

The Implementation of Chemical Health Risk Assessment (CHRA) in Water Treatment Plant

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Structured Abstract

Background: Chemical Health Risk Assessment (CHRA) is a mandatory requirement under the USECHH Regulations 2000 to evaluate health risks arising from the use of Chemicals Hazardous to Health (CHTH) in the workplace. In water treatment plants, workers are frequently exposed to hazardous chemicals through inhalation and dermal routes, especially during routine maintenance, chemical dosing, and sampling activities. Despite this, the implementation of CHRA in such facilities remains inconsistent and often inadequate. Many plants rely on outdated assessments, generic chemical lists, or incomplete evaluations of exposure and control measures. These gaps can lead to underreported risks, ineffective protection, and non-compliance with safety standards.

Methods: This study aimed to identify the hazardous chemicals used in the workplace, assess worker exposure through various routes, evaluate the adequacy of existing control measures, and propose improvements aligned with USECHH guidelines. A qualitative CHRA was conducted at a water treatment plant, following the DOSH CHRA Manual (2018, 3rd Ed). The assessment involved walkthrough surveys, chemical inventory reviews, observation of work practices, and qualitative exposure estimations to determine hazards, exposure pathways, and control measure effectiveness. CHRA Forms A, B1, B2, C1, C2, and D1–D5 were systematically used for documentation and assessment.

Results: Five Chemicals Hazardous to Health (CHTH) including WD-40, Nippon Paint 9000, DPD Free Chlorine Reagent, and Toyo Grease were identified, with inhalation and dermal contact being the primary exposure pathways. Nippon Paint 9000 presented the highest risk due to inadequate engineering controls and non-compliance with PPE usage. The remaining chemicals were classified as moderate to low risk. Overall, control measures were found to be partially adequate, with notable deficiencies in ventilation, PPE implementation, and training. Recommendations included the installation of portable local exhaust ventilation (LEV) systems, enhancement of PPE protocols, and targeted training sessions to reduce chemical exposures to As Low As Reasonably Practicable (ALARP) levels.

Conclusion: CHRA remains a vital tool for systematic chemical risk management in water treatment operations, ensuring compliance while protecting worker health. The implementation of structured CHRA enhances workplace safety culture and aligns with Malaysia's occupational safety goals.

Keywords: Chemical Health Risk Assessment, CHRA, Water Treatment Plant, Hazardous Chemicals, Occupational Safety

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