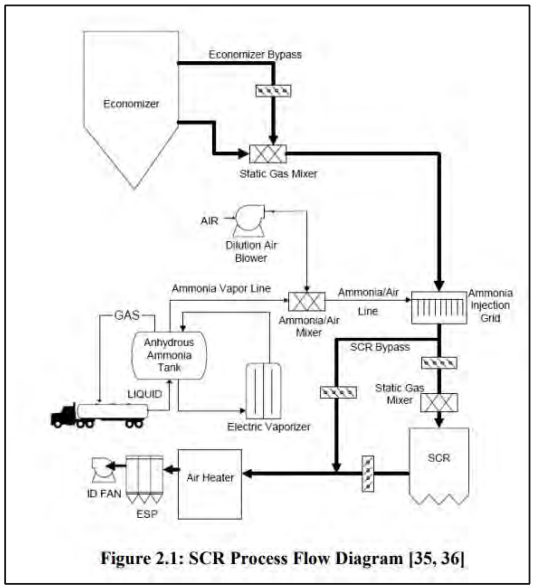

Figure 2.1: SCR Process Flow Diagram [35, 36]

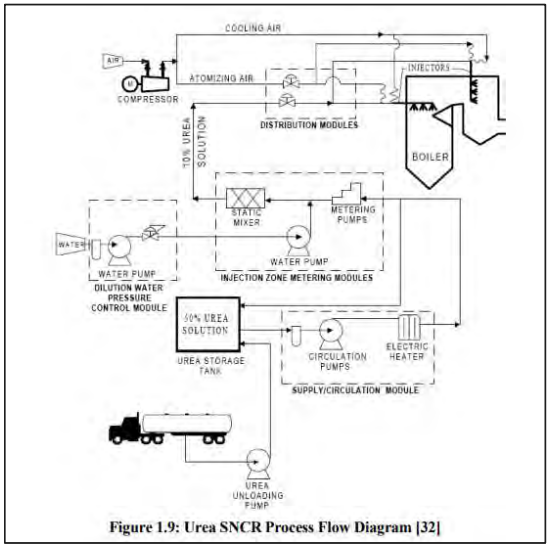

Figure 1.9: Urea SNCR Process Flow Diagram [32]

U.S. Environmental Protection Agency (EPA). (2017). *EPA Air Pollution Control Cost Manual, Chapter 7: Selective Catalytic Reduction (SCR) Cost Methodology*, 7th Edition (2016 revisions). Retrieved from https://www.epa.gov/sites/default/files/2017-12/documents/scrcostmanualchapter7thedition_2016revisions2017.pdf.

U.S. Environmental Protection Agency (EPA). (2017). *EPA Air Pollution Control Cost Manual, Chapter 8: Selective Non-Catalytic Reduction (SNCR) Cost Methodology*, 7th Edition (2016 revisions). Retrieved from https://www.epa.gov/sites/default/files/2017-12/documents/sncrcostmanualchapter7thedition20162017revisions.pdf.

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SO_2 Control

- Flue Gas Desulfurization
  - Wet Systems
  - Semi-dry Systems
  - Dry Systems
- Acid Gas Scrubber
- Alternative Fuels

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VOC and Organic HAP Control

- Thermal Oxidation/Flare
- Catalytic Oxidation
- Biofiltration Systems
- Condensation Systems
- Adsorption Systems
- Wet Scrubber Systems
- Leak Detection and Repair

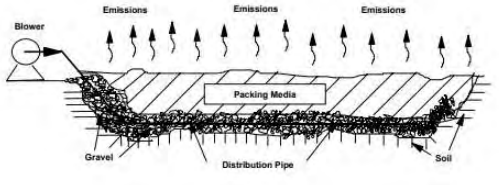

Figure 4 In-Ground Biofilter

Figure 5. Photograph of four Biofilters being installed in Arlington, TX At Central Regional Wastewater System Plant.

Figure 4 and Figure 5. Source: U.S. Environmental Protection Agency (EPA), *Bioreactor Landfills*, EPA-600/R-00/000, May 2000. Available at: https://www3.epa.gov/ttncatc1/dir1/fbiorect.pdf.

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What Is Dispersion Modeling?

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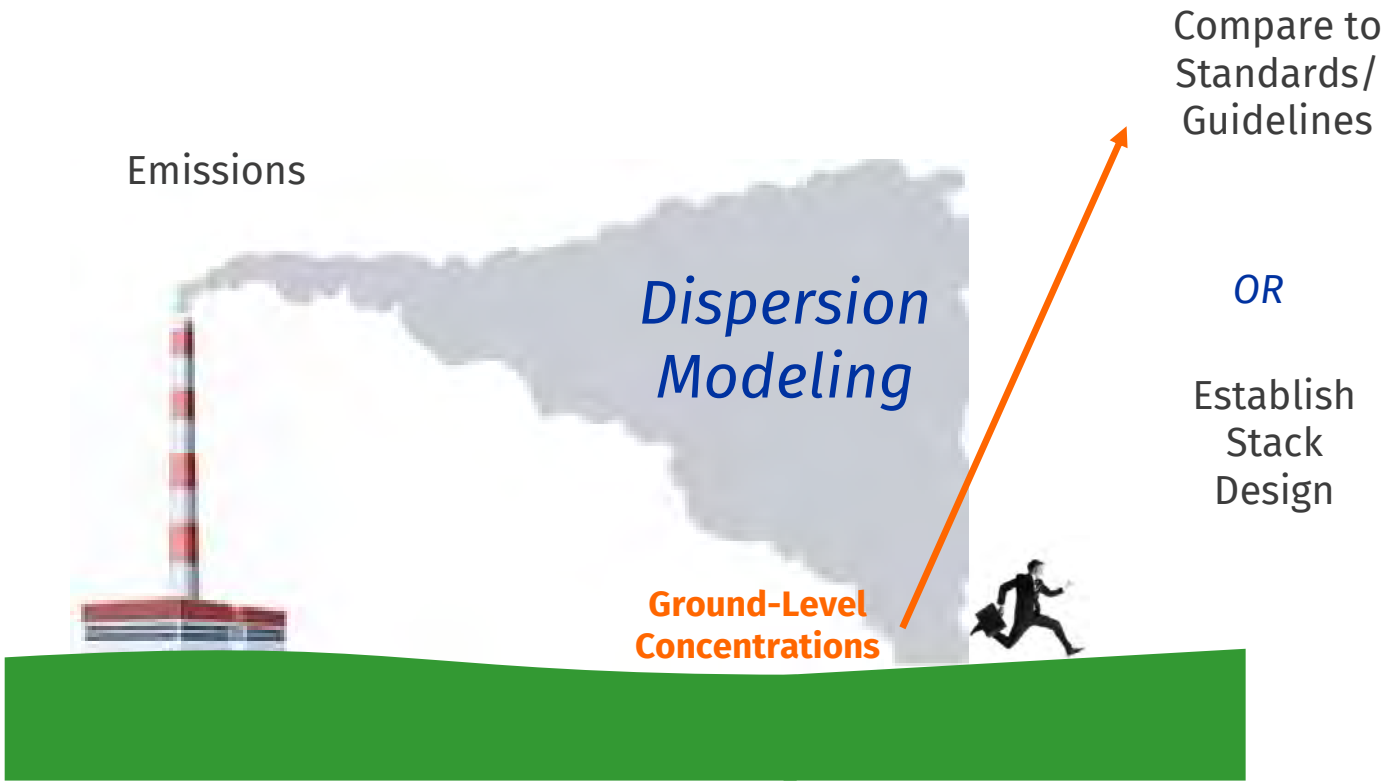
Purpose of Dispersion Modeling

All models are wrong, but some are useful ~ George Box



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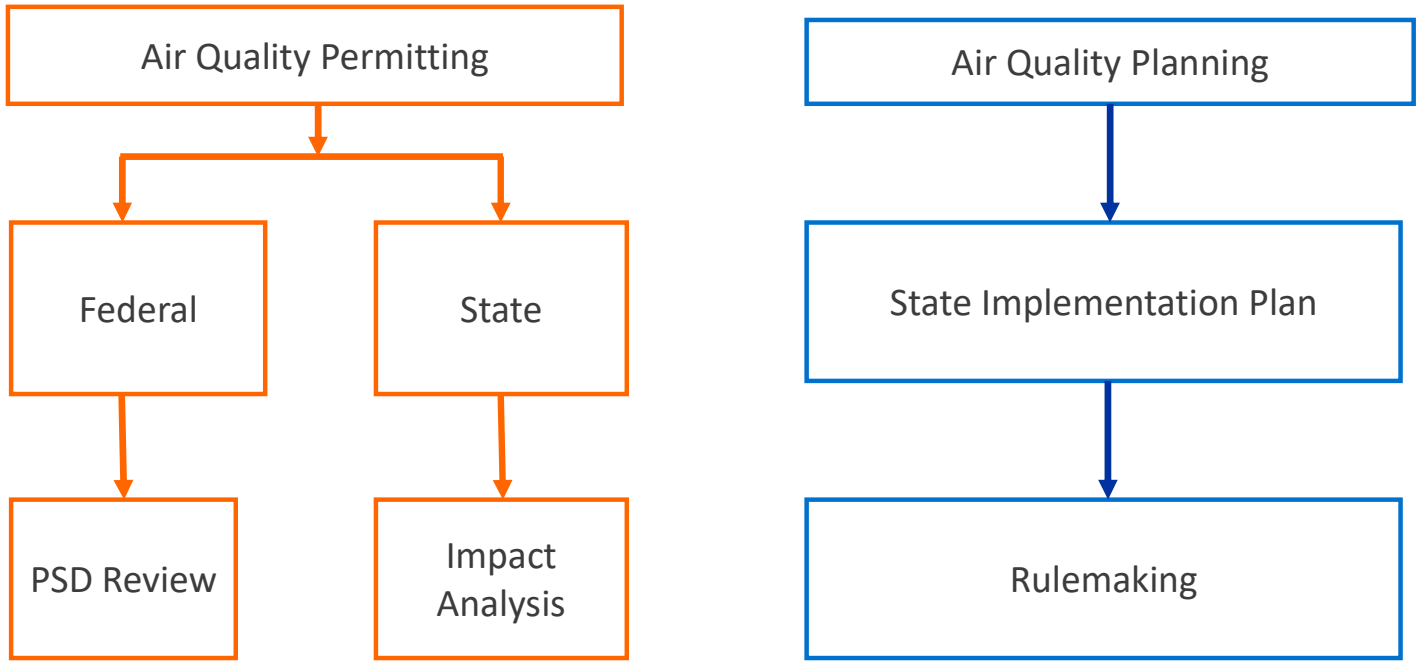
When is Modeling Required?



** For projects that do not trigger a Federal review, modeling for criteria pollutants (NAAQS) may be requested by State or County agency*

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What is Dispersion Modeling?

- Complex computer program
  - AERMOD is typical EPA computer model used for permitting
- Virtual industrial facility & surrounding terrain built inside computer model
- Estimates ground level “footprint” concentrations of pollutants
- Compare modeled off-site impacts to acceptable values
  - Federal NAAQS for criteria pollutants
  - DEQ Presumptively Acceptable Impact Levels for air toxics

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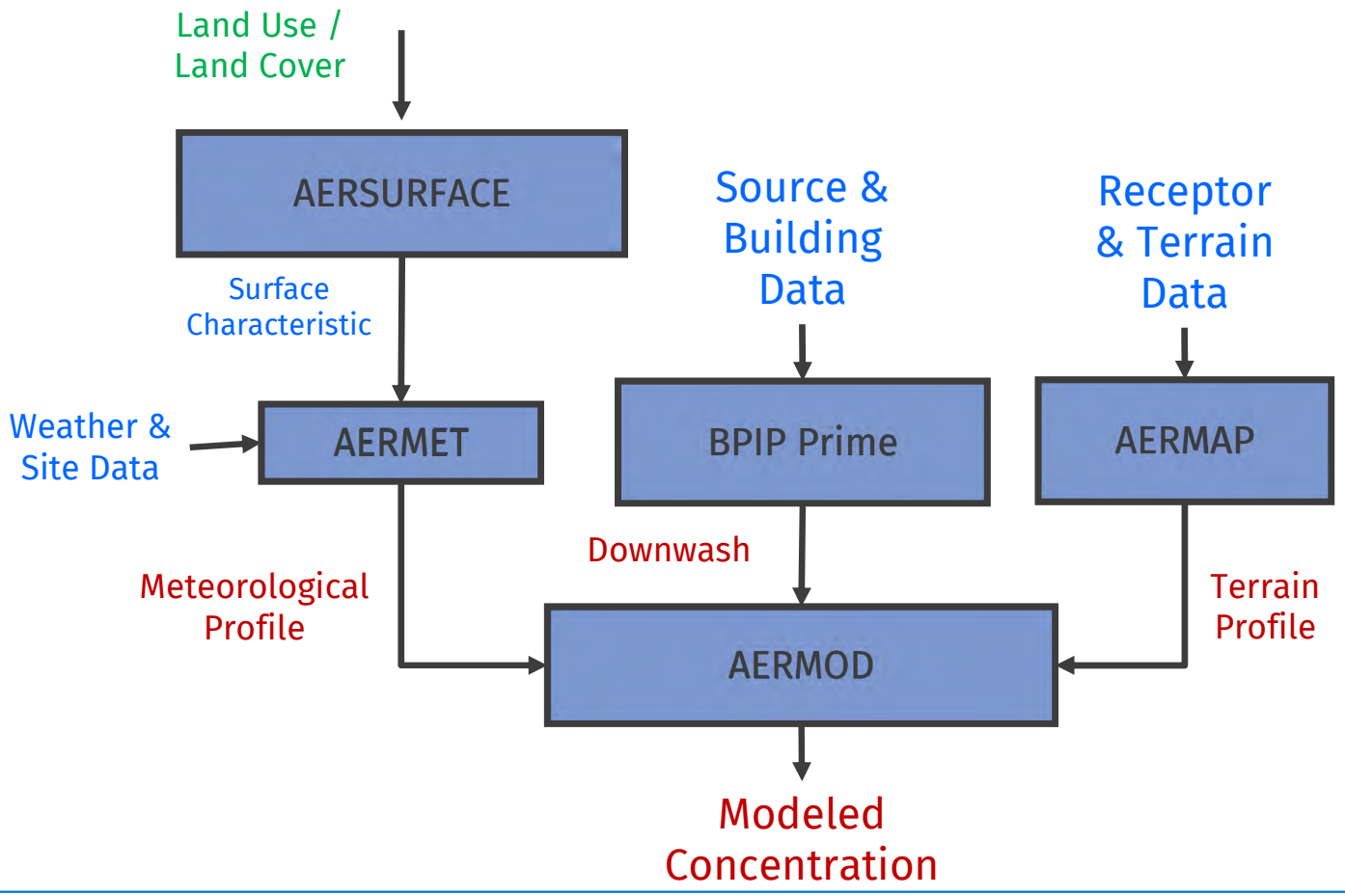
AERMOD Inputs



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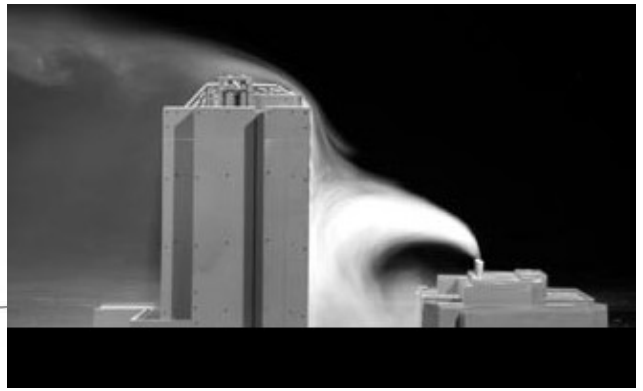
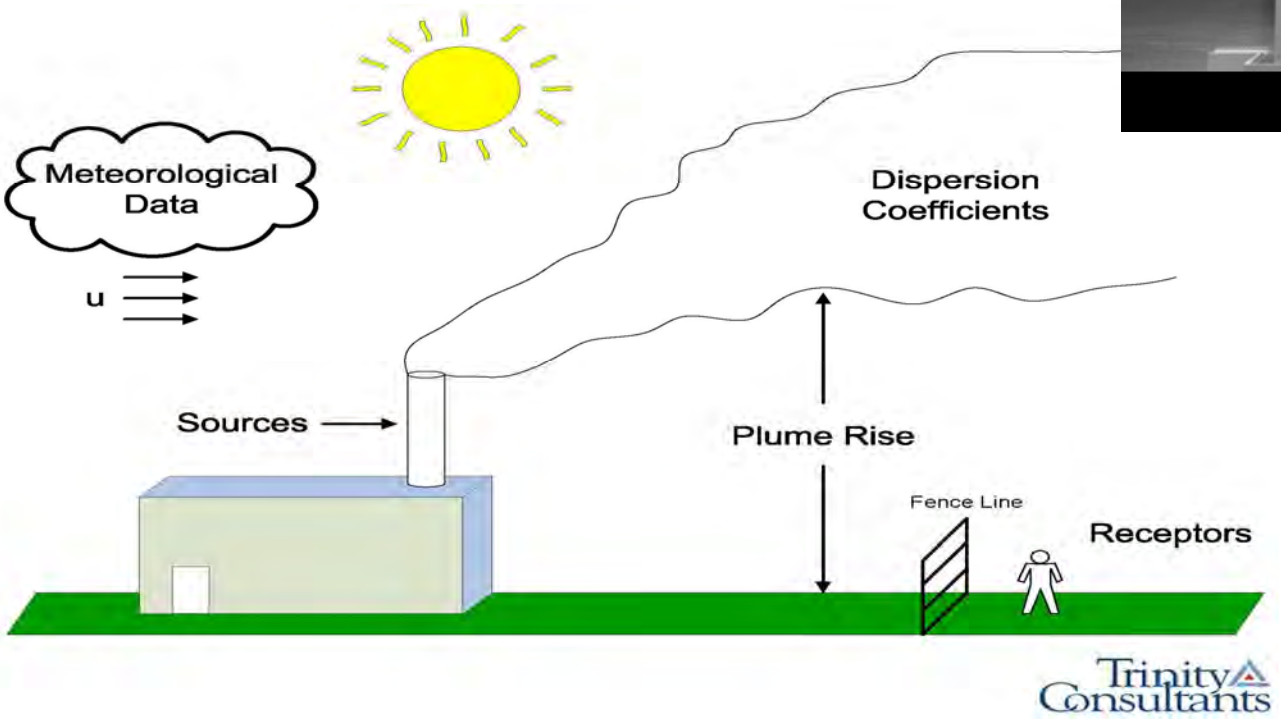
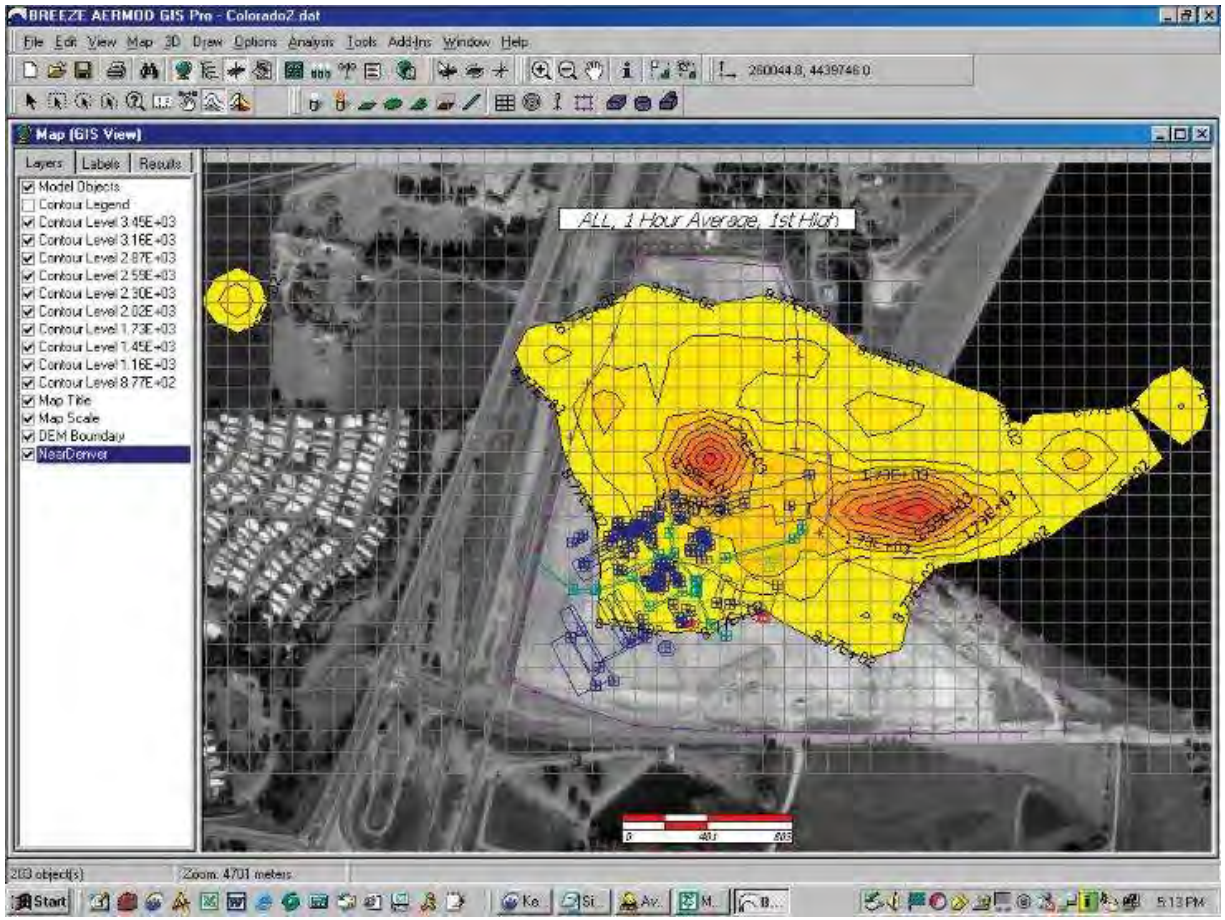
Modeling Definitions





GIS View of Model Results



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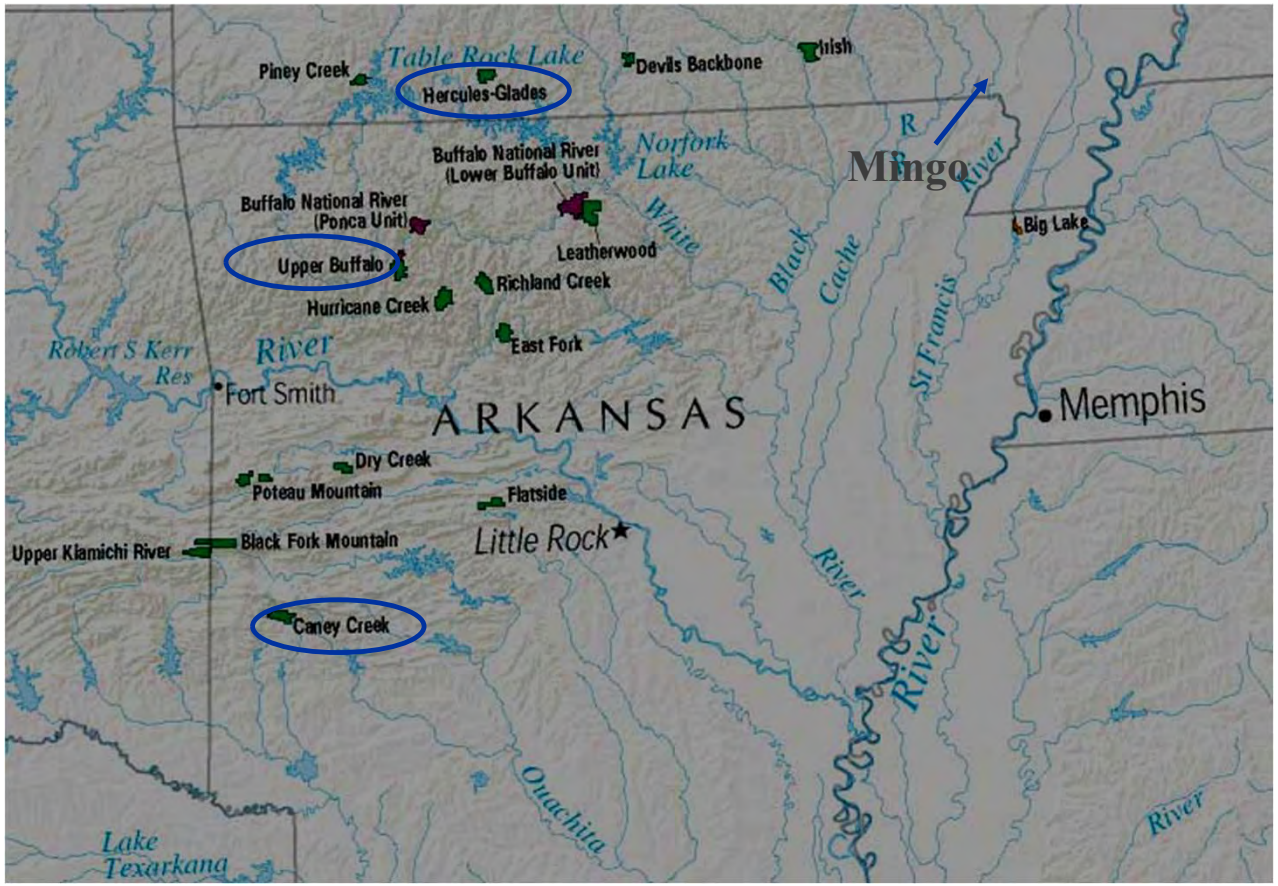
Class I Areas

- Special areas such as national parks and wilderness areas get special consideration
- Must address all Class I Areas within 100, 200, or even 300+ km of the source
- Demonstrate compliance with Class I PSD Increments
  - CALPUFF modeling for long-range transport
- Prepare visibility impact analysis (CALPUFF modeling)
- Address any other concerns of the Federal Land Manager (AQRVs)

Federal Class I Areas



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Why is Modeling Important?

- **May ultimately determine emission limits or controls beyond BACT required for a new project or facility**
- For some types of permits, modeling is in critical permit application processing path
  - **Permit applications fall into limbo until modeling issues are settled!**
- Serious conflicts: fast-track permit approval is needed for a time-sensitive project, but modeling issues arise
- Members of the ***public*** may be concerned about modeling results

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PSD Additional Impact Analysis

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Additional Impacts Analysis

- Growth - Describe effect of direct and indirect growth associated with project (general, commercial, residential, and other)
- Visibility - VISCREEN for visibility screening or CALPUFF modeling for refined studies (e.g., Class I areas)
- Soils/Vegetation/Animals
  - Can relate to NAAQS
  - In-depth analysis (sensitive areas)

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State Toxics Programs

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NCPCS (i.e., Arkansas Air Toxics)

- Intent: Evaluate potential health effects for some air toxics emissions (have no federal ambient air quality standards)
- In practice, primarily used only for HAPs & a few other air toxics (ammonia, hydrogen sulfide)
  - Non-HAP VOCs excluded
- In some cases NCPCS can be the central issue of the air permit

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NCPCS Screening Step #1

Is the air toxic emitted at > 10 tpy OR is the ACGIH TLV < 1 mg/m³

- If not, the analysis for that air toxic is over
- If yes, then move to Screening Step #2.

Is the plant wide PTE (lb/hr) greater than the **Presumptively Acceptable Emission Rates (PAER)**

PAER (lb/hr) = 0.11 x ACGIH TLV (mg/m³)

- If not, the analysis for that air toxic is over
- If yes, then move to Screening Step #3.

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NCPCS Screening Step #3

- If Screening Step #2 PAER exceeded:
  - Conduct site-specific **dispersion modeling** (a significant effort)
  - Compare results to Presumptively Acceptable Impact Levels (PAIL = 1/100 TLV over 24-hr modeling period)

Toluene example: (PAIL = 0.75 mg/m^3 = 750 µg/m^3)

Dispersion model indicates maximum concentration of 526 µg/m^3 (< 750 µg/m^3 PAIL "safe" level)

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If All Screening Steps Fail . . .

- DEQ notifies applicant of problem
  - Remember, your permit application is in limbo until issue is resolved!
- Listed options if you “fail” DEQ Screenings:
  - Accept limiting permit conditions
  - Re-model with refined options
  - Add emission controls
  - Reduce proposed emission rates
  - Conduct ambient monitoring
  - Justify different risk level (risk assessment)
- Most times resolved by adjusting emissions rates and modeling parameters until a “passing solution” found
- Sometimes resolved by using alternative risk values (rather than DEQ 1/100 TLV)

How Do Permittees Comply With Permits?

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Permit Terms

- Numerical Emission Limits
- Work Practice Standards
- Control Technologies
- Process or Operational Limits
- Testing Obligations (Visible Emissions, Stack Testing)
- Monitoring (CPMS/CEMS/COMS), Recordkeeping, Reporting Requirements

What Is Opacity / Visible Emissions?

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Opacity Factoids

- Opacity: density of “smoke” or dust
  - 5% opacity = almost clear (baghouse)
  - 100% opacity = tire fire
- Permit conditions requiring daily/weekly visible emissions (VE) observations
- EPA Method 9 is formal test method
- Smoke school for “certified” VE readers (recertification every 6 months!)

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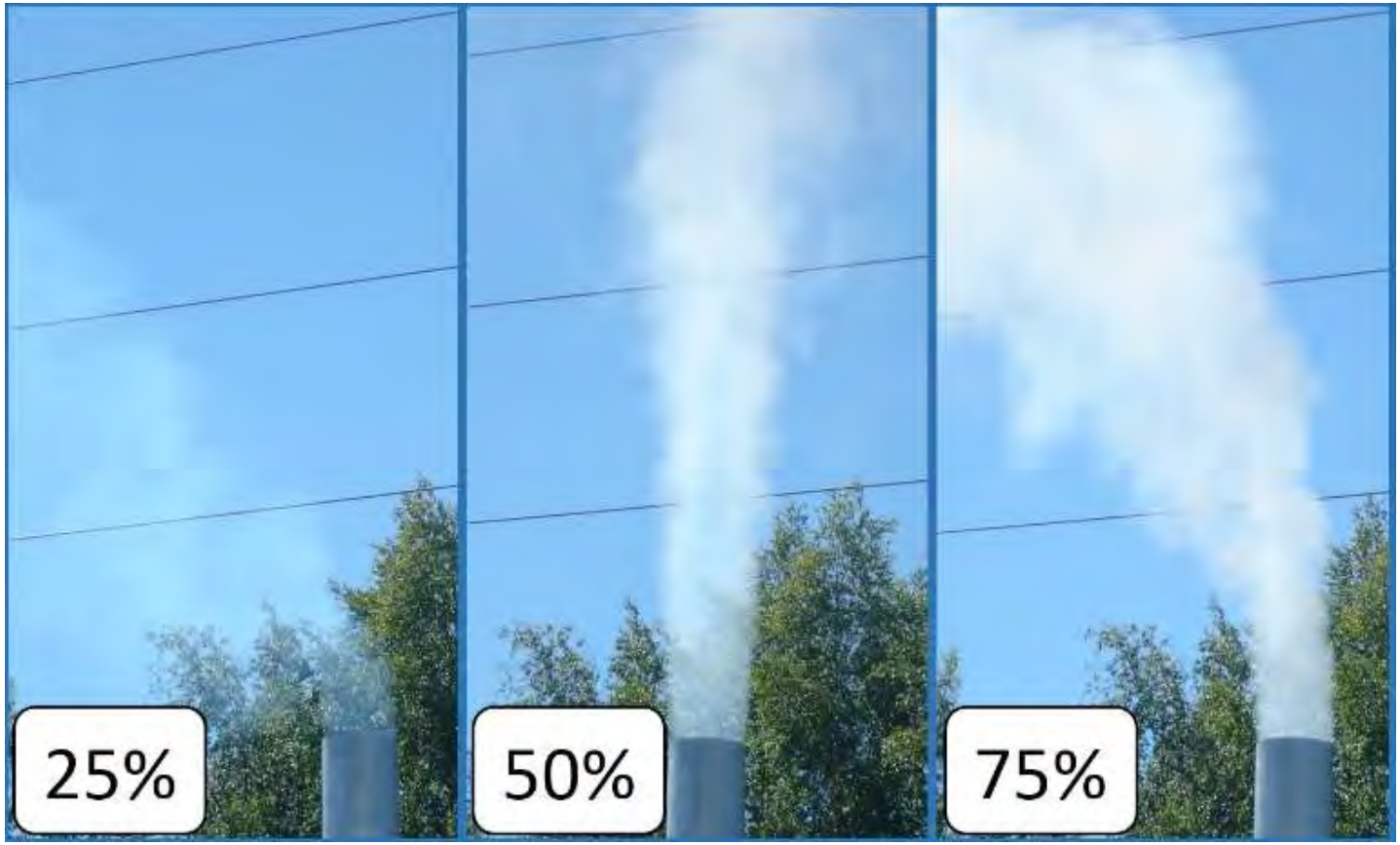
Visible Emissions – White Smoke



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What is Stack Testing?

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Stack Testing

- Used to measure pollutant emissions
- Test results compared to permit limits
- Only small percentage of equipment subject to emissions testing (not everything)
- Can be used to set control device parameter limits (i.e., flow, temperature, pH) to ensure control is obtained.
- Testing common for:
  - Some equipment as mandated by EPA regulations (NSPS & NESHAP)
  - Other “large” emissions sources (at discretion of DEQ)
  - Sources where emissions estimates require validation by DEQ

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Stack Testing Issues

- One-time testing vs. periodic testing
- 5-yr testing intervals common in Title V permits
- EPA has numerous published stack testing methods
- Failed stack test fire drill:
  - Usually a CAO and a fine
  - Fix equipment problems & retest? (Common response)
  - Apply for higher permit limits? (If a state-only limit)

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What Are Continuous Monitors?

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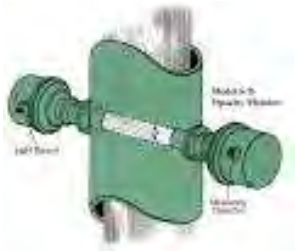
Continuous Monitors



- Not all permits require continuous monitors
- In most cases are a big headache!
- Some regulations and permits require continuous monitoring systems
  - **CEMS** (Continuous Emissions Monitoring System): Measures pollutant concentrations in stack gas
  - **COMS** (Continuous Opacity Monitoring System): Measures opacity of stack gases
  - **CPMS** (Continuous Parametric Monitoring System): Monitors a surrogate parameter to ensure proper operation
    - Example: thermal oxidizer combustion chamber temps

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Continuous Monitors

- Typically required by a specific federal regulation for a specific emission source
- EQ will attach the CEMS guidance as an appendices to the permit
- CEMS/COMS must have a 95% uptime
- Quarterly reports required

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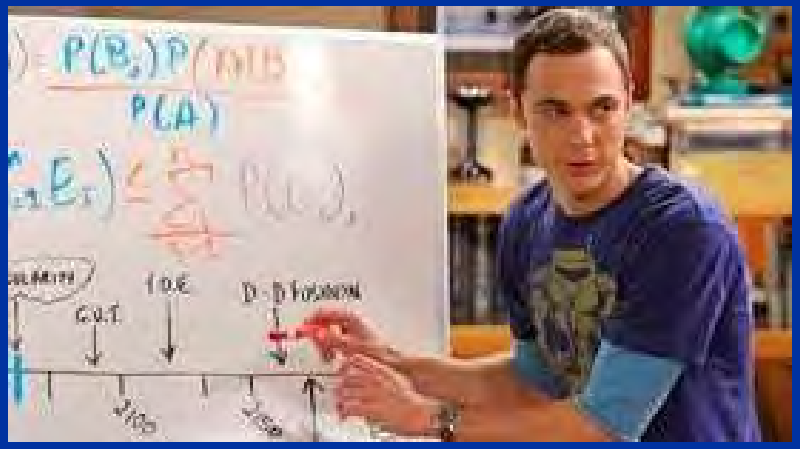

How Do You Do Emissions Calculations?

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Emissions Calculations Hints

- Permit for **conservatively high** hourly and annual production and emissions rates
  - Don't lowball yourself!
  - A permit mod is needed before increasing production/emissions above permitted levels!
- Be clear in calculations & references
- Use "bubble" limits for some types of operations (especially useful for solvent/painting VOC/HAP emissions)
- Apply for alternate scenarios, if applicable
  - Example: Multi-fuel boilers that can burn either fuel oil or natural gas

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Emissions Factors for Calculations

- Most common calculation method: **emissions factors**

Emission factor x process rate = emission rate

0.15 lb NO_x/widget x 100 widgets/hr = 15 lb NO_x/hr

- Can include:
  - Site specific sampling, monitoring, or testing
  - Detailed process knowledge (LDAR fugitive emissions)
  - Complex modeling (ToxChem, Emission Master, BREEZE TankESP)

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Emissions Factors

- **EPA AP-42** publication for emissions factors for many types of processes *(see Appendices for example)*
- Equipment vendors may have better emissions data, maybe even guarantees
- Stack testing of similar equipment sometimes available (from another plant in company)
- Industry associations may have developed emissions factors for air permitting or TRI reporting (NCASI, ACC, RMA, etc.)

Emission Factor Example

Factor Source	Emission Factor
EPA's AP-42 document	0.20 lb PM/widget
vendor data	0.15 lb PM/widget
stack test data from similar source at sister plant	3 one-hour runs, 0.12, 0.19, 0.25 lb PM/widget average = 0.187 lb PM/widget

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Final Thoughts

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Great Truths of Stationary Source Air Permitting

- Air Permits regulate EQUIPMENT and EMISSIONS
  - If either changes, you probably need a permit
  - Even very small equipment can require a permit
- Air Permits must be obtained BEFORE constructing new emitting equipment
- Long lead times and highly technical analyses req'd for some permits
- Air permit compliance is often complicated and costly

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Your Questions

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