Analisis konsentrasi klor bebas pada jaringan distribusi PDAM Kota Depok, Kecamatan Cimanggis menggunakan Software WaterGEMS = Analysis of free chlorine concentration in the distribution network of PDAM Kota Depok, Kecamatan Cimanggis using WaterGEMS Software

Julian Aditya Winarto, author

Abstrak

Penelitian ini menyelidiki tantangan dalam mempertahankan konsentrasi klor bebas yang ideal di sistem distribusi air perkotaan. Menggunakan Instalasi Pengolahan Air (IPA) Legong dan Perumahan Harapan Baru Taman Bunga (HBTB) sebagai lokasi studi kasus, penelitian ini bertujuan untuk menganalisis konsentrasi klor bebas di tiga titik kritis jaringan distribusi IPA Legong: outlet reservoir, dua titik perantara yang mewakili jaringan distribusi utama, dan titik terjauh di HBTB. Penelitian juga mengevaluasi pengaruh jumlah klor yang digunakan dalam proses desinfeksi IPA Legong terhadap konsentrasi klor bebas dalam jaringan. Menggunakan WaterGEMS, studi ini menilai beberapa skenario dosis klor dan dampaknya terhadap konsentrasi klor bebas di wilayah pelayanan. Metodologi utama meliputi pengukuran sisa klor, studi laboratorium kualitas air lainnya, dan perbandingan dengan baku mutu. Simulasi WaterGEMS dilakukan untuk menilai dampak skenario dosis klor. Hasilnya adalah, kualitas air tetap aman di waduk dan jarak-7 km, tetapi memburuk mendekati HBTB pada jarak-10 km, dengan konsentrasi klor bebas menurun. Terdapat korelasi kuat antara klor bebas dan total klor dalam sistem distribusi. Terdapat tiga skenario pemodelan yang dijalankan menggunakan WaterGEMS, dan dari ketiga skenariro tersebut masih belum ada yang memenuhi secara keseluruhan. Akan tetapi, skenario yang dapat dinilai cukup dan paling efektif secara berurutan adalah skenario di mana konsentrasi klor bebas di outlet reservoir bernilai maksimum di 5 mg/L dan juga skenario di mana beberapa variasi jumlah konsentrasi klor bebas diinjeksi di tujuh titik yang tersebar di perumahan HBTB.

.....This research investigates the challenges of maintaining ideal free chlorine concentrations in urban water distribution systems. Using the Legong Water Treatment Plant (WTP) and Harapan Baru Taman Bunga Housing (HBTB) as case study sites, this research aims to analyse the free chlorine concentration at three critical points of the Legong WTP distribution network: the reservoir outlet, two intermediate points representing the main distribution network, and the furthest point at HBTB. The study also evaluated the effect of the amount of chlorine used in the Legong IPA disinfection process on the free chlorine concentration in the network. Using WaterGEMS, the study assessed several chlorine dosing scenarios and their impact on free chlorine concentrations in the service area. The main methodologies included residual chlorine measurements, other water quality laboratory studies, and comparison with quality standards. WaterGEMS simulations were conducted to assess the impact of the chlorine dosing scenarios. The result was that water quality remained safe at the reservoir and at a distance of 7 km but deteriorated close to HBTB at a distance of 10 km, with free chlorine concentration decreasing. There is a strong correlation between free chlorine and total chlorine in the distribution system. There were three modelling scenarios run using WaterGEMS, and none of them met the overall requirements. However, the scenarios that could be considered sufficient and most effective respectively were the scenario where the free chlorine concentration

at the outlet of the reservoir was maximum at 5 mg/L and the scenario where several varying amounts of free chlorine concentration were injected at seven points spread across the HBTB housing estate.