Ozone Water Treatment

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***Abstract*- Ozone has been used in Europe for water treatment since early in the 20th century. Initial applications were to disinfect relatively clean spring or well water, but they increasingly evolved to also oxidize contaminants common to surface waters. Since World War II, ozonation has become the primary method to assure clean water in Switzerland, West Germany and France.**

More recently, major fresh water and waste water treatment facilities using ozone water treatment methods have been constructed throughout the world.

Relatively, the use of ozone for water treatment and purification in the United States has been much more limited. However, the use of ozone has been increasing here in the US, particularly over the last decade as the negative effects of chlorination have become more apparent

INTRODUCTION

TOzone - or O3 - is Mother Nature's purifier and disinfectant. The 3 stands for the three oxygen atoms that compose Ozone. The normal Oxygen we breathe is called O2, and is made up of only two chemically linked Oxygen atoms.

You may have noticed that a sudden summer storm leaves behind a very distinct smell, sort of a "fresh scent" which lasts for about an hour. In this case, you smell Ozone, which has been creating from lighting bolts during the electrical storm. Ozone is also created by the Sun's ultra violet rays.

Ozone Small Potable Water Systems

Ozone, the strongest oxidant and disinfectant in commercial use has been employed in over 3,000 large scale municipal plants world-wide. In August 1997, and again in August 1998, the U.S. EPA identified ozone as a Small System Compliance Technology for existing National Primary Drinking Water Regulations related to revisions in the 1996 Safe Drinking Water Act. Survey data developed to support the inclusion of ozone as a "Compliance Technology" identified that over half of the more than 260 U.S. municipal ozone installations known to be operating in early 1998 are in systems treating less than 1 MG.

ENGINEERING ASPECTS OF OZONATION SYSTEMS

Because ozone is such a powerful oxidant/disinfectant, the trick to applying it to solve water treatment problems is to do so in a manner that is effective for water treatment, yet at the same time ensuring the safety of people in the vicinity. Ozone safety issues are handled quite easily by use of proper ambient ozone monitoring, tank venting and ozone destruction.

The five basic components of an Ozone system include

1 Gas Preparation - either drying gasto a suitable dewpoint or using oxygen concentrators.
2 A suitable electrical power supply.
3 A properly sized Ozone Generator(s)
4 An Ozone contacting system.
5 Ozone off-gasdestruction or suitable venting system.

For corona discharge ozone generation, it is critical to feed the generator a clean and dry oxygen- containing gas. Moisture in the feed gas causes two operating problems. First, the amount of ozone produced by application of a given electrical energy level is lowered as relative humidity rises. Consequently,

OZONE

Ozone is a powerful oxidant with high disinfectant capacity. A study found that within a pH range of 6 to 10, at 3 to 10 C, and with ozone residuals between 0.3 to 2.0 mg/L, bacteriophage MS-2 (a surrogate test organism)

Viral inactivation CT values for ozone were published in the original USEPA guidance manual for the SWTR. The EPA has reviewed survey data submitted by the International Ozone Association

A 1992 research report describes treatment studies conducted on MS-2, poliovirus, and Giardia cysts. It found that MS-2 in natural waters are very sensitive to ozone in comparison to poliovirus type 3.