

UNIVERSITI TEKNOLOGI MARA

**INVESTIGATION OF DIELECTRIC
PERMITTIVITY DUE TO HYDROCARBON PIPE
PERCOLATION UNDERGROUND IN VARIOUS
TYPE OF SOIL USING GPR**

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Thesis submitted in partial fulfillment
of the requirements for the degree of
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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

The invention of ground penetration radar (GPR) technology has facilitated the detection of buried utilities and has mainly been used in civil engineering to detect structural flaws in road pavements, but has not been used to assess the soil contamination affected by hydrocarbon. Soil contamination is caused by chemical changes in the ground caused by the presence of man. Petroleum hydrocarbons are the most common chemicals involved in soil contamination. There are two (2) objectives taken in this investigation which is to estimate dielectric permittivity with the presence of hydrocarbon percolation in subsurface detect by GPR and to analyses the accuracy of dielectric permittivity value. The research involved the construction of a suitable GPR test facility to conduct controlled testing in a dry soil. Several types of soil were investigated with GPR 800MHz antenna. The GPR surveys were carried out in order to obtain dielectric permittivity value from uncontaminated and contaminated soil. This investigation compared the result of dielectric permittivity change by soil moisture and time propagation. The results presented in this thesis show that GPR can identify soil contamination associated with a hydrocarbon percolation under these controlled laboratory conditions.

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