Troubled water

Kaleigh Beale seeks solutions to Carrsville's high fluoride

By Stephen Faleski
Staff Writer

When Kaleigh Beale attended Carrsville Elementary School, she noticed something odd about her classmates.

Some of them had brown stains on their teeth.

"My parents always told me it was because of the well water that they drank, but that since we used a water filter, my teeth would not be stained," said Beale, now a senior chemistry major at Longwood University in Farmville.

After third grade, she moved with her parents to Chesapeake, where her new classmates' teeth weren't stained.

It wasn't until her junior year at Longwood that she learned what was making the difference: fluoride.

"Fluoride is not a common water contaminant that people are concerned about removing," Beale said.

In fact, it's added to most municipal water sources at low levels to help protect residents' teeth against cavities. But it can also occur naturally in groundwater.

Water that contains too much fluoride can cause dental fluorosis in children – the official term for the brown staining Beale observed. Many Isle of Wight County residents get their drinking water from untreated private or municipal wells, making dental fluorosis a recurring problem.

According to a notice Isle of Wight County sent to users of its Carrsville well system, the water serving the unincorporated community and Beale's former school tested at 3.84 milligrams per liter of fluoride in 2020 – just under the 4 mg/L legal limit set by the U.S. Environmental Protection Agency. Anything over 2 mg/L can lead to dental fluorosis in children ages 9 and under, it warns, while concentrations over 4 mg/L can increase the risk of developing bone disease later in life. The World Health Organization recommends an even lower safety threshold, at 1.5 mg/L.

For her senior thesis, Beale is researching lower-cost methods of testing for fluoride and removing the excess. Her work has attracted the attention of the Council on Undergraduate Research, which has invited her to present at the "Posters on the Hill" conference this April.

The conference will afford Beale the chance to connect with members of Congress, making her one of only 60 undergraduate students nationwide chosen for the opportunity this year.

"I was one of at least four (Longwood) seniors to apply for this conference and was shocked when I was the only one to receive an acceptance email," she said.

Last semester, she worked with Dr. Sarah Porter to analyze water samples from the county using standard and alternative methods. Porter, a professor of analytical chemistry, is serving as Beale's advisor for the project.

In the town of Windsor, which operates two municipal wells and does not treat its water, Beale found fluoride concentrations of 3.2 mg/L at a public site and 3.8 mg/L at a residence. A residence in the unincorporated Zuni community also tested at 3.8 mg/L. A commercial site in the town of Smithfield, which operates a reverse osmosis water treatment plant to remove excess fluoride and other contaminants, tested at 1.22 mg/L.

Water at her grandmother's house, located about three miles outside of Windsor, tested at 5.3 mg/L – well above the legal limit. In the town of Farmville, where Longwood is located, tap water tested at 0.3 mg/L for fluoride.

The standard testing method, she explained, consists of a $375 probe and an electrode/pH meter that can cost anywhere from $150 to $1,500. Together, the devices are known as a fluoride ion-selective electrode.

"We have ruled out at-home test strips, as they were vastly inaccurate, and found holes in previous research methods using turmeric and curcumin, a chemical found in turmeric," Beale said.

She then tried using cyanine dye and zirconium, which changes colors based on the concentration of fluoride in the water sample. That method delivered "promising results," she said.

This semester, she's turned her attention to lower-cost fluoride removal options – experimenting with the filtering properties of carbon and aluminum.

While water pitchers advertised specifically to filter excess fluoride "are not commonly produced," Beale said, she and Porter tested multiple water pitcher filters and found that "the Amazon Basics brand does, in fact, remove fluoride."

The average under-the-sink fluoride filter, by comparison, costs $200, and can range in price to more than $600, Beale said. Some also only remove fluoride, chlorine and lead – leaving the consumer exposed to other possible contaminants.

"While the county of Isle of Wight is near and dear to my heart, and my inspiration for this project, fluoride contamination in water is a global issue with significant problems in India," Beale said. "A lower-cost method would benefit my local community and lower-income communities across the globe."

"I am extremely honored to have been chosen to present at the Posters on the Hill conference this April, and could not have made it this far without the support from faculty members at Longwood, especially my research advisor, Dr. Sarah Porter," she added. "My main goal throughout this project has been to aid members of a community that has given me and my family so much, and I am overwhelmed with joy at the chance to make a difference."

After she graduates this spring, Beale plans to take a gap year before applying to medical schools, and return to the Hampton Roads area to become a certified emergency medical technician. She hopes to eventually become a pediatric emergency medicine physician.

Top, Kaleigh Beale analyzes water samples in a laboratory at Longwood University. (Submitted by Courtney Vogel) Beale attended Carrsville Elementary, pictured above, where she observed brown stains on classmates' teeth. Beale tested the town of Windsor's drinking water, which comes from two municipal wells and isn't treated. (file photos)

State panel OKs biogas pipeline

By Stephen Faleski
Staff Writer

The Virginia Marine Resources Commission has unanimously approved a proposed 65-mile biogas pipeline network that would cross the Blackwater River and two swamps at seven locations in Surry, Sussex, Southampton and Isle of Wight counties.

Align RNG, a joint venture of Dominion Energy and Smithfield Foods, secured approval on June 2 from the Surry County Board of Supervisors to build a regional processing facility that would turn methane from hog manure, also known as biogas, into pipeline-quality natural gas.

Methane, if emitted into the atmosphere, acts as a potent greenhouse gas, but according to company officials, emissions from farms can be captured using an anaerobic digester and covered lagoons.

Align's multi-locality pipeline network, which the company proposes to bury a minimum of 14 feet beneath the substrate using a horizontal directional drilling method, would connect participating Smithfield Foods farms to the regional Surry facility. There, the collected gas would pass through membranes to remove hydrogen sulfide and carbon dioxide, leaving a 99% pure product that can be fed into an existing natural gas pipeline.

A group of Surry residents opposed to the county's decision to allow the facility traveled to the VMRC's Fort Monroe headquarters on June 28, hoping to stop the project at the state level by making their case to the commission's nine-member board.

One of the sites where Align's pipeline network would cross the Blackwater River "is behind my

• See PIPELINE, p. 3

Pipeline

• Continued from p. 1

house," Abram Ketchum of Dendron told the commission. "It's pristine, mature growth, never-logged cypress and sweet gums. ... With the plastic lines that they're boring, what is to prevent the roots from penetrating those gas lines, and then you've got a disaster in the Blackwater River."

Ketchum also referenced the lawsuit Align settled last year with the North Carolina-based environmental group Clean Aire NC, which had alleged violations of that state's air quality regulations at a similar processing facility in Mecklenburg County. According to the settlement agreement, Align agreed to request that North Carolina's Division of Air Quality modify the site's permit to "add limitations on raw biogas flow," impose "reporting requirements" for the facility's sulfur dioxide and hydrogen sulfide emissions and "ensure a program of methane leak detection and repair is implemented at all farm operations supplying biogas" in exchange for Clean Aire NC agreeing to drop the case.

"I have no faith that this company will uphold any of their promises regarding emissions," Ketchum said.

Align contends the reduction in greenhouse gas emissions from participating farms would be roughly equivalent to taking 22,000 vehicles off the road, even with the facility re-releasing an estimated 12 tons of extracted carbon dioxide annually. Company officials have also acknowledged not all the extracted hydrogen sulfide will be turned into solid sulfur and hauled away.

The amount that escapes the membranes will be fed into a thermal oxidizer – essentially an incinerator – where intense heat will transform the gas into less-harmful sulfur dioxide. Align anticipates the facility emitting around 8 tons of sulfur dioxide per year.

"When these hog farms came to Surry County originally several years ago, and I remember it well, one of the criteria for their location was that they be located away from populated areas," added Surry County resident Helen Eggleston. "However, now for some unfathomable reason they seem to want to locate this pollution-producing industrial site to within a few hundred feet of occupied homes."

"Hydrogen sulfide in the presence of water forms sulfuric acid," added Eggleston's husband, Mike.

Newly appointed VMRC Commissioner Jamie Green, however, told the speakers his board had "no jurisdiction" to consider air quality concerns.

Tim McHugh, a Troutman-Pepper attorney representing Align, when the commission afforded him the opportunity for rebuttal remarks, concurred with Green that the concerns the speakers raised regarding the central facility and lagoons were "beyond the scope" of the company's requested VMRC permit.

While the processing facility itself would be the first of its kind in Virginia, the directional drilling technique Align plans to use when constructing the pipelines is "a technology that's been used around the state," said VMRC board member John "Ed" Tankard III, who made the motion that the board approve Align's requested permit.

Tankard's motion passed unanimously.

Subscription recycling in Isle of Wight?

By Stephen Faleski
Staff Writer

Isle of Wight County is still set to scale back its recycling program next month, but enough demand from those who don't mind paying for the service could bring private alternatives to the area.

Starting in September, Isle of Wight residents will no longer be able to recycle glass, paper or plastics at any of the county's eight refuse and recycling centers. County Administrator Randy Keaton, in July, said Isle of Wight would be "transitioning" the centers to accept only cardboard and steel or aluminum cans. Everything else, he contends, gets incinerated at the Wheelabrator waste-to-energy plant in Portsmouth.

Isle of Wight's recycling reduction comes amid a string of similar actions across Hampton Roads. Smithfield and the city of Franklin both ended their recycling contracts with Bay Disposal in 2021, each also claiming their recyclables were being incinerated rather than repurposed. Bay disputed the assertion, claiming the company sends only 30% of what it collects throughout Hampton Roads to Wheelabrator and the rest to a processing facility. The city of Chesapeake followed suit in late June, ending its contract with Bay competitor TFC Recycling.

Katie Cullipher, principal environmental education planner with the regional public service initiative askHRgreen.org, is aware of two private companies attempting to fill the void.

Recyclops, a Utah-based 2014 startup, operates under an Uber-style business model — paying local pickup truck drivers in 32 states, including Virginia, to collect recyclables from curbside service subscribers and take the commingled recyclables to a recycling plant.

According to recyclops.com, paper gets sorted by grade and repurposed into cardboard, newsprint or office paper. Plastics get sorted, sifted for contaminants and melted into pellets or made into fibers used in fabrics, construction materials, furniture or insulation.

The company, Cullipher notes, states on its website that it's now "proudly serving Chesapeake and surrounding areas."

Recyclops' website lists a cost of $15 per month, or $144 annually, for pickups every other week, with the option of adding glass collection for an extra $7 per month.

Currently, Chesapeake is the only Tidewater locality Recyclops services, but "as more and more of these locations decide to terminate their recycling program, we will be in consideration of offering service in other places," said Dennis Wise, Recyclops' vice president of sales and business development.

Wise said he'd reached out to Smithfield in April 2021, roughly three months after the town's final recycling pickup, but "never got a response."

Smithfield Town Manager Michael Stallings told the Times he didn't recall receiving anything from Recyclops at the time.

"If there was a viable private alternative, I think we would be receptive to talking to them," Stallings said.

Population density is a key factor Recyclops looks into when deciding whether to expand into a particular area, Wise said. Other factors are the distance drivers would have to travel to the nearest recycling plant, and the types of recyclables the plant will accept. The third and perhaps most important factor Recyclops examines is where the recyclables go after processing. The company, Wise explained, takes pains to ensure what its drivers collect is actually repurposed and not incinerated or put in a landfill.

"We've gotten pretty good at this model. … It's really kicking off really well in Chesapeake," Wise said

The other, more recent startup Cullipher suggests is Virginia Beach-based Happy Planet Recycling.

Glass, paper or plastics will no longer be able to be recycled at any of the county's eight refuse and recycling centers.

Founded in early 2021 by Aaron Brave, Happy Planet contracts with Portsmouth-based Recycling & Disposal Solutions (RDS) to repurpose what its drivers collect. According to RDS, the recyclables are then sold to a variety of buyers.

Speaking to the Times by phone on Aug. 17, Brave said the idea came to him while he was living in a condominium building, where the nearest recycling drop-off center was a 10-minute drive.

Happy Planet, which has also been working to offer solutions to Chesapeake residents disgruntled with their city's decision to end recycling, would be "willing" to serve Isle of Wight too, but hasn't received any service requests from county residents to date.

"Our main area of focus at the moment is the city of Chesapeake, but people that are from other areas of Virginia … they can give us a call," Brave said.

Happy Planet – according to its website, happyplanetrw.com – offers a subscription plan for $15 per month for curbside pickup of commingled recyclables every other week. Annually, it's $165. To add glass, it's $20 per month, or $220 per year.

In 2018, China banned the import of most overseas recyclables, causing a "shift nationwide of the ability to get rid of recyclables," Keaton told Isle of Wight's supervisors at their Aug. 18 meeting. "It used to be we would be paid for recyclables. Now we're paying virtually the same thing to get rid of recyclables that we pay to get rid of the trash."

Tad Phillips – former vice president of business development for TFC, now an independent contractor for the Chesapeake-based company – told the Times in January when Isle of Wight first proposed reducing its recycling program that, in his view, the end market for recyclables was "very strong" and "recovering" from its 2021 low point.

A more localized reason so many recyclables are ending up in the incinerator locally may have more to do with non-recyclable items and contaminants being tossed in with recyclables, Brave speculates.

If glass, metal and plastic containers aren't rinsed out before they're tossed into recycling bins, "it contaminates their whole process," Brave said.

"The beautiful thing about subscription-based recycling," Brave added, is that people serious enough about recycling to be willing to pay for it are also "willing to clean out their plastic and jars."

There's also TerraCycle, which brands itself as "recycling the unrecyclable" and is free.

According to its website, the Trenton, New Jersey-headquartered business began in 2001 when Tom Szaky, then a freshman at Princeton University, came up with the idea of making plant food from cafeteria waste by feeding it to worms. By 2006, TerraCycle "Worm Poop Plant Food" was being sold by major retailers, including The Home Depot, Target and Walmart.

Since 2007, the business has offered nationwide recycling programs funded by brands, manufacturers and retailers around the world that allow consumers to recycle their hard-to-recycle products and packaging.

"This type of hard-to-recycle waste takes the form of virtually anything from cigarette butts to plastic packaging, and everything in between," said Alex Payne, TerraCycle's North American public relations manager.

TerraCycle has a drop-off location for its Bausch + Lomb recycling program, which takes all brands of contact lenses and blister packs, at Sight 2 See Optometry PLLC in Carrollton. For other products, residents can create an account on TerraCycle.com, download a free shipping label and package their waste in any reused cardboard box for processing, Payne said. For each valid shipment, the account holder will earn points that can be redeemed for a donation to a school, nonprofit organization or charity of that person's choosing.

"Plastics are the largest category of material we collect through our programs," Payne said.

Once the plastic arrives for processing, it's turned back into raw material and sold to manufacturing companies who produce products such as outdoor furniture, decking, plastic shipping pallets, artificial turf for athletic fields and more. Organic materials get composted or used in industrial and commercial fertilizers.