Perancangan Pengolahan Air Bersih Menggunakan Slow Sand Filter Bermediakan Zeolit Dan Pasir Silika Untuk Pelayanan Air Bersih Di Fakultas Teknik = Design of Clean Water Treatment Using Slow Sand Filter Providing Zeolite and Silica Sand Media for Clean Water Services at Faculty of Engineering

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Abstrak

Air merupakan unsur alam yang sangat penting untuk setiap makhluk hidup. Berdasarkan sumbernya saat ini banyak sumber air permukaan yang telah tercemari maka dari itu perlu adanya pengolahan sebelum menggunakan air permukaan dan salah satu metodenya yaitu filtrasi dengan jenis saringan pasir lambat dikarena berdasarkan beberapa literatur saringan pasir lambat cocok digunakan dengan nilai kekeruhan dibawah 50 NTU. Penelitian ini bertujuan memberikan referensi kepada UI terutama Fakultas Teknik UI terkait dengan unit-unit pengolahan air dan desainnya berdasarkan kualitas sumber air baku yaitu Danau Mahoni UI. Pengolahan air baku berfokus pada unit filtrasi dengan jenis saringan pasir lambat yang bermediakan zeolit dan pasir silika untuk menghilangkan besi dan mangan dengan komposisi 1,2 mg/L dan 1,3 mg/L. Filtrasi diharapkan dapat melayani Fakultas Teknik UI sampai dengan 2042 dan setelah dilakukan proyeksi kebutuhan air bersih pada tahun 2042 dibutuhkan air bersih sebanyak 19,67 L/detik. Pada perancangan unit ini data yang digunakan untuk berasal dari beberapa jurnal seperti nilai ketebalan zeolit 30 cm, silika 60 cm, kecepatan filtrasi 0,2 m/jam, dan efisiensi 95% serta waktu detensi 24 jam dan hasil perhitungan, penulis mendapatkan luas setiap unit yaitu bangunan intake 10,8 m2, bak penghubung 5,4 m2, suction well 7,9 m2, roughing filter 142,56 m2, slow sand filter 532 m2, bak pencuci media 361 m2, desinfeksi 12,96 m2, reservoir 141,12 m2, dan rumah pompa distribusi 9 m2. Berdasarkan hasil studi literatur dan perhitungan yang dilakukan diharapkan air hasil pengolahan dapat memenuhi kualitas air menurut Permenkes RI No 492 tahun 2010.

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Water is one of the natural elements that is very important for every living thing. Based on the current sources, many surface water sources have been contaminated and therefore need further treatment before using it. Theres many possible way to treatment surface water and one of the methods is filtration using a slow sand filter because based on some literature, slow sand filters are suitable for use with turbidity values below 50 NTU. This study aims to provide a reference to the University of Indonesia, especially the Faculty of Engineering related to water treatment units and design based on the quality of raw water sources located on Lake Mahoni University of Indonesia. Raw water treatment focuses on filtration units with a type of slow sand filter that provides zeolite and silica sand to remove iron and manganese with a composition of 1.2 mg/L and 1.3 mg/L. This filtration is expected to serve the Faculty of Engineering until 2042 and after projecting, 19,67 L/s of clean water is needed until 2042. In this study, the design of the unit that will be used are intake building, suction well, centrifugal pump, closed transmission line, slow sand filter, disinfection, reservoir, and distribution pump housing. The data used for this design come from several journals such as media thickness, filtration speed, and removal efficiency values with a thickness value of 30 cm zeolite, silica 60 cm, filtration speed 0.2 m/hour, and 95% efficiency and detention time 24 hours. The

calculation results show that the area of each unit needed are 10,8 m2 for intake building 5,4 m2 for connecting rods, suction well around 7.9 m2, roughing filter 142,56 m2, slow sand filter around 532 m2, media washing basin around 361 m2, disinfection around 12,96 m2, reservoir around 141,12 m2, and 9 m2 for distribution pump house; and by that the treated water can comply with water quality standards according to the PERMENKES No 492 in 2010.<i/>