Optimalisasi Pengolahan Air Asam Tambang
Di *Settling Pond* 39 *East Block* PT Indominco
Mandiri, Kutai Timur, Kalimantan Timur

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INTISARI

Kegiatan penambangan batubara di PT Indominco Mandiri dilakukan dengan sistem tambang terbuka (*open pit*). Salah satu dampak lingkungan yang ditimbulkan dari aktivitas penambangan tersebut adalah terbentuknya air asam tambang (AAT) batubara. Penelitian ini bertujuan untuk menganalisis karakteristik AAT, menganalisis efektivitas percobaan kombinasi metode pengolahan aktif dan pasif pada *constructed wetland* skala laboratorium sebagai langkah optimalisasi pengolahan, dan membuat rekomendasi arahan pengelolaan AAT yang dapat dilakukan berdasarkan analisis yang didapatkan.

Metode yang digunakan yaitu metode survei, percobaan, laboratorium, metode matematis, dan analisis deskriptif. Media yang digunakan tanaman kiambang (*Pistia stratiotes*), dan lumpur dari dasar kolam SP39. Percobaan dilakukan dalam empat jenis, perlakuan tanpa pengolahan (kontrol), penambahan kapur tohor (pengolahan aktif), penambahan kapur dan tanaman serta perlakuan penambahan tanaman (pengolahan pasif). Rancangan dilakukan secara fitoremediasi statis (air yang di fitoremediasi dalam keadaan diam atau tidak mengalir). Waktu tinggal ditetapkan selama 7 hari untuk pengamatan parameter logam Fe dan Mn, dengan pengambilan data dilakukan hingga hari ke-28. Sementara itu, parameter pH dan TSS dianalisis setiap 3 hari hingga hari ke-30. Melalui pengujian ini dapat diketahui bahwa perlakuan mana yang paling efektif dalam menetralkan nilai pH serta menurunkan kadar TSS, Fe, dan Mn hingga sesuai dengan baku mutu yang ditetapkan dalam Perda Provinsi Kalimantan Timur No. 02 Tahun 2011 tentang Pengelolaan Kualitas Air dan Pengendalian Pencemaran Air.

Berdasarkan hasil analisis menunjukkan bahwa air pada *settling pond* 39 tersebut memiliki karakteristik asam dengan pH 3 dan kandungan logam Fe sebesar 2,12 mg/L dan Mn sebesar 13,95 mg/L. Percobaan laboratorium menggunakan kombinasi kapur tohor sebanyak 0,25 gram/liter dan tanaman kiambang menunjukkan efektivitas tinggi sebesar 138,67% untuk meningkatkan pH dan 99,15% untuk menurunkan kadar logam Mn. Sehingga saran pengelolaan AAT dapat dilakukan melalui pendekatan teknologi yaitu kombinasi metode aktif dan pasif serta melibatkan aspek sosial seperti pelibatan masyarakat, pelatihan teknis bagi karyawan, dan kolaborasi dengan instansi terkait.

Kata kunci: Air Asam Tambang, *Constructed Wetland, Pistia stratiotes*

Optimization of Acid Mine Drainage Treatment
At Settling Pond 39 East Block PT Indominco
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ABSTRACT

Coal mining activities at PT Indominco Mandiri are conducted using an open-pit mining system. One of the environmental impacts of this mining activity is the formation of acid mine drainage (AMD). This study aims to analyze the characteristics of AMD, analyze the effectiveness of a combined active and passive treatment method experiment on a laboratory-scale constructed wetland as a process optimization step, and develop recommendations for AMD management that can be implemented based on the analysis obtained.

The methods used were survey, experiment, laboratory, mathematical, and descriptive analysis. The media used were kiambang plants (Pistia stratiotes) and mud from the bottom of SP39 pond. The experiment was conducted in four types, treatment without treatment (control), addition of quicklime (active treatment), addition of lime and plants, and treatment with addition of plants (passive treatment). The design was carried out using static phytoremediation (water being phytoremediated was in a still or non-flowing state). The residence time was set for 7 days for the observation of Fe and Mn metal parameters, with data collection carried out until the 28th day. Meanwhile, pH and TSS parameters were analyzed every 3 days until the 30th day. Through this test, it can be determined which treatment is most effective in neutralizing the pH value and reducing the levels of TSS, Fe, and Mn to comply with the quality standards stipulated in the Regional Regulation of East Kalimantan Province No. 02 of 2011 concerning Water Quality Management and Water Pollution Control.

Based on the analysis results, it shows that the water in settling pond 39 has acidic characteristics with a pH of 3 and Fe metal content of 2.12 mg/L and Mn of 13.95 mg/L. Laboratory experiments using a combination of 0.25 grams/liter of quicklime and kiambang plants showed high effectiveness of 138.67% to increase pH and 99.15% to reduce Mn metal levels. So the suggestion for AAT management can be carried out through a technological approach, namely a combination of active and passive methods and involving social aspects such as community involvement, technical training for employees, and collaboration with related agencies.

Keywords: Acid Mine Drainage, Constructed Wetland, Pistia stratiotes