



Case study: comparison of Enviro-Chem Cx and Nutriox odour control products for H₂S control in sewer networks in Germany

Key results:

- equivalent effectiveness to Nutriox
- product consumption up to 100× lower
- over 45 % operational cost saving

Gutenborn, Germany (31 October 2023) – In municipal sewer networks, hydrogen sulphide (H₂S) is one of the main causes of odour nuisances. This gas forms when wastewater stagnates and enters anaerobic conditions, for example in pumping stations or rising mains. Relatively short retention times, sometimes around 30 minutes, can be sufficient to initiate these processes.

In addition to odour nuisances, H₂S is also responsible for biogenic corrosion through the formation of sulphuric acid in sewer structures. In interaction with certain bacteria, it causes the progressive degradation of concrete structures and metal reinforcements.

When H₂S is present in pumping stations, it also escapes into the atmosphere above the wastewater, generating not only sometimes very strong odours but also health risks for operating personnel.

Finally, high concentrations of H₂S are harmful to the health of service personnel.

1. Study objectives

In order to limit H₂S emissions and prevent corrosion of the structures, the operator had been using the product **Nutriox®** from Yara, a nitrate-based solution.

The mode of action of Nutriox® consists of promoting denitrifying bacteria, which compete with sulphate-reducing bacteria responsible for sulphide formation.

This study aimed to compare:

- H₂S reduction effectiveness
- the quantities of product required
- operating costs

between the product currently in use (**Nutriox®**) and an alternative solution (**Enviro-Chem Cx**).

At the conclusion of this study, the operator had to decide on a potential replacement of the existing product.

2. Description of the technical setup

The trial was carried out on a section of the sewer network comprising a **5 km rising main**, followed by a gravity section up to the wastewater treatment plant.

The pipe diameters are as follows:

- DN125: 2,6 km
- DN150: 2,1 km
- DN200: 0,3 km

The injection point is located in **pumping station P043**.

Main characteristics:

- Tank pumping station with dry-installed pumps
- Tank volume: **1,6 m³**
- Average dry-weather flow: **80 to 100 m³/d**

Before the trial, the Nutriox[®] product (45 % solution) was continuously injected into the tank of the pumping station via an automatic dosing system, with the injected quantity adjusted according to the wastewater flow rate and temperature.



Layout of the rising main



Pumping station



Dosing tank with ready-to-use solution

3. Materials and methods

On **22 August 2023**, the Nutriox dosing installation was stopped by cutting the electrical supply to the dosing pump. The IBC containing Nutriox was removed from the installation.

A new IBC container was installed and connected to a **membrane dosing pump** to inject the product into the overflow pipe of the pumping station tank.

This setup allowed:

- preparation of different dilution ratios
- precise adjustment of the injected product quantity via the pump frequency and stroke settings

To evaluate treatment performance, an **OdaLog gas analyser** was installed at the end of the rising main in manhole AD-M28. This device measures H₂S concentration in ppm at regular intervals.

Daily wastewater volumes were also recorded to monitor operating conditions.

4. Results

Sur une période de 50 jours, différents rapports de mélange ont été préparés et différentes quantités ont été dosées par jour. On tableau les résume et indique la concentration moyenne de H₂S concentration and the resulting odour nuisances.

Tis day	Mixing ratio	Frequency/stroke settings	Enviro-Chem Cx dosing quantities l/d	∅H ₂ S Concentration ppm	Subjective perception of odour nuisance
1-15	1:50	10 / 60	37,4	3,2	None
		10 / 40	25,9	7,1	None
		20 / 50	64,8	5,4	None
		10 / 50	31,7	6,3	None
16-27	1:100	20 / 50	64,8	5,6	None
28-35	1:200	20 / 40	53,3	18,9	None
38-50	1:100	20 / 40	53,3	17,3	None

For an average wastewater flow of **50 to 70 m³/d**, the existing installation previously injected approximately:

60 to 70 litres per day of Nutriox solution.

With Enviro-Chem Cx:

- optimal dilution: **1:50**
- injected solution volume: **31.7 L/day**
- actual Enviro-Chem Cx concentrate consumption: **0.634 L/day**

The average measured H₂S concentrations remained low (around **3 to 7 ppm**) and no odour nuisance was observed during the trial period

5. Conclusion

The trial carried out on the Gutenberg sewer network shows that **Enviro-Chem Cx**:

- demonstrates **comparable effectiveness** to Nutriox[®] for H₂S reduction
- significantly **reduces H₂S concentrations** in the network
- is **easy to store and handle**
- significantly réaliser **over 45 % cost savings** compared to Nutriox[®], depending on operating conditions and purchase prices

In light of these results, the operator **replaced Nutriox[®] with Enviro-Chem Cx**.