Study of Oil Contamination in Chunnakam Area due to the Wastage from Power Station

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Jaffna Peninsula relies totally on groundwater resources for the water needs of its inhabitants as this karstic terrain does not have any other potable water sources. Chunnakam, Thenmaradchi, Vadamaradchi and Kayts are the four main aquifers in Jaffna Peninsula. Of these Chunnakam aquifer has the highest capacity and acceptable quality as a drinking water source and for other usages. However, its water has become completely unsuitable for drinking due to an oil contamination. The groundwater contamination is attributed to oil waste from a 36 MW diesel power plant operated by the Ceylon Electricity Board (CEB) located in Chunnakam - Valikamam part of Jaffna Peninsula. High levels of contamination have been reported from areas such as Earlali, Mallakam and Uduvil around Chunnakam. Irrespective of the magnitude of the hazard no systematic study on the spatial distribution of the subsurface contaminant distribution has been carried out so far. This study focuses on determining the extent of contamination of groundwater in Chunnakam. Groundwater samples were collected during mid-April 2015 from wells within 2km radius around the power station to represent different uses such as domestic, domestic with home garden, public wells and agricultural wells. Important chemical parameters, namely oil and grease content, electrical conductivity (EC), pH and heavy metals such as lead and cadmium were determined in water samples obtained from 40 wells. Oil and grease concentration was measured by EPA method 1664, Hexane Extractable Gravimetric method. The spatial variation of water quality was mapped on GIS. Analyses reveal that 33 (82.5%) wells contain oil concentration above the permissible level (1.0 mg/1). Only 3 (7.5%) wells showed oil concentration below the permissible limit while 4 (10%) wells were not contaminated with oil and grease. A reciprocal relationship is observed between the oil and grease content in the groundwater and the distance from the power station. It implies that the contaminant front is expected to migrate in the aquifer although the waste disposal has ceased. Spatial pattern of the contamination shows that it spreads more towards the north.

Keywords: Oil contamination, Chunnakam power station, Water quality