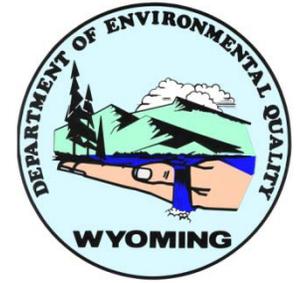


Jonah Field and Pinedale Anticline Development Area (JPAD) in the Upper Green River Basin of Wyoming

Brian Bohlmann, P.E.
WY Department of Environmental Quality
Air Quality Division
Emission Inventory Supervisor

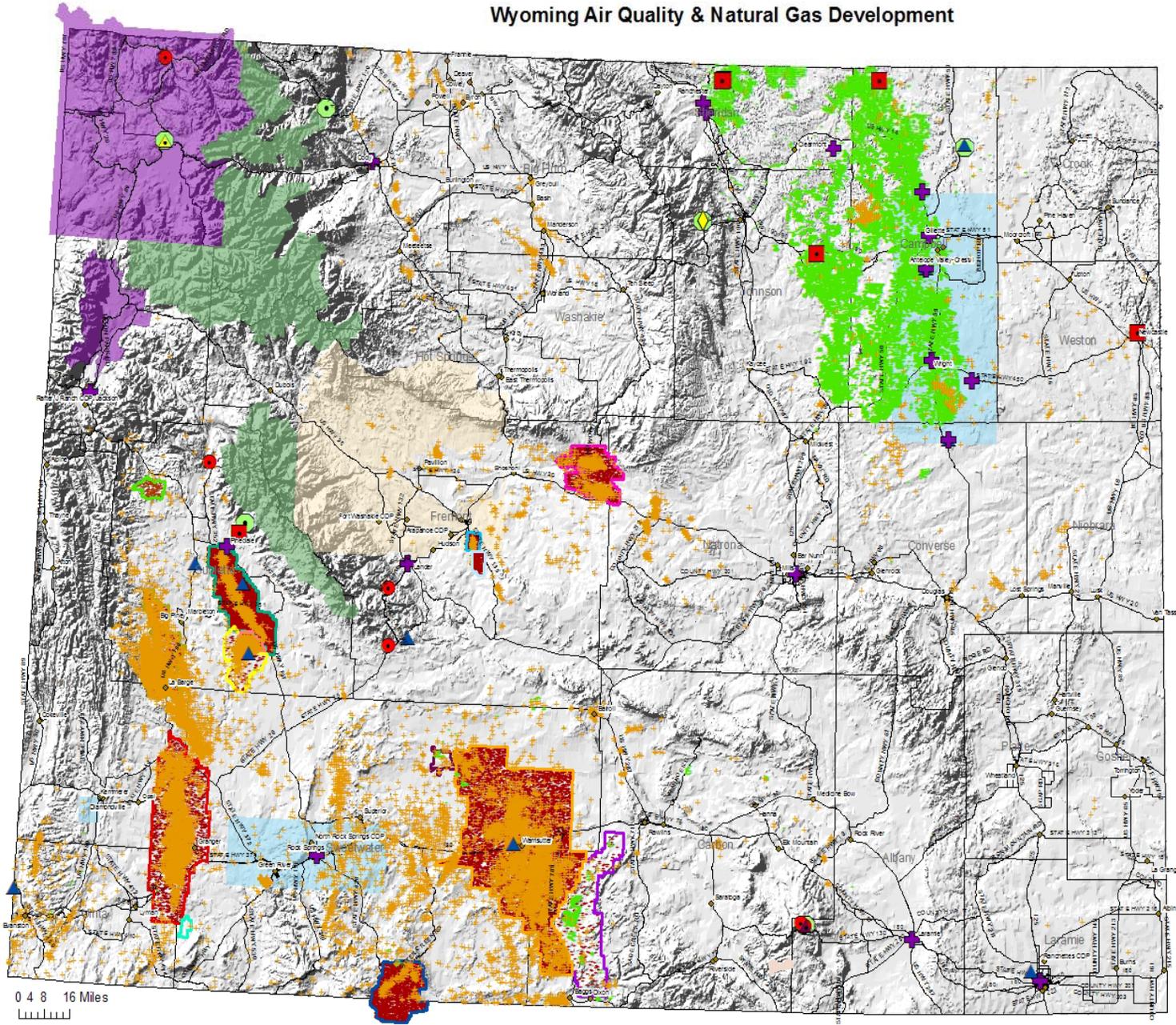
19th International Emissions Inventory Conference
September 28, 2010

Topics



- ◆ State Wide and JPAD maps
- ◆ JPAD well development overview
 - (1994 – 2008)
- ◆ Oil & Gas Permitting Changes
- ◆ JPAD Production & Emissions Trends
- ◆ UGRB Wintertime Ozone

Wyoming Air Quality & Natural Gas Development



Legend

- Existing Conventional Gas Well
- Existing CBNG Well
- Projected Well

EIS Development Areas

- Atlantic Rim - 2000 (CBNG) wells
- Beaver Creek - 228 (CBNG) wells
- Continental Divide-Creston - 8,500 wells
- Eagle Prospect - 136 wells
- EnCana NPL - 85 wells
- GMI - 1370 wells
- Hiawatha - 2100 wells
- Jonah Infill - 3100 wells
- La Barge Platform - 604 wells
- Moxa Arch - 5165 wells
- Pinedale Anticline - 4400 wells
- Riverton Dome - 346 (CBNG) wells

WDEQ Monitors

- State-Gaseous
- State-PM
- State-Visibility

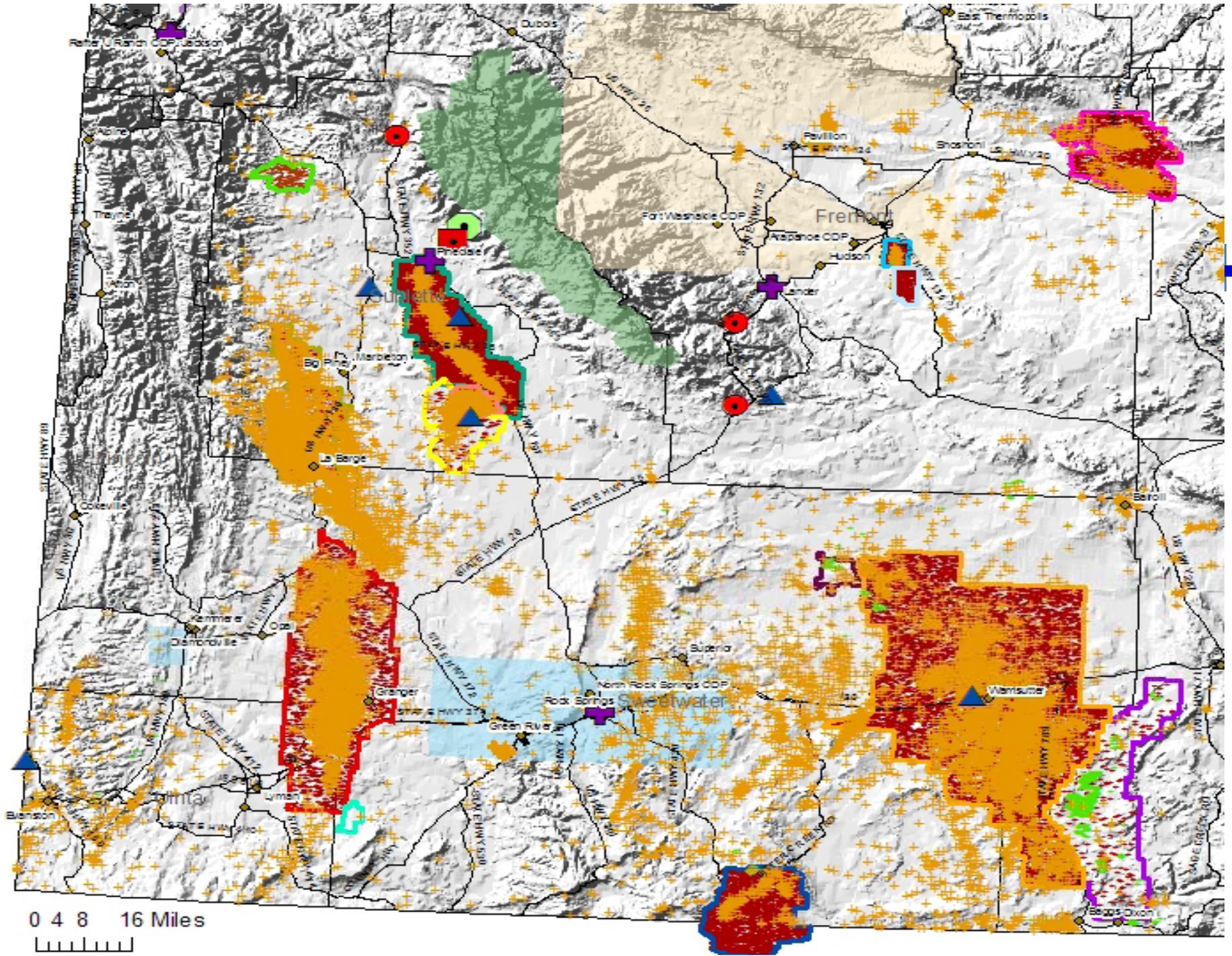
Other Monitors

- CastNet EPA
- CastNet NPS
- NADP
- IMPROVE
- WARMS

Other Features

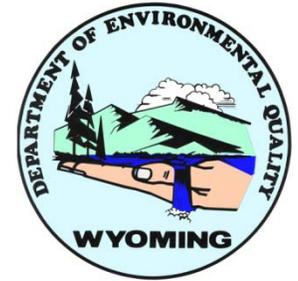
- Industrial Network
- Wind River Indian Reservation
- Forest Service Class I
- Park Service Class I

January 2008
 Map Produced by:
 Kelly Bott
 Wyoming Department of Environmental Quality
 Air Quality Division



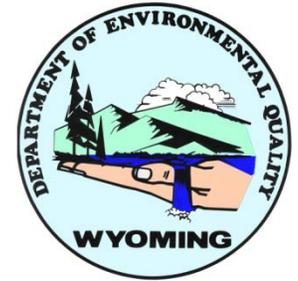
0 4 8 16 Miles
|-----|-----|-----|-----|

JPAD Well Development Overview (1994 – 2008)



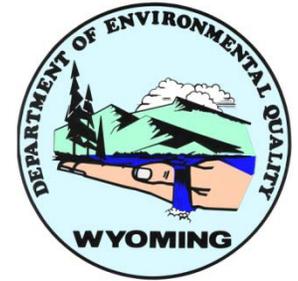
- ◆ Jonah EA issued in 1994
 - 47 existing wells
- ◆ Jonah II ROD issued in April, 1998
 - 450 additional wells
- ◆ Pinedale Anticline Project Area (PAPA) ROD issued July 27, 2000
 - 700 wells
- ◆ Jonah Infill ROD issued March 14, 2006
 - 3,100 additional wells
- ◆ PAPA SEIS ROD issued September 12, 2008
 - 4,400 wells on 600 pads and a liquids gathering system

Permitting Changes



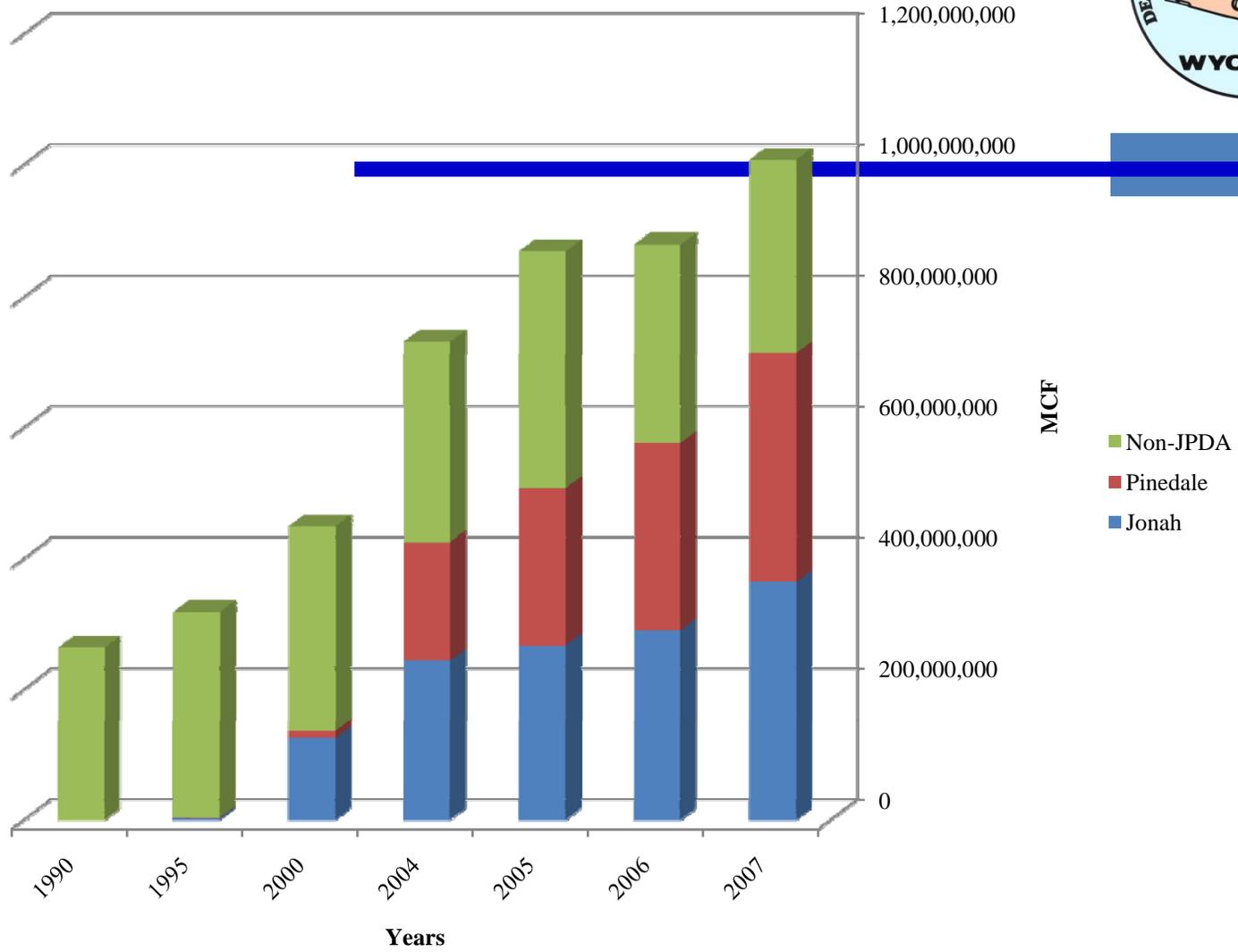
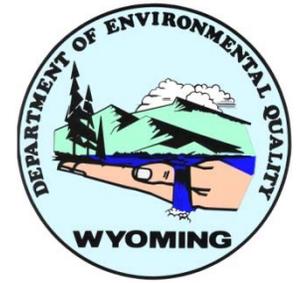
- ◆ June 1997 the WDEQ/AQD issued an oil & gas permitting guidance document for new & modified production sites which specified BACT requirements.
 - <40 TPY VOC uncontrolled
- ◆ July 28, 2004 (4th revision to the guidance) was a proactive approach to the pending Jonah Infill ROD
 - <30 TPY VOC uncontrolled for single well pads
 - Controls required upon first date of production for multi well pads
- ◆ March, 2010 (6th revision to the guidance)
- ◆ <http://deq.state.wy.us/aqd/oilgas.asp>

Production & Emissions Trends

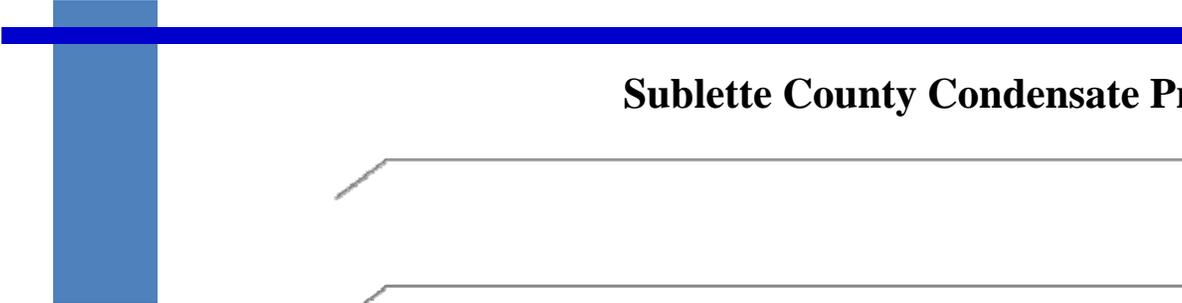
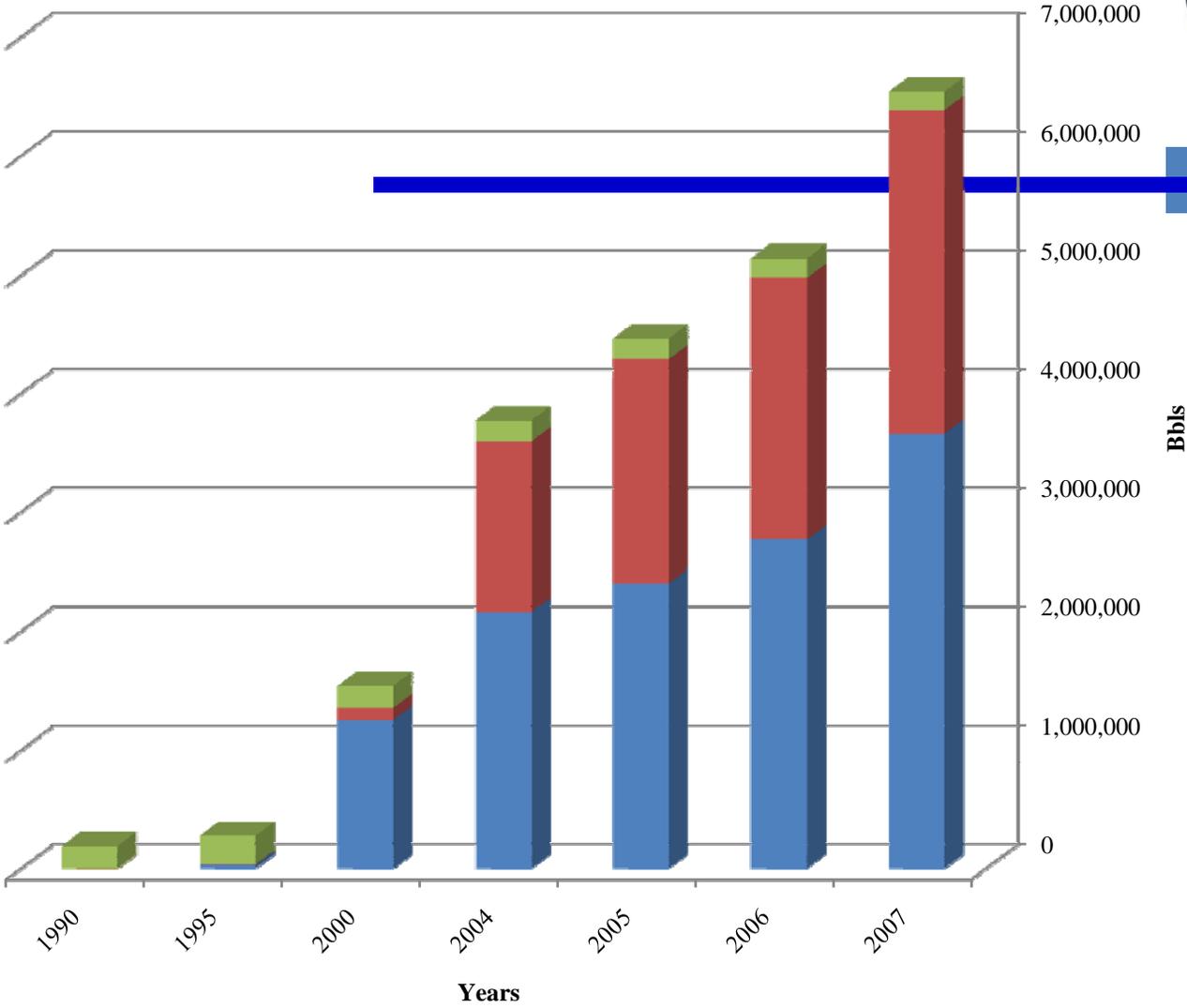
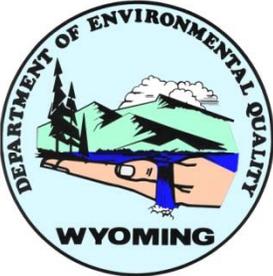


- ◆ A second proactive approach to the pending Jonah Infill ROD was to start collecting well-by-well inventory information for the JPAD area.
- ◆ The first annual inventory for JPAD was requested in January 2005 for calendar year 2004.
- ◆ In 2008 the annual inventory was expanded to all of Sublette County (statewide for the 2008 NEI).

Sublette County Gas Production

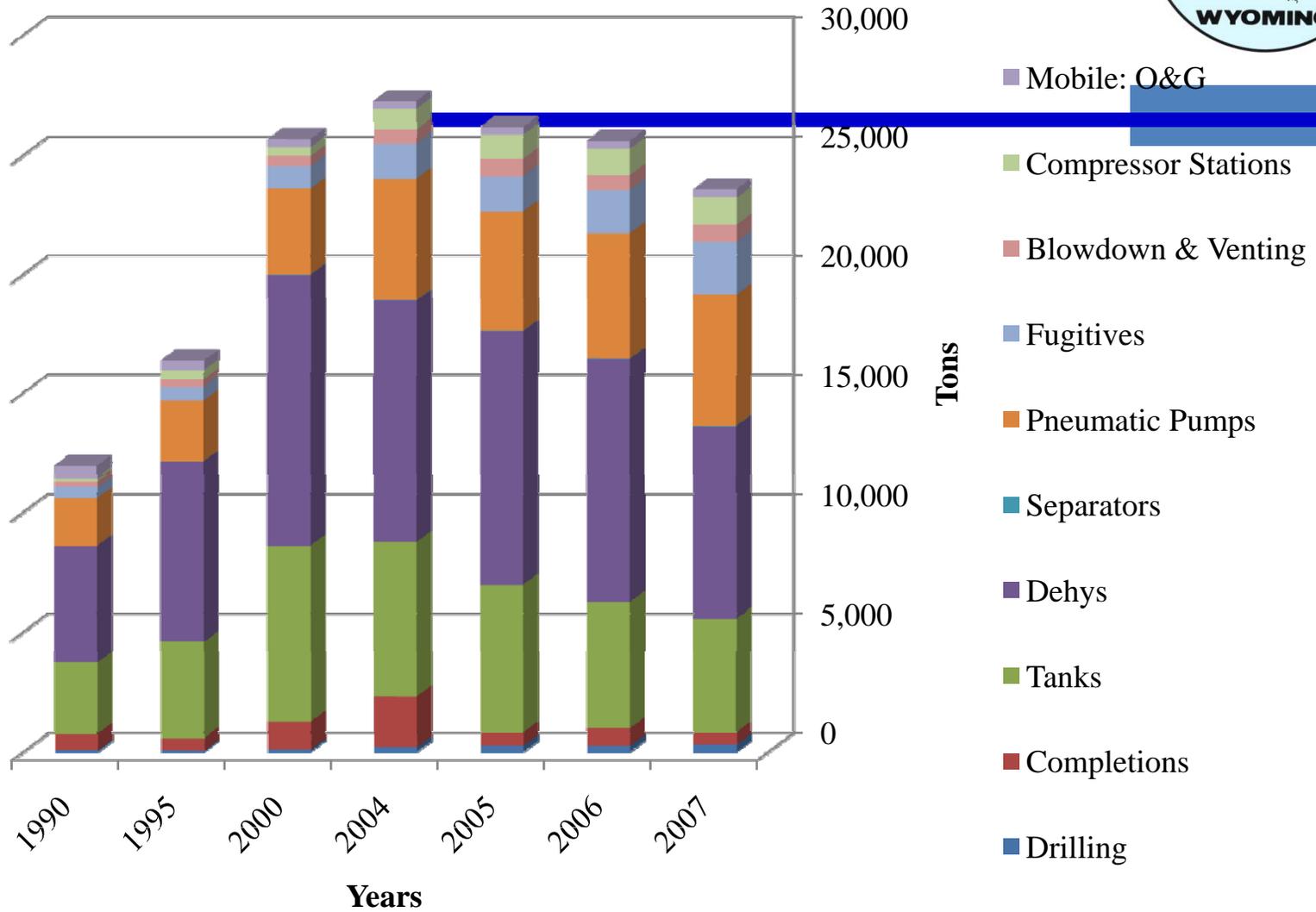


Sublette County Condensate Production

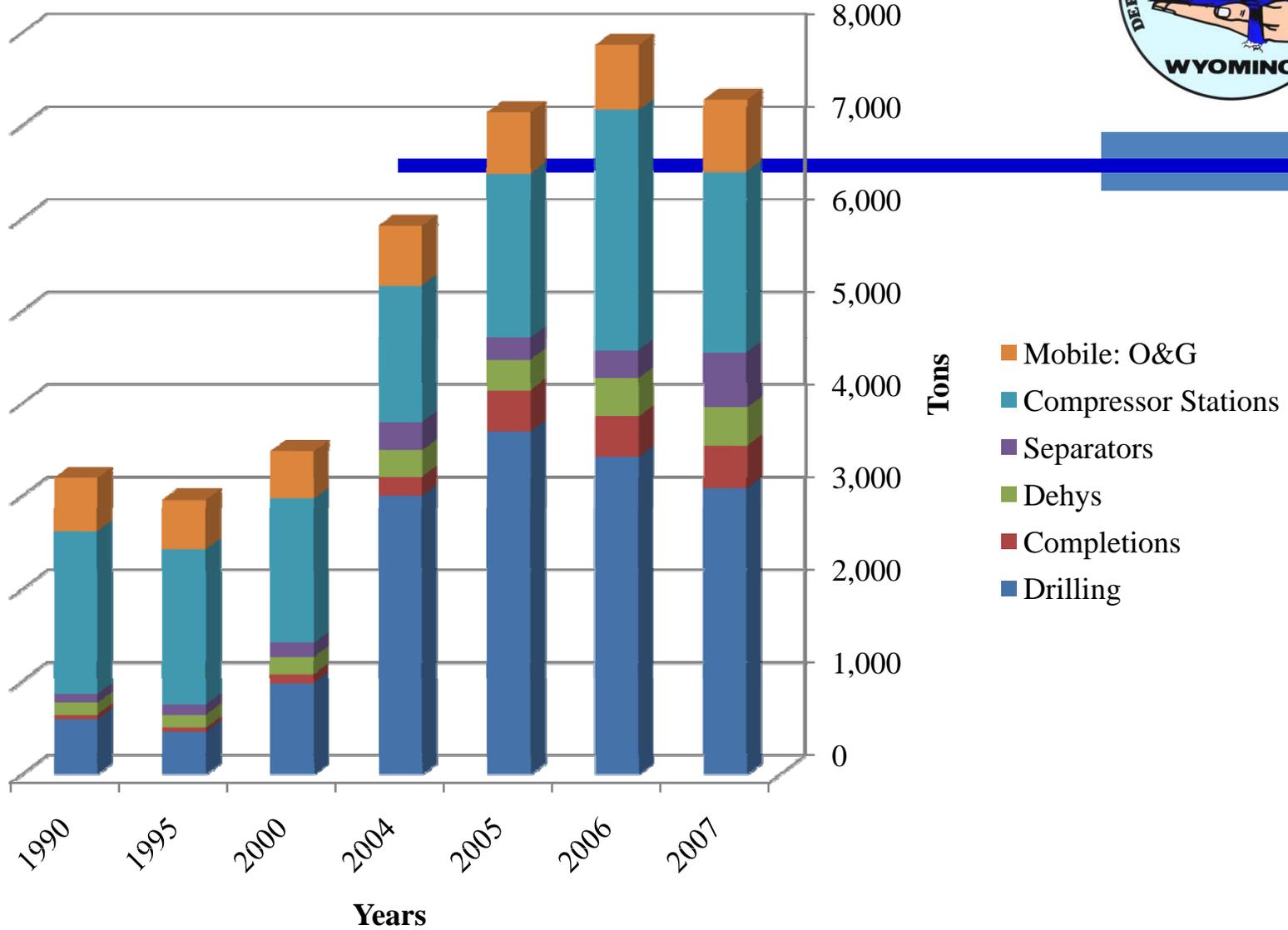
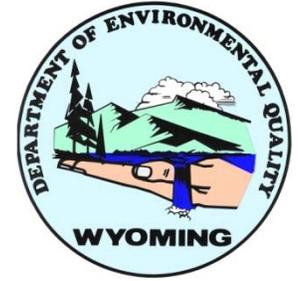


- Non-JPDA
- Pinedale
- Jonah

Sublette County VOC Emissions by Source

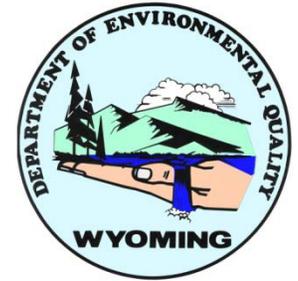


Sublette County NOx Emissions by Source



Production & Emissions Trends

(continued)



◆ Total Producing JPAD Wells:

- 26 in 1995
- 282 in 2000
- 901 in 2004
- 2,964 in 2008 (an increase of 515 wells per year)

◆ Total Jonah Field Wells:

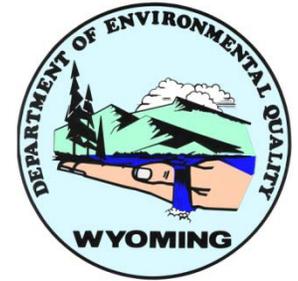
- 539 in 2004
- 1,811 in 2008

◆ Total Pinedale Anticline Wells:

- 362 in 2004
- 1,153 in 2008

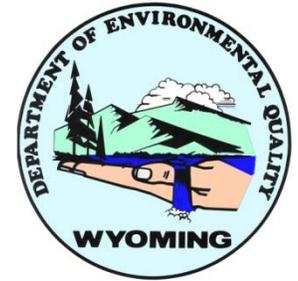
Production & Emissions Trends

(continued) Inventory Changes

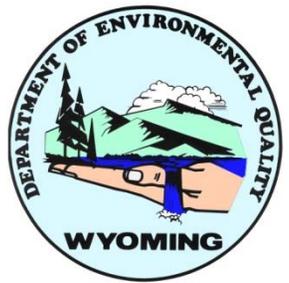


- ◆ 2004 JPAD inventory included:
 - 8 Sources
 - drill rigs, wellhead engines, process burners, tanks, dehydration units, pneumatic pumps, well venting, and well completions
 - 7 Pollutants
 - NO_x, SO₂, Total VOCs, and BTEX
- ◆ 2009 UGRB inventory included:
 - 14 Sources
 - 8 sources above plus fugitives, truck loading, non-road mobile, on-road mobile on both paved and unpaved roads, flares and compressor engines
 - 25 Pollutants
 - 7 pollutants above plus C1 through C10+ speciated hydrocarbons, CO, H₂S, and formaldehyde

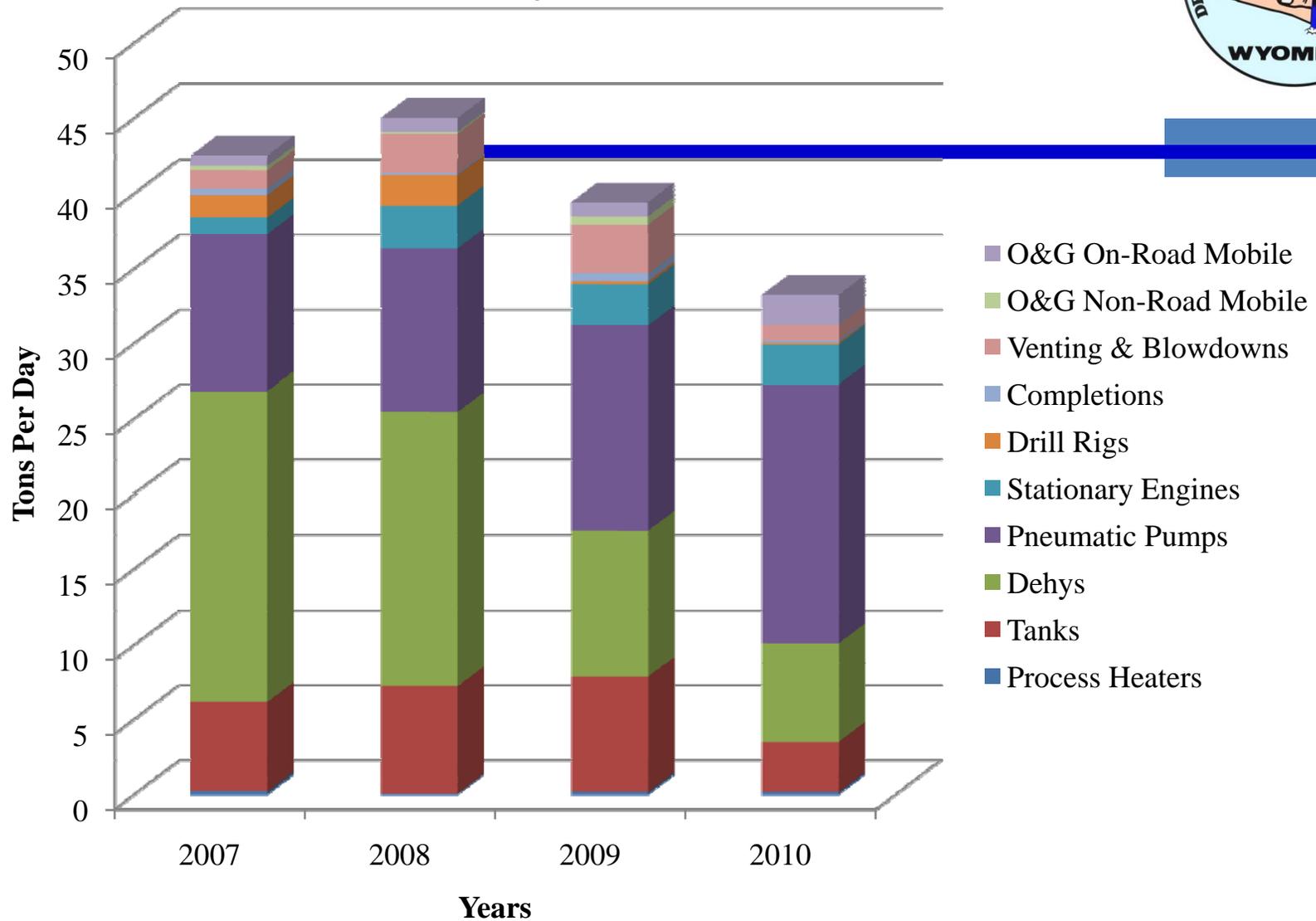
UGRB Wintertime Ozone



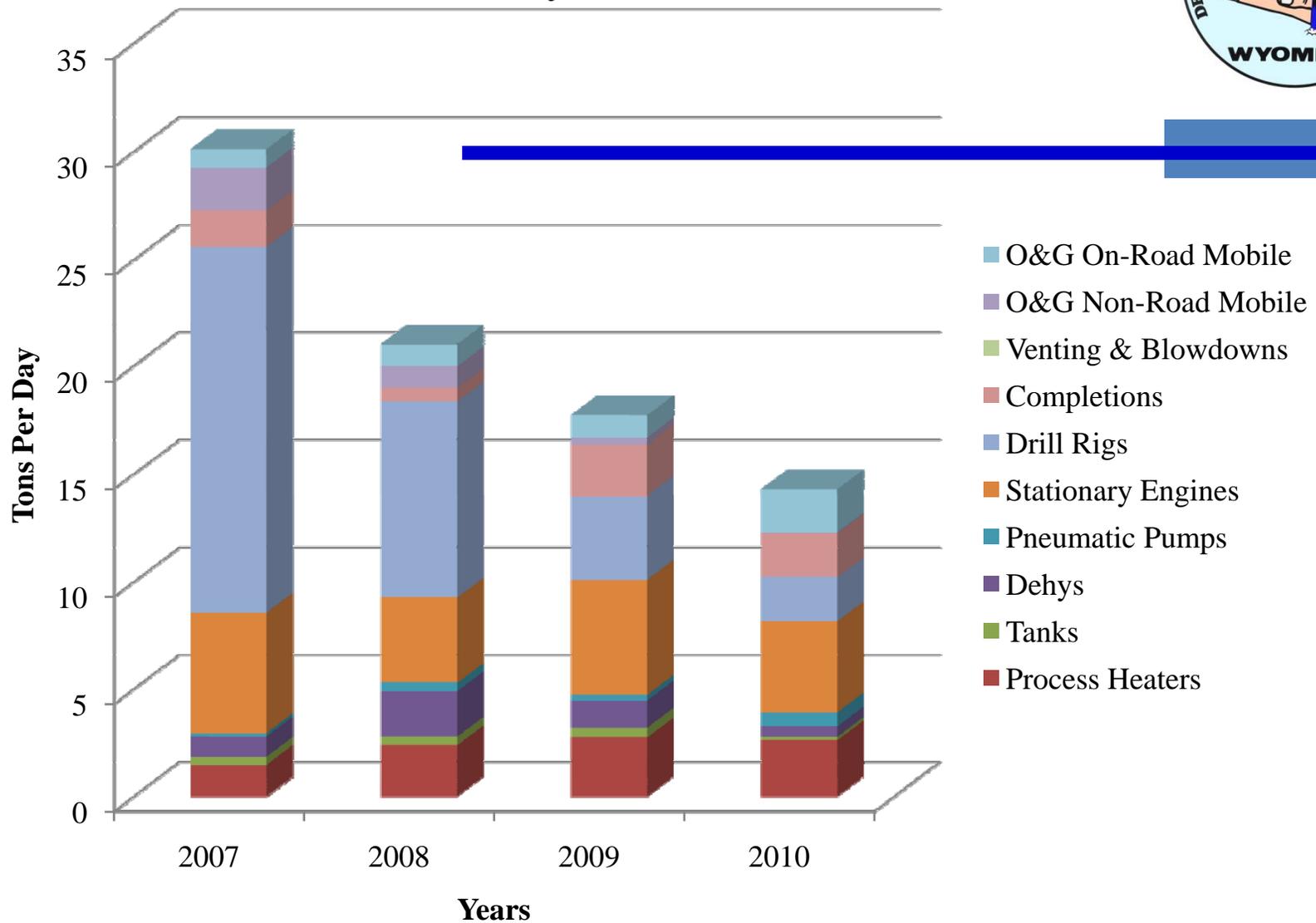
- ◆ In November, 2004, EnCana Oil & Gas (USA), Inc. began operating the infield Jonah ambient monitor as part of a Supplemental Environmental Project (SEP).
- ◆ In February, 2005, Shell Rocky Mountain Production began operating the infield Boulder ambient monitor.
- ◆ As a result of the growth in production and the corresponding rise in emissions as noted by the FRM ambient monitors, a “wintertime” (February 1 – March 31) inventory was first requested in 2007 for all of Sublette County.
- ◆ On February 21, 2008, the Boulder monitor recorded an 8-hr ozone concentration of 122 ppb.



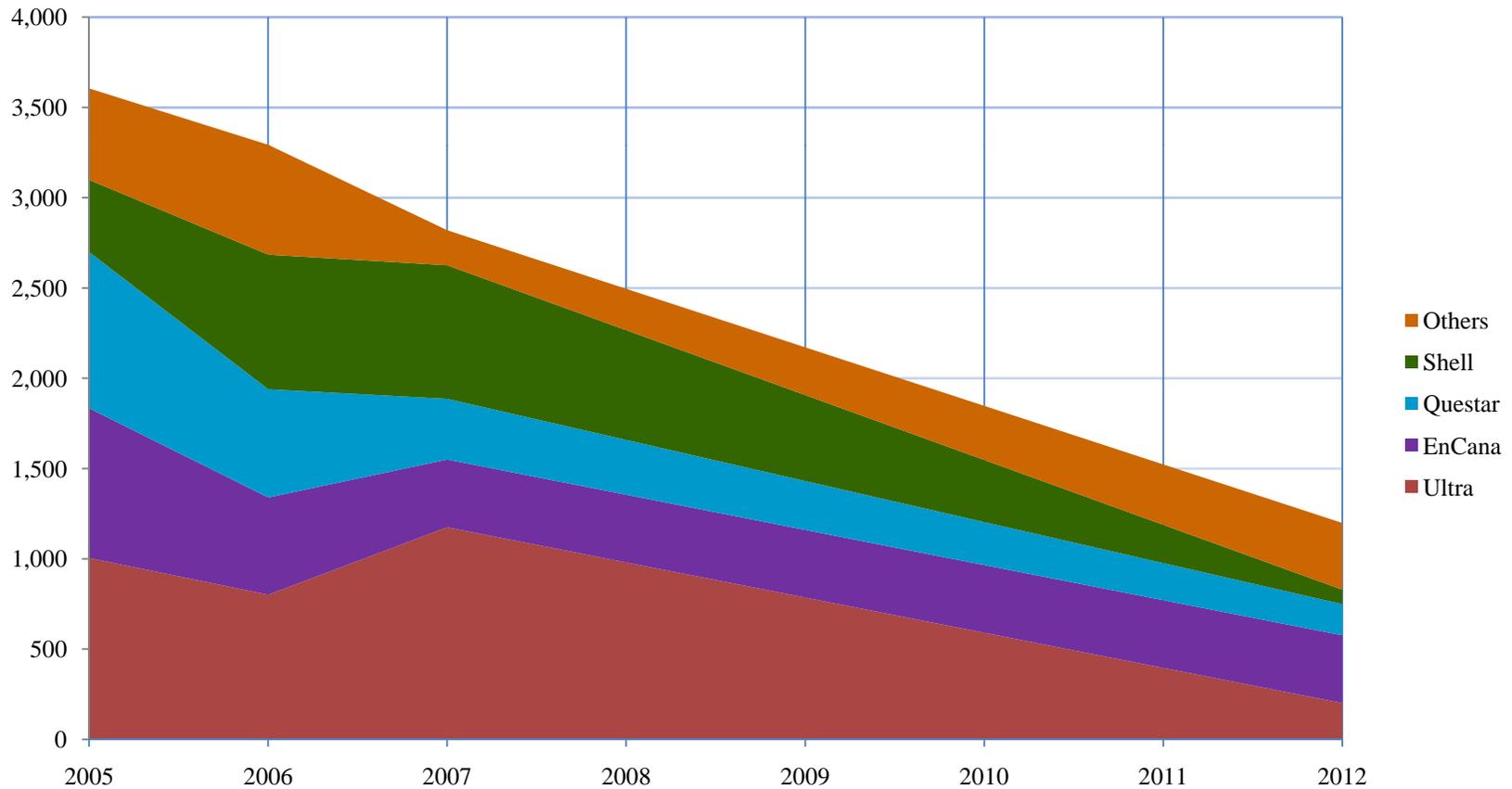
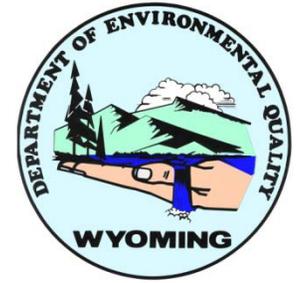
Sublette County Winter Inventory Daily VOC Emissions



Sublette County Winter Inventory Daily NOx Emissions



Estimated JPDA Drill Rig Engine NOx Emissions





Drill Rigs



Questions?

