

Getting The Waters Tested The Marcellus Shale Factor



Presented by:

Mr. Brian Oram, Professional Geologist (PG),
Soil Scientist, Licensed Well Driller, IGSHPA
Accredited Geothermal Installer

Laboratory Director, Center for Environmental Quality
Wilkes University
<http://www.wilkes.edu/water>
and
B.F. Environmental Consultants Inc.
<http://www.bfenvironmental.com>





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FREE

TECHNICAL ASSISTANCE FOR WATERSHEDS!!!

C-SAW

(Consortium for Scientific Assistance to Watersheds)

Funding provided by Growing Greener and the in-kind support of the partners

<http://www.pnercd.org>





Goals

- Local and Regional Geology
- Existing Problems in Region
- The Citizen Groundwater Database
- Baseline Testing – What Parameters?
- Educating the Community





What is the Marcellus Shale Factor?

- We have been educating private wellowners for 20 years- but it was difficult to get citizens to test their well water. It looks clear – I am not sick – It is fine.
- The Marcellus Shale Factor – Baseline Testing for Natural Gas Development is conducting Testing and Citizens are be told they have a Problem NOW.
- Based on Private Well Construction and Placement - Some Private Wells may be the pathways for Contamination.
- WE NEED TO PROTECT OUR SOURCE WATER- not just from Marcellus Shale Development, but from US and our past.
- How do we track an unregulated activity – such as; Private Wells and Identify Zones or Areas that are Vulnerable to Contamination.
- This lead to the idea for creating the Citizen Groundwater / Surfacewater Database

WATER QUALITY
D A T A B A S E
C O N S E N T &
I N F O R M A T I O N

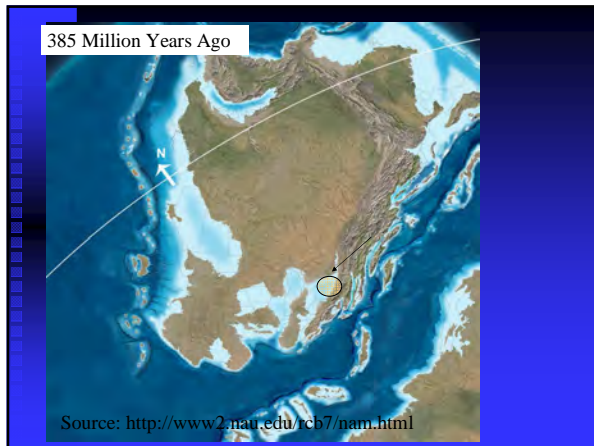
Background

- Geology/ Hydrology

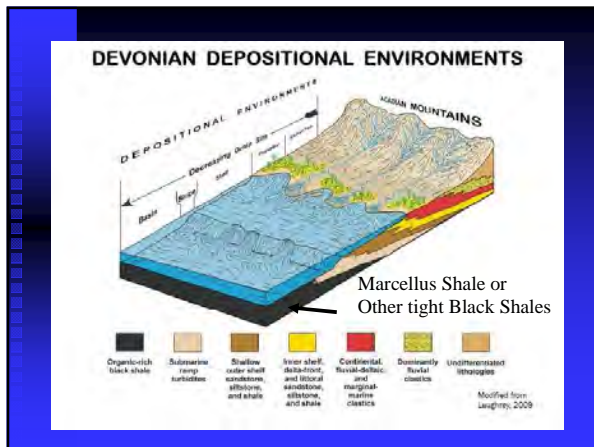
Marcellus Shale

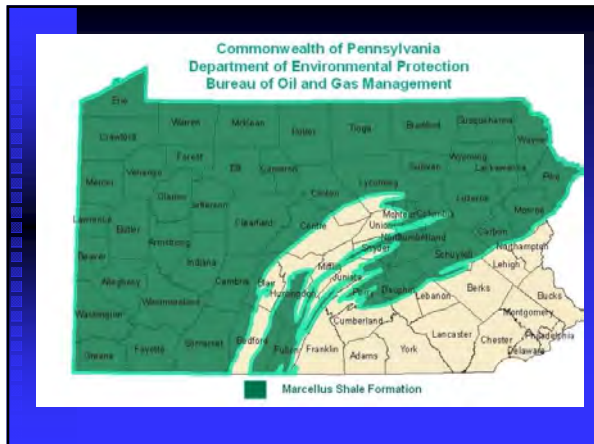


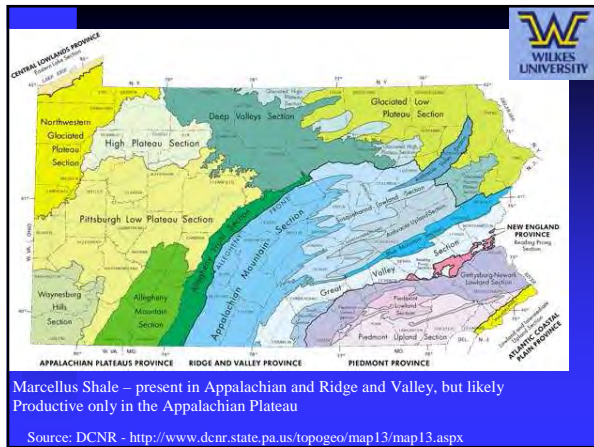
This is Causing all the Concern?

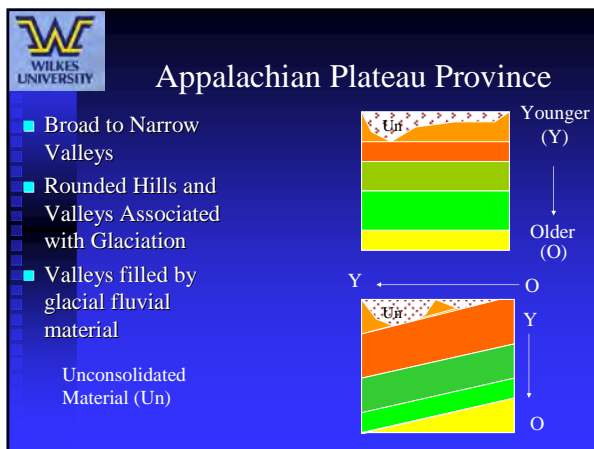








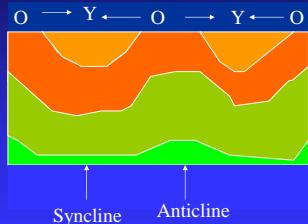






Ridge and Valley Province

■ Bedrock has been folded into a series of anticline and synclinal structures.



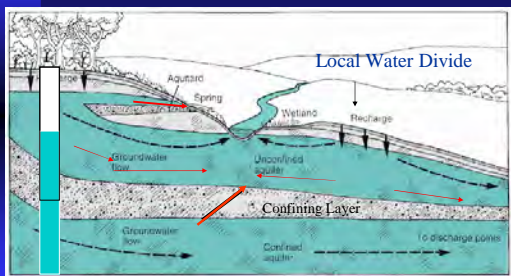
Less likely areas for Marcellus Production

Geological Sequence – Northeast PA

Time	Period	Deposit or Rock Type
0 to 1.8 million years	Quaternary – Glaciation	sand, silt, clay, and gravel
1.8 to 290 million	Tertiary to Permian	Not present (eroded and weathered)
290 – 320 million	Pennsylvanian	Llewellyn (coal) and Pottsville (minor coal)
320 – 354 million	Mississippian	Mauch Chunk, Pocumtuck and Specht Kopf
354 - 417 million	Devonian	Catskill Formation Trimmers Rock Formation Mahantango Formation Marcellus Formation (Black Shale)- Target Onondaga Formation
417 – 443 million	Silurian	(calcareous sandy shale)

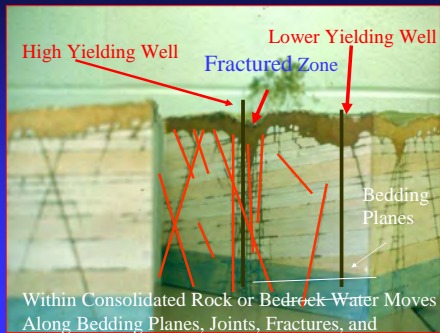
O
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Surfacewater & Groundwater They Are Related and Connected!



Copyright © 1997-2009 - League of Women Voters of PA Citizen Education Fund- image edited by Mr. Brian Oram, PG Wilkes University

Bedrock Fractures and Fractured Zones



Edge Ridge and Valley Province – Rt 309- Dallas, PA



Private Wells/ Springs/ Water Systems in Pennsylvania



What ?



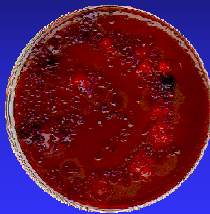
Private Wells Not Regulated

- Private Wells Are Not Regulated under Safe Drinking Water Act
 - ◆ EPA – NO
 - ◆ PADEP – NO
 - ◆ County – Very Few Counties in PA
 - ◆ Townships – some have basic ordinance on placement- some have comprehensive requirements

Groundwater Northeast Pennsylvania



Based on the geology of Northeast PA, the **common** water quality problems are as follows:



- Corrosive Water
- Low pH
- Soft Water (low hardness) to Moderate Hardness
- Iron and Manganese
- Discolored Water – Reddish to Brown Tints
- Total Coliform Bacteria
- Sulfur Odors and Elevated Sulfates
- Methane – Yes Baseline Levels can be High - Predrilling

Air Quality Issues – Radon In Air !

Before Marcellus Shale Development What was the Quality of Private Well Water? Personal Observations

Impacts from Road Salt, Old Landfills, Gas Stations, Saline Water (1981 - 1985)

Bacterial Contamination and Well Construction Issues (1985)

Methane Gas Present in Wells in Northern Tier of PA and in parts of Columbia and Luzerne County, PA(Oram,1989).

Testing Conducted by Wilkes University in throughout the United States indicates that 30 to over 50% may be contaminated – Mostly by Total Coliform Bacteria (1989 – 2011). Locally – it tends to be about 40 to 50%.

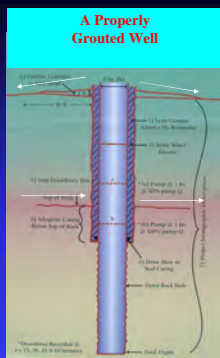
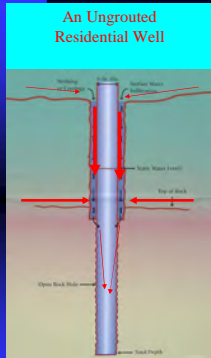


Most Contamination appears to be associated with Total Coliform Bacteria



- Insects, Larvae and Nests / Egg Masses
- Mouse Colonies
- Snakes
- Beehives
- Mud - when casing to close to ground

Therefore – In some cases - the Private Wells are Facilitating Groundwater Contamination.



Source: Pennsylvania State University – Master Well Owner Program - Carbon County Groundwater Guardians (edited by Mr. Brian Oram)

- Baseline Testing – Documenting Conditions
- Citizen Database- Track Change
- Making Improvements – The Real Work !

Three Step
Process



Step 1: Baseline Testing- Education and Need Good Data

- Baseline Testing
 - ◆ Proper Well Purging, Field Monitoring, and Sampling
 - ◆ Documenting Existing Conditions and Well or Water Source Information
 - ◆ Chain-of-Custody Protocols
 - ◆ Using a Certified Lab / Using Certified Methods
 - ◆ Picking Water Quality Parameters
- ◆ Educating Private Well Owners and Explaining Results

Education

- Conducted Free Workshops and Fairs
- Updated Website
<http://www.wilkes.edu/water>
- Created a New Free Community Resource
- Added Informational Water Testing – Saline Water Screening Program



Schedule a Free Training Session – Go to Our Website



Citizen Database at Wilkes University- Guidelines for Submission

II. Guidelines for Data Submission

1. Third Party Samplers following chain-of-custody to certified laboratory.
2. Submit detailed reports from certified laboratory with a GPS position for the well – either from the citizen or direct from laboratory.
3. The water sample must be collected ahead of any water treatment system.
4. other conditions – Learn More at the Wilkes University Website.

Learn More –
<http://www.wilkes.edu/water>



Recent Baseline Testing in Luzerne County, PA 320 Private Wells

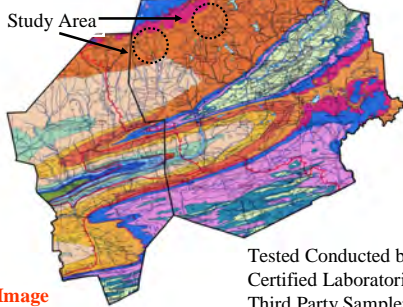
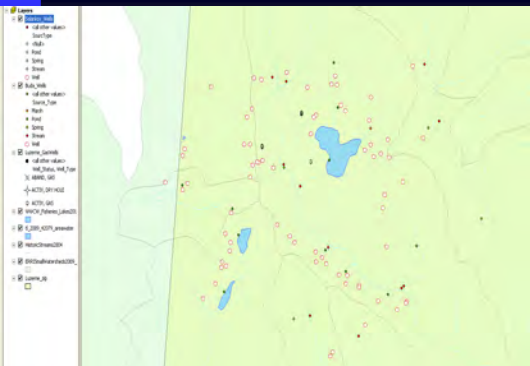
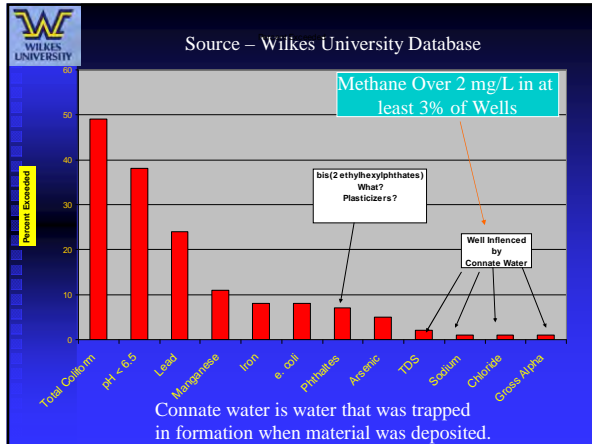


Image
Source: Luzernecounty.org

Tested Conducted by
Certified Laboratories
Third Party Samplers
Not Wilkes University




Preliminary – Screenshots – Add Hydrlogy, Roads, other GIS Layers



Methane in Water


- Methane has been a hidden issue in NEPA.
- The gas is colorless, tasteless, and odorless and there are no known health effects.
- Potential concerns relate to flammability/explosiveness of gas.
- Background – appears to range from non-detect to over 20+ mg/L (highly variable) in Northeast Pennsylvania
- Highest in the database – Now – about 7 mg/L – I am in the process of adding baseline data that is approaching 20 mg/L (predrilling)

Problems with Iron, Manganese, and Sulfur – May be Bacterially Related



In Northeastern PA- "Nuisance Bacteria may be associated with an Odor, Iron, Manganese, or Sulfur problem. Up to 50% of the time.

Make sure to test for total coliform, standard plate count, and Nuisance Bacteria.

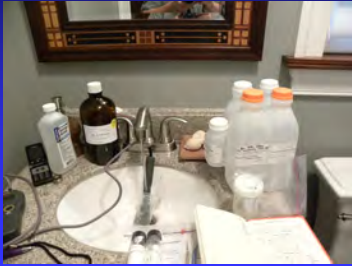


What are Phthalates?

- Used as Plasticizers- is a substance which when added to a material, usually a plastic, makes it flexible and easier to handle.
- Bis(2thylhexylphthalte) (DEHP) – DW Standard – 6 ppb – GI problems, possible endocrine disruptor and carcinogen.
- Recent Testing – Highest Value was 60 ppb.
- How did this get in the aquifer?
 - ◆ Possibly the Black Coil Pipe used in wells and delivery lines for private homes.

What Parameters

- Baseline Testing



Suggested Baseline- For Citizens from PADEP (11/2010)

- Alkalinity, Chloride, Conductivity, Hardness, Oil and Grease, pH, Sulfate, Total Dissolved Solids, Total Suspended Soilds, Total Solids
- Barium, Calcium, Iron, Magnesium, Manganese, Potassium, Sodium, Strontium
- Ethane/Methane
- Total Coliform / E. coli

Other Recommendations at:
<http://www.wilkes.edu/water> (Fact Sheet - Recommended Baseline)

Baseline Testing – Oram’s Recommendations for Citizens

- Where are you located?
- What is your surrounding land-use?
- Do you have any water quality problems- such as discolored water, odors, or staining?
- Do you have a water treatment system?
- What is the source of your water?
 - ◆ Well, Spring, Cistern, etc

Same Baseline Parameters?



Quarry



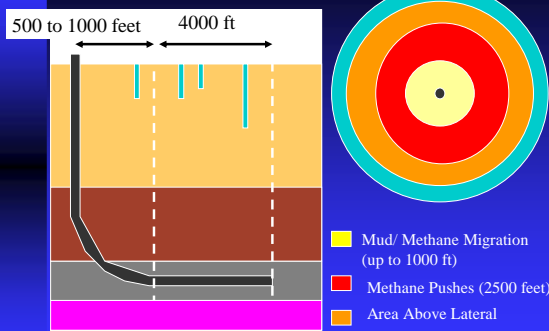
Mixed Hazards



Saline Seep

Salt Spring, Susquehanna County
(You can light the gas- Back to 1800s)

In general – I could see a radius from 3000 ft to 1 mile



This is More Opinion/ Judgment- not fact. Copyright- Brian Oram, 2010

Suggested Baseline- For Citizens

■ Testing Package # 1 Recommendations

Total Coliform with e. coli confirmation, chloride, sodium, bromide, barium, pH, total dissolved solids, MBAS, iron, manganese, and methane/ethane.

■ Testing Package # 2 Recommendations

Package # 1- plus T. Hardness, Magnesium, Selenium, Strontium, Conductivity, Calcium, Zinc, Alkalinity, Arsenic, Nitrate, Total Suspended Solids, Sulfate, Oil & Grease, and 21-VOCs/MTBE.

■ Testing Package # 3 Recommendations

Package #1 and # 2 - plus Potassium, Sulfide, Ammonia, Acidity, Nickel, Gross, Alpha/Beta, Lead, and Uranium.

It may be advisable to add Glycols and other organics and inorganics depending on surrounding land-use, use of geothermal wells, and past history.

<http://www.wilkes.edu/water> (Fact Sheet - Recommended Baseline)

Step 3: New Community Resource Helping To Take Action



Download a Free Copy (pdf) or Link to a copy at <http://www.wilkes.edu/water>

Also:

1. We are Working on a Regional Citizen Water Quality Database.
2. We provide informational water testing- not Certified Test- Screening Testing Post Drilling

Add Your Data to the Citizen Database



Other Projects

- Developing Low Cost Water Monitoring Equipment with Remote Reading Capacity for Citizen Scientists.
- Assisting with the Development of Stream and Watershed Based Monitoring Programs.
- Developing and Training Citizen Scientists
- Working on Sourcewater Protection Projects
- Educating Private Well Owners

Step 4: New Program to Help Private Well Owners (Fixing Problem Wells)

- Pocono Northeast RC&D Council – Private Well Assistance Program
 - ◆ Education
 - ◆ Outreach/Training
 - ◆ Funding Need Repairs – via a 1 % loan program- terms up to 20 yrs.
 - ◆ <http://www.pnesolutions.org>

Working as a Community

Recent Site Tour- Towanda, PA



It is Critical to Get in the Field - Keep Your Eyes Open

Certificate of Completion

Training Event

Getting The Waters Tested The Marcellus Shale Factor
3/12/2011

1 – hour PDH or 0.1 CEUS
Presented by
Mr. Brian Oram, PG

B.F. Environmental Consultants Inc
15 Hillcrest Drive
Dallas, PA 18612
More Online Training @
<http://www.bfenvironmental.com>





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Mine Water Treatment System



BEFORE → POW Process → AFTER

Logos: iCONSERVE, B.F. Environmental Consultants, GreenNEPA STEWARD

Production Water Treatment- Modified POW Process for Brines



Before → After

Logos: iCONSERVE, B.F. Environmental Consultants, GreenNEPA STEWARD

Injection Wells – Class II

Class II wells inject fluids associated with oil and natural gas production. Most of the injected fluid is salt water (brine), which is brought to the surface in the process of producing (extracting) oil and gas.

Regulated by:

EPA - http://www.epa.gov/safewater/uic/wells_class2.html

Does the UIC Program regulate hydraulic fracturing?

Sometimes. The UIC Program regulates the following activities:

- Well injection of fluids into a formation to enhance oil and gas production (Class II wells).
- Fracturing used in connection with Class II and Class V injection wells to "stimulate" (open pore space in a formation).
- Hydraulic fracturing to produce methane from coal beds in Alabama.
- Hydraulic fracturing that uses diesel in the mixture.

Note: Class V wells are shallow wells that inject water into or above a freshwater aquifer. <http://www.epa.gov/ogwdw000/uic/>
