

## ABSTRAK

### PERANCANGAN DESAIN INSTALASI PENGOLAHAN AIR LIMBAH (IPAL) PABRIK TAHU DI PADUKUHAN NGOTO, BANTUL

Oleh  
Fitria Rizky Andini  
NIM: 114220048  
(Program Studi Sarjana Teknik Lingkungan)

Industri tahu menghasilkan limbah cair dengan kandungan bahan organik yang tinggi sehingga berpotensi menimbulkan pencemaran badan air apabila tidak dilakukan pengolahan secara optimal. Permasalahan tersebut ditemukan pada pabrik tahu di Padukuhan Ngoto, Bantul yang belum memiliki IPAL sehingga diperlukan perancangan IPAL yang disesuaikan dengan karakteristik limbah dan baku mutu yang berlaku. Penelitian ini bertujuan untuk merancang desain IPAL sebagai upaya mengurangi beban pencemaran dari limbah cair pabrik tahu. Penyusunan desain dilakukan melalui observasi lapangan, pengukuran debit, pengambilan sampel limbah dan air sungai, analisis laboratorium, serta studi pustaka terkait teknologi pengolahan limbah cair organik. Data diperoleh melalui observasi lapangan, pengukuran debit, pengambilan sampel air limbah dan air sungai, analisis laboratorium, serta studi literatur. Analisis dilakukan terhadap kualitas air limbah, kualitas air sungai, serta kebutuhan unit pengolahan yang direncanakan. Hasil analisis data menunjukkan bahwa limbah cair industri tahu memiliki konsentrasi BOD sebesar 4.530 mg/L, COD sebesar 7.250 mg/L, TSS sebesar 1.215 mg/L, dan pH 5,6 sehingga seluruh parameter tersebut belum memenuhi baku mutu air limbah berdasarkan Perda DIY Nomor 7 Tahun 2016. Sementara itu, kualitas air Sungai Code pada ketiga titik *sampling* tergolong tercemar ringan. Rancangan IPAL yang direncanakan terdiri atas bak ekualisasi, bak netralisasi, bak sedimentasi awal, unit *Anaerobic Baffled Reactor* (ABR), dan bak sedimentasi akhir. Efluen hasil pengolahan ditargetkan memiliki kadar BOD sebesar 95,84 mg/L, COD sebesar 228,52 mg/L, dan TSS sebesar 48,752 mg/L dengan target efisiensi penyisihan dalam unit ABR secara berturut-turut sebesar 89%, 85%, dan 70%. Estimasi biaya pembangunan IPAL sebesar Rp202.121.052. Rancangan ini diharapkan dapat menjadi salah satu alternatif pengelolaan limbah cair pabrik tahu guna menurunkan beban pencemaran lingkungan.

Kata kunci: ABR, air limbah, IPAL, pabrik tahu, Sungai Code.

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### ***DESIGN OF A WASTEWATER TREATMENT PLANT (WWTP) FOR A TOFU INDUSTRY IN PADUKUHAN NGOTO, BANTUL***

By

Fitria Rizky Andini

NIM: 114220048

*(Environmental Engineering Undergraduated Program)*

*The tofu industry generates wastewater containing high concentrations of organic matter, which has the potential to cause water body pollution if not treated optimally. This issue was identified at a tofu factory located in Padukuhan Ngoto, Bantul, which does not yet have a wastewater treatment plant (WWTP); therefore, a WWTP design tailored to the wastewater characteristics and applicable quality standards is required. This study aimed to design a WWTP as an effort to reduce the pollution load generated by tofu factory wastewater. The design preparation was conducted through field observations, flow rate measurements, wastewater and river water sampling, laboratory analyses, and literature studies related to organic wastewater treatment technologies. The collected data were analyzed to evaluate wastewater quality, river water quality, and the requirements of the proposed treatment units. The results of the data analysis showed that the tofu industrial wastewater had BOD, COD, and TSS concentrations of 4,530 mg/L, 7,250 mg/L, and 1,215 mg/L, respectively, with a pH of 5.6, indicating that all parameters did not comply with the wastewater quality standards stipulated in the Special Region of Yogyakarta Regional Regulation Number 7 of 2016. Meanwhile, the water quality of the Code River at the three sampling points was categorized as lightly polluted. The proposed WWTP design consists of an equalization tank, neutralization tank, preliminary sedimentation tank, Anaerobic Baffled Reactor (ABR) unit, and final sedimentation tank. The treated effluent is targeted to achieve BOD, COD, and TSS concentrations of 95.84 mg/L, 228.52 mg/L, and 48.752 mg/L, respectively, with targeted removal efficiencies in the ABR unit of 89%, 85%, and 70%, respectively. The estimated construction cost of the WWTP is IDR 202,121,052. This design is expected to serve as an alternative solution for tofu factory wastewater management in reducing environmental pollution loads.*

*Keywords: ABR, Code River, tofu industry, wastewater, WWTP.*