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Private Wells in New York State

Bureau of Water Supply Protection

Martin Zartarian, Braden Savage, and Patrick O'Connor

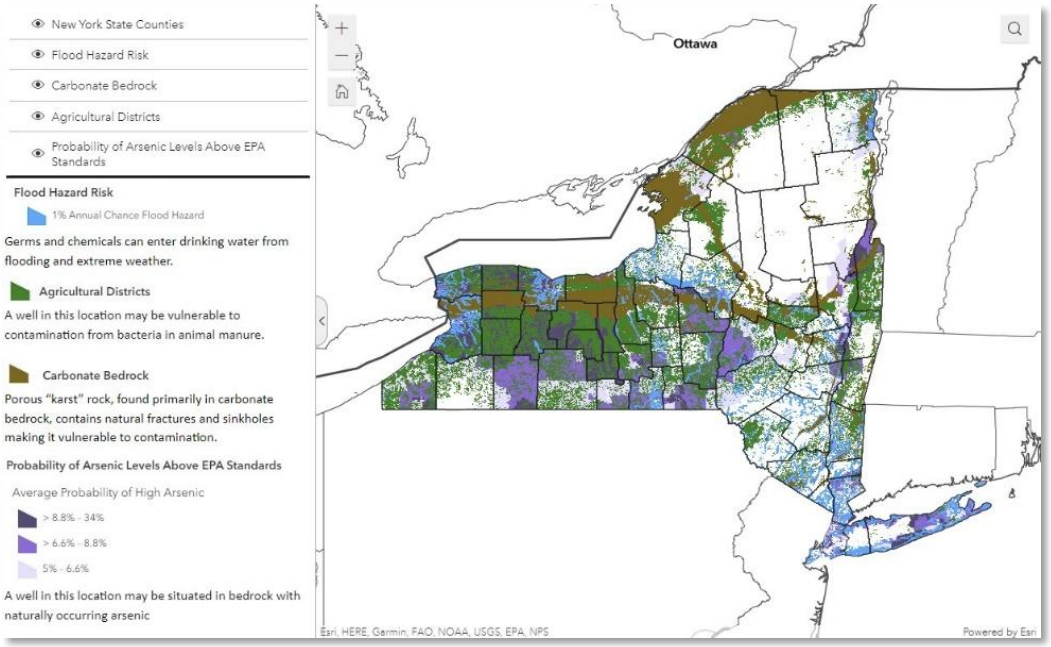
Overview

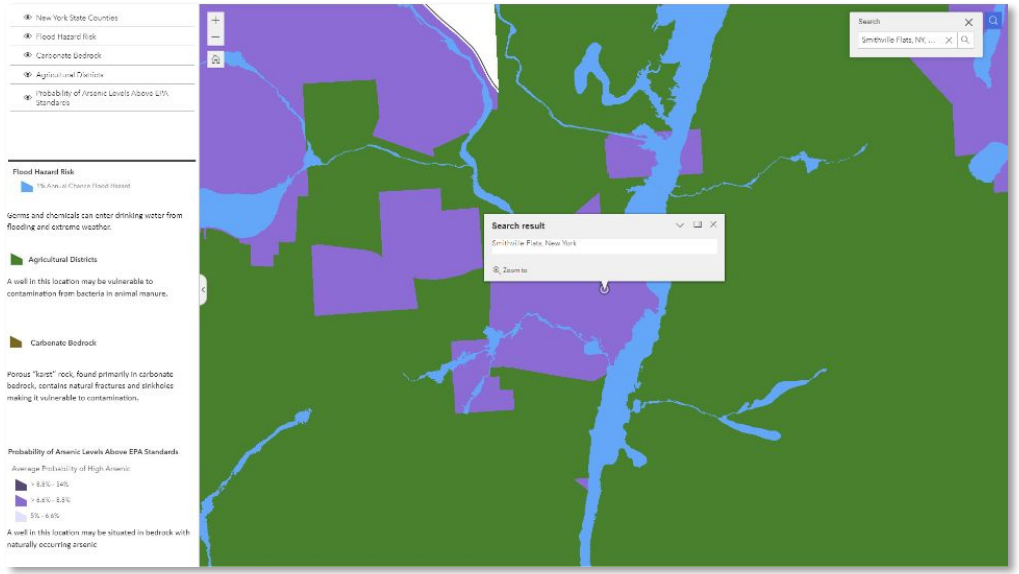
Private Wells in NYS

- Over 15 million US households rely on private wells in the United States every day
- Wells serve 4 million people in NYS
  - Estimates suggest there are 1 million active wells
- EPA does not regulate privately owned water sources under the Safe Drinking Water Act
  - In NYS, if <5 service connections, or serves <25 people, it is not regulated as a public water system.
  - It is up to the well owners to test and maintain their private wells to ensure the quality and safety of their water.

EHC Private Well Components (2020-2025)

- Component A: Informatics
  - Online interactive map of well vulnerabilities
  - Flood zones, karst, arsenic, agriculture





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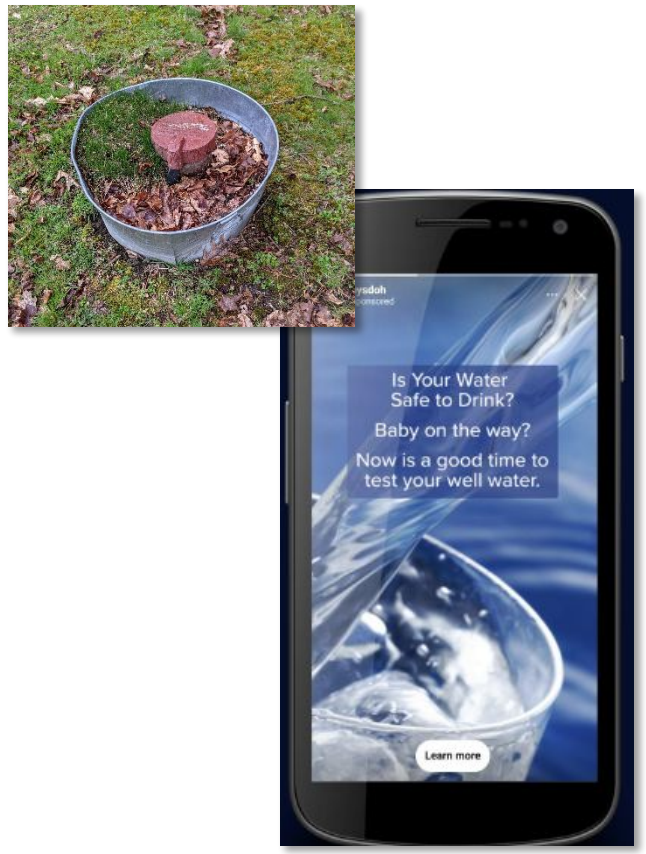
EHC Private Well Components (2020-2025)

- Component B: Private Wells
  - Well sampling
    - Continuation of SafeWATCH work
    - Sampling of vulnerable wells in rural communities
    - Standard analytes and targeted contaminants sampling
    - Data used to decide on new PWS
  - Statewide sampling database
    - Collaborating with a private water lab and their data management vendor
  - Private well repair program
    - Provides funding for certain well maintenance
    - Piloted with a county health department
    - Collaborating with Healthy Neighborhoods Program
  - Outreach and education
    - Social media campaign, educational workshops, etc.



Current Projects

Private Well Repair Pilot Overview

- Addresses the lack of assistance available to private well owners
  - Existing resources are primarily educational
- Simple repairs and common deficiencies were covered at first
  - Provided the pilot county with flexibility
- Piloted with a county health department in the southern tier region
- Reaching rural and low-income communities, which tend to be underserved

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Case Study: Well Cap Replacement

- Rusted casing
- Flood zone
- Well head needed repairs before a cap could be fitted

Case Study: Buried Well Head

- Exploratory digging to find well
- Well head extension
- New pitless adaptor

Case Study: Pit well

- Susceptible to flooding
- Well head extension
- Surrounding structure removed
- New well cap installed

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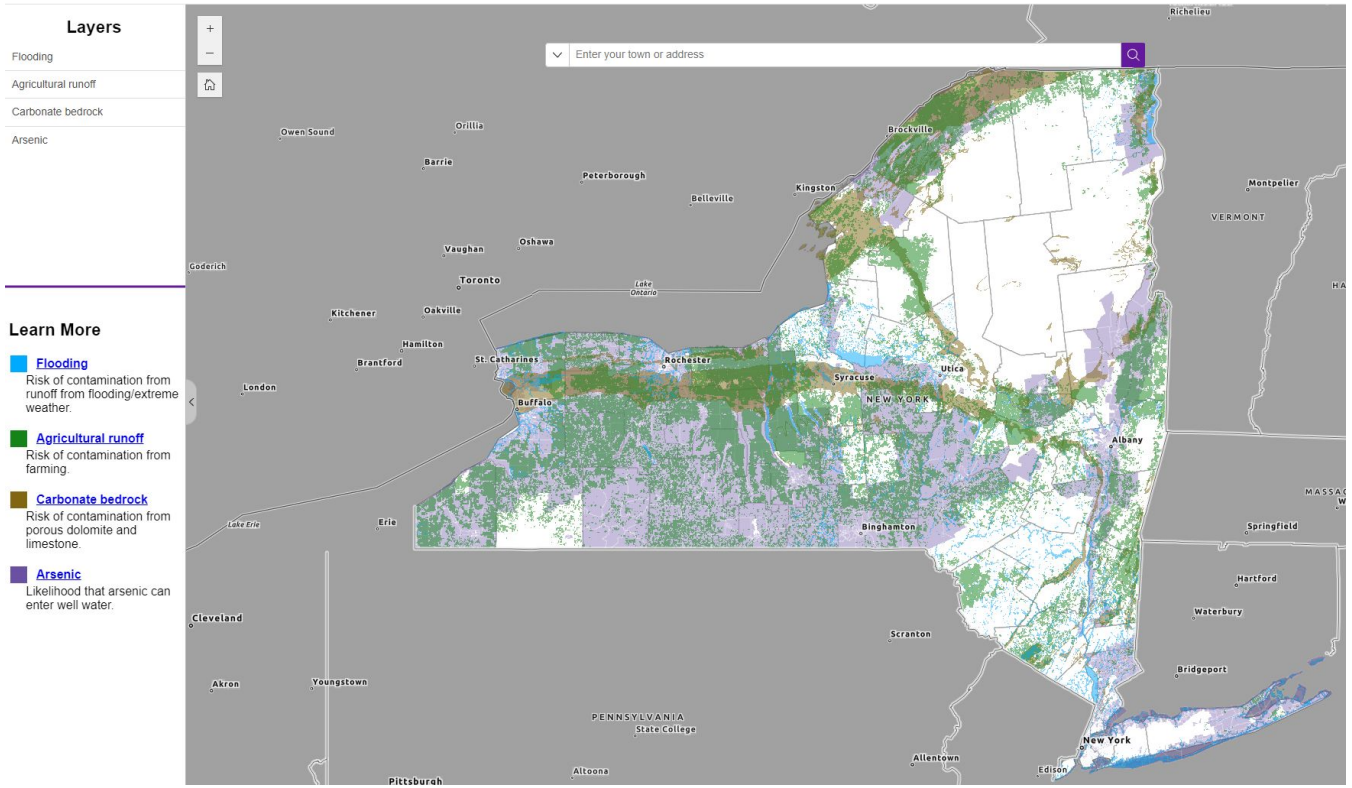
Community Sampling

- Targeted sampling in communities across NYS
- Work in conjunction with NY Rural Water Association
  - NYRWA identifies rural communities and towns with specific groundwater quality concerns
  - Well water results used to supplement NYRWA's source water protection plan for the community
- Overview of sampling results are provided to the town after sampling is completed

Developing a Statewide Database Phase 1

- Develop an interactive statewide map of private well vulnerabilities
  - Flood zones
  - Carbonate bedrock
  - Arsenic zones
  - Agricultural zones



Private Wells Testing

I agree to give NYS Department of Health access to these results for data collection purposes. I understand that information will be kept confidential. ☐

MVWA WATER QUALITY LABORATORY

Tel: (315) 792-0301
Fax: (315) 792-5201

MOHAWK VALLEY WATER AUTHORITY
Quality water... for life.

☐ Cash ☐ Check No. _____
☐ Debit or Credit ☐ To Be Billed

Page ___of ___

REQUEST FOR BACTERIOLOGICAL TEST

- *Presence/Absence ($30)* ☐ • *Quantitative ($40)* ☐ • *Expedite (1-day TAT; 2x cost)* ☐
- *HPC ($15)* ☐
- *Private Wells: Share results with NYSDOH (see Instructions #9): Yes* ☐ *No* ☐

9. NOTE: NYSDOH is collecting data on private well water quality. There are currently no NYS requirements for private well water. With your permission, MVWA will share your results with DOH. It is confidential and there are no additional requirements for you based on test results.

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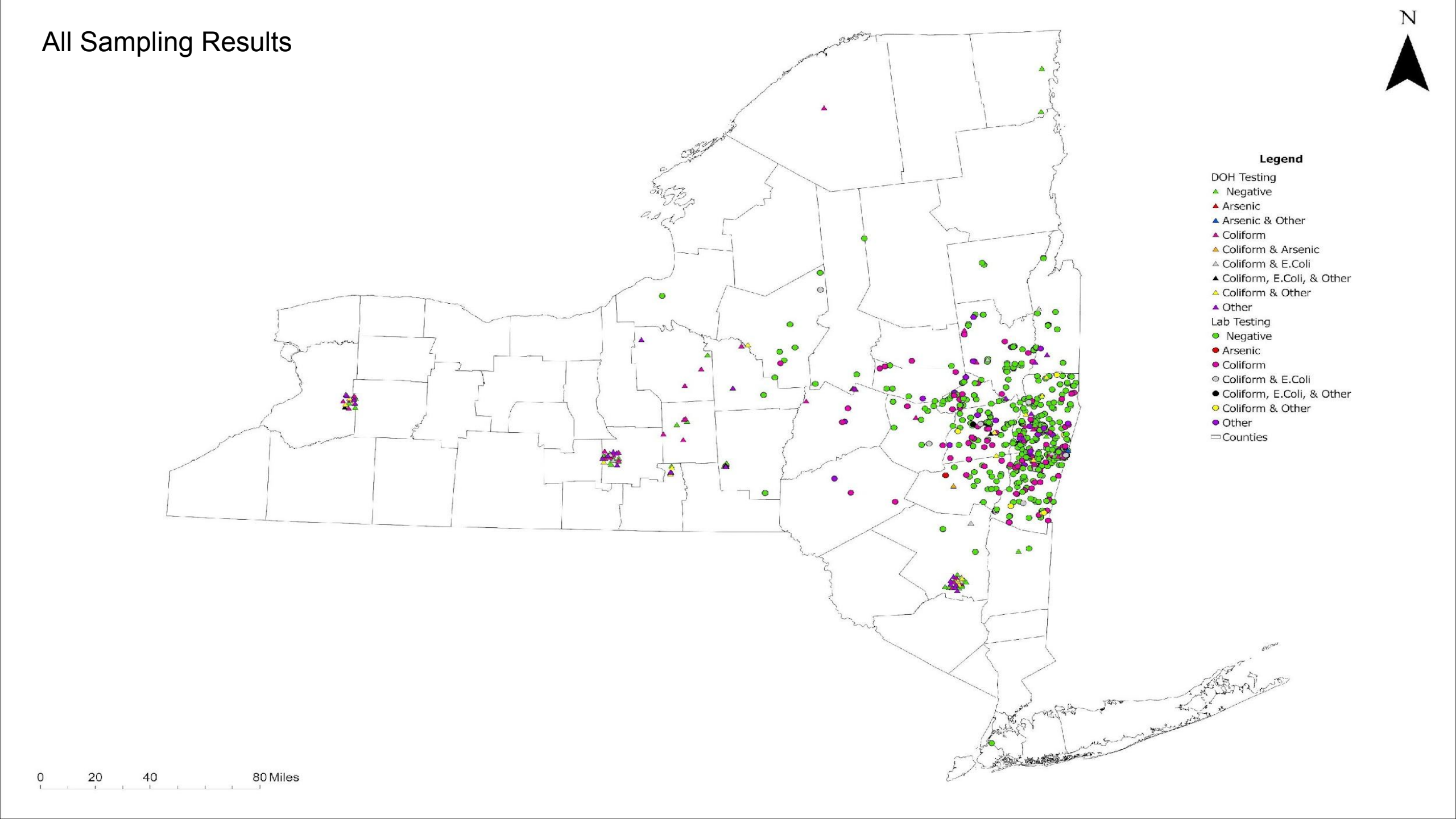
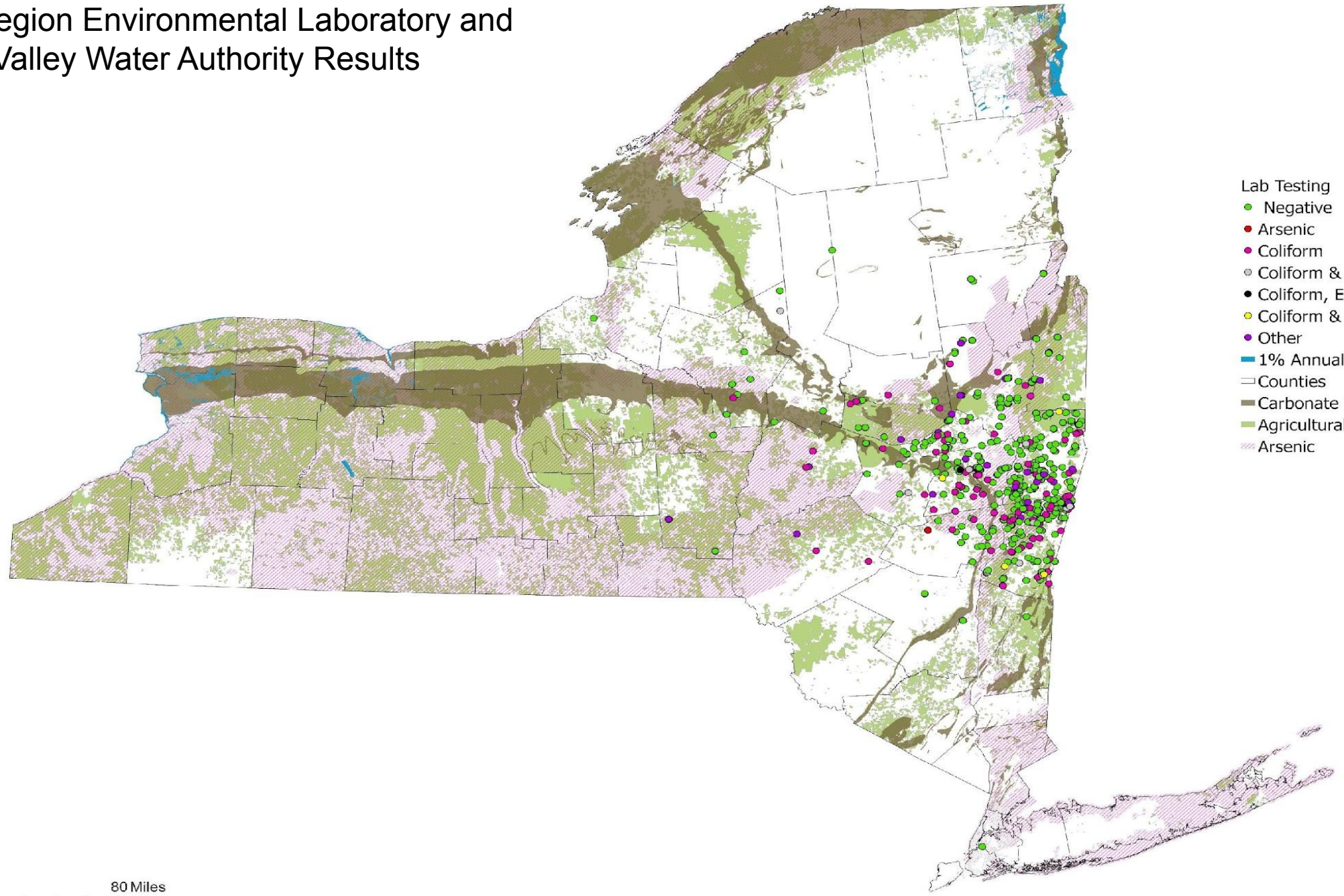
All Sampling Results



Capital Region Environmental Laboratory and Mohawk Valley Water Authority Results



Parameters

Coliform Bacteria

- Coliforms are bacteria that are always present in the digestive tracts of animals, including humans, and are found in their wastes. They are also found in plant and soil material.
- If coliform bacteria are present in your drinking water, it may indicate that other disease-causing organisms may be present. Therefore, your risk of contracting a water-borne illness may be increased
- Health effects: diarrhea, vomiting, upset stomach, cramps, nausea
- MCL = 0
- Remediation: Shock chlorination

Turbidity

- Turbidity is a measure of the cloudiness of your water due to suspended particles
- Cloudy water may interfere with treatment systems (ie: possibly chlorine & UV light)
- Recommended Level = 5 or less
  - Greater than 5 can be indicative of other problems with well
- Remediation: Inspection for defects that lead to increased turbidity
  - ie: well casing defect, pooling around well head

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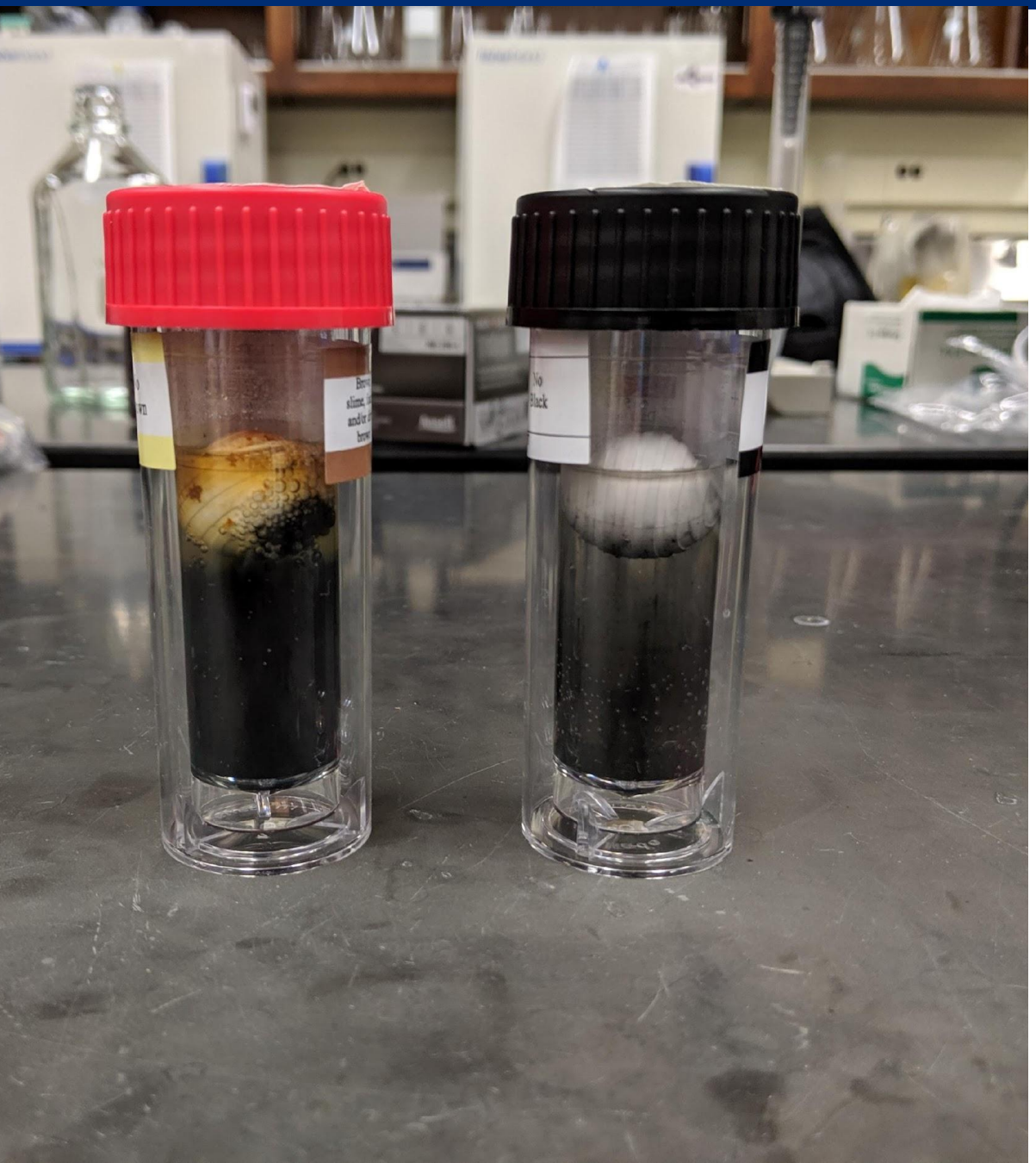
Hardness

- Water with high mineral content is considered hard water
  - Amount of dissolved calcium and magnesium in the water
- Effects: Causes mineral and soap deposits on fixtures; reduces detergent efficiency
- Remediation: Water softener

Nitrates

- Naturally occurring compound that usually does not cause health effects in low concentrations
  - Can enter a water well from fertilizers, nearby septic systems, animal feedlots, industrial waste
- Health effects: most harmful to babies and pregnant women; associated with infant blood problems (Blue Baby Syndrome)
- MCL = 10 mg/L
- Concentrations over 1 mg/L indicate human activity
- Concentrations over 3 mg/L indicate contamination
- Nitrate/Nitrite concentration can increase every year
- Remediation: Reverse osmosis, ion exchange, distillation



Iron & Manganese

- Common elements in rocks and soil and occurs naturally in water
- Manganese Effects: Inconclusive evidence that it can cause nervous system effects in adults and learning/behavioral effects in children
- Iron Effects: Can cause rust or black staining of fixtures or clothes
- No drinking water standard, but the EPA has secondary standard recommendations
  - Iron = 0.3 mg/L
  - Manganese = 0.05mg/L
- Remediation: Green sand filters, chlorination

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Chloride

- Found naturally in environment (usually in form of rock salt)
  - Can be present as a result of human activity (road de-icing salts, fertilizers, landfills, industrial wastewaters
- Health effects: Inconclusive evidence that chloride may attribute to heart and kidney disease, may cause irritation to gastrointestinal tract
- MCL: Less than 250 mg/L (recommended for taste purposes)
- Remediation: Reverse Osmosis, Deionization

Sodium

- Mineral found in many foods and one of the main components of salt
- Health effects: Concern for individuals on restricted sodium diets due to high blood pressure or other medical issues
- No drinking water standard
- Recommended less than 270 mg/L for people on moderately restricted sodium diets and less than 20 mg/L for people on very low sodium diets
- Remediation: Reverse Osmosis

TABLE 1. Water Treatment for Specific Contaminants.

Contaminant or Substance	Water Treatment Unit or System						
	Adsorption Media		Reverse Osmosis (RO)	Distillation	Ion Exchange	Oxidizing Filter	Oxidation-Filtration System
	Activated Carbon Filter	Specialty Adsorption Media					
Arsenic[1,3]		X	X	X	X (Anion)[4]	X	X
Boron[1]			X	X			
Fluoride[1]			X	X			
Hard Water Minerals[2]				X	X (Cation)		
Hydrogen Sulfide[1]	X					X	X
Iron/ Manganese[2]				X	X (Cation)	X	X
Lead[1]			X	X			
Nitrate[1]			X	X	X (Anion)[5]		
Radon[1]	X						
Sulfate[1]			X	X	X (Anion)		
VOCs[1]	X						

[1] Health related contaminant - use treatment only when other options not possible.
[2] Aesthetic contaminant.
[3] Pretreatments, such as oxidation, may be necessary. The best option may depend on the other contaminants present.
[4] Use strong base sulfate selective resin.
[5] Use nitrate selective resin.

Minnesota Department of Health Well Management Section. (2014). *Well Owner's Handbook: A Consumer's Guide to Water Wells in Minnesota.*

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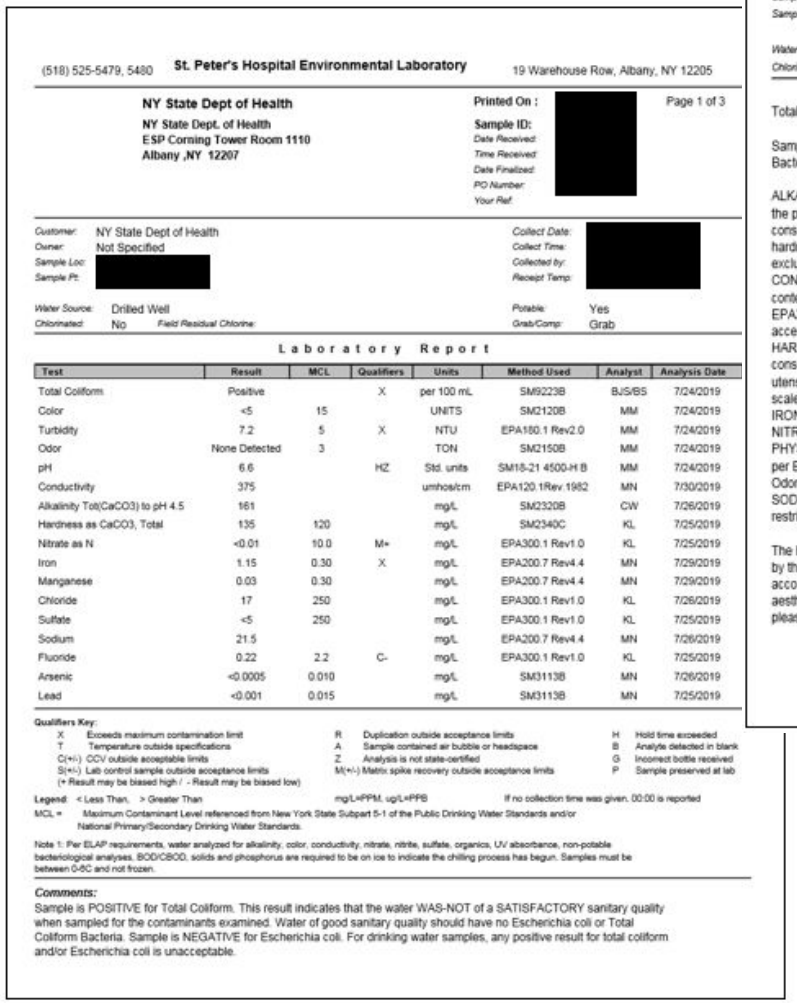
Reading Your Results

Your Results



(518) 525-5479, 5480 **St. Peter's Hospital Environmental Laboratory** 19 Warehouse Row, Albany, NY 12205

NY State Dept of Health
NY State Dept. of Health
ESP Corning Tower Room 1110
Albany ,NY 12207

Printed On : [redacted]
Sample ID:
Date Received:
Time Received:
Date Finalized:
PO Number:
Your Ref:

Page 1 of 3

Customer: NY State Dept of Health
Owner: Not Specified
Sample Loc:
Sample Pt: [redacted]

Collect Date: [redacted]
Collect Time:
Collected by:
Receipt Temp:

Water Source: Drilled Well
Chlorinated: No Field Residual Chlorine:

Potable: Yes
Grab/Comp: Grab

Laboratory Report

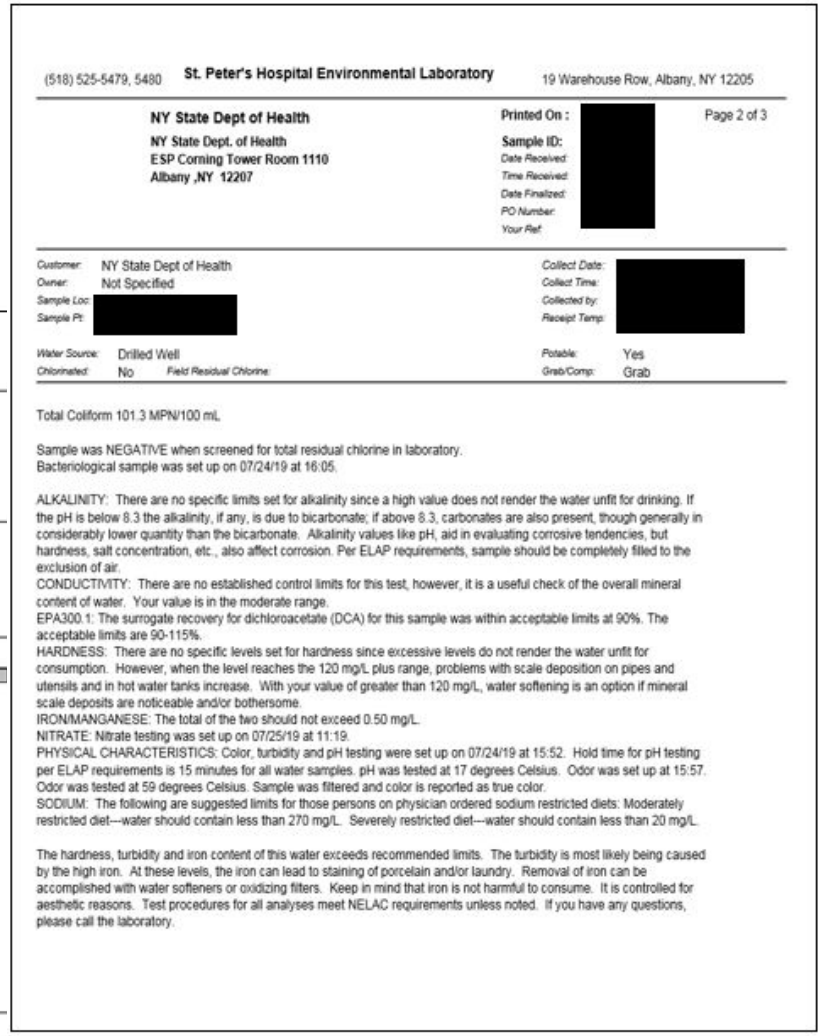
Test	Result	MCL	Qualifiers	Units	Method Used	Analyst	Analysis Date
Total Coliform	Positive		X	per 100 mL	SM9223B	BJS/BS	7/24/2019
Color	<5	15		UNITS	SM2120B	MM	7/24/2019
Turbidity	7.2	5	X	NTU	EPA180.1 Rev2.0	MM	7/24/2019
Odor	None Detected	3		TON	SM2150B	MM	7/24/2019
pH	6.6		HZ	Std. units	SM18-21 4500-H B	MM	7/24/2019
Conductivity	375			umhos/cm	EPA120.1Rev.1982	MN	7/30/2019
Alkalinity Tot(CaCO3) to pH 4.5	161			mg/L	SM2320B	CW	7/26/2019
Hardness as CaCO3, Total	135	120		mg/L	SM2340C	KL	7/25/2019
Nitrate as N	<0.01	10.0	M+	mg/L	EPA300.1 Rev1.0	KL	7/25/2019
Iron	1.15	0.30	X	mg/L	EPA200.7 Rev4.4	MN	7/29/2019
Manganese	0.03	0.30		mg/L	EPA200.7 Rev4.4	MN	7/29/2019
Chloride	17	250		mg/L	EPA300.1 Rev1.0	KL	7/26/2019
Sulfate	<5	250		mg/L	EPA300.1 Rev1.0	KL	7/25/2019
Sodium	21.5			mg/L	EPA200.7 Rev4.4	MN	7/26/2019
Fluoride	0.22	2.2	C-	mg/L	EPA300.1 Rev1.0	KL	7/25/2019
Arsenic	<0.0005	0.010		mg/L	SM3113B	MN	7/26/2019
Lead	<0.001	0.015		mg/L	SM3113B	MN	7/25/2019

Qualifiers Key:
X Exceeds maximum contamination limit
T Temperature outside specifications
C(+/-) CCV outside acceptable limits
S(+/-) Lab control sample outside acceptance limits
(+ Result may be biased high / - Result may be biased low)
R Duplication outside acceptance limits
A Sample contained air bubble or headspace
Z Analysis is not state-certified
M(+/-) Matrix spike recovery outside acceptance limits
H Hold time exceeded
B Analyte detected in blank
G Incorrect bottle received
P Sample preserved at lab

Legend: < Less Than, > Greater Than mg/L=PPM, ug/L=PPB If no collection time was given, 00:00 is reported
MCL = Maximum Contaminant Level referenced from New York State Subpart 5-1 of the Public Drinking Water Standards and/or National Primary/Secondary Drinking Water Standards.

Note 1: Per ELAP requirements, water analyzed for alkalinity, color, conductivity, nitrate, nitrite, sulfate, organics, UV absorbance, non-potable bacteriological analyses, BOD/CBOD, solids and phosphorus are required to be on ice to indicate the chilling process has begun. Samples must be between 0-6C and not frozen.

Comments:
Sample is POSITIVE for Total Coliform. This result indicates that the water WAS-NOT of a SATISFACTORY sanitary quality when sampled for the contaminants examined. Water of good sanitary quality should have no Escherichia coli or Total Coliform Bacteria. Sample is NEGATIVE for Escherichia coli. For drinking water samples, any positive result for total coliform and/or Escherichia coli is unacceptable.



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Printed On : [redacted]
Sample ID:
Date Received:
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PO Number:
Your Ref:

Page 2 of 3

Customer: NY State Dept of Health
Owner: Not Specified
Sample Loc:
Sample Pt: [redacted]

Collect Date: [redacted]
Collect Time:
Collected by:
Receipt Temp:

Water Source: Drilled Well
Chlorinated: No Field Residual Chlorine:

Potable: Yes
Grab/Comp: Grab

Total Coliform 101.3 MPN/100 mL

Sample was NEGATIVE when screened for total residual chlorine in laboratory.
Bacteriological sample was set up on 07/24/19 at 16:05.

ALKALINITY: There are no specific limits set for alkalinity since a high value does not render the water unfit for drinking. If the pH is below 8.3 the alkalinity, if any, is due to bicarbonate; if above 8.3, carbonates are also present, though generally in considerably lower quantity than the bicarbonate. Alkalinity values like pH, aid in evaluating corrosive tendencies, but hardness, salt concentration, etc., also affect corrosion. Per ELAP requirements, sample should be completely filled to the exclusion of air.
CONDUCTIVITY: There are no established control limits for this test, however, it is a useful check of the overall mineral content of water. Your value is in the moderate range.
EPA300.1: The surrogate recovery for dichloroacetate (DCA) for this sample was within acceptable limits at 90%. The acceptable limits are 90-115%.
HARDNESS: There are no specific levels set for hardness since excessive levels do not render the water unfit for consumption. However, when the level reaches the 120 mg/L plus range, problems with scale deposition on pipes and utensils and in hot water tanks increase. With your value of greater than 120 mg/L, water softening is an option if mineral scale deposits are noticeable and/or bothersome.
IRON/MANGANESE: The total of the two should not exceed 0.50 mg/L.
NITRATE: Nitrate testing was set up on 07/25/19 at 11:19.
PHYSICAL CHARACTERISTICS: Color, turbidity and pH testing were set up on 07/24/19 at 15:52. Hold time for pH testing per ELAP requirements is 15 minutes for all water samples. pH was tested at 17 degrees Celsius. Odor was set up at 15:57. Odor was tested at 59 degrees Celsius. Sample was filtered and color is reported as true color.
SODIUM: The following are suggested limits for those persons on physician ordered sodium restricted diets: Moderately restricted diet---water should contain less than 270 mg/L. Severely restricted diet---water should contain less than 20 mg/L.

The hardness, turbidity and iron content of this water exceeds recommended limits. The turbidity is most likely being caused by the high iron. At these levels, the iron can lead to staining of porcelain and/or laundry. Removal of iron can be accomplished with water softeners or oxidizing filters. Keep in mind that iron is not harmful to consume. It is controlled for aesthetic reasons. Test procedures for all analyses meet NELAC requirements unless noted. If you have any questions, please call the laboratory.

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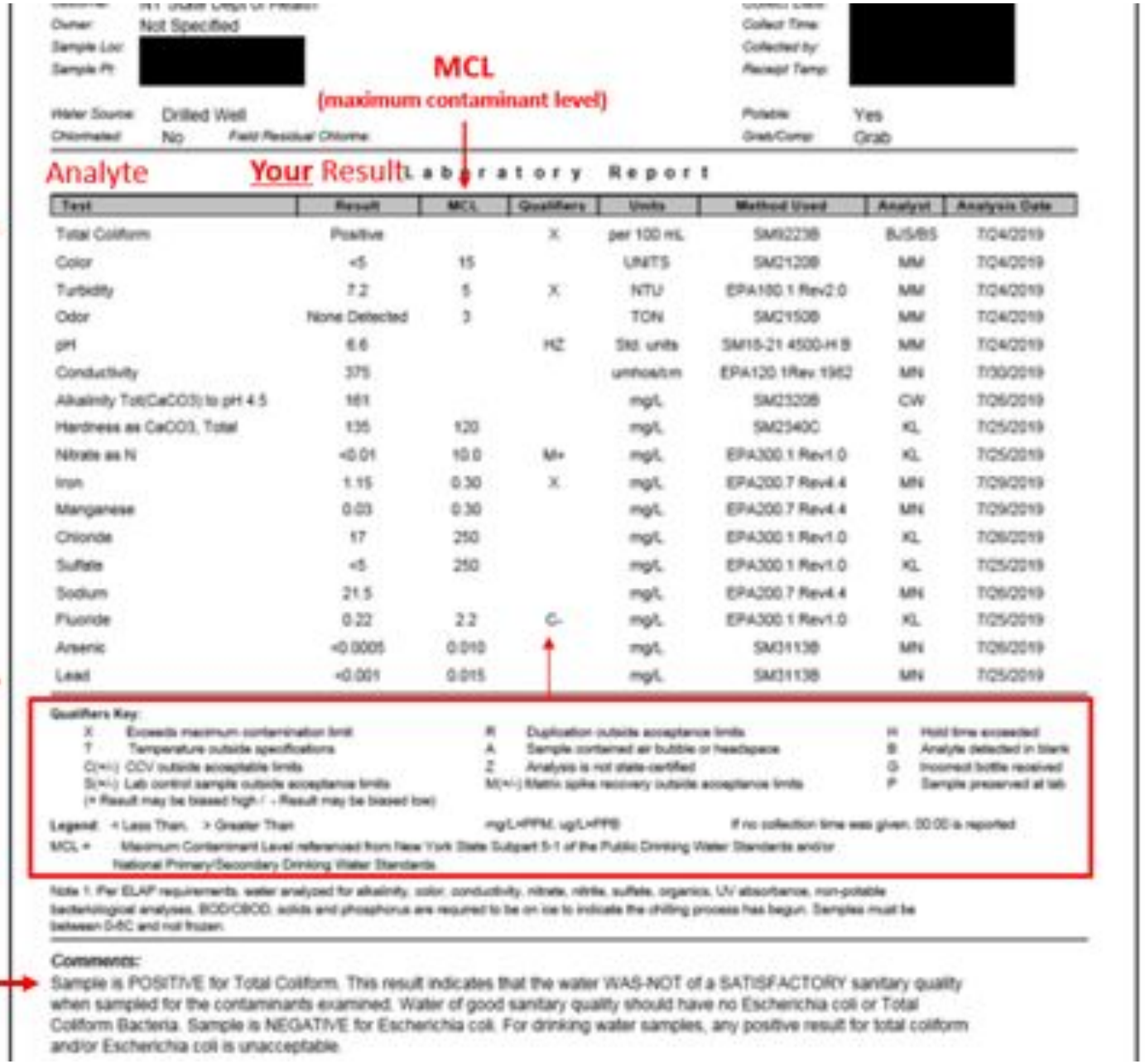
Reading Your Results

As we can see, this water sample was in exceedance (Result > MCL) for:

- Total Coliform
- Turbidity
- Iron

Text below also describes results for coliform bacteria



Owner: Not Specified
Sample Loc: [redacted]
Sample Pt:
Collect Time:
Collected by:
Receipt Temp: [redacted]
Water Source: Drilled Well
Chlorinated: No
Field Residual Chlorine:
Potable: Yes
Grab/Comp: Grab

MCL (maximum contaminant level)

Analyte | Your Result

Laboratory Report

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Recommended Testing Schedule

Test For	How Often
• E. coli & Coliform Bacteria	Every Year
• Lead • Nitrate & Nitrite • Arsenic • Sodium • Iron & Manganese • Turbidity • pH • Hardness • Alkalinity	Every 3 – 5 Years

Thank you!
And please test your wells!

Testing Schedule

Test For	Why	How Often
E. coli & coliform bacteria	indicate fecal contamination that can cause symptoms such as diarrhea and vomiting	Each year
Lead	harmful to many organs and systems in the body and most harmful to developing babies and young children	Every 3-5 years
Nitrate & Nitrite	most harmful to babies; associated with infant blood problems	Every 3-5 years
Arsenic	long-term exposure is associated with nerve and liver damage, cancer, high blood pressure and damage to blood vessels of the heart and brain	Every 3-5 years
Sodium	concern for individuals on restricted sodium diets due to high blood pressure or other medical issues	Every 3-5 years
Iron & Manganese	cause rust or black staining of fixtures or clothes	Every 3-5 years
Turbidity	(cloudy water) interferes with chlorine and UV-light disinfection	Every 3-5 years
pH	causes lead and copper pipe corrosion and metallic-bitter taste	Every 3-5 years
Hardness	causes mineral and soap deposits on fixtures; reduces detergent efficiency	Every 3-5 years
Alkalinity	interferes with chlorine disinfection and causes metallic-bitter taste	Every 3-5 years

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Thank you

Questions or Comments?

Contact Information:
Private.wells@health.ny.gov

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Additional Resources

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Be Well Informed

PrivateWellClass.org

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