Range Resources

- Natural gas production company
- Included in S&P 500
- Committed to Pennsylvania
- Regional Headquarters in Washington County
- Pioneered Marcellus Shale, 2004
- Drilled over 200 horizontal Marcellus wells in PA
- Over $2 Billion invested in Pennsylvania Marcellus Shale
- Employs more than 300 Pennsylvanians, support over 1,200 contractor jobs and many more indirect and induced jobs

What is the Marcellus Shale?

- organic-rich, shale
- 5,000 – 9,000 foot depth
- Mud that settled on ocean floor 380 million years ago; turned to rock
- Natural gas and hydrocarbons are trapped in tiny micropores between grains of mud
- Extremely low permeability

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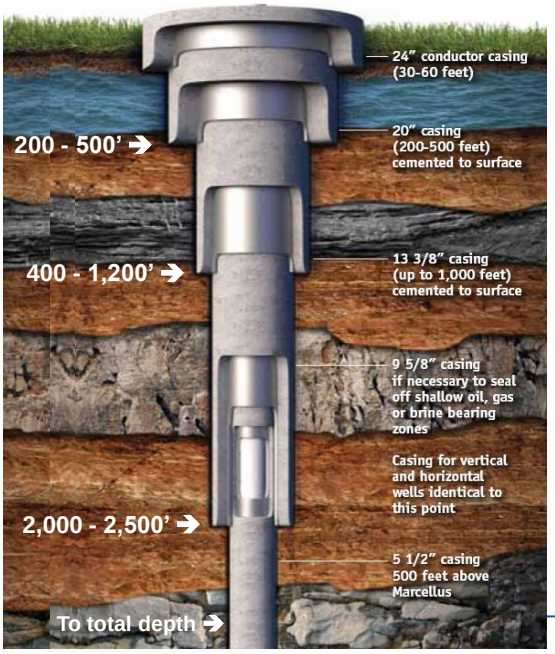
Generalized Casing Design for a Marcellus Shale Well



Ground Water Protection

- Fresh water is generally less than 500-foot depth; below that, water is salty
- Each casing string is cemented by pumping cement down pipe and circulating back up between the outside of pipe and the wellbore

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Ground Water Protection

- PA casing and cementing regulations among toughest in the U.S. Revisions to Chapter 78 regulations have recently been enacted to specifically address shale drilling.
- 1,000' rebuttable presumption rule
- DEP aggressively investigates all claims
- DEP issued only 80 orders to repair or replace water supplies impacted by drilling in past 15 years; 32,000 oil and gas wells drilled; 0.25% incident rate; all impacted water supplies replaced by drillers. Impacts all related to:
  - Physical drilling through aquifers
  - Improper design or installation of surface or intermediate casing
  - Operator negligence
- No impacts from hydraulic fracturing
- By comparison, Penn State 2009 study indicates over 40% of PA's 1.2 million private water wells and springs do not meet safe drinking water standards; common causes of contamination are on lot septic systems, agricultural practices, poor well construction

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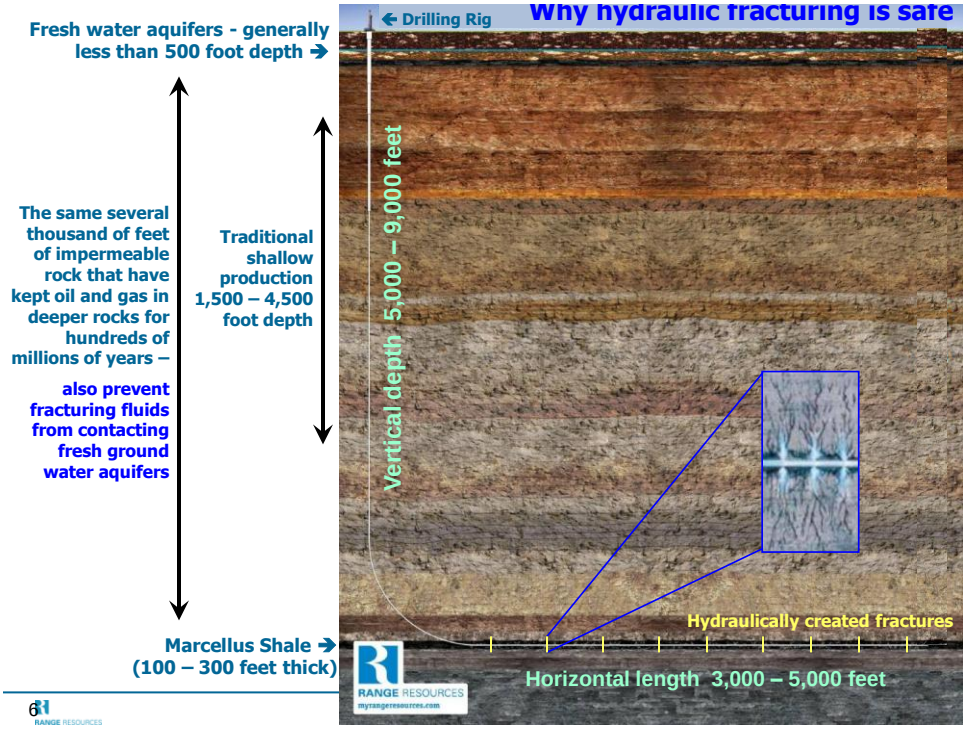

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Fracing

Water requirements for Marcellus Shale

- Fracing a typical horizontal well requires 3-5 million gallons
- Is that a lot of water?
  - 5 million gallons is 1.8 inches of water over an area of 100 acres, the approximate drainage area of a well
  - PA receives about 40 inches of rainfall per year
  - If the productive area of the Marcellus takes 50 years to drill, annual water use over the productive area would be 0.04 inches of water per year or 1/10th of 1% of annual rainfall

Water requirements for Marcellus Shale

Water use per million btu of energy:

•Deep shale natural gas	0.60-5.80 gallons
•Marcellus Shale gas – avg	1 gallon
•Nuclear (uranium ready to use in a power plant)	8-14 gallons
•Conventional oil	8-20 gallons
•Synfuel-coal gasification	11-26 gallons
•Coal (delivered power plant)	13-32 gallons
•Oil shale	22-56 gallons
•Tar sands/oil sands	27-68 gallons
•Fuel ethanol from corn	2,510-29,100 gallons (irrigation)
•Biodiesel from soy	14,000-75,000 gallons (irrigation)

Shale gas production uses less water than any other significant energy source

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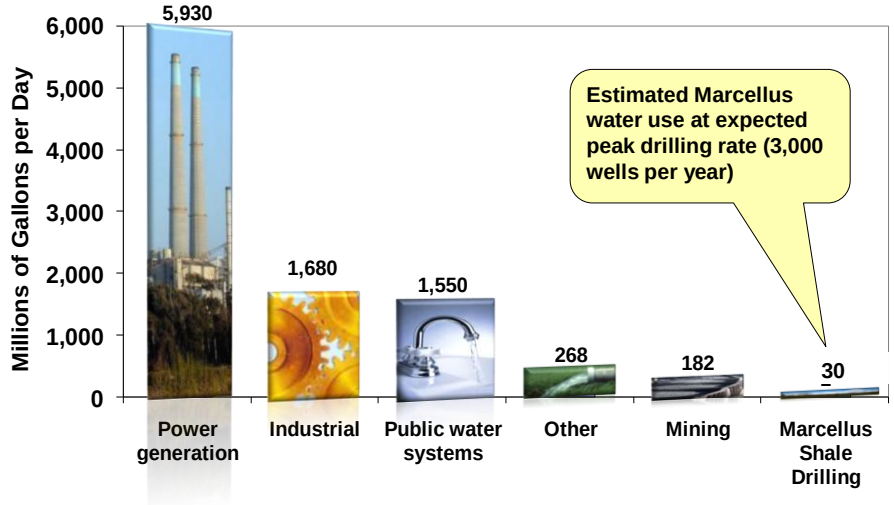
Source: U.S. Dept. of Energy

Water requirement for Marcellus Shale

Small by comparison to other uses



Source: USGS, Pennsylvania Water Consumption

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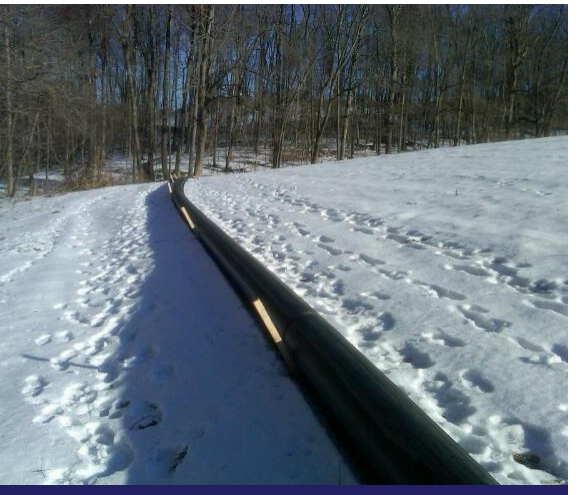
Water supply sources

- Larger streams and rivers
  - Pennsylvania has abundant water supplies
  - Water can be safely withdrawn at reasonable rates during all but the very driest periods
  - Susquehanna and Delaware River Basin Commissions have regulated water withdrawal for many years; no such regulation presently exists in the Ohio River basin
  - DEP has adopted SRBC method for analyzing water withdrawal and must approve all water management plans
  - Protection of downstream uses
- Municipal water supplies
- Acid mine drainage – suitable for use with proper treatment
- Re-use of flowback water

Water Impoundment

- **2-3 acres in size**
- **Engineered design with DEP construction standards**
- **ESCGP-1 Permits required**
- **Enhanced permit requirements if used to contain flow back water (leak detection and GW monitoring)**
- **Safety fencing and bird netting**

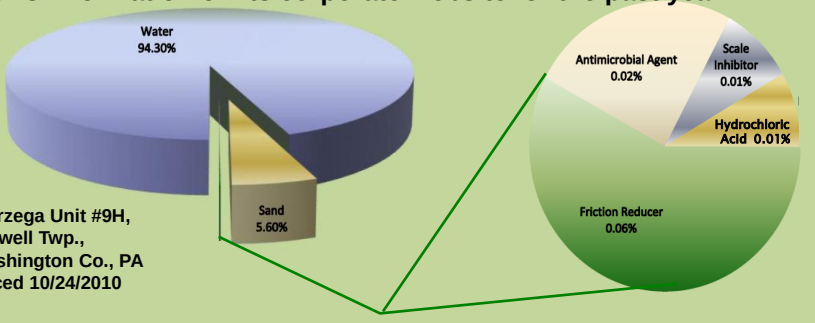


Water Transfer

- Saves thousands of trucks on highways
- Can pump water several miles from impoundment to well during fracturing operation
- HD Polyethylene or PVC for pumping fresh and recycled water
- More permanent, buried lines currently being installed

What goes into the well?

Disclosure of hydraulic fracturing additives by well required under new Chapter 78 regulations. Range Resources has been disclosing this information on its corporate website for the past year



Sierzega Unit #9H, Amwell Twp., Washington Co., PA fraced 10/24/2010

99.9% Water & Sand

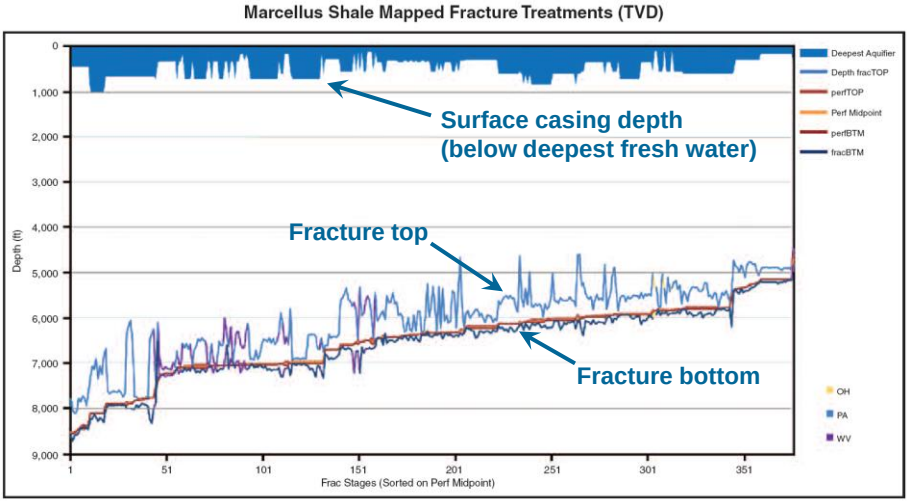
0.1% Additives
(0.023% hazardous in concentrated form)

Chemical additives are less toxic and far more dilute than ever before. MSDS sheets required by US DOT and OSHA list all chemicals that are physical or human hazards in concentrated form. These make up 0.023% of fracturing fluid.

Typical additives used in frac water

Additive type	Main ingredients	Purpose	Common use
Friction reducer	Polyacrylamide (non-hazardous)	Reduces friction between fluid and pipe	Cosmetics; soil conditioner; some children's toys
Anti-Microbial Agent	4,4 Dimethyl-Oxazolidine Glutaraldehyde	Eliminates bacteria in the water that produce corrosive byproducts	Disinfectant; sterilize medical and dental equipment and surfaces
Scale inhibitor	MX588-2 (non-hazardous)	Prevents scale deposit in the pipe	Water treatment, household cleaners, de-icing agent
Diluted Acid	7.5% Hydro-chloric Acid Methanol	Help dissolve cement and minerals and help initiate fractures	Swimming pool chemical and cleaner Disinfectant

Fresh water aquifers are protected



Actual measured hydraulic fracture growth from micro-seismic surveys

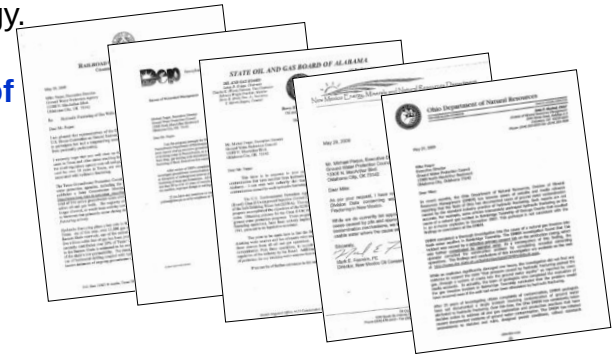
Source: American Oil & Gas Reporter, July, 2010, "Data Confirm Safety of Well Fracturing", Kevin Fisher

Hydraulic fracturing is safe and proven

More than 30 state and federal regulatory agencies have extensively studied hydraulic fracturing technology. **There are no confirmed cases of groundwater contamination in over one million wells fraced over the last 60 years**

"We have not had a single case of these fracking fluids coming back to the groundwater."

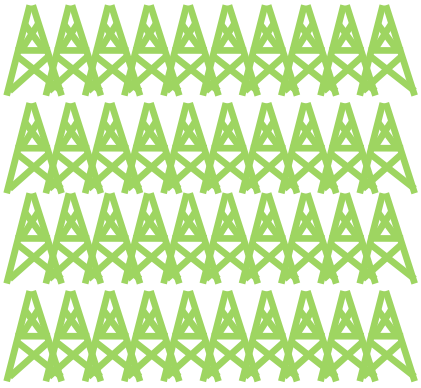
DEP Secretary John Hanger, 10/25/2010



Water treatment and disposal

- 10-20% of frac water flows back to surface after frac; balance is bound in micro fractures in shale
- Water flowed back after frac contains salts and other naturally occurring dissolved minerals present in ancient sea water
- Water is gathered and removed from site by either truck or pipeline
- Management methods during 2010:
  - Recycle
  - Injection wells
  - Advanced treatment facilities
- Recent Chapter 95 revisions prohibit any new or expanded discharges from existing brine treatment facilities

How much salt?



TDS to PA streams from Marcellus Shale sources during 2010 ~100,000 Tons (based on 5.6 M barrels); little change from pre-Marcellus volume

vs

TDS to PA streams from salt dumped on state roads =750,000 T/year (Estimate over 1 Million T/year with municipal roads & turnpike)

Recycling of flowback water

Rapidly evolving technology

- recycling technology did not develop in other shale gas plays due to abundant opportunities for disposal by injection into deep rock formations
- recycling in the Marcellus play has been driven by lack of other disposal options
- estimated that 75% of all Marcellus flowback water is currently being recycled
- technology will continue to improve rapidly

Radiation associated with Marcellus Shale

- Marcellus Shale and flowback water contain low levels of naturally occurring radioactive material (NORM)
- Nothing new to Pennsylvania – low level NORM is common in oil and gas wastewaters worldwide
- Industry has performed significant testing and provided data to DEP
- DEP's Bureau of Radiation Protection has been evaluating Marcellus wastes (drill cuttings and fluids) for the past three years an has found no public health concerns
- Industry fully supports additional testing

Radiation associated with Marcellus Shale

DEP Announces Testing for Radioactivity of River Water Downstream of Marcellus Water Treatment Plants Shows Water Is Safe – March 7, 2011

DEP Secretary Michael Krancer: "Here are the facts: all samples were at or below background levels of radioactivity; and all samples showed levels below the federal drinking water standard for Radium 226 and 228."

Production

- Site is reclaimed to a small fraction of its original size during drilling
- Production equipment will remain for life of the well
- Produced fluids will be removed and safely recycled or disposed

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Multi-well pad production

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Air Quality

DEP Issues Report on Short-Term Air Quality Impacts from Marcellus Shale Operations in Southwest PA – 11/1/2010

- five-week air quality study conducted near Marcellus Shale natural gas operations in southwestern Pennsylvania's Greene and Washington counties
- "**the data shows no emission levels that would constitute a concern to the health of residents living near these operations**," DEP Secretary John Hanger said.

Other studies:

- Texas Commission on Environmental Quality has studied air quality impacts extensively in the Barnett Shale field where over 12,000 shale wells have been drilled over the past 10 years.
  - Spot and continuous air testing has indicated no air pollution of concern
  - Blood and urine tests of Dish, TX residents found no elevated levels of air-borne toxins

Using natural gas to displace other fossil fuels has enormous air quality benefits

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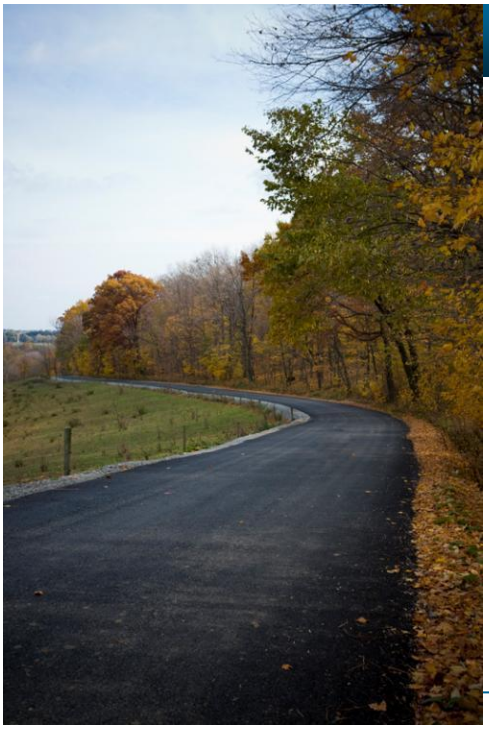
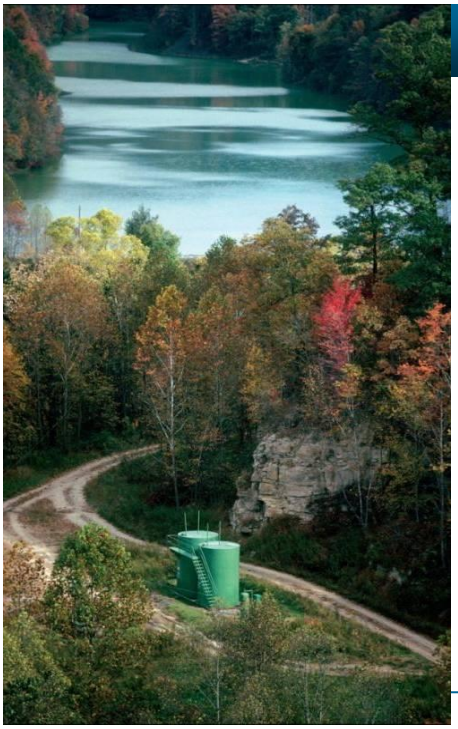


What About the Roads?

- **Nearby roads may be damaged**
- **Drillers are liable to repair all damages**
- **Roads cleaned**
- **Industry spends millions repairing roads**
- **Better than before**
- **Tax-free road improvements**



Thank You

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