

Private Wells in New Jersey: Building Local Health Capacity

PRESENTERS:

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New Jersey Department of Health
Private Well Outreach Program



PRESENTATION AGENDA



Discussion



Private Well Water Regulations in NJ



Contaminants of Concern: Gross Alpha & Lead



Neighbor and School-Based Outreach



Follow-Up Survey Evaluation



How often do you get questions from private well owners?



What types of private well related questions do you receive?



What are your department's barriers to helping private well owners?

PRIVATE WELL REGULATIONS IN NJ



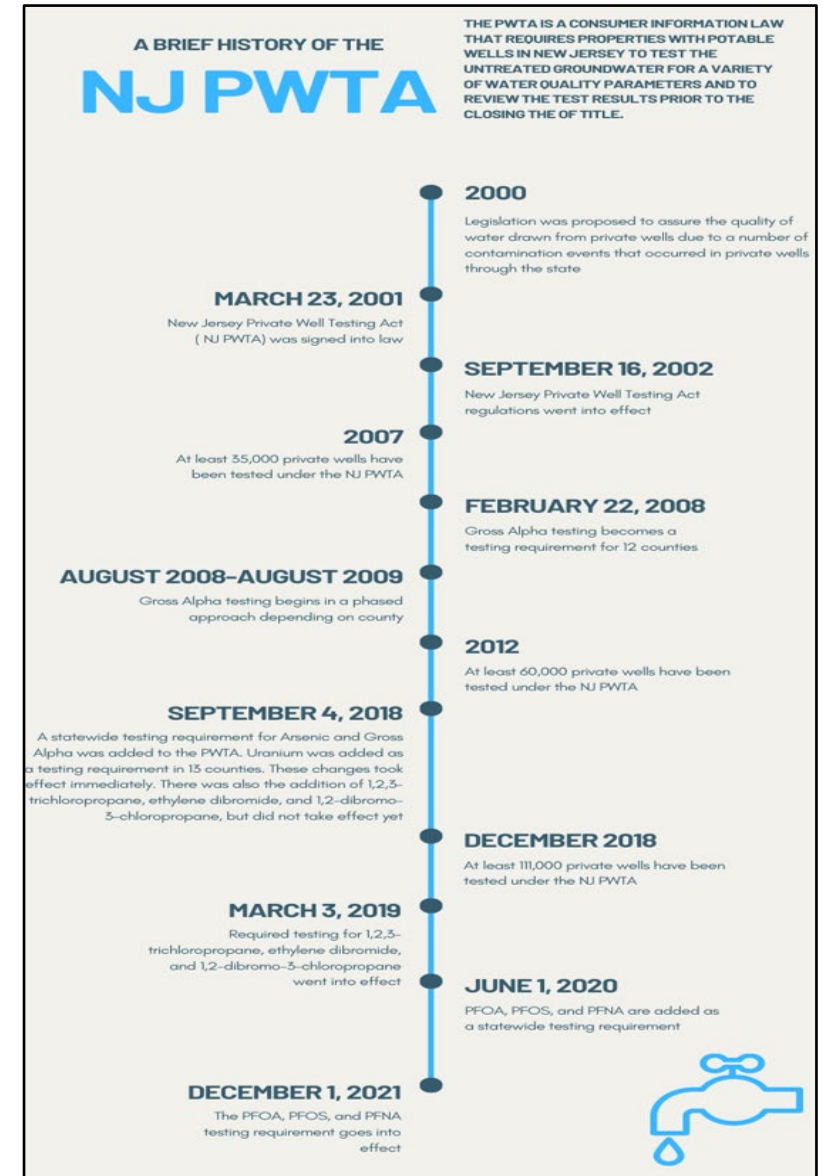
PRIVATE WELLS IN NEW JERSEY

- NJ is the most densely populated state
- About 11-13% of NJ residents on private well water (about 1 million people)
- Estimated 400,000 wells used for water consumption purposes
- No federal regulations



NJ PRIVATE WELL TESTING ACT

- Effective September 2002
- Consumer information law
- Requires buyers and sellers of property with private well to test and share raw water results
- Confidential
- Some water quality parameter requirements specific to some counties (mercury and uranium)



PRIVATE WELL TESTING ACT RULES

- Water sampling must be collected either by NJ certified laboratory or laboratory's authorized representative
 - List of labs available at NJDEP Data Miner: <https://njems.nj.gov/DataMiner>
 - Laboratory must follow reporting rules using standard form and must report to NJDEP electronically
 - Analytical results are valid for 1 year
 - Coliform results valid for 6 months
- Requires raw/untreated water sample
- Laboratory must notify the person who requested the test and LHD of violation within 24 hours from obtaining results
- NJDEP shall notify LHD of violation within 5 business days after receiving notice
- Data submitted or received to LHD must be kept confidential

PWTA REQUIRED PARAMETERS

Primary Drinking Water Contaminants	MCL
Bacteriological: Total Coliform (E.Coli or Fecal)	Presence/ Absence
29 Volatile Organic Compounds (VOCs)	*MCLs vary
Inorganic Compounds:	
Arsenic	5 µg/L
Lead	5 µg/L
Mercury	2 µg/L
Nitrates	10 mg/L
Radiological:	
Gross Alpha (48-hour)	15 pCi/L
Uranium	30 µg/L
Radium 226 + 228	5 pCi/L

Secondary Drinking Water Contaminants	SMCL
pH	6.5-8.5
Iron	0.3 mg/L
Manganese	0.05 mg/L

Abbreviations:

MCL = Maximum Contaminant Level

SMCL = Secondary Maximum Contaminant Level

mg/L = milligrams per liter

pCi/L = picocuries per liter


µg/L = micrograms per liter

NJ PWTA EXPANSION INCLUDES PFAS

- NJ MCLs developed for PFNA, PFOA and PFOS
- Testing for PFAS required under the NJ PWTA – December 2021

PFAS	MCL
PFNA	13 ppt (ng/L)
PFOA	14 ppt (ng/L)
PFOS	13 ppt (ng/L)

parts per trillion (ppt) = Nanogram/Liter (ng/L)



Drinking Water Facts:

Per- and Polyfluoroalkyl Substances (PFAS) in Drinking Water

Updated July 2022

General information

PFAS are a large group of manmade chemicals which repel water and oil and are resistant to heat and chemical reactions. Because of these properties, they have important industrial and commercial uses. PFAS are used in the production of some non-stick cookware, in waterproof and stain proof coatings, in "leak-proof" coatings on food packaging materials, in fire-fighting foams, and other applications.

PFAS can enter drinking water through industrial release to water, air, or soil; discharges from sewage treatment plants; land application of contaminated sludge; leaching from landfills; and use of certain fire-fighting foams.

Four types of PFAS have been found in the blood (serum) of greater than 98% of the United States population. **These long-chain PFAS build up and stay in the human body for many years. The levels decrease very slowly over time after exposure is reduced or stopped.**

- PFO: perfluorooctane sulfonate
- PFOA: perfluorooctanoic acid
- PFNA: perfluorononanoic acid
- PFHxS: perfluorohexane sulfonate

Exposure to PFAS

PFOA, PFOS, and PFNA dissolve in water. If drinking water is contaminated, it is a primary source of exposure to PFAS as compared with other background exposure sources. Other sources of PFAS exposure include food, food packaging, consumer products, house dust, indoor and outdoor air, and workplaces where PFAS are used or made. Exposure to PFAS in drinking water is primarily from ingestion of the water and food prepared with the water. **PFAS are not removed from water by boiling.** Exposure to PFAS through household uses of water such as showering, bathing, laundry, dishwashing, and rinsing produce is not significant.

Health effects of PFAS

Some studies of the general population, communities with PFAS contaminated drinking water, and exposed workers indicate that exposure to PFAS increases the risk of a number of health effects. **Health effects from PFAS are observed within the general population without exposure to PFAS from contaminated drinking water.**


The most consistent human health effect findings for PFOA and PFOS – the most well studied of the PFAS types – are increases in serum cholesterol and uric acid levels in the blood and decreased antibody response following vaccination, as well as increased blood levels of some liver enzymes for PFOA. Although not as well studied, PFNA appears to increase blood levels of cholesterol and some liver enzymes. Human health effects are generally consistent with the toxicity of PFAS observed in laboratory animals.

PFOA and PFOS caused tumors in rodents, while PFNA has not been tested for this effect. In humans, PFOA exposure was associated with a higher incidence of kidney cancer in both the general population and in a community with substantial levels of PFOA in drinking water, and with testicular cancer in the community with contaminated drinking water.

The Centers for Disease Control and Prevention's Agency for Toxic Substance Disease Registry (CDC/ATSDR) is conducting the "PFAS Multi-site Study," to learn more about the relationship between PFAS exposure and health outcomes. This work is taking place across seven U.S. communities exposed to PFAS-contaminated drinking water. Work is ongoing, and results are pending. To learn more visit <https://bit.ly/ATSDR-PFAS>

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Consumer, Environmental and Occupational Health Service
Environmental and Occupational Health Surveillance Program
<http://www.nj.gov/health/ceohs/sanitation-safety/drinking-water-public-health/index.shtml>



NJ SAFE DRINKING WATER ACT

- New wells require "certification" from LHD before drilling begins (or alteration)
- Upon completion of well – owner must have state-certified laboratory to test water for contaminants and submit results to local health agency
- Local health agency finalizes certification after well is constructed and tested
- Local health agency *may* require "physical and chemical treatment"
- Local health agency *shall* require treatment when:
 - Water exceeds a primary drinking water standard
 - Water exceeds a secondary drinking water standard
- Pursuant to NJ SDWA, New Jersey Housing and Mortgage Finance Agency provides 0% interest loans for treatment

NJ SPILL COMPENSATION FUND

- Compensation for damage caused by discharge of hazardous substances (manmade chemicals)
- Qualifications:
 - Requires certified laboratory test: initial and confirming
 - Eligible claim applicable if initial and confirmation results exceed drinking water standards
 - Claims may be eligible for:
 - Installation of water treatment
 - Confirmation test fee
 - Connection to public waterline
- Claims must be filed within one year from date of damage discovery
- More complicated damage must include evidence/documentation
- Contact Environmental Claims Administration (ECA) to file a claim:
 - <https://www.nj.gov/dep/srp/finance/ecacclaim.htm>

LOCAL ORDINANCES

- **Hopewell Township, Mercer County**

- Requires two-tank arsenic treatment if PWTA results exceed NJ arsenic MCL

- **Cumberland County Health Department**

- Ordinance #12
- Requires water certification before Certificate of Occupancy can be issued and for rental licenses
- Original lab results (initial and/or retest) presented to CCHD – all PWTA required parameters must pass standards
- Certificate issued for a fee paid to CCHD

CONTAMINANTS OF CONCERN



PRIVATE WELL SOURCES OF CONTAMINATION

Naturally occurring sources:

- Underlying geology (e.g. - gross alpha, arsenic, radium, uranium)
 - Bedrock: Naturally occurring elements can leach into water through drilling (private wells) and/or fractured bedrock units
 - Aquifers: Acidity and presence of elevated nitrates can increase amount of radium dissolving into the groundwater from contact with sands and soils
 - Other contributing factors: age, depth, and type of well

Anthropogenic sources:

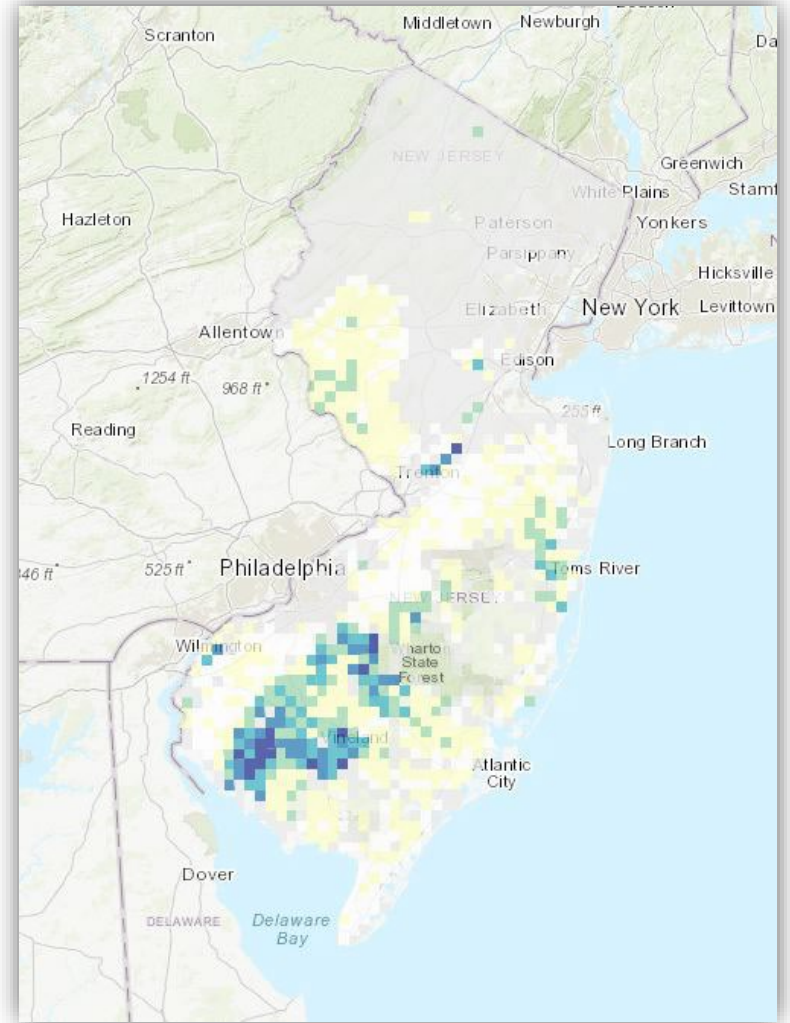
- Agricultural and lawncare (e.g. - nitrates)
- Industrial discharge (e.g. - PFAS)

Microorganisms:

- Bacteria and viruses are detected in groundwater.
- From human or animal sources (broken well head)
- Septic tanks – Minimum of 100-foot separation of leach fields and septic tanks from well

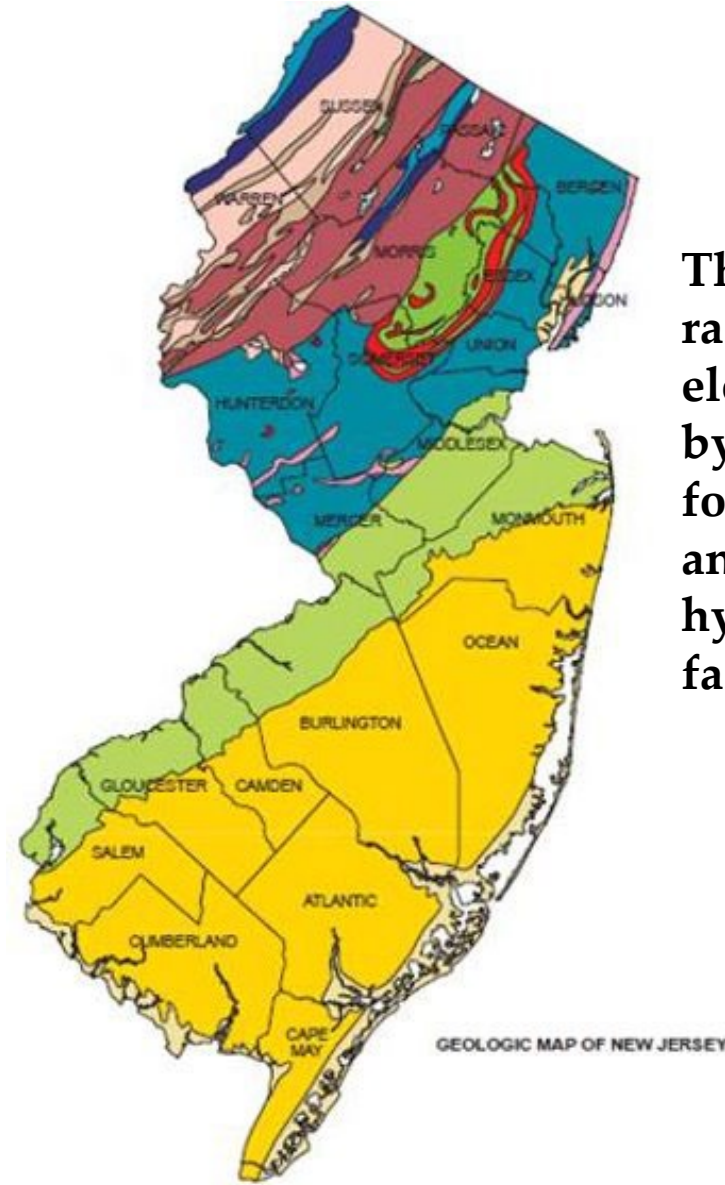
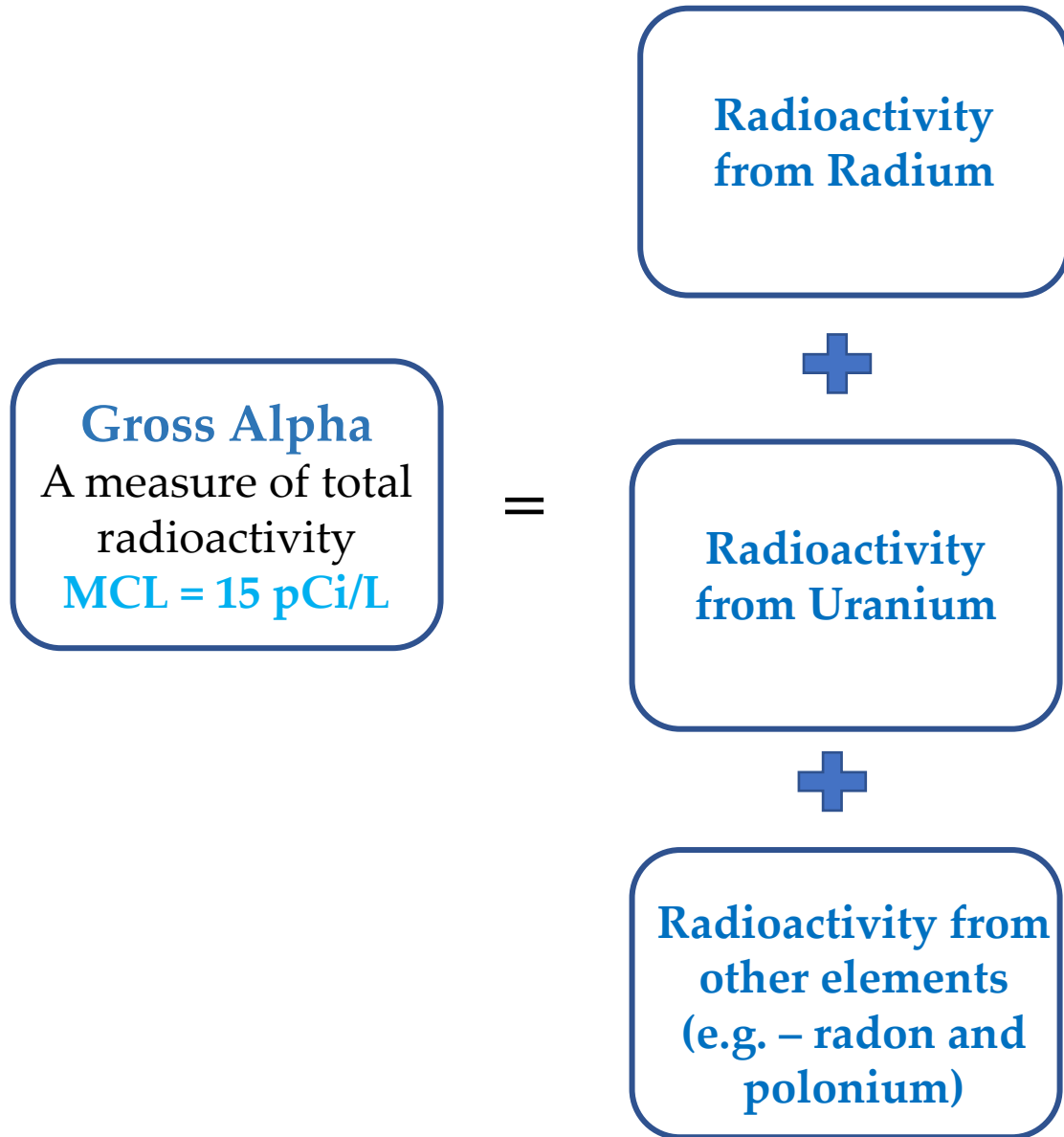
GROSS ALPHA BACKGROUND

- It is the most common contaminant that exceeds the MCL in NJ private well water
 - **MCL = 15 pCi/L**
- Odorless, colorless, tasteless
- Mainly caused by naturally occurring elements
 - **Radium** – **MCL = 5 pCi/L**
 - **Uranium** – **MCL = 30 µg/L**
- Adverse health effects
 - **Radium** – bone and sinus cancer
 - **Uranium** – kidney toxicity
- Requires a 48-hour test
 - Captures half-life of radium-224



NJ PWTA (2002-2018), percentage of wells exceeding for gross alpha (southern twelve counties)

WHAT IS GROSS ALPHA RADIOACTIVITY?



The presence of radioactive elements varies by geologic formation/region and hydrogeologic factors.

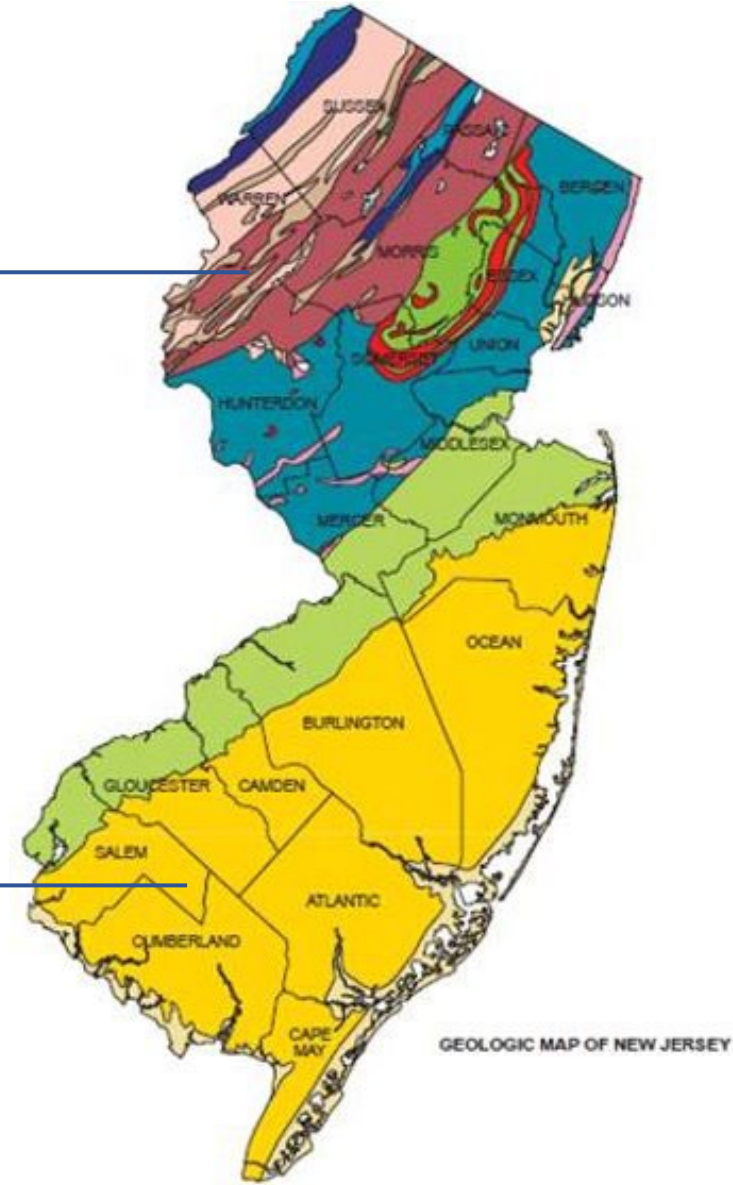
GEOLOGY AND RADIOACTIVE ELEMENTS

Northern Jersey

Mainly geologic-based – specific bedrock compositions increase uranium, radium, and radon concentrations.

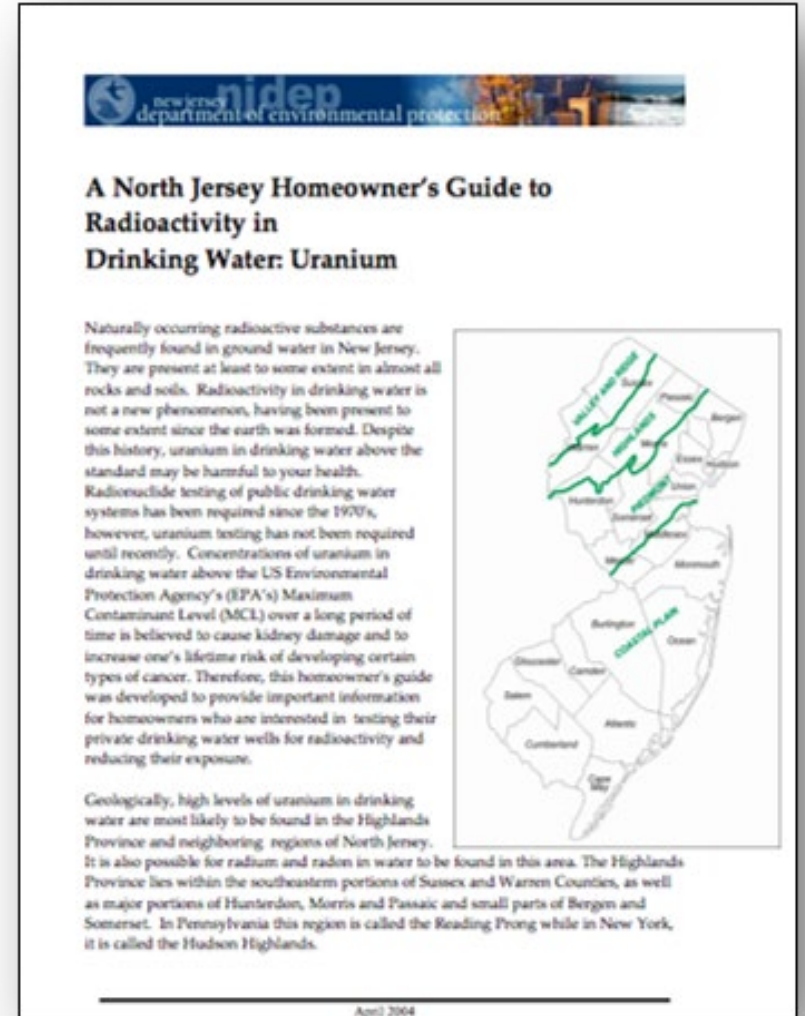
Southern Jersey

Aquifers - The low pH and presence of nitrates can accelerate the mobility of radium.



GROSS ALPHA – NORTH JERSEY

- PWTA amended September 2018
 - Gross alpha expanded and uranium required
- Elements that drive gross alpha radioactivity in north:
 - Uranium (MCL 30 µg/L)
 - Radium (MCL 5 pCi/L)
 - Radon (Recommended MCL of 800 pCi/L)
- Factors which impact presence in drinking water
 - Bedrock geology
 - Well depth
 - pH
 - Dissolved oxygen level
- Detection can differ from one neighbor to the next
- BUT... still strongly predictive



new jersey njdep
department of environmental protection

A North Jersey Homeowner's Guide to Radioactivity in Drinking Water: Uranium


Naturally occurring radioactive substances are frequently found in ground water in New Jersey. They are present at least to some extent in almost all rocks and soils. Radioactivity in drinking water is not a new phenomenon, having been present to some extent since the earth was formed. Despite this history, uranium in drinking water above the standard may be harmful to your health. Radiocesium testing of public drinking water systems has been required since the 1970's, however, uranium testing has not been required until recently. Concentrations of uranium in drinking water above the US Environmental Protection Agency's (EPA's) Maximum Contaminant Level (MCL) over a long period of time is believed to cause kidney damage and to increase one's lifetime risk of developing certain types of cancer. Therefore, this homeowner's guide was developed to provide important information for homeowners who are interested in testing their private drinking water wells for radioactivity and reducing their exposure.

Geologically, high levels of uranium in drinking water are most likely to be found in the Highlands Province and neighboring regions of North Jersey. It is also possible for radium and radon in water to be found in this area. The Highlands Province lies within the southeastern portions of Sussex and Warren Counties, as well as major portions of Hunterdon, Morris and Passaic and small parts of Bergen and Somerset. In Pennsylvania this region is called the Reading Prong while in New York, it is called the Hudson Highlands.

April 2004


GROSS ALPHA – SOUTH JERSEY

- Elements that drive gross alpha radioactivity in south:
 - Radium (MCL 5 pCi/L)
- Radium dissolves more readily into groundwater when:
 - In contact with sands or soils
 - Acidic groundwater (< 6.5 pH) and elevated nitrates
- Gross alpha > 5 pCi/L in South Jersey suggests radium > 5 pCi/L
- Many communities have widespread radium (50 - 70% of wells tested)
- Water softeners are also widespread but not universal
- Maintenance is key.
 - Estimated ~20% of homeowners with elevated gross alpha levels have water softeners in South Jersey.



A South Jersey Homeowner's Guide to Radioactivity in Drinking Water: Radium

Radioactive substances in ground water, such as radium, uranium and thorium, occur naturally. They are present at least to some extent in almost all rocks and radium, in particular, dissolves more readily into ground water in contact with sands or soils. The acidity of the water, which may be increased by the presence of elevated levels of nitrates associated with agricultural land use, is believed to increase the amount of radium that dissolves into ground water from contact with sands and soils.



Sampling of public and private wells that draw water from southern New Jersey's Cobleskill aquifer has shown elevated levels of naturally occurring radioactivity. The aquifer, sometimes referred to as the Kirkwood-Cobleskill aquifer, is present in all, or parts of Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, Monmouth, Ocean and Salem counties (see map at right). Elevated levels of radioactivity most recently were found in the area of Dover township, Ocean County, where an investigation is under way into specific childhood cancers in that area. It is important to note, however, that radioactivity in drinking water, especially at these low concentrations, is not known to cause these types of cancers.

Results from investigations in Dover Township, Ocean County, which used a new testing procedure that detects radiation from short-lived radioactive substances, indicated that elevated levels of radioactivity existed in some area drinking water supplies. Consequently, the N. J. Department of Environmental Protection and the U. S. Geological Survey conducted studies to better understand the presence of radioactivity in this aquifer. The results of these studies confirmed that Radium 226, 228 and 224 may be found in elevated concentrations in parts of the Cobleskill aquifer.

Radioactivity in drinking water is not a new phenomenon, having been present to some extent for thousands of years. Nevertheless, exposure to radium over a long period of time is believed to increase one's lifetime risk of developing certain types of cancer. Therefore, homeowners should be aware of the steps they might wish to take to test their private drinking water wells for radioactivity and to reduce their exposure.

Revised April 2004

WATER TREATMENT

Radium

- Whole-house water softener
 - \$1,200 – \$1,500
- Point-of-use (POU) Reverse Osmosis
 - \$800

Uranium

- Whole-house anion exchange (followed by pH neutralizer)
 - \$2,000
- Point-of-use (POU) Reverse Osmosis
 - \$800

RADON IN WATER

- No radon MCL for public water supply
- NJ Drinking Water Quality Institute – Recommended MCL of **800 pCi/L**
- Health risks from inhalation and ingestion
 - Contributes to radon in air – lung cancer
 - Stomach cancer
- Northern NJ – some localized areas have high concentrations of radon in water
 - Radon levels as high as **73,000 pCi/L**

Water Treatment*

- Granular activated carbon (>800 pCi/L)
 - **Caution:** tanks can become radioactive
 - Tanks need to be properly disposed
 - \$2,000
- Aeration bubbler (>4,000 pCi/L)
 - No radioactive accumulation
 - \$3,000 - \$5,000

BARRIERS TO MITIGATION

- Naturally occurring contamination not covered under NJ Spill Fund
- Water treatment can be costly and complex
- Difficult to provide guidance
- Water treatment professionals are unregulated, lots of differences in recommendations, best practices are not established
- Post treatment testing recommended and expensive
- Maintenance required

NEW JERSEY HOUSING & MORTGAGE FINANCE AGENCY

- **Potable Water Loan Program**

- **Eligibility:**

- Individual private well homeowners only
- Violations of state Primary Drinking Water Standards
- Some secondary Drinking Water Standards included

- **Maximum Loan Amount = \$10,000**

- 0% no-interest
- 10-year maximum term

- **Potable Water Fact Sheet**

- https://www.state.nj.us/dca/hmfa/consumers/docs/ho_potablewater_fs.pdf



SCHOOL-BASED & NEIGHBOR-BASED OUTREACH

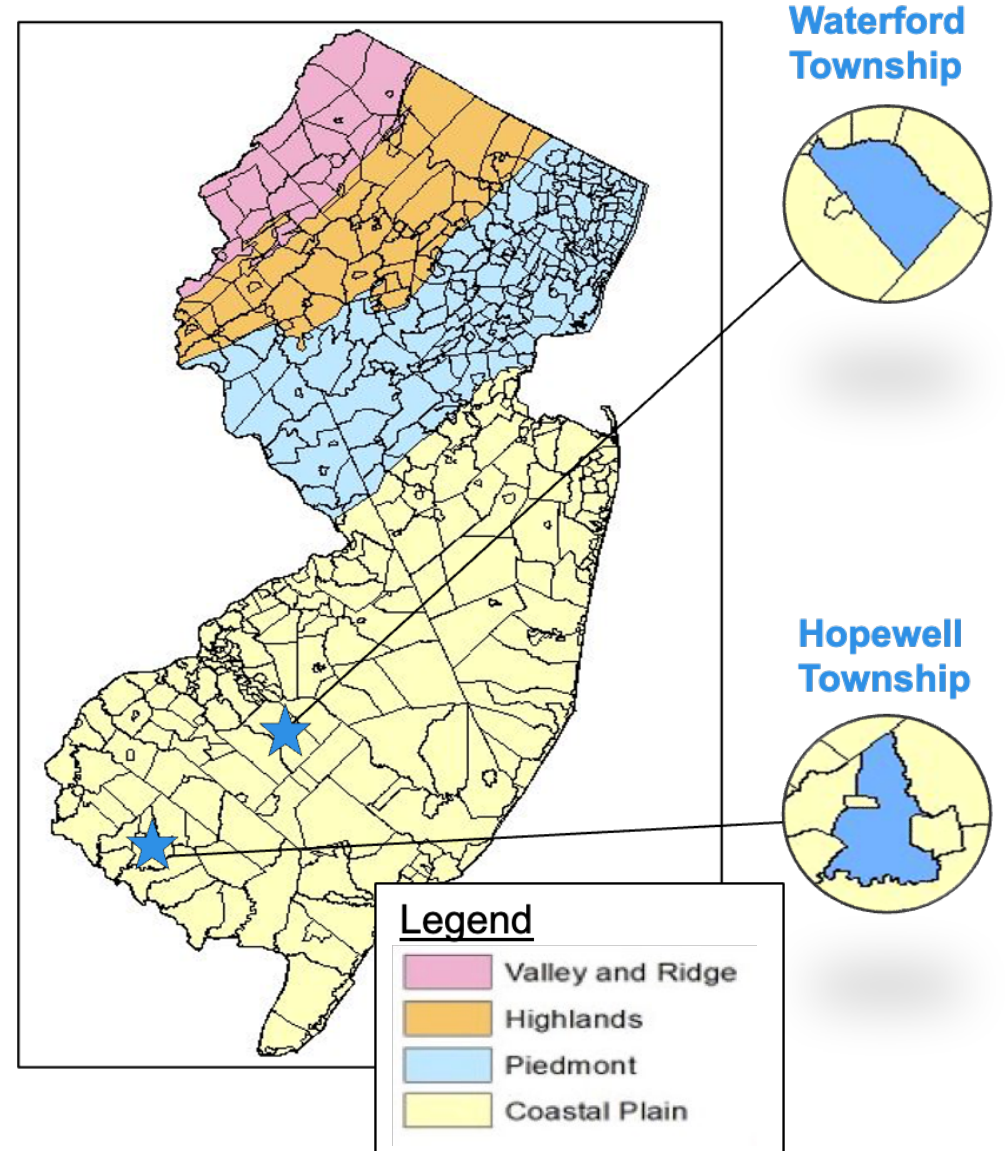


NJDOH PRIVATE WELL OUTREACH PROGRAM

- Funded by Centers for Disease Control and Prevention through the Environmental Health Capacity Award; 2020-2025
- **Objective:** Promote awareness and education of naturally occurring contamination for NJ private well homeowners
- **Strategies:**
 - Conduct evidence-based private well outreach
 - Targeted Schools & Communities
 - Targeted Neighbor-based
 - Provide funding and training for local health departments
 - Evaluate impact of well outreach and trainings

COMMUNITY OUTREACH OVERVIEW

- Analyze available NJ water quality data
 - Private wells and public water systems
- Identify and target communities susceptible to naturally occurring contamination
- Collaborate with community partners
 - Township committees, environmental commissions, school administration



TARGETED COMMUNITY-BASED OUTREACH, 2021

Waterford Township, Camden County:

- NJ PWTA – **46.0%** of wells exceeded gross alpha standard
- Outreach – 82 registrants; 61 wells sampled
 - Raw water: **28%** of wells **failed**
 - Treated water: **3%** of wells **failed**

Hopewell Township, Cumberland County:

- NJ PWTA – **58.8%** of wells exceeded gross alpha standard
- Outreach – 30 registrants; 23 wells sampled
 - Raw water: **39%** of wells **failed**
 - Treated water: **18%** of wells **failed**

NEIGHBORS OUTREACH OVERVIEW

- Utilize NJ PWTA database to map highest exceeding gross alpha wells to identify neighbors
- Neighbors prioritized based on high well's gross alpha result, proximity to high well, and local jurisdiction
- Invitation letters sent in the mail to homes
- Testing offered on a first-come, first-serve basis
- Certified laboratory collects samples
- Tailored result letters include guidance and recommendations
 - Sent in mail and via email
 - Confidential

NEIGHBORS IDENTIFICATION & SELECTION

- **Geographic Information Systems (GIS) ArcMap**
 - Export selected high wells for spatial and geographic data analysis
 - Some properties need to be excluded/removed (if not identified as residential home)
 - 500 ft. buffer surrounding high well – created to identify at-risk neighbors



RESULT LETTER – WATER TEST RESULTS

Water Results analyzed by EMSL Analytical, Inc. [Collected on April 25, 2022]				
		Raw/Untreated Water Results	Treated Water Results	Pass or Fail
Parameter Tested (Unit)	Standard*	Sample Location: Pressure Tank Tap	Sample Location: Outside Tap	
Gross Alpha (pCi/L)	15 ^a	135	33.5	Fail
Ra-226 + Ra-228 (pCi/L)	5 ^a	10		Fail
Total Uranium (µg/L)	30 ^a	11		Pass
Radon (pCi/L)	800 ^d	15,600		Fail
Iron (µg/L)	300 ^b	ND		Pass
Manganese (µg/L)	50 ^b /300 ^c	390		Fail
pH	6.5-8.5 ^b	7.1		Pass

Abbreviations: pCi/L = picocuries per liter; µg/L = micrograms per liter; NA = Not Applicable; ND = not detected

Standard*: ^aMaximum Contaminant Level (MCL); ^bSecondary Maximum Contaminant Level (SMCL); ^cUSEPA Lifetime Health Advisory (HA); ^dNJ Drinking Water Quality Institute Recommended MCL

*Grayed out boxes indicate sampling for that specific contaminant in the treated water was not conducted.

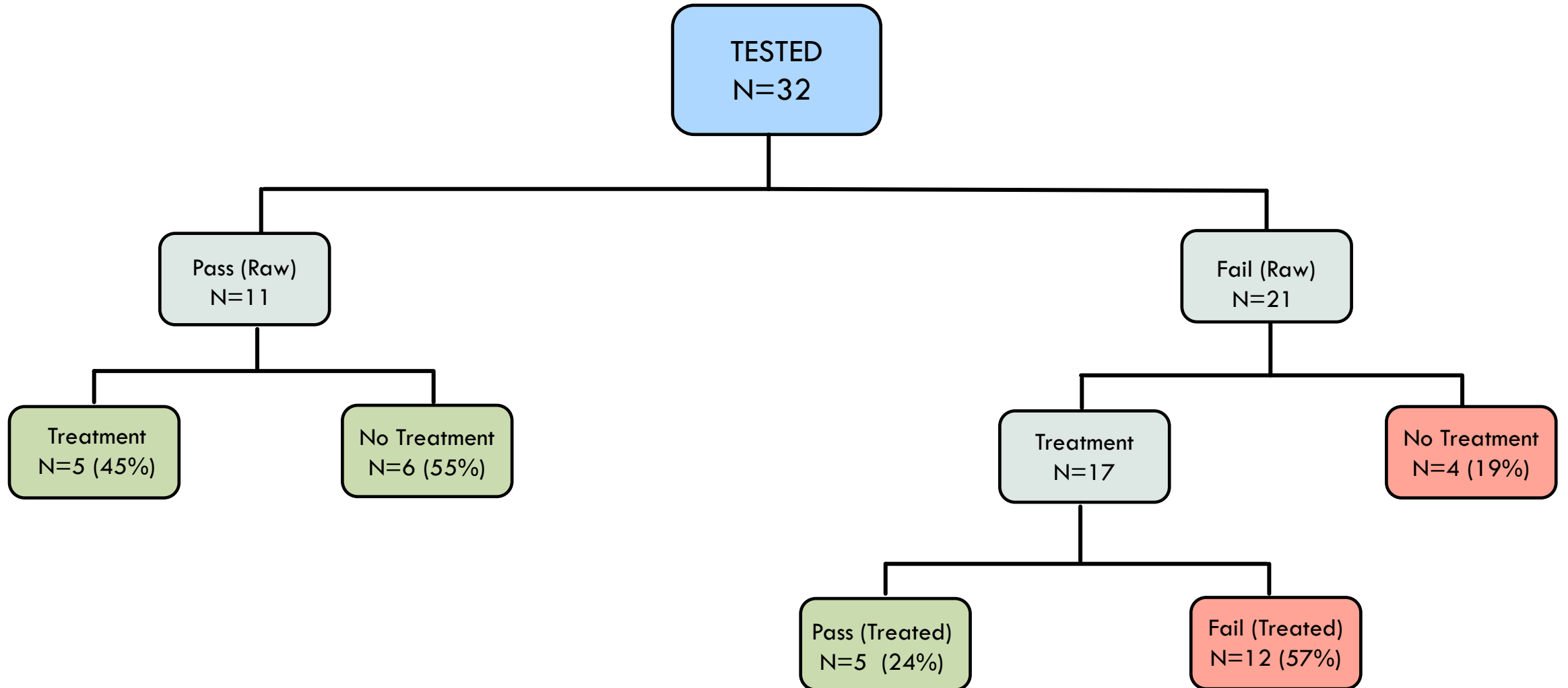
NEIGHBORS-BASED OUTREACH (2021): RAW WATER RESULTS

Parameter (Unit)	Standard*	# (%) EXCEEDING
Gross Alpha (pCi/L)	15 ^a	21 (66%)
Radium (pCi/L)	5 ^a	8 (26%)
Uranium (µg/L)	30 ^a	12 (38%)
Radon (pCi/L)	800 ^d	26 (81%)
Manganese (µg/L)	50 ^b /300 ^c	8 (26%)
Iron (µg/L)	300 ^b	8 (26%)
pH	6.5-8.5 ^a	10 (32%)

Abbreviations: pCi/L = picocuries per liter, µg/L = micrograms per liter

Standard*: ^aMaximum Contaminant Level (MCL), ^bSecondary Maximum Contaminant Level (SMCL), ^cUSEPA Lifetime Health Advisory (HA), ^dNJ Drinking Water Quality Institute Recommended MCL

NEIGHBORS OUTREACH (2021): DRINKING WATER EXPOSURE TO GROSS ALPHA



LOCAL HEALTH DEPARTMENT NOTIFICATION

- Local Health Department (LHD) is:
 - “authorized to issue a public notice to owners of property within vicinity of the subject property suggesting or recommending that property owners may wish to have nearby wells sampled for the failed parameter(s)”
 - NJDOH neighbors' notification and outreach requires permission/support from LHD
 - In our 2021 Northern NJ outreach, 8/12 LHD provided support
 - **What are barriers to receiving 100% support?**

FOLLOW-UP SURVEY EVALUATION



SURVEY OBJECTIVES AND DISTRIBUTION

■ Objectives:

- To learn what actions participants took following free well testing
- Identify ways to improve outreach programs

■ Distribution:

- Follow-up about 6 months after participation
- Sent in the mail
- Postage-paid return envelope included for mailed return
- Web link to complete online
- Tote bag sent as incentive
- Follow-up email reminder to complete



ANALYZING SURVEY DATA

- Export online entries
- Survey questions categorized into topic areas and graphically analyzed
- Master list of entries linked to analysis/visualization tool created in Excel
- Allows new data (for future outreach surveys) to be automatically included in visualization

How satisfied were you with our communication throughout the event?
Circle one number for each statement.

	Disagree	Neutral	Agree	Not applicable
The result letters were clear and understandable.	1	2	3	4
I learned about the health risks associated with contaminants in my well water.	1	2	3	4
Recommendations were clear and helpful.	1	2	3	4
I knew who to reach out to if I had questions.	1	2	3	4
My questions were answered clearly.	1	2	3	4
I trusted event organizers would keep me up-to-date with any changes.	1	2	3	4

11) How satisfied were you with your overall participation in this event?
Circle one number for each statement.

	Disagree	Neutral	Agree
Participation in this event was easy.	1	2	3
I am glad I participated.	1	2	3
I would participate in an event like this again.	1	2	3

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SURVEY TOPIC AREAS

**Household
Characteristics**

**Previous
Knowledge**

Recruitment

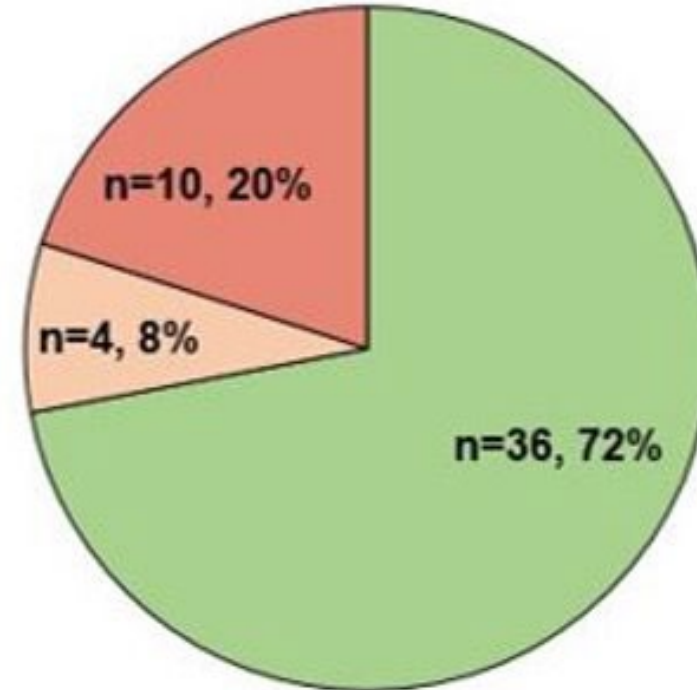
Event Experience

**Stewardship
Actions**

Water Treatment

HOUSEHOLD CHARACTERISTICS

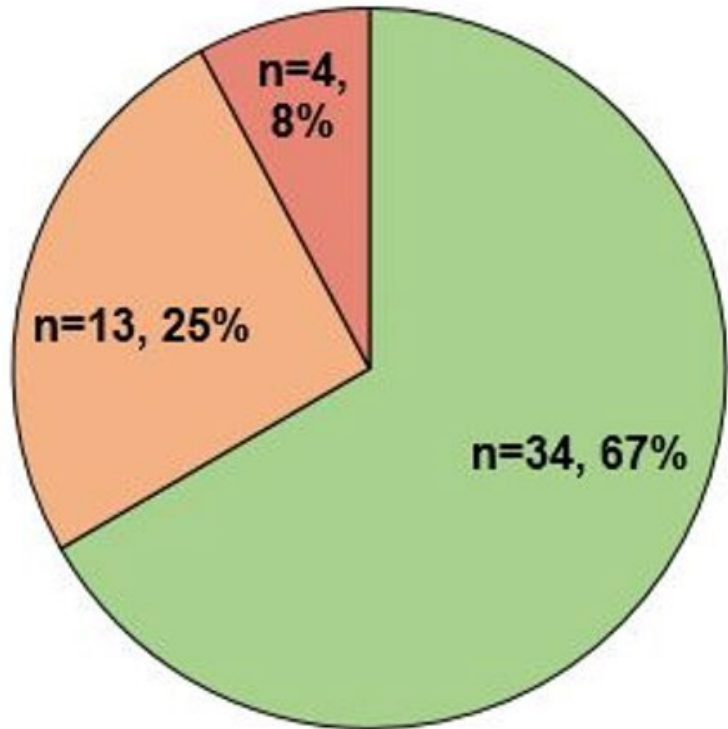
How often do you use this well for drinking water?



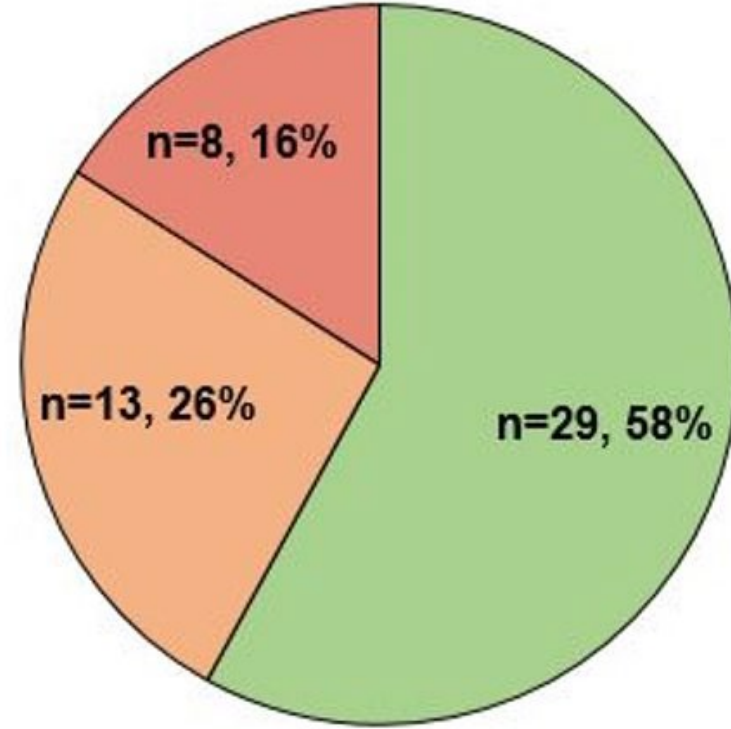
■ Mostly or Always ■ Sometimes ■ Rarely or never

SURVEY DATA – PREVIOUS KNOWLEDGE

Did you know there could be contaminants that are harmful to your health in your well water?



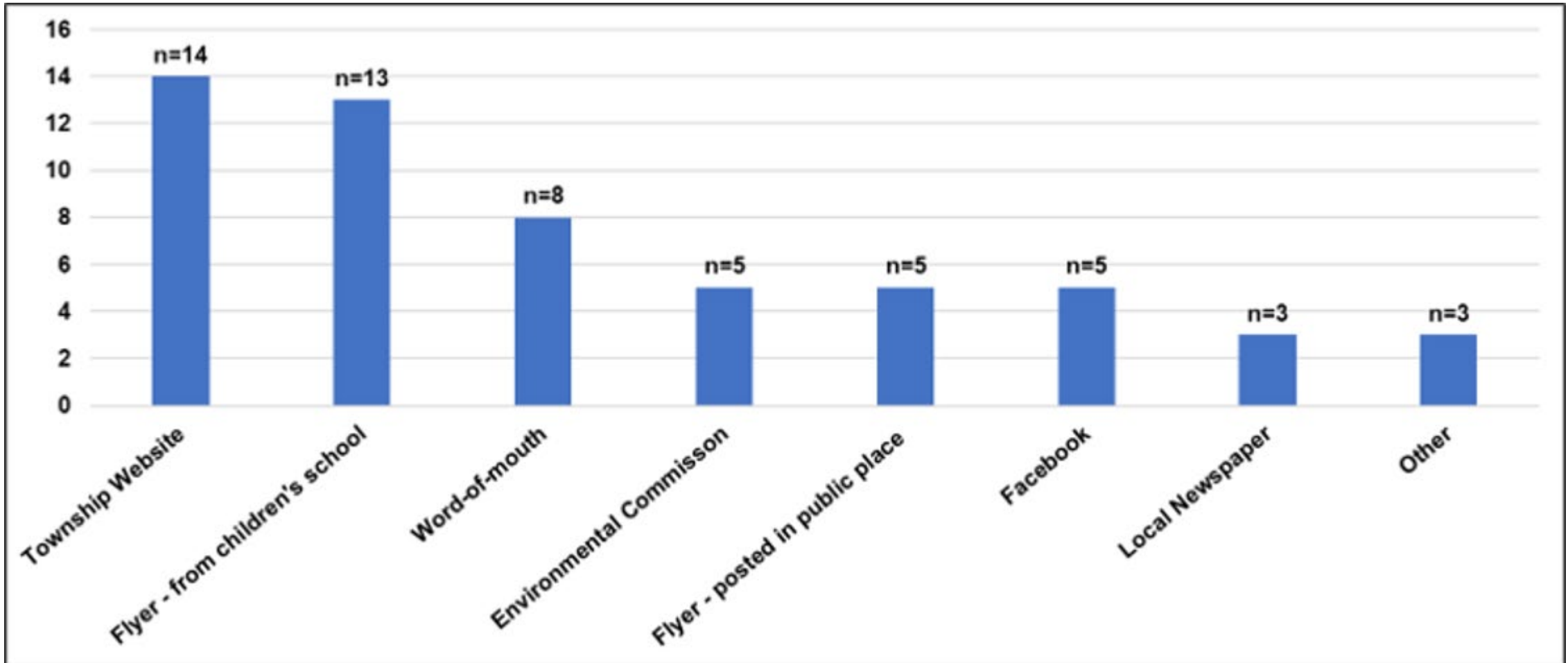
Did you know wells in your area are vulnerable to naturally occurring contaminants?



■ Yes, I knew ■ I had some idea ■ No

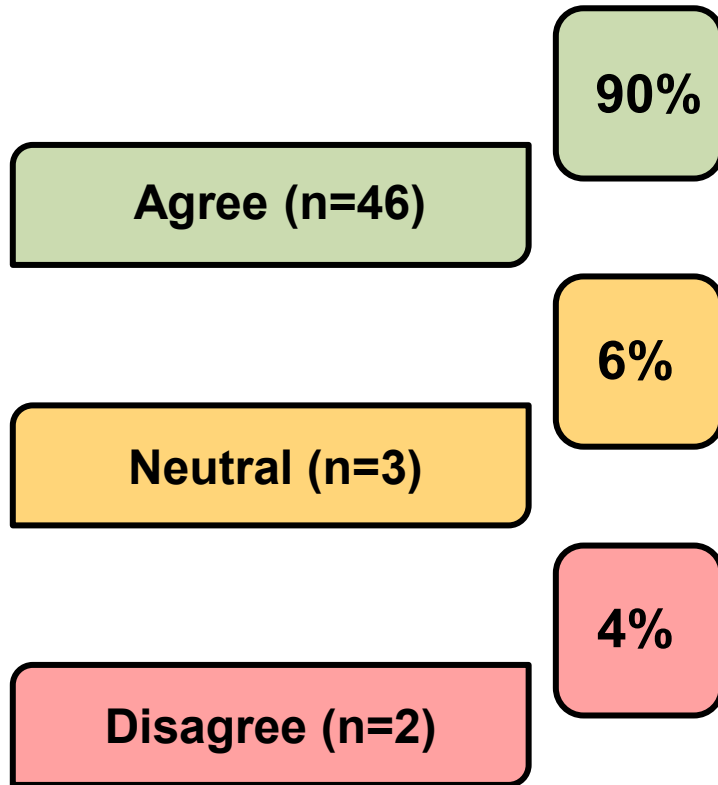
RECRUITMENT

How did you learn about this well testing opportunity?

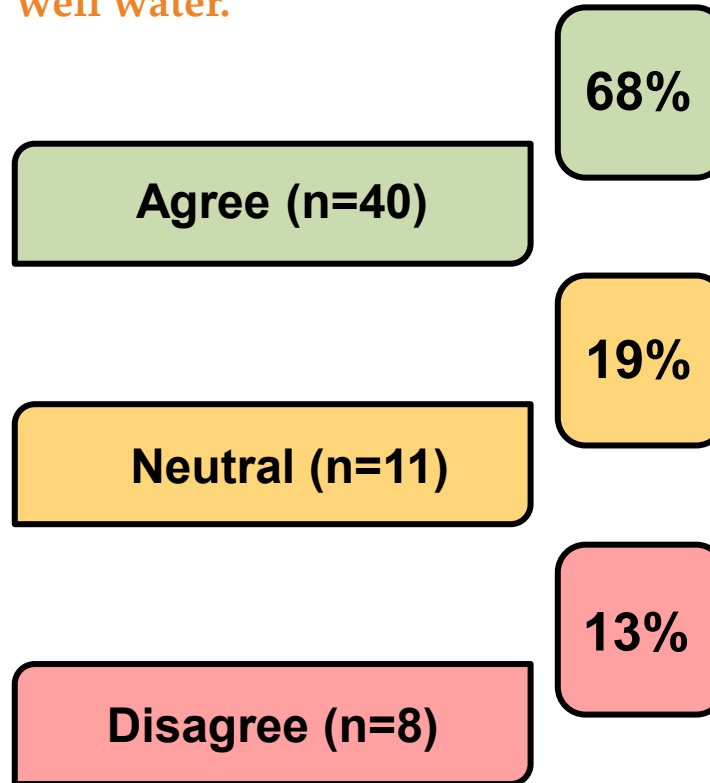


SURVEY DATA – EVENT EXPERIENCE

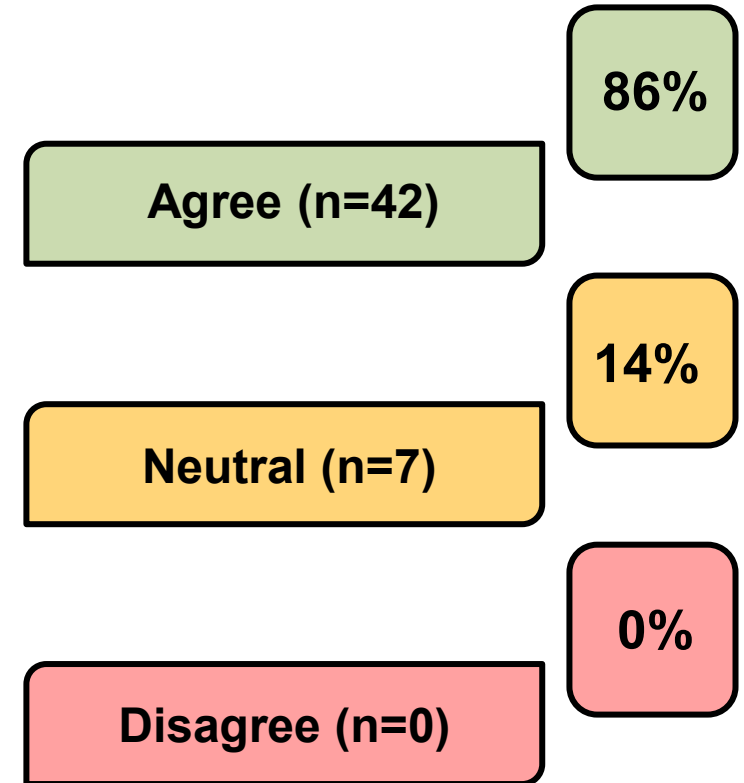
Result letters were clear and understandable.



I learned about the health risks associated with contaminants in my well water.



I knew who to reach out to if I had questions.



STEWARDSHIP ACTION

What actions, if any, did you take after you received results (for those with elevated levels of contamination)?

Actions Taken:

We now use bottled water.

We now use bottled water and filters.

We installed water treatment.

We called a treatment company for help.

We had a new well dug due to sand intake.

New pressure tank and cleaned clog screw to water softener.

No Actions Taken:

We don't drink water from the well.

Water treatment is too expensive.

We don't know what steps to take to get water treatment.

PROGRAM PERFORMANCE AND SURVEY IMPROVEMENTS

- **Conducting the survey**
 - Online reminder was successful – yields more respondents
 - Modifying phrasing for some survey questions
- **Identified program improvements/successes**
 - Revisit approach for communicating gross alpha results (gross alpha MCL v. radium MCL)
 - **100% of respondents agreed, “I would participate in an event like this again”**
 - Future program efforts should focus on water treatment maintenance



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Private Well Project Manager

Survey Evaluation Link:

<http://healthsurveys.nj.gov/NoviSurvey/n/zz3d3.aspx>

SAGE FUNDING AWARDS FOR LHD

- Three LHD awards available \$5,000 each
- Application open October 1st, 2022 available at:
- https://healthapps.state.nj.us/noticeofgrant/documents/EPID23PWO_rfa.pdf
- Epidemiology, Environmental and Occupational Health - Private Well Outreach

STATE OF NEW JERSEY
SAGE
System for Administering Grants Electronically

[System Login](#) [Portal Home](#)

Welcome to the State of New Jersey System for Administering Grants Electronically (SAGE)

This is the State of New Jersey's grant management system. This system requires authorization for access. If you do not have a username and password please click the **New User** link to request access to the site.

Login

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