"STUDY OF CONTAMINANT TRANSPORT FROM SEPTIC TANKS AND ITS EFFECT ON DRINKING WATER WELLS AT RURAL REGIONS"

BY

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Department of Environmental Engineering
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Ain Shams University

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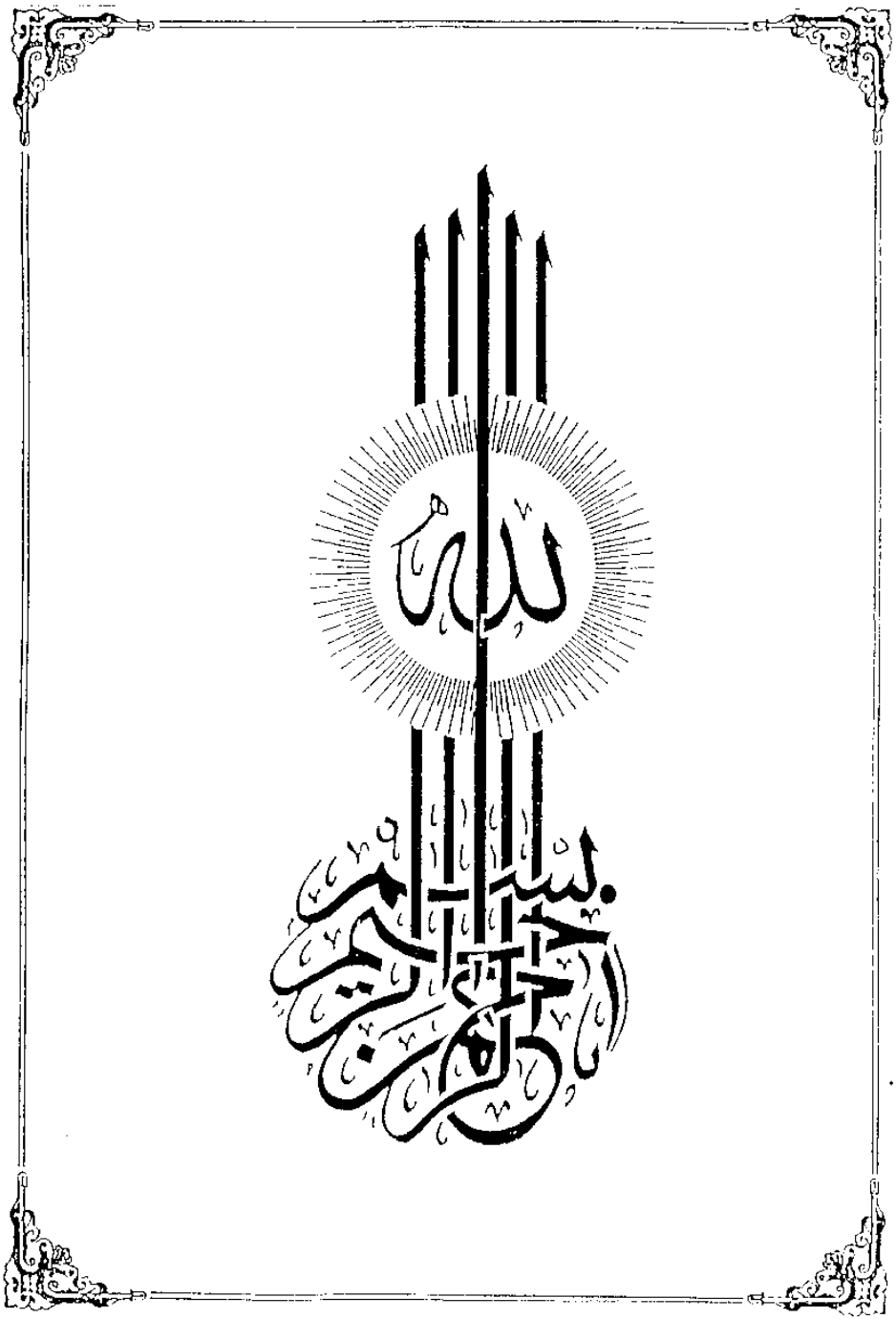

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APROVAL SHEET

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ABSTRACT

Mahmoud Zaki Hussein. Study of contaminant transport from septic tanks and its effect on drinking water wells at rural regions. Master of Science in Environmental Engineering, Environmental Studies and Research Institute, Ain Shams University, 1998.

In rural regions, septic tanks usually exist near by drinking water wells for the domestic uses. When the contaminants from these septic tanks are captured by the drinking water wells human health will be threaten. Therefore, a careful study of the contaminant transport from the septic tanks under different soil conditions has been considered in this research.

The chemical analysis has shown that the total Nitrogen as an indicator, is the most influenced constituent regarding groundwater quality. So the spreading of this pollutant, as an indicator, is considered under the drain-field of the septic tank.

Three study areas for different soil conditions *(West of Tanta, East of Benha, and South of Belbeis)* have been selected to predict the potential contamination from septic tanks at the saturated porous media.

The simulations have been carried out by using numerical model (2D-VDTRAN) to predict the potential contamination from the septic tanks.

The model simulation is used as well to determine the safe distance between the septic tank and drinking water well, and also the safe well depth for different discharge rates to avoid capturing the contaminated plume and to minimized the water quality risk according to the WHO guidelines.

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Results of the study indicate that drinking water wells located up-stream of the septic tank are better than those located down-stream of septic tank. The model simulation showed that the distribution of pollutant concentration is highly affected by the aquifer characteristics and also the recharge rate from septic tank.

The iso-concentration contour charts which, were depicted from the model simulation for different hydrogeological conditions can be used to identify the optimal and suitable well location, suitable well depth, and the discharge rate of water to avoid the adverse effects of septic tank effluent.

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* Abbreviation.

T.N : Total Nitrogen
T.P : Total phosphorous
T.D.S : Total Dissolved Solids
Na : Sodium
Mg : Magnesium
Mn : Manganese
Ca : Calcium
Cl : Chloride
SO_4 : Sulphates
CO_3 : Carbonates
NH_4 : Ammonium
NH_3 : Ammonia
NO_2 : Nitrite
NO_3 : Nitrate
Cd : Cadmium
BOD : Biological Oxygen Demand
COD : Chemical Oxygen Demand
pH : Hydrogen activity
m^3 : cubic meter
ppm : Part per Million
G.W.T: Ground Water Table
N0. : Number
T : Transmissivity
S : Storativity
K : Hydraulic Conductivity
Kd : Distribution Coefficient
Km : Kilometer
m : Meter
M : Mass
t : time
L :length
RIGW : Research Institute for Groundwater
E.COL: Esherchia Coli

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