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Study finds toxic chemical in drinking water sources

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Dangerous levels of perchlorate pose health hazard to people

: Dangerous levels of perchlorate, a toxic chemical found in rocket fuel and fireworks, have been detected in drinking water sources throughout Kerala, indicating a serious health hazard for millions.

A study conducted by the Department of Environmental Technology, National Institute for Interdisciplinary Science and Technology (NIIST), Thiruvananthapuram, has detected high levels of perchlorate contamination in water samples collected from 20 locations in the State. The toxic pollutant was found in samples collected from piped water, open wells and ground water sources.

The report, which bagged the Young Scientist award at the Kerala Science Congress, was authored by V.N. Anupama, research scholar and her guide, B. Krishnakumar, Scientist, NIIST.

Studies have found that perchlorate may impair the functioning of the thyroid, leading to metabolic disorders in adults and stunting the growth of foetuses, infants and children. The chemical is manufactured in large quantities for use as solid propellant in rockets, missiles, explosives and fireworks.

In rocket engines, perchlorate decomposes into oxygen, providing fuel for flight.

The study conducted by NIIST reported high concentrations of the chemical in Ernakulam and Thiruvananthapuram.

The ISRO's Ammonium Perchlorate Experimental Plant (APEP), which manufactures more than 800 tonnes every year, is located at Aluva near Ernakulam. The Vikram Sarabhai Space Centre (VSSC) based in Thiruvananthapuram uses it as propellant in rockets.

The samples collected for the research by NIIST were analysed with the help of the State University of New York which published the first report on perchlorate contamination in India in 2009. Of all the samples analysed, the highest level of 91.4 micrograms per litre was detected at Thumba where the VSSC is located. This is three times higher than the safe level of 24.5 micrograms/L recommended by the US Environmental Protection Agency (EPA)

The highest level of contamination of surface water was reported from the brackish water lake at Veli, near VSSC, (19.6 micrograms/L) while the second highest value was detected in the sample collected from the Periyar river flowing near the APEP in Ernakulam district (18.1). In samples collected from public taps, Attingal in Thiruvananthapuram (66.2) and Kannur in north Kerala (69.2) were found to have the highest values. Kasaragod also reported contamination of piped water.

High levels of perchlorate were found in open well samples from Kottayam and Palakkad as well.

Noting the high level of perchlorate in Kannur and Kasaragod, the report says it could have emanated from the large number of small-scale units manufacturing fire crackers for temple festivals. , many of them unauthorised.

The research team claims to have developed a microbiological system for removing perchlorate from water. Dr. Krishnakumar said the system that was successfully demonstrated at the laboratory scale, could find application in controlling the toxic pollutant at industrial sources.

The method reduces the toxic perchlorate into non-toxic chloride. The team is working on a more energy- efficient bioprocess.

Last week, the U.S. Environmental Protection Agency decided to develop a regulation for perchlorate to protect Americans from health impacts.

Studies carried out by the EPA had found measurable amounts of perchlorate in 26 States and two U.S. territories, enough to contaminate drinking water of up to 17 million Americans. The decision to undertake the first-ever national standard for perchlorate reverses a 2008 preliminary determination by the previous Bush administration.

The website of EPA says the agency would begin to evaluate the feasibility and affordability of treatment

technologies to remove perchlorate and would also examine the costs and benefits of potential standards.

Perchlorate is used in rocket fuel and fireworks

Study done by NIIST gets award for scientist
