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Entitled

BIOLOGICAL TREATMENT OF PRODUCED WATER USING ALGAE: A PROOF OF CONCEPT

by

Shibin Nadersha

Faculty Advisor

Dr. Ashraf Aly Hassan, Department of Civil & Environmental Engineering

College of Engineering

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Abstract

Produced water (PW) is the effluent generated during oil mining and extraction. On average, for every barrel of oil, 4-5 barrels of PW is generated worldwide. In UAE, 1.22 billion cubic meters of PW was generated in the year 2017. Proper management of PW is thus very important taking into account the large volumes of it being generated. In addition, PW is considered toxic as it contains various contaminants such as aliphatic and aromatic hydrocarbons, inorganic salts, metals, phenols, radioactive materials and chemical additives. Disposal of untreated PW into oceans and water bodies can cause adverse effects on the human health and the environment. Therefore, proper treatment is required before reuse or disposal. The currently used methods of treatment include physical and chemical treatments that are expensive and increases the overall cost of the oil product. Biological treatments are, therefore, recommended as an economical alternative. Microalgae can utilize contaminants in the PW as nutrient sources and thus be used for bioremediation. In this study, microalgae enriched and grown in wastewater were acclimatized to three different produced water samples by progressive adaptation in steadily increasing ratio of produced water. The algae which could adapt and grow in highest ratio in minimum time was used for bioremediation of produced water. The treatment efficiency was examined by measuring parameters such as pH, COD, TOC, conductivity, salinity, TDS, anions and alkalinity. COD removal between 22-44% were achieved. A reduction of 12-18% of EC, 12-20% TDS, 13-22% salinity, 16-25% chloride ion concentration and an increase of 78-85% alkalinity was observed in the three produced water samples over a 7 day treatment period.