

ABSTRACT

Title: Ultrafine Particles Exposure in Printing Industries

Name: Shahrulnizam Bin Jamen

Email: shahrulnizam.jamen [at] niosh. com. my

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Abstract:

Laser printer and photocopy machine are already known as the sources of ultrafine particles pollution. However, there is a limited evidence on exposure of ultrafine particles from mass commercial printing process using offset lithography printer. This study aimed to characterise exposure of ultrafine particles from offset lithography printer and investigate the influence of physical environment factors on ultrafine particles at a printing process around peninsular Malaysia. The measurement of particulate matter 2.5 μm (PM_{2.5}), particle number (PN), and LDSA were done using a portable laser photometer, a condensation particle counter (CPC), and diffusion charger meter during the working hours in the printing rooms. The range mean of PM_{2.5}, PN, and LDSA from this study were 35-75 $\mu\text{g}/\text{m}^3$, 10214 to 35626 particles/cm³, and 44- 113 $\mu\text{m}^2/\text{cm}^3$ respectively. Mean of PM_{2.5} (63 $\mu\text{g}/\text{m}^3$) in this study was found exceeded the air quality guidelines standard set by World Health Organization (WHO), 25 $\mu\text{g}/\text{m}^3$. The exposure of ultrafine particles from monochrome printing was found statistical significant higher than colour printing ($p < 0.0001$ for PN; $p < 0.0001$ for LDSA). The possible factor might contribute the higher results is different type of ventilation system equipped in monochrome and colour printing room. The physical environment factors such as relative humidity and air movement were observed to influence the concentration of ultrafine particles (PN and LDSA) in the printing rooms based on correlation statistical analysis.