

Natural Gas, Range Resources and the Marcellus Shale

PSU October 12, 2010



RANGE RESOURCES

Range Resources

- Natural gas production company
- Included in S&P 500
- Committed to Pennsylvania
- Regional Headquarters in Washington County
- Pioneered Marcellus Shale, 2004
- More than \$1 billion invested in Pennsylvania
- Employs more than 250 Pennsylvanians, thousands of indirect jobs





Renz #1H, Washington County, Pennsylvania

First Modern Marcellus Well, initial reclaim

Marcellus is a World Class Discovery

If estimated recoverable reserves are accurate at **50 Tcf- 500 Tcf**, how does the Marcellus stack up against the largest oil and gas fields in the world?

World's Largest Oil Fields			
Field, Country	Discovery	Gb	Tcfe
Ghawar, Saudi Arabia	1948	80	480
Burgan, Kuwait	1938	60	360
Bolivar Coastal, Venezuela	1917	32	192
Sufaniya, Saudi Arabia	1951	30	180
Rumiala, Iraq	1953	20	120
Ahwaz, Iran	1958	17	102
Marun, Iran	1964	16	96
Kirkuk, Iraq	1927	16	96
Romashkino, Russia	1948	16	96
Tengiz, Kazakhstan	1979	15	90

World's Largest Natural Gas Fields			
Field, Country	Discovery	Tcf	Gboe
North Field-South Pars, Qatar-Iran	1976	1400	233
Urengoy, Russia	1966	222	37
Yamburg, Russia	1969	138	23
Hassi R'Mel, Algeria	1956	123	20
Shtokman, Russia	1989	110	18
Zapolyarnoye, Russia	1965	95	16
Hugoton, USA	1926	81	13
Groningen, Netherlands	1959	73	12
Bonavenko, Russia	1971	70	12
Medvezhye, Russia	1967	68	11

Source: IPC Petroleum Consulting, Inc.

Drilling Activity

- Pennsylvania has more than 384,000 oil and gas wells—more than a third of all wells drilled in the US
- 1099 Marcellus wells drilled through September (over 2300 permitted)
- Major drillers estimated 1350 new wells in 2010 (PSU study forecast 1200)
- Marcellus drilling has occurred in almost 30 PA counties



Municipal Government

- Currently addressing 28 townships in SW Pa
- Different ordinance language exists in every location/different requirements
- Range has been pro-active in reaching out to local supervisors to offer assistance in crafting language that works for everyone
- Road repair has become more timely

Economic Impact in SW Pa

- Many local small businesses are prospering
- Leasing is still active; alternate land use playing a larger role
- Royalty payments increased due to better production techniques (each well generates average of \$3-5 million in royalties)
- Less impact on townships with more benefit (faster pad construction, same pad size yields more gas, water recycling reducing truck traffic)
- Outside investment increasing statewide

Local Government Concerns

- Roads— inadequate bonding requirements, repair schedule, resident complaints
- Noise—decibel levels, operating times
- Dust
- Traffic—number of trucks, driving speed, traffic congestion, resident safety
- Potential hazards (lack of information)

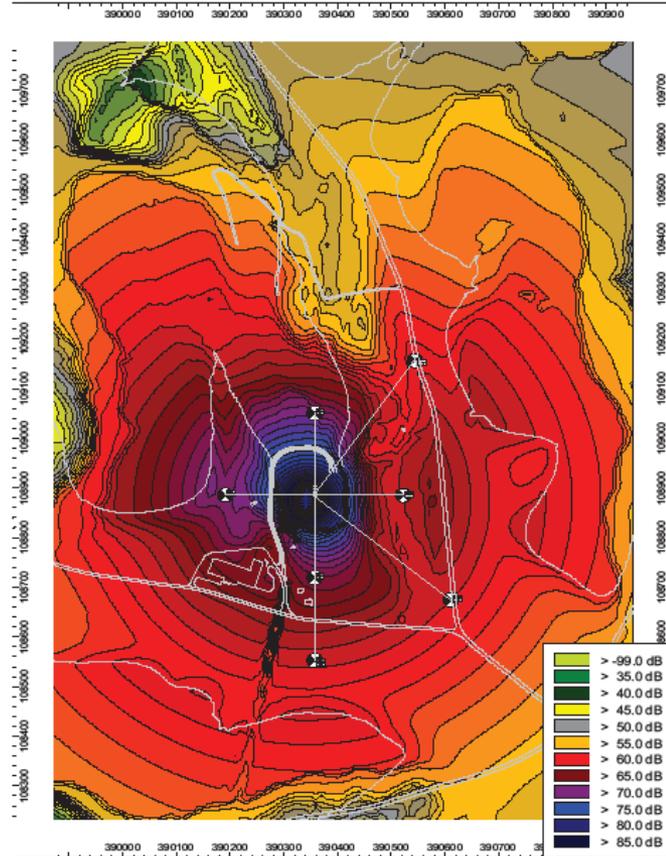
Local Government Concerns (con't)

- Road repair is being coordinated with townships to try to line up with their proposed paving schedules.
- **No complaints** on quality of road construction
- Sound walls erected in select locations to address noise issues—has reduced complaints to a minimum.
- Traffic issues are being addressed—approaching townships to offer assistance including purchasing radar guns, paying for police overtime and providing immediate Range contact numbers.

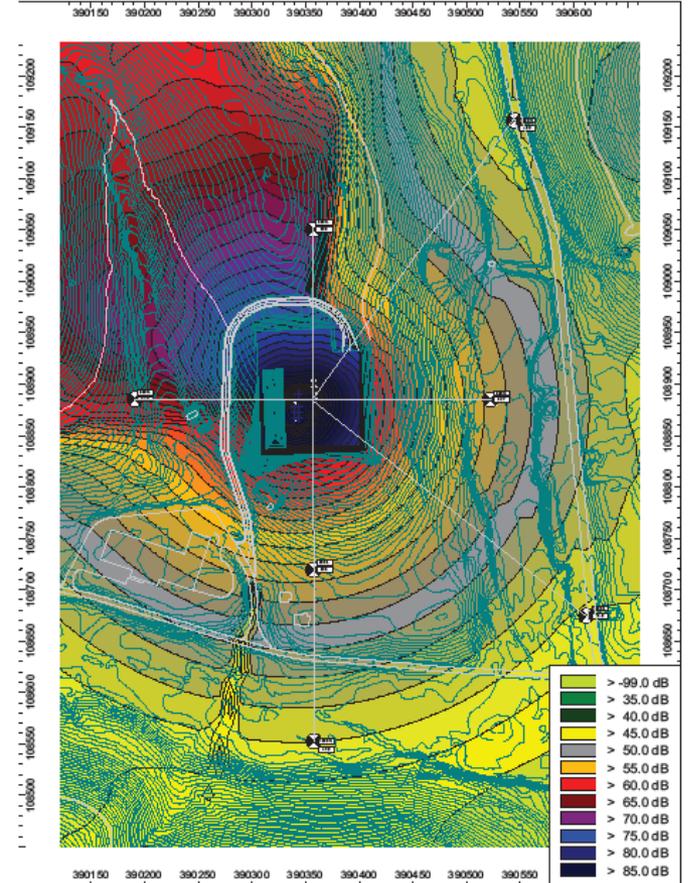


Sound Walls

Troyer Space Management Unit: Air Drilling Operations 2 of 3 (receivers @ 500' radius)



Troyer Space Management Unit: Air Drilling Operations 3 of 3 (receivers @ 500' radius)





Washington County Road

Is there adequate regulation?

Act 223 - The Oil & Gas Act of 1984

- **Primary statute regulating oil and gas drilling activity**
- **Details permitting and operations requirements for the following:**
 - **Well drilling permits**
 - **Well registration and identification**
 - **Inactive status of wells**
 - **Well location restrictions**
 - **Well site restoration**
 - **Site restoration requirements**
 - **Casing and cementing requirements – Protection of fresh groundwater**
 - **Plugging requirements**
 - **Protection of water supplies**
 - **Reporting requirements**
 - **Bonding**
 - **Enforcement and remedies**

PA Code 25, Chapter 78

- Detailed regulations promulgated under Act 223.

Act 214 - Coal and Gas Resources Coordination Act of 1984

- This Act covers governs placement of wells and special regulations in areas containing active coal mines and unmined coal seams.

Act 359 - Oil and Gas Conservation Law of 1961

- Governs spacing of deep wells which penetrate the Onondaga Formation (directly beneath the Marcellus Shale).

PA Code 25, Chapter 102

- Regulations with respect to erosion and sedimentation control for earth disturbance activities.
- Basis for Erosion and Sedimentation Control Manual for oil & gas development (well pads, pipelines, impoundments).
- Requires ESCGP-1 for earth disturbance over 5 acres; applies to all Marcellus wells, pipelines and water impoundments.

PA Code 25, Chapter 105

- **Requires permits for stream and wetland crossings.**
- **Requires permits for stream and wetland encroachments.**
- **Requirements for dam permits for impoundments if the impoundment is to be used for collection/storage of flowback and/or produced water.**
- **Construction Guidelines for the construction of impoundments**

Federal Clean Water Act and Pennsylvania Clean Streams Law

- **These are the laws that allow Pennsylvania to enact the permitting requirements described above associated with Chapter 102 and Chapter 105.**

PA Code 25, Chapter 287, Residual Waste

- **regulates disposal of wastes from drilling or completion operations**
- **regulates transportation of wastes from drilling or completion operations and the record keeping**
- **annual chemical analysis of the waste stream.**

Act 220 - Water Resources Planning Act Of 2002

- Under Act 220, the PADEP has mandated that operators submit a comprehensive Water Management Plan for all Marcellus Shale wells prior to conducting hydro-fracturing operations on wells.

Title 40 of the Code of Federal Regulations, Part 112

- Mandates Oil Pollution Prevention and regulates by requiring Spill Prevention Control and Contingency Plans

SRBC - Susquehanna River Basin Commission

- Interstate Compact Commission that regulates all water usage within the Susquehanna River Basin in PA (and other states).
- Requires reports, plans and procedures to be filed and followed prior to any activity on a wellsite in the SRBC area. Also includes significant fees for water consumptive use.

US Army Corps of Engineers

- ACOE performs a review of the stream/wetland crossing General Permit applications submitted to the PADEP when impacts from the crossings exceed thresholds defined by the ACOE.



Thank You

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