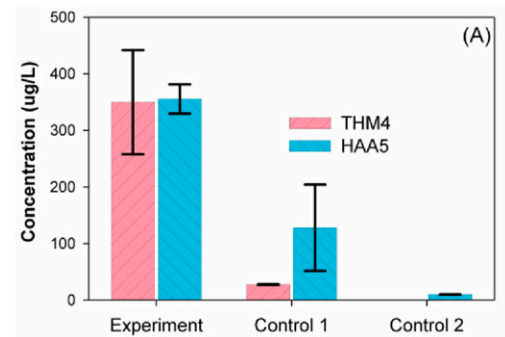
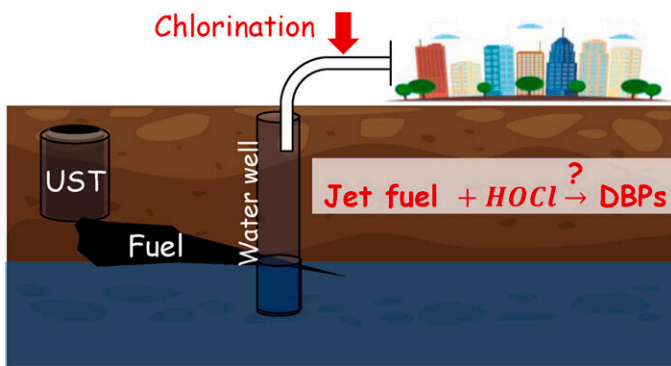


Petroleum and chlorine mix in water could yield harmful byproducts, says new study

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Credit: *Chemosphere* (2024). DOI: 10.1016/j.chemosphere.2024.142057

A new study from the University of Hawai'i at Mānoa shows that chlorine mixed with petroleum in water can potentially produce inadvertent byproducts harmful to human health. The research is [published](#) in the journal *Chemosphere*.

Small amounts of chlorine, within safe industry standards, are added to

disinfect O'ahu's drinking water by the Honolulu Board of Water Supply (BWS) and military installations, according to BWS. In late November 2021, a petroleum release from the Red Hill Bulk Fuel Storage Facility contaminated the Red Hill drinking water well. Hundreds of families, living on Joint Base Pearl Harbor-Hickam and the Army's Aliamanu Military Reservation and Red Hill Housing, reported petroleum odors coming from tap water supplied by the U.S. Navy water system.

Lab experiments conducted by researchers in UH Mānoa's College of Engineering and Water Resources Research Center (WRRC), showed elevated levels of THM4 (total trihalomethanes) and HAA5 (haloacetic acids), which are both classified as [disinfection byproducts](#), can form during chlorination of petroleum contaminated water. THM4 was the most abundant, and additionally, various unregulated disinfection byproducts were produced. The researchers stress that their findings are from controlled lab conditions, and further research is needed to understand real-world implications.

According to the Centers for Disease Control and Prevention, "Chronic exposure to disinfection byproducts may increase risk of cancer. Humans exposed to unusually large amounts of some disinfection byproducts could experience liver damage and decreased nervous system activity."

"These findings highlight the [potential health risks](#) associated with chlorinating petroleum-contaminated water, and further research is needed to fully understand these risks in real-world conditions," said study co-author and Professor Tao Yan from the UH Mānoa Department of Civil, Environmental and Construction Engineering and WRRC.

During the lab process, control reactors containing either only free chlorine or only petroleum hydrocarbons produced significantly lower or no detectable levels of disinfection byproducts, which indicated that the

presence of petroleum hydrocarbons and free chlorine together was responsible for the elevated disinfection byproduct concentrations.

"Recent contamination events in the Pearl Harbor aquifer show that petroleum hydrocarbons can directly enter groundwater wells without undergoing natural breakdown processes," Yan said. "This study reveals that when unaltered [petroleum hydrocarbons](#) come into contact with free chlorine, commonly used in [water treatment](#), they can produce higher levels of regulated disinfection byproducts. Understanding the potential risks during both water treatment and distribution is important for safeguarding water quality and protecting [human health](#)."

More information: Mandy-Tanita Brinkmann et al, Formation potential of disinfection byproducts during chlorination of petroleum hydrocarbon-contaminated drinking water, *Chemosphere* (2024). [DOI: 10.1016/j.chemosphere.2024.142057](#)

Provided by University of Hawaii at Manoa

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