

**UNIVERSITI TEKNOLOGI MARA**

**EMPLOYEE EXPOSURE TO TOTAL  
VOLATILE ORGANIC COMPOUNDS  
(TVOCs) AT PHOTOCOPY AND  
PRINTING SERVICE CENTRE**

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**Project submitted in fulfilment of the requirements  
for the degree of**

**Bachelor (Hons.) of Environmental Health and  
Safety  
Faculty of Health Sciences**

**JULY 2015**

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## Declaration by Student

Project entitled “Employee Exposure to Total Volatile Organic Compounds in photocopy and printing service centre” is a presentation of my original research work. Wherever contributions of others are involved, every effort is made to indicate this clearly, with due reference to the literature, and acknowledgement of collaborative research and discussions. The project was done under the guidance of Madam Shantakumari Rajan as Project Supervisor. It has been submitted to the Faculty of Health Sciences in partial fulfillment of the requirement for the Degree of Bachelor in Environmental Health and Safety (Hons).

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## **ACKNOWLEDGEMENTS**

In the name of Allah, the Most Gracious and the Most Merciful Alhamdulillah, all praises to Allah for the strengths and His blessing in completing this project. I would like to express my genuine appreciation and gratitude to all person upon their support, helps and assist along the way the research progression.

My deepest appreciation and gratitude to my dearest supervisor, Madam Shantakumari Rajan for her invaluable guidance, continuous encouragement and constant support. I really appreciate all her guidance from the beginning to final level of the research. Without her ideas and supports, this research would not come reality.

Many thank to my lovely parents, Mr Abdul Razak bin Abdul Hamid and Mrs Junaidah binti Ahmad for their support during my study. Also, not forgotten to thank my beloved siblings who always encourage and cheer me up.

I also would like to express my special thanks to Ms Ammira Aminuddin for her suggestion and cooperation especially in this valuable study. Many thanks go to my HS 223 (2011-2015) member group for their excellent cooperation, inspiration and support during this study.

Last but not least, my special appreciation and thankful to all my respondents for all their cooperation. Without their helps, the data might not obtainable.

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## ABSTRACT

Indoor air pollution in working places widely being related with human health problem. Volatile Organic Compounds (VOCs) are organic chemical compounds which easily evaporated under normal temperature and pressure. Photocopy and printing machine are electronic devices that being reported emitting high VOC. Photocopy and printing service centre is an independent service centre that mainly used this equipment. Inks, coatings, adhesives and cleaning solvent are sources that emit VOCs from photocopy and printing machine during its operation. Employee who work in this business have high probability to be exposed as they work at very short distance with the equipment. A cross-sectional study was carried out at a photocopy and printing service centre in *Seksyen 2, Shah Alam*. Total number of respondents,  $n$  participate in this study is 47. Photo-ionisation detector (PID), MicroAlert PID 5 was used to measure real-time for personal exposure to Total Volatile Organic Compounds (TVOCs). This equipment was placed at employee breathing zone for 8-hours. Lung function test was carried out by using KokoLegend Spirometer to all respondents as to measure the lung performance. Besides that, questionnaire adopted by Industry Code of Practice (ICOP) on Indoor Air Quality 2010 was distributed to all respondents. This tools was used to assess indoor environmental quality problems and its work-related symptoms. Exposure to TVOCs were conducted based on work area (Customer Service, Large Format, Marketing & Designing and Administration). Large format shown the highest mean TVOCs concentration reading with 5.873 ppm while the lowest mean reading was measured at Administration area with 0.541 ppm. All area except Large Format area were complied with the standard guidelines ICOP on Indoor Air Quality 2010 with the acceptable limit 3 ppm. Correlation analysis shown negative linear correlation ( $r = -0.689$ ) of exposure of TVOCs and lung function performance. By means, the exposure of TVOCs influenced the lung function capability. Headaches, cough and hoarse throat are three most symptoms complained by the employee. As a conclusion, employee who work at photocopy and printing service centre exposed to TVOCs where Large Format area is the highest concentration measured. Hypothesis on TVOCs exposure affect lung function performance was accepted. Three symptoms; headache, cough and hoarse throat.

*Keywords: Indoor Air Quality, Total Volatile Organic Compounds, Lung Function performance, Health Impact*