ABSTRACT

Limitation of drinking water critically affects for day today life of most of the community in Sri Lanka as well as in the world. Specially the community in dry zone in Sri Lanka has been facing to this difficulty for a long period. It is already identified that high concentration of Calcium, Magnesium and Fluoride in groundwater is the main reason for this situation. Even though there are various methods used for the water purification, still the problem remains same for rural community and some of the urban community. This study is focused to evaluate the existing and past methods of water treatment and to analyze new techniques of drinking water treatments with a view to identify the methods suit to the dry zone in Sri Lanka. Subsequently it aims to install the most suitable and effective water treatment pilot plant and to collect data to design for an industrial water treatment plant. General area of Anuradhapura, Mihinthale and Kahatagasdigiliya was selected as the study area using the data collected in field visits. A pilot plant with Reverse Osmosis(RO) membrane was installed and operated for two months starting from July 2018, at army camp Padulagama while comparing with an industrial treatment plant at Rajarata University. Water samples collected twice a week from both the plants were tested and analyzed for two months. Results were compared with each other and with results of an electro dialysis reverse treatment plant at kahatagasdigiliya as well. It was found that 32.43 % of the raw water was successfully purified. Hardness and Fluoride concentration could be reduced up to 42.07 mg/l and 0.06 mg/l respectively. The common parameters which were reduced due to the use of RO membrane were also analysed and found acceptable. Operation lapses and difficulties in treatment plants were identified and rectification were carried out successfully. Requirement of pre-treatment unit and the function of those unit were studied. Designing of RO water treatment plant with pre-treatment unit and maintenance, regeneration and replacements were practically done. Physical and chemical parameter were tested in the site and at the laboratory as well. Advantages and disadvantages of RO treatment plants were discussed. Proposals were made for appropriate discharging of rejected water from RO membrane.

Key words –Hardness removal, Fluoride removal, Dry zone of Sri Lanka, Water purification, RO membrane, Filtration methods, Ground water.