Workshop
What is In My Water and How Did it Get There?

(For the Professional – Working With the Public)

Prepared by:
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B.F. Environmental Consultants, Inc. Network

Training Professionals -Training Portal
http://online-training-courses.info

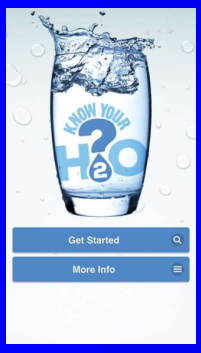
Keystone Clean Water Team (501c3)
http://www.pacleanwater.org

B.F. Environmental Consultants Inc
http://www.bfenvironmental.com

Know Your H20? Program
http://www.knowyourh2o.us

Water Research Center
(Education Portal)
http://www.water-research.net

New Web Application – Diagnose IT!



Results:

- More Detailed Information
- Testing Recommendations
  - DIY
  - Informational Testing
  - Certified Testing
- Water Treatment Advice
  - DIY
  - Certified Professional

Our Goal is to be the FACT Based Resource to Help the Consumer and Community and at the same time assist the PROFESSIONAL.
http://www.knowyourh20.us

What is In My Water and How Did it Get There?

- First is this the Right Question?

Groundwater

Surface Water

“ Ask a Child – Where their Drinking Water Comes from and the most Common Answer is the Sink”

Ask the Parent – Answer: Well or Utility

What the Public Thinks?

- Water is only H20.
- Water is Contaminated if it is not H20?
- Drinking water should be pure water. (Zero Water Ads not helping!)
- Groundwater and Surface Water are Different and Not Connected.
- Others and others activities contaminate the water not them (Not me it is them).
- The threat is the water, not home, diet, etc.

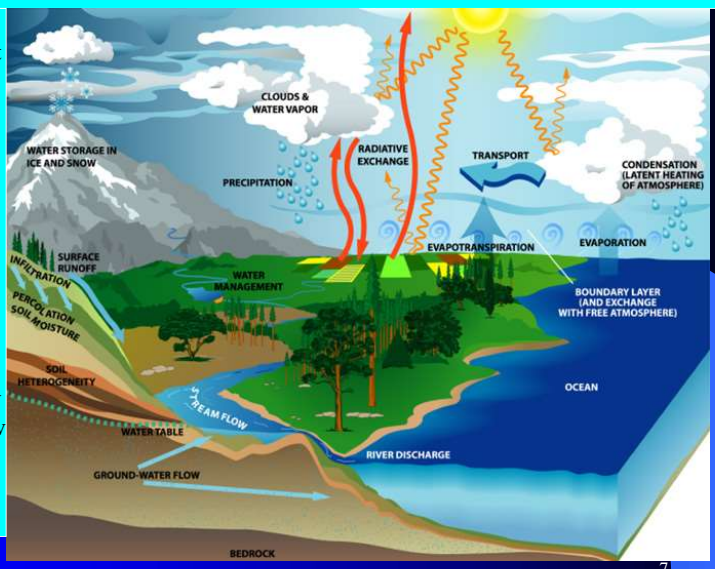
What Influences Water Quality

- Where it is within the Water Cycle?
- Time
- Geologic Material
- Human Extraction/ Modification / Altering Natural Water Cycle
- Activities in the Watershed
- NPDES Discharges
- Non-Point Source Pollution
- Distribution

Components of the Water Cycle

<u>First The Ins</u>
Solar Energy Input
Precipitation
Condensation
Well Injection
Irrigation

<u>The Outs</u>
Evaporation
Transpiration
Infiltration
Percolation
Runoff
Groundwater Flow
Surface Water Flow
Well Pumping



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Water Cycle

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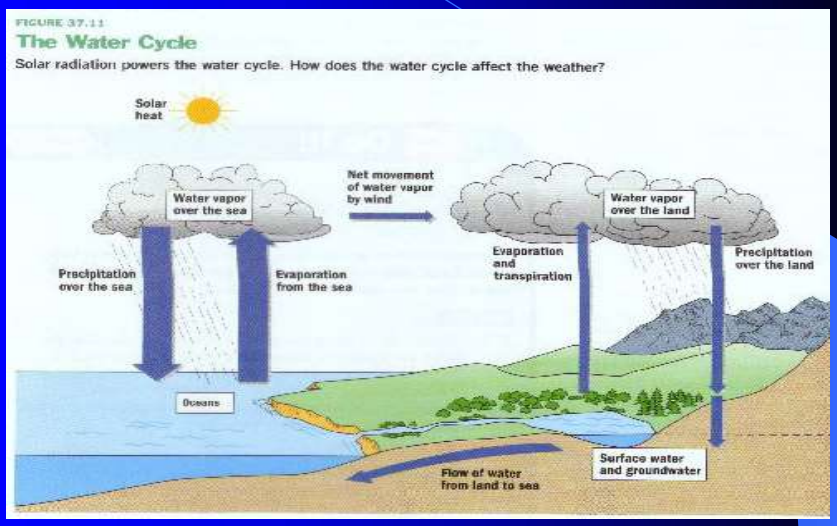
The Water Cycle
Powered by the Sun- Solar Power



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Types of Water in PA

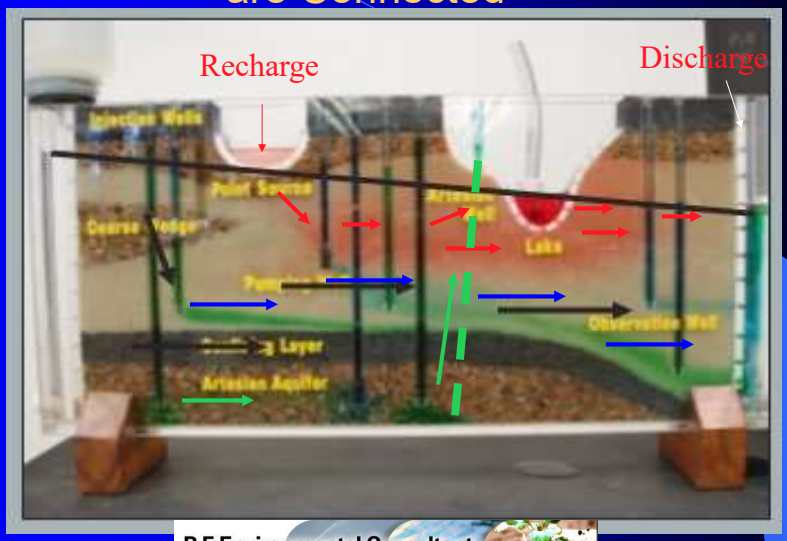
- Freshwater – Typically 600 to 1200 feet
  - < 1000 mg/L
- Saline Water – Where?
  - 1000 to < 35,000 mg/L
- Brine Water- Where? > 35,000 mg/L
  - Connate Water - This would include water that has been trapped in the formation- when it was deposited.

PADEP – Protects – Freshwater; EPA – Protects Water with a Total Dissolved Solids ≤ 10,000 mg/L – UIC Program

What is the Purity of the "Protected" Water ?

- Regulated Drinking Water – Typically has a Total Dissolved Solids of 500 mg/L or 99.95 % pure water.
- Freshwater actually includes – water with a TDS of 1000 mg/L or 99.9 % pure
- EPA Protects Water is up to 10,000 mg/L or 99% pure water.

Groundwater and Surface Water are Connected



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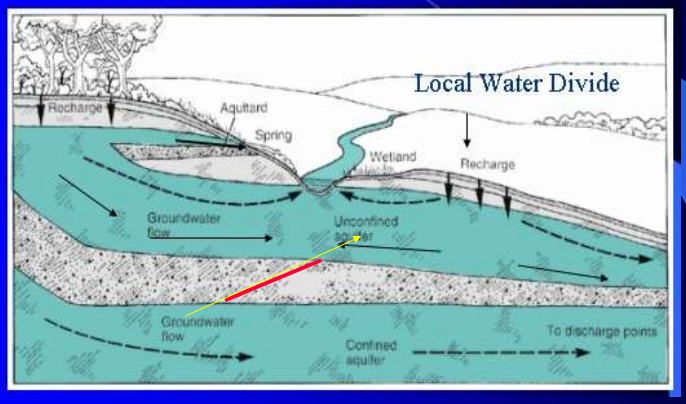
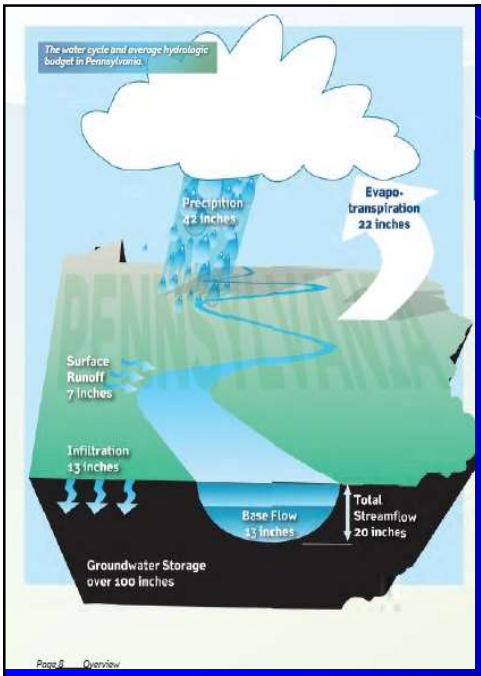
Environmental Scientists, Hydrogeologists, & Environmental Education Specialists
Located in Northeastern Pennsylvania
water reuse hydrogeology soil testing

Surface Water & Groundwater They Are Related and Connected !





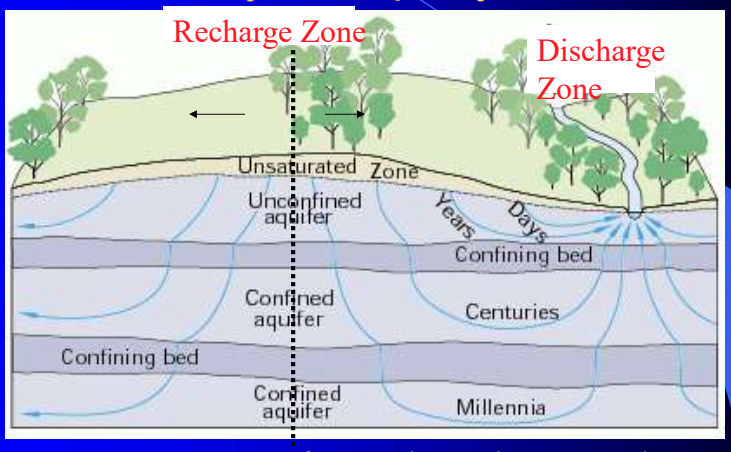
Water Budget for PA

In
Precipitation – 42 inches

Out
Evapotranspiration – 22”
Total Streamflow – 20”
Baseflow – 13”
Surface Runoff – 7”
Therefore, 65% of streamflow is groundwater discharge.

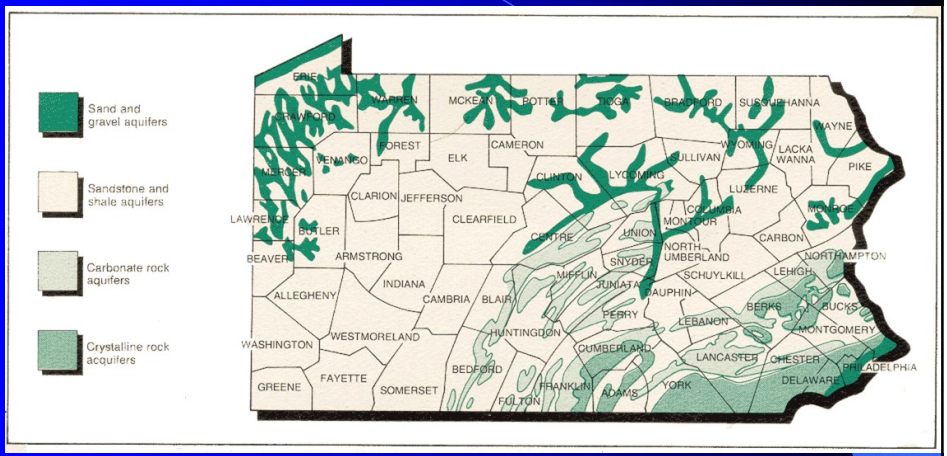
Other
Storage in Groundwater
Aquifers over 100 inches*
* This is our “Water” Cushion.

Groundwater Moves Slowly- feet per year

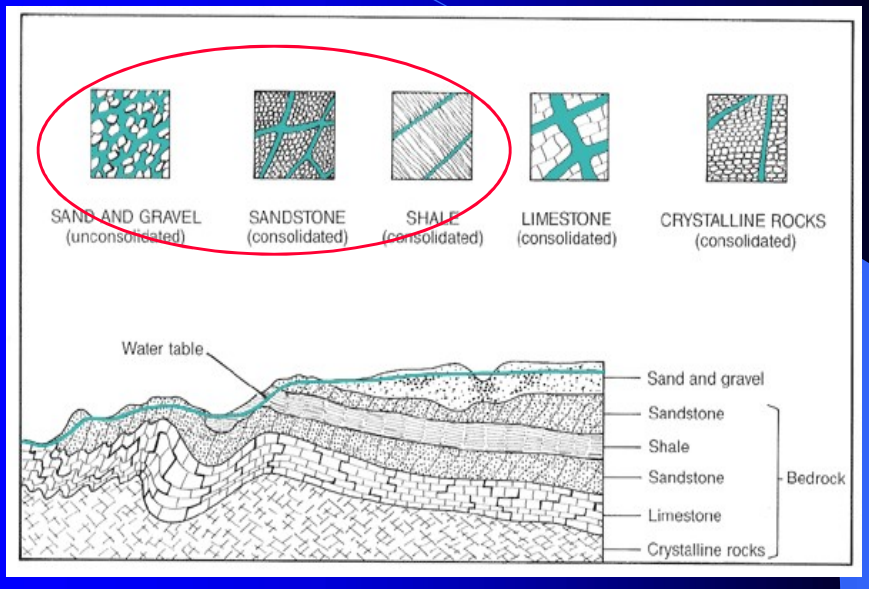


Yes We Have a Lot of Groundwater in Storage, but it have taken centuries or longer to refill up the system.

Sources of Water - Aquifers



Primary Aquifers in PA

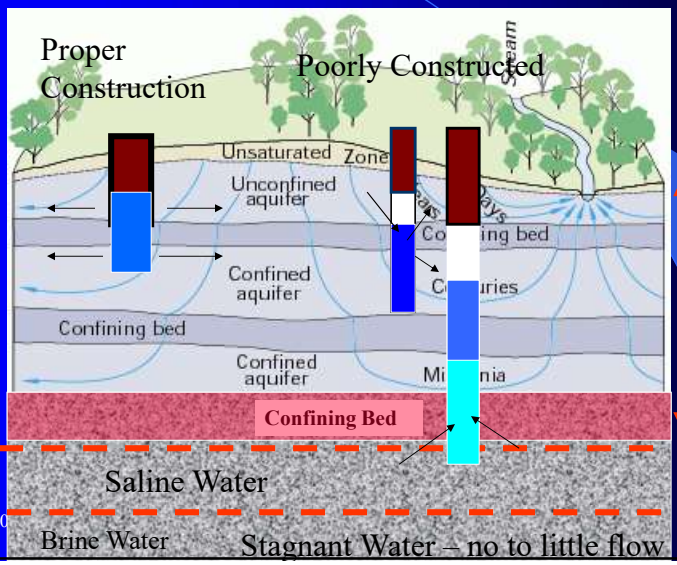


Most Contamination appears to be associated with Total Coliform Bacteria

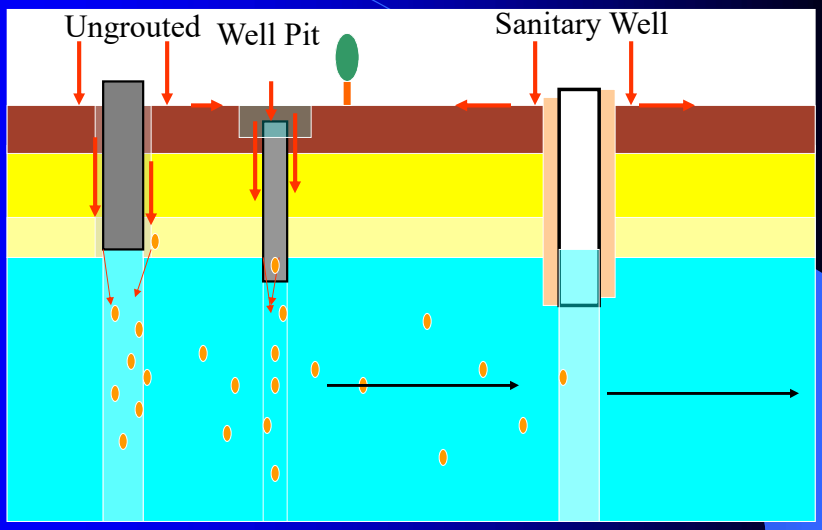
- Insects, Larvae and Nests / Egg Masses
- Mouse Colonies
- Snakes
- Beehives
- Mud - when casing to close to ground

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

Properly Constructed Wells and Poorly Constructed Wells



How Contaminants Can Get In to the Aquifer (Surface)



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Some Private Well Photos


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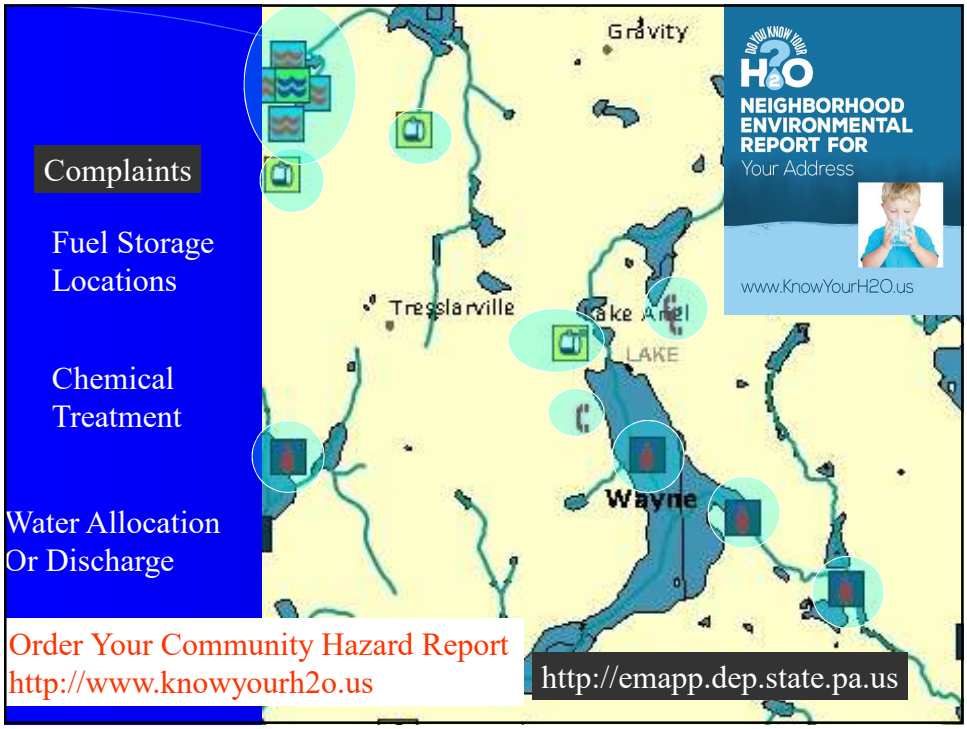
Plumbing vent
Leachfield/drainfield
Septic tank
Effluent absorption and purification
Groundwater
Your Well


Complaints
Fuel Storage Locations
Chemical Treatment
Water Allocation Or Discharge
Gravity
Tresslarville
Lake Angel
LAKE
Wayne
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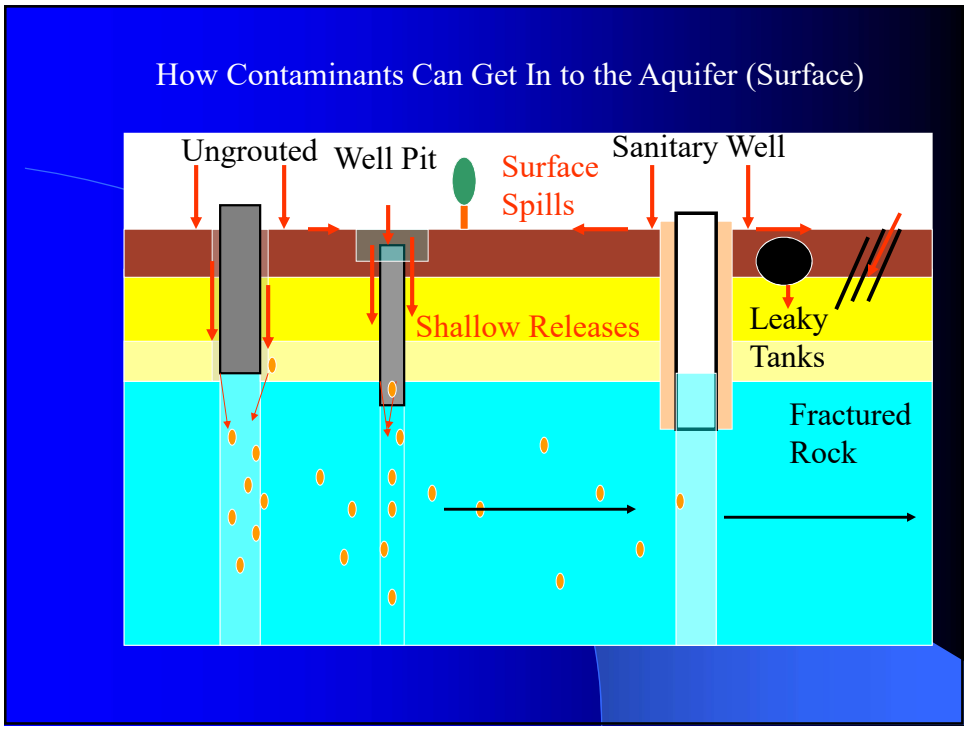
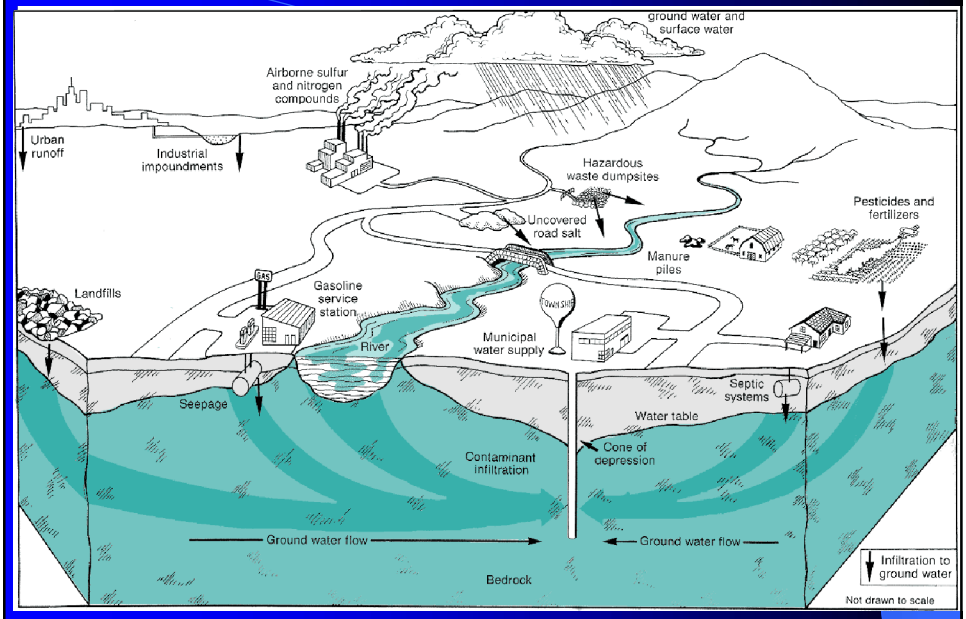
http://emapp.dep.state.pa.us

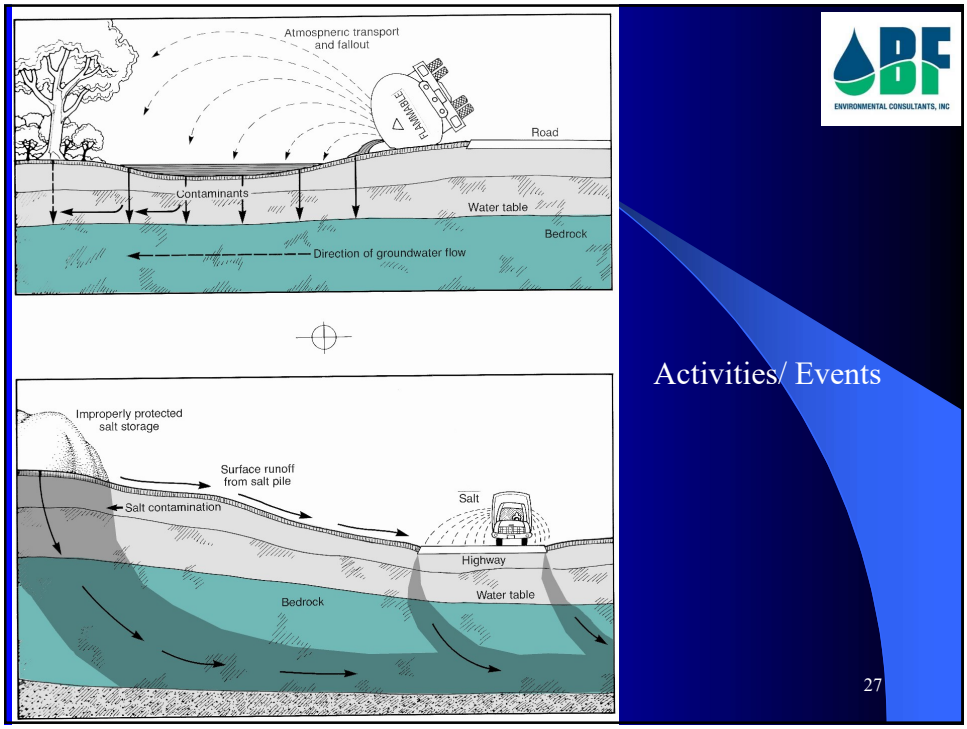

How Contaminants Can Get In to the Aquifer (Surface)
Ungrouted
Well Pit
Surface Spills
Sanitary Well
Shallow Releases
Leaky Tanks
Fractured Rock

Things I have found within 100 feet of a private well – Just a Few

Free Artesian Well Water

By the way – these two photos are only 200 feet apart
Groundwater is Safe and Pure – Really ?





Activities/ Events

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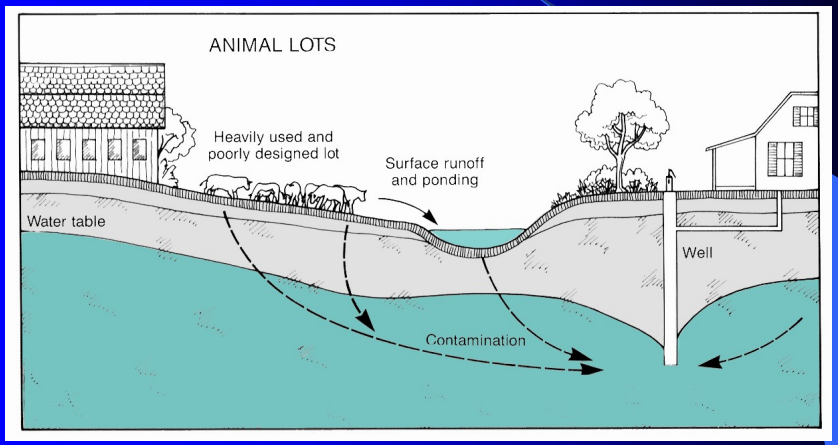
Activities and Well Placement / Operation



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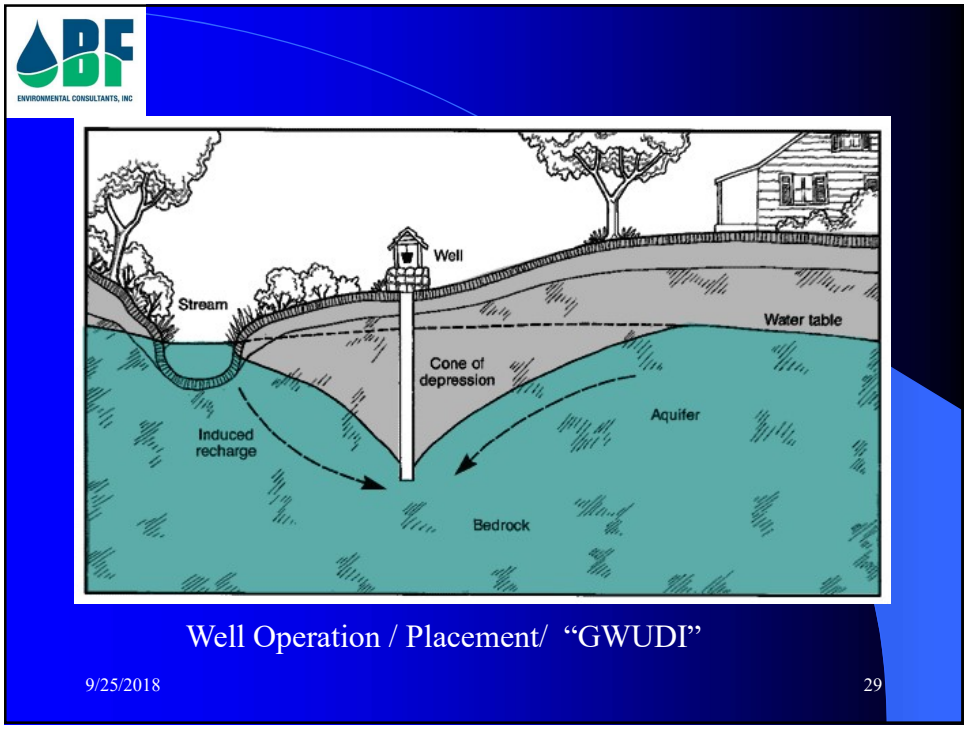

Well Operation / Placement/ "GWUDI"

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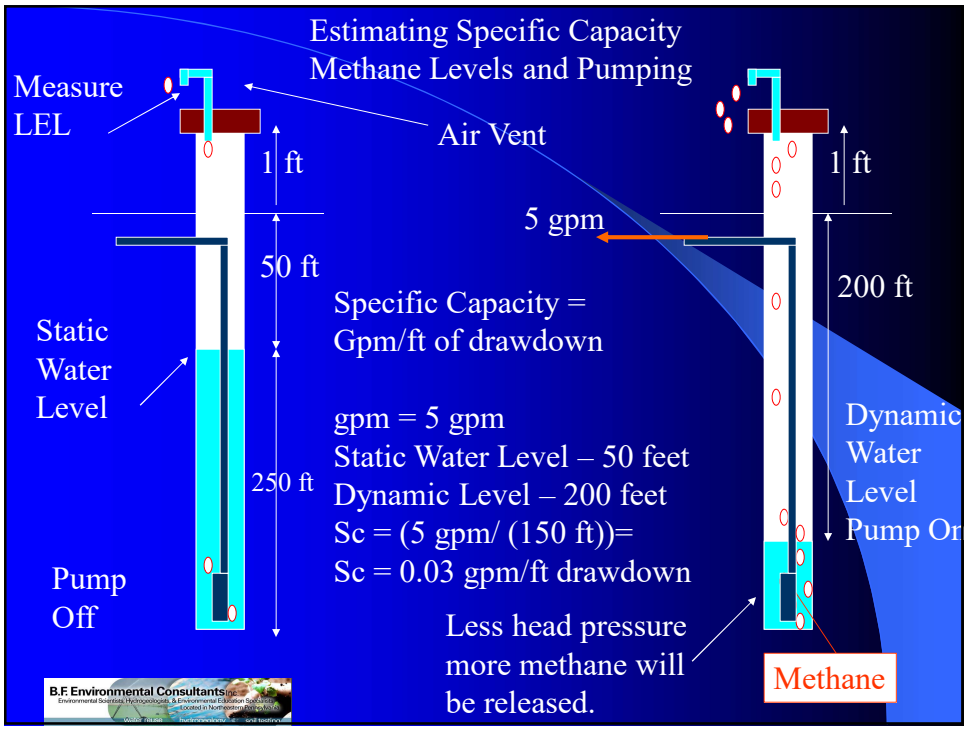
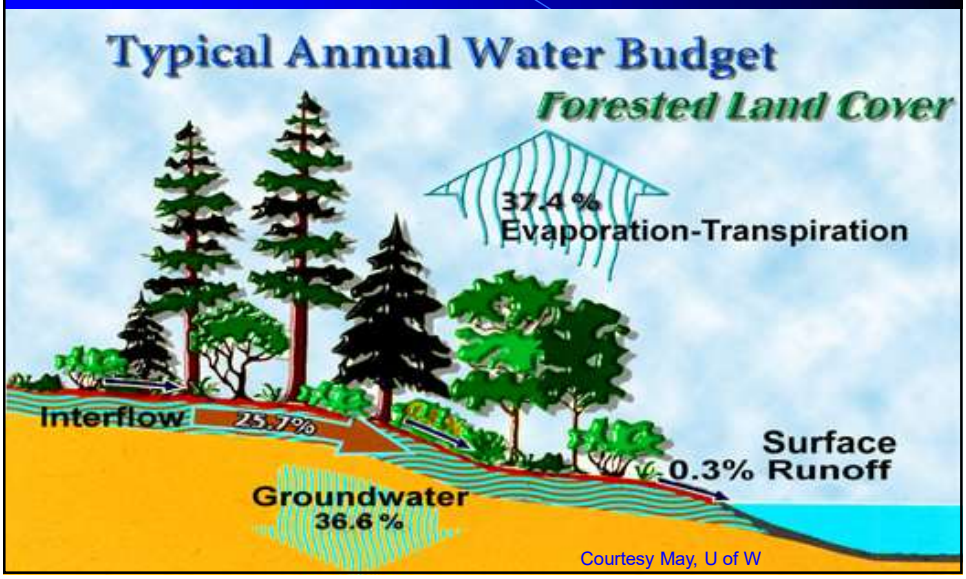
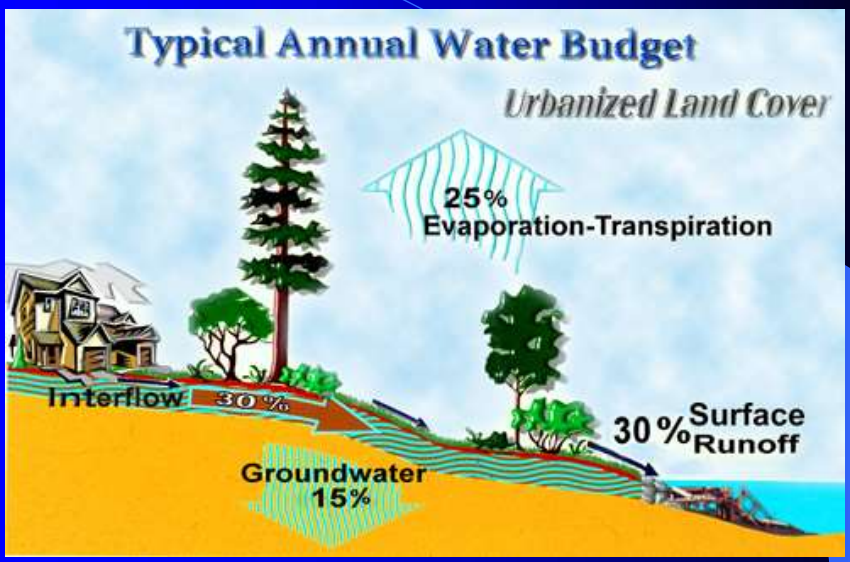


Hydrology Under Natural Conditions



Developed Conditions



The Piping/ Lack of Source Protection





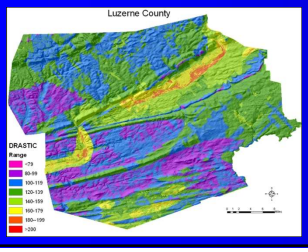

Piping Corrosion / Poor Plumbing Practices

- Chemical
- Biological
- Galvanic
- Poor Plumbing Practices

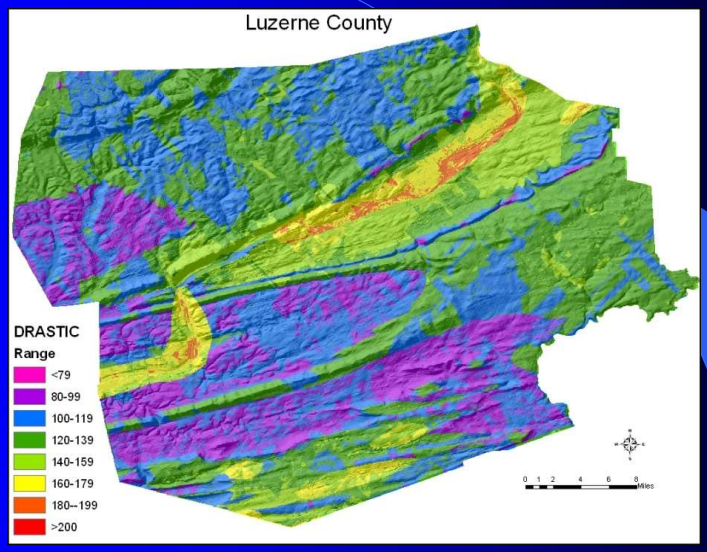



DRASTIC Model

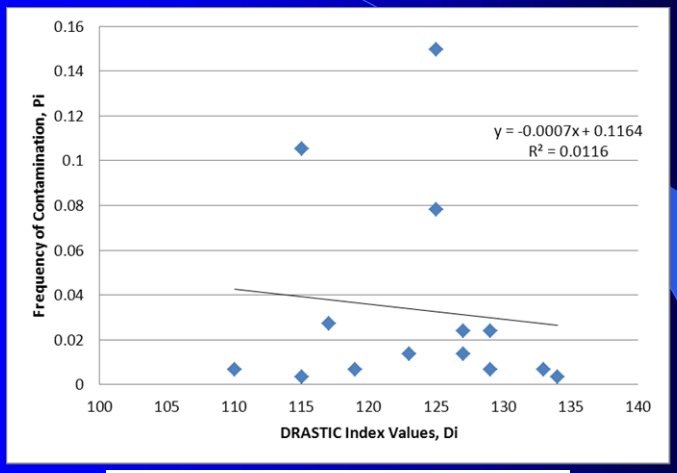
- Model uses hydrogeologic information to generate a measure of groundwater vulnerability
  - (D) **D**epth to water table
  - (R) net-**R**echarge rates
  - (A) **A**quifer media
  - (S) **S**oil type
  - (T) **T**opography
  - (I) **I**mpact of the Vadose Zone
  - (C) Hydraulic **C**onductivity



DRASTIC

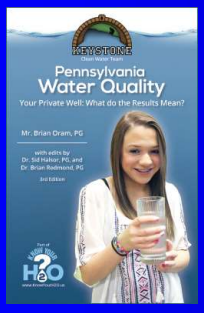


Correlation of DRASTIC and Incidences of Contamination



Poor Correlation. – I think poor well construction making wells more vulnerable than anticipated.

Educational Tools



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2018 EWQA CONFERENCE & TRADE SHOW
KALAHARI RESORT - POCONO MANOR, PA

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