Chlorination Of Wastewater

SEVERN TRENT SERVICES

CAPITAL CONTROLS

General

The disinfection process is the most important phase of wastewater treatment. Proper disinfection ensures removal of pathogens from wastewater before it is discharged to the environment. The most widely used disinfectant is chlorine. The use of chlorine in municipal wastewater treatment is commonly practiced throughout North America. There is a discharge limitation on chlorine residuals in the effluent as low as zero (no detectable amount).

Chlorination effectiveness is measured by the most probable number (MPN) of the indicator group, usually coliform bacteria (E. Coli), which remains after chlorination has occurred.

Application Points

Up-Sewer Chlorination

Up-sewer chlorination is the addition of chlorine to the wastewater before the wastewater reaches the treatment plant. The function of up-sewer chlorination is to control odors and septicity, effectively decreasing the load imposed upon the wastewater treatment plant.

Pre-Chlorination

The addition of chlorine to wastewater at the entrance of the wet well, ahead of settling tanks and before the addition of other chemicals, is called pre-chlorination. Pre-chlorination is primarily applied to prevent odor problems associated with the breakout of hydrogen sulfide (H_2S). Pre-chlorination also helps to reduce plant load, (BOD) and aids in the settling of solids.

Pre-chlorination can also be used to treat specialized industrial wastes (e.g. metal bearing wastewater) before discharge to wastewater collection systems.

The use of A CHLOR-A-VAC® chemical induction unit, in lieu of an ejector, enhances the mixing of the wastewater and chlorine.

In-Plant Chlorination

Chlorine can be applied between primary settling units to control filter ponding, psychoda flies and to aid filter operation. Chlorine can also be added to return activated sludge, to control bulking and to activated sludge prior to the return of the sludge to primary settling units, to assist sedimentation.

The load on primary or secondary treatment processes, imposed by recycled supernatant liquor, can be reduced by chlorine addition to supernatant liquor from digesters. Chlorine will aid odor control from supernatant liquor, digested sludge, and sludge drying beds.

Post-Chlorination

The primary purpose of post-chlorination is disinfection. Chlorine is applied prior to or at the inlet of the chlorine contact chamber. Rapid initial mixing of chlorine solution and wastewater through an efficient diffusion device (CHLOR-A-VAC®) is essential for effective disinfection.

Sizing

For typical dosage rates, refer to Bulletin 010.3100.

Plant Design Capacity: 15 MGD

Type: Secondary Treatment Plant

Objective: Disinfection, Odor Control

Chlorine Demand: 5 mg/l

Chlorine Dosage Design: 10 mg/l

(See calculations below).

The calculations call for a design that requires a chlorination system that uses ton containers. The application point for disinfection should be located at the contact chamber, with addition of chlorine controlled in response to flow variations. A second, manually operated, chlorinator should be provided for odor control at the inlet of the trickling filters. The chemical need indicate a delivery schedule for chemicals on a once-a-month basis would be satisfactory.

The system should have a maximum capacity to meet design dosage requirements to 10 ppm at a maximum flow, and be sized to provide reported chlorine feed requirements.

Dechlorination

For proper operation and disinfection, chlorine dosages may need to be applied at a value which will exhibit a residual in excess of limits in effect at the discharge of the wastewater treatment plant. Reduction of chlorine dosage may not be possible while providing adequate treatment. At this point, dechlorination, using sulfur dioxide or another reducing agent will need to be evaluated.

Calculations Based Upon Sizing Data

Plant Capacity:15 MGD = 10417 gpm x .012 x 10 ppm = 1250 PPD

Maximum Flow: 3 MGD = 2083 gpm x .012 x 5 ppm =125 PPD

Minimum Flow: 0.5 MGD = 347 gpm x .012 x 5 ppm = 21 PPD

System Capacity: 1500 PPD chlorine

Operating Capacity: 200 PPD chlorine

Design improvements may be made without notice.

Represented by:

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