

## Methanol Use in Denitrification

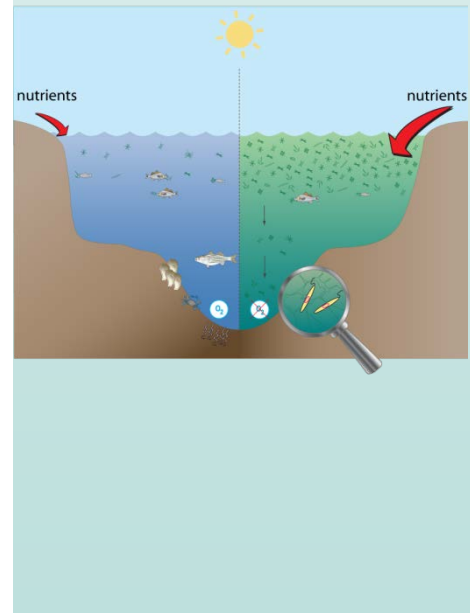
### Working Safely with Methanol in Biological Denitrification Systems

Methanol is the most common external supplemental carbon source used at wastewater treatment facilities in the United States. Methanol has unique chemical and physical properties that require the attention of operations and maintenance staff at wastewater treatment plants. This fact sheet provides a brief introduction to the properties of methanol, effective training and planning suggestions and a listing of typical design standards and codes for wastewater treatment facilities using methanol. A more detailed discussion on the subject can be found in the Methanol Institute's Safe Handling of Methanol manual and presentation listed at the end of this fact sheet.

#### Properties of methanol

Methanol is a simple single carbon molecule  $\text{CH}_3\text{OH}$  that is a colorless liquid at ambient conditions. Methanol has a boiling point of  $65.4^\circ\text{C}$  ( $149^\circ\text{F}$ ) and its freezing point is  $-98^\circ\text{C}$  ( $-144^\circ\text{F}$ ). Methanol is 100 % soluble in water and has very good antifreeze properties. Methanol is extensively used in automobile windshield washer fluid because of its antifreeze properties.

Methanol is classified as a class 1B flammable liquid by the National Fire Protection Association (NFPA) and has an NFPA 704 hazard identification rating of 3 for flammability, 1 for health, 0 for reactivity and no special hazards rating. Methanol has the U.S. Department of Transportation (US DOT) UN number 1230 flammable liquid placard for vehicles transporting methanol. Methanol is toxic to humans and the environment if a release or spill were to occur. Safe storage, transportation, handling and use of methanol are important concerns.



## Effective training and operations

Effective planning and training is of paramount importance for wastewater treatment plant staff in the safe handling and operation of wastewater treatment plant processes that use methanol. This includes the daily operation of facilities in routine, non-routine and emergency situations. Important items to consider with handling methanol in wastewater treatment plant operations are as follows:

1. Preparing for methanol handling tasks:
  - a. Development of standard operating procedures for handling and the bulk delivery of methanol.
  - b. Implementation of detailed hazardous environment working procedures.
  - c. Placement of placarding, signs and labels.
  - d. Readily available “as built” system plans and instrumentation drawings
  - e. Availability of proper tools and instruments that are intrinsically safe for use in flammable environments.
  - f. Availability of standard personal protective equipment and fire extinguishing equipment.
  - g. Training for all staff working with methanol in hazardous work procedures.
2. Preventing spills and vapor releases during system maintenance
  - a. Verification of a lockout-tagout of systems
  - b. Staging of tools and equipment into position
  - c. Monitoring for lower explosive limits and toxic vapor levels
  - d. Implementation of block, bleed, flush, blind and break procedures for plumbing and pump maintenance
  - e. Verification and sign off, hand off of completed work
  - f. Training in the use of bulk storage tanks, tank containment systems, tank pressure relief and flame arrestors, bulk transfer valves and interlocking and grounding controls
3. Protecting against fire and explosion
  - a. Spill containment and spill response plans need to be in place with plant staff
  - b. Emergency response plans with local emergency responders need to be in place and updated on regular basis with joint training exercises



## Engineering controls and design standards

Wastewater treatment facilities that utilize methanol and other flammable or hazardous chemicals are required to be designed and constructed to comply with a number of federal, state and local codes such as:

NFPA - 820 Fire protection in wastewater treatment and collection facilities

NFPA – 30 Combustible Liquids Codes

NFPA – 60 The National Electrical Code

OSHA – 29 CFR 1910.106 standard

Local building and fire codes.

## Additional Information on the use of Methanol for Wastewater Treatment

The Methanol Institute (MI) serves as the trade organization for the global methanol industry. Utility Managers, wastewater treatment plant operators, engineering firms and process equipment manufacturers interested in obtaining information on the use of methanol for denitrification can visit our web site at [www.methanol.org](http://www.methanol.org)

The Methanol Institute provides technical and safety information on the use of methanol in wastewater treatment applications including a safe handling manual.

