

## **Summary of Results from the Community Well Test Participant Pilot Study, Fall 2016**

**A Joint Project of Raritan Headwaters and Columbia University**

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### **Summary/Abstract:**

Raritan Headwaters (RHA) is a non-profit conservation organization working to preserve, protect, and improve water quality in the Raritan Headwaters region through science, education, land preservation, stewardship and advocacy. The Well Testing program conducted by the organization serves to study the health of our region's groundwater resources while promoting the health of its residents through water quality testing. In an effort to raise awareness of water contamination issues and the need for residents to test their well water, an informational survey was developed to assess the motivations and backgrounds of participating citizens. In partnership with the Columbia University Superfund Research Program (Community Engagement and Research Translation Cores), a seven part questionnaire was included with well testing kits that were distributed to residents through the RHA Well Testing Program. Our aim is to reduce public exposure to drinking water contaminants as well as promote conservation of groundwater resources by increasing participation in our Community Well Testing (CWT) program. RHA will utilize information collected from survey responses to build on prior education and outreach efforts by developing new strategies.

### **Introduction:**

Approximately 80% of the households in our region depend upon private wells for drinking water. While commercial water companies are required by law, under the Safe Drinking Water Act, to meet quality standards, private well drinking water quality is unregulated leaving owners of private wells responsible for assessing their own water quality. Under the Private Well Testing Act (PWTA), a consumer information law established in 2002, sellers of properties with wells in NJ are required to test the untreated groundwater for a variety of water quality parameters. Of the roughly 300,000 private wells in NJ, only 20-25% of them have been tested at least once under the PWTA since 2002 (NJDEP, 2016), leaving as many as 80% of the remaining wells in the state potentially unmonitored for water quality.

The US Environmental Protection Agency recommends that household water be tested once a year to ensure the well is free from harmful bacteria and nitrates. RHA has established a program that provides water tests for a wide variety of contaminants at discounted rates for residents of the Raritan Headwaters region. The Raritan Headwaters Community Well Testing (CWT) Program enables residents to test their well water easily and conveniently through their local municipality. On an arranged date, well test kits are made available at a location within the township (typically the municipal building) where residents may acquire a testing kit. Residents sample their water themselves and return samples to RHA staff and volunteers the following week at the same location. Water samples are then sent to a certified lab for analysis. During a typical CWT event, 2-5% of the private wells in a township are tested through RHA.

Water contaminants are generally odorless, colorless, and tasteless. Acute symptoms of contamination rarely occur and the specific causes of chronic illness are more difficult to determine. Often, an assumption that the water is safe and testing is unnecessary is made. People also tend to be optimistically biased, believing their risk to be lower than others'. As private well water quality is the responsibility of the well owner, individual behavior is key. The Community Engagement Core of Columbia University's Superfund Research Program serves to develop tools, resources, and strategies to build the capacity of individuals, communities, and government partners to reduce exposure to arsenic through private well water. Raritan Headwaters is partnering with Columbia University to investigate such strategies in an effort to promote public health through water quality testing in the Raritan Headwaters region.

### **Methods:**

A survey was developed to evaluate barriers to testing in order to identify effective strategies to increase participation in well testing programs. Questions were formulated to assess well testing history, successful modes of communication regarding CWT events, level of contamination risk, psychological (behavioral) and education factors that impact an individual's decision to pursue private well testing. The survey was kept very brief to encourage a higher return rate.

The seven part questionnaire (Fig. 2) was included with well testing kits distributed during RHA Community Well Testing Program events in the fall of 2016. The survey was completed and ready for inclusion in testing kits in October, 2016. All participating Bethlehem and Mendham Township residents received the optional survey in their testing kits. However, most townships participating in the Fall Community Well Test season had already completed the program or had begun selling kits by the time this survey was ready to be distributed. Therefore, Tewksbury, Raritan, and Kingwood Township residents received a link to the survey on Survey Monkey in the email that contained their testing results. Fifty of the 249 residents who tested in Readington received a paper copy of the survey and all were sent the link with results.

### **Results:**

A total of 105 responses to the survey were recorded. Bethlehem and Mendham Townships included the survey in every kit that was distributed. Bethlehem had a return rate of 66% (37 out of 56 residents returned the survey). Mendham had a return rate of 52% (23 out of 44 residents returned the survey). (Table 1) A paper copy of the survey was included in the well testing kit along with other necessary forms and bottles required to complete the testing process. It was found that this method was much more effective at gaining a response than including a link to an electronic survey in the email that included residents' well test results. Tewksbury, Raritan, and Kingwood Township residents received a link to the survey on Survey Monkey in the email that contained their testing results. These townships had a response rate of less than 10%. Fifty of the 249 residents who tested in Readington received a paper copy of the survey and all were sent the link with results. Of the 33 responses from Readington residents, 25 were paper copies returned with samples and 8 were completed online.

An eighth question at the end of the electronic version was used to identify the particular township where testing was completed. This was not necessary in the paper copy as the surveys were returned on that township's specific well testing return date and therefore unnecessary. (Table 1)

70 out of the 105 respondents indicated more vulnerable members in the household; children under 12, senior citizens, and those with chronic illnesses or symptoms (Table 5). Half of these households (35) report never having tested for arsenic. Of the 16 households with young children, 8 households indicated that they have not tested their wells for contamination in several years and 2 have never tested. Half of the households in the survey (52) are home to senior citizens and 11 are home to residents with chronic illness.

When asked how they became aware of the event, the majority (80%) of respondents indicated that they were notified of the event through their township. This aspect of the program is very important as it lends another layer of confidence in the quality of our program as well as effectively reaching the most people within a specific community. This question could be updated to further clarify if the township sent emails to each resident or if the program information was posted to newsletters, township home pages or outdoor signage. Seventy-two of the respondents have never tested with our organization. Sixteen residents received a postcard notification of the event. Of the residents who chose "Other" as a response, 2 indicated that a sign in front of the municipal building notified them, 6 read newspaper articles about the event, and 2 read locally posted flyers. (Table 2)

Residents were asked why they chose to participate in the well testing event. (Table 3) Convenience is the number one reason residents test during community well testing events. A local event being held on a weekend morning and open for a 3 or 4 hour window gives more people an opportunity to take advantage of our program. There is no hassle of scheduling or the need for a home visit. Affordability was also a significant factor. RHA offers testing at reduced rates that are comparatively less expensive than coordinating with a private lab for testing. Thirty-seven percent of respondents are concerned over the safety of their drinking water.

Arsenic is one of watershed's most prevalent contaminants. Watershed wide, 17% of the wells tested through our well testing program in the fall of 2015 and spring of 2016 exceeded the NJ Maximum Contaminant Level (MCL) of 5ppb. Some townships, like Alexandria and Kingwood, have a higher incidence of contaminated wells at closer to 40 and 50%. About 20-25% of the wells tested in Readington and Raritan Township fail to meet the New Jersey MCL. Arsenic is concentrated in the southwest part of the watershed in Hunterdon County and parts of Somerset but pockets of higher arsenic levels occur throughout the Piedmont region. This question is an attempt at finding out the level of awareness and experience of the individual homeowner with arsenic contamination. 66% of respondents have never before tested their water for arsenic. This confirms that there is still a general lack of awareness and/or concern of this potentially health threatening pollutant in our water supply. (Table 4)

The lead ban amendment to the Safe Drinking Water Act took effect in 1986. Thirty-five of the respondents have lived in their homes since before the lead ban took effect. These older homes should be tested for lead contamination as they may still have older pipes with higher lead contents. The Private Well Testing Act was established in 2001 becoming effective in September 2002. Of the 105

residents who answered the survey, 29 live in homes that were likely tested for water contaminants under the Private Well Testing Act when the home was purchased. (Table 6) A question has been added to the new survey to assess the number of residents who have tested for lead.

Eighty-two percent of the residents who tested their wells are college graduates with 46% of those residents holding graduate degrees. (Table 7) This is not surprising given the median home values for the areas covered. The median value of owner-occupied housing units in Mendham Township (2011-2015) is \$862,100 and in Bethlehem Township, median home value is \$410,800 (census.gov).

**Table 1. Township where resident participated in the Community Well Test program**

Answer Choices	Responses	
Tewksbury	5.71%	6
Readington	31.43%	33
Raritan	1.90%	2
Mendham	21.90%	23
Bethlehem	35.24%	37
Kingwood	3.81%	4
<b>Total</b>		<b>105</b>

**Table 2. How did you hear about this well test event? Choose all that apply.**

Answer Choices	Responses	
I have tested with Raritan Headwaters before	26.67%	28
I received a postcard notifying me of the event	15.24%	16
Word of mouth from another resident	4.76%	5
The township publicized the event	80.00%	84
Facebook or other social media	0.95%	1
Other (please specify)	10.48%	11
<b>Total Respondents: 105</b>		

**Table 3. Why are you testing your well water today? Please choose all that apply.**

Answer Choices	Responses	
I have not tested my well water before	18.10%	19
I have not tested my well water in several years	43.81%	46
I regularly test my well water	29.52%	31
This event reminded me to test my well water	44.76%	47
This is a convenient opportunity to test my water	63.81%	67
This is an affordable opportunity to test my water	39.05%	41
I noticed a change in the smell, taste, or appearance of my water	1.90%	2
I heard about water quality problems in my town	7.62%	8
I heard about water quality problems in my neighborhood	1.90%	2
I'm concerned about the safety of my drinking water	37.14%	39
I was recommended to test by a local authority	3.81%	4
Other (please specify)	4.76%	5
<b>Total Respondents: 105</b>		

**Table 4. What is your experience with arsenic? Please choose all that apply**

Answer Choices	Responses	
I have never tested my well water for arsenic	66.33%	65
I have tested my well water for arsenic before	30.61%	30
I am aware of an arsenic problem in my well	2.04%	2
I am treating my well water for arsenic	6.12%	6
<b>Total Respondents: 98</b>		

**Table 5. Please check off any of the following that apply to the occupants in your home.**

Answer Choices	Responses	
Children under 12	22.86%	16
Senior citizens	74.29%	52
Chronic illnesses or symptoms	15.71%	11
<b>Total Respondents: 70</b>		

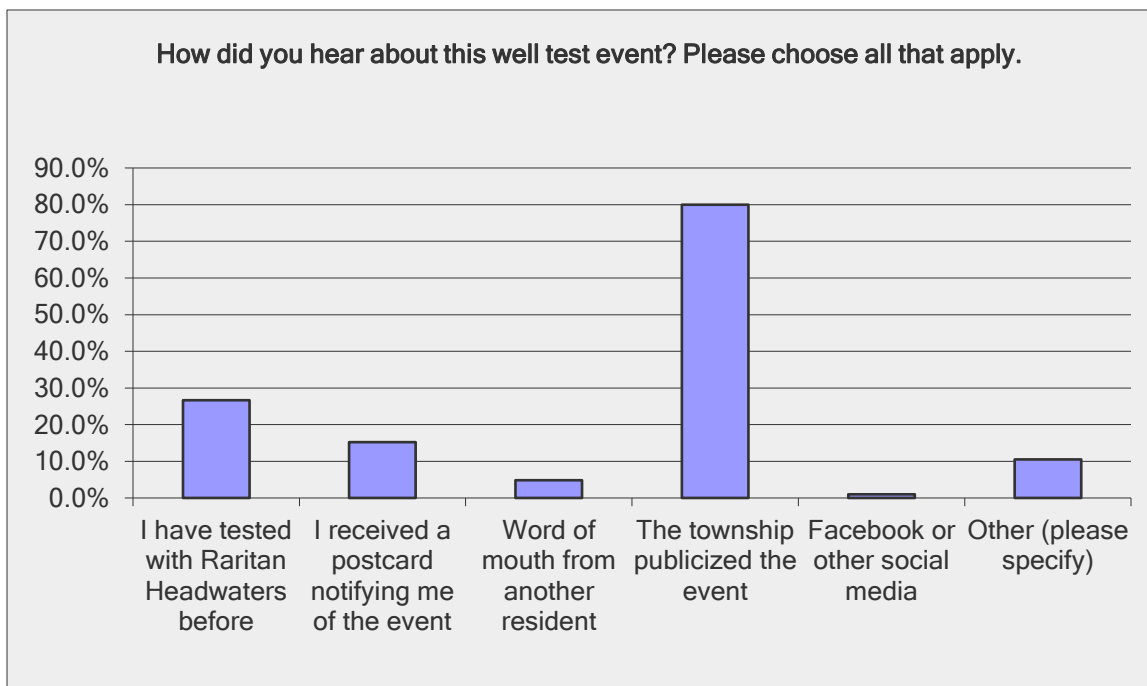
**Table 6. Years spent in current dwelling?**

Answer Choices	Responses	
Lived in current home before 1986	33.33%	35
Moved into current home between 1987 and 2003	39.05%	41
Moved into current home between 2003 and present	27.62%	29
<b>Total</b>		<b>105</b>

**Table 7. What is the highest level of education you have completed?**

Answer Choices	Responses	
Less than high school	0.00%	0
High school / GED	2.91%	3
Some college	10.68%	11
Community college / technical degree	3.88%	4
Bachelor's degree	36.89%	38
Graduate degree	45.63%	47
<b>Total</b>		<b>103</b>

**Fig. 1**



## Conclusions

Of the domestic water supplies in our watershed, 80% are private wells. The RHA Well Testing program is currently reaching just 2-5% of private well owners in townships holding organized well testing events. Scaling up outreach efforts is essential to better participation rates. This survey was a pilot study to assess motivations and backgrounds of private well owners who have tested their wells outside of testing mandated by the Private Well Testing Act. A second, revised survey will be conducted in the 14 townships participating in spring 2017 CWT and will provide a broader assessment of varying socioeconomic, situational, and behavioral characteristics.

A major finding of this survey is that supporting township communications and providing additional resources for education and outreach is critical to increasing participation. The survey shows that township generated publicity for well testing events was by far the most effective method of communication. (Fig. 1) Enhancing outreach in other community supported/frequented venues such as community groups on social media, church groups, scout groups, and community events would be beneficial in raising awareness of drinking water quality in the region. Outreach messages can be tailored for more effective communications and an analysis of the efficiency of those communications will enable higher outreach potential. By utilizing innovative channels of communication and stressing the importance of the need to test, communities can enhance public health in the Raritan headwaters region and surrounding areas.

Information needs of residents must also be addressed. Local contamination risks based on both RHA and NJDEP data should be made available to residents. Protecting human health and the environment by developing and disseminating information to the public regarding groundwater pollutants and causes of contamination through a more informative website is critical. Developing FAQs on testing and treatment and making them available on the RHA site as well as local outlets such as the township municipal buildings would bolster awareness. A clear course of action for residents to improve water quality should be outlined. The success of changes made to outreach and education efforts will be documented and assessed to further refine future strategies.

## Literature Cited

Chillrud, S.N., S.R. Baptista, S. Braman, S. Flanagan, J.H. Graziano, A. van Geen, Y. (2016) Columbia University Superfund Research Program-Research Translation Core. Translating Research on the Health Effects and Geochemistry of Arsenic.

Raritan Headwaters [www.raritanheadwaters.org/protect/welltesting](http://www.raritanheadwaters.org/protect/welltesting) website

NJDEP <http://www.nj.gov/dep/dsr/pwta/> website accessed March 2017

U. S. Census Bureau, American Community Survey (ACS) and Puerto Rico Community Survey (PRCS), 5-Year Estimates. The PRCS is part of the Census Bureau's ACS, customized for Puerto Rico. Both Surveys are updated every year. American FactFinder

Fig. 2

### Optional Informational Survey for Private Well Owners

In an effort to increase awareness about water quality issues and better communicate with residents regarding the importance of regular well testing, we ask that you complete the following anonymous survey. Responses to the questions below will aid Raritan Headwaters in future outreach and education efforts.

Your feedback is greatly appreciated.

Thank you.

1. Did you find the well testing process through RHA satisfactory? \_\_\_yes \_\_\_no  
If not, please let us know why. \_\_\_\_\_

2. How did you hear about this well test event? Please choose all that apply.

- I have tested with Raritan Headwaters before
- I received a postcard notifying me of the event
- Word of mouth from another resident
- The township publicized the event
- Facebook or other social media
- Other \_\_\_\_\_

3. Why are you testing your well water today? Please choose all that apply.

- I have not tested my well water before
- I have not tested my well water in several years
- I regularly test my well water
- This event reminded me to test my well water
- This is a convenient opportunity to test my water
- This is an affordable opportunity to test my water
- I noticed a change in the smell, taste, or appearance of my water
- I heard about water quality problems in my town
- I heard about water quality problems in my neighborhood
- I'm concerned about the safety of my drinking water
- I was recommended to test by a local authority
- Other \_\_\_\_\_

4. What is your experience with arsenic? Please choose all that apply

- I have never tested my well water for arsenic
- I have tested my well water for arsenic before
- I am aware of an arsenic problem in my well
- I am treating my well water for arsenic

5. Please check off any of the following that apply to the occupants in your home.

- Children under 12
- Senior citizens
- Chronic illnesses or symptoms

6. Years spent in current dwelling?

- Lived in current home before 1986
- Moved into current home between 1987 and 2003
- Moved into current home between 2003 and present

7. What is the highest level of education you have completed?

- Less than high school
- High school / GED
- Some college
- Community college / technical degree
- Bachelor's degree
- Graduate degree