

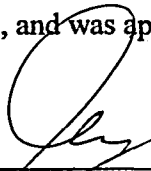
**DETERMINING TRAY POSITION AND RELATED  
PROBLEMS IN DISTILLATION COLUMN BY USING  
GAMMA-RAY ABSORPTION TECHNIQUE**

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**Final Year Project Report Submitted in  
Partial Fulfillment of the Requirements for the  
Degree of Bachelor of Science (Hons.) Industrial Physics  
In the Faculty of Applied Sciences  
Universiti Teknologi MARA**

**JULY 2013**

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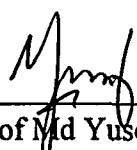
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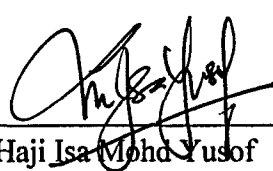
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## ABSTRACT

Distillation is a process where chemicals are separated mainly by the difference and ease in which they vaporize. The working principle of distillation columns depends largely on what is inside the column (trays and/or packed beds). Distillation columns are considered as one of the most critical components in petroleum refineries, gas processing installations and chemical plants. Plant performance depends to a large extent on the ability of these columns to function as intended. Defective columns may lead to a serious consequences to the plant operation and hence the quality of the product. Thus, when a distillation column experiences irregularities, it is urgent to find out exactly what is happening inside the column. Any kind of problem can result to a large financial loss especially when it involves off-specs product, loss of production or unexpected shut down of the plant. Gamma-ray scanning or often referred to as "column scanning" is a convenient, cost effective, fast, efficient and non-intrusive technique to examine inner details of the distillation column, while it is in operation. Throughout the investigation using gamma-ray absorption technique, a small and adequate encapsulated radioactive material was used. Special source housing with gamma-ray source and appropriate collimator was used to direct the beam to the tower. Interaction of the radiation with the medium of interest will produce changes in intensity of the beam, which can be correlated to the property of the medium.