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Hazard Identification and Risk Assessment at Selected Port in Northern Malaysia

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Structured Abstract

Background: Port operations involve high-risk activities such as refuelling, equipment maintenance, chemical storage, and emergency response, which may expose workers to multiple Chemicals Hazardous to Health (CHTH) through inhalation and dermal contact. Although occupational safety regulations are available, systematic evaluation of chemical health risks in port settings remains limited across different work units and operational areas. Therefore, this study aimed to assess chemical health hazards and exposure risks among port workers using a qualitative Chemical Health Risk Assessment (CHRA) approach.

Methods: A qualitative study was conducted using the CHRA framework based on the Department of Occupational Safety and Health (DOSH) Manual of Recommended Practice (3rd Edition). The assessment was performed at three operational locations involving four work units: Operation Support, Engineering personnel, Inventory Storekeeper, and Fire & Rescue. Data collection included workplace observations, interviews with supervisors and workers, review of Safety Data Sheets (SDS), and document analysis of chemical inventories, work procedures, and control measures. Hazard Rating (HR) was determined from SDS classification (Section 2), while Exposure Rating (ER) was derived from task characteristics, frequency, duration, and exposure conditions. Risk Rating (RR) and Action Priority (AP) were determined using the CHRA risk matrix. All organisational details were anonymised to ensure confidentiality.

Results: Findings showed that Operation Support and Engineering personnel had higher exposure potential due to routine refuelling and maintenance activities, resulting in higher qualitative risk ratings. Place B recorded the greatest diversity of CHTH, followed by Place A and Place C. Inhalation was the main exposure route for fuel- and solvent-related tasks, while dermal exposure ranged from moderate to high for activities involving petroleum-based substances and maintenance chemicals. AP evaluation classified Operation Support and Engineering as AP2 (inadequate controls), while Inventory Storekeeper and Fire & Rescue were AP3 (adequate controls). Key gaps included limited engineering controls, unsuitable PPE, and insufficient spill response training.

Conclusion: In conclusion, qualitative CHRA successfully identified priority work units, key exposure routes, and critical control weaknesses in port operations. Strengthening engineering controls, improving PPE suitability, and enhancing spill response preparedness are essential to reduce chemical exposure risks and support safer port working environments.

Keywords: Chemical Health Risk Assessment (CHRA), Chemicals Hazardous to Health (CHTH), Port Operations, Occupational Exposure, Inhalation Exposure

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