

EXECUTIVE SUMMARY

Ozone is finding increased use in water treatment due to its remarkable properties as oxidant. It is used in a wide range of applications viz disinfection of bacteria and viral inactivation, removal of iron and manganese, oxidation of organic pollutants, destruction of odours and tastes, improvement of colour and many more. Ozone is often the only feasible method for many of these water treatment problems. Secondary uses e.g. treatment of industrial and sewerage effluent find equally wide application.

Historically, ozonation in South Africa was considered to be too expensive to find widespread use. Large capacity ozone generators have to be imported, with the associated problems of maintenance and spare parts. Deteriorating water quality in South Africa will no doubt benefit greatly from the properties of ozone if the equipment is available locally at competitive prices.

The main aim of this project was the development of South African ozonation technology, to make ozonation available locally. The technology is based on high-frequency surface corona discharge using proprietary materials. A range of ozone generator sizes of increasing production capacity was developed and commercialised. These range from output of 2 g/h of ozone, to 1 kg/h units in the prototype stage. Inherent modularity allow easy expansion to higher sizes. The units are now available for introduction into the marketplace.

Bad tastes and odours have been plaguing the Hartbeespoort Dam for decades due to large scale eutrophication and algae blooms. The removal of these odours with ozone was investigated as a secondary aim in this project. Results indicate that relatively high ozone doses, and specialised ozonation designs, will be required.

Hartbeespoort Dam will always be a candidate for the occurrence of enteric viruses, and the outbreak of associated disease, receiving large quantities of treated sewerage effluent. Ozone is a proven viral inactivant. The ozone demand of the water and the reaction rates of ozone with compounds in the water are important parameters for the design of an ozonation system for viral inactivation. These parameters were measured as part of this investigation to enable efficient design of future systems to combat viral contamination.