OPTIMIZATION OF WATER DESALINATION BRINE DISPOSAL

A Thesis
Submitted to the Faculty of Engineering Ain Shams University
for the Fulfillment of the Requirement of PHD Degree in Civil Engineering

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DEDICATION

This work takes a period from my life. I wish to dedicate it to whom suffered to educate, prepare, build capacity and help my self to be as I am;

TO MY FATHER & MY MOTHER

I wish to dedicate it also to whom ease my life and share in carrying the responsibility to help me

TO MY WIFE
AND
MY LOVELY CHILDREN

STATEMENT

This dissertation is submitted to Ain Shams University, Faculty of Engineering for the degree of PhD. in Civil Engineering.

The work included in this thesis was carried out by the author in the department of Public Works, Faculty of Engineering, Ain Shams University, from December 2011 to June 2015.

No part of the thesis has been submitted for a degree or a qualification at any other University or Institution.

Date: - ---/0-/2015

Signature:----------

Name:- ***MOHAMED TAREK ISMAIL***

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ABSTRACT

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Title : **OPTIMIZATION OF WATER DESALINATION BRINE DISPOSAL**

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Summary :

Water desalination processes have contributed to a better standard of living in a number of countries during the second half of the 20th century, following an increase in water demand for drinking purposes as well as industrial and agricultural uses. Desalination process produces two streams of water, one is the product fresh water, and the other is concentrate water containing salts and any un-reacted pre-treatment chemicals (Brine). Brine is considered to be one of the main environmental aspects that affects the surrounding environment during disposal. There are a variety of methods that are used for brine disposal / management. The most common methods include (i) Surface water Discharge, (ii) Ground water Discharge, (iii) Evaporation ponds.

The availability of the disposal alternative is mostly site-specific. Therefore, the most suitable disposal methods from an environmental and economic perspective have to be evaluated on a site-specific basis.

The aim of this study is to develop a mathematical model, named "Brine disposal decision support system" (BDDSS) .The model's main objective is to assist decision makers (Consultant's or Government authorities) in the selection of an optimum brine disposal solution applying applicable, environmentally friendly and cost effective methods, through a user friendly interface that reaches results in a short time.

The BDDSS model can be applied to any desalination plant to obtain the optimum brine disposal solution, by providing three scenarios for brine disposal, after performing a compilation of all inputs provided by the user, then start comparison among the three alternatives and select the optimum solution / alternative through an evaluation matrix based on the cost / environmental of each disposal alternative. The optimum solution provided is the one achieving lowest cost and lowest negative environmental impact

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