

# Morbidity Study of Former Marines, Employees, and Dependents Potentially Exposed to Contaminated Drinking Water at USMC Base Camp Lejeune: A Summary of Agency for Toxic Substances and Disease Registry (ATSDR) Study Design and Results

## Study Purpose

Some residents and civilian employees who lived or worked at Camp Lejeune from the 1950s through 1985 were exposed to drinking water contaminated with volatile organic compounds.

The purpose of this study was to determine whether there is a link between exposure to contaminated drinking water at Camp Lejeune and selected cancers or other diseases in former service men and women, their families, and civilian workers.

Drinking water at Camp Lejeune was contaminated with volatile organic compounds (VOCs), including trichloroethylene (TCE), tetrachloroethylene (PCE), benzene, trans-1,2-dichloroethylene (DCE), and vinyl chloride.

## What Was Studied

Health surveys were mailed to over 247,000 study participants or their next of kin. Over 76,000 surveys were completed, collecting information about cancers and other diseases, including type of disease and age of diagnosis, as well as factors that affect health like age, race, education, smoking, and alcohol use.

## Features of this Study

This study looked at military personnel, their families, and civilian employees at Camp Lejeune who may have been exposed to contaminated drinking water and compared some specific health problems with military personnel and civilian employees at Camp Pendleton who were not exposed to the water. Using a comparison group with a similar population who was not exposed helps assess if there is a link between exposure to the water and diseases.

In addition, the researchers conducted an 'internal' analyses (looking at the exposed populations within Camp Lejeune only) to see if increasing levels of exposure to the contaminants in the drinking water resulted in increased risk of disease.

## Conclusion and Key Results

This study shows that contaminated drinking water at Camp Lejeune was linked to increased risk for bladder cancer, kidney cancer, and kidney disease.

- Exposure to both TCE and PCE was associated with an increased risk for kidney cancer in both Marines and civilian employees
- Exposure to both TCE and PCE was associated with increased risk for bladder cancer and kidney disease in civilian employees
- Exposure to PCE was associated with increased risk for bladder cancer and kidney disease in Marines

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Risk increased with increasing levels of exposure to the contaminants for kidney cancer (TCE and PCE in Marines and TCE/PCE in civilian employees) and kidney disease (PCE in Marines and TCE/PCE in civilian employees).

These results are consistent with results found in previous studies.

## Next Steps

The results of this study add to the scientific literature on the risk of cancer and other diseases associated with TCE and PCE in drinking water. ATSDR will follow up on these findings in a cancer incidence study that will involve state cancer registries nationwide, as well as federal cancer registries.

## For More Information

This study can be accessed online at [https://www.atsdr.cdc.gov/sites/lejeune/docs/health\\_survey\\_report-508.pdf](https://www.atsdr.cdc.gov/sites/lejeune/docs/health_survey_report-508.pdf).

More information about the mortality studies is available at <https://www.atsdr.cdc.gov/sites/lejeune/mortalitystudy.html> and <https://www.atsdr.cdc.gov/sites/lejeune/civilianmortalitystudy.html>.

Other Camp Lejeune public health activities can be found online at <https://www.atsdr.cdc.gov/sites/lejeune/activities.html>.

For more information about ATSDR's work on Camp Lejeune, visit [www.atsdr.cdc.gov/sites/lejeune](http://www.atsdr.cdc.gov/sites/lejeune).

