

Odor Control Sewage Plants and Collection Systems

Introduction

Sewage and industrial plants located near residential areas can be subject to political and legal problems if these facilities produce unpleasant odors. Odors in the vicinity of treatment plants are generally gaseous inorganic products or highly volatile organic compounds. Ammonia and hydrogen sulfide are considered to be the main causes of odor when the sewage comes from mainly households.

Measurement of Odors

The following are some parameters to express the concentration of odors: *Perceptibility Threshold* (ATC: Absolute Threshold Concentration), defined as the minimum concentration that can be detected by 100% of the persons involved with an olfactory analysis. *Maximum Exposure Concentration* (TLV: Threshold Limit Value). This represents the maximum concentration at which persons can be exposed for a period of 8 hours a day, 5 days a week and 50 weeks a year, for a work life of 40 years. *Maximum Allowable Concentration* (MAC: Maximum Allowable Concentration): Maximum concentration which should never be exceeded.

The table below reports the values of some of these indices relative to a series of compounds found in the atmosphere of sewage treatment plants.

Compound	ATC (ppm)	TLV (ppm)	MAC (ppm)	Olfactory Sensation
Hydrogen Sulfide	0.00047	10	50 (USA) 20 (UK)	Rotten Eggs
Ammonia	46.8	25	37.5 (UK)	Pungent
Methyl Mercaptan	0.0021	10		Rotting Cabbage
Carbon Disulfide	0.21	20		Sweet/Pungent
Biphenyl Sulfide	0.0047			Burned Rubber
Dimethyl Sulfide	0.001			Rotting Vegetables

Odor Control Technologies

The three most often applied technologies for treating these problems are thermal oxidation, bio filters and chemical scrubbing.

Thermal oxidation is the least used method of odor control due to the high capital and operating costs. It is most often used for treatment of VOC with odor control as a side benefit.

Bio filters are simple, moderate in cost and generally effective. The major limitation of bio filters is the large area required for their installation. To operate effectively bio filters must be kept moist and this requires significant amounts of water. The leachate and condensate eventually needs to be treated. Bio filters are typically not used for high intensity odors or large volumes of air.

Multi stage chemical scrubbers have been proven to be effective in removing a wide range of odor causing compounds including hydrogen sulfide and ammonia. Typically these systems are used for high intensity odors in large air volumes. There are several types of scrubbers including packed bed, mist, and venturi scrubbers. The advantage of a packed scrubber is that the concentration of the scrubbing solution can be varied in response to fluctuating odor levels. These units are usually the least costly method of treating high intensity odors.

The physical area required for chemical scrubbing systems is intermediate between thermal and biological systems as are the operating costs. A disadvantage of wet chemical scrubbing systems using hypochlorite is a potential for emission of chlorinated compounds in the wastewater and particulate from the scrubber exhaust stack. The use of ozone as the oxidant minimizes these problems. In addition, ozone is a more powerful oxidant than chlorine or hypochlorite.

Odor Control Design Considerations

In order to apply any odor control technology some key factors must be known: type of odor, odor concentration, air flow, temperature, specific ozone dose, contact chamber retention time and waste water acceptability criteria.

The process starts by taking air from various unit operations at the sewage plant or collection system which have been enclosed and fitted with vents and ducting. The air flow needed varies by unit operation, e.g. pretreatment – 6 to 8 recycles per hour, denitrification, oxidation and nitrification – 2 to 4 recycles per hour and sludge areas – 10 to 15 recycles per hour. The air is conveyed by ducts to the odor control system.

Spartan Environmental Technologies

Spartan provides the DESOZONE Odor Control system which uses **chemical scrubbing** with ozone that provides economic and effective odor control.

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