

Camp Lejeune, North Carolina



Introduction

The Agency for Toxic Substances and Disease Registry (ATSDR), a federal public health agency, has completed the public health assessment (PHA) of drinking water at U.S. Marine Corps Base Camp Lejeune.

This drinking water public health assessment (PHA):

- Evaluates whether past volatile organic compound (VOC) exposures to chemicals at Camp Lejeune were likely to result in exposure-related disease.
- Assesses additional VOC exposure scenarios requested by the Camp Lejeune Community Assistance Panel (CAP).
- Evaluates more recent exposure to lead in drinking water at Camp Lejeune (2005–2013).

The Bottom Line

Marines and Naval personnel, residents (including infants and children), and civilian workers were exposed to trichloroethylene (TCE), tetrachloroethylene (PCE), dichloroethylene (DCE), vinyl chloride, benzene, and other contaminants in the drinking water at Camp Lejeune from the 1950s through February 1985. Exposures to these chemicals increase the risks for cancers, birth defects, and other health-related problems.

Findings

- TCE and vinyl chloride in drinking water, from the Hadnot Point Water Treatment Plant (WTP), were high enough to increase the risks of cancer and other illnesses not related to cancer. This WTP supplied water to the Hadnot Point area and was the sole source of water to the Holcomb Boulevard area prior to 1972.

- Young children who used water from the Tarawa Terrace WTP during 1956–1984 might have higher risks for cancer. The drinking water was contaminated with vinyl chloride, TCE, and PCE. Marines living in the Tarawa Terrace area who were exposed to water from the Hadnot Point WTP during training may have had a higher risk of health-related problems.
- Using water from the Holcomb Boulevard WTP, which began operating in 1972, is generally not expected to have harmed people’s health. However, during brief periods when the Holcomb Boulevard WTP was shut down and the water source was the Hadnot Point WTP, pregnant women were exposed to levels of TCE that could have harmed their baby’s health.
- People’s health could have been harmed by chemicals in the water if they worked at the laundry facilities, in dining operations, or swam in the indoor training pools in the Hadnot Point area from 1950–1985.
- Based on 2005–2013 sampling data, people’s health could have been harmed by lead from building water lines and plumbing fixtures.

Background of the Site

Since the late 1980s the ATSDR has been assessing the human health risks from hazardous substances in drinking water at the U.S. Marine Corps Base Camp Lejeune located in North Carolina.

The contamination of drinking water at Camp Lejeune started in the early 1950s and ended in 1985 when highly contaminated water wells were removed from service.

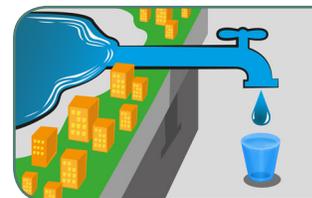
Based on the limited information available at the time, ATSDR’s 1997 public health assessment (PHA) cited past exposures to chemicals at Camp Lejeune a public health hazard. Since publication of the 1997 PHA, additional analyses and studies have expanded the scientific knowledge about the contaminants in Camp Lejeune’s drinking water.

The 2017 PHA evaluates exposures based on these new analyses and studies. ATSDR’s updated

PHA used water models, designed by ATSDR, to reconstruct the levels of historical contamination. These models helped determine whether drinking or showering in water contaminated with VOCs could harm the health of people who lived and worked at base housing and other buildings at the U.S. Marine Corps Base Camp Lejeune in North Carolina.

Drinking water at Camp Lejeune was contaminated with:

- Tetrachloroethylene (PCE);
- Trichloroethylene (TCE);
- Vinyl chloride (VC);
- Benzene;
- Dichloroethylene (DCE); and
- Lead



Why do we need models?

Sometimes we want to learn about past pollution. Models can help us estimate past pollution levels. Other times, we only have samples for some of the places we want to learn about. Models can help us estimate pollution levels in areas where we did not have samples. For more information on ATSDR’s modeling at Camp Lejeune visit: <http://www.atsdr.cdc.gov/sites/lejeune/watermodeling.html>.

Benzene, TCE, and vinyl chloride are known human carcinogens, and PCE is considered a likely human carcinogen. A privately owned dry cleaner next to Camp Lejeune, as well as base activities that released fuel and chlorinated solvents into the environment, were identified as the sources of the contamination.

As many as 1 million military and civilian staff and their families might have been exposed to the contaminated drinking water for more than 30 years from 1950 to 1985.

ATSDR’s review found that short- and long-term exposure to these chemicals increases the risk of certain health conditions.

Community Concerns at Camp Lejeune

ATSDR works closely with local community members and interested groups to address community concerns. ATSDR listened to the community and established a Community Assistance Panel (CAP) for the Camp Lejeune site. The CAP:

- Allows Marines and their families to share their health concerns with ATSDR.
- Provides the opportunity for the community to have input on ATSDR's public health activities.

The panel consists of community members, independent scientific experts, and ATSDR staff. The Community Assistance Panel (CAP) asked ATSDR to review three different exposure scenarios to estimate a person's exposure to the identified contaminants of concern. The CAP wanted ATSDR to evaluate whether those exposures might have been at levels high enough to cause health problems.

Questions and Answers about this PHA

What are the overall conclusions of the PHA?

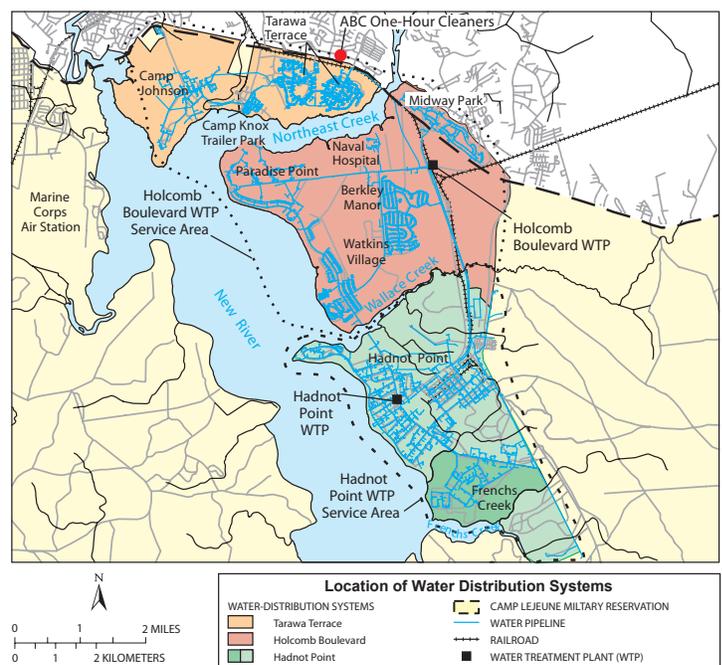
ATSDR made the following five conclusions about exposure to contaminated drinking water at Camp Lejeune.

1. People who used water from the Hadnot Point Water Treatment Plant (WTP) during specific periods were at higher risks for cancer and other illnesses not related to cancer. TCE and vinyl chloride were found in the drinking water.

- Children and adults exposed to TCE during 1972–1985 could be at risk for immune system disorders.
- Pregnant women using the water from Hadnot Point during 1972–1985 were exposed to TCE.
- TCE exposure during the first 3 months of pregnancy (when a baby is developing) increases the chance of having a baby born with heart problems and immune system disorders. Not all babies exposed to TCE during pregnancy will be born with a birth defect.

2. Young children who used water from the Tarawa Terrace WTP during 1956–1984 might have higher risks for cancer. The drinking water was contaminated with vinyl chloride, TCE, and PCE.

- Young children exposed to vinyl chloride may have had a higher risk for liver cancer.
- Pregnant women living in the Tarawa Terrace area who were exposed to TCE from the Hadnot Point WTP during training could have had a higher risk of a child born with heart problems and immune system disorders.
- Marines living in the Tarawa Terrace area who were exposed to water from the Hadnot Point WTP during training may have had higher risks for cancer.



3. Using water from the Holcomb Boulevard WTP, which began operating in 1972, is generally not expected to have harmed people's health. However, during several brief periods, pregnant women were exposed to levels of TCE that could have harmed their baby's health.

- During the months of June 1978 and April 1981, and from January 28 to February 4, 1985, pregnant women living in the Holcomb Boulevard area were exposed to water contaminated with TCE from the Hadnot Point WTP.
- Using TCE-contaminated water during the first three months of pregnancy might have increased the risk of babies being born with heart problems and immune system disorders.
- Using the water during other periods was not a health concern for children, pregnant women, women who were not pregnant, and other adults.
- Individuals who lived within the Holcomb Boulevard area prior to 1972 would have experienced health risks similar to those described for the Hadnot WTP area.

4. Exposures to VOCs could have harmed people's health if they worked in the laundry facilities, dining operations, or swam in the indoor training pools in the Hadnot Point area.

- ATSDR developed models to estimate a person's possible exposure to VOCs.
- TCE and benzene amounts were higher than minimum risk levels (MRLs). Estimated TCE exposures also exceeded the levels at which health can be affected.
- For Marines who trained at the Hadnot Point indoor pools or worked in the dining hall or laundry facilities, from 1950 – 1985, PCE amounts also exceeded the MRL.



5. Past exposure to lead could have harmed people's health. People's health could still be harmed now or in the future from lead exposure through drinking water.

- From 2005-2013, lead in tap water at 19 locations could have harmed people's health.
- Currently, the water lines in Camp Lejeune buildings contain copper piping and lead-containing solder that may leak lead into the tap water, especially hot water.
- Children are more likely than adults to have health problems due to lead exposure.
- Camp Lejeune should continue to test drinking water to prevent exposure to lead.



What are TCE, PCE, and VOCs?

TCE and PCE are chemicals used in dry cleaning and in cleaning metal parts of machines. VOCs are volatile organic compounds, which are a group of chemicals that includes solvents and fuels that dissolve easily in water. TCE and PCE are examples of VOCs.

What are the health effects of TCE, PCE, benzene, and VC?

The effects of exposure to any chemical depend on:

- When you are exposed (such as during pregnancy or as a baby),
- How much you are exposed to,
- How long you are exposed,
- How you are exposed (breathing, drinking), and
- Your personal traits and habits.

Not everyone who is exposed to TCE, PCE, benzene, or VC will develop a health problem. Most of the available information about health effects of these chemicals comes from animal studies or studies of workers who use the chemicals in their workplace. There are very few studies conducted of people exposed to these chemicals in drinking water.

I'm a veteran. Where do I go for more information?

If you are a veteran, and have concerns about your health, you can find out more information at these websites:

- Department of Veterans Affairs (VA): <http://www.publichealth.va.gov/exposures/camp-lejeune/>
- ATSDR: <http://www.atsdr.cdc.gov/sites/lejeune/index.html>

What are the next steps?

- ATSDR will continue to work with the Community Assistance Panel (CAP) and the U.S. Department of Veterans Affairs (VA) to provide educational materials about Camp Lejeune to people concerned about their health.
- ATSDR urges individuals to discuss any health concerns with their health care providers.
- Health care providers may make a referral to an Association of Occupational and Environmental Clinics (AOEC). AOEC has doctors who specialize in occupational and environmental medicine. A list of clinic locations is available at <http://www.aoec.org>.
- ATSDR will provide copies of this public health assessment (PHA) to local health and public officials, as well as other interested parties near the site. Copies of the PHA will also be available on ATSDR's website, https://www.atsdr.cdc.gov/sites/lejeune/cl_pha.html



Where to Learn More About ATSDR's Camp Lejeune Drinking Water Public Health Assessment

For more information about ATSDR's public health activities at this site, call ATSDR at 1-800-CDC-INFO (232-4636) or visit online at:

- ATSDR: www.atsdr.cdc.gov
- Camp Lejeune: <http://www.atsdr.cdc.gov/sites/lejeune/index.html>
- VOCs: <https://www.atsdr.cdc.gov/substances/toxchemicalisting.asp?sysid=7>