Air Quality in the PAPA

August 2012

ULTRA PETROLEUM

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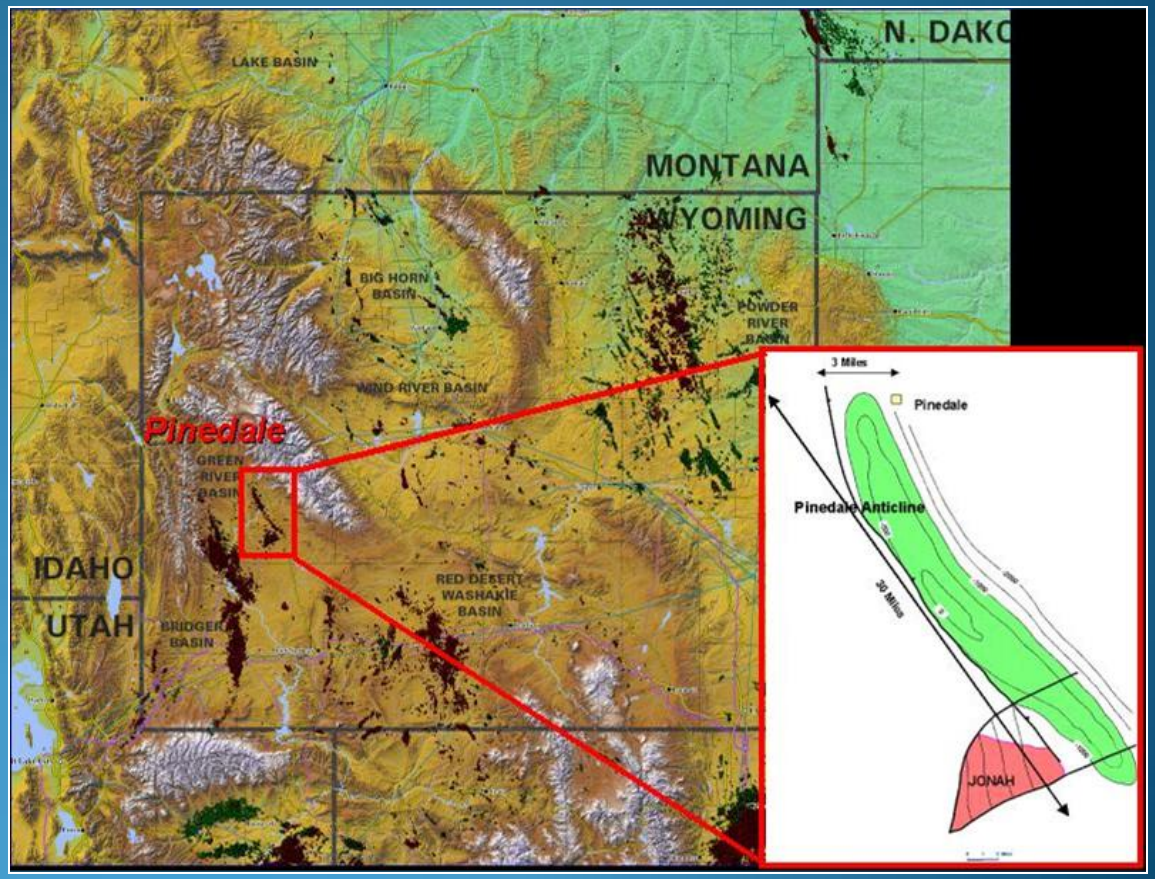
Agenda

- Background
- Emission Reduction Activities
  - Oxides of Nitrogen (NOx)
  - Volatile Organic Compounds (VOC)
- Ozone Contingency Plans
  - Implementation
- Ongoing and Future Emission Reduction

Air Quality Background

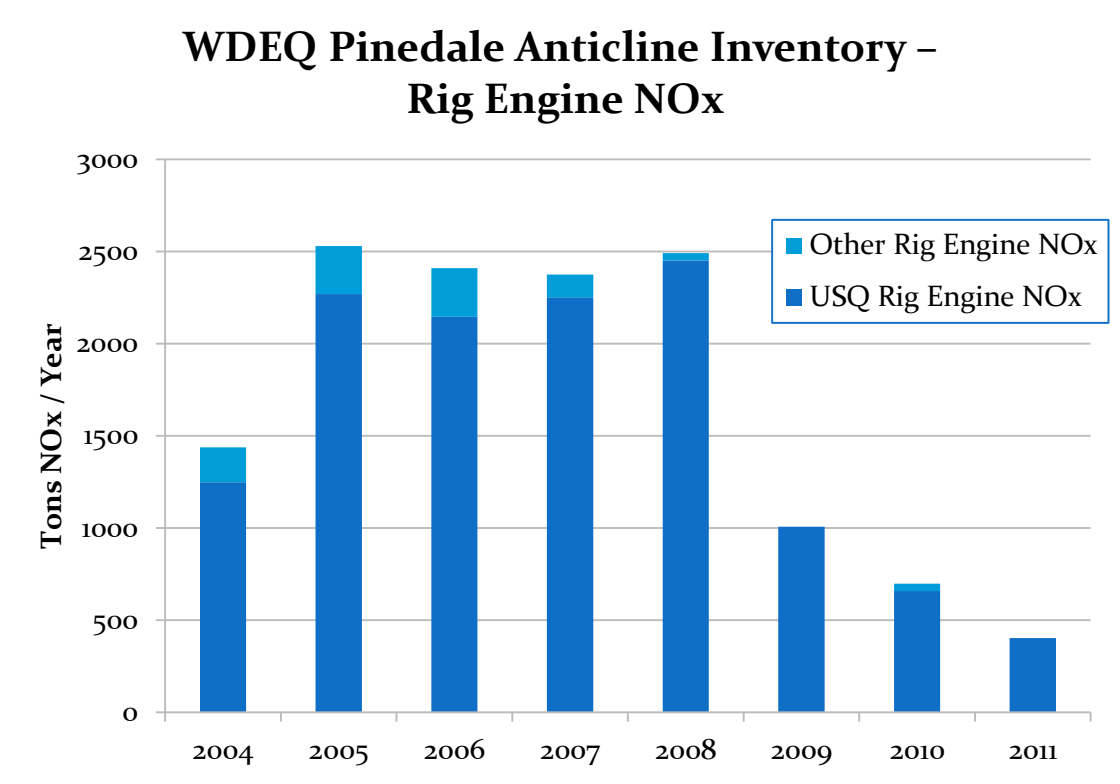
- Upper Green River Basin in SW Wyoming
- A top NG Field in US
- 90% of Acreage is Federal BLM
- Several Adjacent Class I Areas & National Parks
- Pinedale Drilling Activity
  - 2008: 30 Diesel Rigs
  - 2012: 11 Diesel Rigs with SCRs
- Producing Wells
  - 2008: 950
  - 2012: 2,035
- Wells / Rig
  - Past 8 to 10 Wells / Year / Rig
  - Now 20 Wells / Year / Rig



Air Emission Inventory - NOx

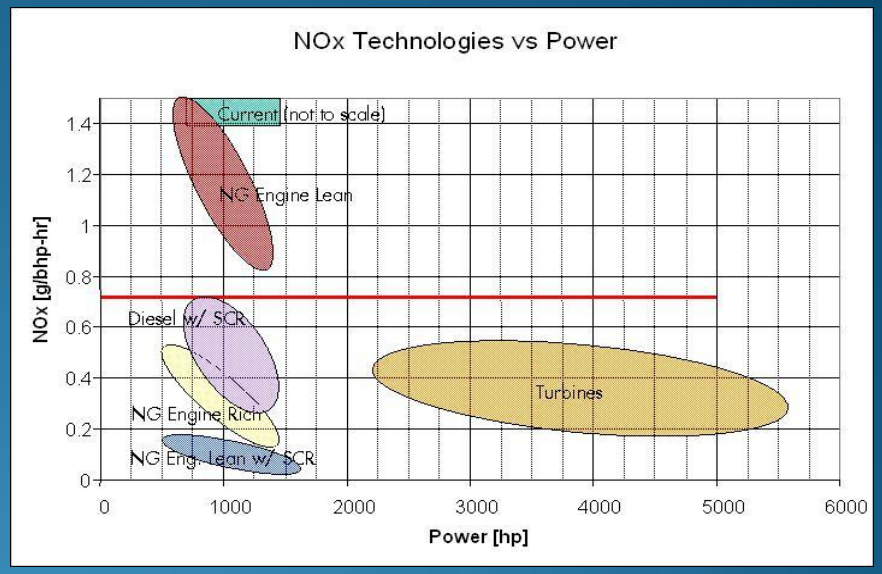
- Nitrogen Oxides (NOx)
  - Combustion
- Sources
  - Drilling Rigs
  - Compression
  - Engines
    - Stationary
    - Mobile
  - Production Burners
  - Control Devices
- Impacts
  - Visibility
  - Precursor for Ozone

85% NOx Reduction



Emission Reduction Activities – NOx

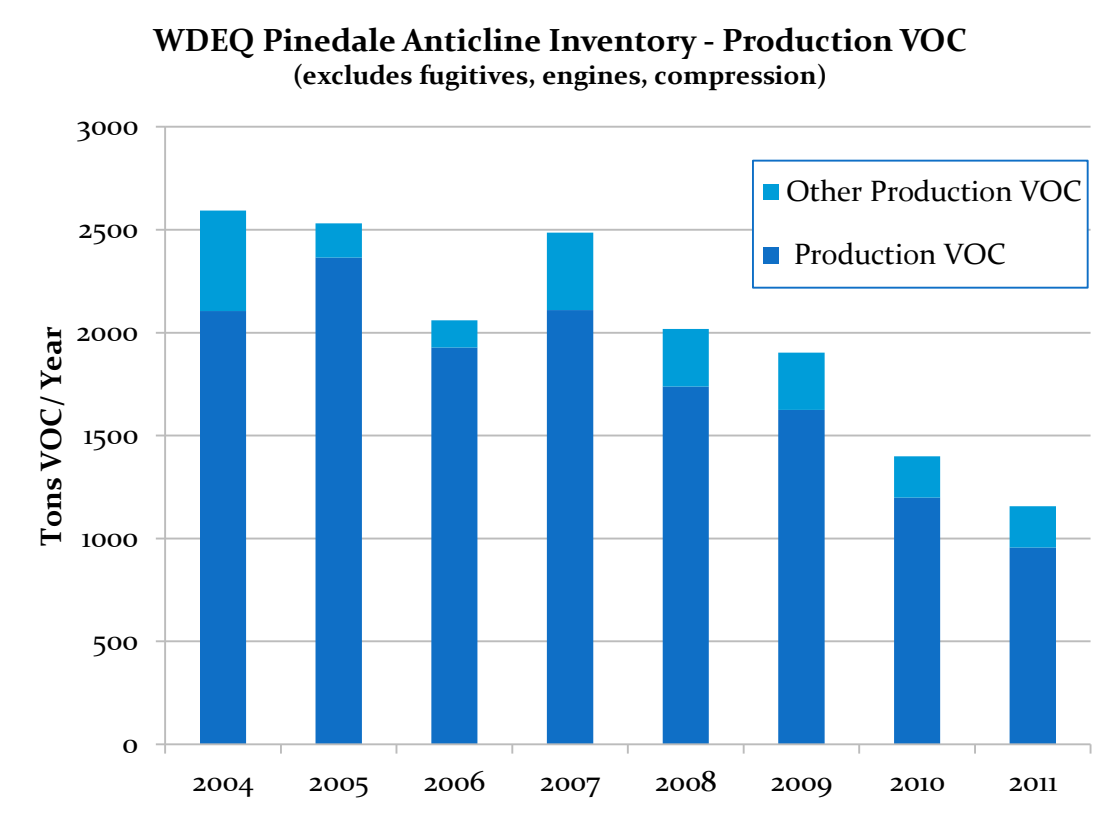
- Drill Rig Engine Emissions
  - Newer / Lower Emission Engines
    - All EPA Tier 1 or Tier 2
  - Catalyst Technologies
    Selective **C**atalyst **R**eduction
    - Uses Liquid Fertilizer
    - Greater 90% Removal of NOx
    - Minimal Operational Issues
    - 31% Usage on Rig Engines March 2011
    - 100% Usage on Rig Engines Dec 2011
- Electrification of natural gas engines
- Progress to Achieve Regulatory Commitments
  - 2005 NOx Levels (Completed)
  - 80% NOx Reduction Rig Emissions (Completed)
  - Goal of Zero Days Visibility Impact
- Reduced Air Quality Impacts
  - Ozone, Visibility



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

45% VOC Reduction



Emission Reduction Activities – VOC

- WDEQ Best Available Control Technology (WDEQ Required)
  - Storage Tanks
  - Dehydration
  - Pneumatic Pumps / Controls
  - Engines
  - Emission Testing
- Voluntary Efforts
  - Grandfathered Locations
- Fugitive Emissions
  - Infrared Camera Inspections
- Liquids Gathering System
  - Storage Tanks
  - Liquids Loading
  - Fugitives

Ozone Contingency Plans

Ozone Forecasting / Advisory → Implement Required Plans → Short Term Emission Reductions

- Awareness Training
- Inspection & Maintenance
- Notification System
- Short Term Control Measures
  - Standby / Shutdown of Well Completion Operations
  - Shutdown Construction
  - Reschedule Maintenance Activities
- Report Measures Taken to WDEQ

Ongoing & Future Emissions Reduction

- Reviewing Operations for Additional Emission Reduction Measures
- New WDEQ BACT Requirements
  - Venting / Blowdown Permits
  - Other Concentrated Development Areas
- Participation in WDEQ Upper Green River Basin Air Quality Citizen's Advisory Task Force
- Fugitive Leak Surveys at Facilities
- Complete d Installation of SCR NOx Technology
  - Dec 2011 100% of Drill Rig Engines
- Looking at Catalyst Technology Options for Frac Engines
- Convert Natural Gas Engines Where Electricity is Available
- Reconvene Operator BMP Workgroup

Update on Visibility Milestone #3 Modeling to Meet Pinedale Anticline SEIS ROD Requirements

ROD Requirement for Visibility Modeling

- Final goal defined as Milestone #3 (Section 4.1.1 of the ROD):
  - *"Within 78 months after signing of this ROD modeled project related visibility impacts will be no greater than 0 days of visibility impairment over 1 dv at the Bridger Wilderness Area."*
- Process is described by Implementation Item #4:
  - *"No later than the fifth annual planning session following signing of this ROD, Operators will submit to the collaborative group an evaluation of alternatives, and recommend a plan that addresses all sources from project activities, and of which the aim is to meet a predicted visibility impact objective of no more than zero days greater than 1.0 dv of visibility impairment. The Operators' evaluation will include modeling of the expected reduction in predicted visibility impairment which can be achieved by each alternative as well as an implementation schedule. All visibility modeling shall be performed using protocols approved by WDEQ-AQD and BLM in consultation with EPA. BLM is committed to assuring that any mitigation necessary to achieve the goal of zero days of modeled visibility impairment will be implemented. BLM, WDEQ, and the Operators will work together to evaluate impacts, and if needed, sequentially review and employ the most effective technologies available to address impacts to visibility. Absent an effective technology to achieve further reductions beyond the 80 percent described in the Final SEIS, adjustments in the pace of development may be utilized to achieve zero days of modeled visibility impairment. The collaborative group will also specify a schedule for completely implementing the plan."*

Progress to Date

- Multiple meetings held with the Operators, WDEQ-AQD and BLM (in consultation with EPA)
  - Principles of modeling and methodologies, including applicability of model improvements and updates to modeling and Federal Land Manager guidance
- Administration Plan developed
- Protocol currently under development
  - Reviewed by Operators and Agencies, working to finalize
- Emissions inventory under development

Schedule

- Protocol to be finalized – August 2012
- Operators, WDEQ-AQD and BLM in consultation with EPA review results – April 2013
  - From Implementation Item #4:
    - *BLM, WDEQ, and the Operators will work together to evaluate impacts, and if needed, sequentially review and employ the most effective technologies available to address impacts to visibility.*
- Final report – August 2013

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