



Hockessin Ground Water Plume Site (aka DNREC's Hockessin Groundwater Site, DE-1317)

Frequently Asked Questions (FAQs)

Background

DNREC's Site Investigation and Restoration Section, with support from the U.S. Environmental Protection Agency (EPA), the Delaware Division of Public Health (DPH) and Artesian Water Company (Artesian), is investigating contamination from volatile organic compounds (VOCs) in some groundwater wells that supply Hockessin's drinking water. **The public drinking water provided by Artesian in the Hockessin area is treated to remove VOCs. The finished drinking water continues to meet Federal and State Safe Drinking Water standards, according to Artesian's annual water quality reports. The reports are available at: <http://www.artesianwater.com/customer-service-center/artesian-water-quality-reports>.** DNREC has requested federal assistance from the EPA to help investigate the area and identify the sources of the VOC groundwater contamination.

The primary groundwater contaminant of concern is tetrachloroethylene (PCE), most commonly used as a dry-cleaning solvent and industrial degreaser. PCE is a VOC that can cause adverse human health effects. PCE, along with low levels of other related VOCs, were identified in a commercial irrigation well, three residential wells, as well as the public supply wells in Artesian Water Company's Hockessin well field. As stated above, Artesian treats the water to remove the VOCs. DNREC installed water treatment systems at the three residential properties impacted by the VOC contamination.

DNREC has worked with several potentially responsible parties, and completed numerous environmental investigations and remedial efforts at sites of concern in the area. However, the sources of the groundwater contamination have not been fully determined. Subsequently, DNREC requested additional assistance from the EPA. EPA is using Superfund authority and resources to determine if the site warrants further long-term investigation and cleanup. EPA's investigations could result in the site being listed on the National Priorities List, the list of sites eligible for remedial action financed under the federal Superfund program.

Representatives from DNREC, EPA, DPH and Artesian provided a community update at the Greater Hockessin Area Development Association's monthly meeting on June 19, 2017. DNREC and EPA presented information on the groundwater well testing results for residential properties, and the 2016-2017 environmental assessment work completed by EPA in the area, respectively. Many of the following questions were asked at the community update:

- 1. Where is the site located?** The Hockessin Ground Water Plume Site is located in Hockessin, along Lancaster Pike (Route 41) in New Castle County, Delaware. The site consists of approximately 200 acres and encompasses numerous commercial and residential properties. DNREC's previous investigations completed as part of a Preliminary Assessment in Hockessin

refer to a smaller area as the “Hockessin Groundwater Site.” Approximately 32 acres in size, information on DNREC’s Hockessin Groundwater Site, identified as DE-1317, can be found at DNREC’s Delaware Environmental Navigator (DEN) database:

<http://www.nav.dnrec.delaware.gov/DEN3/>.

2. **Why is there a concern?** The Hockessin drinking water in the area is treated to meet all Federal and State Safe Drinking Water standards and remains within normal limits. However, groundwater plumes underground may have an impact on water quality if not addressed. When contaminants are released to the soils, sediments, surface or shallow groundwater, they can migrate down to deeper groundwater aquifers, leading to extensive groundwater pollution. The resulting polluted water within an aquifer is called a plume. If the Site is proposed and listed to the National Priorities List, the EPA may further investigate the plume.
3. **Where does my drinking water come from?** If you are not on your own well, your water is provided by Artesian Water Company. Artesian’s six drinking water supply wells produce water from the Cockeysville Formation, a fractured karst bedrock aquifer. Volatile organic compounds (VOCs) have been detected in the groundwater samples collected from the aquifer. VOCs are organic compounds found in some industrial and commercial products that can cause adverse human health effects. However, the groundwater from the wells is blended and treated by Artesian to meet Federal and State Safe Drinking Water Act standards.
4. **Is drinking water provided by Artesian safe to drink?** Yes. The Division of Public Health (DPH) confirms that the treated drinking water provided by Artesian from their Hockessin well field treatment plant meets Federal and State Safe Drinking Water Act standards, which includes VOC contaminants such as PCE. Statewide, the DPH Office of Drinking Water (ODW) regulates and monitors public water supply systems such as Artesian Water Company (AWC). To access the latest AWC water quality report for Hockessin, please visit: <http://www.artesianwater.com/customer-service-center/artesian-water-quality-reports>. For more information on the EPA’s drinking water standards and regulations, please visit: <https://www.epa.gov/dwstandardsregulations>.
5. **When did DNREC first report the contaminants in the water from the public drinking water supply wells?** As part of a statewide groundwater study in 2002, DNREC collected untreated groundwater samples from three Artesian public supply wells in Hockessin, and one finished water sample from Artesian’s treatment plant. PCE was detected in all four samples. However, only the concentrations of PCE in the untreated groundwater samples from two of the wells exceeded the EPA’s maximum contaminant level (MCL) of 5 parts per billion (ppb). The

finished water sample from the plant was below the MCL. The 2002 study recommended further investigation along Rt. 41 in Hockessin to determine the possible source(s) of PCE.

After requesting funding from the EPA, DNREC performed a Preliminary Assessment (PA) of the Hockessin Groundwater Site in 2005, which identified nine potential sources of the PCE contamination. The nine sites consisted of four service stations, four dry cleaners, and one auto service center. The sites were investigated by either DNREC and/or the property owners from 2006 through 2015. Based on the results, two dry cleaning sites, Sunrise Cleaners (DE-1532) and Hockessin Cleaners (DE-1591), were identified as potential sources of the PCE contamination impacting Artesian's well field. Investigation is on-going at these two sites. For more information on the sites, please visit DNREC's environmental database at:

<http://www.nav.dnrec.delaware.gov/DEN3/>.

6. What are the contaminants of concern? PCE is the primary contaminant of concern, and to a much lesser extent, trichloroethylene, or TCE, another VOC. Both are nonflammable liquids that are used for metal degreasing. In addition, PCE, or "Perc", is commonly used as dry cleaning agent. The Agency for Toxic Substances and Disease Registry (ATSDR) reports that the International Agency for Research on Cancer (ARC) considers PCE and TCE "probably carcinogenic to humans" - however, additional research is needed. In an abundance of caution, State and Federal officials take the presence of TCE and PCE very seriously. For more information, please visit the ATSDR website for the most frequently asked health questions about PCE and TCE at: <http://www.atsdr.cdc.gov/index.html>.

7. What else was done to investigate the groundwater contamination problem in the area?

Artesian assisted DNREC with identifying 38 properties with private wells in a 0.5 mile radius of the Hockessin Groundwater Site. Between November 2014 and March 2015, at DNREC's request the DPH Office of Drinking Water (ODW) collected water samples from thirty-one (31) residential wells and one (1) irrigation well within 0.5 mile of the site. Low levels of PCE were detected in the raw water from three (3) residential wells and whole house carbon units were installed at DNREC's request to treat the water. The irrigation well contains elevated levels of PCE. These wells are currently sampled semi-annually by ODW, at DNREC's request.

EPA began an environmental assessment of soil vapor, groundwater and surface water in September 2016 with additional sampling completed in spring 2017. If the Site is proposed and listed to the National Priorities List, the EPA may further investigate the plume.

8. What can be done with the pits (quarries and sinkholes) located around Hockessin?

The quarries and sinkholes located in the Hockessin area are probable bedrock features associated with the Cockeysville Formation, the fractured karst bedrock aquifer discussed in Question 3. DNREC and the EPA would like to know more about the quarries and sinkholes in the area. Please contact either Robert Asreen (DNREC) or Connor O’Loughlin (EPA) with location information regarding these features. Their contact information is available at the end of the FAQs.

9. How did you decide on the 0.5 mile radius? The EPA provided DNREC with funding to complete a Preliminary Assessment (PA). The PA is a limited-scope investigation performed by states or the EPA designed to distinguish between sites that pose little to no threat to human health and the environment, and sites that required further investigation, or sites that require possible emergency response actions. The 0.5 mile radius was used to characterize the site and potential sources including hazardous waste generators in the area. The 0.5 mile radius was also used to evaluate the likelihood of a release of hazardous substances, pollutants, or contaminants to ground water, surface water, soil, or air pathways; and provide an estimate of actual or potential receptors exposed to releases via one or more of these pathways.

10. Do you recommend that homeowners within the 0.5 mile radius test their water more frequently than once a year?

- For homeowners on a public drinking water system (Artesian Water Company) within the 0.5 mile radius, the drinking water you receive is tested quarterly for PCE, so there is no reason to have your drinking water tested. If you don’t know if you are connected to a public drinking water system and live in the impacted area, please call Artesian to determine if your home address is listed as supplied by them.
- For homeowners that utilize a private well for drinking water within the 0.5 mile radius and **do not** have a water treatment system to remove PCE, they should contact Robert Asreen with DNREC (contact information at end of FAQs) to inquire about having their water tested. Homeowners that **do** have a water treatment system to remove PCE, should also contact Robert Asreen to ensure their raw and treated water are tested.

11. What can homeowners do to treat their well water for VOCs? Homeowners with private wells may consult with a water treatment professional. Industry standard treatment methods for residential private wells are National Sanitation Foundation (NSF) Certified Granular Activated Carbon or Reverse Osmosis.

12. Please advise homeowners on how they can get their water tested. Which laboratory tests should homeowners use to test their private wells? Volatile organic testing? Heavy metals testing?

- For homeowners on a public drinking water system, such as Artesian Water Company, the system is regulated by the Division of Public Health. Drinking water from public water systems is tested on a schedule in accordance with Delaware's Drinking Water Regulations for regulated contaminants, including PCE. Artesian Water Company tests quarterly for PCE. Additionally, Artesian monitors its drinking water for PCE before and after filtration to ensure the filters are performing properly.
- For homeowners living within the 0.5 mile radius that utilize a private well for drinking water, they can contact Robert Asreen with DNREC (contact information at end of FAQs) to have their private drinking water tested for PCE.
- For homeowners living outside the 0.5 mile radius that utilize a private well for drinking water and are interested in having their water tested for PCE, Eurofins QC is the only private EPA certified drinking water laboratory in Delaware. The sample category to reference when contacting them would be drinking water VOCs (Volatile Organic Compounds).
- For any homeowners that utilize a private well, additional bacteriological and chemical testing (not related to PCE) can be done through the Delaware Division of Public Health for \$4.00. Information regarding this testing can be found at <http://www.dhss.delaware.gov/dph/hsp/privdw.html>.

13. How often does Artesian test the water quality in the public water supply?

Artesian's carbon filtration system consists of two pairs of filters, one lead filter and one lag filter in each pair. The water first flows through the lead filter and then the lag filter to ensure removal of the VOCs. Artesian monitors these filters monthly for PCE. When breakthrough of the lead filter appears, the media is then replaced.

14. Is showering worse than drinking the filtered (treated) Artesian water?

No. The water is treated and is meeting all regulatory standards for drinking and cleaning.

15. Are the following properties on private wells or public water supply: Rita's Water Ice, Piedmont Ballfield, Hockessin Library and Mexican Table?

Rita's Water Ice, Mexican Table, Piedmont Ballfield, Hockessin Library, Hockessin Memorial Hall complex and Hockessin Fire Company are all served by Artesian.

16. How do you remove the VOC contamination including PCE from the groundwater?

The VOC contamination including PCE is removed by either aeration to strip the volatiles out of the water or using Granular Activated Carbon (GAC) filtration, which is the current method of removal used by Artesian.

17. Can you detect dry cleaning contaminants by color, taste, and smell (i.e., would you get any indication that something was wrong in a private well)?

PCE has been known to typically have a sweet smell. However, at the concentrations that have been observed in the down gradient residential wells, it would not be identifiable to one's senses.

18. How does the PCE migrate in the aquifer?

As indicated by previous sampling results, potential routes of migration for PCE and associated degradation products within the area of the Site are principally through flow of water within the groundwater aquifer. Continued use of groundwater as a source of drinking water and natural hydraulic flow of groundwater will result in the continued migration and spreading of contaminants. PCE is denser than water, and if spilled on the ground in quantities great enough to overcome the residual saturation, the contamination may migrate vertically downward through the aquifer. The chemicals are also soluble in water and can migrate in a dissolved phase in the direction of groundwater flow. PCE is a high density liquid, or dense non-aqueous phase liquid (DNAPL), which flows under gravity and sinks through the aquifer until the contaminant reaches the bottom of an aquifer or an impermeable zone. In addition, if groundwater is discharging to nearby streams, the possibility exists that contaminants may be detected in the surface water bodies due to migrating groundwater.

19. What can be done to keep the contaminants from getting into the public/private wells?

Unfortunately, the contaminants have already reached several wells. However, DNREC has investigated two active dry cleaning facilities and both have entered the voluntary cleanup program. DNREC had Sunrise Cleaners install a Vapor Extraction/Air Sparge (SVE/AS) system at the facility to remediate the shallow surface soil and groundwater adjacent to the facility. DNREC also had Hockessin Cleaners begin a remedial investigation to determine the best course of future remediation. These steps may help limit the extent of continued spread of contaminants into the aquifer. Artesian has been treating the groundwater to meet all State and Federal standards prior to water distribution.

20. Please discuss the contamination of the aquifer that provides water to local wells in Hockessin?

Surface and subsurface soils sampled within the immediate vicinity of the former Dry Cleaner facilities have revealed contamination of PCE and associated degradation products. Leaching of

chemicals from soil is a process of migration involving the movement of a chemical downward through soil by percolation of water. Typically, the more precipitation, the greater the chance for chemicals to leach. Leaching is a concern because of the potential for a chemical to move through the soil and contaminate the groundwater. Many factors affect whether or not a chemical leaches in soil, including solubility of the chemical, biodegradation, sorption, volatility, rainfall, and evaporation. A chemical such as PCE is a dense, non-aqueous phase liquid and is somewhat water-soluble meaning the contamination can leach in soil and is likely to be transported into the aquifer.

The presence of contamination in the unsaturated soils serves as a continuing source of groundwater contamination. As the water table fluctuates over time, the saturated portion of the flow system repeatedly comes in contact with contaminated soil. Each rise of the water table serves to recharge the contaminants in the groundwater. Infiltration from above also contributes to the contaminant distribution in groundwater. Once a chemical enters the groundwater, several transport mechanisms are present that may aid in the spreading of the contamination. These mechanisms include diffusion, advection, mechanical dispersion, and hydrodynamic dispersion.

The four methods cause the plume to elongate, but also become wider. The aquifer system consists of the Cockeysville Marble which has dissolved/widened fractures, voids, sinkholes, caves, and dissolved areas all of which can transport large amounts of water over distances quickly.

Analytical results for the samples from the drinking water wells showed the presence of PCE in all six of the public supply wells, three of the four domestic wells, one of the observation wells, and an irrigation well. PCE ranged in concentration from 0.58 parts per billion (ppb) to 390 ppb. Additionally, the samples contained PCE breakdown products such as TCE (as high as 1.1 ppb) and cis-1,2-DCE (as high as 0.68 ppb).

At the Hockessin Cleaners property, groundwater samples contained PCE at concentrations as high as 7,500 ppb. Groundwater samples also contained PCE breakdown products such as TCE (as high as 1,100 ppb), cis-1,2-DCE (as high as 1,000 ppb), and vinyl chloride (as high as 6 ppb). At the Sunrise Cleaner facility analytical results for ground water samples collected from the six monitoring wells indicated the presence of PCE as high as 13,000 ppb.

21. How much surface water sampling has been done in the creeks and streams in the area?

During the Removal Assessment, EPA conducted two rounds of surface water sampling in September 2016 and April 2017. EPA collected a total of nine surface water samples from Mill Creek. Sample locations during the first round of sampling were selected at locations up-gradient of the contamination and then at intervals to a downgradient location near the bridge at Mill Creek Road and Nathalie Drive. During the second round of sampling in April 2017, EPA collected samples in two additional locations along Mill Creek. The first location was at Mill Creek Road and Stella Drive and the second location was near the bridge on Brackenville Road. EPA also collected two surface water samples from the surface water impoundments located in the town of Hockessin. The chemical sampling of these surface water resources were all non-detect for PCE.

22. Is there a means for sharing the surface water and groundwater testing data?

Yes, the data is open source and in the public domain. It can be found at:

https://response.epa.gov/site/doc_list.aspx?site_id=11708 in the file called: *Final Hockessin Trip Report*, which is dated September 2016.

23. Can you advise on any monitoring or threat to safety from PCE contamination outside of the sampling area or 0.5 mile radius map? These areas are residential and have wells.

Due to the rising concentrations, Artesian has indicated it would sample its wells quarterly to continue to monitor the contamination levels. EPA and DNREC will continue to monitor concentrations in the private residential and irrigation wells. Wells that reside outside of the 0.5 mile radius will be assessed and a determination will be made if further sampling is warranted. If a well is downgradient from the source areas and could have the potential to be impacted, the wells would be sampled.

24. Will there be continued monitoring in the future?

Yes, due to the rising concentrations, Artesian has indicated it would sample its drinking water wells quarterly to continue to monitor the contamination levels. EPA and DNREC/DHSS will continue to monitor residential well concentrations annually.

25. Why is DNREC asking for the EPA's help? Continued rising levels of VOCs in the raw groundwater in the Hockessin well field and a significant reduction in the state's funding of the Delaware Hazardous Substances Cleanup Act (HSCA) program for ongoing investigation and remedial action prompted DNREC to partner with the EPA, DPH and Artesian to help identify and treat the sources of groundwater contamination.

26. What will determine whether the site is eligible for EPA's help? The site is being scored by EPA using the Superfund Hazard Ranking System (HRS). Based on the outcomes of the HRS, the

site has exceeded the score required for potential listing on the EPA's National Priorities List (NPL) because of a public drinking water source that has been affected by contaminants. Currently, the HRS draft document is under consideration. This document will determine if the site is proposed and listed to the NPL for further potential action. The NPL process provides a means of identifying contaminated sites (and the associated potential responsible parties) that warrant remedial action or cleanup under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the Superfund Amendments and Reauthorization Act (SARA). Cleanups at NPL sites are managed and financed under the Federal Superfund program. If the site is proposed, there will be a 60-day public comment period on the proposed listing. If comments do not affect EPA's scoring of the site using the HRS, the site could be eligible for listing on the NPL.

27. How will the EPA investigate the site? If the site is included on the NPL, the EPA will use Superfund authorities and resources to begin long-term investigation. Utilizing various methods of assessment the EPA would investigate the shallow and deep groundwater, and shallow soil contamination at the Hockessin Ground Water Plume Site. Methods include but are not limited to drilling observations wells, installing shallow soil boring, geophysical exploration, groundwater pump tests, chemical sampling, and surface water sampling.

28. If the EPA lists the site to the NPL, does that mean that the Hockessin area will be listed as a "Superfund site?"

Yes, if the Site is proposed and finalized on the NPL the areas in Hockessin where contamination has been located would be designated as a Superfund Site. These Site areas then would have available Federal financial assistance and long-term Site remediation.

29. Will our property values be impacted by being listed as a Superfund site? Is there a means for compensation for this?

When EPA lists the Site on the NPL we are doing so to protect your health. In doing so we may have to consider some remedies that may not completely resolve concerns about property values in the near term, but they would be implemented to protect human health and the environment. Our mission as EPA is to find the best remedy to protect health and attempt to not affect property values; but our primary concern is safeguarding human health. By returning the affected portions of the community to a healthful state and preventing it from being unsafe, EPA can help protect the community's property values in the long term. EPA acknowledges that property is an important investment and requires due attention. But, if there are still apprehensions regarding this please contact a real estate professional for additional information on the effects to property values due to Superfund activities.

- 30. Why did the EPA's investigations include a vapor intrusion study?** In an abundance of caution, the EPA also conducted a limited vapor intrusion investigation, which is an environmental study to determine if there was any migration of vapor-forming chemicals into an overlying building or dwelling from an underground chemical source. The site did not have to be on the NPL to conduct the vapor intrusion study. The investigation included 32 shallow borings and nine sub-slab samples below buildings examining whether vapors from the VOC groundwater contamination were moving into nearby buildings and dwellings in the area of concern. The results of the limited vapor intrusion investigation indicated that no immediate further action is needed to protect human health and the environment at this time.
- 31. Will the companies responsible for the contamination be identified?** DNREC has identified two potentially responsible parties. If the site is included on the NPL, additional potentially responsible parties that contributed to the VOC contamination in the groundwater may also be identified by the EPA to pay for the cleanup.
- 32. How will the community be updated on the site?** As part of the listing process, EPA will develop a Community Involvement Plan for the community with the goal of keeping the community informed and involved in EPA's work at the site. In addition, the EPA will hold public workshops to address questions from the community.
- 33. Whom should I contact for additional questions?**

Please check DNREC's Hockessin Ground Water Plume Site webpage for more information and important links: <http://www.dnrec.delaware.gov/dwhs/SIRB/Pages/Hockessin-Ground-Water-Plume-Site.aspx>.

You may also call the following DNREC, EPA and Artesian representatives:

- **For more information about EPA's Superfund program and the NPL, please visit: <https://www.epa.gov/superfund> or contact:**

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For toxicology questions:

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For EPA-related media inquiries:

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- **For more information about DNREC's remedial investigations and cleanups in the Hockessin area, please visit: <http://www.nav.dnrec.delaware.gov/DEN3/> or contact:**

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- **For more information about the Artesian's drinking water supply in the Hockessin area, please visit: <http://www.artesianwater.com/customer-service->**

[center/artesian-water-quality-reports](#), or contact:

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