

INVESTIGATION ON
MIGRATION OF
LNAPL AND DNAPL
IN DIFFERENT
SAND SIZE LAYERS

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SUPERVISOR'S DECLARATION

I hereby declare that I have checked this thesis and in my opinion, this thesis is adequate in terms of scope and quality for the award of the degree of Civil Engineering.

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Date : 16th June 2017



STUDENT'S DECLARATION

I hereby declare that the work in this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

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LIST OF SYMBOLS

Cu	Uniformity coefficient
Cc	Coefficient of gradation
SG	Specific gravity of soil
M	Mass of soil
k	Coefficient of permeability
V	Collected volume of water
L	Length of soil column
A	Area of soil column
h	Head difference
t	Time required to V volume
S ₀	Sorting coefficient
g	Gram
%	Percentage
w	Moisture content
mm	Millimeter
m	Meter
s	Second

LIST OF ABBREVIATIONS

NAPL	Non-aqueous phase liquids
LNAPL	Light non-aqueous phase liquid
DNAPL	Dense non-aqueous phase liquid
PCB	Polychlorinated biphenyl
TCE	Trichloroethylene
GRM	Gamma radiation method
X-RAM	X-ray attenuation method
LRM	Light reflection method
LTM	Light transmission method
MIAM	Multispectral image analysis method
TL3-DS	Time-lapse three dimensional seismic
RTDF	Remediation technologies development forum
ASTM	American society for testing and materials
PCE	Perchloroethylene
GPR	Ground-penetration radar
MATLAB	Matrix laboratory
AASHTO	American association of state highway and transportation officials
USCS	Unified soil classification system
ROI	Region of interest