



THE OHIO STATE UNIVERSITY

Development of a Private Well Test Interpretation Tool for Ohioans

A collaborative effort between OSU, the Ohio Department of Health, and the Ohio EPA



Collaborators

Ohio State University Extension

- Anne Baird
- Joe Bonnell
- Brian Weaver

Ohio Department of Health

- Rebecca Fugitt
- Steven Schmidt
- Russell Smith

Ohio Environmental Protection Agency

- Mike Eggert
- Chris Kenah

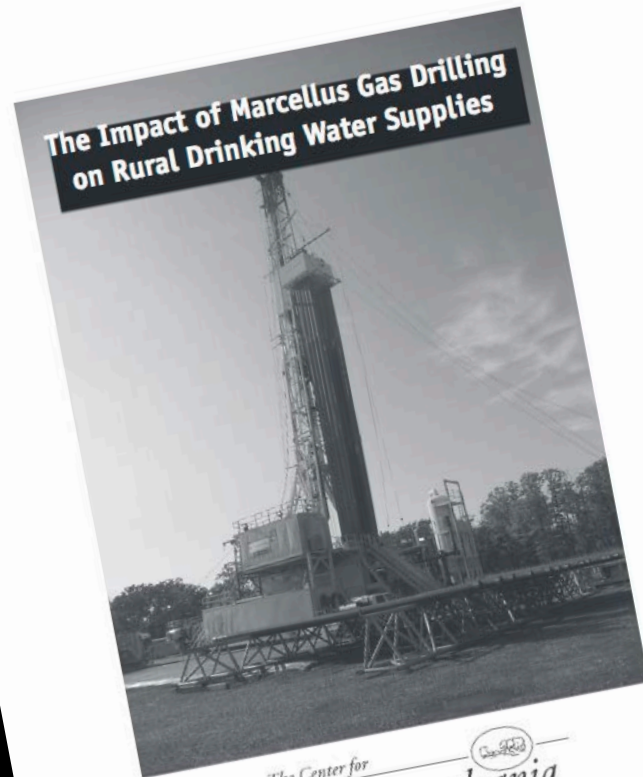


Why?

- Well water testing requirements prior to oil/gas drilling.
- Raise awareness among domestic well owners.
- Help interpret lab results.



Need for Well Water Test Tool



Penn State Study of Rural Water Wells

- Proximity to Marcellus gas wells.
- 233 wells tested
- 40% didn't meet drinking water standards



Partnership

Ohio State University Extension

- Trusted source of information
- Network of County Extension offices/educators

Ohio Department of Health

- Sets health-based standards for private water systems
- Partners with local health districts
- Registers water well industry contractors

Ohio Environmental Protection Agency

- Administers federal drinking water laws and regulations
- Provides technical assistance on groundwater protection



Examples from other states/regions



DWIT is provided by the



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)	<input type="text"/>
Fecal Coliform Bacteria (bacteria per 100 ml)	<input type="text"/>
E.Coli (bacteria per 100 ml)	<input type="text"/>
Giardia lamblia (oocysts)	<input type="text"/>
Cryptosporidium parvum (oocysts)	<input type="text"/>

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

Benzene (mg/L)	<input type="text"/>
Carbon Tetrachloride (mg/L)	<input type="text"/>
MTBE (Methyl Tert-Butyl Ether) (mg/L)	<input type="text"/>
Styrene (mg/L)	<input type="text"/>
Tetrachloroethylene (PCE) (mg/L)	<input type="text"/>
Toulene (mg/L)	<input type="text"/>



DWIT is provided by the



institutes of energy & the environment & Penn State **Extension**



DWIT

Drinking Water Interpretation Tool



The results of the values you entered are listed below. (Perform new analysis)

Paramter	Water test value entered	Does sample meet safe drinking water standards?	Drinking Water Standard	For more information
Fecal Coliform Bacteria	1	NO, value exceeds standards Fecal coliform bacteria are specific to the intestinal tracts of warm-blooded animals and are thus a test for sewage or animal waste contamination. Fecal coliform bacteria in water may cause gastrointestinal illnesses. Fecal coliform bacteria can be removed from water using ultraviolet light, chlorination, or ozonation treatment systems.	0 (mg/L)	Coliform Bacteria



Northern Plains & Mountains Regional Water Program

Applying knowledge to improve water quality

A Partnership of USDA NIFA & Land Grant Colleges & Universities

[Home](#) | [About](#) | [Tools & Resources](#) | [Partners](#) | [Regional Initiatives](#) | [Research](#) | [Contact Us](#)

Water Quality Interpretation Tool

Evaluation

Resources

Contact Us

Welcome to the Northern Plains and Mountains Water Quality Interpretation Tool. This tool has been created to help you evaluate your drinking, livestock and irrigation water quality. *Adobe Reader is required to view PDF files. To download free Adobe Reader software [click here](#).*

To use the tool, simply follow these steps:

1. **Select the state where you collected your water samples:** Colorado
2. **Select your water application type:** Drinking Water
3. Enter the values that have been provided to you by a laboratory in the spaces pertaining to your analyses results. If you do not have a value for a particular parameter, leave the space blank.
4. Click the submit button below to obtain a table with an interpretation of the quality of your water.
5. If you need to start over, or wish to enter data for a different type of water, click the reset button below.

Routine Water Analysis

Alkalinity as CaCO ₃	<input type="text"/>	mg/L
Ammonium (NH ₄)	<input type="text"/>	mg/L
Bicarbonate	<input type="text"/>	mg/L
Boron (B)	<input type="text"/>	mg/L
Calcium (Ca)	<input type="text"/>	mg/L

Trace Elements Analysis

Antimony (Sb)	<input type="text"/>	mg/L
Arsenic (As)	<input type="text"/>	mg/L
Beryllium (Be)	<input type="text"/>	mg/L
Cobalt (Co)	<input type="text"/>	mg/L
Cyanide (CN) (free)	<input type="text"/>	mg/L



Northern Plains & Mountains Regional Water Program

Applying knowledge to improve water quality

A Partnership of USDA NIFA & Land Grant Colleges & Universities

Water Quality Interpretation Tool

Evaluation

Resources

Contact Us

Interpretations of Drinking Water Quality for North Dakota

Test Name	Lab Result	Interpretation	Acceptable	Additional Comments
2) Bacterium				
Fecal Coliforms	1 CFU/100ml	Objectionable	≤ 0 CFU/100ml *	<p>This water is considered objectionable because it does not meet the MCL of containing no fecal coliforms. "Fecal coliforms are bacteria that are associated with human or animal wastes. They usually live in human or animal intestinal tracts, and their presence in drinking water is a strong indication of recent sewage or animal waste contamination" (EPA). Some short terms symptoms that may be caused by pathogens indicated by fecal coliforms are diarrhea, cramps, nausea and headaches. Treatment can be accomplished with chlorine, ultraviolet light, or ozone. Bringing water to a full boil for at least a minute is an effective way to kill pathogens. For more information on fecal coliforms in drinking water please visit:</p> <ul style="list-style-type: none">• EPA: Basic Information About Pathogens and Indicators in Drinking Water• Well Educated Factsheet on Total Coliform and E. coli Bacteria



Ohio's well test interpretation tool objectives:

- Easy to use
- Build on existing resources
- Identify potential sources of contaminants
- Answer “So what?” questions:
 - Health risks?
 - Testing and Treatment options?
 - Information about...
 - Well Maintenance
 - Information and Assistance
 - Rules and Regulations
 - Groundwater Basics





Ohio Watershed Network

[Search](#)[HOME](#)[ABOUT US](#)[NEWS](#)[EVENTS](#)[COURSES](#)[WATERSHED EDUCATION](#)[WELL EDUCATED OHIO](#)[WATERSHED GROUPS](#)[INTRANET](#)

Well Water Interpretation Tool

[View](#)[Edit](#)

The Ohio State University in conjunction with the Ohio Department of Health and Ohio EPA have developed an online assessment tool that offers instant water quality interpretation for Ohio residents.

Dissolved gas

Carbon Dioxide (CO₂)

mg/L ▾

Hydrogen Sulfide (H₂S)

mg/L ▾

Methane (Dissolved in water)

mg/L ▾

Field parameter

pH

pH ▾

Pesticide

2,4,5-TP (Silvex)

ug/L ▾

2,4-D
(2,4-Dichlorophenoxyacetic
Acid)

ug/L ▾

Atrazine

ug/L ▾

Carbofuran

ug/L ▾

Chlordane

ug/L ▾



Well Water Interpretation Tool

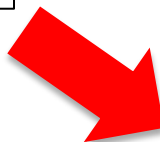
[View](#)[Edit](#)

The Ohio State University in conjunction with the Ohio Department of Health and Ohio EPA have developed an online assessment tool that offers instant water quality interpretation for Ohio residents.

Download results

Test Name	Lab Result	Interpretation	Acceptable values	Typical range in Ohio	Major sources in drinking water	Comments
Arsenic	20 ug/L	Action is recommended.	10 ug/L (MCL)	2 - 7	Erosion of earth materials; Runoff from orchards; Runoff from glass and electronics production wastes	<p>MCL ADVISORY - ACTION IS HIGHLY RECOMMENDED</p> <p>Arsenic levels were detected in your water sample to exceed the maximum contaminant level (MCL).</p> <p>GENERAL INFORMATION</p> <p>Arsenic occurs naturally in soil and minerals and may enter the air, water, and land from wind-blown dust and may get into water from runoff and leaching. Arsenic cannot be destroyed in the environment. It can only change its form. Many common arsenic compounds can dissolve in water. Most of the arsenic in water will ultimately end up in soil or sediment.</p> <p>HEALTH EFFECTS</p> <p>Drinking water is the main source of human exposure to arsenic. Some people who drink water containing arsenic in excess of the MCL over many years could experience skin damage or problems with their circulatory system, and may have an increased risk of getting cancer.</p>

Also includes:
-Treatment options
-Web resources
-Fact Sheets





THE OHIO STATE UNIVERSITY



Ohio Department of Health

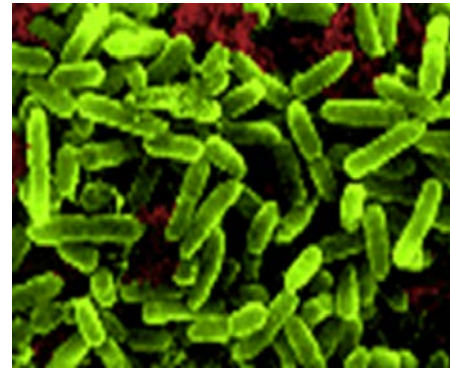
Why do people test their wells?

- When they notice water quality changes in their drinking water – color, odor, etc.
- When they get sick and someone – usually a medical professional suggests well testing
- As part of a private water system alteration
- When they are concerned about a land use activity



Most Common Well Water Quality Issues

- Bacteria – Total coliform or E. coli, salmonella, cryptosporidia, giardia
- Arsenic
- Iron, Manganese
- Dissolved gases – methane, hydrogen sulfide
- Organics – gasoline, oil



Well Water Quality Issues



- Many wells are being sampled as part of pre-drilling programs for shale gas development or other nearby land use, for information, or real estate transaction.
- Public concerns related to possible ground water quality impacts from shale gas development



Laboratory Organic Analysis Data Report

Sample	150822		
Date Received	02/13/2013 3:27 PM	Matrix	DW
Begin		End	
Date Collected	02/13/2013 11:55 AM	Collected by	SMITH, RUSSEL
Program	OTHERS	Sample Type	COMPLAINT
Client	ODH	Station ID	
OEPA Division		Customer ID	
Location	Reed 737 Hickory Lane Mansfield, OH 44905	External ID	

EPA Method	Parameter	Units	Cas Number	Result	RL	Analyzed	Qualifier
USEPA 524.2		ug/L					
	Benzene		000071-43-2	<0.50	0.5	02/21/2013	
	Bromobenzene		000108-86-1	<0.50	0.5	02/21/2013	
	Bromodichloromethane		000074-97-5	<0.50	0.5	02/21/2013	
	Bromodichloromethane		000075-27-4	<0.50	0.5	02/21/2013	
	Bromoforn		000075-25-2	<0.50	0.5	02/21/2013	
	Bromomethane		000074-83-9	<0.50	0.5	02/21/2013	
	n-Butylbenzene		000104-51-8	<0.50	0.5	02/21/2013	
	sec-Butylbenzene		000135-98-8	<0.50	0.5	02/21/2013	
	tert-Butylbenzene		000098-06-6	<0.50	0.5	02/21/2013	
	Carbon tetrachloride		000056-23-5	<0.50	0.5	02/21/2013	
	Chlorobenzene		000108-90-7	<0.50	0.5	02/21/2013	
	Chloroethane		000075-00-3	<0.50	0.5	02/21/2013	
	Chloroform		000067-66-3	<0.50	0.5	02/21/2013	
	Chloromethane		000074-87-3	<0.50	0.5	02/21/2013	
	2-Chlorotoluene		000095-49-8	<0.50	0.5	02/21/2013	
	4-Chlorotoluene		000106-43-4	<0.50	0.5	02/21/2013	
	Dibromodichloromethane		000124-48-1	<0.50	0.5	02/21/2013	
	1,2-Dibromo-3-chloropropane		000096-12-8	<0.50	0.5	02/21/2013	
	1,2-Dibromomethane		000106-93-4	<0.50	0.5	02/21/2013	
	Dibromomethane		000074-95-3	<0.50	0.5	02/21/2013	
	1,2-Dichlorobenzene		000095-50-1	<0.50	0.5	02/21/2013	
	1,3-Dichlorobenzene		000541-73-1	<0.50	0.5	02/21/2013	
	1,4-Dichlorobenzene		000106-46-7	<0.50	0.5	02/21/2013	
	Dichlorodifluoromethane		000075-71-8	<0.50	0.5	02/21/2013	
	1,1-Dichloroethane		000075-34-3	<0.50	0.5	02/21/2013	
	1,2-Dichloroethane		000107-06-2	<0.50	0.5	02/21/2013	
	1,1-Dichloroethene		000075-35-4	<0.50	0.5	02/21/2013	
	cis-1,2-Dichloroethene		000156-59-2	<0.50	0.5	02/21/2013	
	trans-1,2-Dichloroethene		000156-60-5	<0.50	0.5	02/21/2013	
	1,2-Dichloropropane		000078-87-5	<0.50	0.5	02/21/2013	
	1,3-Dichloropropane		000142-28-9	<0.50	0.5	02/21/2013	
	2,2-Dichloropropane		000594-20-7	<0.50	0.5	02/21/2013	
	1,1-Dichloropropene		000563-58-6	<0.50	0.5	02/21/2013	
	cis-1,3-Dichloropropene		010061-01-5	<0.50	0.5	02/21/2013	
	trans-1,3-Dichloropropene		010061-02-6	<0.50	0.5	02/21/2013	
	Ethylbenzene		000100-41-4	<0.50	0.5	02/21/2013	
	Hexachlorobutadiene		000087-68-3	<0.50	0.5	02/21/2013	
	Isopropylbenzene		000098-82-8	<0.50	0.5	02/21/2013	
	4-Isopropyltoluene		000099-87-6	<0.50	0.5	02/21/2013	
	Methylene chloride		000075-09-2	5.96	0.5	02/21/2013	
	Methyl-tert-butyl ether		001634-04-4	<0.50	0.5	02/21/2013	
	Naphthalene		000091-20-3	<0.50	0.5	02/21/2013	
	n-Propylbenzene		000103-65-1	<0.50	0.5	02/21/2013	
	Styrene		000100-42-5	<0.50	0.5	02/21/2013	
	1,1,1,2-Tetrachloroethane		000630-20-6	<0.50	0.5	02/21/2013	
	1,1,2,2-Tetrachloroethane		000079-34-5	<0.50	0.5	02/21/2013	
	Tetrachloroethene		000127-18-4	<0.50	0.5	02/21/2013	
	Toluene		000108-88-3	<0.50	0.5	02/21/2013	
	1,2,3-Trichlorobenzene		000087-61-6	<0.50	0.5	02/21/2013	
	1,2,4-Trichlorobenzene		000120-82-1	<0.50	0.5	02/21/2013	
	1,1,1-Trichloroethane		000071-55-6	<0.50	0.5	02/21/2013	

Report Produced on Feb 27, 2013 10:28 am

Page 1 of 2

Certificate of Analysis - Fax Copy

MAEI ENVIRONMENTAL SERVICES
P. O. Box 1440
Dublin, Ohio 43017
(614) 873-4654

Page: 1
Date: 11/01/13

ODH / BUREAU OF ENVIRO HEALTH
R SMITH / R FUGITT
248 N HIGH ST
COLUMBUS OH 43215

Client No: 0000006212
AR Sheet No: 0119124-AR
Chemical Certification 4039
Bacterial Certification 877
PWS ID No:
STU ID No:
PO No:

Dear Client:

Along with your results listed below we would like to thank you for allowing MASI to assist you with your environmental testing requirements.

Account Name: ODH / BUREAU OF ENVIRO HEALTH
Sampler Name: CHUCK BASLER
Sample Date: 10/29/13
Sample Time: 13:51
Sample Type: PORTABLE
Sample Monitoring Point:
Sample Tap: REAR OUTSIDE FAUCET
Sample Class: SPECIAL
Sample Address: 1330 SCENIC HEIGHTS DR WOOSTER
Sample ID:

Private
County: WAYNE
Chlorinated:
Repeat No:
C12 Total:
C12 Free:
C12 Combined:

Test Requested	Lab Number	Method Number	Analyst Number	Date Analyzed
COLIFORM, TOTAL (TCR)	05732	9223B-OT	4171	10/30/13
<1.0 MPN				14:55

Interpretation of sampling results

- Homeowners typically do not understand their sampling results
- Are the water quality results normal, high or low?
- How will the water quality affect my health or the health of my family and our safety?
- What are the best options for water treatment?



Public information and perception

- Lack of information by private well owners on their current ground water quality
- Local health districts and Cooperative Extension offices – often contacted for recommendations



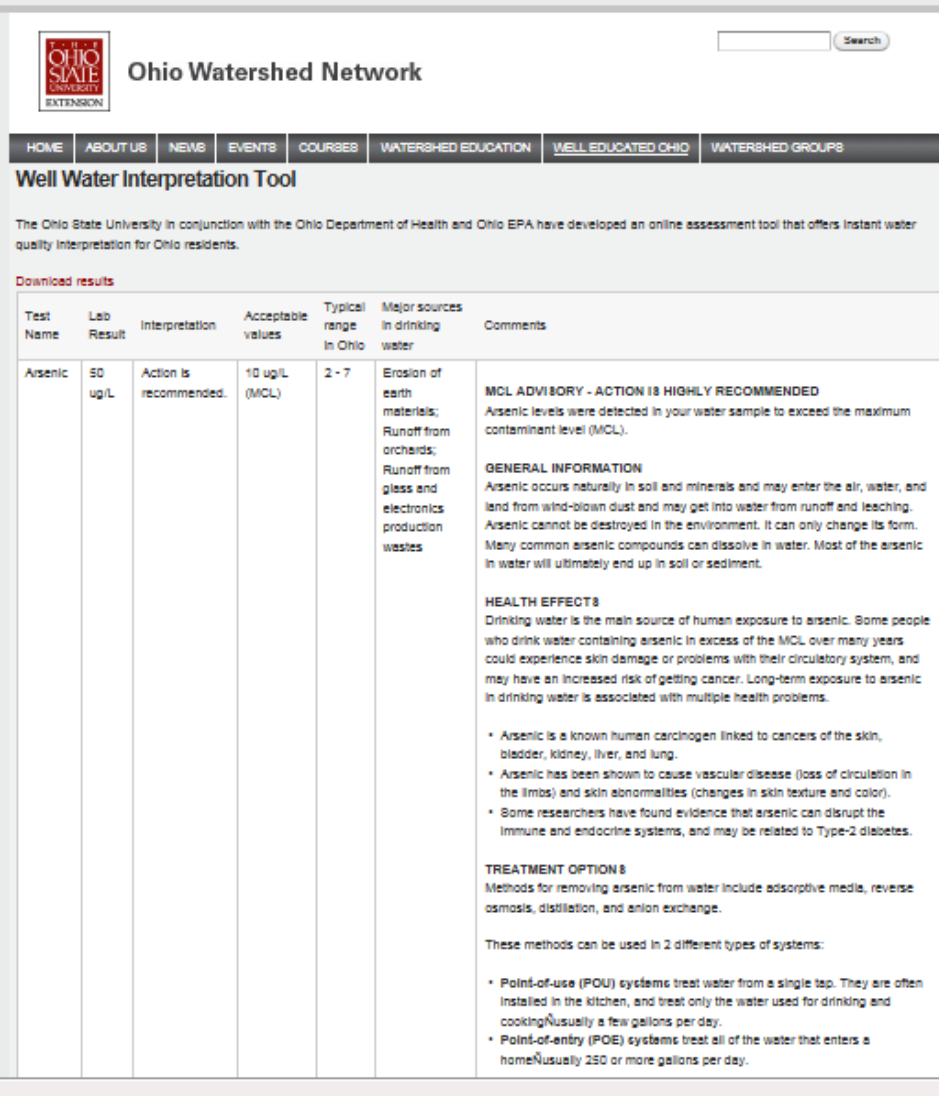
Use and benefits of tool

- Information on how to “read” the lab result and extract information to enter into tool
- Recommendations for action
- Identifies acceptable values
- Information on typical ranges for that parameter in Ohio
- Major sources of contamination for a parameter



Uses and benefit of tool

- Identifies MCL and Advisories
- Information on health affects
- Information on treatment option
- Web links/resources
- Fact Sheets



The screenshot displays the 'Well Water Interpretation Tool' interface. At the top, the 'OHIO STATE UNIVERSITY' logo and 'Ohio Watershed Network' title are visible. A navigation bar includes links for HOME, ABOUT US, NEWS, EVENTS, COURSES, WATERSHED EDUCATION, WELL EDUCATED OHIO, and WATERSHED GROUPS. Below the navigation bar, the tool's title 'Well Water Interpretation Tool' is shown, followed by a brief description: 'The Ohio State University in conjunction with the Ohio Department of Health and Ohio EPA have developed an online assessment tool that offers instant water quality interpretation for Ohio residents.' A 'Download results' link is present. The main content area features a table with columns: Test Name, Lab Result, Interpretation, Acceptable values, Typical range in Ohio, Major sources in drinking water, and Comments. The table contains one row for 'Arsenic' with a lab result of '50 ug/L'. The interpretation is 'Action is recommended.' and the acceptable value is '10 ug/L (MCL)'. The typical range in Ohio is '2 - 7'. The major sources listed are 'Erosion of earth materials; Runoff from orchards; Runoff from glass and electronics production wastes'. The comments section provides detailed information, including a 'MCL ADVISORY - ACTION IS HIGHLY RECOMMENDED' warning, 'GENERAL INFORMATION' about arsenic's natural occurrence and health effects, 'HEALTH EFFECTS' detailing risks from drinking water, and 'TREATMENT OPTION'S' listing methods like adsorptive media, reverse osmosis, distillation, and anion exchange, along with point-of-use (POU) and point-of-entry (POE) systems.

Test Name	Lab Result	Interpretation	Acceptable values	Typical range in Ohio	Major sources in drinking water	Comments
Arsenic	50 ug/L	Action is recommended.	10 ug/L (MCL)	2 - 7	Erosion of earth materials; Runoff from orchards; Runoff from glass and electronics production wastes	<p>MCL ADVISORY - ACTION IS HIGHLY RECOMMENDED Arsenic levels were detected in your water sample to exceed the maximum contaminant level (MCL).</p> <p>GENERAL INFORMATION Arsenic occurs naturally in soil and minerals and may enter the air, water, and land from wind-blown dust and may get into water from runoff and leaching. Arsenic cannot be destroyed in the environment. It can only change its form. Many common arsenic compounds can dissolve in water. Most of the arsenic in water will ultimately end up in soil or sediment.</p> <p>HEALTH EFFECTS Drinking water is the main source of human exposure to arsenic. Some people who drink water containing arsenic in excess of the MCL over many years could experience skin damage or problems with their circulatory system, and may have an increased risk of getting cancer. Long-term exposure to arsenic in drinking water is associated with multiple health problems.</p> <ul style="list-style-type: none">Arsenic is a known human carcinogen linked to cancers of the skin, bladder, kidney, liver, and lung.Arsenic has been shown to cause vascular disease (loss of circulation in the limbs) and skin abnormalities (changes in skin texture and color).Some researchers have found evidence that arsenic can disrupt the immune and endocrine systems, and may be related to Type-2 diabetes. <p>TREATMENT OPTION'S Methods for removing arsenic from water include adsorptive media, reverse osmosis, distillation, and anion exchange.</p> <p>These methods can be used in 2 different types of systems:</p> <ul style="list-style-type: none">Point-of-use (POU) systems treat water from a single tap. They are often installed in the kitchen, and treat only the water used for drinking and cooking. Usually a few gallons per day.Point-of-entry (POE) systems treat all of the water that enters a home. Usually 250 or more gallons per day.

Health Based Standards

- Public water systems – Federal National Drinking Water Primary and Secondary Standards
- Private water systems – health based standards are the same as the federal primary and secondary drinking water standards



Treatment Options

- Treatment options are based on requirements in the private water systems rules
- Or current best technologies





Next Steps

- Expert review and well owner interviews
(Nov., 2013-Jan., 2014)
- Finalize website design (Feb. – Mar., 2014)
- Launch during national Groundwater Awareness Week (March 9-15, 2014)
- Training (April, 2014)
 - Co. Health Departments
 - Extension Educators
 - Well owners