

# MARCELLUS SHALE: Murky Water Issues

## Water Use, Regulation & Unintended Consequences

Thank you for joining us today

The webinar will begin promptly at 12 pm

Please note, your phone lines will be  
automatically muted upon entering the webinar

© 2010 Steptoe & Johnson PLLC All Rights Reserved



# Today's Presenter: Armando Benincasa



**Step toe & Johnson  
Chase Tower – Eighth Floor  
707 Virginia Street, East  
Charleston, WV 25326**

**Office: 304.353.8147  
Cell: 304.550.0921**

[armando.benincasa@step toe-johnson.com](mailto:armando.benincasa@step toe-johnson.com)

[www.step toe-johnson.com](http://www.step toe-johnson.com)



# **MARCELLUS SHALE: Murky Water Issues**

Water Use, Regulation &  
Unintended Consequences



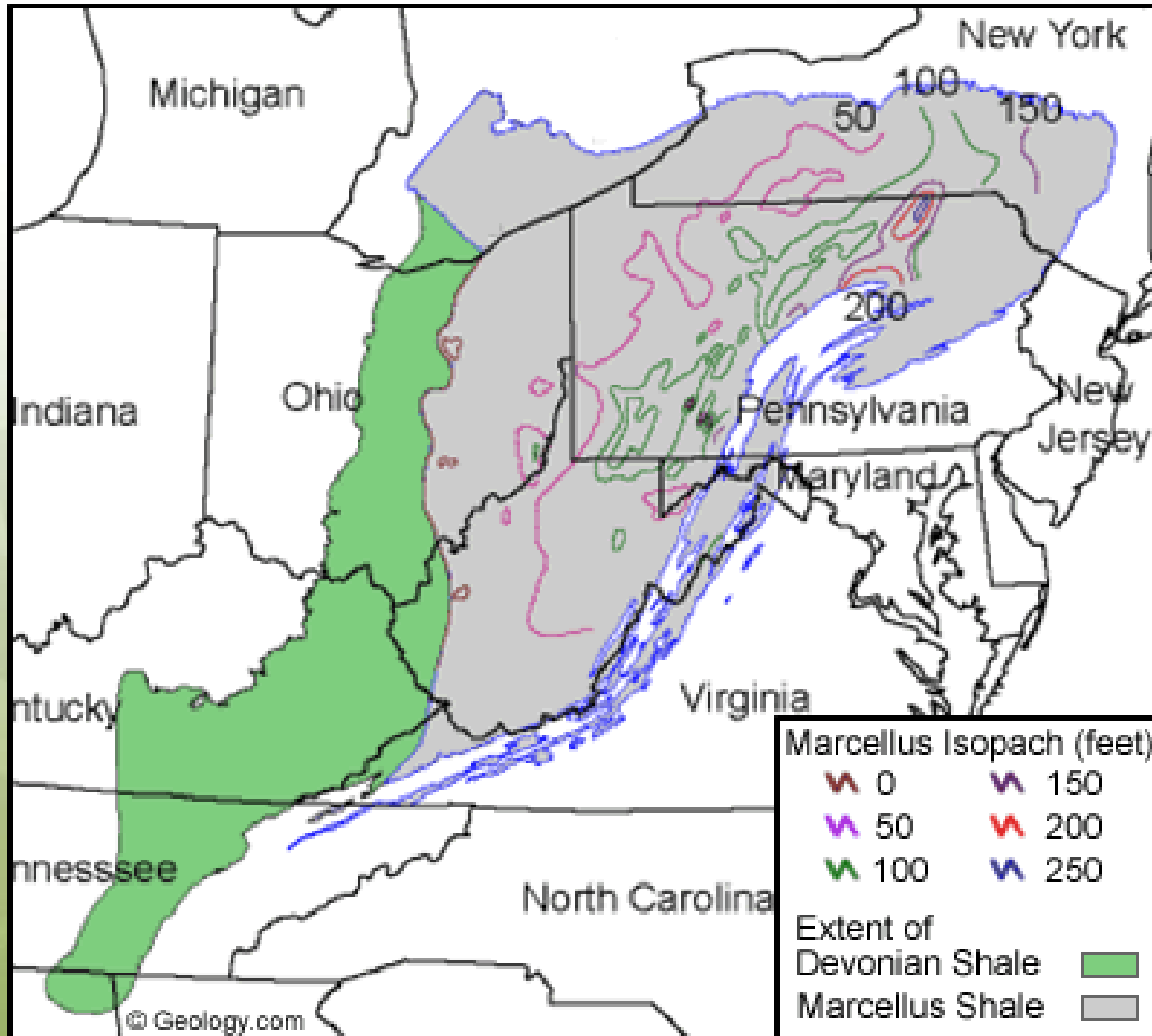
# *What is the Marcellus Shale?*



The Marcellus Shale Play represents the largest new natural gas play in the world with estimated reserves of 489 trillion cubic feet.

The Marcellus Shale can be found thousands of feet below the ground primarily in New York, Pennsylvania, West Virginia and Ohio.

# Marcellus Shale



# Marcellus Shale

Until recently, the depth of Marcellus shale made exploration cost prohibitive

System	Western Pennsylvania	Northwestern New York	
Middle Devonian	Harrell Shale	Genesee Fm.	
	Tully Limestone	Tully Limestone	
	Mahantango Formation	Moscow Shale	Hamilton Group
		Ludlowville Shale	
		Skaneateles Shale	
	Marcellus Shale	Marcellus Shale Tioga ✓ bentonite	
Selinsgrove Limestone	Onondaga Limestone		
Lower Dev.	Needmore Shale	Bois Blanc Fm.	



## *Why is the Marcellus Shale important?*



- Local and State Investment
- Domestic Energy Supply
- Greenhouse Gas Emissions



# *Why is Water so Important?*



- Marcellus Shale exploration requires substantially more water than historical exploration
- Individual Marcellus Shale wells will use 1-4 million gallons of water
- Wells historically used less than one million gallons of water



# *How does it work?*



- Liquid made up chiefly of water and other additives, such as friction reducers, are forced down the well to dislodge the natural gas from the Marcellus Shale formation
- The liquid fractures the formation releasing the natural gas and allowing it to flow back to the surface



## *How does it work? (continued)*



- Along with the natural gas the fluid initially introduced into the well also flows back to the surface
- This process is commonly known as hydraulic fracturing

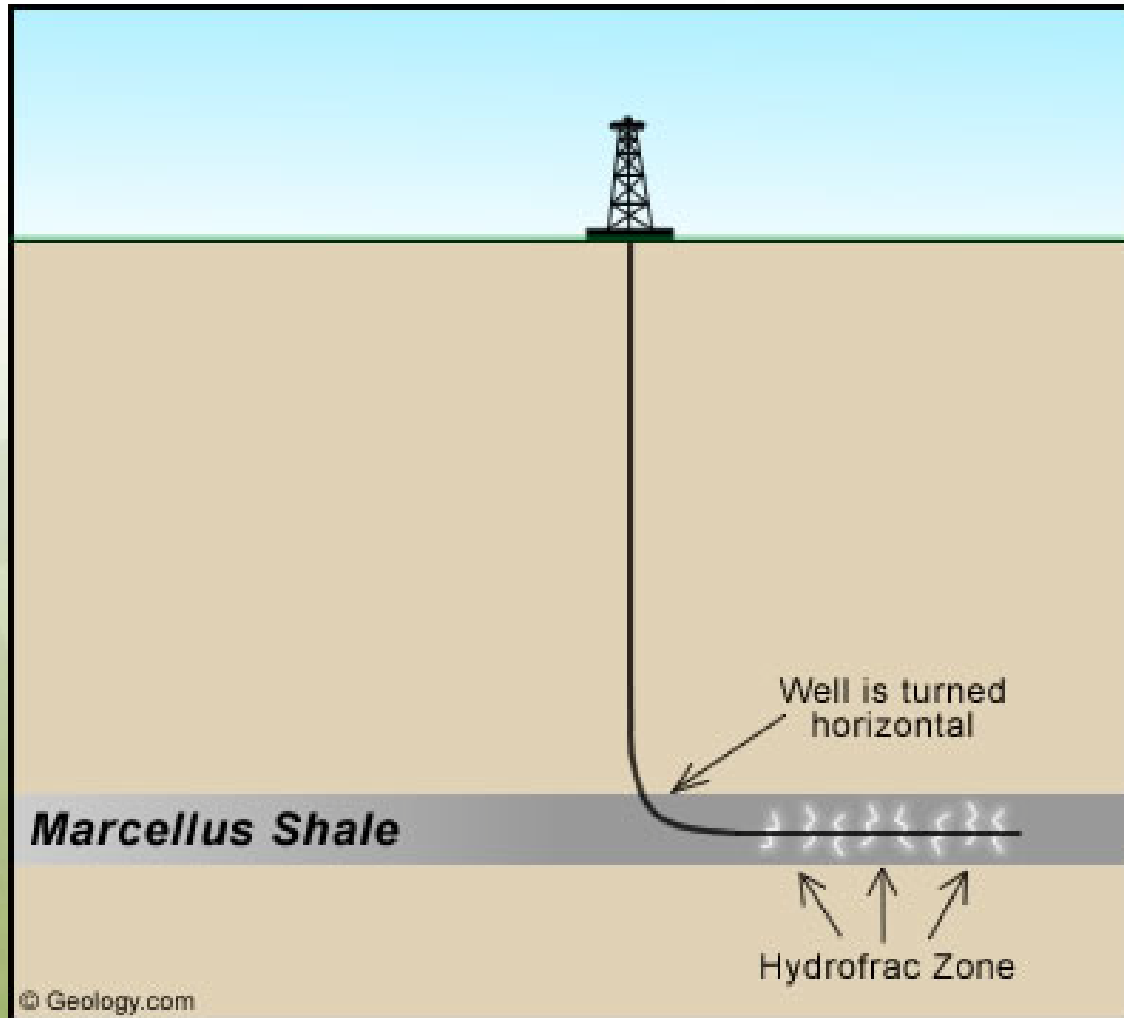


## *How does it work? (continued)*



- Wells are also turned in a horizontal direction once the well reaches the gas producing formation
- This allows one well to produce a larger area of the shale at a much more efficient rate

# How does it work? (continued)





# *Frac Fluid*



*Frac Fluid* is the common term used for the liquid material used to dislodge the natural gas from the Marcellus Shale formation.



# *Flow Back Water*



Flow back water is the water which returns as part of the production process.



# *What Has Changed?*



- We are using larger amounts of water
- We are producing larger amount of wastewater



# *Water Concerns*



- Use of large amounts of water will impact other uses (Water Use)
- Production of large amounts of wastewater will result in contamination of water supplies (Water Handling)



# *Water Use Concerns*



Capacity – Smaller streams in Pennsylvania in 2008 had severe low flow conditions due to certain water withdrawals related to oil and gas exploration.

As a result, the Pennsylvania DEP, in conjunction with the SRBC, halted water withdrawal approvals within the Susquehanna River basin for a short period of time.



## *State Regulation for Surface Waters*



- State regulators were not ready to address water use issues in the context of oil and gas exploration
- Traditionally, oil and gas exploration did not require the use of large amounts of water
- State regulation was generally a post-use reporting requirement, if any requirement was necessary at all



## *Traditional Water Use Regulations*



- West Virginia required uses of water in excess of 750,000 gallons of water in a given month to be reported
- Pennsylvania similarly required uses of water in excess of 10,000 gallons of water in a given month to be reported



# *New Concerns for Water Use*



These post-use reporting requirements did not contemplate or attempt to address potential impacts of water uses.

Use of surface waters during certain times of the year can interfere with traditional stream uses for human consumption, farming and industrial uses, and recreation particularly in smaller waters.



# *Pennsylvania Permit Addendum*



- The first state to institute new water use controls related to the Marcellus Shale was Pennsylvania which adopted a permit addendum as part of its well permitting process in 2008
- The Permit Addendum required prospective permittees to identify the source of its fracing water, among other things
- This initial requirement to identify the source of frac water would eventually include an analysis of impacts upon the stream



# *Water Management Plans*



The Permit Addendum would subsequently be replaced in 2009 through the development of watershed based Water Management Plans.



# *West Virginia*



In early 2009, West Virginia issued a Marcellus Shale Policy which requested that permittees within the Marcellus Shale provide certain basic information with regard to proposed water use.

This policy statement was further amended through the issuance of guidance by the WVDEP alerting the regulated community that water use which results in a violation of water quality standards or which adversely impacts aquatic life is not acceptable.

The policy statement also stressed the need to plan for wastewater handling.



# *New York*



New York has essentially placed a moratorium on the issuance of Marcellus Shale wells pending the issuance of a Supplemental General Environmental Impact Statement.



## *Important Fact*



As a percentage of the hydrology of any area, oil and gas exploration will never be more than a very small percentage of uses.



# *Water Handling Concerns*



- Disposal Issues
- Groundwater Contamination
- Surface Water Contamination



# *Disposal Options*



- Underground Injection – This method of disposal is a traditional method which has been used for decades and has been proven to be safe and effective
- Permits obtained in West Virginia through the state UIC program, but must be obtained from USEPA in Pennsylvania
- Problem – The geology of any given area controls the capacity of any given injection well



# *Disposal Options (Continued)*



- Land Application – Yet another traditional disposal method. Wastewater is allowed to settle in pits located likely adjacent to the well and the liquid on the top is land applied.
- Permitting is obtained through the states through general permits
- Problem – Sheer volume of the wastewater does not allow for land application of the entire volume of water due to the limited assimilative capacity of the land
- Test project in West Virginia showed the impacts of overloading any area with wastewater



# *Disposal Options (Continued)*



- Treatment and Discharge – One more traditional method of treatment where water is taken to a POTW or specialty treatment facility and is treated and discharged to surface waters
- Permitting is through the states and their state NPDES permitting programs
- Problems – POTWs do not provide much in the way of treatment. Specialty treatment facilities do not have the capacity to accommodate Marcellus Shale size volumes.



# *Disposal Options (Continued)*



- Evaporation/Crystalization – Non-traditional treatment method which effectively treats water and forms either a sludge cake or crystalline product
- Permitting obtained through the states requiring air permitting
- Problem – the process would require undertaking large capitol expenditures and substantial operation and maintenance costs related to transportation, energy consumption, and disposal of the sludge cake or crystal product



# *Disposal Options (Continued)*



- Recycling/Re-use – Nontraditional option now being heavily favored as it can result in a zero surface water discharge. Treatment to levels which allow for wastewater to be re-used as frac water with a smaller percentage being collected for disposal.
- Permitting would be the through the states individual NPDES permitting programs
- Problem – the concentrated brine product has extremely high salt levels, but can be properly discharged through a UIC permitted discharge point or other traditional methods



# *Groundwater Concerns*



- Issue has been substantial in New York to the point that Chesapeake Energy has agreed to perform no drilling in the watershed which provides New York City its drinking water
- Pennsylvania has experienced surface water spills triggering general concerns regarding water contamination
- Many are concerned that oil and gas operations will result in NORM contamination



# *UIC/Drilling Proven Safe*



- Regulations are already in place to assure that wastewater from drilling activities do not result in groundwater impacts
- Well casing and location requirements, either proposed or in law, assure that drilling will not occur within certain boundaries of underground drinking water sources
- Drilling in the Marcellus Shale formation will mean drilling well below any underground drinking water sources



# *NORM*



Sampling of frac water in West Virginia and Pennsylvania show no evidence of elevated levels of NORM in oil and gas wastewater.



# *Frac Water Debate*



The contents of Frac water, notwithstanding the current debate, are well known. What is protected as a trade secret are the various proportions of the various elements that make up frac water and the effectiveness of the frac water to fracture the shale.



# *Surface Water*



- Surface water is the chief source of drinking water supplies
- Concern is whether surface water discharges will impact drinking water supplies



# *TDS Debate*



- TDS is the abbreviation for *Total Dissolved Solids*
- TDS is the total of all organic and inorganic substances contained in a dissolved state in water
- TDS is comprised mostly of inorganic salts (principally calcium, magnesium, potassium, sodium, chlorides, and sulfides)
- TDS contributes to a stream's health and hardness



# *TDS Background*



- TDS is a secondary drinking water contaminant – secondary because it is not generally a threat to human health or aquatic life
- TDS can impact the odor and taste of drinking water
- USEPA developed a maximum contaminant level (MCL) of 500ppm for TDS to protect the aesthetics of public drinking water



# *Why the Concern?*



- In the Fall of 2008, high levels of TDS were detected in the Mon River in Pennsylvania which can impact the aesthetics of drinking water
- In 2009, Dunkard Creek (which flows through both West Virginia and Pennsylvania) suffered a catastrophic event because of golden algae bloom attributed to extremely high levels of chlorides and salts in the surface water



# *New Proposed Regulations*



Pennsylvania and West Virginia have proposed, or are considering, numeric water quality standards for TDS:

- Pennsylvania proposed new draft rules in November 2009 to limit TDS discharges state-wide
- West Virginia legislators have draft legislation requiring the development of TDS water quality standards



## *Regulation on the Quick*



Proposed regulation is for a statewide WQS, but...

Data does not necessarily indicate TDS is a statewide issue.



# *Regulation on the Quick*



Data generally supports the notion that TDS varies depending upon available water flow rates.



# *Regulation on the Quick*



- In West Virginia, there are no permitted surface water discharges for oil and gas wastewater to the Mon River
- Traditional sources of surface water TDS are mining related water discharges and urban storm water



## *Potential Unintended Consequences*



- Treating TDS to proposed limits will require the expenditure of billions of dollars
- The Pennsylvania Chamber of Commerce estimated the installation of treatment technology at a single power plant would be \$62,000,000 for capital costs and an additional \$4,500,000 for disposal



# *Surface Water Discharges*



No matter which side of the debate you support, the TDS debate shows that surface water discharges will be largely scrutinized and likely limited



# *So Where are We?*



- We are in a very fluid situation – rules are being developed and modified on a continual basis
- States are looking for a reasonable middle ground where water resources and the environment are protected, but the natural resources of the state are used to promote economic development
- The Oil and Gas Industry must remain flexible and cognizant of these real and legitimate concerns
- Water conservation, both on the water use side and the water handling side of the equation will be necessary



The meeting host will now open phone and chat lines for questions

To pose a question to the presenter, please click “Raise Your Hand”  
and the host will open your phone line

You may also ask questions by typing your question  
into the chat box on the lower right-hand portion of the screen

**Thank you for participating!**

**February 17, 2010**

**The Marcellus Shale Series Continues**



# *Material Disclaimer*



These materials are public information and have been prepared solely for educational purposes to contribute to the understanding of energy and oil and gas law. These materials reflect only the personal views of the author and are not individualized legal advice. It is understood that each case is fact-specific, and that the appropriate solution in any case will vary. Therefore, these materials may or may not be relevant to any particular situation. Thus, the author and Steptoe & Johnson PLLC cannot be bound either philosophically or as representatives of their various present and future clients to the comments expressed in these materials. The presentation of these materials does not establish any form of attorney-client relationship with the author or Steptoe & Johnson PLLC. While every attempt was made to insure that these materials are accurate, errors or omissions may be contained therein, for which any liability is disclaimed.