

Ozone Reduces Micropollutants

Bad Sassendorf – The sewage plant of the future

An intensively used river like the Ruhr serves as drink- and process water catchment area for several million people as well as for business and industrial establishments. In addition it is also a recipient of treated residential and commercial waste waters. These waste waters contain several organic micropollutants that can not or only insufficiently be removed by traditional waste water treatment in municipal sewage.

The sources for such micropollutants are various: Hormones, pharmaceuticals, cosmetics, pesticides, industrial base materials and final substances as flame retardants and coatings are commonly found.

Due to the tight regional coupling between sewage disposal and drinking water supply in this watershed a scientific research program was implemented to survey the processes required to effectively prevent the emission of organic pollutants. Especially the effects as well as the costs of adapted municipal sewage plants on river's water quality should be determined hereby.

“The first municipal sewage plant to eliminate pharmaceuticals is brought online!”

Against this background the ministry of environment and conservation of the federal state of North-Rhine-Westfalia MUNLV supported the realization of three large scale plants to establish an additional treatment step in a municipal sewage plant in the greater Ruhr area.

Bad Sassendorf has been chosen by the operating company Lippeverband as one place for an installation due to the particular age pattern of the connected



PROJECT DETAILS

FLOW (MAX):	180 l/s
OZONE DOSAGE MAX:	15 mg/l
POPULATION EQUIVALENT:	13.000
PROCESS PRINCIPLE:	After the clarifier and before a subsequent polishing pond

households. As a traditional health resort as well as a retirement residence for the cities in the near Ruhrgebiet the average age is about 48 years. This circumstance does reflect the expected patterns of North-Rhine Westfalia in 30 to 40 years due to demographic changes. The high density of hospitals (1.200 beds in six hospitals at 12.000 inhabitants) leads to PPCP (Pharmaceuticals and Personal Care Products) charges that are understandably higher as in an average sewage. Therefore the location lends itself to test series as the expected significant reduction effects are ideal for the optimization of the application in whole.

Project Evaluation

Operating company is the Lippeverband that also bore 30 percent of the invest costs of the installed system. The remaining costs were covered by a promotion

fund of the federal state of NRW. Responsible for the design and the project handling were the engineering office Hydro-Ingenieure, Düsseldorf.

Sewage Plant design

The incoming waste water is lifted by a spiral pump station and rejects are removed in a subsequent fine screen. After treatment in an aerated grit chamber and grease trap the waste water is led to the two lines of an aeration tank. Sludge separation takes place in the subsequent clarifier. The treated water is discharged to a clarification pond as a last finishing step.

Ozone plant design

The ozonation step is located in the process after the clarifier and before the polishing pond. The WEDECO ozone system is designed for treating a maximum hydraulic flow of 648 m³/h. The design flow has been specified with 300 m³/h at a design dose of max 15 g/m³. This leads to a max design production of up to 4.6 kg/h. The WEDECO ozone generator of the SMO series is installed in a 20 feet container whereby only minimal additional concrete civil works for the housing of the machinery equipment are required by the implemented additional treatment step. Diffusers are utilized to mix in the ozonated product gas in form of fine bubbles. This principle has proven itself in drinking water applications since decades and can be transferred if combined with an efficient pre-treatment in the wastewater line. Considering a hydraulic retention time of 13 minutes at 300 m³/h the tank volume is 63 m³ utilizing two lines in parallel.

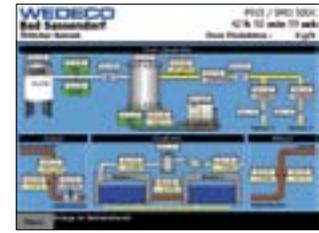
Completed is the set by a residual ozone destructor and an application specific combination of ozone measurement devices. In order to control the systems ozone production a control philosophy based on the incoming flow, measured by a MID combined with two correction factors has been chosen. Various control philosophies can be set enabling ideal ozone dosing on varying flow and concentrations.

Project economics

Based on the customer specific values for oxygen and energy the operating costs per cubic meter of treated water range between 2 and 6 €cent.



Containerized WEDECO SMO/SMA Ozone generator with gas distribution.



A control panel serves for visualization and adjustment of all system parameters. The graphical illustration of the process ease the handling.

First measurement campaigns are aiming at an ozone dose of 3 - 5 g/m³ to run the system with the current water conditions. This approach refers to other pilot plants (i.e. Regensdorf, Switzerland) that have already shown very good results in significant load reduction of problematic organic micropollutants with doses in the named range. Since the upcoming tests in Bad Sassendorf are expected to validate these former outcomes, the implemented system will even be able to provide enough backup capacity to meet much higher demands for future increase of micropollutants or peak loads.

For more than 10 years Xylem has taken over an active role by supporting several national and international projects with WEDECO ozone equipment as well as with know-how and background for the reduction of micropollutants by ozone. This support covered by different functional directions of nearly all departments made Xylem to the right partner to implement the Bad Sassendorf installation. The possibility to take the whole machinery equipment out of one hand makes the implementation of an additional ozonation step much easier to handle for the customer.

In November 2009 after a construction time of 6 months only (including the concrete works for the foundation and the reaction tanks) the system was officially inaugurated by the minister of environment NRW Eckhard Uhlenberg with the words: "Today in Bad Sassendorf history is written: The first municipal sewage plant to eliminate pharmaceuticals is brought online!"

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