

Last barrier for clear leachate

Landfill leachate is often difficult to clean as it can contain a multitude of polluting substances dissolved from the waste. Therefore, an exact and continuous control of the leachate values of the wastewater treatment plant belonging to the landfill is very important.

Together with two other administrative districts, Neuwied (Rheinland-Pfalz, Germany) runs a mechanical-biological plant as the pre-stage for the subsequent domestic waste landfill storage. The yearly capacity is 80,000 to 90,000 t. This amount is taken to a landfill site selected according to the rotation procedure. Leaching precipitation water dissolves a wide variety of organic and inorganic substances from the waste. Typical for landfill leachate are high nitrogen concentrations but also dangerous substances such as absorbable organically bound halogens (AOX). Up to the year 1992, the occurring leachate was temporarily stored at the landfill site to be later treated together with other water at a municipal waste water treatment plant. This type of treatment has not been possible as a longterm treatment since the Appendix 51 of the "Allgemeine Rahmen-Verwaltungsvorschrift" (general framework of administration prescriptions¹) came into effect. As soon as dangerous substances are present, a separate, state-of-the-art treatment of the landfill leachate is obligatory since then.

Treatment of leachate

For cleaning purposes, the landfill leachate flows through an upstream biological treatment step. Here, the easily degradable organic pollutants and nitrogen are degraded. A gravel filter collects the suspended solids. The pre-cleaned leachate then runs through 5 activated carbon columns, each of which has a size of 20 m³. In an adsorption procedure the leachate is cleaned so its values do not exceed the discharge limit values. The loaded carbon is picked up by the supplier, regenerated and used again.

Important Parameters	Unit	Inlet	Outlet limit values
CSB	mg/L	approx. 2000	200
N total inorg.	mg/L	approx. 800 as NH ₄	100 (target value: 70)
BOD	mg/L	approx. 250	20
AOX	mg/L	approx. 2	0,5



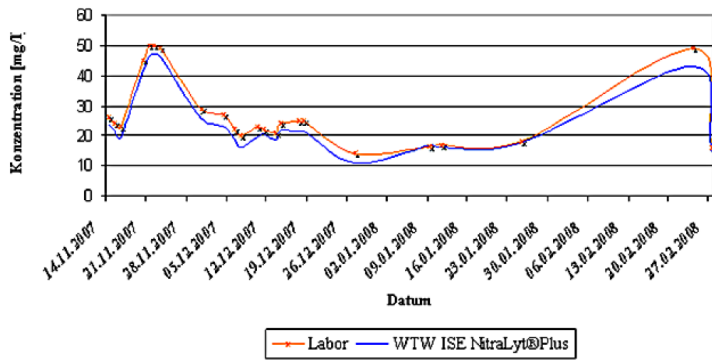
Over a period of months, the ISE measuring procedure has permanently delivered exact nitrate values in the biological cleaning.

Check of the outlet values

When discharging the cleaned landfill leachate into the river Wied, a number of limit values have to be observed. Some of these values have already been recorded and documented by online instrumentation for a long time. Most of them, however, have to be determined in the laboratory. Efforts to use optical nitrate measurement according to the absorption principle for the determination of the NO₃ values in the biological stage showed that this UV spectroscopic measurement can only be used for a limited measuring range due to the intrinsic coloration of the landfill leachate. In this context, the ion selective measuring technique (ISE) by Xylem Analytics in Weilheim, Germany caught plant manager Heinz-Peter Jung's attention. At the same time as a competitor's product, the NitraLyt[®] ISE sensor of the WTW brand was tested for nitrate determination in the biological stage.



Comparison after 3 months of continuous operation in the biological stage of the DSRA (Landfill leachate purification plant) Fernthal



From the beginning and over a longer period, the WTW sensor provided consistent results. Additionally, the ISE measuring system showed a very low drift of the measured values and thus required less sensor maintenance work. After several months of measuring practice, Peter Jung summarizes: "Online measurement continually provides and records the rather erratic NO₃ value in the outlet of the biological stage. This enables an optimum carbon supply of the biology und thus results in a clear reduction of the carbon used." Degradation interferences in the biological stage could be recognized faster and limit violations avoided even more safely in the area of nitrogen elimination.

Stefanie Borza, being the supplier and disposer and thus responsible for analysis, expressed her satisfaction with the instrumentation solution from Weilheim: "After our previous experience we couldn't imagine that there was such a simple solution for our continuous measured value recording". Besides, the new measuring technique has considerable financial advantages for the plant manager: "Thanks to online measurement we can now voluntarily declare the discharge limit value of N_{total} 100 ml, at least 20% lower. By this, there is the possibility to offset the complete effluent charges of the past three years (approx. 26,000 €) against investments." According to Jung, the Xylem measurement procedure is also cheaper by approx. 70 % than the competitor's product, which operates optically.

A200902

Source reference:
 1) AbwV - Anhang 51; Bundesamt für Justiz; https://www.gesetze-im-internet.de/abwv/anhang_51.html (17.09.2021)

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