

ABSTRAK

Kegiatan transfer kargo curah kering dari kapal ke truk memiliki potensi risiko keselamatan kerja yang tinggi akibat interaksi pekerja, alat berat, dan paparan debu. Penelitian ini bertujuan menganalisis risiko keselamatan kerja pada aktivitas tersebut di PT Pelindo Multi Terminal Semarang menggunakan metode *Hazard Identification and Risk Assessment* (HIRA) dan *Bow Tie Analysis* (BTA). Data diperoleh melalui observasi, wawancara, dan dokumen perusahaan. Hasil identifikasi menunjukkan 13 potensi bahaya pada lima tahapan kerja. Penilaian risiko menunjukkan paparan debu soda ash sebagai risiko tertinggi dengan kategori *extreme* (skor 12). Analisis *Bow Tie* mengidentifikasi lima ancaman utama, lima konsekuensi kesehatan, serta kelemahan pada kepatuhan penggunaan alat pelindung diri. Rekomendasi yang diberikan meliputi penguatan budaya keselamatan, penerapan sistem *reward-punishment*, dan penambahan *dust control hopper* untuk meningkatkan efektivitas pengendalian risiko.

Kata Kunci: *bow tie analysis; curah kering; HIRA; keselamatan kerja; paparan debu*

ABSTRACT

The transfer of dry bulk cargo from ships to trucks poses a high occupational safety risk due to the interaction between workers, heavy equipment, and dust exposure. This study aims to analyze occupational safety risks in this activity at PT Pelindo Multi Terminal Semarang using the Hazard Identification and Risk Assessment (HIRA) and Bow Tie Analysis (BTA) methods. Data were collected through field observations, interviews, and company documents. The hazard identification process identified 13 potential hazards across five operational stages. The risk assessment indicated that soda ash dust exposure was the highest-risk hazard, classified as extreme with a risk score of 12. Bow Tie Analysis identified five primary threats, five potential health consequences, and weaknesses in compliance with personal protective equipment (PPE) use. The proposed recommendations include strengthening the safety culture, implementing a reward and punishment system, and installing a dust control hopper to improve the effectiveness of risk control measures.

Keywords: *bow tie analysis; dry bulk; dust exposure; HIRA; occupational safety*