PERFORMANCE EVALUATION OF CHAMBER UNITS IN THE WASTEWATER TREATMENT PLANT (WWTP) OF SPPG MARGOMULYO SEYEGAN

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ABSTRACT

Background : *Wastewater from the SPPG Margomulyo Seyegan kitchen contains high organic matter, oil and grease, detergents, and suspended solids. Fluctuations in flow and pollutant load require optimal performance of each WWTP chamber to ensure the effluent is environmentally safe. However, preliminary measurements show that most units do not meet design criteria: the equalization tank is overloaded with an average OLR of 9.70 kg COD/m³·day (up to 11.76 kg COD/m³·day), while the bioball and honeycomb media tanks have an HRT of only 18.52 hours, far below the 36–48 hour criterion. This condition causes suboptimal biological processes and pollutant accumulation in intermediate stages, so evaluating the chamber units' performance is necessary to identify problematic units and formulate improvements.*

Objective : *To evaluate the chamber units' performance based on HRT, OLR, BOD/COD/TSS removal efficiency, and effluent conformity with quality standards.*

Methods : *A quantitative descriptive study involving direct measurement of tank dimensions and laboratory analysis of inlet and outlet samples from each chamber.*

Results : *Most units do not comply with design criteria. The Equalization Tank experienced overloading (average OLR 9.70 kg COD/m³·day; up to 11.76 kg COD/m³·day), while the Bioball and Honeycomb Media tanks had excessively short HRT (18.52 hours vs. the 36–48 hour criterion). The highest removal efficiency occurred in the Filtration Tank (BOD 98.22%; COD 98.89%; TSS 98.58%).*

Conclusion: *The biological performance of the WWTP is not yet optimal; however, the charcoal filtration unit effectively acts as a final treatment, resulting in effluent quality (BOD 10.45 mg/L; COD 28.0 mg/L; TSS 12.0 mg/L) that complies with Minister of Environment Regulation No. 2760 of 2025.*

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Keywords : *WWTP Evaluation, HRT, OLR, Removal Efficiency, Quality Standards*

EVALUASI KINERJA UNIT CHAMBER PADA IPAL (INSTALASI PENGOLAHAN AIR LIMBAH) SPPG MARGOMULYO SEYEGAN

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ABSTRAK

Latar Belakang : Air limbah dapur SPPG Margomulyo Seyegan mengandung bahan organik tinggi, minyak dan lemak, deterjen, serta padatan tersuspensi. Fluktuasi debit dan beban pencemar menuntut kinerja optimal setiap chamber IPAL agar efluen aman dibuang ke lingkungan. Namun, pengukuran awal menunjukkan sebagian besar unit belum memenuhi kriteria desain : bak equalisasi mengalami overloading dengan OLR rata-rata 9,70 kg COD/m³·hari (hingga 11,76 kg COD/m³·hari), sedangkan bak bioball dan sarang tawon memiliki HRT hanya 18,52 jam, jauh di bawah kriteria 36–48 jam. Kondisi ini menyebabkan proses biologis tidak optimal dan beban pencemar terakumulasi pada tahap menengah, sehingga evaluasi kinerja unit chamber diperlukan untuk mengidentifikasi unit bermasalah dan merumuskan perbaikan.
Tujuan : Mengevaluasi kinerja unit chamber berdasarkan HRT, OLR, efisiensi penyisihan BOD/COD/TSS, serta kesesuaian efluen dengan baku mutu.
Metode : Penelitian deskriptif kuantitatif dengan pengukuran langsung dimensi bak dan analisis laboratorium sampel inlet dan outlet setiap chamber.
Hasil: Sebagian besar unit belum sesuai kriteria desain. Bak Equalisasi mengalami overloading (OLR 11,76 kg COD/m³·hari), sedangkan Bak *Bioball* dan Sarang Tawon memiliki HRT terlalu singkat (18,52 jam). Efisiensi penyisihan tertinggi terjadi di Bak *Filtrasi* Efisiensi penyisihan tertinggi terjadi di Bak *Filtrasi* (BOD 98,22%, COD 98,89%, TSS 98,58%).
Kesimpulan: Kinerja biologis IPAL belum optimal, namun unit *filtrasi* arang mampu menyempurnakan pengolahan sehingga efluen (BOD 10,45 mg/L, COD 28,0 mg/L; TSS 12,0 mg/L) memenuhi baku mutu Peraturan Menteri Lingkungan Hidup No. 2760 Tahun 2025.

Kata Kunci: Evaluasi IPAL, HRT, OLR, Efisiensi Penyisihan, Baku Mutu