

An extensive Public Health Evaluation was performed under the guidance of the Navy and Marine Corps Public Health Center. The Public Health Evaluation was designed to evaluate the potential short and long-term health risks associated with living in the Naples area as a result of inadequate trash collection, uncontrolled open burning of uncollected trash, and widespread dumping of waste, including chemical and other hazardous waste. Launched in 2008 and completed in 2011, the Public Health Evaluation involved the collection of air, water, soil and soil gas samples from throughout the Naples area to identify whether there were potential health risks.

Your Health: Facts for Navy Families in Naples

About: Background Arsenic Levels in Soil and Water

The U.S. Navy is committed to ensuring our families are safe while serving our country at home or overseas. The following information is provided as part of a wide-ranging effort to understand the health risks of our personnel and families living in Naples, Italy. From 2008-2011, the Navy conducted a comprehensive Public Health Evaluation to assess potential short and long-term health risks associated with living in the Naples area (see sidebar). In line with our commitment to continually share important health information, we encourage you to review the following information.

What is arsenic?

Arsenic is a naturally occurring element that is widely distributed in the earth's crust. It is found mostly everywhere and occurs naturally in rocks, soil, water, air, plants, animals and all living matter. Arsenic can be released to the environment through natural activities, such as the erosion of rocks, forest fires and volcanic action, like the eruption of Mount Vesuvius here in the Naples area. Arsenic can also be released through human activities, such as pesticide application.

Where is arsenic found?

There are small amounts of arsenic almost everywhere – in ocean water and soil, in the water we drink, the food we eat and the air we breathe. Natural forms of arsenic can be traced back to geological deposits and thus can be found in soil. Arsenic may also be found in water that has flowed through arsenic-rich rocks.

How does arsenic get into food?

Arsenic can be taken up from soil by plants. Fruits and vegetables generally contain small amounts of arsenic, and animals that eat these plants may also ingest small amounts of arsenic.

Does arsenic occur in groundwater in the United States?

Yes. Under certain conditions, arsenic from soil and rocks beneath the ground surface may travel to groundwater. Arsenic concentrations vary across broad regions of the country. Arsenic in groundwater is largely the result of minerals

dissolving from weathered rocks and soils. The

U.S. Geological Survey developed maps that show where and to what extent arsenic occurs in groundwater across the United States. The current maps are based on samples from 31,350 wells. Widespread high concentrations are found in the West, the Midwest and the Northeast. Figure 1, below, is one of the maps developed.

Was arsenic measured as part of the Naples Public Health Evaluation?

Yes. Soil and tap water samples were collected and tested for the presence of arsenic, one of about 200 chemicals tested in the samples. Testing results from Phase I of the Naples Public Health Evaluation show increased concentrations of arsenic in soil and tap water when compared to Regional Screening Levels (RSLs) established by the U.S. Environmental Protection Agency (USEPA). However, it is important to understand that arsenic is a naturally occurring chemical common in volcanic areas such as Naples,

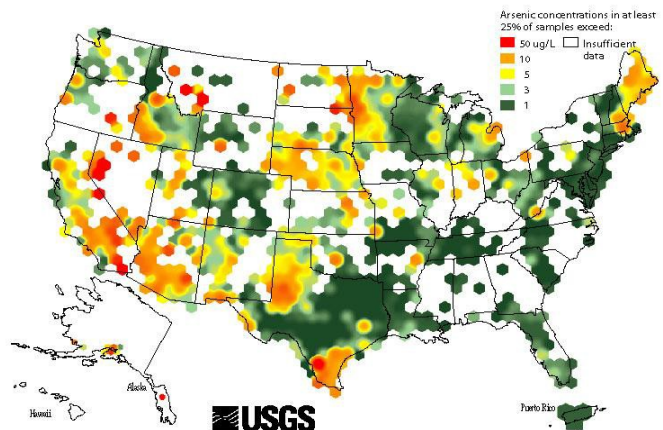


Figure 1. Equal-area map: Arsenic concentrations found in at least 25% of groundwater samples within a moving 50-kilometer radius.

Source: http://water.usgs.gov/nawqa/trace/pubs/geo_v46n11/fig3.html.



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therefore, it is critical to take into account the “background” concentrations of naturally occurring chemicals when determining whether there is a risk to human health.

A 2005 study by the University of Sannio in Benevento, Italy, and the University of Naples in Naples, Italy, analyzed 982 soil samples in the Naples area and determined the levels of naturally occurring chemicals in the soil, called “background” levels, versus the levels of these chemicals from human contributions. The Naples Public Health Evaluation compared the concentrations of arsenic detected in soil samples to the background levels identified in the 2005 study as well as applied various statistical techniques to determine whether arsenic could be attributable to background. The Public Health Evaluation found that arsenic in the soil samples was detected at less than background levels. Therefore, arsenic in soil is being considered as part of background risk in the Naples Public Health Evaluation.

For tap water samples, no suitable background concentrations could be located in scientific literature. Although Phase I testing detected arsenic in all tap water samples at concentrations exceeding the RSLs, there does not appear to be a significant difference in arsenic concentrations between public tap water supplies and private well water supplies. Furthermore, this information, coupled with the regional geology (i.e., volcanic soils and high concentrations of arsenic in soil), indicate that arsenic in tap water is representative of natural background. Therefore, arsenic in tap water, along with soil, is being considered as part of background risk in the Naples Public Health Evaluation.

Why is arsenic being considered as background risk in the Naples Public Health Evaluation?

“Background risk” is the risk for chemicals that are naturally occurring in the environment. Since arsenic is naturally found in soil and groundwater in the Naples area and is likely associated with volcanic activity in the region, it is not included in making risk management decisions. This practice is consistent with the USEPA. However, arsenic is included in the “total risk” for comparison purposes. Total risk is the cumulative risk of all the chemicals that were tested as part of the Naples Public Health Evaluation.

Sample sites map

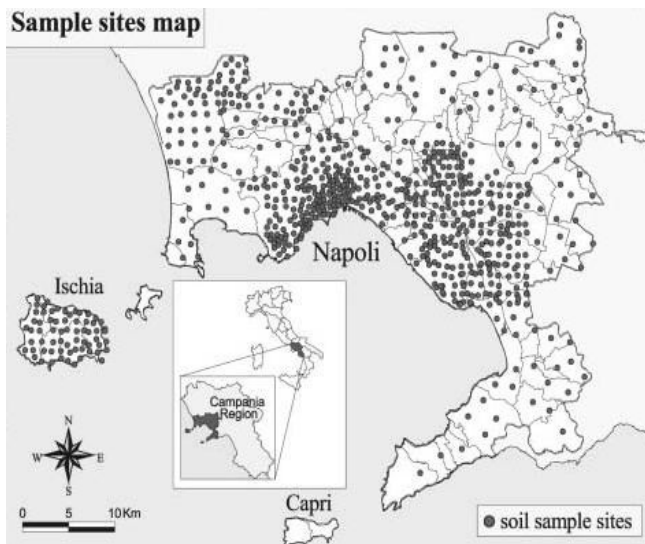


Figure 2. A 2005 study by the University of Sannio and the University of Naples analyzed 982 soil samples in the Naples area to determine the levels of naturally occurring chemicals in the soil.

What actions can I take to reduce exposure to arsenic in soil and tap water?

- Limit your contact with soil. If you must dig, be sure to wash your hands and other areas of your body that come into direct contact with the soil. Also, thoroughly clean shoes and clothes that have come in direct contact with soil prior to bringing them into the house.
- Only use bottled water for drinking, cooking, brushing teeth and making ice.

Where can I get more information about arsenic?

More information about arsenic can be found on the U.S. Department of Health and Human Services, Agency for Toxic Substances and Disease Registry website:

<https://emergency.cdc.gov/agent/arsenic/index.asp>

For health-related questions or more information about the Naples Public Health Evaluation, contact the U.S. Naval Hospital Naples, Public Health, at 081-811-4170.