

Drinking Water Safety in NC

Water pollution can come in many different forms, ranging from nutrient and sediment pollution that occurs from runoff due to excess nutrients to common trash and debris from households. These contaminants often end up not only damaging the environment around us, but also in the drinking water supply that North Carolinians rely on. One of the main types of water contamination in North Carolina is agricultural pollution, with runoff and waste from farms infiltrating their way into our water systems, carrying pesticides and fertilizers that can cause illness in those that drink them. However, chemical and manufacturing pollution has historically been one of the largest sources of water contamination in North Carolina, going back as far as the beginning of the Camp Lejeune case in the 1950s, in which the disposal of chemicals, solvents, and other hazardous materials into unsecured pits and landfills leaked into the groundwater and ultimately the military bases water supply (*Background*). The primary contaminant of Camp Lejeune was Trichloroethylene (TCE), a solvent used in manufacturing, which had a concentration of 1400 ppb by May of 1982 -- almost 300 times the limit set by the Environmental Protection Agency (EPA). While the health effects of TCE aren't fully understood, the Agency for Toxic Substances and Disease Registry (ATSDR) has classified it as a human carcinogen (*Health Effects Linked with TCE, PCE, Benzene and Vinyl Chloride Exposure*). However, various other chemicals polluted the camp's water, ranging from Benzene, a colorless liquid used to manufacture rubbers and detergents to Vinyl Chloride, both of which--along with others-- have been linked with evidence of causing various cancers and neurological conditions. Although this occurred 70 years ago, the soldiers stationed at Camp Lejeune have recently begun receiving benefits for the health problems stemming from there (*Camp Lejeune Water Contamination Health Issues*). Although the presence of these major types of water pollutants could present a considerable challenge, North Carolina has since developed organizations whose sole purpose is to prevent occurrences like this from happening. North Carolina's environmental agencies like the Department of Environmental Quality (NCDEQ) have implemented new bills and policies that have helped regulate our drinking water and eliminate pollution to provide North Carolinians with safe drinking water in a monitored, protected way that will prevent contamination. However, both historically and recently this has proved to not be the case due to the state's lack of preparation for pollution, and inefficient system.

The Department of Environment Quality has two divisions developed for the maintenance of our water quality. The Division of Water Infrastructure (DWI) provides financial assistance for non-governmental projects that improve water quality (*State Water Infrastructure Authority*). The DWI has various programs that give funding to programs such as the Drinking Water Revolving Fund which provides loans to projects that develop new drinking water sources, treatment plants, storage facilities, or transmission & distribution systems. On the other hand, the Division of Water Resources (DWR) is the branch dedicated to regulating the water supply through strict laws and policies designed to provide its citizens with safe drinking water, with policies such as the Neuse Nutrient Strategy, which targets nonpoint nutrient pollution in the Neuse River Basin to protect the drinking water of the counties that reside within it (*State Water Resources Authority*). The Public Water Supply section handles the management of drinking water, which itself is split into its branches and programs that vary from inspections and complaint investigations for water systems to source water assessment and protection. While the DWR handles the quality of drinking water, with each type --bottled, municipal, and well water-- being processed differently, with varying regulations and standards based on their sources, how

they are processed, and their methods of distribution, they each also have a set maximum level for concentrations of contaminants that are safe for human consumption.

Beginning with municipal water, it is drinking water sourced from a combination of surface water, groundwater, and recycled water and provided by the state government through public water systems. The water that fills these systems primarily comes from surface water such as rivers and lakes and while they have extensive regulations that protect them, there are still cases in which contaminants have been allowed to run rampant (*Surface Water Standards*). The most recent occurrence of this is the *State of North Carolina v. E.I. Dupont de Nemours and Company* case in which the company DuPont de Nemours, Inc was discovered to have allowed dangerous chemicals called PFAS into the surrounding area, with it eventually making its way throughout the Cape Fear River Watershed and its tributaries, an area that holds within it the drinking water for over 400,000 people (*State of North Carolina v. E.I. Dupont de Nemours and Company*). PFAS (per- and poly-fluoroalkyl substances) resist biodegradation, accumulate in the food web, and have been associated with cases of kidney and testicular cancers, decreased fertility, thyroid disease, and many more conditions. While Dupont is being legally prosecuted for this, this still shows the flaws in our current system as they were able to pollute a major drinking source for years unchecked. While situations like this are rare, when they do happen they can have powerful, irreversible effects. Overall, municipal water has stricter regulations compared to other water sources, however, they can still carry the risks of consuming dangerous substances due to --evidently-- not thorough enough treatment. Secondly, wells are water sources established by private companies that have their water naturally sourced from groundwater and aquifers (*Private Well Information*). Many people source their water from water wells due to the belief that it's safer and healthier because of the lack of harsh chemicals, however, while they are safe to drink from, wells aren't considered the safest drinking source. Although many wells use filtration, distillation, and disinfectant systems to naturally treat water, wells can still contain traces of nutrient, sediment, and chemical pollution as they are very prone to runoff due to North Carolina's heavy rainfall and a large focus on its agricultural sector (*Well Treatment*). This can especially become problematic during natural disasters like hurricanes or heavy snowfall, in which large amounts of precipitation can cause floods that ultimately seep into the groundwater, potentially contaminating wells, and the drinking water of those that need them. The Department of Health and Human Services (DHHS) has strict requirements for distributing well water, requiring that all private drinking water wells are sampled and chemically analyzed by local health departments, however, the EPA regulations protecting public water systems don't apply to these private wells. Overall, while well water may seem to be ideal, it still has plenty of room to improve. Lastly, bottled water is simply water that is treated, and distributed by private companies, sourced primarily from groundwater and surface water. Bottled water has always been a reliable source of water, whether it be in emergencies like natural disaster relief, or simply as a way to get a quick, portable drink (*Lowe's pledges \$2 million to support Hurricane Ian Relief efforts*). However, while bottled water seems to be the best choice, it still has issues within itself. While the public consensus is that bottled water is safer to tap water, plastics from the bottle can leach into the water, introducing microplastics to our bodies, and any bacteria that go undetected during bottling can continue growing, causing the spread of diseases and pollutants into the population. Contaminants such as PFAS from the *State of North Carolina v. E.I. Dupont de Nemours and Company* case also made their way into drinking water due to the lack of consistent testing that allowed these chemicals to go undetected from their surface water and groundwater sources. Overall, while bottled water is a useful water source, it still has factors that hold it back from being completely safe.

There are currently many problems that pose a risk to North Carolina's water safety with the regulations for each of our water sources having room to improve. Part of this problem is largely due to our limited current technology that is unable to keep up with new types of contamination, such as microplastics, with them being just discovered in 2004, it's still largely unknown how to effectively deal with them (*International Marine Litter Research Unit*). Processes like reverse osmosis have been devised that could be viable solutions however, they are often difficult to maintain. While reverse osmosis is excellent at removing harmful contaminants like PFAS and heavy metals, they are difficult to do on a large scale as they are very inefficient and high maintenance for a public water system, wasting up to six times the amount of clean water that is produced (*Jern*). Reverse osmosis also almost always requires an activated carbon filter to remove chlorine or soften the water but in the process removes many healthy minerals, worsening the taste and increasing the chance for bacteria to grow. While the processes to remove these contaminants are important to consider, it's essential to consider preventing the pollution from occurring in the first place. With North Carolina's robust agricultural and manufacturing industries, the government must prepare systems that are designed to counteract the contaminants produced by them, as they come. No matter the water source, stormwater and runoff is the largest nonpoint source of pollution in North Carolina's drinking water, as excess sediments, fertilizers, and other waste products are released into our drinking water (*Water Pollution*). Along with the *Dupont* case, a fairly recent example of this was the case of *State v. Freedman Farm LLC*, a case in which Freedman Farms was sentenced to pay \$1.5 million for violating the Clean Water Act by allowing hog waste to run into a tributary of the Waccamaw River, a major drinking water source for the locals (*Summary of Criminal Prosecutions*). These cases show us the reality of how predictable pollution can be. While all the corporations that create the waste should dispose of it properly, not everyone does and our public water system should be prepared for this very possible reality. A system like this would also prevent corporate contamination in the first place as it would remove the delayed response that allows private companies to get away with reckless contamination for years. Dupont and Freedman's pollution of drinking water went on for as long as it did because of the delayed consequences, with Dupont knowing the consequences that the chemicals they released would have, and simply not caring because they didn't expect there to be real consequences, and desired a profit over anything else. Take Camp Lejeune as well, only after decades of water contamination is justice being served for the veterans, the families, and the future generations that have been and will continue to be affected by that poison released. While the state of North Carolina's drinking water is not as secure as it can be, these steps will help us to reach that goal, when we can be sure that our drinking water is truly clean. To reach that goal, it is of the utmost importance that we take action now, that we adjust the public water system to eliminate the current levels of contaminants, that we hold those guilty responsible for their crimes, that we strive to ensure the safety of ourselves, and future generations of North Carolina.

In conclusion, while North Carolina's drinking water has had plenty of scandals in its lifetime, it, for the most part, is safe to use and consume. The only outstanding necessity for it truly is to implement a way of preventing source water contamination and instigating consistent testing on all sources, whether it be sampling a random case of bottled water or the Cape Fear River itself in various locations. Doing this would also result in faster identification of major contaminants caused by specific companies and corporations. While historically, North Carolina hasn't done the best in protecting its drinking water, the state has grown. Although North Carolina has a long way to go before catching up with the mistakes of the past and modernities of time like microplastics, the state has done an effective job at keeping our water safe.

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