

# TerranearPMC Safety Share

## Week of February 3, 2014 – Chemical Leak in West Virginia

On January 9, 2014, a region of West Virginia took center stage in the national news as it became the scene of a chemical leak, resulting in the water supply being cut off to hundreds of thousands of citizens across nine counties in the state. The specific chemical of concern is 4-methylcyclohexane methanol or MCHM. While the leak was the result of a breeched storage tank, the specific nature and reason for the leak has not been clarified.

The state put water restrictions into effect after discovering that about 7,500 gallons of the chemical had leaked into the Elk River, at a point that is just above a drinking water plant. Authorities told residents in nine West Virginia counties to stop using their water for everything except flushing toilets, and to watch for symptoms of exposure such as skin irritation, nausea, vomiting or wheezing.

Freedom Industries, which owns the leaking tank acknowledges that a total of approximately 10,000 gallons of two chemicals; MCHM and PPH (propylene glycol phenyl ether) were released. Initially, the company did not report the presence of the second chemical until one week after the incident. The leak has resulted in hundreds of thousands of people in the region (near the State's Capital, Charleston, WV) without access to tap water for days. While a formal advisory on the water was lifted after more than one week, there are still many in the areas that are concerned about possible health effects from using their water supply.

According to the health department, 411 patients have been treated at hospitals for symptoms that patients said came from exposure to MCHM, while 20 people have been admitted. Also, more than 1,600 people have called poison control to complain of symptoms. State officials are trying to sort out how many of those patients were actually sickened by the chemical, and not by other diseases.

MCHM is one of tens of thousands of chemicals exempt from testing under the federal Toxic Substances Control Act (TSCA) because they were already in use when the law was approved in 1976. A fact sheet of available data on the chemical says there is no specific information about its toxic effects on humans. In addition, according to the Centers for Disease Control and Prevention (CDC), its chances of causing cancer and its effects on reproductive health are unknown.

MCHM is an organic compound with the formula  $\text{CH}_3\text{C}_6\text{H}_{10}\text{CH}_2\text{OH}$  and is classified as a saturated higher alicyclic primary alcohol. It is a colorless oil with a faint mint-like alcohol odor (or some describe it as licorice) and is slightly soluble in water; however, MCHM is highly soluble in organic solvents.

It is used as a frothing agent during the “coal-cleaning” process which leverages natural differences in density to separate coal from such impurities as sulfur, ash, and rock. The raw material is ground up into tiny chunks, sorted, and initially screened for impurities. Then a fluid (often water) is pulsed upward through a bed of crushed coal. Lighter coal particles rise to the



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top of the slurry, while the heavier impurities fall and are removed from the bottom. It is during this stage that MCHM is used, causing finely divided coal particles to adhere to air bubbles induced into the agent which rises to the surface. The purified coal is then dried in a final preparation process before being shipped off to the power plant. This process is typically performed at the mine before the coal is shipped to the utility plant, where the purified coal is burned.

MCHM has the advantage of being less toxic than previous frothing agents (those containing 2-ethylhexanol). Coal straight from the mine brings with it various types of shale, clay, and impurities. To burn it more efficiently and with less pollution, the energy-dense coal must be separated from its associate waste.

Current Safety Data Sheets for MCHM report an oral lethal dose for 50% of test subjects (LD-50) of 825 mg/kg and a dermal LD-50 greater than 2,000 mg/kg; both in rats. According to the latest hazard classification data per the recent OSHA Globally Harmonized System for the Hazard Communication Standard, these concentrations do not require any warnings in terms of language and pictograms that indicate a significant degree of human toxicity (i.e. no key words as “danger” or pictures illustrating high human health conditions).

Studies conducted by the World Health Organization (WHO) on the specific chemical class of which MCHM is categorized, have reached similar conclusions regarding this materials’ toxicity. Yet, while the WHO study *may* indicate that MCHM is not a potent human toxin, its metabolites (carboxylic acids and naphthenic acids) have both acute and chronic toxicity to fish and other organisms; thus suggesting a negative impact on the local environment.

So while this chemical – MCHM – appears to be not so toxic to humans, there does seem to be an environmental component that cannot be ignored. In addition, there seems to be many gaps in our knowledge of this chemical. While current information suggests that MCHM may not be as harmful as the initial headlines were reporting, it is apparent that not enough research has been conducted to make an informative decision as to the possible health effects associated with an exposure to MCHM. This is partly due to our current regulations (i.e. exemption within TSCA) not being adequately up-to-date with all the substances used in the US as well as the world. Another point is, regardless of whether MCHM is highly toxic or, less than slightly toxic; the fact is, a leak occurred and, to-date, the mechanism that caused this incident has not been fully understood. While the toxicity of MCHM may not cause severe or even mild health effects to humans, it appears that appropriate leak/spill control measures were not incorporated. Mitigating measures, such as double walled tanks, secondary containment, and effective leak monitoring equipment appears to have been absent from this particular scenario. Through this event, positive strides can be made to ensure, that while industry requires the use of hazardous materials, such substances can be used effectively, without jeopardizing our health and environment....it all comes down to whether we believe that such controls are necessary and that proper information is available to make informative decisions.

**Education is when you read the fine print; experience is what you get when you don't.**

Pete Seeger

