PRAKIRAAN DISPERSI POLUTAN KARBON MONOKSIDA, NITROGEN DIOKSIDA, SULFUR DIOKSIDA, DAN MATERI PARTIKULAT (PM_{10}) AKIBAT KEGIATAN PENGEMBANGAN DAN OPERASIONAL INFRASTRUKTUR DI KAWASAN UNIVERSITAS GADJAH MADA MENGGUNAKAN AERMOD

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INTISARI

Prakiraan dispersi polutan karbon monoksida (CO), nitrogen dioksida (NO_2), sulfur dioksida (SO_2), dan material partikulat (PM_{10}) akibat kegiatan pengembangan dan operasional infrastruktur di kawasan Universitas Gadjah Mada menggunakan perangkat lunak *American Meteorology Society-Environmental Protection Agency Regulatory Model (*AERMOD) telah dilakukan. Tujuan penelitian ini adalah melakukan pemodelan dispersi polutan CO, NO_2, SO_2, dan PM_{10} pada saat adanya kegiatan pengembangan infrastruktur UGM dan tidak adanya kegiatan tersebut.

Penelitian diawali dengan pengumpulan dan pengolahan data-data penunjang seperti sumber emisi, meteorologi, dan topografi di wilayah penelitian. Simulasi dispersi polutan dilakukan dengan perangkat lunak AERMOD. Validasi dan kajian dampak lingkungan dari polutan-polutan tersebut juga dilakukan.

Hasil penelitian menunjukkan konsentrasi polutan yang terdispersi pada saat adanya kegiatan pengembangan infrastruktur lebih tinggi dibanding kegiatan operasional infrastruktur. Konsentrasi tertinggi polutan CO, SO_2, NO_2, dan PM_{10} saat mobilisasi pengangkutan material (pra-konstruksi) dan operasional infrastruktur terletak di Perempatan Jl. Simanjuntak-Jl. Persatuan-Jl. Prof. Sardjito-Jl. Terban. Konsentrasi tertinggi polutan CO dan PM_{10} saat konstruksi terletak di Perempatan Jl. Simanjuntak-Jl. Persatuan-Jl. Prof. Sardjito-Jl. Terban, sedangkan SO_2 dan NO_2 terletak di Fakultas Teknik. Dampak lingkungan yang terkuantifikasi adalah pemanasan global, oksidasi fotokimia, asidifikasi, eutrofikasi, dan toksisitas manusia.

Kata kunci: AERMOD, polutan, udara, UGM

PREDICTION OF CARBON MONOXIDE, NITROGEN DIOXIDE, SULPHUR DIOXIDE, AND PARTICULATE MATTER (PM10) POLLUTANT DISPERSION DUE TO INFRASTRUCTURE DEVELOPMENT AND OPERATIONAL IN UNIVERSITAS GADJAH MADA AREA BY USING AERMOD

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ABSTRACT

Simulation of carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and particulate matter (PM_{10}) pollutants dispersion due to the construction and operation in Universitas Gadjah Mada area has been conducted using American Meteorology Society-Environmental Protection Agency Regulatory Model (AERMOD) software. This research aimed to simulate the dispersion of CO, NO_2, SO_2, and PM_{10} pollutants between the infrastructure development activities in UGM and the usual activities.

The research was started with collecting and processing the supporting data such as emission sources, meteorology, and topography in the research area. The dispersion of pollutants was modeled by AERMOD software. Validation and environmental impact assessment of these pollutants was also carried out.

The results showed that the concentration of dispersed pollutants during infrastructure development activities was higher than operational infrastructure activities. The highest concentrations of CO, SO_2, NO_2, and PM_{10} pollutants during the mobilization of material transportation (pre-construction) and infrastructure operations were located at the intersection of Simanjuntak-Persatuan-Prof. Sardjito-Terban streets. The highest concentrations of CO and PM_{10} pollutants during construction were located at the junction of Simanjuntak-Persatuan-Prof. Sardjito-Terban roads, while SO_2 and NO_2 were located at the Faculty of Engineering UGM. The quantified environmental impacts are global warming, photochemical oxidation, acidification, eutrophication, and human toxicity.

Keywords: AERMOD, air, pollutant, UGM