

Siriluk Tangkhabuanbut 2008: Interaction Between Methanotrophs and Nitrifiers on Methane Oxidation in Nitrogen Rich Landfill Cover Soil. Master of Engineering (Environmental Engineering), Major Field: Environmental Engineering, Department of Environmental Engineering. Thesis Advisor: Associate Professor Wilai Chiemchaisri, D.Tech.Sc. 132 pages.

This study was conducted to investigate methane oxidation rate (MOR) and soil property changes in the nitrogen rich landfill cover soil (1,300  $\mu\text{g/g}$ ). Four simulated landfill cover soils were set up: no landfill gas feeding (LFG) and LFG feeding: no wind, windy (surface aeration 1,000 ml/min) and vegetated cover soil with *S.virginicus* in dry (0-60 days) and wet conditions (50ml/d, 61-180 day).

The results appeared that rich ammonium nitrogen (1,300  $\mu\text{g/g}$ ) was not the inhibited condition for MOR. Although soil contained high ammonium concentration, methane oxidations had been detected in all soil conditions throughout the experimental period. In dry condition vegetated and windy cover soil had high methane oxidation ( $>300 \text{ gCH}_4/\text{m}^3 \cdot \text{d}$ ) as compared to no wind condition ( $<100 \text{ gCH}_4/\text{m}^3 \cdot \text{d}$ ). In wet condition average MOR of all wet soils had been higher than the dry soils in which reaching their maximums of  $450 \text{ gCH}_4/\text{m}^3 \cdot \text{d}$  at different times. For soil properties, moisture content was found to be an important factor that highly influencing MOR. The moisture content lower than 6% or higher than 11% could reduce MOR. The ammonium nitrogen content of all conditions gradually decreased with time. Determination of microorganisms by FISH technique revealed that methanotrophic population was about 20-40% of all microorganisms and correlating with the MOR. Amount of methanotroph Type II had been more than Type I especially in wet soils in 3-5 times. *Nitrosomonas spp.* had not correlated with the MOR. However in high MOR period (153 day) they were found in range of 12-21%, while *Nitrobactor spp.* were in range of 7-16%.

S. Tangkhabuanbut

Student's signature

W. Chiemchaisri

Thesis Advisor's signature

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