

NIIST develops process to treat contaminated well water

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The CSIR-National Institute for Interdisciplinary Science and Technology (NIIST) here has come up with a hybrid process for treating well water contaminated with perchlorate. Perchlorate contamination poses health risks, as it can affect the thyroid gland leading to hypothyroidism and associated physiological disorders.

The NIIST has established a demonstration plant at Keezhmad panchayat in Aluva, which is capable of treating contaminated well water and generating 2,000 litres of potable water a day. The treatment process was developed by a team led by Krishnakumar B., Senior Principal Scientist with the NIIST's Environmental Technology Division.

A strong oxidising agent, perchlorate salts find wide use in many industries, including the strategic sector and space research and development units. The NIIST developed the hybrid process (bio-physical) as conventional treatment meth-

ods scarcely work. The project was funded by the Jal Jeevan Mission, Ministry of Jal Shakti.

How it works

The contaminated water is initially treated in a bioreactor with a specially developed bacterial system. It then passes through a combination of custom-designed ultrafiltration (UF) and reverse osmosis (RO) units for removing residual contaminants. It's also a zero-discharge process as the UF and RO rejects too get treated in the bioreactor.

According to the NIIST, studies carried out by it during 2009-2015 had revealed high levels of perchlorate in well water samples around the Ammonium Perchlorate Experimental Plant, Aluva. Contamination was observed in the Keezhmad and Edathala panchayats. In the community wells at Kulakkad in Keezhmad panchayat, perchlorate levels up to 45,000 micrograms per litre had been observed.

Later studies by the Health department also

showed elevated TSH levels (indicating hypothyroidism) among Keezhmad residents who use the contaminated well water. "Three of the contaminated community wells in the panchayat were permanently closed, and people in the affected Kulakkad region were supplied piped water by the Kerala Water Authority," Dr. Krishnakumar said.

Recent NIIST studies also found that even after 10 years, the level of perchlorate in the closed community wells was in the range of 9,090 to 1,490 micrograms per litre, which is several magnitudes higher than the existing WHO guideline for perchlorate in drinking water, which is 70 microgram per litre. For the project, NIIST had selected one of the abandoned wells.

The capital cost of the 2,000 litre-a-day plant is ₹3 lakh. Pure water production cost is just 20 paise per litre, the NIIST said. The plant has been installed with the support of the Keezhmad grama panchayat and the residents of Kulakkad.