

Planning for Private Drinking Water Supplies

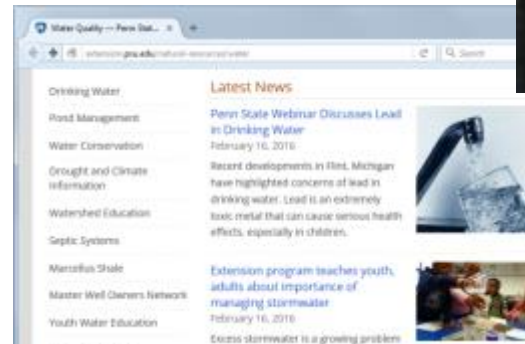
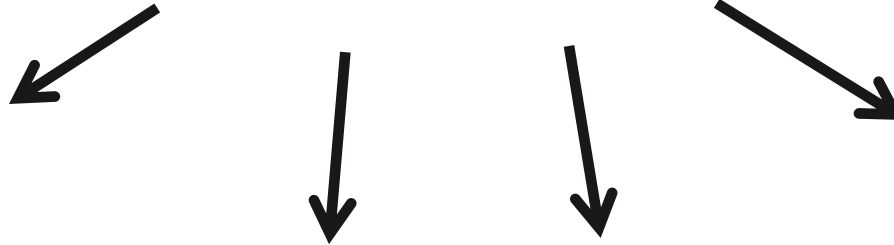
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Extension Educator, Pike County



About Cooperative Extension

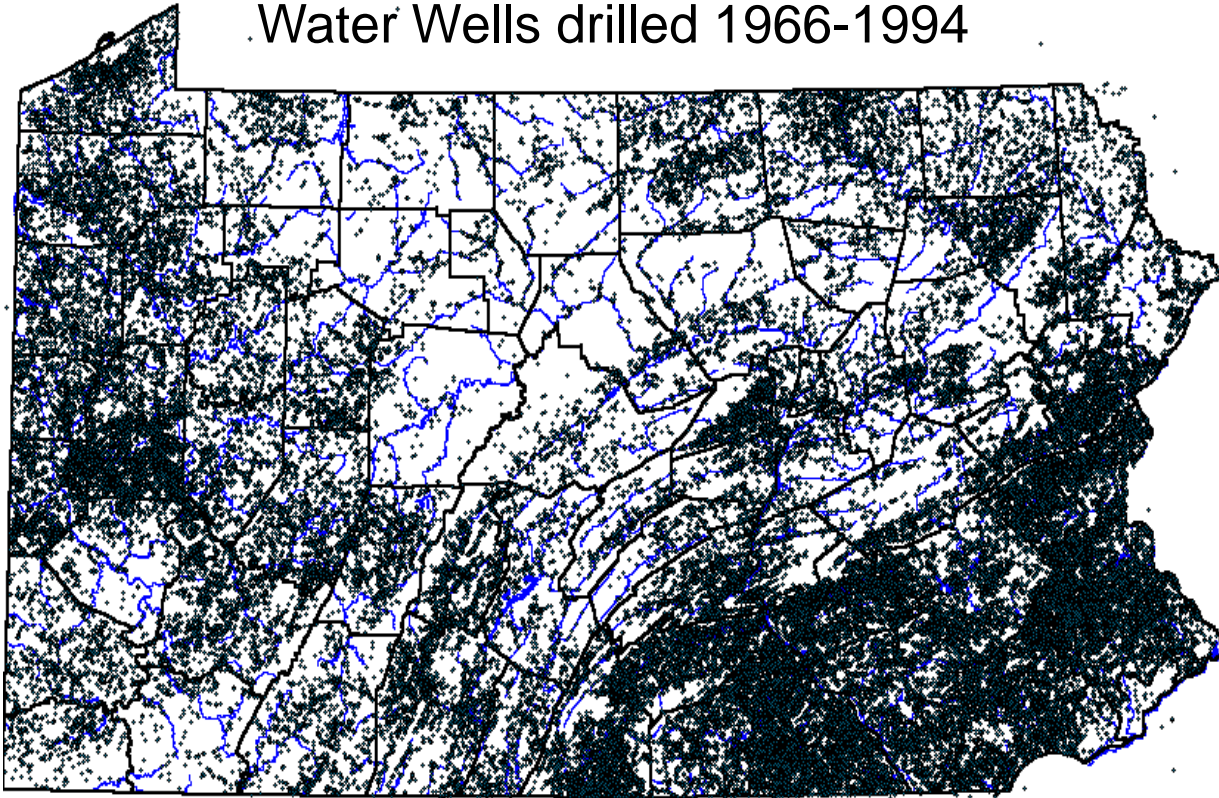
Providing factual information and education from unbiased research



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Private Water Supplies

Water Wells drilled 1966-1994



- Over one million homes and farms
- 45% never properly tested
- Access to groundwater but not ownership
- No statewide regulations but some local ordinances

Wells



Springs



Cisterns

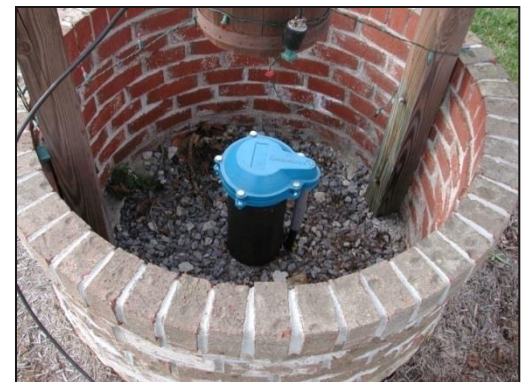


Private Water Systems Statistics for Some Counties

County	# of homes served by private water systems		% of homes using wells, springs	% drilled wells	% hand-dug wells	% springs
	1980	2000				
Adams	13,231	19,649	55	88	7	5
Armstrong	13,240	14,442	44	69	9	22
Bedford	12,027	18,621	70	81	7	12
Cambria	8,574	9,830	14	65	12	23
Carbon	6,594	17,876	45	91	6	3
Centre	6,885	10,939	19	69	9	22
Chester	42,075	58,969	36	91	7	2
Clarion	8,241	12,505	58	55	12	33
Clinton	3,536	6,692	31	54	7	39
Erie	21,384	24,224	21	77	20	3
Indiana	15,196	17,160	47	73	9	18
Monroe	21,129	53,363	68	93	5	2
Pike	9,441	24,309	55	92	6	2
Washington	19,290	19,858	23	66	5	29
Wyoming	7,236	10,078	73	85	5	10

Water Supply Characteristics

- Average well depth = 173 feet
 - Range = 30 feet to 725 feet
- Well yield was generally adequate
 - Average = 18 gpm, 95% report no problems
- Only 10% have a well completion report
- 84% lack sanitary construction
 - Buried casing = 13% (some >1990)
 - Extended w/ Standard Cap = 62%
 - Extended w/ Sanitary Cap = 16%
 - Extended with other or missing cap = 9%
 - Evidence of grout = 18%
- 89% have on-lot septic, 28% never pumped



Swistock, B.R, S. Clemens, W.E. Sharpe and S. Rummel. 2013, Water quality and management of private drinking water wells in Pennsylvania. *Journal of Environmental Health*, 75(6):60-67.

Water Well Owner Opinions

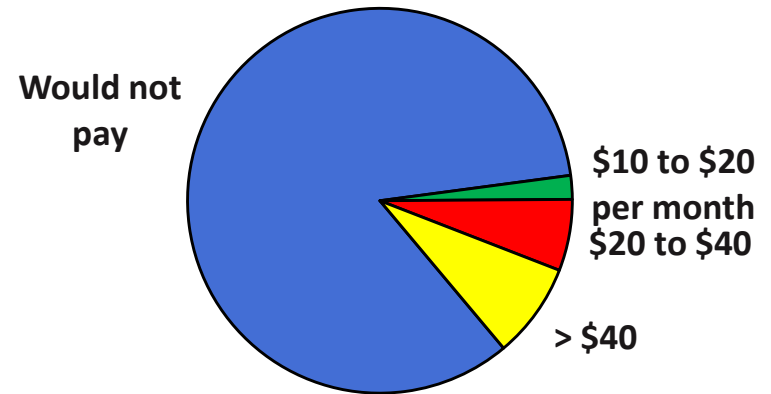
They Like Their Water Supply!

- 71% are satisfied with their well water quality
- 83% are satisfied with their well water quantity

But They Have Concerns

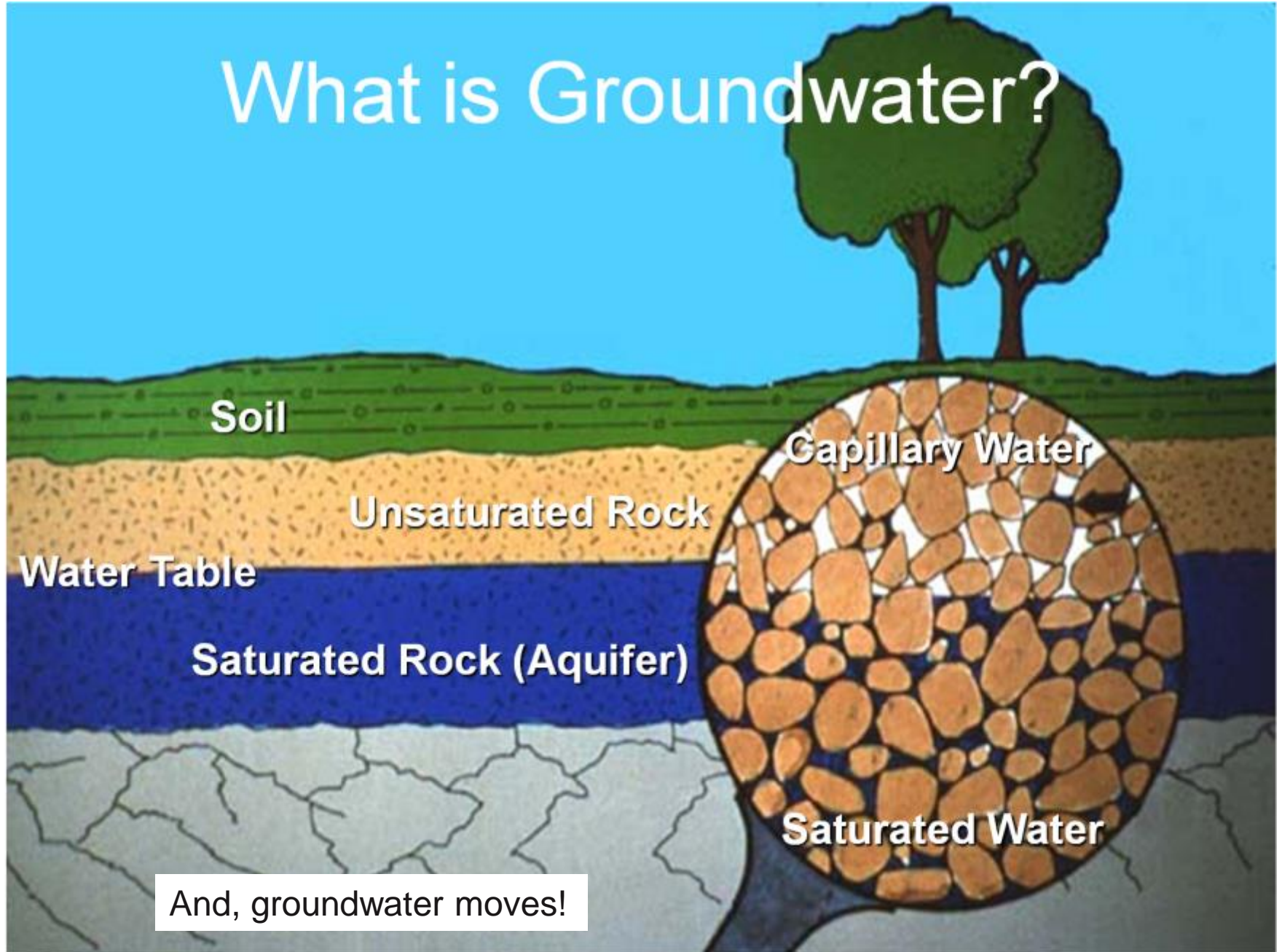
- 64% of homeowners are very or somewhat concerned about their future water quality
- 39% are very or somewhat concerned about the future well water quantity
- Biggest perceived threats – development, mining, gas/oil

How Much Would They Pay for City Water?



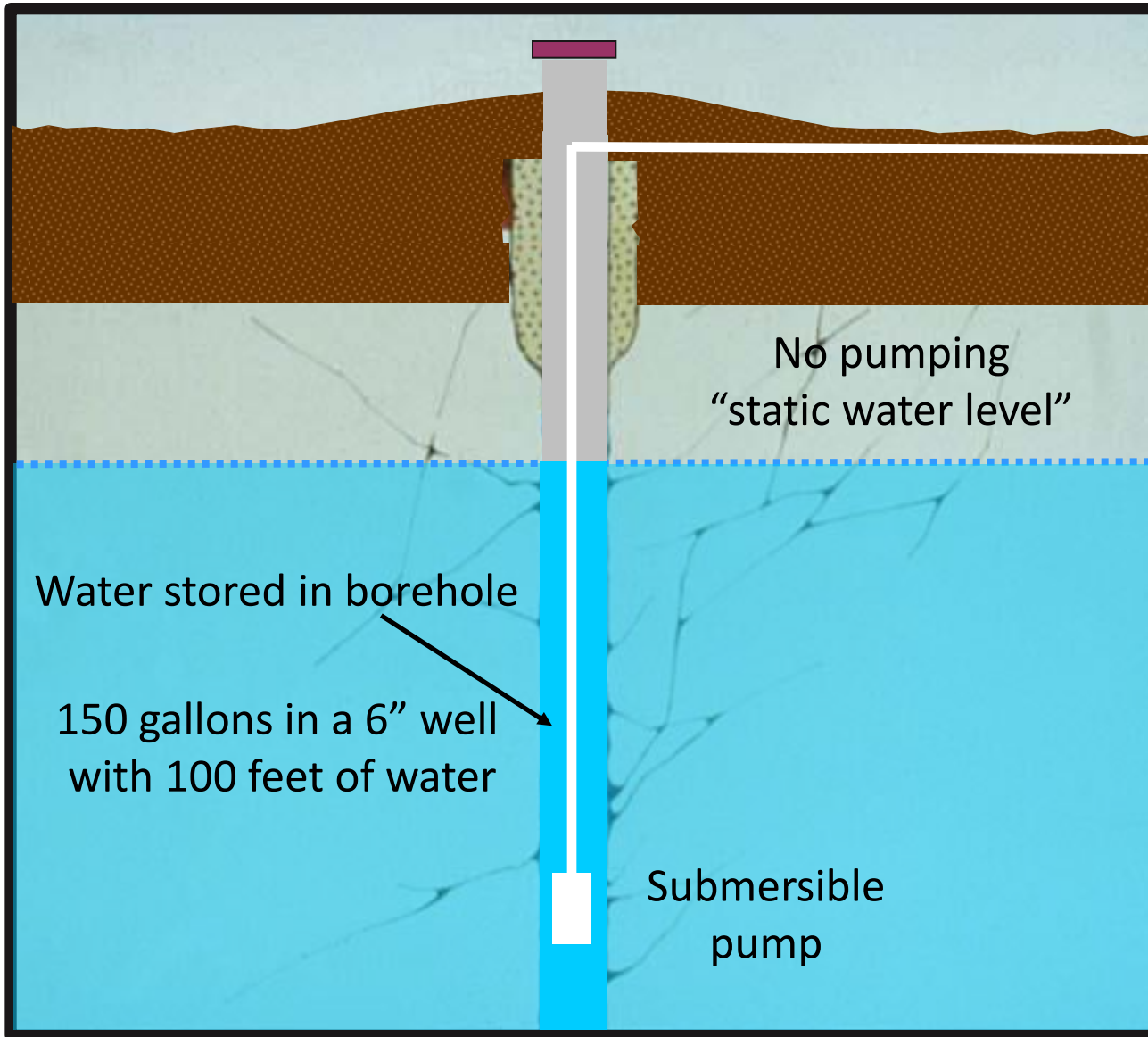
Swistock, B.R., S. Clemens and W. Sharpe. Drinking Water Quality in Rural Pennsylvania and the Effect of Management Practices. Center for Rural Pennsylvania, Final Project Report, January 2009. (http://www.rural.palegislature.us/drinking_water_quality.pdf).

What is Groundwater?

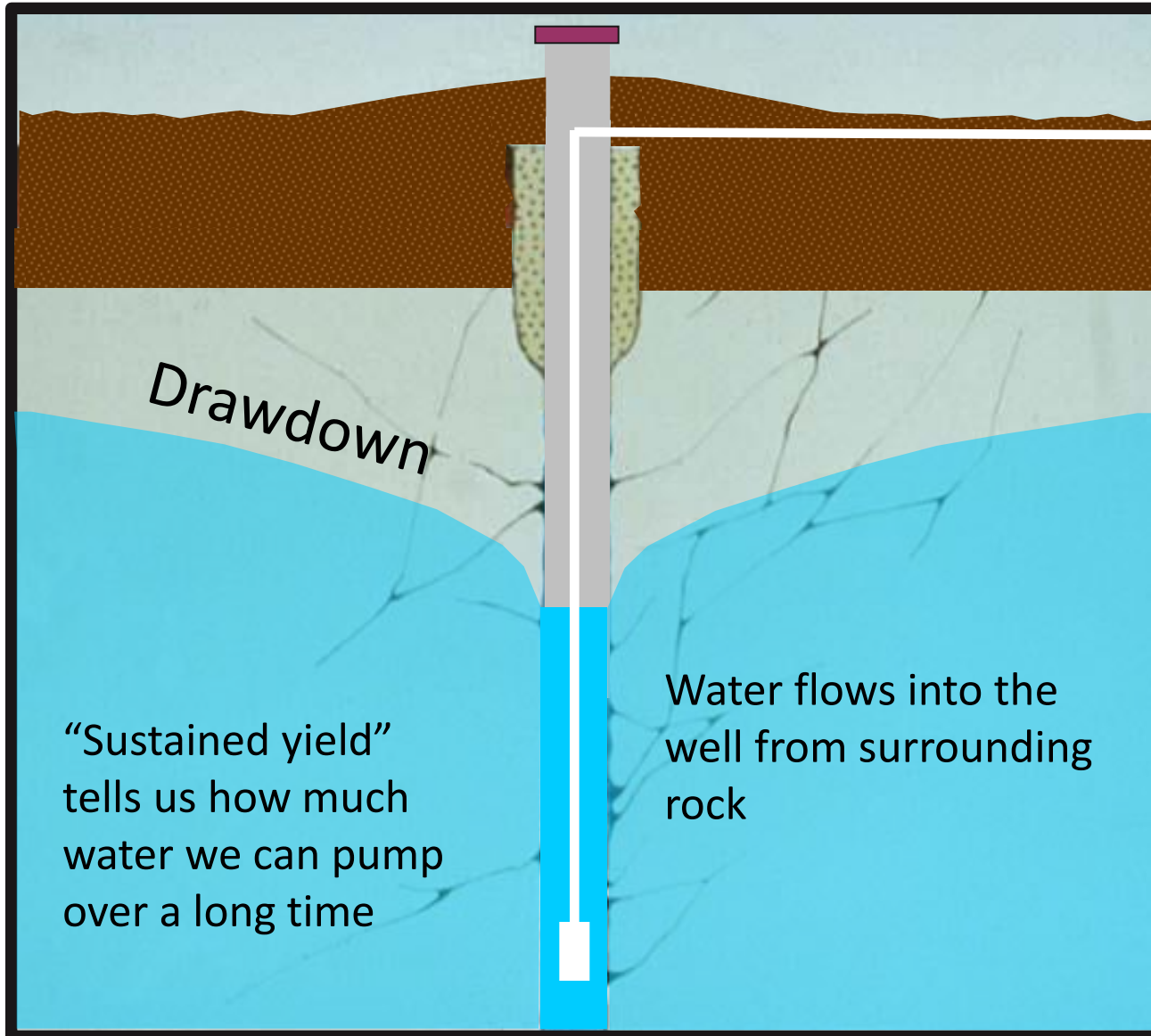


And, groundwater moves!

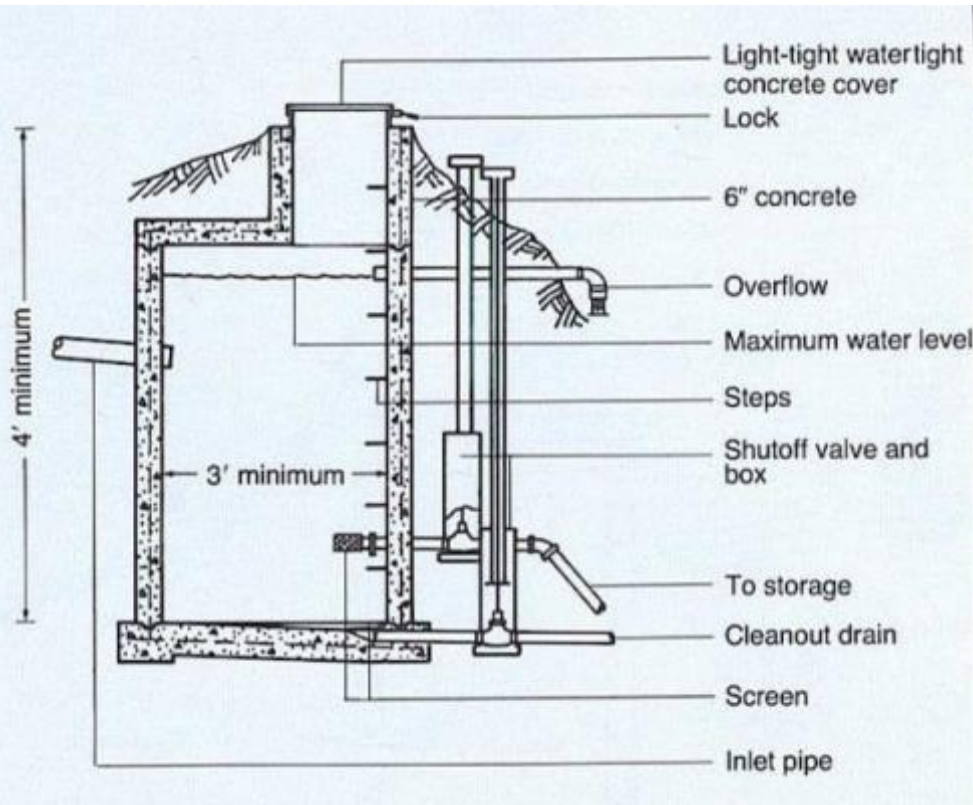
Water Well – Pump Off



When the Well is Pumped



Spring Development



- Collection system to concentrate flow
- Reinforced and sealed concrete spring box
- Able to empty and clean
- Disinfection (75% contain coliform bacteria)

Springs are more susceptible to drought, bacteria, and surface activities

Poorly sealed spring



Properly Locate the Water Supply

- Upslope and away from potential sources of contamination
- At least 100 feet from septic drainfields
- Away from runoff, roads, neighbors' wells, and property lines



Preventing Problems with Proper Water Well Construction



5
"sanitary" well cap

Fewer than 20% of home and farm wells in PA have this "sanitary" construction

12" above ground 1

4
sloping ground

casing to bedrock

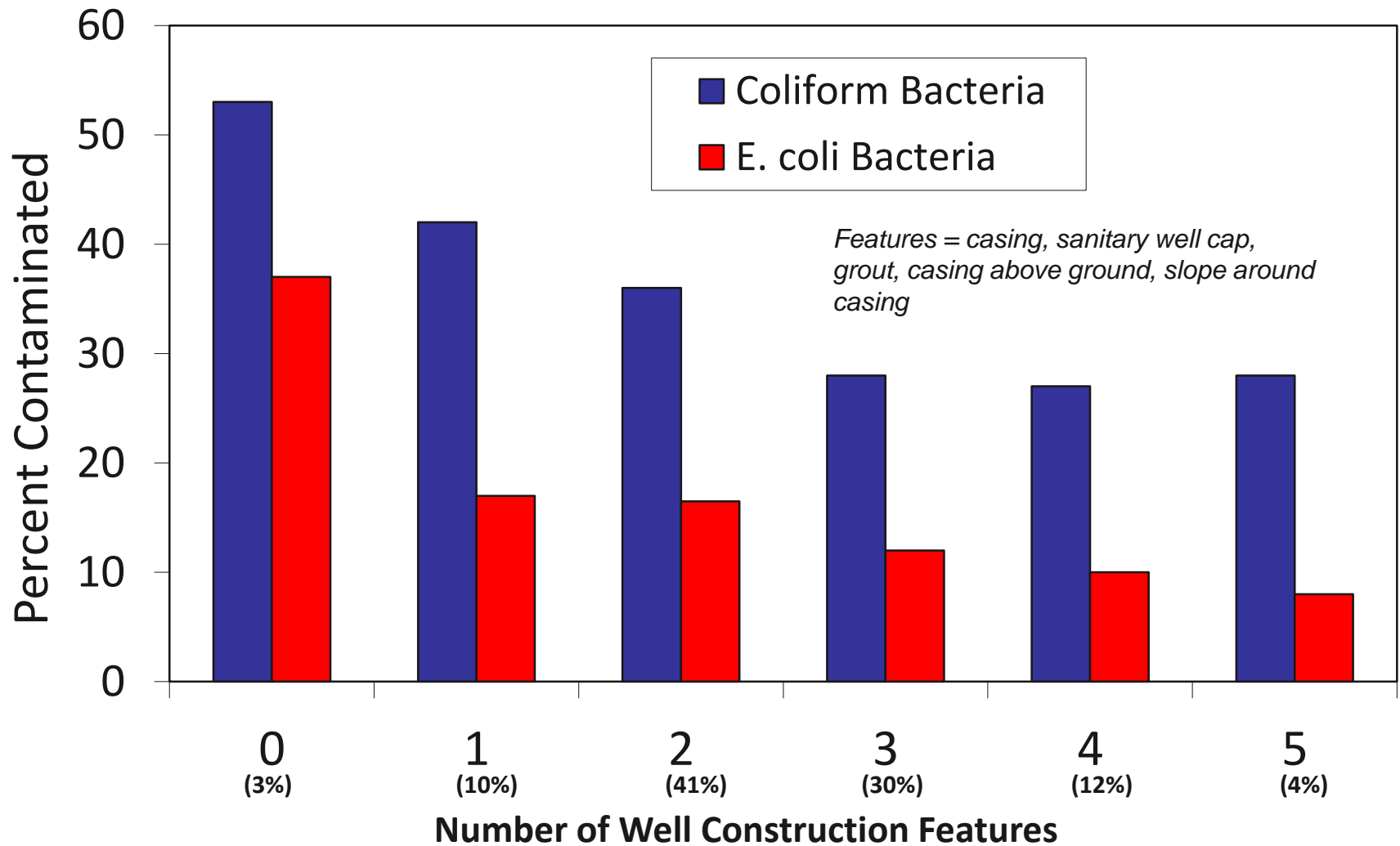
2

3
grout seal

bedrock



Well Construction Affects Water Quality



Swistock, B.R, S. Clemens, W.E. Sharpe and S. Rummel. 2013, Water quality and management of private drinking water wells in Pennsylvania. *Journal of Environmental Health*, 75(6):60-67.

Other Examples



The Good



The Bad



The Very Bad



The Nervous



The Ugly

Well Completion Report ("Well Log")

- Info about depth, rock layers, aquifers, construction features.
- Check with the well driller for a copy
- PA DCNR Groundwater Info System has some records online. Search for "PA GWIS", search by lat/long, township, date.

(See previous page for Explanation)
Department of Conservation and Natural Resources

WATER WELL COMPLETION REPORT

Use Ball Point Pen, Press Firmly and print Clearly
(DO NOT WRITE IN GRAY COLORED BLOCK)

Topographic and Geologic Survey
Water Well Drillers Licensing
3240 Schoelkopf Road
Millsboro, PA 17067-9534
717-762-2017

ST. 42 Co. Lat Long Sect. A or B Town/Setting Aquifer Rock Type State Hydrologic Unit Map Well # Township/County County Address Owner Last Name First Name Driller License No. License Number Date Drilled Well Date Drilled Well #	(Circle Appropriate Answer) Well Type water supply, irrigation, monitoring, test point, test, other Water Use residential, public, stock, irrigation, horticulture, industrial, geothermal, other Well Finish open hole, open and screen, perforated casing, Length of screen or perforated casing Drilling method cable, air rotary, auger, other Yield Method bucket, watermeter, orifice, rate pump Landform at site hilltop, valley, terrace, if Absent/why?	Well Log (materials penetrated) FROM - TO _____ - _____ _____ - _____ _____ - _____ _____ - _____ _____ - _____ _____ - _____ _____ - _____ _____ - _____
Title Casing (1) _____ well plastic _____ grouted not grouted Title Casing (2) _____ well plastic _____ grouted not grouted Depth to freshwater ft. Contaminant zone ft. Water-bearing zones (1) _____ (2) _____ Water levels (static) ft. (after test) ft. (pumping) ft. Yield _____ gallons per minute (GPM) Length of pump line ft. _____	(SKETCH MAP) If this portion is traced, please give source. Indicate route numbers, intersections, schools, churches, cemeteries, streams, towns and any notable feature such as quarries, bridges, railroads, etc. Be sure to show distances between these features (miles/feet)	
I hereby certify that the above information is true and complete to the best of my knowledge and belief. Driller's Signature (Required) _____ Date _____	8700-PM-TGS0015 Rev. 2/2000	

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PA STATE AGENCIES ONLINE SERVICES Search PA go

Tom Corbett, Governor Ellen Ferretti, Acting Secretary

DCNR Home | Geological Survey | Groundwater | PaGWIS | Records

PaGWIS Records

Multiple Criteria Search

You must enter at least one search item.

Multiple Criteria
 Polygon Search
 Radial Search

To:

(Search on all or part of the last name or company name.)

(Search on all or part of the name of the well owner.)

[Currently Licensed Driller List](#)

Protecting and Testing Your Water Supply



Wellhead Protection



100' minimum

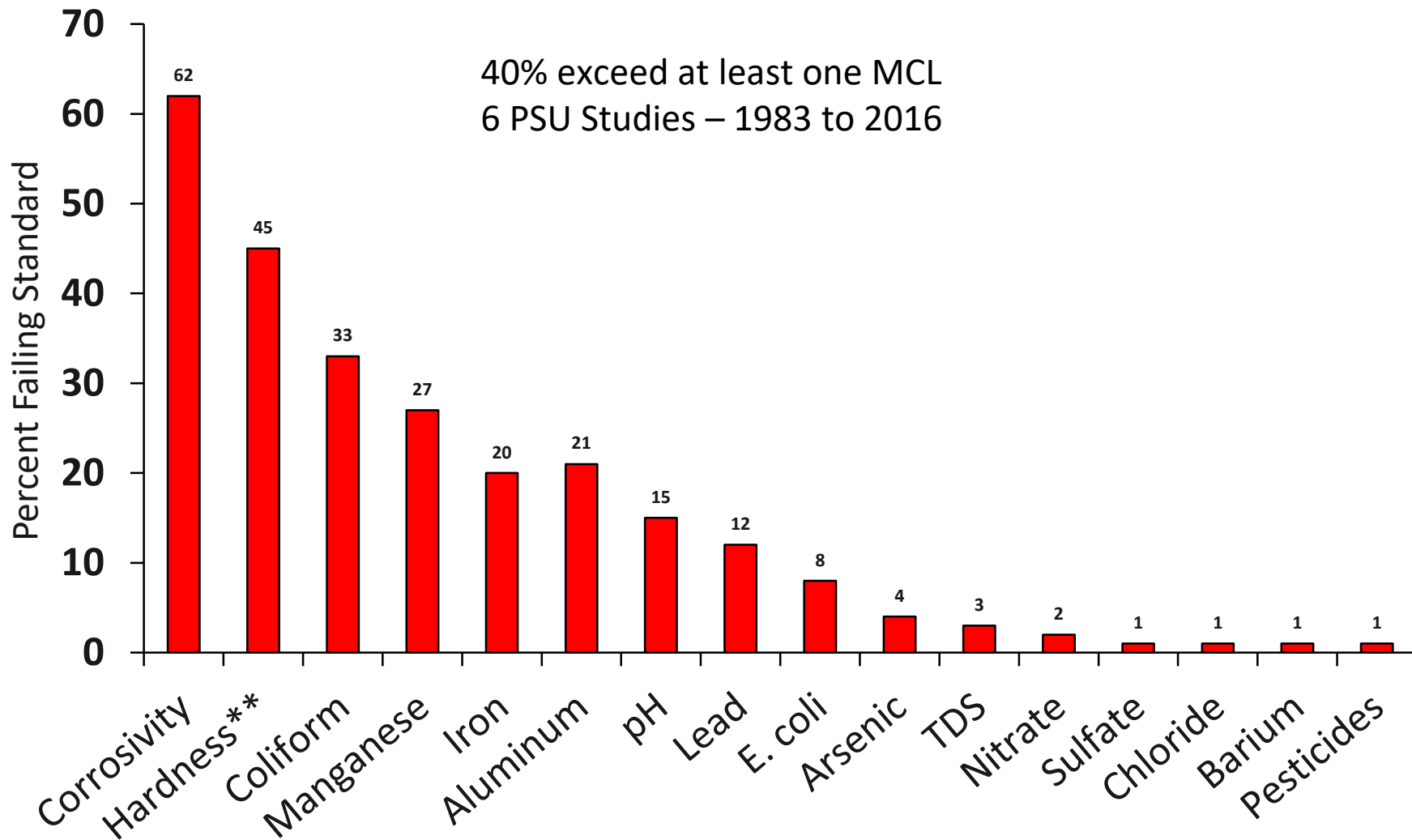
Have the Water Supply Inspected

- Keep area clear, protect from vehicles
- Inspect regularly for damage
- Professional inspection every 10 years
- Keep records yourself



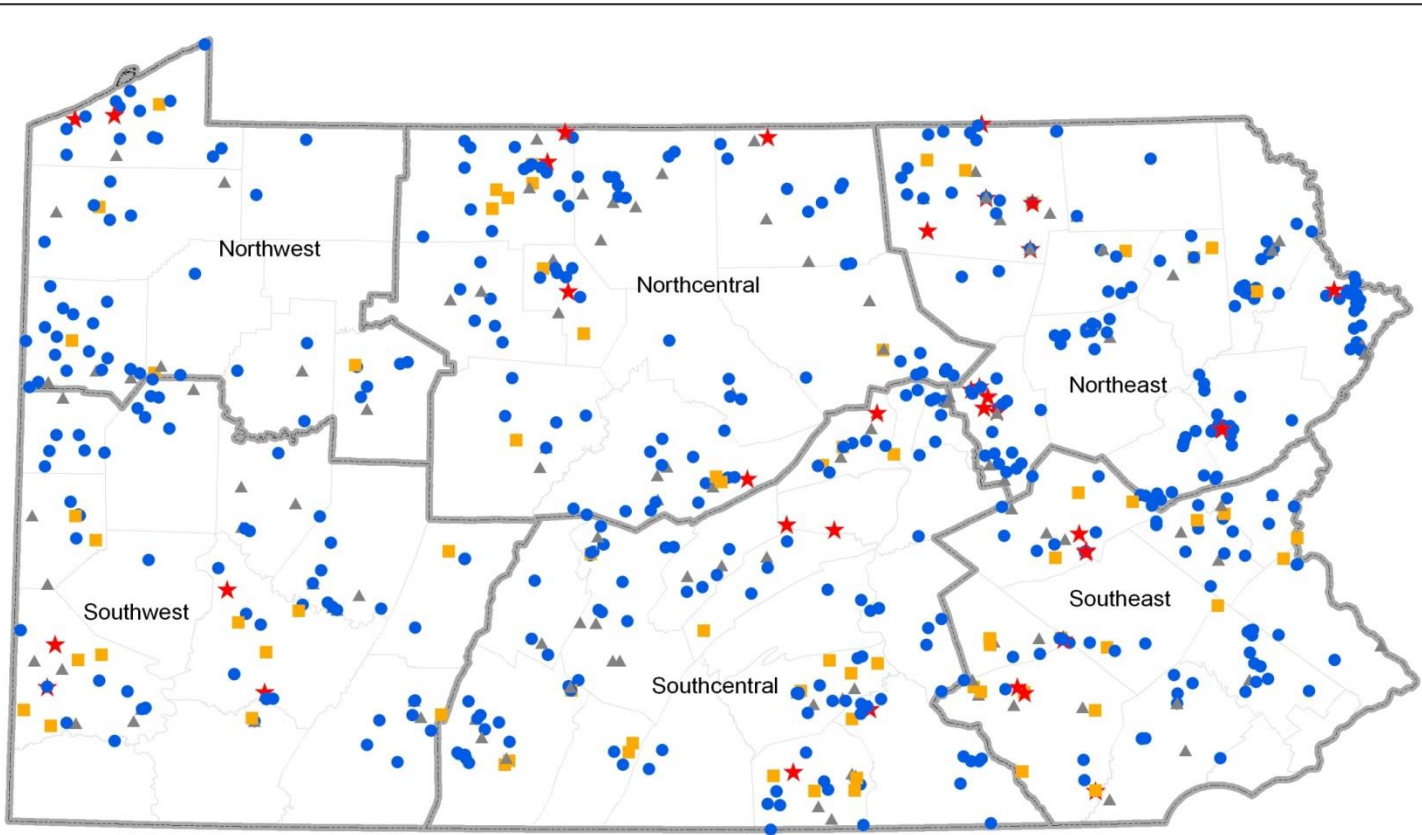
Photo courtesy Todd Giddings, PA Ground Water Assoc.

Prevalence of Water Quality Problems



Wellhead Issues

(Total Coliform Bacteria)

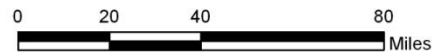


- 33% exceed MCL
- Correlated to water well location and construction
- Source tracking indicates mostly animal sources

Well Coliform Bacteria Concentration (Colonies/100mL)

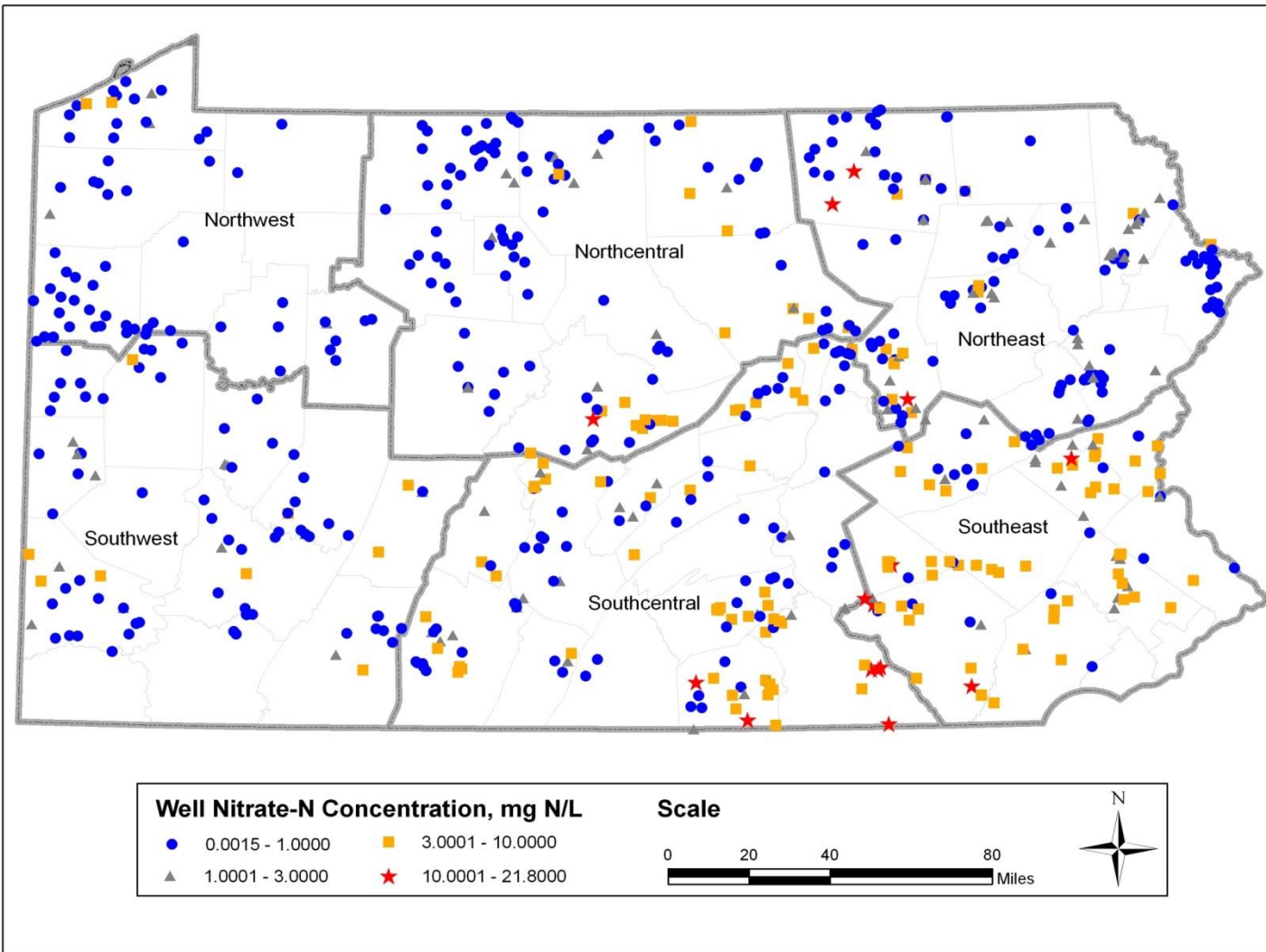


Scale



Land Use Issues

(Nitrate-Nitrogen)



- 2% exceed MCL
- Regional occurrence
- Correlated to water well location, land use and geology

Home Plumbing Issues

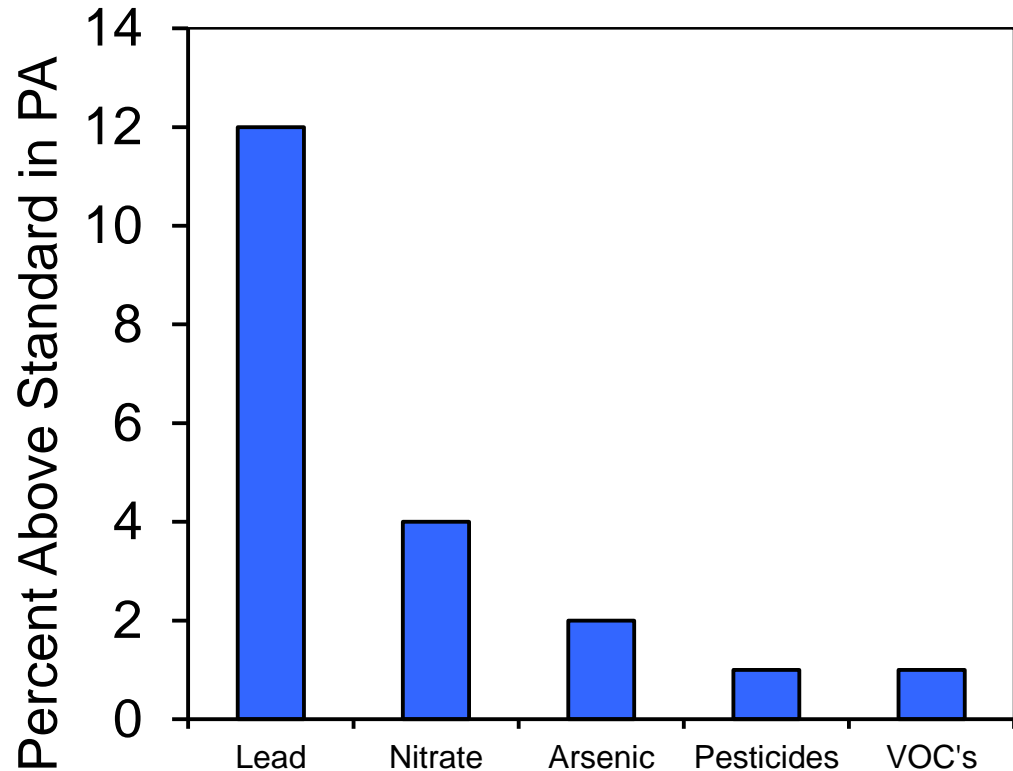
(Lead and Copper)

- Nearly always comes from plumbing system (pre-1990's)
- Lead causes many health effects especially in young children
- Drinking water standard = 0.015 mg/L
 - 12% exceeded standard statewide
 - >95% from plumbing corrosion
- Removal options
 - Flush pipes (if running water copper is below standard)
 - Corrosion control (if copper is coming from plumbing)
 - Plumbing system replacement (to plastic)
 - Reverse osmosis (does not address plumbing damage)
 - Bottled water



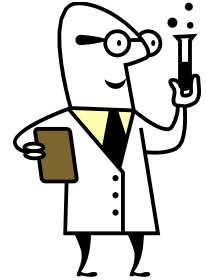
Other Contaminants with Health Standards

- Most related to human activity
 - Lead from corrosion
 - Arsenic natural too
 - VOCs = volatile organic compounds
 - Pesticides no single test
- Serious health effects
- Most have no obvious taste/smell/color



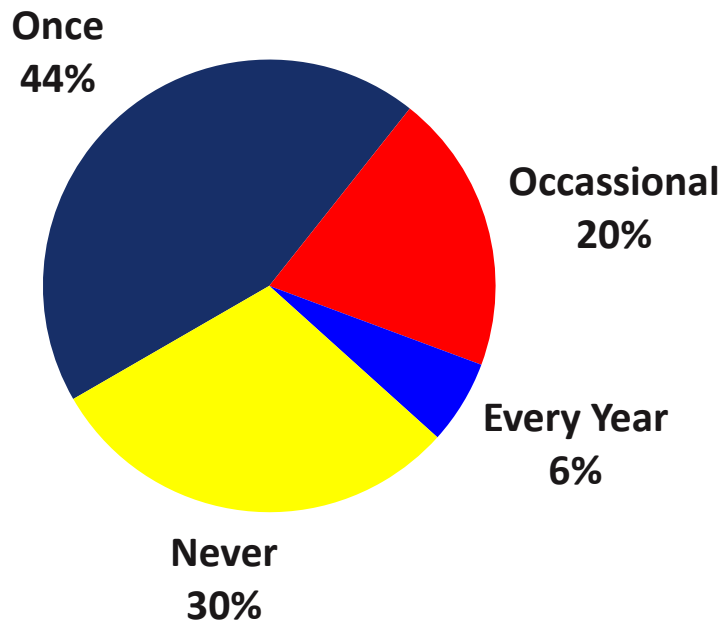
Test Your Water!

- Why test? Many pollutants have no obvious symptoms
- Many water supplies have never been properly tested
- Use PA DEP accredited laboratories!
- Test BEFORE new activities for legal protection using chain-of-custody
- Test recommendations
 - Annual test for bacteria (every 14 months)
 - Every three years for pH, TDS, pollutants associated with activities within sight
- Compare test results to drinking water standards



A Lack of Water Testing Creates Low Awareness of Existing Water Quality Problems

Testing Frequency

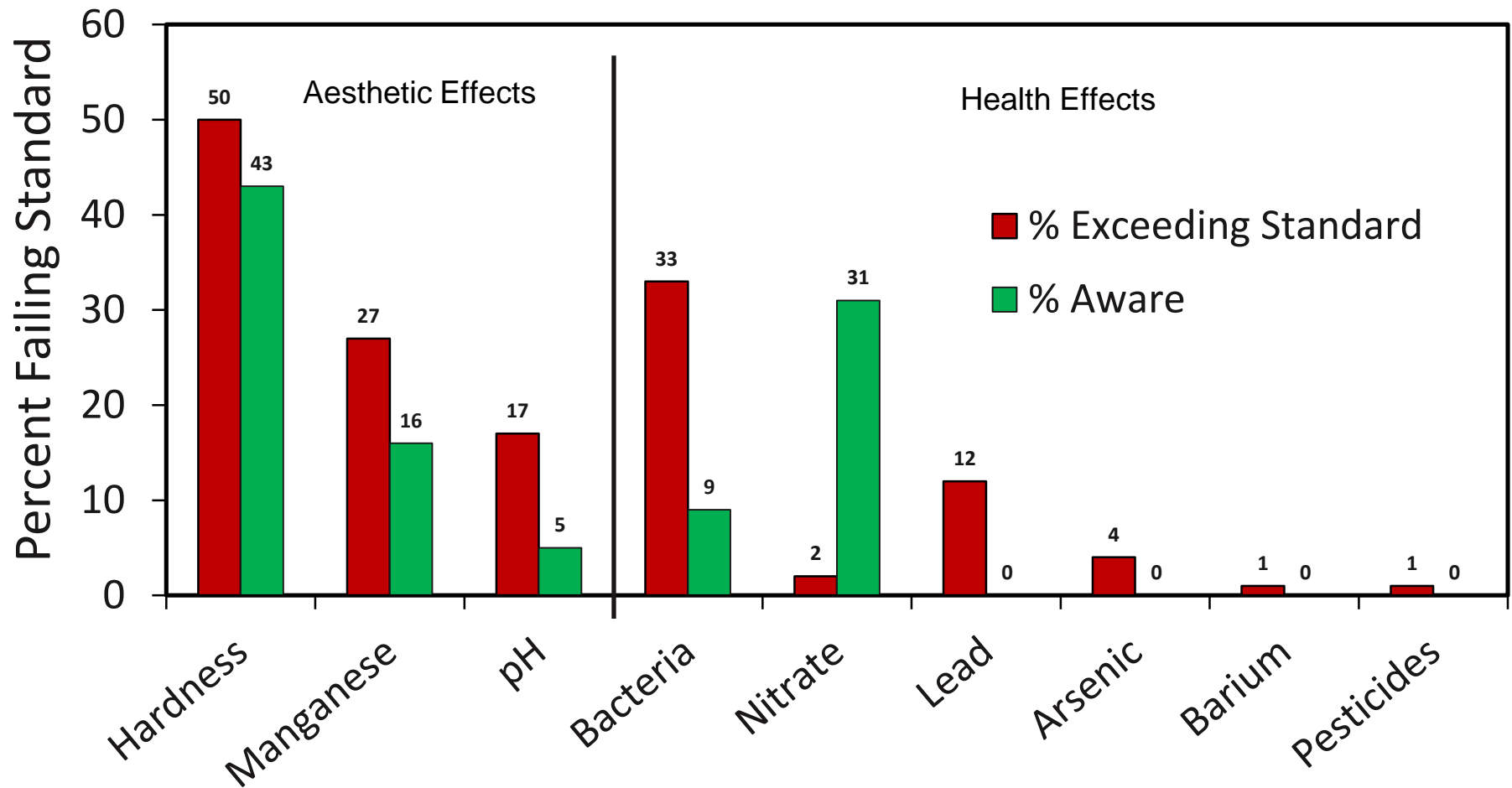


Testing Location

Private Lab	62%
Treatment Co.	21%
DEP	9%
Test Kits	8%
Other	7%
Water Co.	3%

Swistock, B.R, S. Clemens, W.E. Sharpe and S. Rummel. 2013, Water quality and management of private drinking water wells in Pennsylvania. *Journal of Environmental Health*, 75(6):60-67.

Awareness of Pre-Existing Issues



Boyer, E., B.R. Swistock, J. Clark, D. Rizzo, M. Madden. Impact of Marcellus Gas Drilling on Rural Drinking Water Supplies, Final report to the Center for Rural Pennsylvania, 26 pp. Report available online at: http://www.rural.palegislature.us/documents/reports/Marcellus_and_drinking_water_2012.pdf

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To Test or Not to Test



- 2011 study found 20% of private water supply owners would not pay >\$200 for a pre-drilling baseline water test
- Extension has run many free (grant funded) water testing programs over the past 30 years
- On MANY occasions, free testing has gone un-used
 - 2012 – free extensive pre-drilling, chain-of-custody water tests offered to 800 of 57,000 homes (1.4%) – great difficulty giving away
- Indifference and the time needed to arrange testing are major issues
- Even where testing is done, 54 to 80% find the results difficult to understand

Client	Work Order	NTA055						
Am	Project Name							
	Project Number							
	Received	01/10/09						
ANALYTICAL REPORT								
Analyte	Result	Flag	Units	MRL	Dilution Factor	Analysis Date/Time	Method	Batch
Sample ID: NTA055-01 [REDACTED] Ground Water Sampled: 01/10/10 16:00								
General Chemistry Parameters								
Bicarbonate Alkalinity as CaCO3	248		mg/L	10.0	1	01/10/10 17:38	SM 2320B	10A1180
Carbonate as CaCO3	21.2		mg/L	10.0	1	01/10/10 17:38	SM 2320B	10A1182
Chloride	33.2	E	mg/L	1.00	1	01/27/10 01:17	EPA 300.0	10A2370
MBAS (incl. wt 320)	0.0985		mg/L	0.0500	1	01/12/10 14:07	SM540 C	10A1183
Oil & Grease HEM	ND		mg/L	5.81	1	01/21/10 13:08	EPA 1664A	10A2497
pH	8.20	HTI	pH Units	0.100	1	01/13/10 14:00	SM 4500 HB	10A1254
Specific conductance	482		umho/cm	10.0	1	01/21/10 10:37	SM2150 B	10A2181
Sulfate	7.50		mg/L	1.00	1	01/27/10 01:17	EPA 300.0	10A2370
Total Dissolved Solids	310		mg/L	20.0	1	01/14/10 15:31	SM2540 C	10A1341
Total Suspended Solids	ND		mg/L	1.00	1	01/13/10 21:01	SM2540 D	10A1337
Turbidity	ND		NTU	1.00	1	01/10/10 13:15	EPA 180.1	10A1163
Temperature of pH determination	21.2	HTI	Deg C	NA	1	01/13/10 14:00	EPA 170.1	10A1254
Methane, Ethane, and Ethane by GC								
Methane	3.56		mg/L	0.0520	2	01/18/10 13:47	RSK 175	10A1454
Ethane	ND		mg/L	0.0280	1	01/18/10 12:59	RSK 175	10A1454
Propane	ND		mg/L	0.0340	1	01/18/10 12:59	RSK 175	10A1454
Sum: Acetylene (70-122%)	103 %					01/18/10 12:59	RSK 175	10A1454
Total Metals by EPA Method 6010B								
Arsenic	ND		mg/L	0.0100	1	01/13/10 18:21	SW346 6010B	10A1134
Barium	0.227		mg/L	0.0100	1	01/13/10 18:21	SW346 6010B	10A1134
Cadmium	ND		mg/L	0.00100	1	01/13/10 18:21	SW346 6010B	10A1134
Calcium	8.80		mg/L	1.00	1	01/13/10 18:21	SW346 6010B	10A1134
Chromium	ND		mg/L	0.0500	1	01/13/10 18:21	SW346 6010B	10A1134
Iron	0.0634		mg/L	0.0500	1	01/13/10 18:21	SW346 6010B	10A1134
Lead	ND		mg/L	0.00500	1	01/13/10 18:21	SW346 6010B	10A1134
Magnesium	1.72		mg/L	1.00	1	01/13/10 18:21	SW346 6010B	10A1134
Manganese	ND		mg/L	0.0150	1	01/13/10 18:21	SW346 6010B	10A1134
Potassium	1.83		mg/L	1.00	1	01/13/10 18:21	SW346 6010B	10A1134
Selenium	ND		mg/L	0.0100	1	01/13/10 18:21	SW346 6010B	10A1134
Silver	ND		mg/L	0.00500	1	01/13/10 18:21	SW346 6010B	10A1134
Sodium	109		mg/L	1.00	1	01/13/10 18:21	SW346 6010B	10A1134
Mercury by EPA Methods 7470A/7471A								
Mercury	ND		mg/L	0.000200	1	01/20/10 10:22	SW346 7470A	10A1697
Volatile Organic Compounds by EPA Method 8260B								
Benzene	ND		mg/L	0.500	1	01/13/10 02:30	SW346 8260B	10A0503
Ethylbenzene	ND		mg/L	0.500	1	01/13/10 02:30	SW346 8260B	10A0503
Toluene	ND		mg/L	0.500	1	01/13/10 02:30	SW346 8260B	10A0503
Xylenes, total	ND		mg/L	0.500	1	01/13/10 02:30	SW346 8260B	10A0503

Boyer, E., B.R. Swistock, J. Clark, D. Rizzo, M. Madden. Impact of Marcellus Gas Drilling on Rural Drinking Water Supplies, Final report to the Center for Rural Pennsylvania, 26 pp. Report available online at: http://www.rural.palegislature.us/documents/reports/Marcellus_and_drinking_water_2012.pdf

Drinking Water Standards

- “Acceptable” level of the pollutant in drinking water
- Enforced for public water supplies by PA DEP
- Primary = health based (MCL)
 - Barium MCL = 2.0 mg/L
 - Lead MCL = 0.015 mg/L
 - Benzene MCL = 0.005 mg/L
- Secondary = aesthetic (RMCL or SMCL)
 - Chloride RMCL = 250 mg/L (salty taste)
 - Iron RMCL = 0.3 mg/L (red stains, metallic taste)

A Penn State Water Test Report

LAB ID	SAMPLE ID	REPORT DATE	DATE SAMPLED	SAMPLE TYPE	COUNTY
██████████	██████████	12/20/2007	12/10/07	Drinking Water	Schuylkill

WATER ANALYSIS Trace Element Package (WD07)

Analysis	Units	Your Test Results	Drinking Water Standard ¹		Method
			Standard	Type	
Total Coliform Bacteria	MPN ² per 100 mL	18	0	Health	SM 9223B
<i>E. Coli</i> Bacteria	MPN ² per 100 mL	None detected ³	0	Health	SM 9223B
pH	-	8.1	6.5 - 8.5	Aesthetics	EPA 150.1
Total Dissolved Solids (TDS)	mg/L	96	500	Aesthetics	SM 2540C
Arsenic (As)	mg/L	0.022	0.01	Health	EPA 200.9
Barium (Ba)	mg/L	< 0.002	2	Health	EPA 200.7
Cadmium (Cd)	mg/L	< 0.002	0.005	Health	EPA 200.7
Chromium (Cr)	mg/L	< 0.002	0.1	Health	EPA 200.7
Copper (Cu)	mg/L	< 0.01	1.3	Health	EPA 200.7
Lead (Pb)	mg/L	< 0.006	0.015	Health	EPA 200.9
Nickel (Ni)	mg/L	< 0.01	-	-	EPA 200.7
Mercury (Hg)	mg/L	< 0.0004	0.002	Health	7471
Zinc (Zn)	mg/L	< 0.05	5	Health	EPA 200.7

Water sample failed the drinking water standard for TOTAL COLIFORM BACTERIA.

Water sample failed the drinking water standard for ARSENIC.

For more details on your water test results, please see the description of each parameter on the back of this report and any fact sheets that may have been included with your results.

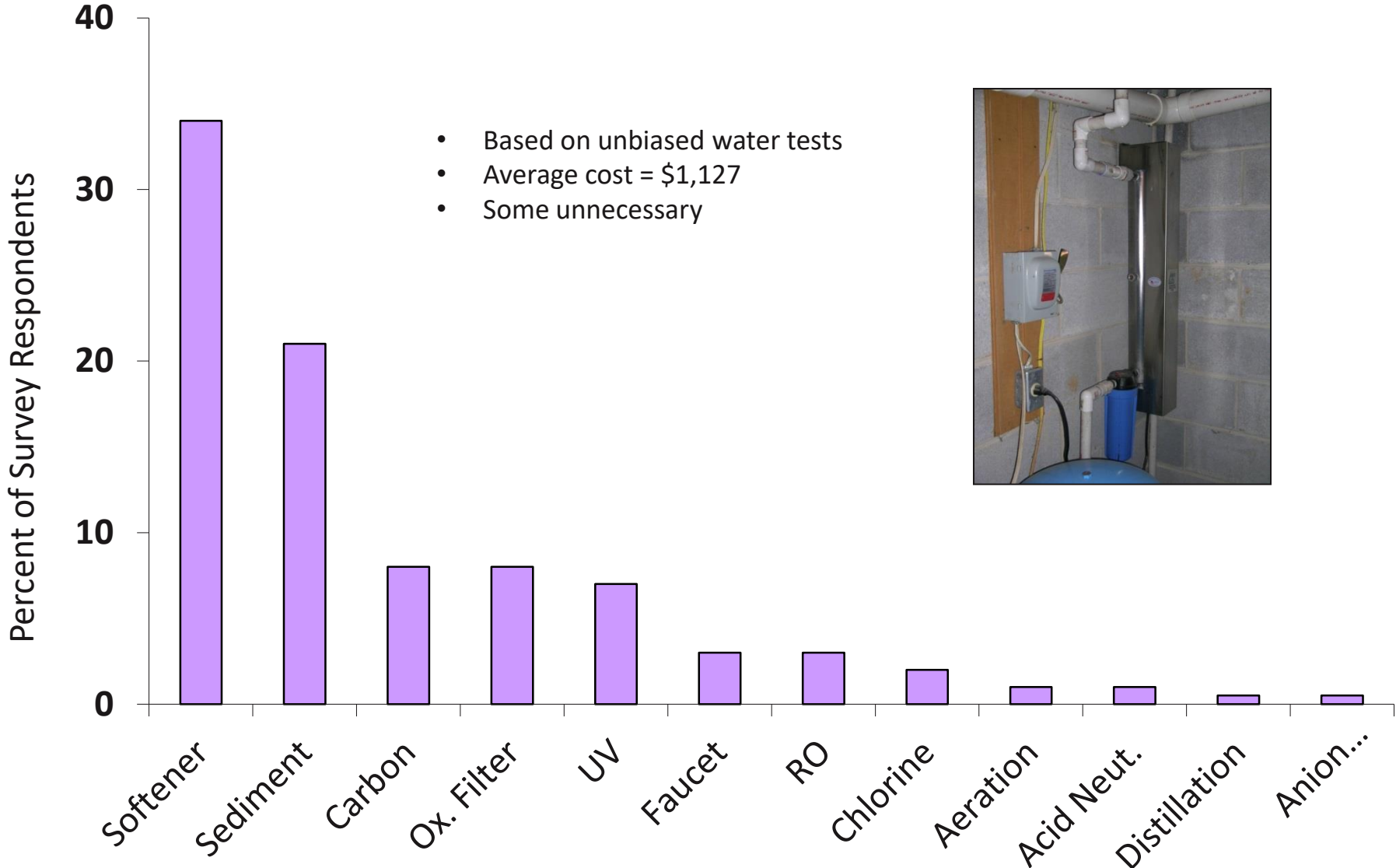
If you have any questions on your test report, please contact Bryan Swistock, extension associate, at 814-863-0194 (telephone) or brs@psu.edu (email) OR Tom McCarty, extension educator, at 717-240-6500 or trm3@psu.edu.

Solve Your Water Quality Problems

- New source
- Pollution control
- Maintenance or repairs
- Treatment
- Bottled

Explore all of them before taking action!

Water Treatment



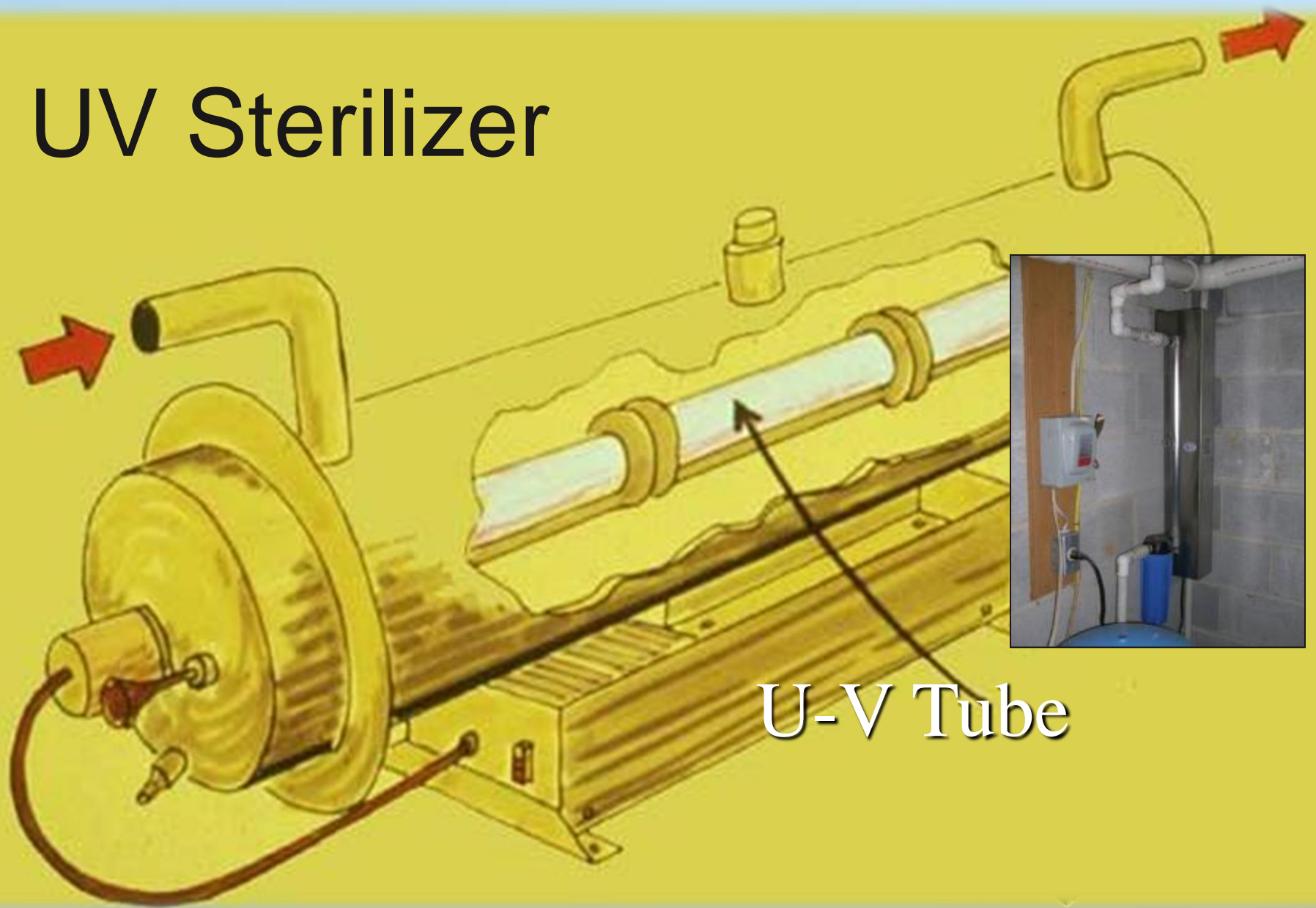
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Whole House Treatment

Process	Treats
UV light	Bacteria
Chlorine	Bacteria, iron, sulfur
Softener	Hardness, some iron
Carbon filter	Organics, radon, sulfur
Sediment filter	Turbidity
Oxidizing filter	Metals, sulfur
Acid neutralizing filter	Low pH, corrosive water, lead, copper

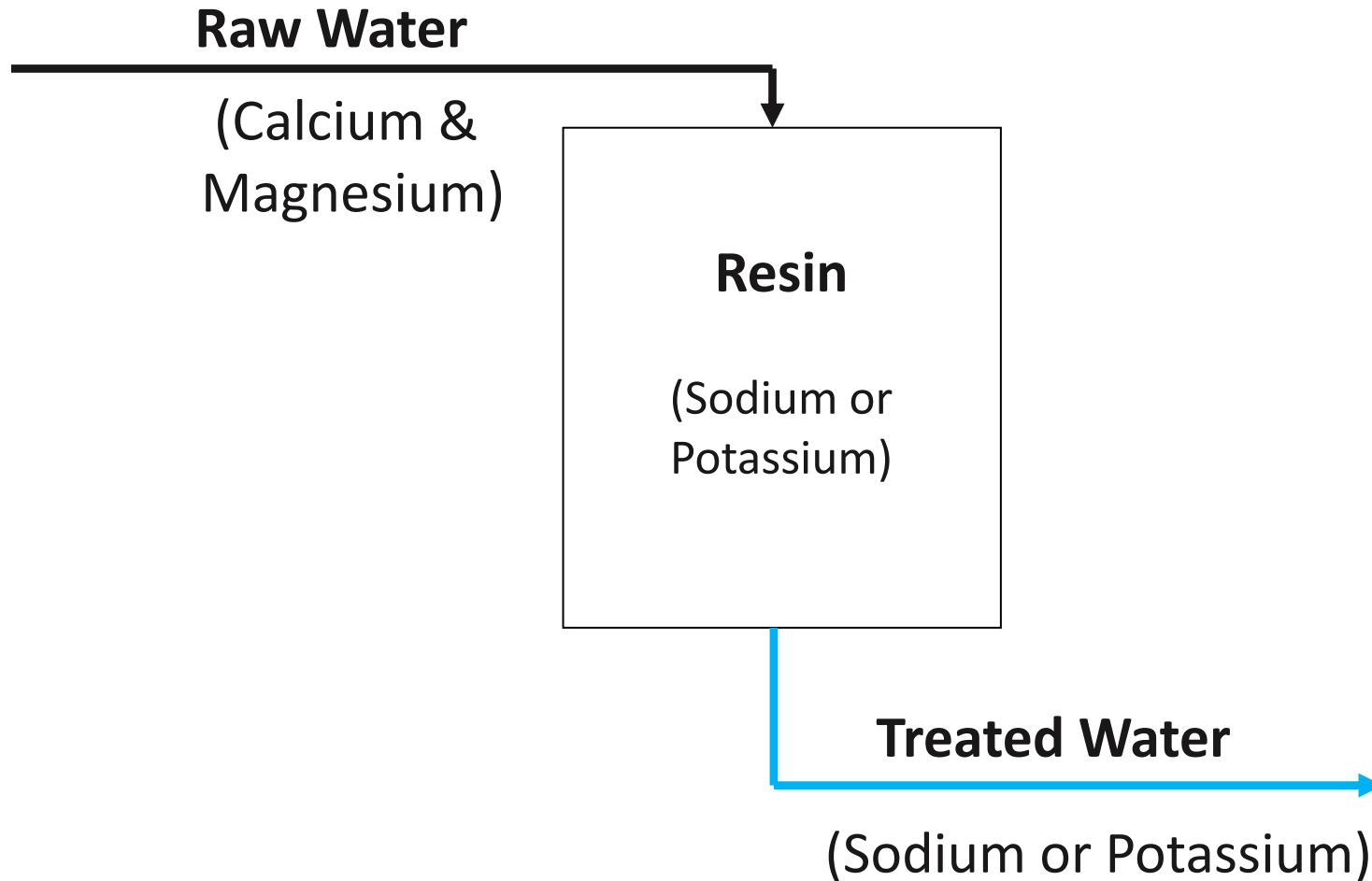


UV Sterilizer



U-V Tube

Water Softener



Carbon Filtration

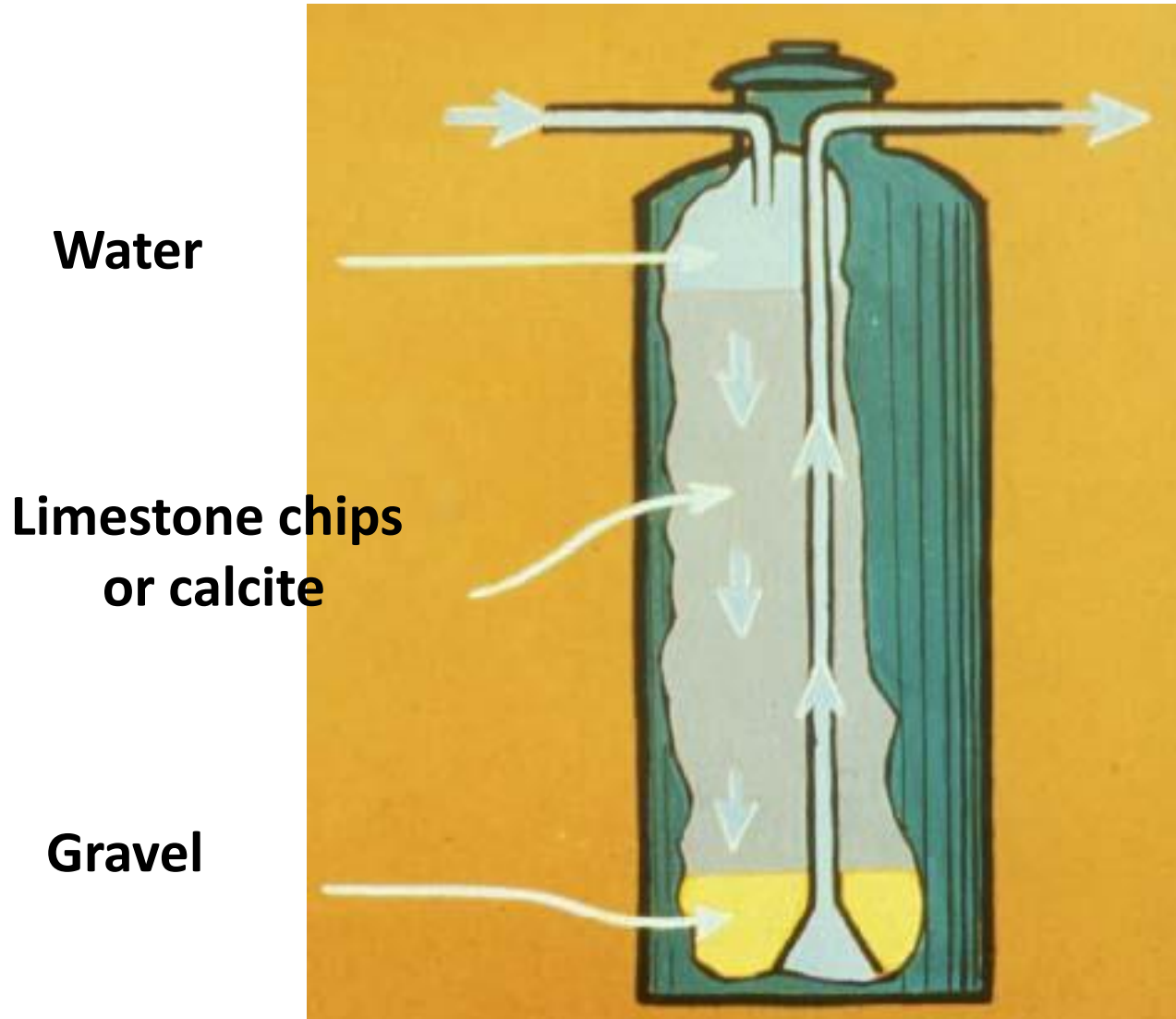
Removes:

- Man-made organic chemicals
- Miscellaneous tastes
- Radon gas

- Carbon must regularly replaced and properly disposed



Acid (Corrosive Water) Control



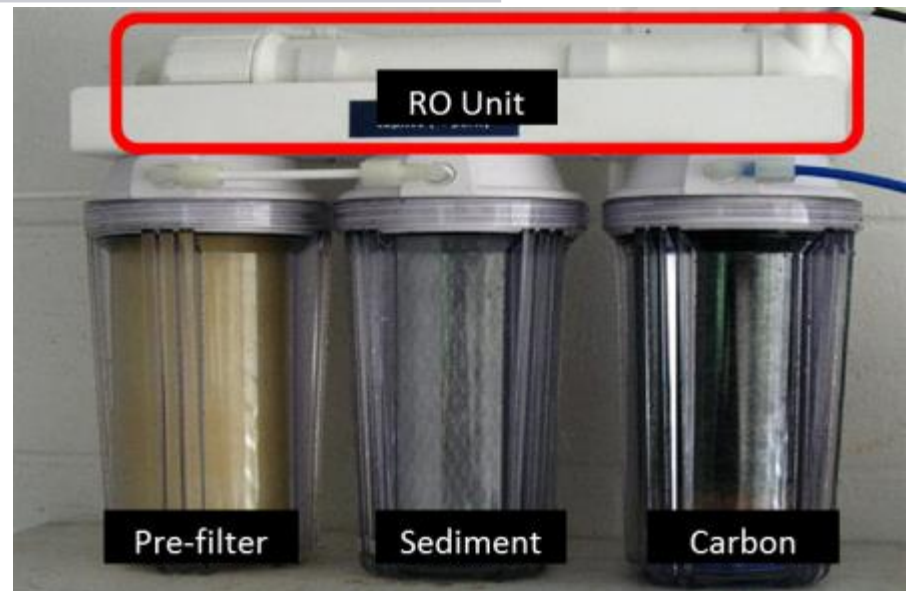
Oxidizing Filters

- Treat iron, manganese and hydrogen sulfide
- Examples = greensand, birm
- Oxidize pollutant to a particle and then filter the particle from the water

Point of Use Treatment

e.g., treat only kitchen tap

Process	Treats
Carbon filter	Chlorine, organics
Reverse Osmosis (RO)	Most solutes – Not bacteria
Distillation	Many except light organics



Buy Water Treatment Devices Carefully

- Rely on accredited lab results
- Look for NSF and WQA certifications for specific contaminants
- EPA certification means nothing (or water conservation)
- Seek reputable companies, references
- Beware of hard sale techniques (scare tactics)
- Ask questions. If it sounds too good - it is!
- Ask about maintenance requirements (parts, chemicals, etc.)
- Get a detailed warranty in writing.

Penn State Cooperative Extension Resources




Overall Lessons Learned

- The need for education is great
 - A huge audience with many water quality problems
 - Awareness of issues is low (lack of testing, indifference, etc.)
 - Largely a reactive audience that lacks water quality data (difficult to reach)
- Education CAN make a difference
 - A high percentage of well owners make changes after education
- Innovative and diverse tools are needed to reach this large audience
 - Volunteer networks (MWON) can help with basic information
 - A mix of online and traditional tools
 - Expertise contacts for assistance
 - Teachable moments!

Online Articles

- Several dozen articles on various private water supply topics

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HOME | COLIFORM BACTERIA

Coliform Bacteria

This article describes what coliform bacteria are, where they come from and how to remove them from drinking water.

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ARTICLES | UPDATED: AUGUST 14, 2017



What Are Coliform Bacteria?

Coliform bacteria include a large group of many types of bacteria that occur throughout the environment. They are common in soil and surface water and may even occur on your skin. Large numbers of certain kinds of coliform bacteria can also be found in waste from humans and animals. Most types of coliform bacteria are harmless to humans, but some can cause mild illnesses and a few can lead to serious waterborne diseases.

Coliform bacteria are often referred to as "indicator organisms" because they indicate the potential presence of disease-causing bacteria in water. The presence of coliform bacteria in water does not guarantee that drinking the water will cause an illness. Rather, their presence indicates that a contamination pathway exists between a source of bacteria (surface water, septic system, animal waste, etc.) and the water supply. Disease-causing bacteria may use this pathway to enter the water supply.

Specific types of coliform bacteria may be tested for, especially after a total coliform bacteria test is positive. These subgroups of coliform bacteria include fecal coliform and *Escherichia coli* or *E. coli*. Fecal coliform bacteria are specific to the intestinal tracts of warm-blooded animals, including humans, and thus require a more specific test for sewage or animal waste contamination. *E. coli* is a type of fecal coliform bacteria commonly found in the intestines of animals and humans. A positive *E. coli* result is much more serious than coliform bacteria alone because it indicates that human or animal waste is entering the water supply. There are hundreds of strains of *E. coli*. Although most strains are harmless and live in the intestines of healthy humans and animals, a few strains can produce a powerful toxin and can cause severe illness and death.






Health Effects of Coliform Bacteria



GET CONNECTED

Access a well full of knowledge! Learn the best ways to optimize and maintain your residential water supply while mitigating concerns.

[SIGN UP](#)

YOU MAY ALSO BE INTERESTED IN...

-  [Why Conserve Water?](#)
VIDEOS
-  [Mosquito Fern in Pennsylvania Ponds](#)
ARTICLES
-  [Assessment of Energy Crops to Improve Water...](#)
WEBINARS
-  [Using Grass Carp to Control Aquatic Plants](#)
ARTICLES
-  [Irrigation Water Quality Guidelines for Turfgrass Sites](#)
ARTICLES

Penn State Water Testing

- Kits available at most County Cooperative Extension offices
- Ability to consult with drinking water experts

The screenshot shows the Penn State website for the Agricultural Analytical Services Lab's Water Testing page. The page header includes the Penn State logo and the College of Agricultural Sciences. The main content area is titled "Water Testing" and lists various testing services: Drinking Water Testing, Livestock Drinking Water Testing, Irrigation Water for Nurseries and Greenhouses, and Irrigation Water for Turfgrasses, and Pond and Lake Water. Each service has a brief description and a link to more information. A sidebar on the left contains a navigation menu with categories like Soil Testing, Water Testing, Plant Analysis, etc., and buttons for "Submitting Samples" and "View Your Soil Fertility Report". A "Contact Us" section at the bottom left provides contact information for the lab, including address, phone, fax, and office hours. A "Recommend" button at the bottom right indicates that 6 people recommend the page.

PENN STATE
College of Agricultural Sciences

AgSci » Agricultural Analytical Services Lab » Water Testing

Water Testing

Tests in this area include Drinking Water Testing, Livestock Drinking Water Testing, Irrigation Water for Nurseries and Greenhouses, Irrigation Water for Turfgrasses, and Pond and Lake Water.

Drinking Water Testing

The goal of Penn State's Drinking Water program is to promote well water testing and to educate home-owners on its importance. Penn State's Agricultural Analytical Services Laboratory is accredited by the Pennsylvania Department of Environmental Protection for drinking water analysis.

Livestock Drinking Water

Testing drinking water for livestock is an important step for diagnosing problems related to water quality that could limit productivity and profitability. It is not uncommon for aesthetic problems, such as odors and tastes, to cause water intake in livestock to drop. This, in turn, can reduce productivity. Less frequently, bacterial contamination can adversely affect animal health.

Irrigation Water for Nurseries and Greenhouses

Testing irrigation waters is important for diagnosing problems that may be related to water quality as well as for assessing irrigation water nutrient content when used for fertigation.

Irrigation Water for Turfgrasses

Testing irrigation water is important for diagnosing problems that may be related to water quality as well as for assessing irrigation water nutrient content when used for fertigation.

Pond and Lake Water

Testing your pond or lake water is an important step for assessing its quality and to help prevent problems before they occur. For ponds or lakes with an existing water quality program, testing is an essential tool for diagnosing the cause of the problem and determining suitable treatment options.

Farm Food Safety (GAP) Water Testing

This program offers bacterial testing of irrigation and postharvest processing water for fresh fruit and vegetable production to promote farm food safety and Good Agricultural Practices.

6 people recommend this. Sign Up to see what your friends recommend.

Submitting Samples

View Your Soil Fertility Report

Contact Us

Staff Directory

Address
Tower Road
University Park, PA 16802

Directions

Contact
Phone: 814-863-0841
Fax: 814-863-4540
aaslab@psu.edu

Office Hours
M-F, 8:00 AM - 4:30 PM



Private Water APP


- Diagnose water problems using symptoms
- Access all Penn State water testing records for a given county
- Find contact information for the closest Penn State Extension water educator (using phone location)
- Search “H2OSolutions” App



Online Water Test Interpretation


- DWIT – Drinking Water Interpretation Tool


 DWIT is provided by the  **pslee** penn state institutes of energy & the environment & Penn State **Extension**



DWIT

Drinking Water Interpretation Tool



This website provides interpretation of water test results you have received from a water testing laboratory. Simply enter your results into the boxes below and click "Submit!" at the bottom of the page to get an interpretation of your results. If you are visiting this site and have not had your water tested, you should arrange to have your water tested through a state certified water testing laboratory. A list of certified labs is available from your local Penn State Cooperative Extension office or online at <http://extension.psu.edu/water/drinking-water/water-testing/testing>. For a list of recommended water tests and testing strategies, consult our [water testing fact sheet](#). For more information on each of the contaminants listed here, consult the U.S. Environmental Protection Agency [Safe Drinking Water](#) web site.

- Enter numerical values - **ONLY ENTER NUMBERS - DO NOT ENTER LETTERS** .
 - If you do not have a value for a particular parameter, leave the space blank.
 - If you have a result larger than 999 do not enter commas.
 - If your water test results contain either ND (not detected) or BD (below detection) enter a zero in the form for that chemical parameter.
 - If your microbial test results are reported as either P (present) or A (absent), enter a zero for A and 10 for P. If you received only presence/absence bacteria results, you might want to consider asking the water testing laboratory to provide you with numerical results in the future. Numerical results provide important clues to the severity and possible causes of bacterial contamination.
- **NOTE: Results reported in ppm units are equal to mg/L units; Standards in mg/L can be converted to µg/L units by multiplying by 1,000.**

Enter Microbial Results (All are Primary Standards)

Total Coliform Bacteria (bacteria per 100 ml)

Fecal Coliform Bacteria (bacteria per 100 ml)

E.Coli (bacteria per 100 ml)

Giardia lamblia (oocysts)

Cryptosporidium parvum (oocysts)

Enter Inorganic Chemicals with Health Standards

Arsenic (mg/L)

Barium (mg/L)

Cadmium (mg/L)

Chromium (mg/L)

Copper (mg/L)

Cyanide (mg/L)

Fluoride (mg/L)

Lead (mg/L)

Mercury (mg/L)

Nitrate (NO₃-N) (mg/L)

Selenium (mg/L)

Thallium (mg/L)

Turbidity (Total Suspended Sediment) (NTU)

Enter Inorganic Chemicals with Aesthetic Standards

Acidity (mg/L)

Alkalinity (mg/L)

Aluminum (mg/L)

Chloride (mg/L)

Color (color units)

Corrosivity

Surfactants, Methylene Blue Active Substances (MBAS) (mg/L)

Hardness (me/L)

Enter Volatile Organic Chemicals (All are Health-related Standards)

Benzene (mg/L)

Carbon Tetrachloride (mg/L)

MTBE (Methyl Tert-Butyl Ether) (mg/L)

Styrene (mg/L)

Tetrachloroethylene (PCE) (mg/L)

Toluene (mg/L)

Trichloroethane (TCE) (mg/L)

Total Trihalomethanes (mg/L)

Vinyl Chloride (mg/L)

Xylenes (total) (mg/L)

Enter Synthetic Organic Chemicals (All are Health-related Standards)

2,4-D (2,4-Dichlorophenoxyacetic Acid)(mg/L)

Atrazine (mg/L)

Carbofuran (mg/L)

Chlordane (mg/L)

DBCP (Dibromochloropropane) (mg/L)

Dioxin (2,3,7,8-TCDD) (µg/L)

Diquat (mg/L)

Endothall (mg/L)

Endrin (mg/L)

Ethylene Dibromide (EDB) (mg/L)

Glyphosate (mg/L)

Lindane (mg/L)

Methoxychlor (mg/L)

PCBs (Polychlorinated Biphenyls)(mg/L)

Silvex (2,4,5-TP)(mg/L)

Simazine (mg/L)



HOME | WATER

Water



Drinking and Residential Water

Make clean water a priority. Test and treat drinking water, build and manage a well, and improve water quality for you and your family. Conserve water and lower your bill.



Pond Management

Increase your pond expertise. Uncover educational content to help you build and manage a pond. Explore aquatic plants, invasive species, pond construction, and pond ecology.



Stormwater Management

Protect your home, business, property, and septic system from flooding and storm damage. Improve stormwater quality. Build cisterns, rain gardens, and more.



Wastewater Management

Discover educational content to help you build, maintain, and troubleshoot a private or industrial septic system.



Water for Agriculture

Use quality water for your crops and livestock. Discover nutrient management techniques, test and improve water quality, conserve water, and more.

YOU MIGHT ALSO BE INTERESTED IN...



ARTICLES

Helping Realtors Understand On-Lot Wastewater Inspections



ARTICLES

Managing Your On-Lot Septic System



ARTICLES

The Role of Trees and Forests in Healthy Watersheds

by Vincent Cotrone



ARTICLES

Neighboring Natural Landscaping in Residential Areas

by Margaret C. Brittingham, Ph.D.

Water Resources Extension Website <http://extension.psu.edu/water>



Recorded Webinars

- Free
- 30-45 minutes

The screenshot displays the Penn State Extension website interface. At the top, there is a navigation bar with the Penn State Extension logo, a menu dropdown, a search bar, and links for 'ACCOUNT' and 'CART'. Below the navigation bar, a banner reads 'Personalize your experience with Penn State Extension. **SUBSCRIBE TODAY!**'. The main content area features the webinar title 'Lead in Drinking Water from Private Wells, Springs and Cisterns' and a description: 'Penn State Extension Specialist Bryan Swistock provides a webinar focusing on lead issues in private drinking water supplies.' A small image shows a close-up of a blue-handled water valve on a pipe. To the right of the image, the webinar details are listed: 'WEBINARS', 'SKILL LEVEL: Beginner', 'LENGTH: 1 hour', and 'LANGUAGE: English'. A 'RECORDED WEBINARS' section shows the date 'February 10, 2016 | FREE' and a price of '\$0.00'. Below this, there is a 'WATCH NOW' button and a 'SAVE FOR LATER' option. At the bottom, a section for the instructor, 'BRYAN SWISTOCK', is shown, including a photo and a list of his expertise: 'Water wells, springs and cisterns', 'Pond management', 'Watershed management', 'Water conservation', 'Shale gas drilling and water', and 'Acid deposition'. A link for 'MORE BY BRYAN SWISTOCK' is also present.

PennState Extension MENU SEARCH ACCOUNT CART


Personalize your experience with Penn State Extension. **SUBSCRIBE TODAY!**

HOME | LEAD IN DRINKING WATER FROM PRIVATE WELLS, SPRINGS AND CISTERNS

Lead in Drinking Water from Private Wells, Springs and Cisterns

Penn State Extension Specialist Bryan Swistock provides a webinar focusing on lead issues in private drinking water supplies.

#WBN-G-1116 | [BE THE FIRST TO LEAVE A REVIEW](#)



WEBINARS

SKILL LEVEL:
Beginner

LENGTH:
1 hour

LANGUAGE:
English

RECORDED WEBINARS


February 10, 2016 | FREE

QTY 1 PRICE IS CONFIGURED **\$0.00**

WATCH NOW

[SAVE FOR LATER](#)

INSTRUCTORS DESCRIPTION DOWNLOADS REVIEWS FAQ



BRYAN SWISTOCK
Senior Extension Associate; Water Resources Coordinator

Expertise

- Water wells, springs and cisterns
- Pond management
- Watershed management
- Water conservation
- Shale gas drilling and water
- Acid deposition

[MORE BY BRYAN SWISTOCK](#)

Short Videos

- 3-7 minutes

PennState Extension MENU SEARCH ACCOUNT CART

HOME | WATER | DRINKING AND RESIDENTIAL WATER | SEE ALL DRINKING AND RESIDENTIAL WATER | PROTECTING YOUR WATER WELL

Protecting Your Water Well


Several steps are discussed to help homeowners and farmers protect and properly manage their private water well.

[Save For Later](#)

VIDEOS | LENGTH: 00:07:48

Water Well Management

3. Proper Well Construction



GET CONNECTED

Access a well full of knowledge! Learn the best ways to optimize and maintain your residential water supply while mitigating concerns.

[SIGN UP](#)

YOU MAY ALSO BE INTERESTED IN...

- [Water Conservation for Communities](#)
GUIDES AND PU...
- [Potter County Implements Source Water Protection Plan](#)
NEWS
- [Best Management Practices for Private Water Wells](#)
ARTICLES
- [Nitrates in Drinking Water](#)
ARTICLES
- [Understanding Bottled Water](#)
ARTICLES

Safe Drinking Water Clinics

- Best management practices
- 1 to 2 hours
- Onsite water testing



Detailed Manuals

A Guide to Private Water Systems in Pennsylvania

Learn the proper construction and maintenance of your private well, spring, or cistern.

#AGRS-111 | [BE THE FIRST TO LEAVE A REVIEW](#)



GUIDES AND PUBLICATIONS

PAGES:
80

QTY **\$10.00**

SHIPS IN:
1 - 2 Business days

LANGUAGE:
English

PREVIEW SAMPLE:
[A Guide to Private Water Systems in Pennsylvania](#)

BUY NOW

[SAVE FOR LATER](#)

[DESCRIPTION](#) [INSTRUCTORS](#) [REVIEWS](#) [FAQ](#)

Rural homeowners often face challenges in managing their water supply because, unlike public water supplies, managing private water systems is entirely the homeowner's responsibility. This manual is intended as a guide for private water system owners in Pennsylvania. From proper location and construction to recommended testing and treatment strategies, it will help homeowners make educated decisions about their water supply.

WHO IS THIS FOR?

Owners of private water systems; homeowners

WHAT WILL YOU LEARN?

Hydrologic cycle; groundwater basics; threats to groundwater; estimating water needs; proper construction and management of private water wells; spring development and protection; rainwater cisterns; wellhead protection and land-use impacts; what you can do to protect groundwater; water testing and interpretation; components of a typical water test report; drinking water standards; common pollutants by category; solving water-quality problems; misconceptions about home water treatment; common

Master Well Owner Network

Volunteer Training

- Funded by PA DEP and PGWA
- Objective – more efficiently reach the large target audience by training an army of volunteers who can provide basic education on proper private water system management
- Provide 6-8 hours of instruction followed by exams and certification (signed policy statement)
 - Expectation – volunteers will attempt to educate 50 private water supply owners annually
- 759 volunteers trained (about 230 active)
- Volunteers educate ~3,000 to 4,000 annually (~50,000 total)
- Over 100,000 indirect contacts (newsletters, etc.)



Volunteers Educate Others

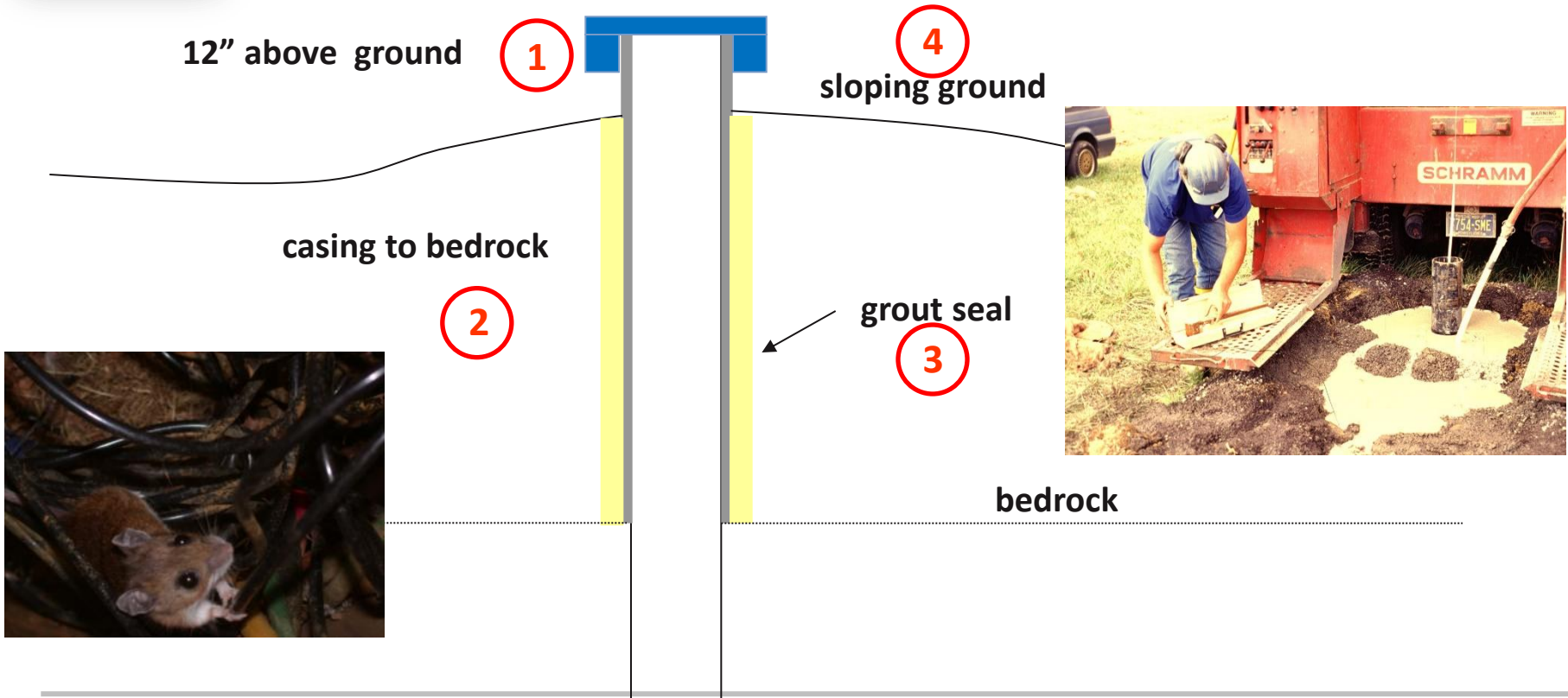


Preventing Problems with Proper Water Well Construction



5
"sanitary" well cap

Fewer than 20% of home and farm wells in PA have this "sanitary" construction



Don't Get Carried Away !



Photo by Tom McCarty

Wellhead Protection

Isolation Distances - The following isolation distances shall be maintained from all water wells:

POTENTIAL POLLUTION SOURCE	MINIMUM REQUIRED ISOLATION DISTANCE (feet)
Animal enclosures and manure piles	100
Chemical preparation/storage area	300
Fertilizers preparation/storage area	300
Hazardous spray materials preparation/storage area	300
Lakes, ponds, streams	25
Landfill, existing, proposed, or abandoned	1,000
Septic tanks	50
Sewage disposal systems, subsurface	100
Property lines	10
Road right of way, public	25
Storm drains	25
Salt piles	300
Water well, existing	25

Construction Standards

The construction of all water wells in the Township shall conform to the following standards and such compliance shall be certified by the well driller in the well completion report. In cases where state or federal regulations are more stringent, such standards shall apply.

- A. Construction by Licensed Driller - All water wells in the Township shall be constructed in accordance with PA Act 610 (Water Well Drillers License Act) by a well driller licensed by the Commonwealth of Pennsylvania.
- B. Disinfection Criteria - The well owner shall disinfect a water well in accord with Attachment A prior to testing and prior to use. A statement that the well has been disinfected shall be submitted to the Township along with the Water Well Completion Report.

Construction Standards

Well Casing

Casing should extend ~12 inches above the ground (about 50% of wells meet this recommendation)

Casing Length

Minimum protective casing depth shall be forty (40) feet or fifteen (15) feet into bedrock, whichever is greater

Slope ground away from the well



Grouting

Grout Requirements –

All permanent water well casings shall be surrounded by a minimum of one and one-half (1.5) inches of grout to a minimum depth of at least five (5) feet below grade to effectively prevent contamination from ground surface sources.

Grouting materials shall comply with the standards established by the American Water Works Association in the most current AWWA Standard for Water Wells or as otherwise approved by the Township.



Picture courtesy of Todd Giddings, PA Ground Water Association

Sanitary “Vermin Proof” Well Cap

- 16% of wells in PA have one – mostly in counties where required (Bucks, Chester, Montgomery)
- Include rubber gasket to seal the top of the casing.
- Slightly more expensive than standard well cap.



Well Completion Report

The Applicant or well driller shall, upon completion of the well, provide to the Township a copy of the Well Completion Report submitted to the Pennsylvania Department of Conservation and Natural Resources.

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