Air Permit Authorizations for Oil and Gas Operations

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Introduction

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Questions?

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Presentation Outline

- Session 1: Authorization Mechanisms
- Break
- Session 2: Emission Representations
- Question / Answer Session


THE STATE OF TEXAS
TEXAS COMMISSION ON
VIRONMENTAL QUALITY

Authorization Mechanisms

Session One Outline

- Overview of Air Permitting in Texas
- Authorization Mechanisms for Oil and Gas Production and Handling Operations
- Aggregation
- State and Federal Regulations
- Submitting Authorization

Overview of Air Permitting in Texas

Texas Clean Air Act

Texas Health and Safety Code Sec. 382.001(a):

> The policy of this state and the purpose of this chapter are to safeguard the state's air resources from pollution by controlling or abating air pollution and emissions of air contaminants, consistent with the protection of public health, general welfare, and physical property, including the esthetic enjoyment of air resources by the public and the maintenance of adequate visibility.

Texas Administrative Code

- The Texas Administrative Code (TAC) is a compilation of all state agency rules in Texas. There are 16 titles in the TAC.

- TAC Title 30 Part 1: The Texas Commission on Environmental Quality

- Air Permit authorizations are specifically covered in:
  - 30 TAC § 116: Control of Air Pollution by Permits for New Construction or Modification
  - 30 TAC § 106: Permits By Rule

30 TAC Chapter 116.110: New Source Review

"…before any actual work is begun on the facility, any person who plans to construct any new facility or to engage in the modification of any existing facility which may emit air contaminants into the air of this state shall either:

(1) Obtain a permit under §116.111 of this title (NSR General Application);

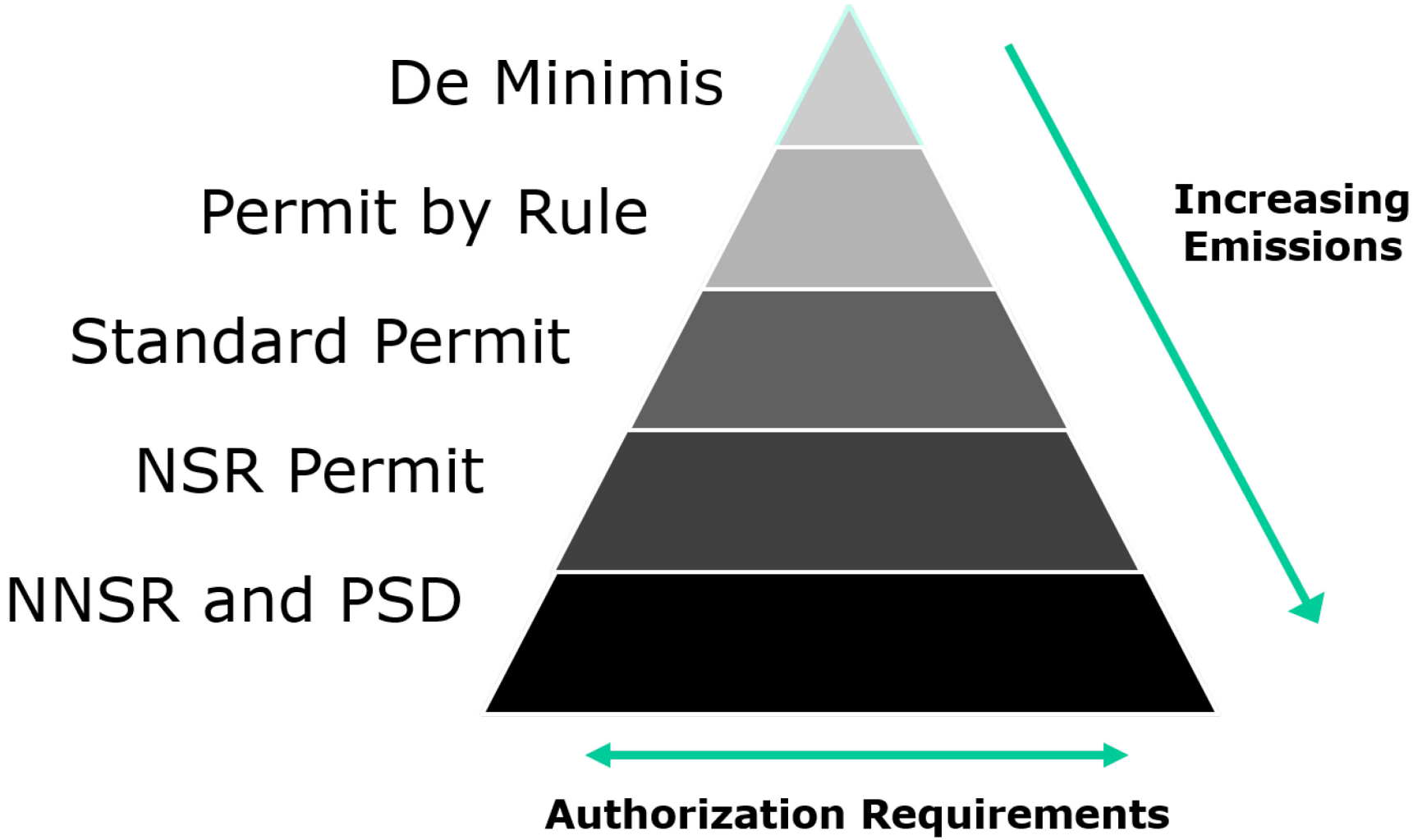
(2) Satisfy the conditions for a standard permit

(3) Satisfy the conditions for a flexible permit

(4) Satisfy the conditions for facilities permitted by rule under Chapter 106 of this title (relating to Permits by Rule); or

(5) Satisfy the criteria for a de minimis facility or source under §116.119 of this title (relating to De Minimis Facilities or Sources)."

Overview of Authorization Mechanisms (1 of 2)



30 TAC 116.119: De Minimis

- List of De Minimis Facilities maintained by TCEQ

  https://www.tceq.texas.gov/permitting/air/guidance/newsourcereview/list-of-de-minimis-facilities.html

- Specific list of facilities or sources where registration or authorization prior to construction is not required

- Other TCEQ environmental authorizations may be applicable

Chapter 106 Permits by Rule

- 30 TAC 106 Subchapter A: General Requirements
- 30 TAC 106 Subchapter B: Fees
- 30 TAC 106 Subchapters C-X: Specific PBR conditions for listed facilities and operations

General PBR Requirements

- Must meet **all** conditions exactly
- Emission limits in 30 TAC §106.4(a)(1):
  - 25-tpy of VOCs & SO_2 & PM
  - 250-tpy NOx & CO
  - 25-tpy H_2S (Any Other Air Contaminant)
  - 15-tpy PM_{10} & 10-tpy $PM_{2.5}$

Terminology: Pollutants of Concern

- VOCs = volatile organic compounds
- H_2S = hydrogen sulfide
- CO = carbon monoxide
- NO_2 = nitrogen dioxide
- SO_2 = sulfur dioxide
- PM_{10} = particulate matter ≤10 microns in diameter
- $PM_{2.5}$ = particulate matter ≤ .5 microns in diameter

Obtaining PBR Authorization

- Claiming:
  - Maintaining records to demonstrate compliance
- Registering:
  - Submittal of a PI-7 / STEERs registration to formally represent authorization
- Certifying Representations:
  - Making federally enforceable limitations through authorization representations

30 TAC §106.6: Registration of Emissions

- §106.6(a): Federally enforceable emission limits can be certified
- §106.6(b): Representations become conditions of the authorization
- §106.6(c): Changes from representations require registration
- §106.6(d): Documentation is required

Reasons to Certify

- Emission limitations for Title V applicability
- Federal applicability
- Control/destruction efficiency claims
- Limiting operating hours

30 TAC §106.8 Recordkeeping

Maintain records sufficient to demonstrate compliance with authorization representations in a reviewable format

30 TAC Chapter 116 Subchapter F: Standard Permits

- Permit authorization for specific, well-characterized classes of facilities
- Registration based authorization
- Must be renewed every 10 years
- Impacts review required by 30 TAC 116.610 or specific standard permit requirements

General Standard Permit Requirements

- Must meet **all** conditions exactly
  - In addition to the General Conditions for standard permits in 30 TAC §116.611-615
- Meet all other applicable federal, state, and local requirements
- Cannot trigger PSD or NA Review

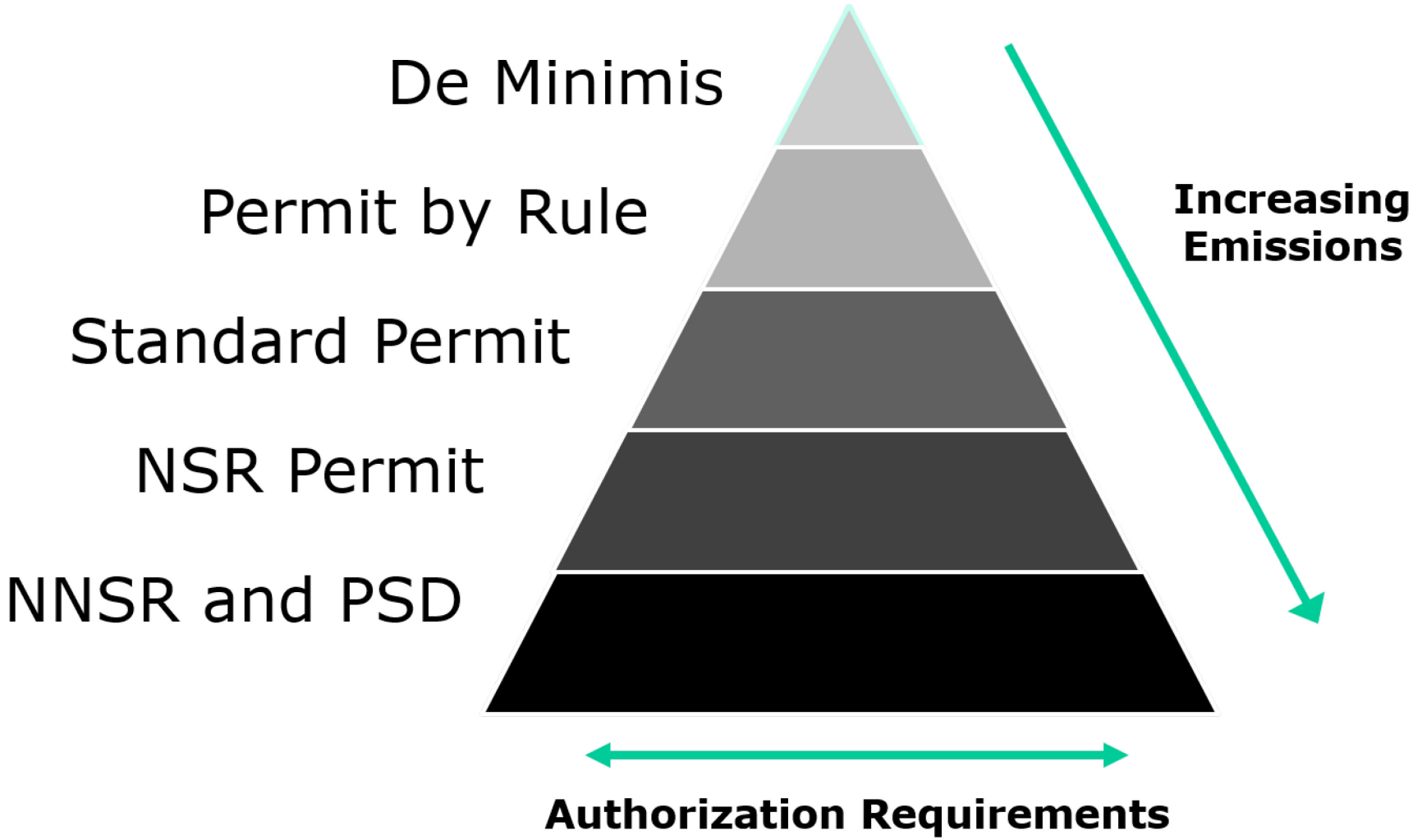
Obtaining Standard Permit Authorization

- Notification:
  - Required for the Non-Rule Standard Permit
- Registration:
  - Submittal of a documentation to formally represent authorization
- Certification and Recordkeeping:
  - Certification: 30 TAC §116.615(2)
  - Recordkeeping: 30 TAC § 116.615(8)

30 TAC Chapter 116 Subchapters B and G: New Source Review Permitting

- Facility/Site specific authorization mechanism
- Must meet or exceed current BACT
- Subject to Public Notice
- Includes PSD / Non-Attainment evaluations

Overview of Authorization Mechanisms (2 of 2)



How to Read the TAC

- If we are trying to reference the bolded text next to (i) below, it would read as follows:

30 TAC §106.352(c)(1)(B)(i):

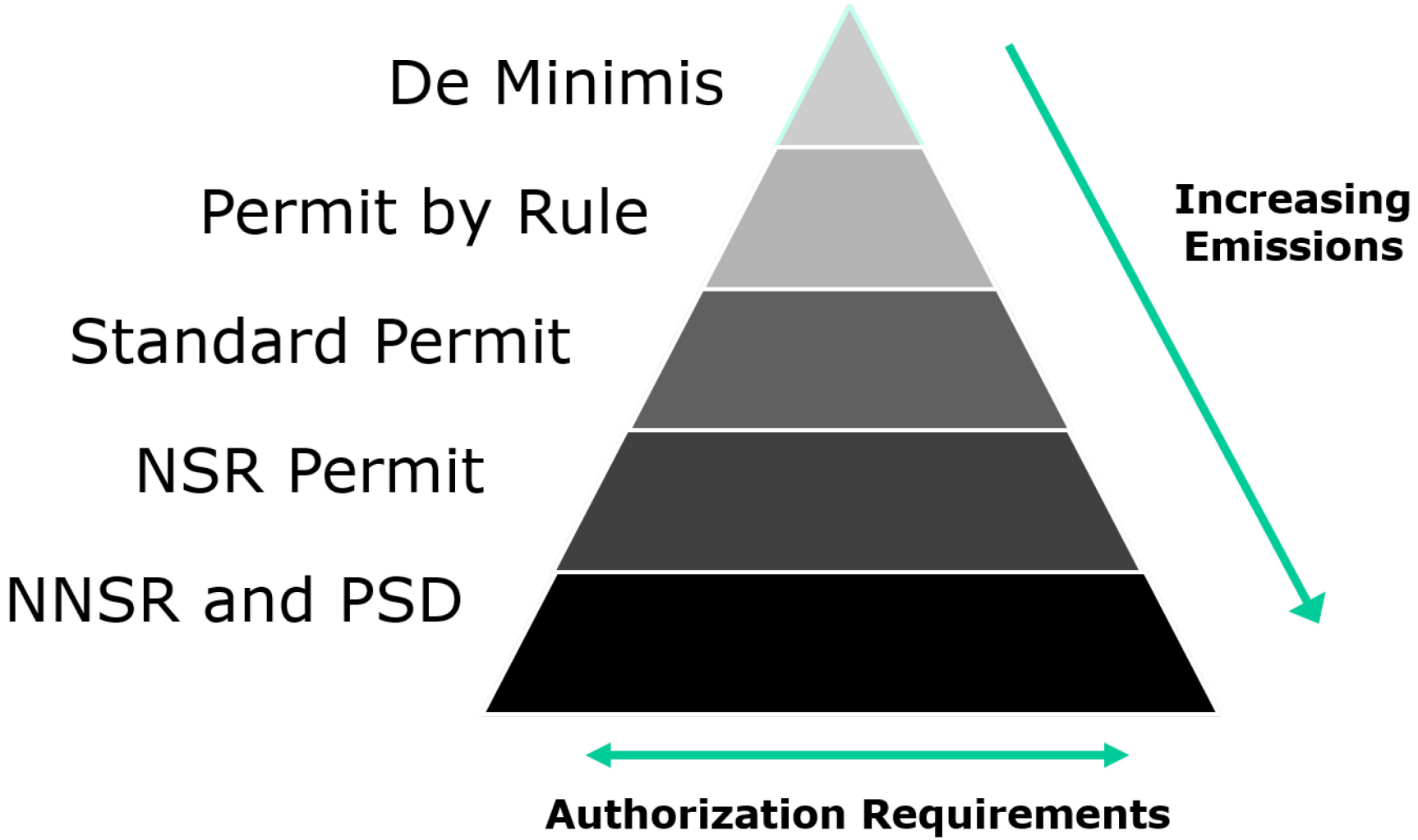
- **(c)** Authorized Facilities, Changes, and Activities.
- **(1)** For existing OGS which are authorized by previous versions of this section.
- (A) A project requires registration unless otherwise specified.
- **(B)** The following projects do not require registration, but must comply with best management practices (BMP) in subsection (e) of this section, compliance demonstrations in subsections (i) and (j) of this section, and must be incorporated into the registration at the next revision or certification:
- **(i) Addition of any piping, fugitive components, any other new facilities, that increase actual emissions less than or equal to 1.0 tpy VOC, 5.0 tpy NO_X, 0.01 tpy benzene, and 0.05 tpy H_2S over a rolling 12-month period;**

Authorization Mechanisms for Oil and Gas Production and Handling Operations

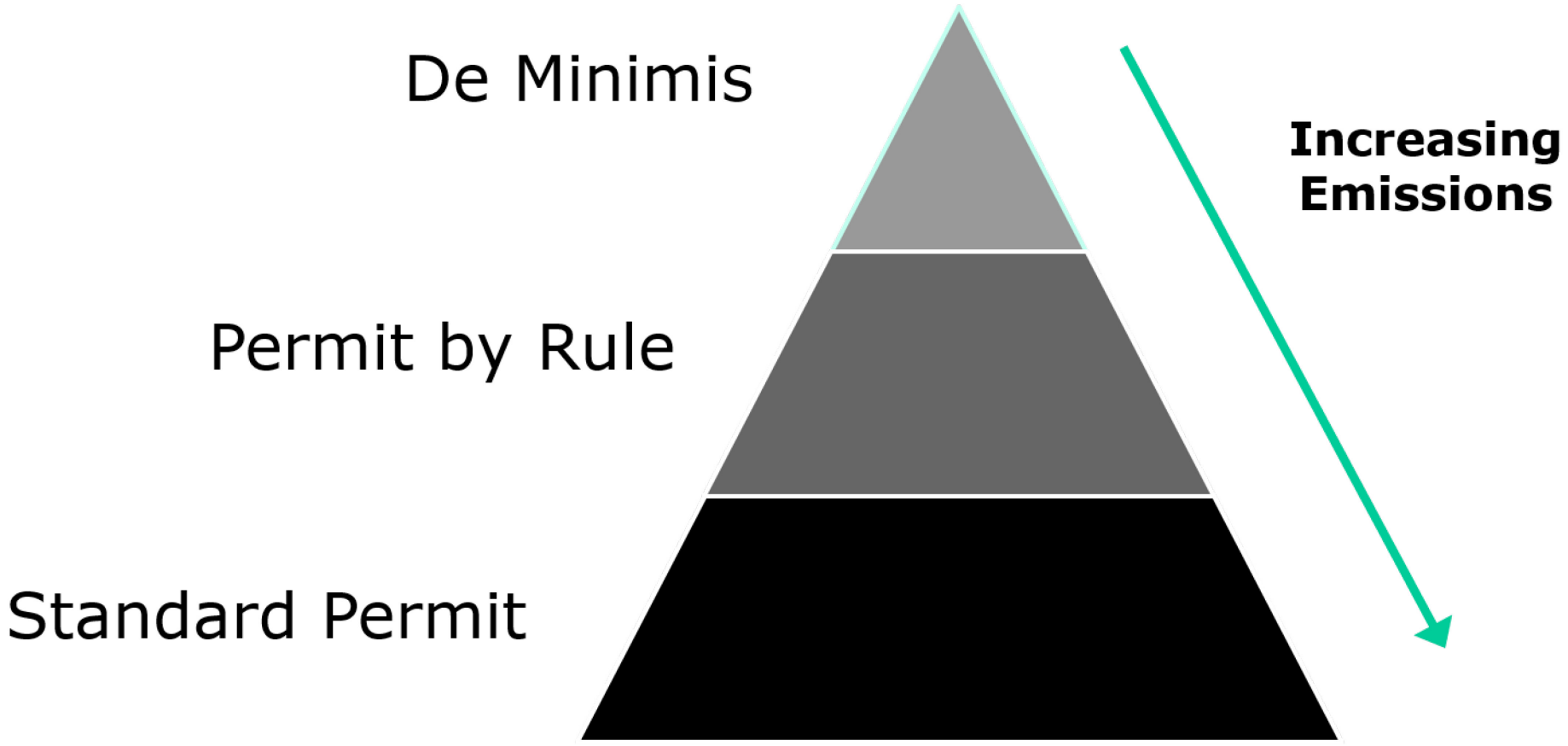
What Requires Authorization?

- Stationary sources of air emissions:
  - Tanks, Process Equipment, Loading
- Planned and Predictable MSS
  - Maintenance, Startup, and Shutdown Emissions associated with stationary sources.

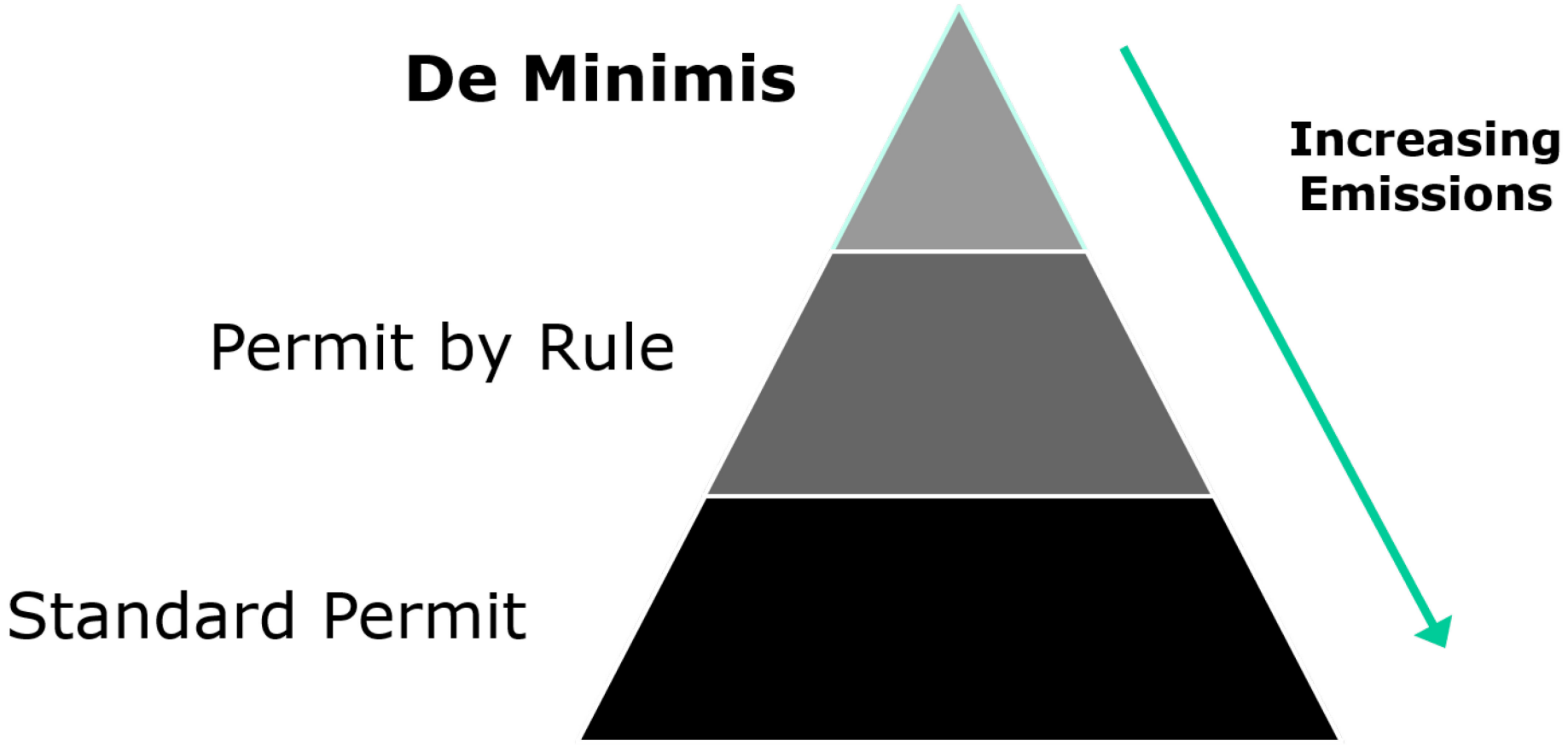
Air Permit Authorizations



Permitting Strategies (1 of 4)



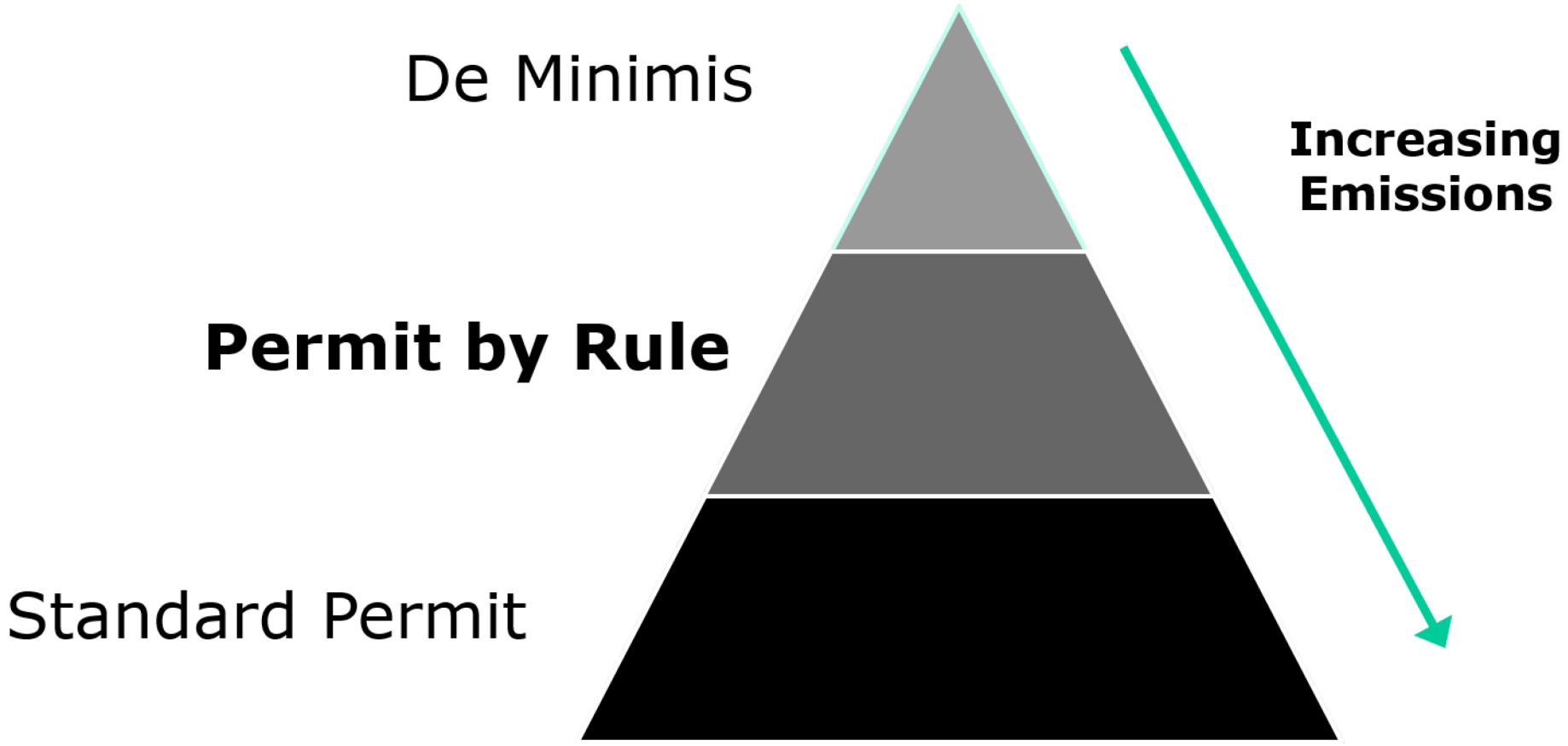
Permitting Strategies (2 of 4)



De Minimis (30 TAC §116.119)

- Pipeline isolation valve sites meeting certain criteria
  - ≤ 3 valves
  - Not otherwise authorized and >50 feet from any other stationary source
  - Not in an Air Pollutant Watch List area
  - Specific to Listed Chemicals

Permitting Strategies (3 of 4)

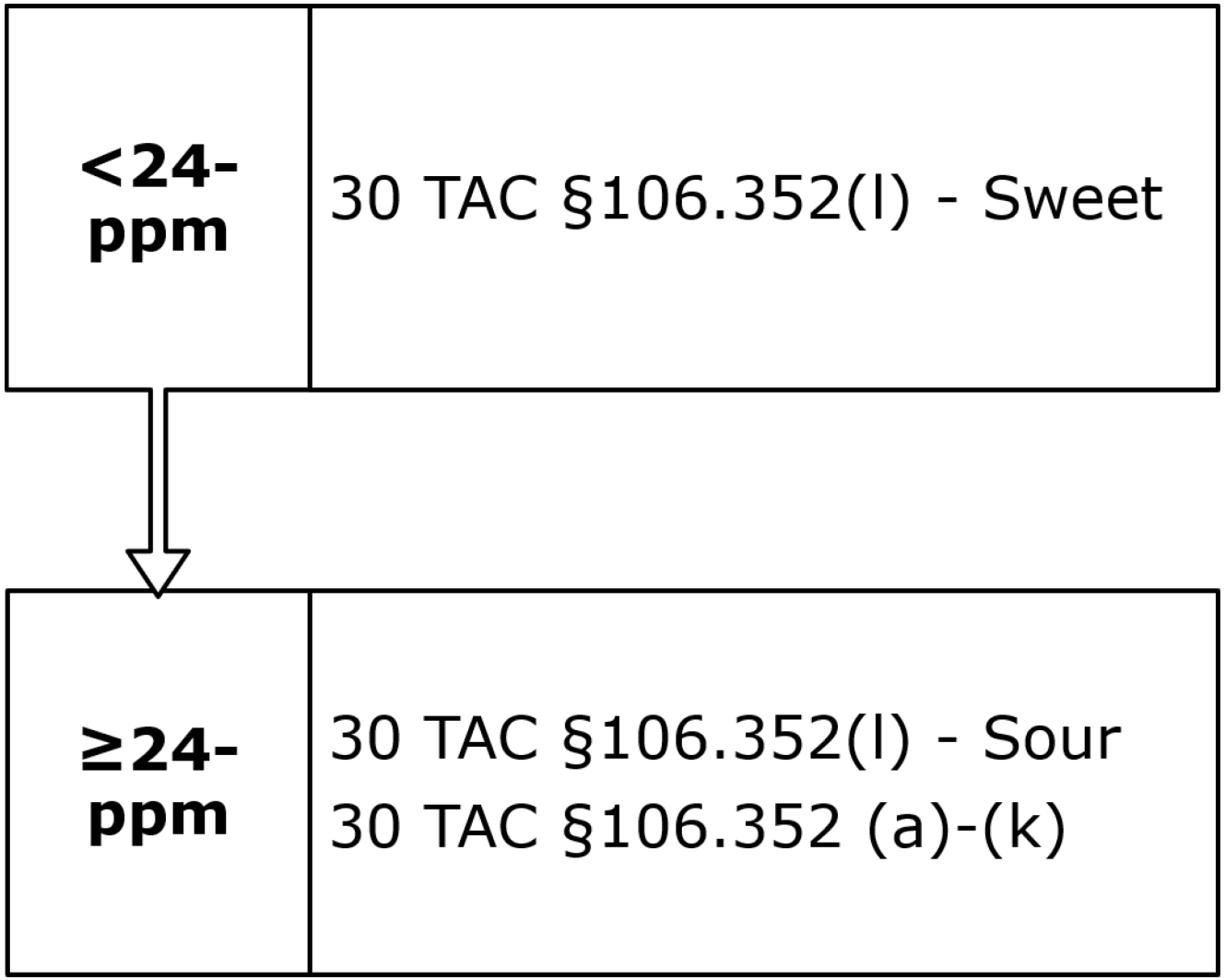


Terminology

- Receptor - Residence or other structure which is not used only by the O&G owner/operator, which also includes recreational areas.

- Site – a group of oil and gas facilities at a property

PBR Options
H_2S Based



Hydrogen Sulfide Concentration

- **Site Specific Concentration**
  - ≥24-ppm H_2S Concentration is “Sour”

- “Sour Gas” defined in 30 TAC §101.1(96):
  - Any natural gas containing more than 1.5 grains of hydrogen sulfide per 100 cubic feet, or more than 30 grains of total sulfur per 100 cubic feet.

- “Sour Crude” defined in 30 TAC §101.95:
  - A crude oil that will emit a sour gas when in equilibrium at atmospheric pressure.

30 TAC §106.352(l) – Sweet

- No registration required
- Production and handling facilities included
- Flares authorized under §106.492
- Compressors authorized under §106.512
- Sulfur emission limit and vent height requirements

30 TAC §106.352(l) – Sour

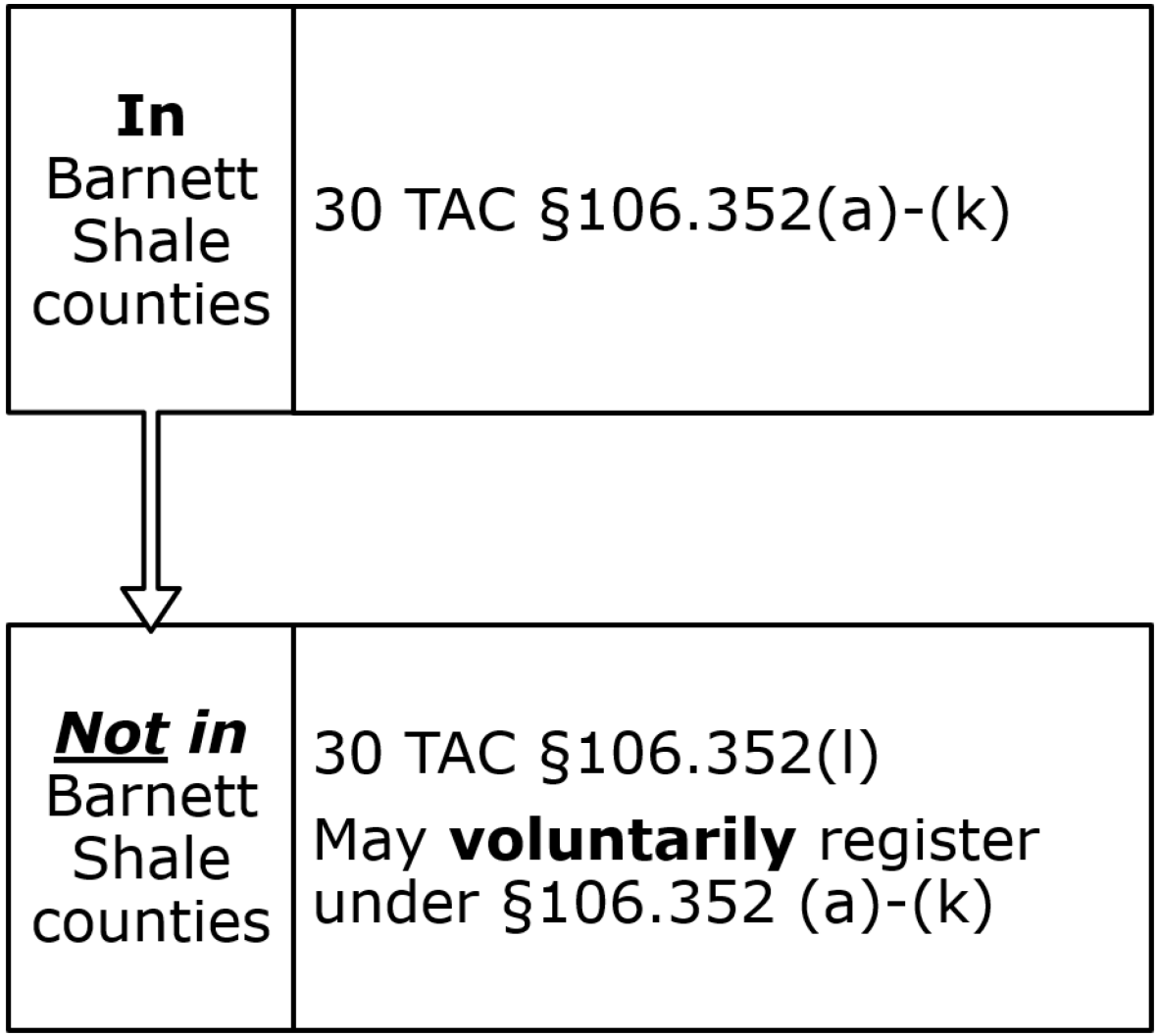
106.352(l) - Sweet requirements plus:

- Registration required before operation
- ¼-mile distance to nearest receptor
- Maximum total sulfur emissions <4.00-lb/hr
- Vent height requirements:
  - 0.27 lb/hr at 20 feet
  - 4.00 lb/hr at 68 feet

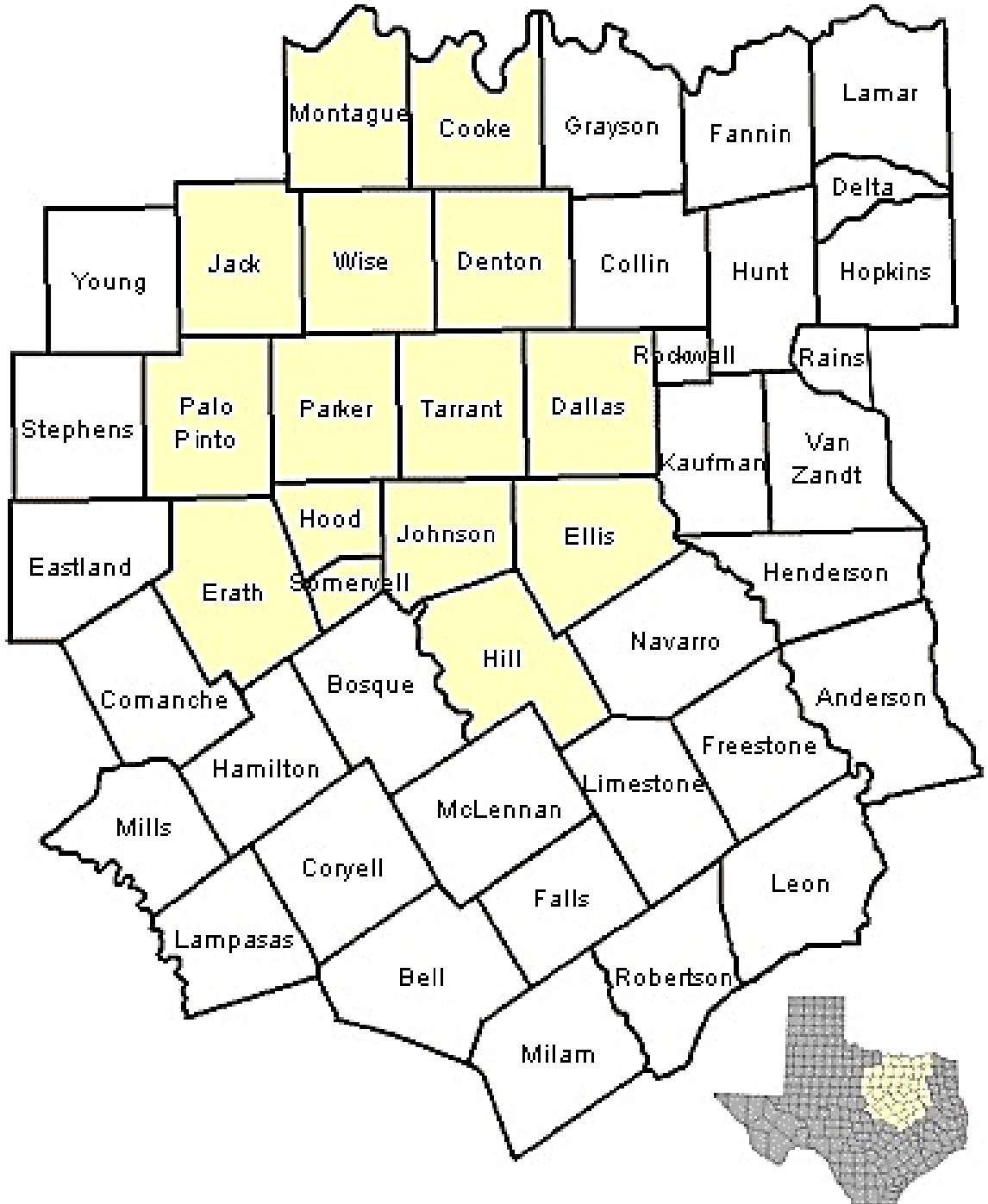
Other PBRs Used with 106.352(l)

- **§106.359: Planned MSS at O&G Facilities**
  - Lists activities covered under the rule.
- **§106.492: Flares**
  - 40 CFR §60.18 Control Devices
- **§106.512: Engines / Turbines**
  - Requires registration if >240-hp

PBR Options
Location Based



Barnett Shale Counties



30 TAC §106.352(a-k) – Barnett Shale

- Engines, Flares, and MSS included
- 50-foot distance requirement
- Operational and monitoring requirements
- Impacts review required

30 TAC §106.352(a-k): Level 1 & Level 2

- Notification required prior to construction
- Level 1: Lower emission limits
  - Specific monitoring and operational requirements
  - Registration: 180-days after operation or change
- Level 2: Higher emission limits
  - Increased monitoring and operational requirements
  - Registration: 90-days after operation or change

30 TAC §106.352(g) Level 1 Emission Limits

Air Contaminant	Steady-state lb/hr	< 20 psig periodic lb/hr up to 150 hr/hr	≥ 30 psig periodic lb/hr up to 300 hr/yr	Total tpy
Total VOC				15
Total crude oil or condensate VOC	100	145	318	
Total natural gas VOC	204	750	1,500	
Benzene	1.95	7	15.4	2.8
Hydrogen sulfide	4.7	5.1	9.8	20.6
Sulfur dioxide	47	93.2		25
Nitrogen oxides	43.2			100
Carbon monoxide	45			100
$PM_{2.5}/PM_{10}$	10			5

30 TAC §106.352(h) Level 2 Emission Limits

Air Contaminant	Steady-state lb/hr	< 20 psig periodic lb/hr up to 150 hr/hr	≥ 30 psig periodic lb/hr up to 300 hr/yr	Total tpy
Total VOC				25
Total crude oil or condensate VOC	100	145	318	
Total natural gas VOC	356	750	1,500	
Benzene	3.35	7	15.4	4.8
Hydrogen sulfide	6	6	9.8	25
Sulfur dioxide	63	93.2		25
Nitrogen oxides	54.4			250
Carbon monoxide	57			250
$PM_{2.5}$	12.7			10
PM_{10}	12.7			15

30 TAC §106.352(k) – Impacts

- Demonstration of compliance with:
  - State/Federal ambient air standards for NO_2, SO_2, H_2S
  - Hourly and annual ESLs for Benzene
- Distance measurement requirements
- NOx to NO_2 conversion factors for engines

30 TAC §106.352(k) – Impacts Demonstrations

- Emission impacts tables
- Screening modeling
- Dispersion modeling

30 TAC §106.352(k) – Exemptions

- Distance Exclusions:
  - Level 1: No receptors within ¼-mile
  - Level 2: No receptors within ½-mile
- De Minimis Emission Rates:
  - Benzene: 0.039-lb/hr
  - H_2S: 0.025-lb/hr
  - SO_2: 2.00-lbs/hr
  - NO_x: 4.00-lbs/hr

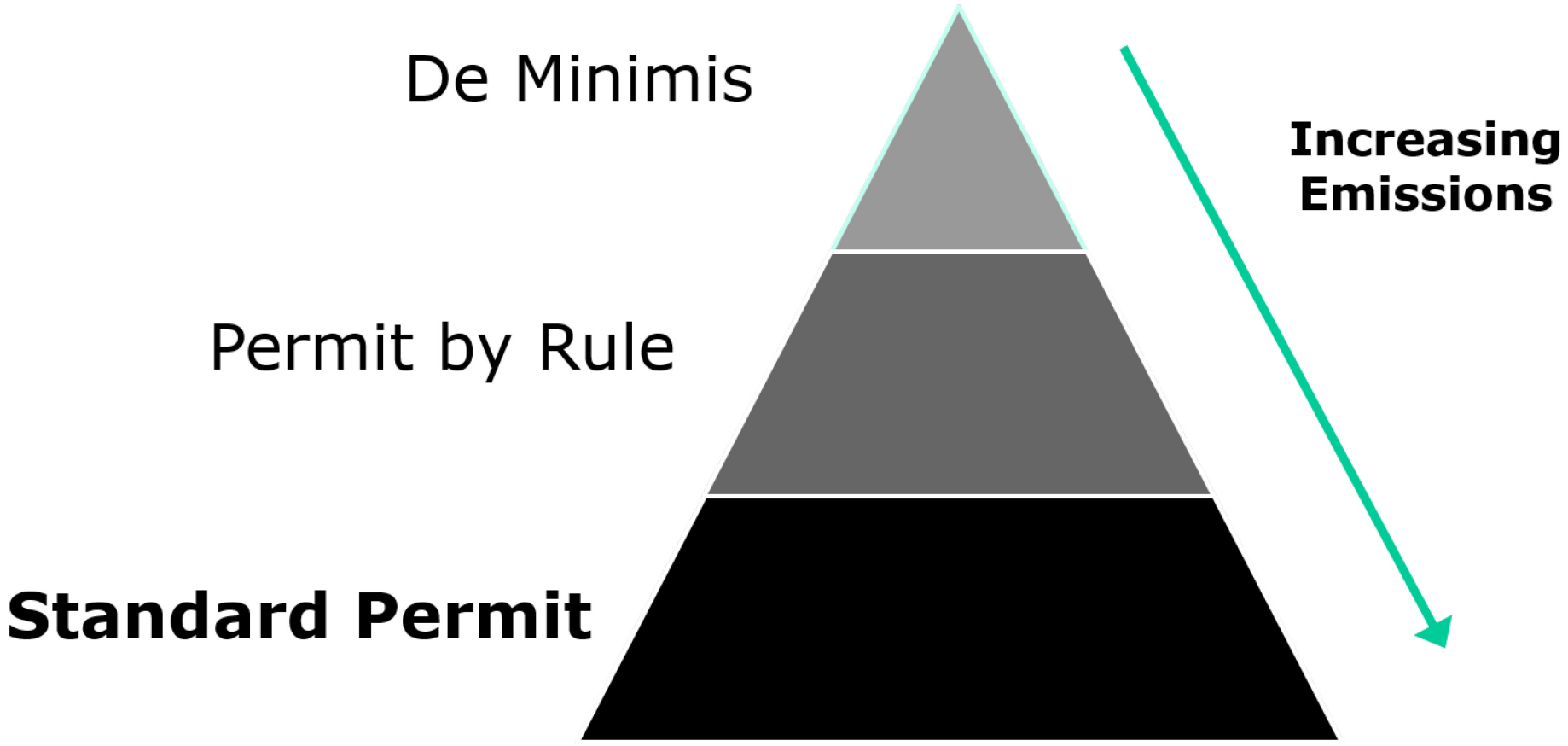
MSS Authorization Mechanisms

- §106.352(l):
  - Authorize using PBR §106.359
- §106.352(a-k):
  - §106.352(i) requires inclusion in the authorization.

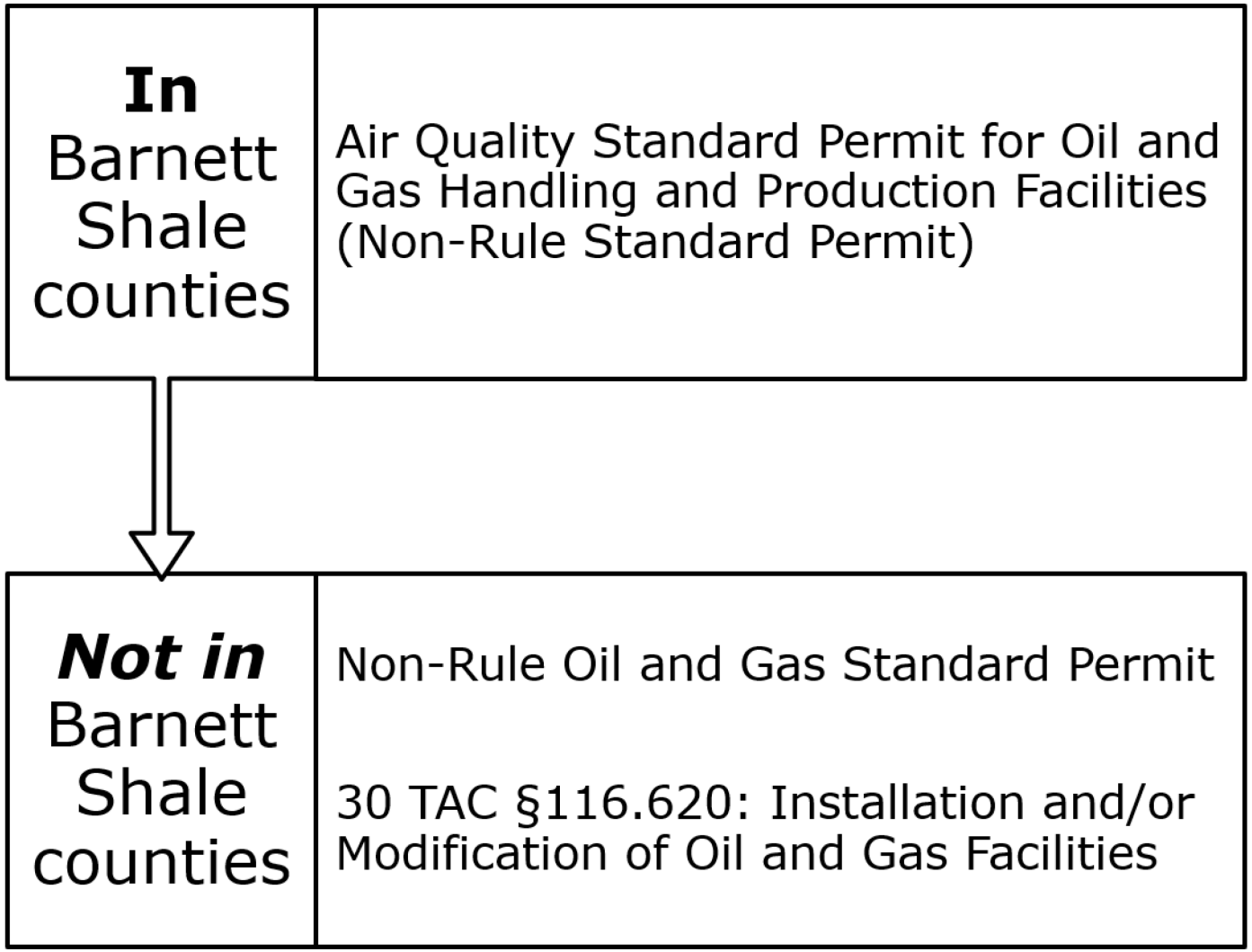
Other Useful Oil and Gas PBRs

- §106.351: Salt Water Disposal (Petroleum)
  - Aqueous waste from production and water injection facilities
- §106.353: Temporary Oil and Gas Facilities
  - Allows ≤90-days to test subsurface stratum and/or establish proper design
  - Control requirements and emission limits
- §106.355: Pipeline Metering, Purging, and Maintenance
  - Metering, purging, and maintenance operations for pipelines between sites

Permitting Strategies (4 of 4)

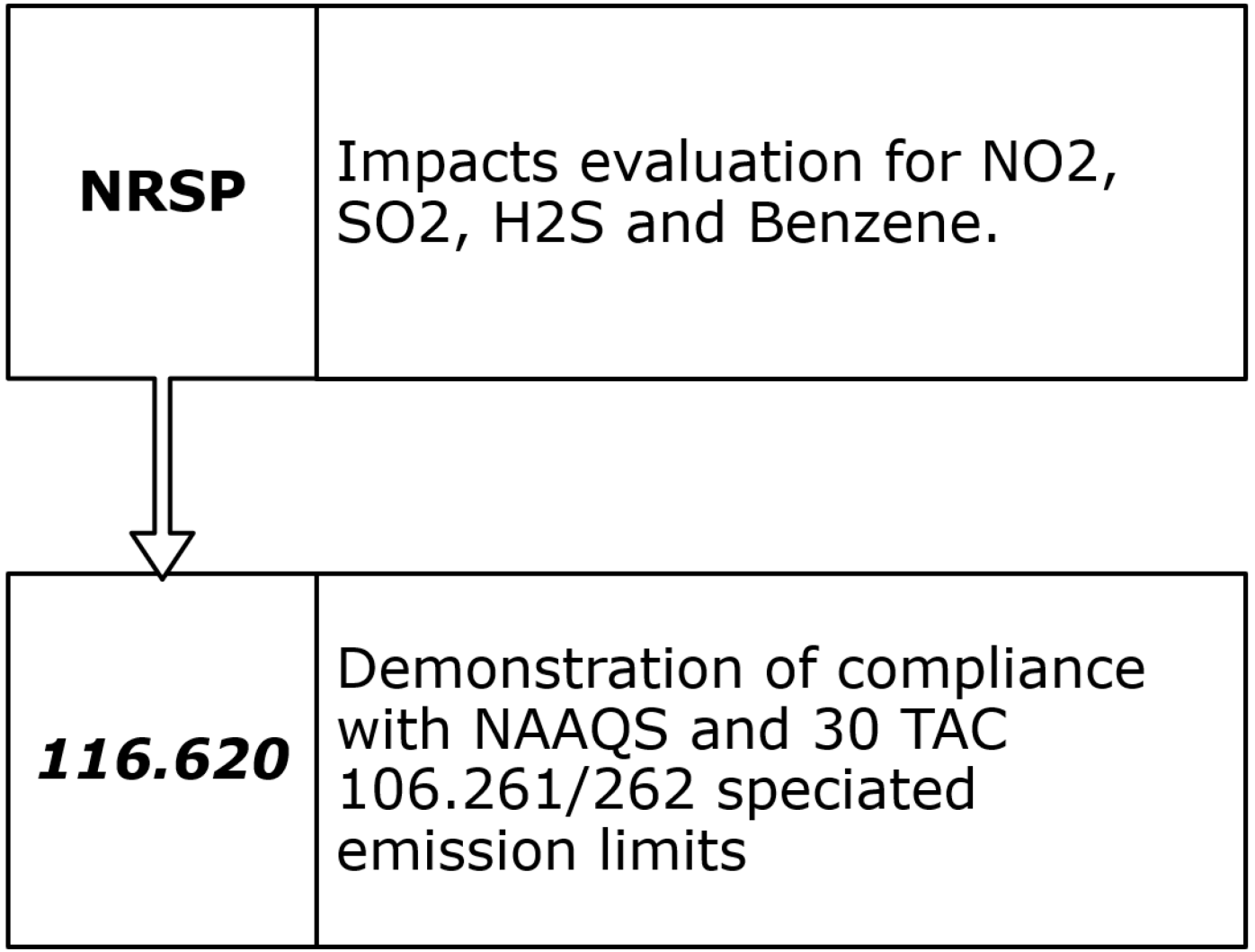


Standard Permit Options
Location Based



Standard Permit Options

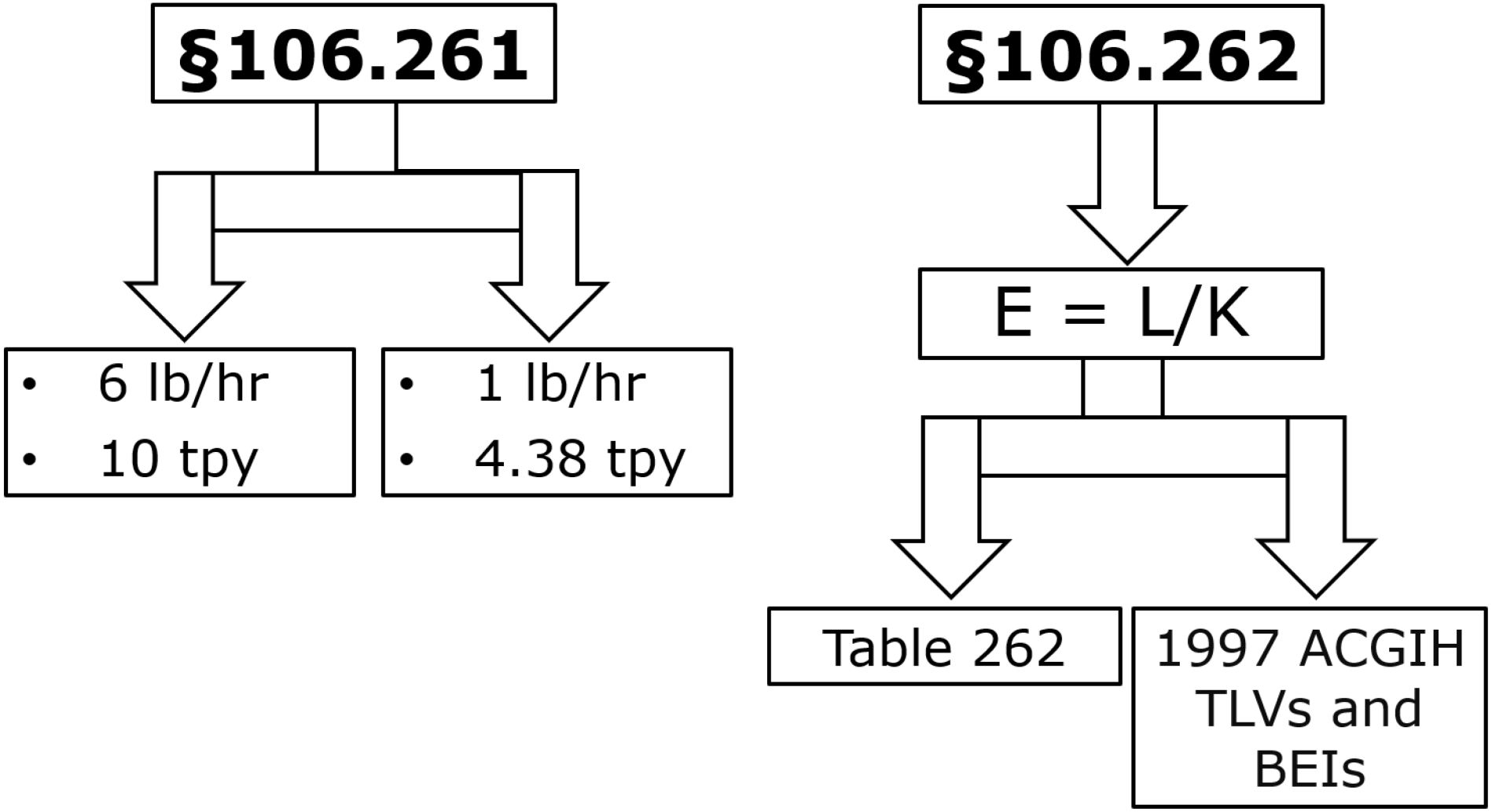
Impacts Based



30 TAC §116.610

Any project that results in a net increase in emissions of air contaminants from the project other than water, nitrogen, ethane, hydrogen, oxygen, or GHGs…, or those for which a NAAQS has been established must meet the emission limitations of §106.261 of this title (relating to Facilities (Emission Limitations)), unless otherwise specified by a particular standard permit.

30 TAC §106.261/262 Limits



Example Speciation

PBR 106.261 and 106.262 Emission Limits

Chemical	PBR	L, mg/m³	Emission Limit (E = L/K), lb/hr	Emission Limit tpy	Actual Emissions lb/hr	Actual Emissions tpy
Propane	106.261(a)(2)	-	6.00	10.00	3.00	9.62
Butanes	106.261(a)(2)	-	6.00	10.00	2.94	9.44
Pentanes	106.262	350	6.00	5.00	2.25	4.22
Hexanes	106.262	176	6.00	5.00	1.25	3.65
Hydrogen Sulfide	106.262	10	1.25	5.00	0.15	0.69
D=3000	**K=8**			**Total VOC Emissions:**	**9.44**	**26.93**

30 TAC §116.620

- Registration and response from TCEQ required prior to construction/operation
- Must meet specific requirements / BACT / listed in the rule
  - Sour sites <1/4 mile: Monitoring and vent requirements
  - <500-ft requires fugitive monitoring
  - Note 30 TAC 116.620(a)
- No specific emission limits except 30 TAC §116.610

Non-Rule Oil and Gas Standard Permit

- Notification required prior to construction/implementation of changes
- Registration required within 90-days of operation
- Must meet specific requirements / BACT / listed in the rule
  - 50-foot distance to property line or receptor
  - Emission limits both rule and impacts based

Non-Rule Oil and Gas Standard Permit Emission Limits

Air Contaminant	Steady-state or < 30 psig (lb/hr)	≥ 30 psig periodic (lb/hr)	Total tpy
Total VOC			250
Total crude oil or condensate VOC	145	318	
Total natural gas VOC	750	1,635	
Benzene	7	15.4	10.2
Hydrogen sulfide	10.8	15.4	47
Sulfur dioxide	93.2	9.8	250
Nitrogen oxides	121		250
Carbon monoxide	104		250
$PM_{2.5}/PM_{10}$	28		15

Non-Rule Oil and Gas Standard Permit – Impacts

- Demonstration of compliance with:
  - State/Federal ambient air standards for NO_2, SO_2, H_2S
  - Hourly and annual ESLs for Benzene
- Distance measurement requirements
- NOx to NO_2 conversion factors for engines

Non-Rule Oil and Gas Standard Permit Impacts Demonstration Options

- Emission impacts tables
- Screening modeling
- Dispersion modeling

Non-Rule Oil and Gas Standard Permit – Exemptions from Impacts Review

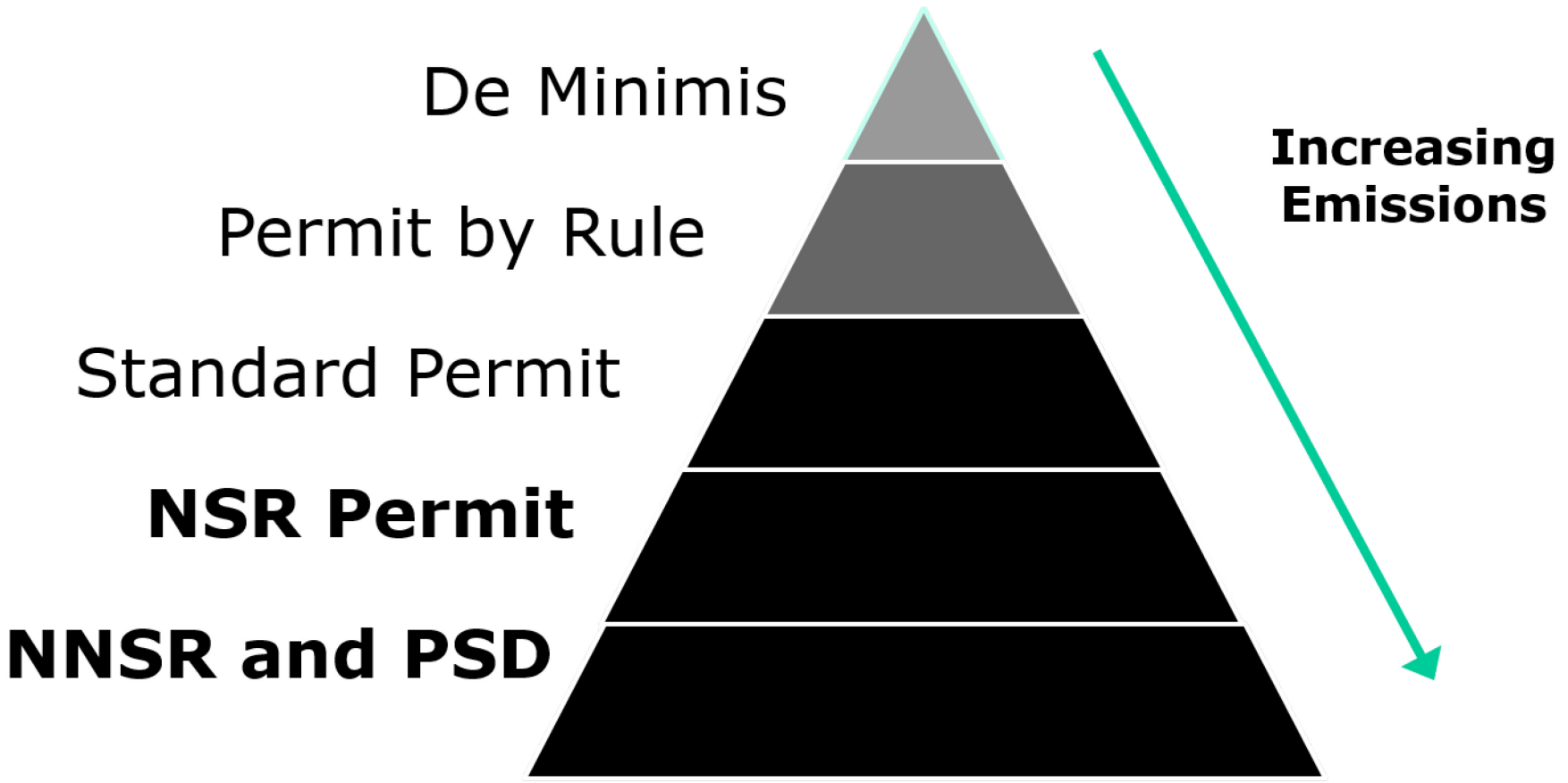
- Distance Exclusions:
  - Property-line more than one mile for NAAQS
  - Receptor more than one mile for benzene ESL review
- De Minimis Emission Rates:
    - Benzene: 0.039-lb/hr
    - H_2S: 0.025-lb/hr
    - SO_2: 2.00-lbs/hr
    - NO_x: 4.00-lbs/hr

MSS Authorization Mechanisms for Standard Permits

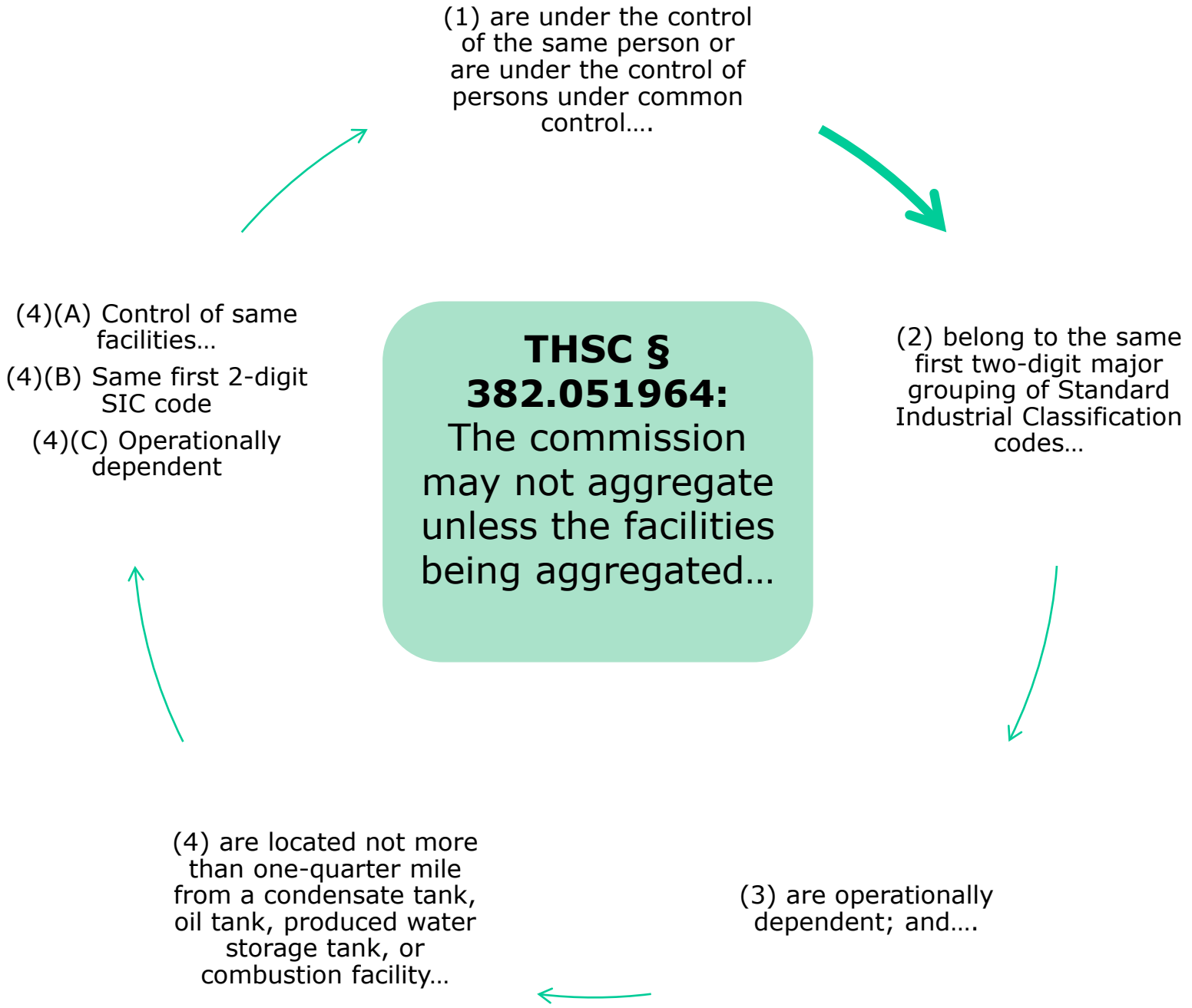
- 30 TAC §116.620 Standard Permit:
  - Include in Standard Permit registration [and 30 TAC §116.610(a)(1) demonstration]
  - Authorize using PBR §106.359

- Non-Rule Oil and Gas Standard Permit:
  - Paragraph (i) requires inclusion in the authorization and impacts evaluation

New Source Review Permitting



Aggregation


(1) are under the control of the same person or are under the control of persons under common control….
(2) belong to the same first two-digit major grouping of Standard Industrial Classification codes…
(3) are operationally dependent; and….
(4) are located not more than one-quarter mile from a condensate tank, oil tank, produced water storage tank, or combustion facility…
(4)(A) Control of same facilities…
(4)(B) Same first 2-digit SIC code
(4)(C) Operationally dependent
THSC § 382.051964:
The commission may not aggregate unless the facilities being aggregated…

State and Federal Regulations

Other Applicable Regulations

State Rules	30 TAC Chapters 111, 112, 115, and 117
Federal Rules	40 CFR Parts 60, 61, and 63

New Source Performance Standards (NSPS)
40 CFR Part 60

- NSPS K, Ka, Kb — Storage Tanks
- NSPS Subparts GG — Turbines
- NSPS Subpart IIII — Diesel Engines
- NSPS Subpart JJJJ — Engines (2006-present)
- NSPS Subpart KKK — Fugitives, natural gas liquids
- NSPS Subpart KKKK —Turbines
- NSPS Subpart LLL — Gas sweetening (amine units)
- NSPS Subpart OOOO/OOOOa – Crude Oil and Natural Gas Facilities

Maximum Achievable Control Technology (MACT) 40 CFR Part 63

- MACT H - Equipment leaks
- MACT HH - TEG units (Area Source)
- MACT HHH - All dehydration (Major Source)
- MACT YYYY - Turbines
- MACT ZZZZ - Engines

NSPS OOOOa & LDAR

- Reductions must be based on appropriate LDAR programs identified in the mechanism or TCEQ guidance

- NSPS OOOO/OOOOa requirements are in addition to permit and emission reduction requirements
  - LDAR monitoring completed as part of permit requirements may be used to demonstrate compliance

Submitting Authorization

Submittal of Registration

- Submit documentation through STEERs
- Pay fee
- Maintain records

Documentation Submittal

- Introduction
- Process and Flow Diagram
- Process Description
- Summary of Emissions / Emission Calculations
- Impact Analysis / NAAQS
- Forms / Checklists
- Rule Compliance Demonstrations
- Supporting Documentation
- Tables

Session One Recap

- Overview of Air Permitting in Texas
- Authorization Mechanisms for Oil and Gas
- Aggregation
- State / Federal Regulations
- Obtaining Authorization

Session One Questions?

Rule Registration Section
Air Permits Division
Office of Air
Texas Commission on Environmental Quality

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airRR@tceq.texas.gov – Rule Registration Section


THE STATE OF TEXAS
TEXAS COMMISSION ON
VIRONMENTAL QUALITY
Break

Session Two Outline

- Emission Representations
  - Facility Emissions
  - Control Techniques
- Alternate Operating Scenarios
- Material Analysis

Emission Representations

Facility Emissions

TCEQ Oil and Gas Emission Calculation Spreadsheet

- Assists with PBR and Standard Permit authorizations
- Includes inputs for all facilities that we will discuss
- Includes references to TCEQ guidance documents
- MSS calculations
- Includes impacts analysis tool for 30 TAC 106.352(a-k) and Non-Rule Oil and Gas Standard Permit authorizations

Sources of Emissions That Require Authorization

- Fugitive Emissions
- Storage Tanks
- Loading
- Combustion Units
- Maintenance, Startup, and Shutdown
- Control Devices

Fugitive Emissions

- Emissions from piping components and associated equipment including, but not limited to:
  - valves, connectors, pumps, agitators, compressor seals, relief valves, process drains, and open-ended lines.
  - Does not include loading emissions, uncontrolled tanks, etc.

- Calculated based on a component count and an emission factor
  - TCEQ “Air Permit Technical Guidance for Chemical Sources: Fugitive Guidance”
  - Emission reductions through Leak Detection and Repair programs

Leak Detection and Repair (LDAR)

- Required for some PBR and Standard Permit authorizations at specific thresholds
- Protocols to inspect fugitive components to identify leaks
- Leaks identified by the inspections must be repaired within a specified time period
- Specific control efficiencies for LDAR programs are identified in the permit rule language and TCEQ Fugitive Guidance

Storage Tank Emissions

- Breathing losses
  - Evaporative losses during storage
- Working losses
  - Vapors displaced by changes in liquid level
- Flash losses
  - Vapors liberated by changes in liquid pressure

Storage Tank Calculation Methodologies

- Working/Breathing:
  - Direct Measurement
  - Process Simulators
  - AP-42 Chapter 7
- Flash:
  - TCEQ Flash Guidance
    - Direct Measurement
    - Process Simulators
    - Laboratory Measurement (GOR)
    - Vasquez-Beggs Equation

Direct Measurement

- Measures working, breathing, and flash losses.
- Should include:
  - Description of where and how sample was taken, and how measurements were made;
  - Laboratory analysis of tank vapors;
  - Flow rate of tank vapors;
  - Temperature of tank vapors; and
  - Supporting calculations for all emission estimates.

AP-42 Chapter 7

- Only calculates working and breathing losses from a storage tank.
- Should include:
  - Sources of data used
  - Calculations

- AP-42 Chapter 7 was updated in November 2019.
  - As of December 16, 2019, Tanks 4.0.9d is no longer supported and will not be accepted

Process Simulator

- Calculates variations of flash, working, and breathing

- Should include:
  - Copy of the report (listing all the inputs and outputs)
  - Copy of analysis used as inputs for the program

G.O.R. (Gas-Oil Ratio)

- Calculates flash losses only
- Should Include:
  - Laboratory Analysis that contains Gas-Oil Ratio (in SCF/bbl) and composition of flash gas
  - Supporting calculations for all emission estimates
- G.W.R (Gas-Water Ratio) for water tanks

Vasquez-Beggs Equation

- Calculates flash losses only
- Flash guidance establishes acceptable parameters for:
  - API Gravity
  - Separator temperature, pressure, and gas specific gravity
  - Gas molecular weight
  - VOC fraction
- Should Include:
  - Lab analysis confirming parameters
  - Calculations

Produced Water

- *Tanks containing aqueous mixtures in which phase separation has occurred, resulting in a free layer of oil or other volatile materials floating on top of the water, should have emissions estimated on the basis of the properties of the free top layer* - AP-42 Chapter 7 Revisions
- With the frequent unloading operations of produced water tanks at oil and gas sites, there is a short time for settling to occur
  - The TCEQ Produced Water guidance addresses this scenario and recommends ≥1% VOC be represented if they are unable to obtain a speciated sample from the tank

Loading Emissions

- Loading losses occur as organic vapors are displaced by the liquid being loaded into the vessels

- These vapors include:
  - Leftover vapors formed in the "empty" vessels by evaporation of residual product from previous loads
  - Vapors generated in the vessels as the new product is being loaded

Calculating Truck Loading Emission Factors

AP-42, Section 5.2

$$L_L = \frac{12.46\ SPM}{T}$$

L_L = loading loss (lb/1000-gallons loaded)

S = saturation factor

P = vapor pressure of liquid

M = molecular weight of vapors

T = temperature of liquid

P, M, and T should be included on the liquid analysis

Saturation Factors

Saturation factors account for recent loading history:

AP-42 Table 5.2-1 Saturation Factors

Cargo Carrier	Mode Of Operation	S Factor
Tank trucks and railcars	Submerged loading of a clean cargo tank	0.5
	Submerged loading: dedicated normal service	0.6
	Submerged loading: dedicated vapor balance service	1.0
	Splash loading of a clean cargo tank	1.45
	Splash loading: dedicated normal service	1.45
	Splash loading: dedicated vapor balance service	1.0

Estimating Loading Emissions

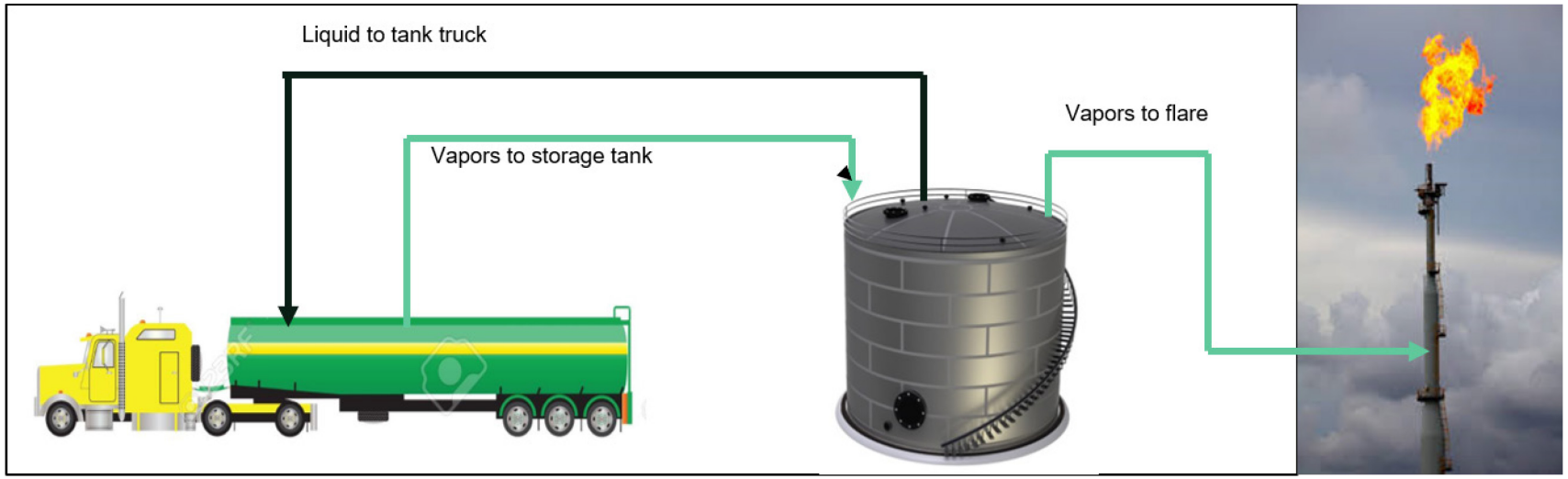
- Short-term Emissions:
  - Maximum vapor pressure
  - Maximum temperature of the material being loaded
  - Maximum hourly pumping rate

- Annual Emissions:
  - Average temperature
  - Average vapor pressure of the material being loaded
  - Annual throughput

Tank Truck Loading Emission Points

- For uncontrolled truck loading, emissions occur at loading spot from vapors that are not collected

- Vapor Balance Loading should represent two sources of emissions:
  - Uncollected emissions at the truck loading spot
  - Collected emissions at the release point



Truck Loading Collection Efficiency

Leak Test Certification Program	Maximum Collection Efficiency
Uncontrolled loading	0%
No Testing Available for Truck	70%
Annual Leak Test for Truck (NSPS XX)	98.7%
Annual Leak Test for Truck (MACT R)	99.2%
Pressurized Tank Trucks (15 psig) (49 CFR 180.407)	100%
Vacuum Loading (1.5 inch water column)	100%

Engine Emissions

- Operational uses:
  - Drive compressors and pumps
  - Provide electricity to sites without electric grid connection
  - Provide emergency backup power

- Emissions should be calculated using:
  - Vendor data
  - AP-42 Emission Factors
  - Catalyst Vendor Data

- NAAQS demonstration required by rule language

Heater and Boiler Emissions

- Combustion of fuel results in emissions
- Calculated using AP-42 Chapter 1.4
  - lb/MMBtu
  - Emission factors in AP-42 Table 1.4-1 or Vendor Data
- Field gas fired units should represent sulfur emissions

Glycol Dehydration Unit Emissions

- Use triethylene glycol (TEG) or diethylene glycol (DEG) to remove water from produced gas streams
- Sources of emission include the reboiler firebox, regenerator vent, and flash tank
- GRI-GlyCalc and other process simulators used for emission representations
  - Emission reductions can be represented by routing emissions to a control device or the reboiler

Sweetening Unit Emissions

- An Amine Unit is utilized to reduced acid gas concentration
  - Typical amine solutions include Diethanolamine (DEA), Monoethanolamine (MEA), Monodiethanolamine (MDEA), and/or Sulfinol
- Sources of emission include the reboiler firebox, regenerator vent, and flash tank
- AmineCalc and other process simulators used for emission representations
  - Emission reductions can be represented by routing emissions to a control device or the reboiler

MSS Activities

- Air emissions resulting from the planned maintenance, startup, or shutdown (MSS) of equipment or facilities at a site

- Planned MSS emissions:
  - emissions that are predictable; and
  - are part of normal or routine facility operations

- All planned emissions from oil and gas facilities must be authorized

MSS Activities: Lower Emitting Activities

- Engine, compressor, turbine, and other combustion facilities maintenance
- Repair, adjustment, calibration, lubrication, and cleaning of site process equipment
- Replacement of piping components, pneumatic controllers, boiler refractories, wet and dry seals, meters, instruments, analyzers, screens, and filters
- Turbine or engine component swaps

MSS Activities: Higher Emitting Examples

- Piping used to bypass a facility during maintenance
- Pigging and purging of piping
- Blowdowns
- Emptying, purging, degassing, or refilling of process equipment, storage tanks and vessels (except landing floating roof tanks for convenience purposes)
- Abrasive blasting, surface preparation, and surface coating of facilities and structures

Calculation of Emissions from MSS Activities

- Process Simulators
- TCEQ Oil & Gas Emission Calculation Spreadsheet
  - Spreadsheet contains the default value for all activities authorized by 30 TAC §106.359(b)(1)- 106.359(b)(6)
  - The spreadsheet also allows more customized estimates of emissions for applicants choosing not to accept default values
  - Higher emitting activity calculations are also included in the workbook and require site data

Painting and Sandblasting Emissions

- Air Permit Technical Guidance for Coatings Sources: Surface Coating Operations
- Surface Coating Facilities: Emissions Calculation Spreadsheet
- TCEQ Technical Guidance : Abrasive Blast Cleaning
- Emissions from Aerosol Cans: Assume that 90% of the can contents evaporate

Emission Representations

Capture and Control Techniques

Control Device Requirement Charts for Oil and Gas Handling and Production Facilities

- Lists requirements specific to control technology and efficiencies claimed
  - Design, operational, monitoring, recordkeeping and testing requirements increase as represented efficiencies increase
- Includes requirements for:
  - Flares
  - Thermal Oxidation and Vapor Combustion Control Devices
  - Process Reboiler, Heater, or Furnace used for emission control
  - Mechanical Vapor Recovery Units
  - Liquid Vapor Recovery Units
- Available on TCEQ Website

Vapor Recovery Units (VRU)

- Not a control device
  - Captures vapor and routes it to either a control device or the sales line
  - What a VRU does not capture cannot be controlled
- 95-100% capture efficiency
- Downtime should be included in representations

Vapor Recovery Towers (VRT)

- Not a control device
  - Used in tandem with VRU to collect flash emissions
  - Emissions are routed to sales line or a control device
- Separator oil enters and flash gas is capture
- After flashing, liquids are routed to the storage tanks

Flares

- Direct flame contact with the waste gas
- 98% VOC and H_2S destruction efficiency
  - 99% Propane destruction efficiency
- NOx and CO emission factors from TCEQ Emission Inventory Flare Guidance
- SO_2 emissions should be based on mass-balance of destructed H_2S

Vapor Combustion Units (VCU)

- Direct flame contact with the waste gas
- 98% - 99.9% destruction efficiency
- Combustion emissions:
  - Vendor guarantee
  - Unit testing
- SO_2 emissions should be based on mass-balance of destructed H_2S

Thermal Oxidizers

- Vapors oxidized within an enclosed chamber
  - Can also be thermally regenerative, thermally recuperative, and/or equipped with heat exchangers
- 98% - 99.9% destruction efficiency
- Combustion emissions:
  - Vendor guarantee
  - Unit testing
- SO_2 emissions should be based on mass-balance of destructed H_2S

Process Reboilers, Heaters, and Furnaces

- Waste gas delivered to the flame zone or combustion firebox
- 90% - 99% destruction efficiency
- Combustion emissions:
  - Vendor guarantee
  - AP-42
  - Unit testing
- SO_2 emissions should be based on mass-balance of destructed H_2S

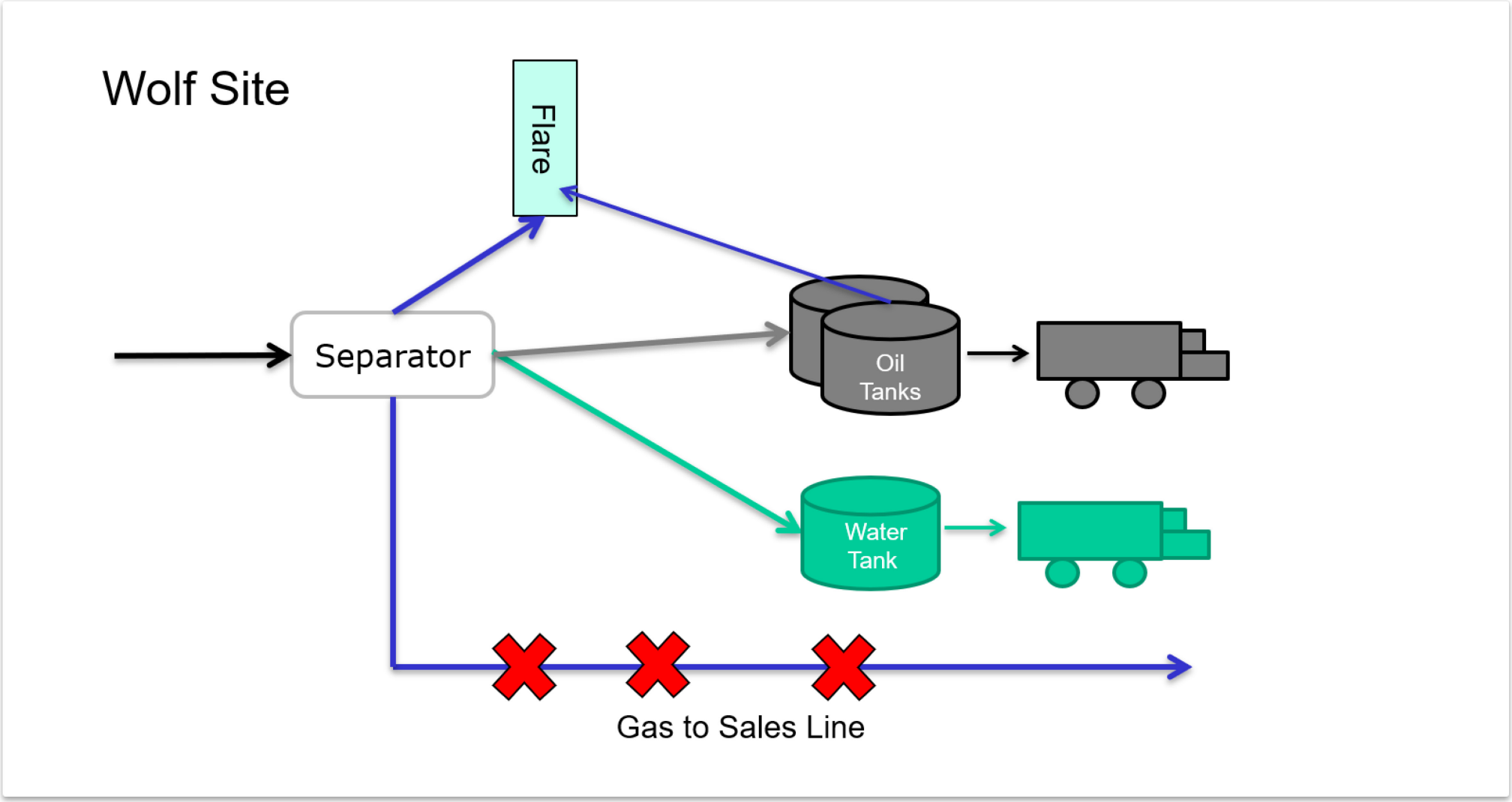
Alternate Operating Scenarios

About Alternate Operating Scenarios

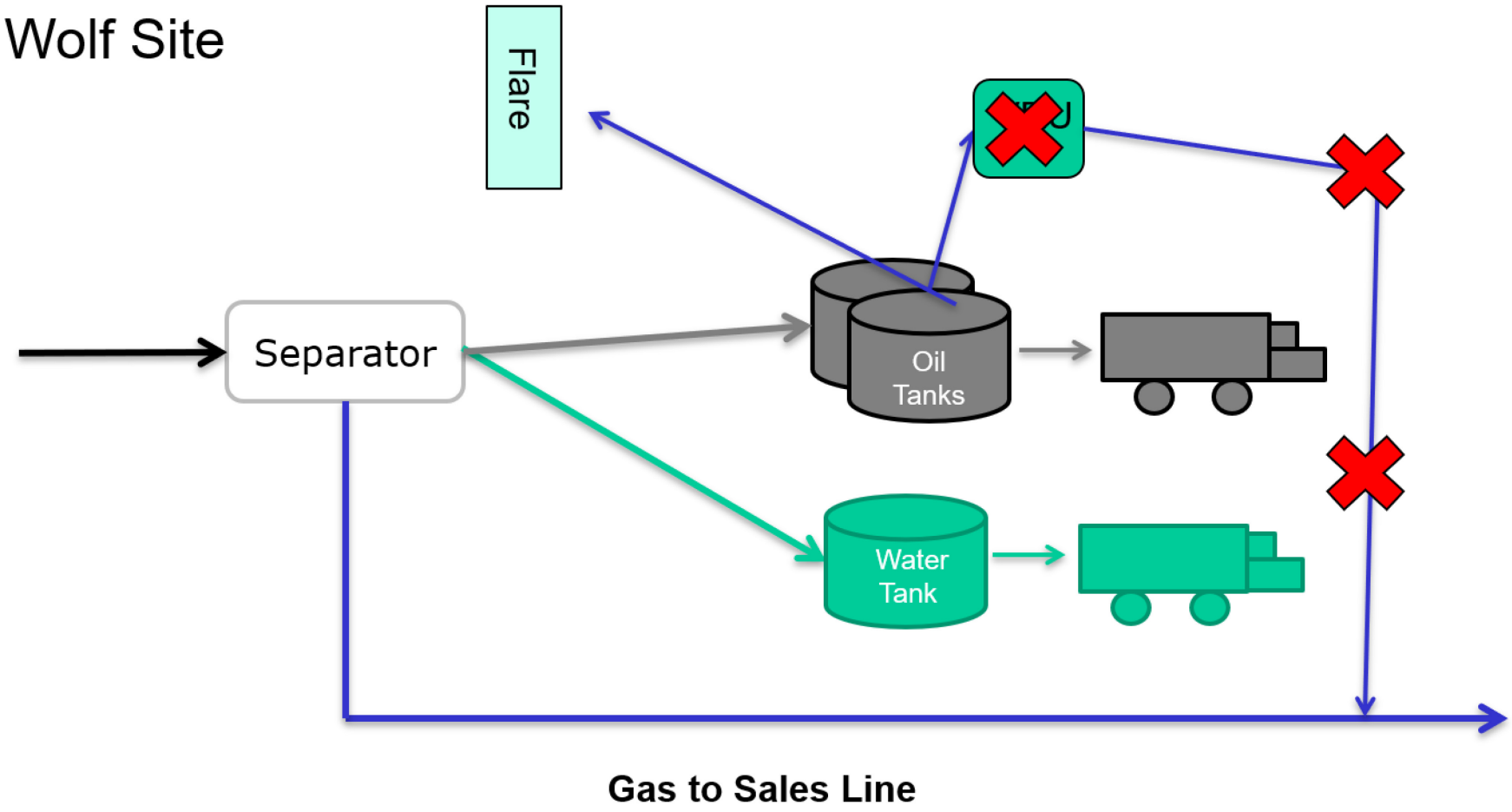
- Alternate Operating Scenarios (AOS) are different modes of normal operation that can be foreseen or anticipated for a facility or group of facilities

- AOS allow the site to continue to accept and process incoming product while some facilities are not operated

Alternate Operating Scenarios: Example One



Alternate Operating Scenarios: Example Two



Material Analysis

Gas/Liquid Analysis

- What is a gas/liquid analysis?
  - Physical properties of the material handled
  - Concentration of individual chemicals in the material
  - Physical properties of material at that point in the process
  - Basis of emissions estimates used in representations

Types of Material Analysis

- Crude Oil / Condensate
- Produced Water
- Gas
- Gas/Oil Ratio (Flash Gas Analysis)
- Hydrogen Sulfide

Material Analysis Report

- Should Include:
  - Date of Analysis
  - Sample Location
  - Type of Analysis
  - Site name
  - H_2S concentration
  - Molecular Weight
  - Testing Conditions

January 23, 2020

FESCO, Ltd.
1100 Fesco Ave. - Alice, Texas 78332

For: [redacted]

Sample: [redacted]
Inlet Separator
Spot Gas Sample @ 53 psig & 83 °F

Date Sampled: 01/17/2020 Job Number: [redacted]

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2286

COMPONENT	MOL%	GPM
Hydrogen Sulfide*	1.500	
Nitrogen	6.007	
Carbon Dioxide	6.772	
Methane	58.436	
Ethane	14.483	3.869
Propane	7.817	2.151
Isobutane	0.997	0.326
n-Butane	2.380	0.749
2-2 Dimethylpropane	0.006	0.002
Isopentane	0.579	0.212
n-Pentane	0.507	0.184
Hexanes	0.256	0.105
Heptanes Plus	0.260	0.104
Totals	100.000	7.702

Computed Real Characteristics Of Heptanes Plus:

Specific Gravity	3.410	(Air=1)
Molecular Weight	98.32	
Gross Heating Value	5060	BTU/CF

Computed Real Characteristics Of Total Sample:

Specific Gravity	0.887	(Air=1)
Compress bility (Z)	0.9955	
Molecular Weight	25.58	
Gross Heating Value		
Dry Basis	1234	BTU/CF
Saturated Basis	1213	BTU/CF

*Hydrogen Sulfide tested on location by: Stain Tube Method (GPA 2377)
Results: 943.4 Gr/100 CF, 15000 PPMV or 1.500 Mol %

Base Conditions: 14.650 PSI & 60 Deg F

Sampled By: (24) D. Field/R.Perez
Analyst: NG
Processor: NG
Cylinder ID: T-4512

Certified: FESCO, Ltd. - Alice, Texas

David Dannhaus 361-661-7015

Flash Gas Analysis

- Separator Properties
- Stock Tank Properties
- Gas Oil Ratio
- Liquid Properties
  - Shrinkage Recovery Factor
  - Oil API Gravity
  - Reid Vapor Pressure

February 11, 2020

FESCO, Ltd.
1100 Fesco Avenue - Alice, Texas 78332

For: [redacted]

Sample: [redacted]

Date Sampled: 01/17/20

Date Analyzed: 01/30/20

Job Number: [redacted]

FLASH LIBERATION OF HYDROCARBON LIQUID		
	Separator HC Liquid	**Stock Tank**
Pressure, psig	53	0
Temperature, °F	83	70
Gas Oil Ratio (1)	------	22.3
Gas Specific Gravity (2)	------	1.307
Separator Volume Factor (3)	1.0353	1.000

STOCK TANK FLUID PROPERTIES	
Shrinkage Recovery Factor (4)	0.9659
Oil API Gravity at 60 °F	32.52
Reid Vapor Pressure Equivalent (D-6377), psi (5)	5.49

Quality Control Check			
	Sampling Conditions	**Test Samples**	
Cylinder No.	------	W-1228*	------
Pressure, psig	53	50	------
Temperature, °F	83	83	------

(1) - Scf of flashed vapor per barrel of stock tank oil
(2) - Air = 1.000
(3) - Separator volume / Stock tank volume
(4) - Fraction of first stage separator liquid
(5) - Absolute pressure at 100 deg F
Analyst: E.T. III
* Sample used for flash study
Base Conditions: 14.65 PSI & 60 °F

Certified: FESCO, Ltd. - Alice, Texas

David Dannhaus 361-661-7015

Representative Analysis Criteria

- Criteria for use of a representative analysis:
  - Same producing reservoir/formation
  - Similar API Gravity (±3 degrees) and same site type
  - Sample taken from a site that processes the stream in a similar manner
  - No more than 3 years old

- **H_2S analysis should still be Site Specific**

Hydrogen Sulfide

- **Site Specific Concentration**
- ≥24-ppm H_2S Concentration is “Sour”
- Use worst-case or process specific data

Session Two Conclusion

- Emission Representations
  - Facility Emissions
  - Control Techniques
- Alternate Operating Scenarios
- Material Analysis

Final Questions?

Rule Registration Section
Air Permits Division
Office of Air
Texas Commission on Environmental Quality

512-239-1250 – Air Permits Main Line

airperm@tceq.texas.gov – General Air Permit Questions
airRR@tceq.texas.gov – Rule Registration Section