

Evaluasi Sistem Pengelolaan Limbah Cair Laboratorium di Lingkungan Fakultas Teknik Universitas Indonesia = Evaluation of Laboratory Wastewater Management System in Faculty of Engineering University of Indonesia

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Deskripsi Lengkap: <https://lib.ui.ac.id/detail?id=20519131&lokasi=lokal>

Abstrak

Air limbah laboratorium mempunyai karakteristik spesifik dan dapat memiliki kandungan bahan berbahaya beracun. Pengelolaannya diperlukan untuk memastikan air buangan tersebut tidak berakhir mencemari lingkungan. Namun, penelitian terkait evaluasi pengelolaan limbah cair laboratorium di Indonesia masih sangat sedikit. Penelitian ini bertujuan untuk mengevaluasi sistem pengelolaan limbah cair laboratorium di lingkungan Fakultas Teknik Universitas Indonesia (FTUI). Metode penelitian yang digunakan adalah dengan observasi, wawancara, sampling dan pengujian limbah cair laboratorium. Hasil dari data yang diperoleh dianalisis menggunakan statistik deskriptif dan dibandingkan dengan regulasi standar. Tiga laboratorium yang dijadikan objek studi adalah laboratorium teknologi intensifikasi proses departemen teknik kimia (TIP DTK), laboratorium korosi dan ekstraksi departemen teknik metalurgi dan material (DTMM), dan laboratorium kimia departemen teknik sipil dan lingkungan (DTSL). Berdasarkan penelitian yang telah dilakukan, kuantitas limbah cair laboratorium di lingkungan FTUI bersifat fluktuatif dan mengalami penurunan ketika kondisi pandemi melanda. Kuantitas rata-rata limbah cair laboratorium adalah 1.403 L/tahun. Rata-rata karakteristik limbah cair laboratorium dengan parameter suhu, pH, BOD, COD, Fe, TSS, TDS, dan total bakteri koliform secara berurutan bernilai 27°C, 1,9, 3.201 mg/L, 4.180 mg/L, 201 mg/L, 257 mg/L, 401 mg/L, dan 0. Dengan urutan parameter yang sama, kualitas limbah cair bekas pencucian alat bernilai 27,1°C, 5,1, 36,8 mg/L, 57 mg/L, 2,3 mg/L, 212 mg/L, 93 mg/L, dan 23 mg/L. Terdapat temuan negatif pada setiap aspek pengelolaan limbah cair di antaranya karakteristik dan label limbah cair yang tidak sesuai dengan standar, tidak adanya pemisahan limbah cair berdasarkan 5 karakteristik limbah, dan masa penyimpanan yang melebihi 1 tahun. Kinerja sistem pengelolaan limbah cair dapat ditingkatkan dengan pengkondisian praktikan dan laboran, pengadaan diskusi dan pelatihan, penambahan jerigen, corong dan alat kebersihan, melakukan segregasi limbah B3, menggalakkan penggunaan APD, serta menyediakan jalur khusus pengumpulan.

.....Laboratory wastewater has specific characteristics and may contain toxic hazardous materials. Its management is needed to ensure that the wastewater does not end up polluting the environment. However, there are very few studies related to the evaluation of laboratory wastewater management in Indonesia. This study aims to evaluate the laboratory liquid waste management system in the Faculty of Engineering, University of Indonesia (FTUI). The research method used are observation, interviews, sampling and testing of laboratory liquid waste. The results of the data obtained were analyzed using descriptive statistics and compared with standard regulations. The three laboratories used as objects of study are the chemical engineering department's process intensification technology laboratory (TIP DTK), the corrosion and extraction laboratory of the metallurgical and materials engineering department (DTMM), and the chemical laboratory of the civil and environmental engineering department (DTSL). Based on the research that has been carried out, the quantity of laboratory liquid waste in the FTUI environment is fluctuating and

decreases when the pandemic conditions hit. The average quantity of laboratory liquid waste is 1,403 L/year. The average characteristics of laboratory wastewater with parameters of temperature, pH, BOD, COD, Fe, TSS, TDS, and total coliform bacteria are respectively 27°C, 1.9, 3,201 mg/L, 4,180 mg/L, 201 mg /L, 257 mg/L, 401 mg/L, and 0. With the same order of parameters, the quality of liquid waste used for washing tools is 27.1°C, 5.1, 36.8 mg/L, 57 mg/L, 2.3 mg/L, 212 mg/L, 93 mg/L, and 23 mg/L. There are negative findings in every aspect of liquid waste management including the characteristics and labels of liquid waste that are not in accordance with standards, the absence of separation of liquid waste based on 5 characteristics of waste, and a storage period that exceeds 1 year. The performance of the wastewater management system can be improved by conditioning practitioners and laboratory assistants, providing discussions and training, adding jerry cans, funnels and cleaning tools, segregating B3 waste, promoting the use of PPE, and providing special collection routes.