

**ANALISIS EMISI DAN SIMULASI PERSEBARAN GAS RUMAH
KACA DARI SEKTOR TRANSPORTASI DAN ALAT - ALAT
BERAT TAMBANG DI AREA PIT 19A, PT PAMAPERSADA
NUSANTARA DISTRIK INDOMINCO, KUTAI TIMUR,
KALIMANTAN TIMUR**

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ABSTRAK

Udara menjadi komponen utama dalam kesehatan makhluk hidup dan kelestarian lingkungan. Aktivitas pertambangan batubara, terutama di sektor transportasi dan alat berat menjadi salah satu sumber utama dari emisi gas rumah kaca. Kontraktor pertambangan batubara di Indonesia mengoperasikan banyak kendaraan berat di area pit yang berkontribusi terhadap emisi gas rumah kaca. Penelitian ini bertujuan menganalisis besarnya emisi dan mensimulasikan persebaran emisi gas rumah kaca yang berasal dari operasional pertambangan serta memberikan arahan pengelolaan yang sesuai. Pengolahan data dilakukan menggunakan data *fuel consumption* selama periode 10 bulan dengan pendekatan IPCC 2006 Tier 1 membutuhkan variabel data aktivitas dan faktor emisi *default*. Simulasi persebaran emisi dilakukan dengan perangkat AERMOD yang menghasilkan gambaran distribusi spasial dari konsentrasi gas rumah kaca.

Rata-rata emisi CO₂ mencapai 26.330 ton/bulan, CH₄ sebesar 29,101 ton CO₂eq/bulan, dan N₂O sebesar 429,596 ton CO₂eq/bulan. Hasil penelitian menunjukkan estimasi emisi gas rumah kaca pada lokasi penelitian memiliki rata-rata yang berbeda sesuai dengan jenis gas yang dihitung. Persebaran emisi didominasi oleh angin dari arah barat laut dengan konsentrasi CO₂ tertinggi berada di ketinggian 100–200 meter, CH₄ dan N₂O di sekitar ketinggian 10 meter. Semakin besar konsumsi bahan bakar, semakin tinggi pula emisi yang dihasilkan. Arahan pengelolaan yang direkomendasikan meliputi penanaman vegetasi penyerap gas rumah kaca, penerapan *eco-driving*, perbaikan jalan tambang bergelombang, dan pemantauan emisi secara berkala serta pemetaan potensi persebaran emisi.

Kata kunci: emisi, gas rumah kaca, kendaraan berat, IPCC, AERMOD, pertambangan batubara

**ANALYSIS OF EMISSIONS AND SIMULATION OF
GREENHOUSE GAS DISTRIBUTION FROM THE
TRANSPORTATION AND HEAVY EQUIPMENT SECTORS IN
PIT 19A, PT PAMAPERSADA NUSANTARA INDOMINCO
DISTRICT, EAST KUTAI, EAST KALIMANTAN**

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ABSTRACT

Air is a key component in the health of living things and environmental sustainability. Coal mining activities, especially in the transportation and heavy equipment sectors, are one of the main sources of greenhouse gas emissions. Coal mining contractors in Indonesia operate many heavy vehicles in pit areas, which contribute to greenhouse gas emissions. This study aims to analyze the magnitude of emissions and simulate the distribution of greenhouse gas emissions from mining operations and provide appropriate management guidelines. Data processing was carried out using fuel consumption data for a period of 10 months with the IPCC 2006 Tier 1 approach requiring activity data variables and default emission factors. Emissions dispersion simulation was performed using the AERMOD model, which produced a spatial distribution of greenhouse gas concentrations.

Average CO₂ emissions reached 26,330 tons/month, CH₄ emissions reached 29,101 tons CO₂eq/month, and N₂O emissions reached 429,596 tons CO₂eq/month. The results of the study show that the estimated greenhouse gas emissions at the study site have different averages according to the type of gas calculated. The distribution of emissions is dominated by winds from the northwest, with the highest concentration of CO₂ at an altitude of 100–200 meters, and CH₄ and N₂O at an altitude of around 10 meters. The greater the fuel consumption, the higher the emissions produced. Recommended management measures include planting greenhouse gas-absorbing vegetation, implementing eco-driving, repairing bumpy mining roads, and periodically monitoring emissions and mapping potential emission distribution.

Keywords: emissions, greenhouse gases, heavy equipment, IPCC, AERMOD, coal mining, air quality