

Methanol Handling Practices

By Gregory A. Dolan, Methanol Institute

On January 11, 2006, three workers at Bethune Point wastewater treatment facility in Daytona, Florida, were removing a hurricane-damaged steel roof that covered two chemical storage tanks; one empty and the other containing 3,000 gallons of methanol. Two workers were up in a manlift basket using an acetylene torch to cut the roof into sections, when sparks from the torch ignited methanol vapors coming from the tank. The resulting explosion and fire killed two workers and critically injured a third. Two days later, investigators with the U.S. Chemical Safety Board (CSB), an independent federal agency charged with investigating industrial chemical accidents, arrived on the scene. Following a detailed investigation and a public hearing, the CSB issued its final report at a press conference held in Tallahassee on March 13, 2007. The report pointed to equipment failures, including a severely corroded flame arrestor on the methanol tank and methanol-incompatible plastic piping, as contributing factors to the explosion. The major findings, however, fault inadequate safety programs and a lack of safety coverage for municipal employees in the State of Florida. Without an effective hazard communications program in place, the Bethune Point workers were simply unaware of the hazards associated with methanol. As the saying goes, to be forewarned is to be forearmed.



The CSB listed a number of recommendations to help prevent similar accidents from occurring in the future, including a call for the Water Environment Federation and the Methanol Institute to work together to promote methanol safety at wastewater treatment facilities. The Methanol Institute (MI) serves as the trade association for the global methanol industry, representing methanol producers, distributors and technology companies. Many wastewater plants add methanol to accelerate the biodegradation of excess nitrogen, and reduce nitrogen-loading of sensitive aquifers from plant effluent. Excess nitrogen flowing from wastewater facilities contributes to an over-growth of algae which can lead to hypoxia (oxygen depletion), which in turn can stress aquatic organisms and form “dead zones” in affected rivers, lakes and seas.



As the CSB held its press conference in Tallahassee, Florida, WEF and MI issued a press release announcing the launch of an aggressive safety awareness campaign in response to the CSB recommendations. “The hazards of methanol weren’t even on the radar screen until a few years ago but with the fatalities in Florida, we want to do everything we can to

prevent something even close to the accident in Bethune Point from happening again,” said Al Calliers, Chair of WEF’s Safety and Occupational Health Committee. “In addition to the activities currently being developed, we are also actively seeking out opportunities with other WEF committees to provide the best training and education on this issue not only for our members but the overall wastewater industry.” Methanol Institute President and CEO John Lynn added, “Wastewater treatment plant operators use hazardous chemicals like chlorine every day, but many are unfamiliar with methanol. Working cooperatively, our two organizations will impart basic facts about the physical properties of methanol, and how to properly store and handle this flammable and hazardous chemical. Tragic accidents like the one in Bethune Point are preventable, and knowledge is the key.”

The outlines of this safety campaign were presented to the CSB in a joint letter from WEF and MI sent on May 16, 2007. This correspondence stated, “we fully support the recommendations directing our two organizations to prepare technical guidance and conduct training activities for the safe handling of methanol at the nation’s wastewater treatment facilities.” The initiation of this joint safety campaign is a direct result of discussions and meetings held with WEF, MI and CSB staff that began just days after the incident in Daytona. This aggressive safety campaign includes a number of elements including:

- MI’s Vice President Gregory Dolan initiated the campaign with a “Safety Minute” presentation during the opening plenary session of WEF’s Nutrient Removal Workshop held in Baltimore on March 5th (one week prior to the release of the CSB’s final report). Over 400 wastewater treatment professionals were in attendance at this specialty conference focusing on nutrient removal processes that can include the use of methanol.
- WEF plans to publish articles on safe handling practices for methanol in its monthly member publications, Water Environment & Technology (magazine) and WEF Highlights (newsletter), each with a circulation of 32,000.
- A representative of Methanex Corporation (Vancouver, British Columbia), a leading MI member company, gave a presentation on methanol safety at the WEFTEC 2007 Conference in San Diego in October. More than 19,000 water and wastewater treatment professionals attended the conference.
- Also at press time, WEF planned to host a webcast in the fall focusing exclusively on methanol usage and safety for wastewater treatment professionals. Potential speakers for the webcast may include a representative from the CSB to present the findings/recommendations from Bethune Point, an MI representative to discuss safe handling issues, a wastewater treatment plant operator to provide a case study in using methanol for nutrient removal, and a consulting engineering professional with experience in the design and construction of methanol systems for wastewater treatment plants.
- The WEF Safety Committee, in cooperation with the Methanol Institute, will consider revisions to WEF’s Manual of Practices to provide technical guidance on the physical properties of methanol and safe handling procedures.

Many plant operators are unfamiliar with methanol, so the first task is to impart some basic facts about the physical properties of methanol, and how to properly store and handle this flammable and hazardous chemical. As a liquid or vapor, methanol is both poisonous and highly flammable. Both of these risks can be managed to keep you safe. On the health side, there are four routes by which methanol can get into the body: skin contact; eye contact; breathing; and swallowing. Drinking as little as 50 mL of methanol – less than ¼ cup – can be fatal. The key to personal protection is wearing the right clothes and equipment to prevent any exposure. This may include the use of fire retardant clothing, nitrile gloves, safety glasses with side shields or even full face shields, and rubber boots. In more extreme cases, such as responding to a methanol spill, the use of full chemical suits and self-contained breathing apparatus is recommended.

On the fire risk side, methanol is flammable. You may have a storage liquid methanol, but may still contain ignite if an ignition source is present. vapors coming from a corroded flame that first ignited, leading to a flash and become engulfed in flames. flame that may be difficult to see in bright sunlight, and the only indication of a methanol fire may be a shimmering “heat haze” or something nearby burning. By comparison, methanol is harder to ignite than gasoline, and burns with just one-eighth the heat. Depending on the size of a methanol fire and its location, fire fighting equipment such as CO2 extinguishers, dry chemical extinguishers, and alcohol resistant foam can be used. Water also can be used to put out methanol fires, but you should contain any methanol/water mixtures for proper cleanup.



in both its liquid form and as a vapor tank that appears to be empty of methanol vapors that can easily At Bethune Point, it was methanol arrestor on the top of the storage tank back that caused the tank to explode Methanol burns with a clear blue

The basics of fire prevention apply to methanol, with all three elements of the “fire triangle” required to be present to start a fire: fuel (methanol); ignition source, and oxygen. The aim is the break the fire triangle, and the best precaution is to eliminate any ignition sources near the methanol fuel. Another way to prevent methanol fires is to remove oxygen from the equation, and this may involve more expensive solutions such as the use of nitrogen blanketing in larger storage tanks.

Thanks to the investigative work of the U.S. Chemical Safety Board, we know just what went wrong that January day in Daytona. Had the workers at Bethune Point understood the physical properties of methanol and the risk of using an acetylene torch on top of a methanol storage tank, that tragic accident might have been prevented.

Through the aggressive safety campaign now underway by the Water Environment Federation and the Methanol Institute, we hope to impart this lesson on wastewater treatment facility operators using methanol to ensure the safety of plant workers. To be forewarned is to be forearmed.