Dechlorination System Minimum Design Criteria

Adopted April 18, 2003

Introduction

The Triennial Review Committee's move to adopt a fresh water standard for total residual chlorine (TRC) is driving the implementation of TRC effluent limitations for facilities that use chlorine or a chlorine derivative for disinfection. Such a limit may necessitate the use of a dechlorinating agent such as sulfur dioxide or a sulfite derivative. The relatively simple nature of dechlorination affords the Division the opportunity to develop a fast-track permitting strategy for approval of such systems. The minimum design criteria outlined herein are meant to provide the regulated community and their engineers the information necessary to ensure proper system design and rapid project turn-around.

Applicability

This criteria document applies to the design of sulfur dioxide and sulfite derivative systems. Facilities proposing to employ an alternate means for dechlorination, such as activated carbon, are required to follow the standard authorization to construct (ATC) permitting process.

Design Criteria

1.0 Dosage Rates

The following dosage rates are to be used for the design of dechlorination systems. These dosage rates constitute the stoichiometric requirement plus a 10% margin of safety[1].

Dechlorinating Agent	Dosing Rate
Sulfur Dioxide	1.0 mg/L SO_2 per mg/L Cl_2 removed
Sodium Bisulfite	1.6 mg/L $NaHSO_3$ per mg/L Cl_2 removed
Sodium Metabisulfite	1.5 mg/L $Na_2S_2O_5$ per mg/L Cl_2 removed

2.0 Duality Requirements

Designs shall include dual feed systems to insure compliance with residual chlorination limitations in the event the primary (if one is designated) system fails.

[1] Recommended Standards for Wastewater Facilities; Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers; page 100-7, 1997 Edition.

3.0 Feed Systems

3.1 Sulfur Dioxide

Gaseous sulfur dioxide feed systems shall employ vacuum pumps and carbon steel or stainless steel piping. For aqueous solutions, PVC, PE, CPVC, or rubber tubing are acceptable piping alternatives.

3.2 Sulfite Derivatives

Feed systems for both sodium bisulfite and sodium metabisulfite solutions shall employ positive displacement pumps and stainless steel piping.

4.0 Mixing

Proper turbulent mixing should be provided such that the dechlorinating agent is completely mixed within 20 seconds of application. Designs shall provide no less than 30 seconds detention time for mixing.[2]

5.0 Chemical Storage

The dechlorinating agent storage area must route solution spills or leakage to a containment area. Chlorine and sulfur dioxide are to be stored separately in well-ventilated areas.

6.0 Effluent Quality

Dechlorination consumes alkalinity and exerts an oxygen demand. As such, proper consideration must be given to effluent pH and dissolved oxygen to ensure that both parameters are within acceptable ranges at the point of discharge.

[2] Recommended Standards for Wastewater Facilities; Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers; page 100-8, 1997 Edition.