

Air Quality in the PAPA

August 2013



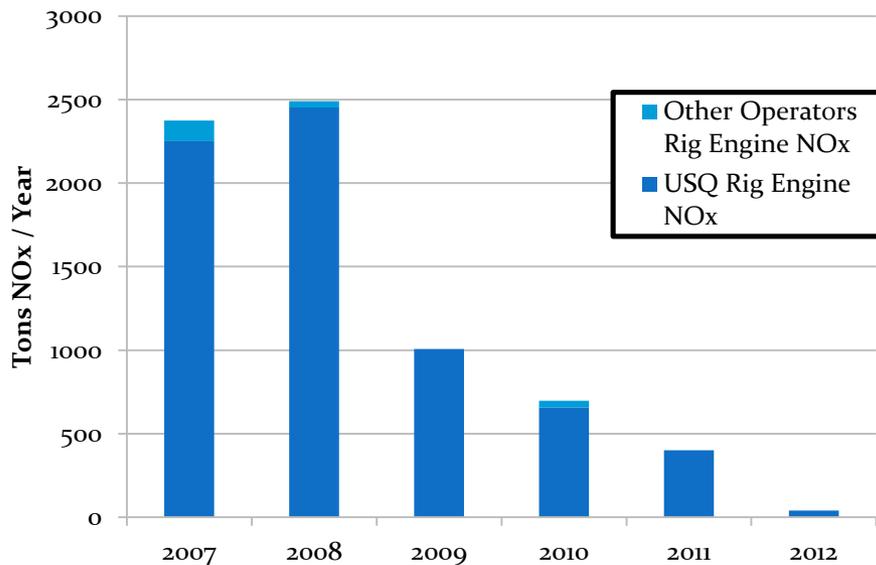
Agenda

- Emission Reduction Activities
 - Oxides of Nitrogen (NO_x)
 - Volatile Organic Compounds (VOC)
- Ozone Contingency Plans
 - Implementation
- Additional Emission Reduction Efforts

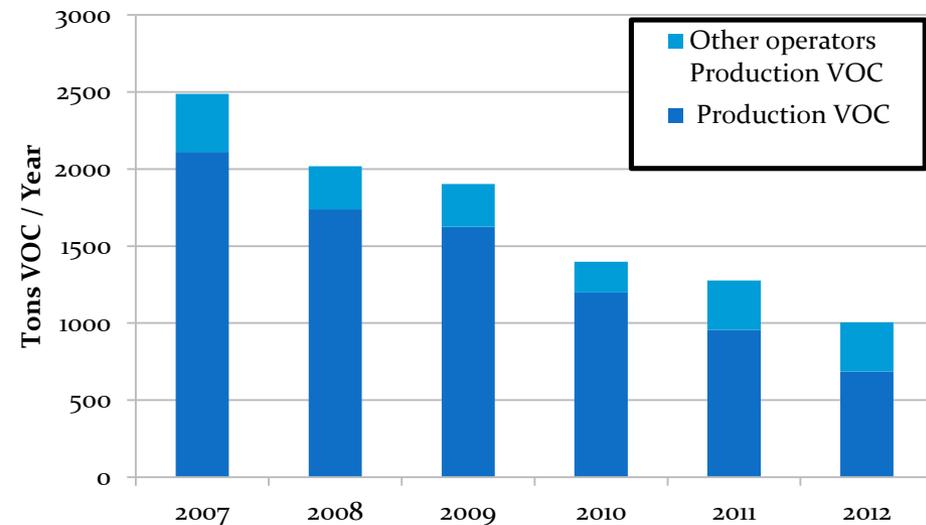
Emission Reduction Efforts

- Continued efforts to reduce ozone precursor emissions and emissions that contribute visibility impairment

WDEQ Pinedale Anticline Inventory - Rig Engine NO_x



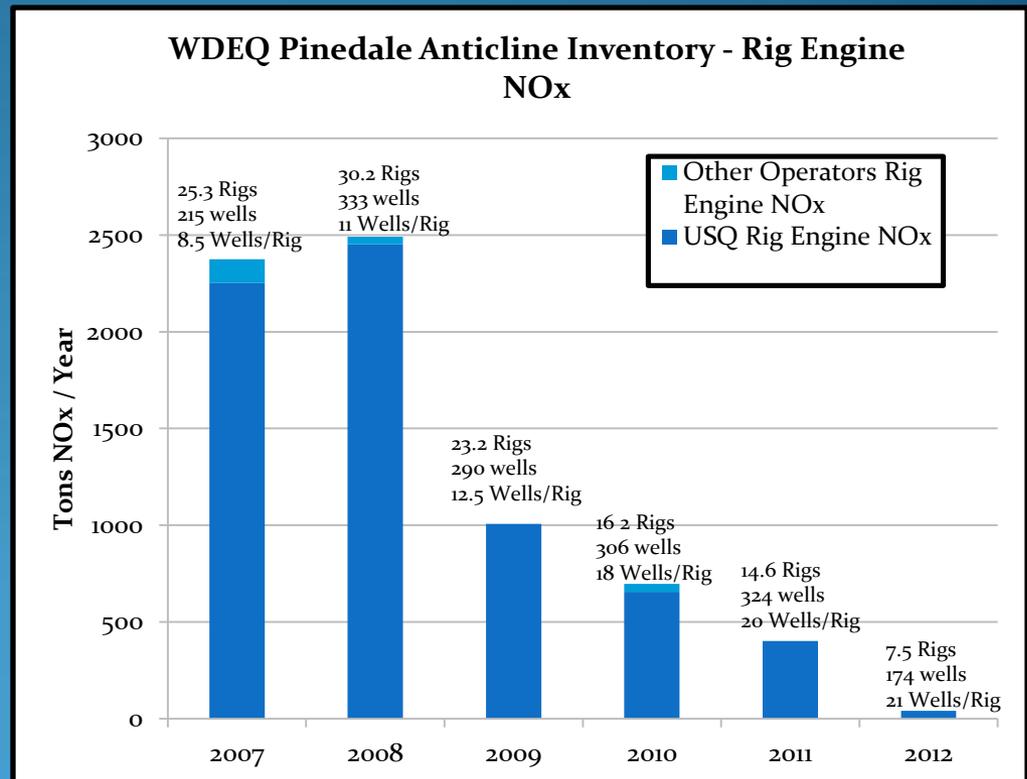
WDEQ Pinedale Anticline Inventory - Production VOC
(excludes fugitives, engines, compression)



Air Emission Inventory - NOx

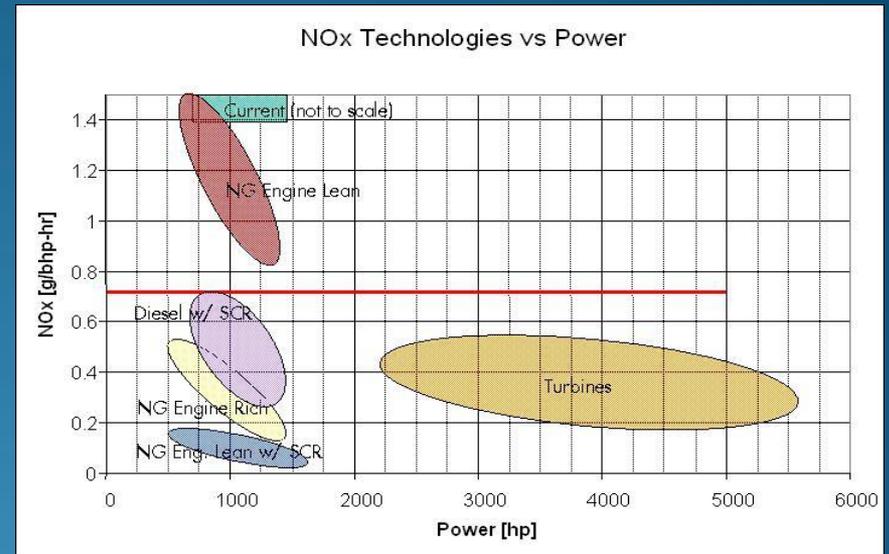
- Nitrogen Oxides (NOx)
 - Combustion
- Sources of NOx
 - Drilling Rigs
 - Compression
 - Engines
 - Stationary
 - Mobile
 - Production Burners
 - Control Devices
- Impacts
 - Visibility
 - Precursor for Ozone

97% Drill Rig NOx Reduction



Emission Reduction Activities – NO_x

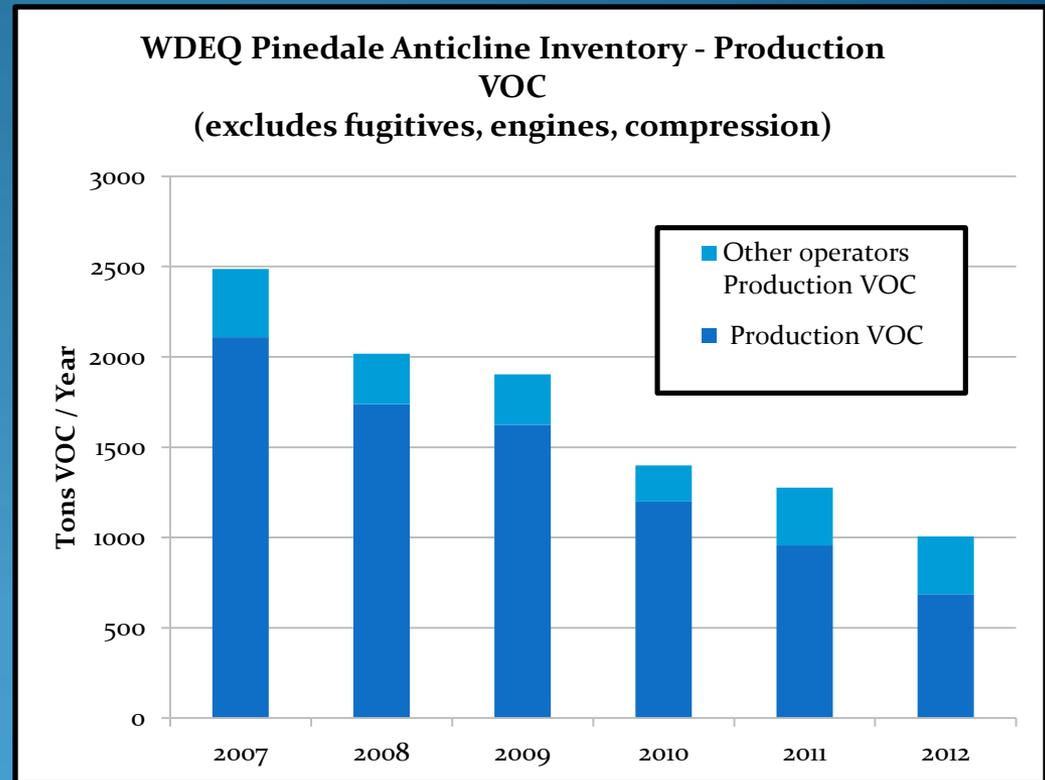
- Drill Rig Engine Emissions
 - Newer / Lower Emission Engines
 - All EPA Tier 1 or Tier 2
 - Increased drill rig efficiencies
 - Catalyst Technologies
 - **S**elective **C**atalyst **R**eduction
 - Uses Liquid Fertilizer
 - Greater 90% Removal of NO_x
 - Minimal Operational Issues
 - 100% Usage on Rig Engines Dec 2011
- Electrification of natural gas engines
- Re-route pneumatic pump emissions from combustors, for use as fuel
- Solar Sand Castles for completions
- Solar Pumps
- Liquids Gathering System
 - Reduced truck traffic
 - Reduced combustion of tank emissions



Air Emission Inventory - VOC

- Volatile Organic Compounds (VOC)
 - Gas Production and Liquids Storage / Handling
- Sources
 - Dehydration
 - Condensate Storage
 - Truck Liquids Loading
 - Fugitive
 - Compression
 - Engines
 - Stationary
- Impacts
 - Precursor for Ozone
 - Health – Air Toxics

61% VOC Reduction



Emission Reduction Activities – VOC

- WDEQ Best Available Control Technology (WDEQ Required)
 - Storage Tanks
 - Dehydration
 - Pneumatic Pumps / Controls
 - Engines
 - Emission Testing
- Voluntary Efforts
 - BACT controls at grandfathered Locations
- Fugitive Emissions
 - Infrared Camera Inspections
- Electrification of NG engines
- Retrofit high-bleed pneumatic controllers to low-bleed
- Liquids Gathering System
 - Storage Tanks
 - Liquids Loading
 - Fugitives



Ozone Contingency Plans

- Short-term emission reduction plan
 - Implemented if DEQ issues an Ozone Action Day Notice
 - Standby / Shutdown of Well Completion Operations
 - Shutdown Construction
 - Reschedule Maintenance Activities
 - Additional short-term activities
- Annual evaluation and submittal of Contingency Plans
- Awareness Training Conducted to all contractors and employees
- 1 Action Day in 2012
 - no exceedance of standard
- 0 Action Days in 2013
 - no exceedance of standard
- Reports of emission reduction efforts submitted to DEQ following an Ozone Action Day

Additional Efforts

- On-going evaluation of operations for Additional Emission Reduction Measures
- Participation in WDEQ Upper Green River Basin Air Quality Citizen's Advisory Task Force
- Visibility Milestone #3

www.papaoperators.com

