Threats to Collierville’s Drinking Water

Protect Our Aquifer

Talking Points

Background

Decades ago, Carrier Corporation contaminated the Memphis Sand Aquifer (MSA), the source of Collierville’s drinking water, with trichloroethylene (TCE). Since then, Carrier has worked to capture and remove TCE, and they have paid as much as $615,603 a year to extract and clean it, including costs to dispose of the wastewater to Collierville’s wastewater treatment plant.

Now, Carrier Corporation wants to convert existing extraction wells into injection wells. These wells inject partially treated wastewater back into the MSA. Two of Carrier’s stated reasons for installing these wells are to “eliminate costs associated with sewer disposal,” and to “mitigate” the migration and capture of “the off-site chromium plume,” another contaminant that Carrier discovered in its extraction wells—likely drawn from Smalley-Piper, another nearby Superfund site.

How Carrier became a Superfund Site

Contamination at the Carrier campus was so significant that it was placed on the Superfund National Priorities List in 1990, and remedial work is still ongoing thirty years later.

In three known ways, Carrier contaminated the Memphis Sand Aquifer and groundwater pumped by Water Treatment Plant #2, which had provided drinking water for the Town of Collierville.

1. Carrier’s unlined wastewater lagoon, storing clarifier pit sludge, leaked TCE into groundwater.

2. A 1979 spill resulted in Carrier losing several thousands of gallons of TCE when a filter on its heated degreasing unit failed.

3. An underground pipe from Carrier’s TCE holding tank sprang a 500-gallon leak in 1985. The company’s TCE contamination of groundwater, sludge, and soil resulted in EPA’s 1989 decision to place the 135-acre Collierville Carrier Site on the Superfund National Priorities List.

Three Reasons to Deny Carrier’s Injection Well Permits

1. The Groundwater Board should deny Carrier Corporation’s appeal because the Shelby County Well Code prohibits injection wells and does not allow any exceptions.

2. Carrier Corporation has not presented sufficient technical information to evaluate its proposal to operate injection wells in the midst of two contaminant plumes.

3. Carrier Corporation has not addressed the need to remediate chromium contamination pulled out in extraction and (possibly) re-injected into the Memphis Sand Aquifer.

Hexavalent Chromium Discovered at Carrier Site

In 1993, EPA issued a Unilateral Administrative Order to the Carrier Corporation to capture and treat the groundwater contaminated by its TCE. Under the terms of that agreement, water was pumped from Water Treatment Plant #2, treated, and then discharged for use as drinking water. That ended in 2003 when Carrier Corporation discovered chromium, including hexavalent chromium, in the water produced by Water Treatment Plant #2.

The chromium was likely drawn (or pushed) from the nearby Smalley-Piper facility, a neighboring Superfund site that the EPA is responsible for remediating. As a result of this discovery, Carrier was required to discharge its chromium-contaminated water to Collierville’s Northwest Wastewater Treatment Plant, contributing to increased expenses.

EPA Installs Injection Well at Smalley-Piper in 2015—with NO permit

In 2015, without the knowledge or a permit of the Shelby County Health Department, the EPA installed an injection well at the Smalley-Piper Superfund site which has been injecting groundwater treated for Hexavalent Chromium back into the Memphis Sand Aquifer. Officials at the Health Department only found out about the injection well in the summer of 2019. It is still injecting today.
The Human Health Impacts of TCE and Chromium

TCE is a carcinogen linked to central nervous system impairment, harm to male reproductive systems, increased risk of autoimmune disease, increased risk of cancer, and detrimental effects to the liver, kidneys, and immune system. There is evidence that TCE causes liver cancer and malignant lymphoma, as well as kidney cancer, leukemia, lymphomas, lung tumors, and testicular cancer. The EPA has characterized TCE as “carcinogenic in humans by all routes of exposure.”

Like TCE, hexavalent chromium is a known carcinogen causing a plethora of negative health impacts. When ingested, it irritates the stomach and small intestine, causing ulcers and anemia. It also causes allergic dermatitis, damage to the male reproductive system, and irritation of nasal lining.

The EPA has set a maximum contaminant level (MCL) of 5 micrograms per liter as a national primary drinking water standard for TCE. Carrier’s monitoring wells routinely report levels of TCE that greatly exceed the MCL of 5 micrograms per liter.

The EPA established a maximum contaminant level of 100 micrograms/liter for total chromium in drinking water and may set further limits on hexavalent chromium in the future. Notably, Collierville has imposed its own discharge standard of 50 micrograms/liter for hexavalent chromium.

A Smalley-Piper monitoring well, 1000 feet from the extraction wells at Water Treatment Plant #2, detected chromium concentrations of 827 and 1,490 micrograms per liter in 2016 and 2017.

Injection Wells Can Exacerbate Contamination of the Aquifer

1. **The injected water may be contaminated.** Carrier will treat water it extracts for TCE, but it has no plans to treat extracted water for chromium before injecting the water back into the aquifer. Nor does Carrier plan to even monitor the water it extracts pre- or post-treatment for chromium contamination. This is particularly concerning because chromium has been detected not only near Water Treatment Plant #2 but also in monitoring wells near Carrier Corporation’s proposed extraction well and south of the proposed prohibited injection wells.

2. **The act of injecting water itself can displace already contaminated groundwater in the aquifer both horizontally and vertically.** In some circumstances, such displacement can force contaminated water deeper into the aquifer—a result that would be counterproductive in cleaning this site. Carrier proposes to inject water in the midst of two contaminant plumes. Monitoring wells installed in these plumes report contamination as high as 720 times the MCL for TCE and 14 times the MCL for total chromium.

3. **Carrier’s groundwater flow model may be flawed.** Carrier fails to model the fate and transport of TCE and chromium, and therefore cannot meaningfully assess whether the injection wells will cause more harm than good. A fundamental prerequisite to modeling contaminant fate and transport is an accurate groundwater flow model. Unfortunately, the groundwater flow model described in the 2017 Supplemental Investigation Report paints a grossly oversimplified picture of the hydrology of the site. For example, their vertical permeability assumption is not even consistent with existing US Geological Survey data.

4. **Carrier’s proposal is designed to reduce its own costs at the risk of our water safety.** The Groundwater Board, in contrast, is charged with safeguarding public health and therefore must consider the potential cost to the aquifer—the County’s drinking water source.

5. **Carrier Has Not Addressed the Need to Remediate Chromium Contamination.** The company’s proposal focuses solely on creating a “hydraulic barrier,” purportedly to block future migration of chromium from the Smalley-Piper plume. This justification for the proposal ignores the fact that chromium has already been detected at monitoring wells across Carrier’s campus.
In Summary

**Carrier is treating groundwater for TCE but not chromium.**
The presence of chromium in the groundwater extracted at Water Treatment Plant #2 is the reason Carrier had to stop using extracted and treated groundwater as drinking water, because their current groundwater treatment system is only designed to treat volatile organic compounds like TCE, not chromium.

**Carrier’s injection well plan is too risky.**
Carrier’s oversimplified groundwater flow model raises significant concern that the injection wells will not operate as Carrier claims, and instead may push TCE or chromium further into the aquifer. Nothing in Carrier’s analysis to date provides assurance that its proposal would do more good than harm.

**Shelby County prohibits injection wells.**
The Well Code prohibits injection wells. For that reason alone, the Groundwater Board should affirm the Health Department’s denial based on its determination that “the Shelby County Well Construction Code states that no injection wells of any type will be allowed within Memphis and Shelby County.” The Well Code does not provide any exceptions or variances for injection wells.

**The Position of Protect Our Aquifer is clear: No Injection Wells at This Site.**
The EPA should observe Shelby County regulations and shut down the Smalley-Piper injection well. The Carrier application for an injection well should be denied.

**Carrier and Smalley-Piper Should Consider Working Together**
Even though the Smalley-Piper and Carrier plumes now overlap, Carrier has not discussed working cooperatively with EPA at the Smalley-Piper Superfund site. Protect Our Aquifer wants to see a holistic, cooperative approach to these two side-by-side Superfund sites.

Conclusion

It is simply too risky to operate two injection wells in the middle of two uncharacterized contaminant plumes and hope, based on an incomplete and inaccurate analysis, that the contaminants will not be driven even deeper into Shelby County’s drinking water source: the priceless Memphis Sand Aquifer.
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