Junior Science Communications
Faculty of Applied Sciences, UiTM Shah Alam
https://journal.uitm.edu.my/ojs/index.php/JSC

E-ISSN 2637-0689
Vol 49 2025

Colloquium on Applied Sciences 1 2025
20-24 January 2025, Faculty of Applied Sciences, UiTM Shah Alam, Malaysia

Chemical Exposure Monitoring of Testing Personnel in The Fire Testing Section, Testing Services Department, SIRIM

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Structured Abstract

Background: The technicians who work in fire testing departments are exposed to health hazard from airborne contaminants such as CO along with lead and inhalable dust. Exposure to hazardous materials stems from material fire behaviour and handling operations during tests of fire-resistant materials and concrete frame crush procedures. The research evaluated exposure levels within SIRIM QAS and SIRIM RASA to identify the variables responsible for the changing risk zones. Testing activities required a dual approach that combined area sampling with personal sampling as the main method to monitor contaminant concentrations.

Methods: Employees used breathing zone monitoring by using IOM samplers for inhalable dust and lead which combined with direct-reading gas analyzers for CO to assess their exposure levels. It was conducted at various locations near the point sources that produced dust and combustion emissions like the furnace operations and concrete breaking zones. The NMAM 0500 and NMAM 7303 regulated the procedures for inhalable dust and lead analysis during sampling operations. Repeated exposure measurements were done across various work shifts to identify differences in work activities and environmental conditions.

Results: Both sites showed results indicating acceptable levels of inhalable dust and lead concentrations under regulatory PELs. The small workspace and poor ventilation at SIRIM QAS led to CO readings surpassing the 25ppm threshold established by ACGIH. CO concentrations at SIRIM RASA remained safe because they persisted at levels that were less than thresholds level. Evaluation results demonstrated CO exposure levels were statistically higher, increased lead concentrations at SIRIM QAS while neither site exhibited different inhalable dust readings.

Conclusion: In conclusion, the findings of this study indicated high-capacity exhaust fans combined with localized extraction devices hold essential value for SIRIM QAS ventilation systems to minimize CO exposures. Besides, improving PPE guidelines with sustained safety education will guarantee technicians remain safeguarded. The study serves as a foundation to develop safer industrial work environments and monitoring practices and protective solutions to reduce employee exposure risks. Further research over an extended duration should investigate both the health effects of airborne pollutants and industrial protection methods.

Keywords: Carbon Monoxide, IOM Samplers, Threshold Level, Personal Protective Equipment, NIOSH Manual of Analytical Methods

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