

RINGKASAN

PT Madhani Talatah Nusantara (MTN) merupakan perusahaan yang menyediakan layanan utama dalam industri konstruksi dan pertambangan di Indonesia. Salah satu lokasi yang dikerjakan yaitu penambangan batubara milik PT Kalimantan Energi Lestari (KEL). Penambangan tersebut terletak di Kabupaten Kotabaru, Provinsi Kalimantan Selatan. Dalam proses penambangan dilakukan pembongkaran lapisan tanah penutup. PT MTN *Jobsite* 037C KEL melakukan pembongkaran lapisan penutup dengan kegiatan peledakan. Salah satu masalah yang sering timbul akibat kegiatan peledakan adalah efek getaran tanah (*ground vibration*). Tercatat pada bulan Juli sampai Agustus 2023 nilai *peak particle velocity* (PPV) mencapai 5,78 mm/s dan melebihi standar ambang batas nilai PPV terhadap bangunan sekitar yaitu sebesar 3 mm/s. Menurut SNI 7571 tahun 2010 efek peledakan pada lokasi penelitian dikatakan tidak aman terhadap bangunan dan kebun warga sekitar. Dimana bangunan warga tergolong bangunan kelas II yaitu jenis bangunan dengan pondasi, pasangan bata dan adukan semen saja, termasuk bangunan dengan pondasi dari kayu dan lantainya diberi adukan semen, dengan nilai batas aman PPV yaitu sebesar 3 mm/s.

Penelitian ini bertujuan untuk menganalisis pengaruh *ground vibration* terhadap lingkungan dan memberikan rumusan prediksi berdasarkan teori *scaled distance* dan teori *multivariate regression analysis*. Dilakukan perbandingan antara kedua teori tersebut untuk mendapatkan hasil rumusan prediksi yang lebih akurat. Kemudian didapatkan rumusan usulan prediksi yang harapannya dapat digunakan sebagai acuan untuk menentukan jumlah isian maksimal bahan peledak per *delay* agar efek *ground vibration* yang dihasilkan tidak melebihi ambang batas aman bangunan sekitar.

Hasil analisis terhadap bangunan di sekitar lokasi penelitian tidak terjadi adanya kerusakan. Meskipun tidak terjadi kerusakan, masyarakat merasa terganggu karena tetap merasakan efek getaran dari kegiatan peledakan. Berdasarkan pendekatan teori *multivariate regression analysis* dihasilkan rumusan prediksi dengan persen kesalahan relatif rata – rata untuk PPV prediksi sebesar 23,12 % terhadap PPV aktual. Faktor – faktor yang paling berpengaruh terhadap besaran getaran yang dihasilkan adalah jarak dan isian bahan peledak per *delay*. Kemudian berdasarkan hasil rumusan prediksi digunakan untuk menghitung rekomendasi isian maksimal bahan peledak per *delay*. Agar supaya mendapatkan nilai PPV sebesar 3 mm/s sesuai dengan kondisi bangunan kelas II, maka dengan jarak 475 meter isian bahan peledak sebanyak 153,16 kg/*delay* dan jarak 800 m sebanyak 46.298,94 kg/*delay*.

SUMMARY

PT Madhani Talatah Nusantara (MTN) is a company that provides main services in the construction and mining industry in Indonesia. One of the locations being worked on is coal mining owned by PT Kalimantan Energi Lestari (KEL). The mining site is located in Kotabaru Regency, South Kalimantan Province. In the mining process, the overburden is dismantled. PT MTN Jobsite 037C KEL dismantled the overburden using blasting activities. One of the problems that often arises due to blasting activities is the effect of ground vibration. It was recorded that from July to August 2023 the peak particle velocity (PPV) value reached 5.78 mm/s and exceeded the standard threshold for PPV values for surrounding buildings, namely 3 mm/s. According to SNI 7571 of 2010, the effects of blasting at the research location are said to be unsafe for the buildings and gardens of local residents. Residential buildings are classified as class II buildings, namely buildings with foundations, brick masonry and cement mortar only, including buildings with wooden foundations and cement mortar floors, with a PPV safe limit value of 3 mm/s.

This research aims to analyze the effect of ground vibration on the environment and provide a prediction formulation based on scaled distance theory and multivariate regression analysis theory. A comparison was carried out between the two theories to obtain more accurate prediction formulation results. Then a proposed prediction formulation was obtained which we hope can be used as a reference to determine the maximum amount of explosives per delay so that the resulting ground vibration effect does not exceed the safe threshold for surrounding buildings.

The results of the analysis of the buildings around the research location did not show any damage. Even though no damage occurred, the public felt disturbed because they still felt the effects of vibrations from the blasting activity. Based on the multivariate regression analysis theoretical approach, a prediction formula was produced with an average relative error percentage for the predicted PPV of 23.12% of the actual PPV. The factors that most influence the magnitude of the vibrations produced are the distance and the explosive charge per delay. Then, based on the results of the prediction formulation, it is used to calculate the recommended maximum explosive charge per delay. In order to get a PPV value of 3 mm/s in accordance with class II building conditions, at a distance of 475 meters the explosive charge is 153.16 kg/delay and at a distance of 800 m it is 46,298.94 kg/delay.