

Enhancement of waste degradation with leachate recirculation at an old landfill

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ABSTRACT

This paper studies the behaviour of a completed landfill in a Nordic climate when leachate recycling is applied. The 17 ha landfill (Seutula, Vantaa) was in operation mainly from 1974 – 1987 and was later covered with a surface layer. Leachate is collected in an equalisation basin, from where it is pumped to a municipal sewage treatment plant. A gas collection and utilisation system was completed in the mid- 1990's.

During the experiment leachate from the equalisation basin was directed to two areas of the site and the effects compared with a third (reference) area without leachate feed. In each area the water was fed into three wells to maintain a more equal distribution. The recirculation period during the warmer half year was approximately three months and the feed rate was 0.5 – 1 m per year.

Several parameters were monitored in the water phase in different locations of the three areas, ie. water level, temperature, pH, conductivity, COD, BOD₇, NH₄-N, PO₄-P, chlorides, heavy metals, the amount of active biomass and AOX. Gas flows, pressures and methane concentration were also monitored in 19 gas well.

An increase in BOD₇, COD and NH₄-N-concentrations was observed in the water phase of monitoring wells in areas with leachate recirculation. The BOD/COD ratio correlated well with the temperature (with a negative sign). These findings indicate an enhanced degradation of waste due to recirculation, but the gas production was limited by the temperature.

From the basis of gas measurements a clear difference in gas production could be found. The gas production before and at the end of the recycling period in the three areas increased by 55, 12 and 70 %, where the lowest value is for the reference area. Hence approximately a 50 % increase in gas production can be estimated.

To enhance the degradation more permanently a through the whole year recirculation system is suggested due to the long winter period taking into consideration the heat balance.