ENVIRONMENTAL MANAGEMENT OF GROUNDWATER RESOURCES IN SAUDI ARABIA, CASE STUDY: SEWAGE TREATMENT PLANT IN MAKKAH

By

Mansour Harbi Ahmad Albahoot

A Thesis Submitted to
the Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for the Degree of
DOCTOR OF PHILOSOPHY

in

IRRIGATION AND HYDRAULICS ENGINEERING

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
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Title of Thesis:

Environmental Management of Groundwater Resources in Saudi Arabia, Case Study: Sewage Treatment Plant in Makkah

Key Words: Groundwater- Water treatment- Makkah- Pollution- MODFLOW

Summary:

The mechanics of pollution spread and attenuation including dispersion, convection, sources/ sinks, adsorption, and decay are presented. The equations of three-dimensional solute transport are illustrated. Parametric study has been performed covering the effect of some parameters on spread of contaminants in groundwater. Different methods of remediation of groundwater contamination are demonstrated by numerical simulation. Numerical simulation of different approaches is simulated to stop contamination spread out of sewage treatment plant in Makkah.

Disclaimer

I hereby declare that this thesis is my own original work and that no part of it has been submitted for a degree qualification at any university or institute.
I further declare that I have appropriately acknowledged all sources used and have cited them in references section

Name : Date:

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Acknowledgment

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