

Air Quality Management Survey

How states manage and protect
air quality



Overview

- Clean Air Act requires the protection of **public health and welfare**:
 - EPA established national ambient air quality standards for certain common and widespread pollutants
- States are required to adopt enforceable plans to achieve and maintain air quality meeting the air quality standards.



States surveyed by ADEC

- Wyoming 
- Colorado 
- Texas 
- Oklahoma 
- Kansas 
- Louisiana 
- North Dakota 
- Montana 
- West Virginia 
- New York 
- Ohio 
- Pennsylvania 
- New Mexico 



Districts surveyed by ADEC

- CARB-San Joaquin



- CARB-South Coast



- CARB-Ventura



- CARB- Monterey Bay



- CARB- Bay Area



- CARB- Santa Barbara



Examples of Survey Questions

- What is the regulatory framework for agency oversight of oil and/ or gas drill rigs?
- Are ancillary sources (compressors, dehydrators, boilers, tanks, etc.) permitted in drilling operations?
- Is there modeling performed on oil and gas drilling operations?
- How extensive is the Ambient Air Monitoring (AAM) network throughout the state?
- Have increased levels of oil and gas drilling adversely affected the Ambient Air Quality (AAQ)



Summary of Oil and Gas Drill Rigs Permit Information from Other States

State/District Name	Non-Attainment	Oil & Gas % of Economy	Active Drill Rigs (8/13)	Permits Required during O&G Production	TV Major SS Modification Required
CO	8-hr O3 (Front Range)	8	71	Yes	?
KS	O3 (close in Wichita)	9	24	Yes	?
LA	8-hr O3, (Baton Rouge)	17	108	Yes	?
MT	PM10, Pb, SO2	7	9	Yes	?
NM	PM10 (Anthony)	10	74	Yes (with AERMOD modeling)	?
WY	8-hr O3 (Sublette Co)	24	51	Yes (ind. drill rigs permitted in Sublette Co)	?
AK	PM10 (Fbks)	13	11	Yes	Yes



Summary of Oil and Gas Drill Rigs Permit Information from Other States (cont.)

State/District Name	Non-Attainment	Oil & Gas % of Economy	Active Drill Rigs (8/13)	Permits Required during O&G Production	TV Major SS Modification Required
ND	none	8	171	No	Yes
OH	8-hr O3	4	51	Yes	?
OK	none	25	168	Yes	No
TX	8-hr O3 (DFW, Houston)	20	849	Yes	?
WV	PM2.5	7	38	Yes	?
PA	8-hr O3, SO2, PM2.5	4	51	?	?
NY	8-hr O3	3	none	Yes	?



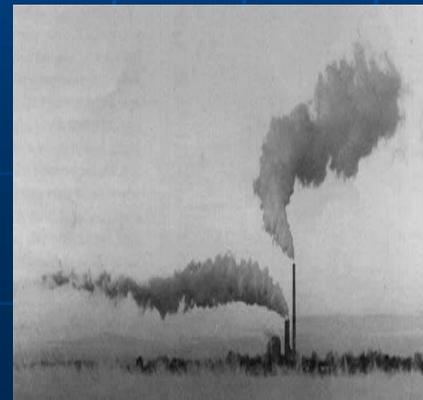
Summary of Oil and Gas Drill Rigs Permit Information from Other States (cont.)

State/District Name	Non-Attainment	Oil & Gas % of Economy	Active Drill Rigs (8/20)	Permits Required during O&G Production	TV Major SS Modification Required
CA-Ventura	8-hr O3	5(CA total)	4	Yes (PERP Registration)	N
CA-Santa Barbara	8-hr O3, 1-hr O3, PM10	5(CA total)	1	Yes(PERP Registration)	?
CA- South Coast	8-hr O3, PM2.5, PM10	5(CA total)	9	Yes (PERP Registration)	?
CA-San Joaquin	8-hr O3	5(CA total)	18	Yes (PERP Registration)	Yes
CA-Monterey Bay		5(CA total)	none	Yes(PERP Registration)	?
CA-Bay Area	8-hr O3	5(CA total)	none	Yes (PERP Registration)	Yes



How do States Manage and Protect Air Quality?

- All states' air quality protection agencies address the pollution issues in order of priority for the region **to protect human health**
- States' AQ rules set up to address worst/most persistent emission sources; these causes must be addressed first:
 - transportation corridors
 - coal-fired power plants
 - heavy manufacturing



How do States Manage and Protect Air Quality?

- There is no ONE approach or ONE uniform solution
- Each state has different methods based on the AQ issues to be addressed
- Factors in other states' regulations:
 - Auxiliary Sources/ Emission units (boilers, tanks, etc.) are regulated
 - Priority of Significant Emission Sources
 - Proximity to population centers
 - Public access
 - Topography/ Weather patterns
 - Non-attainment areas



Other States' Regulations – Drill Rigs

- In many states, drill rigs' activities are monitored by commissions or departments outside of environmental quality departments
- Often based on historical oversight practices pre-dating the 1970 enactment of the Clean Air Act
 - Railroad Commission of Texas
 - Louisiana Department of Natural Resources
 - Kansas Corporation Commission



Other States' Regulations – Drill Rigs

- Air Quality is regulated by Health and Environmental Agencies, based on a combination of elements:
 - Stationary/ Permanent emission units
 - Auxiliary emission units/ sources: boilers, dehydrators, etc.
 - Non-road emission unit rules



Other States' Regulations – Drill Rigs

- State AQ programs in the Lower 48 (L48) generally do not issue individual permits for transportable drill rigs
 - Mostly classified as mobile engines
 - Drill Rigs do not (or have limited) Auxiliary-Permanent emission sources (boilers, tanks) for initial drilling
 - Non-attainment areas may require special AQ controls
 - Texas has Permit-by-Rule for Drill Rigs



Other States' Regulations – Production and Drill Rigs – Emission Units

- Many states require permits when oil/ gas production operations commence
- Minor source permits are required for production operations
- Auxiliary source/ units are included in the Minor Source (MS) – Operations permit
- Some specific examples:
 - In L48, limited drilling operations occur on TV permitted facilities
 - In NM, oil production operations required AERMOD modeling
 - In LA, requirement that 10 days after drill test completed, need MS permit for permanent equipment (emission units)



Alaska's Drill Rig Permits - Background

- In 1977, Congress expanded the scope of the nation's PSD program
 - Measures needed to protect areas with air quality better than the national ambient standard
 - Established ambient increments and ceilings to limit deterioration of air quality
- In the early 1980s, ADEC changed its regulations to incorporate requirements for PSD programs
 - Did not generally address nonroad engine emissions unless an applicant provided information



Alaska's Drill Rig Permits - Background

- In 1989 EPA published a policy requiring all states to include all sources at a facility in permit applicability determinations for PSD
- 1990, Congress amended the CAA:
 - Promulgated standards for controlling air pollution from nonroad engines
 - Amended the definition of a stationary source to exclude emissions resulting from a nonroad engine
- In 1997, ADEC exempted nonroad engine emissions from permit applicability, but did **not** exempt the emissions from being considered in the ambient impact analyses required by the PSD permit program



Alaska's Drill Rig Permits - Background

- Through 1999, ADEC focused efforts on portable oil and gas activities that operate
 - with the greatest emissions
 - in areas for extended periods of time,
 - within areas that have significant ambient concentrations, for preventing PSD.
- In 2004, Minor Permit for Portable Oil and Gas for Drill Rigs base Air Quality Concerns
 - Program adjusted to be aligned with Federal Standards
 - Industry request
 - Included a SIP Minor Program



Transportable Drill Rigs

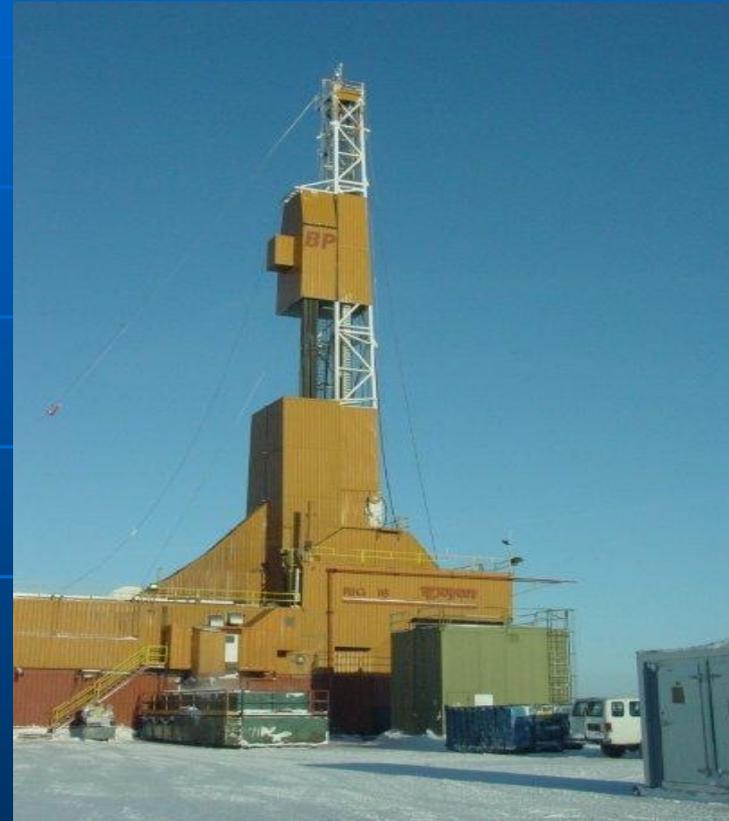
- Engine size is similar to Alaska (WY 500 – 1150 HP, CA- South Coast 910 HP)
 - Exception- ND shale gas drill rigs may be smaller/ have fewer drill rig engines
- Fuel – Options, Access, or Requirements:
 - Tier 3 or Tier 4 engine requirements (CA PERP program)
 - Highline power - offshore CA
 - Natural gas-fueled drill rig engines, and Sublette Co., WY
 - BACT on drill rig engines to reduce NO₂ – CA – Ventura
 - Examples may or may not be due to AQ controls, but all have the advantage of reducing air emissions



Drill Rigs Comparison



Typical oil drilling operation in North Dakota – pre-production – open derrick



Typical oil drilling operation from NS AK—closed derrick requires heaters, boilers during 1st phase of drilling



How do States Manage and Protect Air Quality?

Ambient Air Monitoring (AAM)

- Due to pre-existing populations and industry:
 - Ambient air quality had pre-existing pollutant profile
 - Protection of the ambient standard = protection of the baseline AAQ
- Extensive ambient air monitoring **networks** in L48:
 - Modeling is not the only source of checking the AAQ effects from emission sources
 - Often set up through industry funding (TX, CO)



Summary of AAM Information from State Survey

State/District Name	Number of AAM stations (all types)	State Area (mi ²)	AAM Network Randomly Scattered or Close to Population
CO	57	104,185	Population centers
LA	36	51,843	Population centers
MT	25	147,165	Randomly scattered
NM	22	121,298	Population centers
WY	275	97,818	Randomly scattered
AK	12	572,000	Population centers
TX	229	268,580	Population centers

Summary of AAM Information from State Survey (cont)

State/District Name	Number of AAM stations (all types)	State Area (mi ²)	AAM Network Randomly Scattered or Close to Population
KS	12	82,277	Population centers
WV	51	24,230	Population centers
PA	57	46,055	Population centers
NY	55	54,556	Population centers
ND	11	75,885	Randomly scattered
OH	3	44,825	Population centers
OK	34	69,957	Population centers

Summary of AAM Information from State Survey (cont)

State/District Name	Number of AAM stations (all types)	State Area (mi ²)	AAM Network Randomly Scattered or Close to Population
CA-Ventura	7	1,873	Population centers
CA-Santa Barbara	18	2,735	Population centers
CA-South Coast	35	25,084	Randomly scattered
CA-San Joaquin	33	22,053	Population centers
CA-Monterey Bay	10	5,382	Population centers
CA-Bay Area	28	4,900	Population centers

Drill Rigs North Dakota

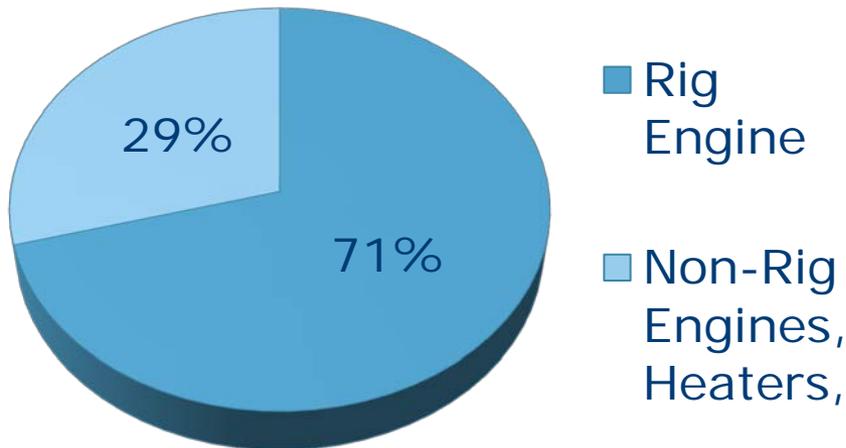


Aerial photograph showing the well pads placed in corridors along roads

How Much NOx Do Drill Rig Engines Emit?

NOx Emissions of TV Permitted Drill Rigs, BPXA Model

NOx Emissions; Rig Engines vs. Others



BPXA Multiple-Rig Drilling Operations		
Emission Unit	NOx Emissions (lb/hr)	Notes
Rig Engine	275.8	Cat D399
Non-Rig Engines, Heaters, Boilers, etc.	113.9	

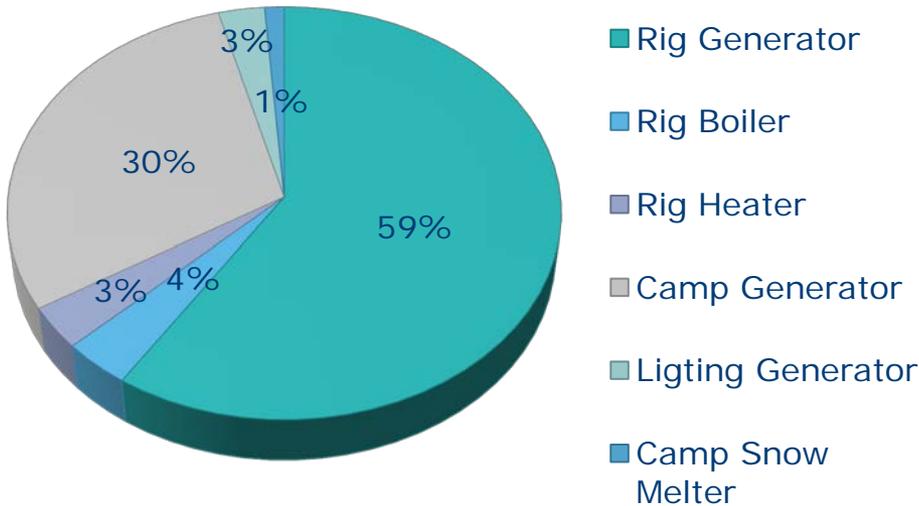
Comparison of the NO_x emissions emitted by Rig Engines vs. other associated emission units on a Title V-permitted drilling operation.

This information is based on a 2004 modeling analysis related to the application for Permit No. AQ0455TVP01.



NOx Emissions; Non-Rig Emission Units

NOx Emissions; Non-Rig Emission Units



Non-Rig Engine Emission Units		
Emission Unit	NOx Emissions (lb/hr)	Notes
Rig Generator	67.5	Cat 3412
Rig Boiler	4.2	
Rig Heater	3.8	
Camp Generator	33.7	Cat 3412
Ligting Generator	3.3	
Camp Snow Melter	1.4	

This is a breakdown of what the "others" category of emission units on a drilling operation permitted under Title V consists of, and their individual NOx emissions.

ADEC Permit-Specific Ambient Analysis for NOx in tons per year

BPXA Multiple-Rig Drilling Operations

ADEC Assessment of NOx Emission Factors

Small engine fuel rate (gal/hp-hr) =	0.054
Small engine NOx rate (lb/hp-hr) =	0.031
Small engine NOx rate (lb/gal) =	0.574
Requested annual fuel limit (gal/yr) =	1,500,000

As Submitted by BPXA (assumes 2 rigs per pad)

Unit Type	Rating		Max Fuel	No. of Units	Total	Emission	Total	Weighted Ems (lb/gal)	Resulting Ann'l NOx (tpy)	NOx PTE (tpy)
	Size	Unit	Rate (gal/hr)		Fuel Rate (gal/hr)	Factor (lb/gal)	NOx Ems (lb/hr)			
Rig Engine - Cat D399	1215	bhp	70	10	700	0.394	275.8	0.284	213	1208.004
Rig Gen - Cat 3412	500	kW	33	4	132	0.511	67.5			295.4398
Rig Boiler	150	boiler hp	52	4	208	0.020	4.2			18.2208
Rig Heater	4.2	MMBtu/hr	32	6	192	0.020	3.8			16.8192
Camp Gen - Cat 3412	500	kW	33	2	66	0.511	33.7			147.7199
Lighting Generators	8	kW	0.58	10	5.8	0.574	3.3			14.5819
Camp Snow Melter	8.8	MMBtu/hr	68	1	68	0.020	1.4			5.9568
Total					1372		389.7			



Conclusions

- Ambient air quality in AK must be protected
- Drill rig engines operating on TV facilities emit significant pollutants
- Other states are as concerned about air emissions as AK; their AQ regulations address the air pollution issues unique to their region through permits, controls, registration, AAM
- Auxiliary Emission Units require regulations





Questions and Answers

Tom Turner, 907-269-8123, tom.turner@alaska.gov

Jeanne Swartz, 907-269-6271, jeanne.swartz@alaska.gov

End

