CASE STUDY

AZZURO

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SPECIFICATIONS

Application:
Biogas Emission from a Beer Brewery in Zouterwoude, the Netherlands

Air flow:
1,200 m^3/h (phase 1) and another 6,200 m^3/h (phase 2)

Contaminants:
Hydrogen sulfide concentrations up to 1,000 ppm

System configuration:
1 x Torrenta

Reactor material:
FRP

Media material:
PermaPac

Year installed:
2002

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INTRODUCTION

In an anaerobic wastewater treatment plant septic conditions caused the emission of malodorous gases. These odors created problems in close proximity of this industrial plant. At this beer brewery, wastewater is being treated on site. Increased production caused increased nuisance to the surrounding area and treatment of these off-gases was proposed.

DESIGN COMMENTS

The following design criteria were encountered: An air flow of 1,200 m^3/h (phase 1) and an additional air flow of 6,200 m^3/h (phase 2), containing hydrogen sulfide concentrations up to a couple of hundred ppm. Acceptance criteria were based on the following starting points:

1. 99.4% Removal of odor;
2. Outlet odor concentration less than 170 OU/h.

OPERATION OF THE SYSTEM

During the start-up, a start-up vessel was being used. This 3,000 liter vessel incorporated an acid resistant pump and water level control. The vessel was first filled with water, nutrients and biology. The biology used was a combination of prepared inoculum and activated sludge.

After a period of 4 weeks, the start-up kit (with the recirculation pump) was disconnected and removed and the system control was changed over from start-up operation to normal operation. During normal operation, water with nutrients was discontinuously added to the bioreactor operating in upflow.

Read why all major Beer Breweries like Anheuser-Busch, Carlsberg and Heineken rely on Azzuro for their OCS needs.

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The water that is being used for this bioreactor is effluent water from the aerobic wastewater treatment in which the effluent water from the anaerobic wastewater treatment plant is being treated. This water contains enough nutrients to operate the bioreactor without a nutrient dosing system. During normal operation no special attention has to be paid to the bioreactor, other than checking on the blower, the screen filtering, the effluent water and the valves. The pH of the discharged water is continuously monitored and the water amount is automatically adjusted by the control system.

PERFORMANCE

During normal operation the plant operator checks the bioreactor on a weekly basis visually and acts on alarm signals should they occur.
The performance was measured by analyzing:

- online inlet and outlet concentrations of H_2S;
- Odor concentrations of the inlet and outlet air, with samples being collected in a Tedlar bag and sent to an independent lab;
- Reduced sulfur compounds, other than hydrogen sulfide, were measured by Nijmegen University.

Pollutant	Unit	Inlet Concentration	Outlet Concentration	Removal %
Hydrogen sulfide	ppm	800	1.7	98
Organic reduced sulfur compounds:				
Methyl mercaptan	ppb	2.260	145	94
Carbonyl sulfide	ppb	?	< 4	?
Dimethylsufilde	ppb	452	220	51
Dimethyldisulfide	ppb	68	20	71
Dimethyltrisulfide	ppb	?	10	?
Total reduced sulfur	**ppb**	**> 2.780**	**< 399**	**86**

Table 1: Removal efficiencies of the bioreactor of hydrogen sulfide and reduced sulfur compounds after approx. 6 weeks from start-up

Pollutant	Unit	Inlet Concentration	Outlet Concentration	Removal %
Odor concentration	MOU/h	7.000	200	97

Table 2: Removal efficiencies of the bioreactor of odor after approx. 10 weeks from start-up

Pollutant	Unit	Inlet Concentration	Outlet Concentration	Removal %
Odor concentration	MOU/h	5.000	30	99

Table 3: Removal efficiencies of the bioreactor of odor after approx. 25 weeks from start-up during winter