



Email: info@aquilogic.com
Telephone: +1.714.770.8040

Perfluoro-2-propoxypropanoic Acid (GenX)

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GenX in the Environment¹

Perfluoro-2-propoxypropanoic acid (GenX) (CAS No. 62037-80-3) is a trade name for a chemical that went into production around 2010 as an alternative to a perfluorooctanoic acid (PFOA, or C8) in the synthesis of Polytetrafluoroethylene (PTFE) (i.e., Teflon). Therefore, GenX is essential for the production of common household products including non-stick pans, firefighting foam, and for waterproofing outdoor fabrics. In 2009, DuPont (and its spin-off, Chemours) informed the United States Environmental Protection Agency (USEPA) that it will begin producing GenX commercially, as a replacement for PFOA, at its Fayetteville Works plant along the Cape Fear River in North Carolina.

In June 2017, the North Carolina Department of Health and Human Services (NC DHHS) and the North Carolina Department of Environmental Quality (NC DEQ) began an investigation into reported presence of GenX in the Cape Fear River. At the request of the NC DEQ, the USEPA is also performing independent laboratory analysis for GenX, and several other compounds, in water samples being collected by the NC DEQ along the Cape Fear River; including: wastewater, surface water, groundwater, and treated drinking water.

GenX Health Effect²

There is limited information about the health effects of GenX. Laboratory studies on animals indicate negative effects to the liver and blood, along with cancer of the liver, pancreas, and testicles. The relevance to human health is unknown. The potential human health effects of many other new or emerging polyfluorinated and perfluorinated alkyl substances (PFAS) are unknown. The NC DHHS continues to work with federal partners to review all new health and toxicity information about these compounds as it becomes available.

Current Regulatory Guidelines^{2,3}

There are no federal health guidelines for GenX. The NC DHHS used available toxicity information to set a health goal for GenX in drinking water at 140 nanograms per liter (ng/L) or parts per trillion (ppt). A health goal is a non-regulatory, non-enforceable level of contamination below which no adverse health effects would be expected over a lifetime of exposure. This health goal may change as new information becomes available.

Fate and Transport Properties of GenX

Property	Units	GenX	Source
Molecular Weight	gram/mole	347.08	4
Density	g/cm ³	1.118	5
Melting Point	(°C)	208	5
Boiling Point	(°C)	9e ⁻⁵	5
Vapor Pressure	mm Hg at 20°C	8.77e ⁻⁵	6
Solubility	mg/L at 25°C	207	5
Henry's Constant (K _H)	atm*m ³ /mole	4.0e ⁻¹¹	5
Sorption Coefficient (log K _{oc})	---	1.08 – 1.1 (soil)	5
Biodegradation	ug/L	Not Readily Biodegradable	6

Cape Fear River, North Carolina - GenX Investigation Timeline¹

- **July 14, 2017** - The NC DEQ regulators released the first test results from water sampled for GenX between June 19 and July 6, near the Cape Fear River. On the same day, State health officials announced that they lowered the safety threshold for GenX from 71,000 to 140 ng/L after consulting with USEPA scientists.
- **September 6, 2017** - As part of the ongoing State investigation, the NC DEQ collected groundwater samples from 14 groundwater monitoring wells on the Chemours property in early August. GenX was detected at concentrations exceeding acceptable limits in 13 of 14 industrial wells at the plant.
- **September 21, 2017** - NC State officials directed Chemours to provide bottled water to 11 homeowners near the company's Fayetteville Works facility after the company's preliminary test results detected GenX at concentrations above the State health goal (140 ng/L) in residential drinking wells.
- **October 4, 2017** - For the third time in three weeks, the NC DEQ directs Chemours to supply bottled water to additional well users near the company's Fayetteville Works plant. A total of 26 wells, about one-third of the 85 wells sampled, exceeded the State's health goal for GenX. At the other 59 wells, GenX was either not detected or concentrations were below 140 ng/L.
- **November 3, 2017** - NC State officials directed Chemours to provide bottled water to 15 more well owners near the company's Fayetteville facility after GenX was detected at concentrations above the provisional State health goal.
- **November 7, 2017** - GenX was detected at a concentration of 620 ng/L in a surface water sample taken from the recreational lake at Camp Dixie in Bladen County. GenX was detected at concentrations of 915 ng/L and 53.6 ng/L in a surface water sample taken from Marshwood Lake in Cumberland County and a well sample taken from Hall Park baseball field, respectively.
- **December 13, 2017** - In all, there are 115 private well owners living near Chemours' Fayetteville Works facility who are receiving bottled water because of GenX concentrations above the provisional State health goal of 140 ng/L. Water samples from 349 wells have been collected and verified from both the initial sampling by the NC DEQ and Chemours, and recent expanded sampling. Of the 349 wells, 144 had concentrations of GenX below the provisional health goal, and GenX was not detected in groundwater samples from 90 wells.

Sources:

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3. USEPA. (2017). Fact Sheet on Protecting Public Health & Addressing PFAS Chemicals. November.
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5. Beekman, M.; et al. (2016). Evaluation of substances used in the GenX technology by Chemours, Dordrecht. National Institute for Public Health and the Environment (RIVM, The Netherlands). December 12.
6. European Chemicals Agency (ECHA). (n.d.). ammonium 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoate. EC No. 700-242-3. CAS No. 62037-80-3. Retrieved from: <https://echa.europa.eu/registration-dossier/-/registered-dossier/2679/1>.

GenX Chemical Structure (CF₃)₂(CF₂)₃OCOOH-NH₃

