Oil and Gas Development
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July, 2012

- Jonah Field and Pinedale Anticline Development (JPAD)
Jonah-Pinedale Anticline Development (JPAD) & Normally Pressured Lance (NPL) Area
Pinedale Anticline Development

- Pinedale Anticline Project Area (PAPA) Record of Decision (ROD) issued July 27, 2000
  – 700 wells mainly Federal minerals

- PAPA Supplemental Environmental Impact Statement (SEIS) ROD issued September 12, 2008
  – 4,400 wells on 600 pads and a liquids gathering system
  – average 7.3 wells per pad
  – 40 acre down-hole well spacing
Directional Drilling

At the basic level:

- A deviated (or directional) well is a well that has been intentionally deviated from vertical. The deviation (or inclination) is measured from the vertical.
- A horizontal well is a deviated well with an inclination at or near 90°

- Vertical Well
  - Some unintentional deviation
  - Typical inclination < 3°

- Deviated (directional) Well
  - Planned deviation from vertical
  - Planned direction (azimuth)
  - Inclination up to 85°

- Horizontal Well
  - Planned deviation of 85° – 95°
  - Planned azimuth
Development Options

Pads

Single Wells

Pods

Pads; Pods; or Single Wells…
Construction of a new well pad

Existing Multi-well Production Site
Construction of a new well pad
Proposed Well Locations

(Down-hole 40 acre well spacing in the Pinedale Anticline)
Shell’s Nabors 784 Drill Rig
Shell’s Nabors 784 Drill Rig
Cat 3512 (~1500 HP each) Diesel Generator Stacks w/SCR

Note: Typically all 3 generators operate only during the drilling of the first 2,500 feet of each well with 2 generators operating for the rest of the drilling.
Insulated Urea storage tank used w/SCR to control NOx emissions from the diesel generators.
Shed housing the Drill Mud Pumps
Drill Mud Tanks
Chemical Tanks
Drill Mud Return Pipe
Drill Cuttings Solids/Liquids Separation
Drill Cuttings Shaker
Drill Cuttings
Drill Cuttings
Drill Cuttings from different wells
Temporary Water Storage Ponds
Drilling Flare Box w/Spark Ignition
Well Casing (45 foot lengths)
Drill Rigs
Drill Rigs
Drill Rigs

Warbonnet Area
Portable 4-Phase Green Completion Equipment

(JPAD operators began using green completions in 2005)
{Green Completions required on all wells in the CDA as of 8/1/10}
Well Fracing Equipment

Sand Tanks
Well Fracing Equipment

Fracing Fluid Tanks
Mesa 7-27 Well (Single Well Site)
Well Separator
Separator Heater

Dehydrator Contact Tower

Glycol Pump

Separator Heater
Dehydrator Kimray Glycol Pump
Dehydrator Reboiler Heater
Line Heater for Heat Tracing
Controlled Pneumatic Glycol Heat Trace Pump
Dehydrator & Pneumatic Pump Control Device
Uncontrolled Condensate & Produced Water Storage Tanks

200 bbl storage tanks
Condensate Tank Thief Hatch
Truck Loadout Hook-ups for Storage Tanks
Facility Data Logger & Control Station
Gas Sales Custody Transfer Point
Multiple Well Facility
Dehydration Unit Contact Towers and Control Devices

Dehy Contact Towers

Dehy Control Devices

Heaters

09/17/2008
Dehydrator & Pneumatic Pump Control Device

Note: Storage tanks have a separate control device for VOCs
Multiple Well Facility

(As of July 28, 2004, for all multiple well or Pad facilities, all emissions from existing and new tanks and dehydration units must be controlled upon the first date of production.)
Line Heater w/3 Pneumatic Pumps
Controlled Pneumatic Glycol Heat Trace Pump
Solar Powered Control Station
Controlled Condensate & Produced Water Storage Tanks

300 bbl storage tanks
Methanol Tank
Reclaimed Well Pad

Sage Brush

09/17/2008
Reclaimed Well Pad
Camouflaged Storage Tanks near the Lander Cut-Off Trail
Questar Gas Management’s (now QEPE) Liquids Gathering Facility 
(processes nearly 160 million mcf of gas and 1.4 million bbls of condensate in 2012)
Enterprise Jonah Gas Gathering’s Paradise Compressor Station

{consists of 8 Cat G3612LE (3,668 Hp), 2 Cat G3516LE (1,800 Hp), and 1 Cat G3408CLE (425 Hp) compressor engines: Total of **33,369 Hp** at one compressor station}
Anticline Water Disposal

Photo taken from the Boulder Monitoring Station Location
(Processed 5.9 million barrels of water and 41,236 bbls of condensate in 2012)
Shell’s Warbonnet Water Handling Facility (Phase I)
Temporary Storage Tanks
Shell’s Warbonnet Water Handling Facility (Phase I)
Truck Unloading Produced Water
Shell’s Warbonnet Water Handling Facility (Phase I)
Storage Tanks

500 bbl storage tanks
Shell’s Warbonnet Water Handling Facility (Phase I)
Temporary Generators for Electrical Needs
Construction of Shell’s Liquid Gathering System
Construction of Shell’s Liquid Gathering System
Boulder Monitoring Station

http://www.wyvisnet.com/

Camera

09/17/2008
Boulder Monitoring Station
(measured 8-hour ozone level of 122 ppb in February, 2008)
Websites/Links

• Inventory Web Page: http://deq.state.wy.us/aqd/ei.asp

• UGRB Ozone Non-Attainment Area Inventory Forms Web page: http://deq.state.wy.us/aqd/Annual%20and%20Winter%20Upper%20Green%20River%20Basin%20Emission%20Inventories.asp

• Actual Emissions Web Page: http://deq.state.wy.us/aqd/Actual%20Emissions.asp

• Oil & Gas forms & Guidance Documents Web page: http://deq.state.wy.us/aqd/oilgas.asp

• Oil & Gas Production Facilities Guidance Document: http://deq.state.wy.us/aqd/Oil%20and%20Gas/September%202013%20FINAL_Oil%20and%20Gas%20Revision_UGRB.pdf
Questions?

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http://deq.state.wy.us/aqd/ei.asp

http://deq.state.wy.us/aqd/oilgas.asp