

FINAL CASE STUDY 2023

Project Title: All About Arsenic

School: Pelham High School

Grade Level: 10-12

Teacher: Dr. Janet Holden

Project Partners: Scientist Partner Dr. Flor Fahnestock University of N.H.

Teacher Profile: After 20 years of research, I have now completed 22 years of teaching. I graduated with a degree in Food Chemistry and now have a doctorate in education. I returned to N.H. in 2006 and was surprised to discover the number of homes still on well water. I grew up in Salem N.H. that had public water since the early 1960's.

Summary: Five years ago in the All About Arsenic SEPA grant the elementary school was targeted as the logical place to test homes. The children are at greatest risk of long-term health issues if they remain for eighteen years drinking contaminated water. A four-day event with the help of the administration took place during parent conferences. The results were disturbing with over 20% of homes with high levels of arsenic or uranium. Students asked if the event could be repeated again in 2022 with the thought that the households that were tested previously would now have students in the middle or high school. During the October Parent Conferences 100 vials were distributed and 86 were returned. The registrations showed that many of the households had previously tested their well water through the grant or independently. When the data set was examined, numerous households were using filters, but they were not removing arsenic or uranium.

Using TUVA, students were surprised that many of the schools did not have uranium as a problem. Dr. Flor Fahnestock demonstrated to students the geological issues in southern N.H. that have formations that commonly have arsenic in them, and other formations that generally have uranium in them, but rarely both. Students also raised the question to why the Federal or State governments were not involved in this and they discussed Flint Michigan was on the National news for lead when arsenic and uranium can be just as detrimental to children's health. I showed them the work students had been involve in to set the arsenic levels lower in Maine. One student stated, "Lowering the level isn't enough, it needs to be eliminated."

In the Anatomy and Physiology classes, students researched the health risks of ingesting toxic metals during the Digestive System; it also could easily be studied in the Nervous System. Students created small groups research health effects of arsenic, uranium, lead, manganese, and copper. In the Environmental Science class, the geological reasons there are toxic metals in drinking water were discussed.

In the first four years of the SEPA grant students reported to the Board of Selectman, which were televised, the results and posters demonstrating the results and or health risks were placed in central areas of the town including a doctor's office. I do not believe a very large

population watches the televised meetings because we never received any follow-up questions from the public. I believe we need a greater voice through state television for individuals to realize the extent of the problem.

Project Details:

September 22 – Met with Administration and faculty at Pelham Elementary School to discuss the Oct. four night Community Event during Parent Conferences. Teachers were shown what the vials looked like and when students would start bringing the vials back so they could watch for them.

October 14- Dr. Flor Fahnestock gave a discussion on the geologic reasons for uranium, and arsenic to be in ground water, and eventually into well water.

October 24 through the 27 Community event- At Pelham Elementary School from 3:30-7:00 P.M. during Parent Conferences. A series of tables were set up with literature previously attained from Dartmouth College on toxic metals in well water. Students encouraged parents to stop and by the tables and read the literature and register to have, their well water tested. A Clear container was placed just outside the office door so students could return the water vials the following day. Every morning I would go over to the elementary school and pick up the vials that had been returned. Over the four night event 20 students took turns and shifts operating the event and 86 vials out of the 100 were returned.

Nov 13- An Anatomy and Physiology class registered in TUVA

Nov 14- The Anatomy students took the pretest in TUVA

Nov 29 – The well water was shipped to Dartmouth.

January 4- Results from Kat Taylor sent results from the well water

January 5-6 discussed well water results –focusing on the number negative of results with filters

January 13, 2023- Results from Bill Zolleick were discussed with the math and science departments.

April 11- Dr. Flor Fahnestock reached out for an end of the year meeting. AP Environmental is where she will be presenting in May.

Discussion:

- I believe the most interesting discussion was the number of homes repeating the tests had put in a filter since discovering the original results, unfortunately few of the filters they are using actually take out uranium or arsenic.
- Only a few parents reached out and said they had wished they had paid attention to the information that students provided over the types of filters that remove toxic metals, or they said they wished they had the water tested in previous events.
- I found the students to be motivated to share with parents during the Community Events information.
- Nothing

Conclusion: It is unfortunate that the governor of the state has no desire to look at this issue. I do not want to be political because previous governors also have done nothing, I think this is such a health issue that pediatricians and obstetricians in the state should be actively contacted with literature on the health risks associated with well water.

References: If you used any references with your students or other readings, list them here. Again, provide links where possible.

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