Perancangan sistem pengolahan lanjutan "produced water" menjadi air bersih studi kasus: plant tonga, PT. Energi Mega Persada Tonga = Design of advanced treatment system of produced water into clean water case study: plant tonga PT. Energi Mega Persada Tonga

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Abstrak

Rencana Pengembangan Lapangan Migas Terbatas di Blok Tonga oleh PT. Energi Mega Persada Tonga menyebabkan penambahan produksi minyak bumi menjadi1.700 barel minyak per hari. Meningkatnya produksi minyak bumi akan diikuti oleh jumlah produced water yang semakin besar pula mencapai 4.000 barel air per hari. Oleh karena itu, muncul pilihan untuk mendaur ulang produced water menjadi air bersih yang dapat dimanfaatkan untuk kebutuhan nonpotable operasional lapangan seperti flushing toilet, pengairan taman, pencucian alat dan kendaraan. Berdasarkan uji laboratorium dan analisis data sekunder (untuk parameter BOD) didapatkan kualitas produced water dari unit pengolahan eksisting sebagai berikut : BOD 39,46 mg/L ; COD 48 mg/L ; TSS 15 mg/L; TDS 84,1 mg/L; Ammonia 0,06 mg/L ; Phenol < 0,001 mg/L; Sulfida 0,01 mg/L; Pb < 0,023 mg/L; Zn < 0,006 mg/L; Cu < 0,006 mg/L; serta minyak dan lemak sebesar < 1,13 mg/L. Alternatif teknologi daur ulang yang dianalisis meliputi pengolahan dengan chemical precipitation, pengolahan membran dengan reverse osmosis, dan pengolahan biologis dengan fitoremediasi wetland menggunakan tanaman akar wangi. Target kualitas air daur ulang mengacu pada Peraturan Pemerintah No.82 tahun 2001 peruntukkan air kelas 2. Pemilihan teknologi pengolahan lanjutan produced water dilakukan dengan metode pembobotan yang memperhitungkan parameter removal kontaminan dan biaya, serta mempertimbangkan luasan lahan yang diperlukan dan dampak lingkungan. Dari perhitungan yang dilakukan, unit pengolahan lanjutan yang terpilih adalah fitoremediasi wetland menggunakan tanaman akar wangi. Melalui pengolahan tersebut, didapatkan kualitas efluen berupa BOD 2,34 mg/L ; COD 4,8 mg/L ; TSS 1,5 mg/L; TDS 84,1 mg/L; Ammonia 0,06 mg/L ; Phenol 0,0007 mg/L; Sulfida 0,002 mg/L; Pb 0,0067 mg/L;Zn 0,0006 mg/L; Cu 0,0006 mg/L; serta minyak dan lemak sebesar 0,098 mg/L.Total biaya investasi awal yang diperlukan sebesar Rp 1.320.855.290,00.

.....Development Plan of Oil & gas Limited Block in Tonga by PT Energy Mega Persada Tonga will cause the additional of petroleum production up to 1.700 barrels of oil per day. The increased petroleum production will be followed by the number of produced water which are getting bigger too until reached 4.000 barrels of water per day. Therefore, it appears the option to recycle produced water into clean water that can be used for the needs of the operational field as nonpotable needs, as flushing toilets, watering the garden, and also washing equipment and vehicles. Based on laboratory tests and analysis of secondary data (for parameters BOD), the quality of produced water from the existing processing units as follows: BOD 39,46 mg/L; COD 48 mg/L; TSS 15 mg/L; TDS 84,1 mg/L; Ammonia 0.06 mg/L; Phenols < 0,001 mg/L; Sulfide 0,01 mg/L; Pb < 0,023 mg/L;Zn < 0,006 mg/L; Cu < 0,006 mg/L; and oil and grase < 1,13 mg/L. Alternative recycling technology which is analyzed covers chemical precipitation, reverse osmosis, and wetland plant use V. zizanioides. The target of the quality of water recycling are referenced to PP No.82/2001 designated class 2 water. Selection of advanced processing technology produced water is done by weighting method that takes into account parameters of contaminant removal and costs, as well as

considering the land area required and the environmental impact. From the calculation, the advanced processing unit selected is phytoremediation wetland by plants Vetiver. Through the treatment, effluent quality is obtained in the form of BOD 2,34 mg/L ; COD 4,8 mg/L ; TSS 1,5 mg/L; TDS 84,1 mg/L; Ammonia 0,06 mg/L ; Phenol 0,0007 mg/L; Sulfida 0,002 mg/L; Pb 0,0067 mg/L;Zn 0,0006 mg/L; Cu 0,0006 mg/L; also oil and grase 0,098 mg/L. The total cost of the initial investment required of Rp 1.320.855.290.00.