Meena Fuangkaeow 2015: The Utilization of Fly Ash and Constructed Wetland for Tertiary Treatment of Effluent from Pulp and Paper Industrial Wastewater Treatment Plant. Master of Science (Environmental Science), Major Field: Environmental Science, Department of Environmental Science. Thesis Advisor: Associate Professor Nipon Tungkananuruk, Ph.D. 97 pages.

This research was to study the treatment efficiency of color and COD from activated sludge treated pulp and paper industrial wastewater. The results were used to develop the constructed wetland for using as tertiary treatment of industrial wastewater by fly ash as adsorbent. Fly ash is generated as a residue of lignite coal 90% and biomass 10% in combustion process for pulp and paper production. The batch experiments were carried out and found that fly ash 8 g. per 50 mL. of wastewater and 3 hr. of contact time that gave maximum treatment percentage of color (71.78%) and COD (67.20%) . The ratio by weight of fly ash to soil at 1:40 was the best efficiency Also, adsorption model of fly ash was conformed to Freundlich isotherm. The experiments were also carried out on a continuous basis in a glass column (5 cm. i.d. x 30 cm.L.) and packed with gravel 9.6 cm., coarse sand 4.2 cm., sand 2.8 cm. and mixed fly ash and soil (1:40) 16.5 cm. from the bottom to the top. The 3-hr. duration of wastewater in column gave a better results (90.74% and 100.00%) than the 4-days duration and 3-days releasing (75.00% and 71.29%) and the continuous flow (61.75% and 64.28%). Furthermore, the constructed wetland was simulated in square plastic tank with size 51x51x54 cm. which containing the growing material as the column experiment with growing *Vetiveria zizanioides and Typha angustifolia* L. and treated by 3-hr. duration. The results revealed that the treatment unit which using mixed fly ash and soil (1:40) and growing *Typha angustifolia* L. gave the higher treatment efficiency of color (88.44%) and COD (100.00%) than the treatment unit which growing *Vetiveria zizanioides* and control unit (using only soil). This treatment could be reduced the COD value to 0.00 mg/L and the color of water to 1.37 Pt-Co unit. Therefore, the developed constructed wetland with fly ash can be used as tertiary treatment of effluent from pulp and paper industrial.

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