

Superfund contamination seeps into groundwater at breaches in Memphis aquifer



Like many South Memphis residents, Frank Johnson is opposed to Byhalia Connection's plans to route a crude oil pipeline through the Davis Wellfield, where [Memphis Light, Gas and Water withdraws around 19.8 million gallons of water](#) per day from the Memphis Sand drinking water aquifer.

Johnson, 43, doesn't live immediately on the proposed

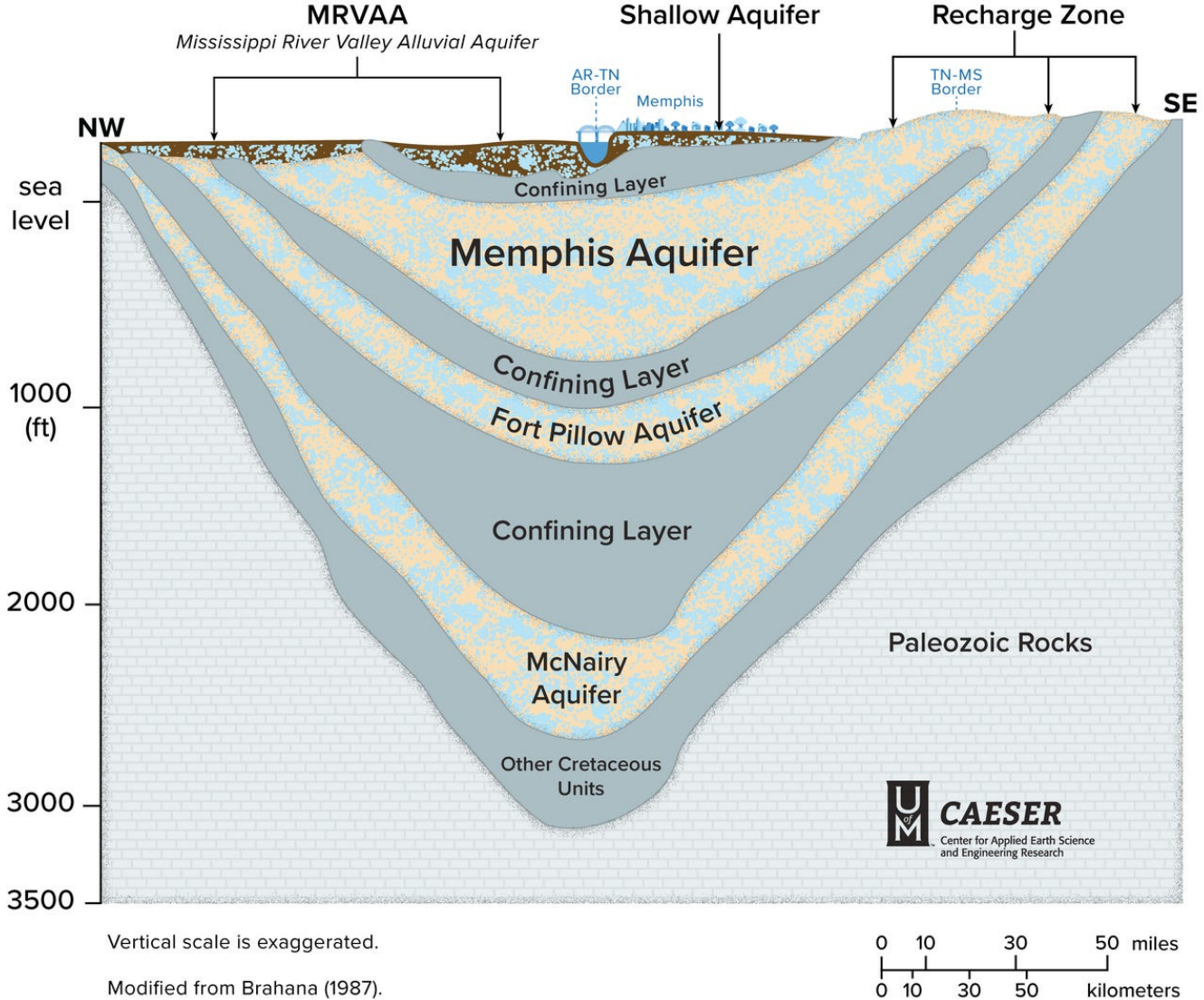
pipeline route. But environmental contamination loomed large in his youth; he grew up near the 632-acre Memphis Defense Depot Superfund site, a former U.S. Army logistics installation.

"It gets brushed aside," Johnson said of hazardous waste impacts in Black communities. "Then we have this big site sitting next to us, like that did not affect us. I don't want anyone to go through what we went through."

Only after his health-conscious sister, who was a nurse, had a tumor removed from her brain, did the siblings begin to wonder whether contamination at the Superfund site nearby played a role in the brain cancer diagnosis of an aunt who also lived in the neighborhood. Johnson's mother also had back-to-back breast cancer and brain cancer diagnoses, which were unrelated, according to Johnson.

"You want to prevent it from happening to other other people," he said.

According to a 2019 MLGW evaluation, contamination from the Depot is still present — migrating in water below ground, as a plume of volatile organic compounds, towards the Allen Wellfield, a mile from the Depot site.



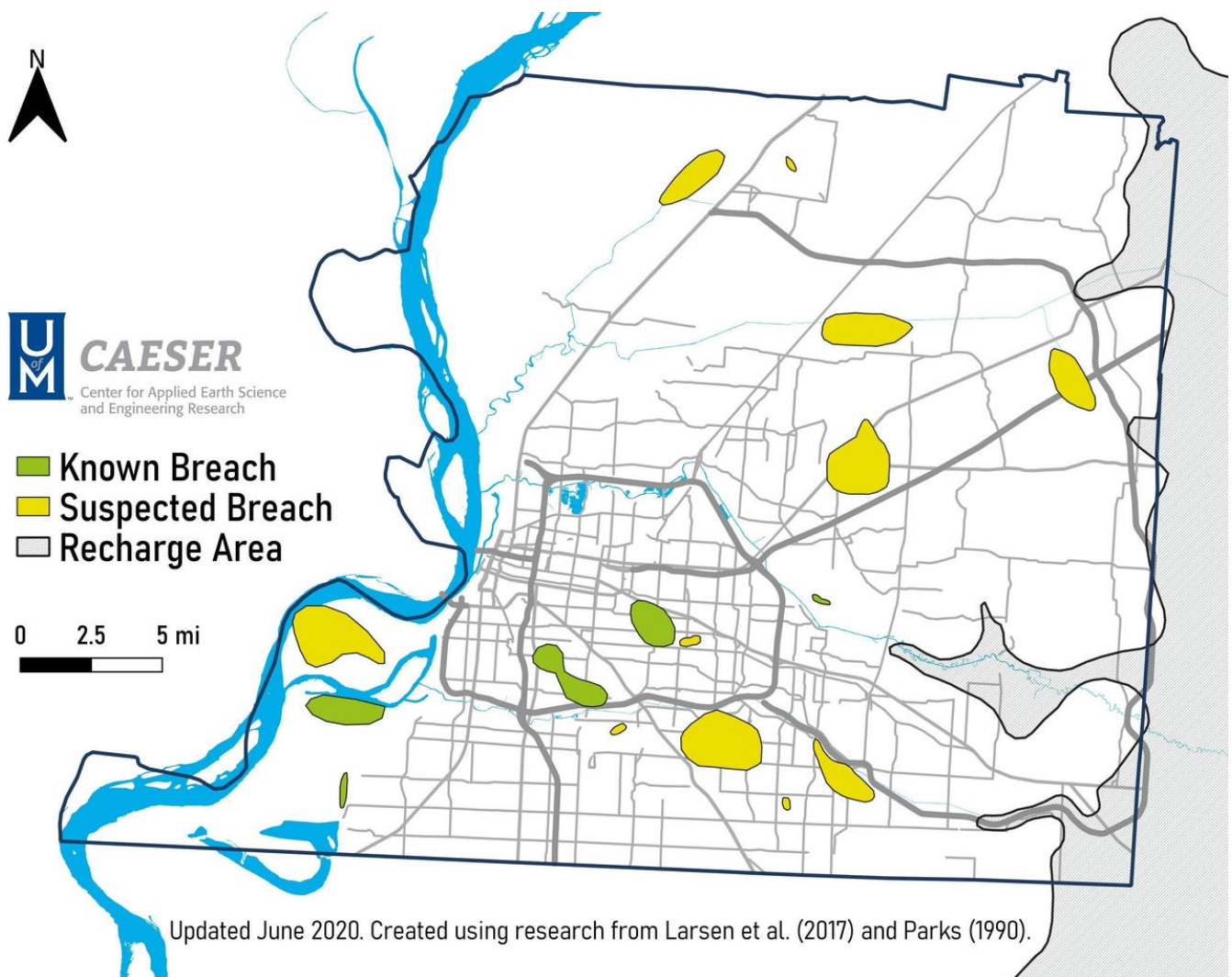
The Allen Wellfield withdrew 21.1 million gallons of water per day from the Memphis Sand aquifer, according to a Center for Applied Earth Science and Engineering Research (CAESAR) [study of known and suspected breaches](#) in the "confining" layer of clay that predominantly protects the Memphis Sand aquifer from shallow, readily contaminated groundwater above it.

"The presence of these breaches, even at a local scale, can have a region-wide, costly impact on water quality when younger, potentially contaminated water, leaks into deeper, more pristine groundwater reservoirs," CAESAR researcher

Rodrigo Villalpando-Vizcaíno wrote in a 2019 study of the total exchange of water occurring in the aquifer system in Shelby County.

In the upper 60 meters of the Memphis Sand aquifer, leakage represented 29% of the zone inflow, and as much 53% in certain areas, Villalpando-Vizcaíno found.

One such breach is at the Memphis Defense Depot site, according to CAESAR Director Dr. Brian Waldron.



At three other Shelby County sites where soil contamination seeped into groundwater, Environmental Protection Agency

Superfund hazardous waste remediation program documents show: One groundwater contamination plume is atop a suspected breach and one mile from a known breach; two other sites, in Collierville, are in the aquifer recharge area, where the confining clay doesn't span the full breadth of the aquifer.

The Memphis Defense Depot may be unique as a former military site.

But its groundwater plume, migrating towards a municipal wellfield at a known breach, is indicative of bigger questions involving threats to the Memphis drinking water supply — amplified by [the debate over the Byhalia pipeline](#).

When it comes to potential contamination, Waldron said his take is simple. "We don't want it. It's a threat. The more that we can do to prevent it or minimize its movement, the better and the less expense we will have in the future," he said.

Congress members oppose:[Pressley, Omar, Ocasio-Cortez among 28 in Congress calling on Biden to stop Byhalia Pipeline](#)

Byhalia pipeline:[Toxic refinery pollution, monitoring blind spot in southwest Memphis](#)

"I've always heard remediation of a contaminated site is, at a low end, ten times what it would be if you had protected it in

the beginning," he said. "No matter what, you're going to have to deal with it," Waldron said of potential contamination.

"It's better to be proactive rather than reactive."

MLGW, Plains say little on risk of downward leakage

MLGW spokesperson Lillian Johnson wrote in an email, "Our staff is still looking at the issues surrounding the pipeline and risk to our wellhead protection area. Simultaneously, we are reviewing our legal options on this matter." MLGW will submit recommendations to its board of commissioners, Johnson said. She did not address a request for details on wellhead protection measures MLGW carries out in its designated protection zones.

Plains All American Pipeline, a partner with the Valero Energy Corp. in aiming to build the 49-mile Byhalia pipeline through Black communities in southwest Memphis, asserts the crude oil project poses no threat, given its shallow depth, three to four feet beneath the surface. The Memphis Sand aquifer is at least 100 feet below ground.

Katie Martin, communications manager for Plains, did not address a question as to how the company's safety plans, in Mississippi portions of the route atop areas of the aquifer

with no protective clay layer, account for the direct hydraulic connection with the Memphis Sand aquifer.

She also did not answer a question, posed for the third time by The Commercial Appeal, regarding whether the pipeline company has full remediation liability insurance coverage in the event of a spill requiring groundwater remediation.

Toxic air. Insufficient monitors:[Why Memphis families fighting Byhalia pipeline have had enough](#)

"Protecting the aquifer and the drinking water supply, which is so important to this community, is something we take very seriously," Martin said.

Plains reviewed the scientific data and the project was engineered to avoid any potential impacts to the aquifer, at every stage of design, construction and operation, Martin said.

But Waldron, the CAESAR director, said it's important to note where the scientific data offers no certainty on specific locations of suspected breaches. The center was [awarded](#) a \$5 million, five-year contract from MLGW in 2018 to identify water-quality issues in the Memphis aquifer.

The pipeline route through southwest Memphis isn't "close" to the location of a suspected breach produced in a model, Waldron said. "But it's also not validated. A modeled result

is great. But it's not a verification," he added.

Martin said, "Significant focus was placed on understanding the groundwater resources of the area along the route, which was undertaken by experienced environmental professionals and engineers – both within Plains and with outside consultants."

The Superfund sites

Memphis Defense Depot: 23 years since a first clean-up action was recorded among an estimated \$5 million, 30-year clean-up cost, groundwater contamination remains at the site.

In a slurry of lime, bleach and a deactivating chemical, workers buried 26 leaking mustard gas bombs at the Depot's 60-acre Dunn Field in 1942. In the years between then and 1990, unknown amounts of petroleum, oils, lubricants, paints, acids, herbicides, and medical waste joined the cocktail of chemicals dumped into Dunn Field.

Left to seep through the soil, the contaminants formed at least three plumes of volatile organic compounds in the groundwater by 2004, when the U.S. Army's Defense Logistics Agency submitted a comprehensive Superfund remediation plan to the Environmental Protection Agency.

The confining clay layer above the Memphis Sand aquifer is "known to be absent" beneath the Memphis Defense Depot.

"Chemical data obtained during our investigations of modern (young) water in production wells indicate that water quality from several production wells in the Allen wellfield is affected by leakage processes," the MLGW and University of Memphis evaluation states.

Custom Cleaners: At a second Superfund site with groundwater contamination, Custom Cleaners on Southern Ave. in Memphis, the confining clay is "likely not present," meaning shallow groundwater "and the Memphis Aquifer are likely interconnected directly beneath the Site. A known interconnection exists within one mile of the site. The site is located near the Memphis, Light, Gas & Water Sheahan Well Field, which provides a portion of the drinking water supply for the City of Memphis and surrounding Shelby County," a 2018 EPA document states.

"Elevated levels of [Perchloroethylene] have been identified in soil and groundwater at a depth of approximately 125 feet beneath the Site, and is suspected to have migrated into the Memphis Aquifer," the report continues, citing a chemical classified as "likely to be carcinogenic to humans".

"Migration of chemicals of concern (COCs) into the underlying groundwater, where it could potentially impact

the water quality in the Memphis Aquifer and the wells in the Sheahan Well Field" is the "primary concern" at the site, the EPA states, adding that high pump rates may draw the groundwater contamination towards the wells.

Carrier and Smalley-Piper in Collierville: A pair of other Superfund sites are located in areas of the county where the problem with the protective clay layer isn't a breach — it's that it doesn't span the full breadth of the Memphis drinking water aquifer.

A groundwater plume of trichloroethylene, a carcinogen, at the Carrier air conditioner manufacturing plant in Collierville, "extends further than 2,000 feet from the Carrier facility into the well field," a five-year EPA site review noted in 2020.

The contamination caused Collierville to stop using at least one of its drinking water wells due to detections of chromium. Nearby, the Smalley-Piper Superfund site also sits on an unprotected portion of the aquifer in Collierville.

Sarah Macaraeg is an award-winning journalist who writes in-depth stories on accountability, solutions and communities for The Commercial Appeal. She can be reached at sarah.macaraeg@commercialappeal.com or on Twitter [@seramak](https://twitter.com/seramak).