

BOC
WATER
UPDATE

THE PRIMOX SYSTEM

Oxygen to prevent sewage septicity and provide in-main treatment

Primox, short for Pumped Rising Main Oxygen Injection, is the oxygenation of sewage within the sewage system itself. The oxygen is usually, but not always, injected into rising mains.

Originally applied as a highly effective means of preventing septicity, it is now increasingly being used as an economic means of pre-treating sewage before it arrives at a works.

OVERCOMING SEPTICITY

When starved of dissolved oxygen, particularly in longer mains or where long retention takes place, bacterial action can strip out the combined oxygen from the sulphates and nitrates in the sewage, producing sulphides and other harmful compounds. The result is septicity, foul odours and a sewage with poor settling characteristics.

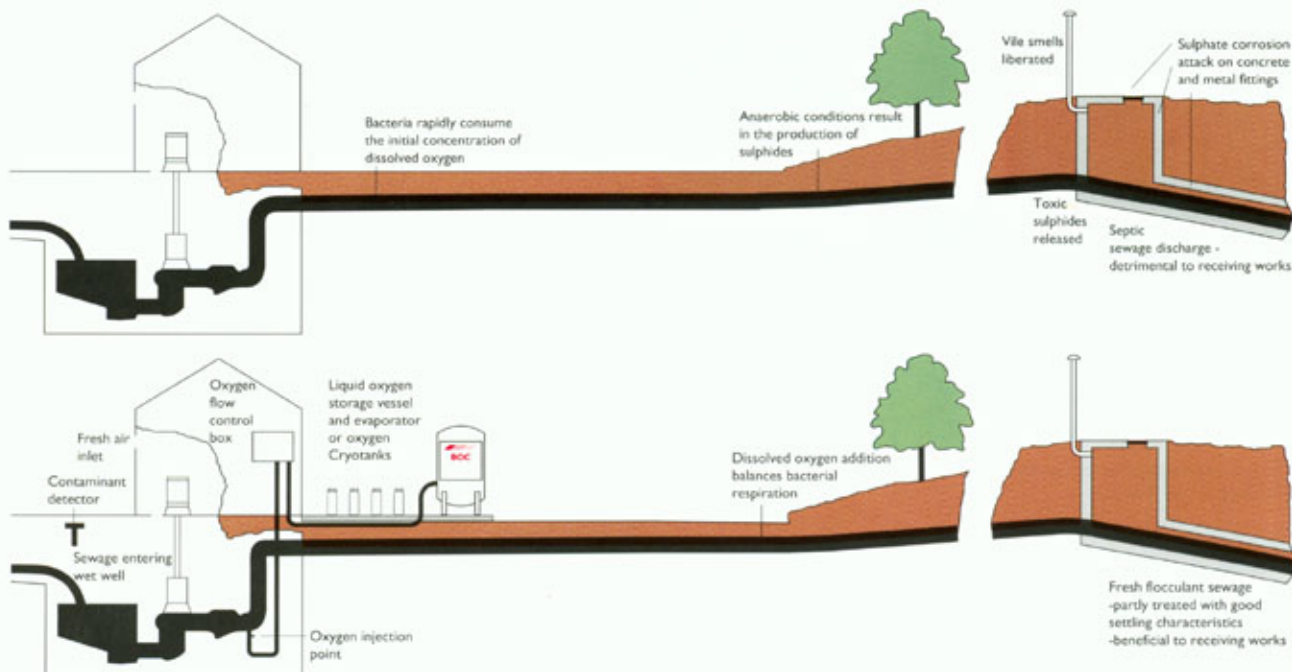
Primox was developed by BOC to overcome this. Using very simple equipment, oxygen is injected at the base of the rising main in quantities sufficient to maintain aerobic conditions through its entire length.

Primox has clear advantages over conventional systems: chlorination and liming, for instance, inhibit or kill oxygen-consuming bacteria, resulting in sterile sewage and producing unwanted side-effects. Hydrogen peroxide would do the job but the real cost of the oxygen available for bacterial respiration from this source is often prohibitively expensive and uncompetitive.

PROVIDING IN-MAIN TREATMENT

Experiments undertaken at Bath have proved that oxygen injected under controlled conditions can do a lot more than solve septicity problems.

By maintaining a positive dissolved oxygen level in the sewage the bio-oxidation of the more readily degradable pollutants is allowed to continue normally. The sewage emerging at the treatment works exhibits extremely good primary settling characteristics yielding a biological oxygen demand reduction of up to 65%. In practice it has been found that for every kilogramme of oxygen dissolved at least 1 kilogramme of BOD can be removed. Primox is therefore an extremely effective and economical form of sewage treatment and is particularly useful if the receiving works is already overloaded. In effect the main becomes an extension of the treatment process - a positive asset.



WHY IS PRIMOX SO EFFECTIVE?

The saturation limit of oxygen dissolved from air at atmospheric pressure is about 8mg/litre at normal temperatures. The bacterial respiration in fresh sewage is up to 14mg of oxygen/litre/hour and the bacterial floc adhering to the wall of the main can utilise another 700 mg of oxygen/m²/hour. The amount of oxygen initially present in fresh sewage is unlikely to exceed 3ppm. Consequently this is absorbed in a very short time and even sewage containing the air saturation limit of 8ppm of dissolved oxygen is unlikely to remain fresh for more than an hour.

BOC is able to undertake an accurate assessment of the oxygen requirement for a given retention time in a given rising main. Pure oxygen dissolves 12 times more readily than atmospheric oxygen, with a solubility limit of 48ppm at atmospheric pressure (increasing to 94ppm at 10 metres pumping head) the bacterial respiratory oxygen requirement can nearly always be met within the solubility limit of the pumped liquor. In the few situations where the solubility limit is exceeded by the demand, oxygen may be added at further points along the main.



THE BOC PACKAGE

BOC can supply oxygen in a variety of ways depending on the size of the Primox installation. Large systems are fed from a bulk storage tank of liquid oxygen.

An economical alternative for smaller installations is offered by BOC's Cryospeed liquid oxygen service. This is a fast, reliable delivery service of liquid oxygen for storage in on-site liquid oxygen cylinders.

In addition to supplying the gas, BOC can advise on the system set-up and supply the control equipment required.



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