MTBE Environmental Risk Assessment Report in China

In Focus

December 2024

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On June 26, 2024, after three years of information gathering, exchanges with stake holders and comprehensive research work, the China Chemical Environmental Protection Association (CCEPA) and the Solid Waste and Chemicals Management Center of the Ministry of Ecology and Environment (SWCMC), in cooperation with the Asian Clean Fuels Association (ACFA), completed the high-level literature assessment on the in-water environmental risks of MTBE. The review, conducted by a panel of local and international experts, encompassed situation assessments at home and abroad as well as fieldwork on typical point sources or areas in mainland China. The Priority Controlled Chemicals List (PCCL) meeting successfully completed the final report and outcome of the project.

In our newsletter we would like to share the key findings of the report with our readers, highlighting the facts and positive conclusions drawn from the project.

Combining the results of environmental hazard assessment and exposure assessment of chemical substances to calculate the predicted no-effect concentration (PNEC) and predicted environmental concentration (PEC) respectively of MTBE in surface water, the report concludes **unreasonable environmental risk of MTBE"** has been found.

The environmental risk value or risk categorization ratio (RCR) for MTBE in surface water in typical point sources is calculated at 0.064. The RCR value is the ratio between the environmental exposure concentration from typical point source to surface water (MTBE: PEC 0.324) and the product's predicted no-effect concentration (MTBE: PNEC 5.1 mg/l). Results <1 indicate that no unreasonable environmental risk has been found.

This MTBE risk assessment has been a major success for the clean fuel industry and its supporters in China and worldwide and should be added to the already long list of risk assessments and other studies with positive results that have been conducted over the years.

The findings and conclusions are based on comprehensive, scientific data and the testing and calculation methods comply with industry standards. The qualifications and credibility of the expert committee are undisputed.

The Chinese risk assessment can be used to promote and defend MTBE globally. MTBE is a long-term solution to improve air quality and reduce CO2 emissions. The study shows that it does not pose a burden on the environment or human health. MTBE is a long-term solution to improve air quality and reduce CO2 emissions. In some regions it is already classified as a sustainable product. The MTBE risk assessment can be used in discussions with both legislators and individual entities.

Key features and findings of the study in detail

Introduction:

MTBE is one of the most tested and evaluated blending components in petrol. First health screening tests were conducted as early as 1969. Further tests to characterize MTBE properties were carried out in 1970's, as approval was granted in the US and Europe for blending to lead-free petrol.

Expanded toxicological and environmental testing was completed during the 1980's as MTBE's commercial importance grew and further in the 2000 and 2010 in the EU resulting in no further restrictions. Further extensive research work continued until today.

All of the results from these testing programmes were either published in the scientific literature or the final reports submitted to governmental agencies and made publicly available. As this database expanded, various organizations performed hazard/risk assessments of MTBE to determine if legitimate concerns about health effects existed.

The outcome of these evaluations was the firm conclusion that MTBE blending in petrol does not pose increased risks to human health nor the environment or resulted in risk measurements for safe use. Furthermore, the demonstrated benefits from reduced emissions and improved air quality confirmed that MTBE is a safe, beneficial, reliable, cost-effective component in today's cleaner-burning petrol.

Classification and Conclusion of risk assessments and other studies

The working group looked at the following risk assessment and scientific studies in detail:

- International Agency for Research on Cancer (IARC)
- US National Toxicology Program (NTP) Report on Carcinogens
- China Harmonized Hazardous Classification
- World's Health Organisation (WHO) assessment on MTBE in drinking wate

Based on the above-listed assessments and studies, the PCCL meeting concluded that MTBE does not represent human health risk from exposure at the very low levels in the environment as a result of MTBE use in petrol. The overwhelming majority of scientific evaluations to date highlight that:

• MTBE is not classifiable as a carcinogen.

• MTBE does not accumulate in the body.

• MTBE does not damage genetic cellular structures.

• MTBE is not a confirmed endocrine disruptor.

• MTBE does not impair fertility or reproductive functions.

• MTBE does not damage the developing foetus.

• MTBE does not present acute toxicity or neurotoxic health risks.

Furthermore, the use of MTBE in cleaner-burning petrol formulations actually reduces the relative cancer risk to humans compared to conventional petrol. With the improved emissions performance of petrol blended with MTBE, the continued use of MTBE is clearly warranted.

Legal framework, use and production of MTBE

In addition to evaluating the listed risk assessments and studies, the working team also looked at the legal framework for the use of MTBE, its actual employment and its production worldwide.

The meeting concluded that MTBE is allowed to be employed almost everywhere in the world. MTBE is widely used for its ability to improve fuel quality standards and reduce vehicle pollution, mainly by replacing aromatics, benzene and improving fuel octane for increased fuel economy. MTBE helps the refining industry to meet new and more stringent gasoline standards.

After the literature review, the meeting moved on to the environmental risk assessment of MTBE, comprising a comprehensive review of the environmental hazard of MTBE and the assessment of the environmental exposure of the product. This than leads to the typical point source risk categorization of MTBE.

Environmental Hazard Assessment of Methyl Tert-Butyl Ether (MTBE)

To assess the environmental risk of MTBE and safeguard aquatic ecosystems from its impact, it is crucial to establish a threshold of hazard, commonly referred to as the Predicted No-Effect Concentration (PNEC). This study systematically collects toxicity data for MTBE through database retrieval and literature review, employing data quality assessment for high quality data screening. Following the guidelines outlined in the "Guidelines for Environmental and Health Hazard Risk Assessment of Chemicals," the PNEC value is calculated using statistical extrapolation or the assessment factor method. This aims to evaluate the potential hazard of MTBE to aquatic organisms, providing a basis for the environmental risk assessment of MTBE.

The research methods applied entail the collection of eco-toxicity data and its screening, which is in accordance with the current "Guidelines for Environmental and Health Hazard Risk Assessment of

Based on the toxicity data of MTBE on aquatic organisms, it became evident that the data meet the requirement of having "at least three EC10 (effect concentration) or NOEC (no observed effect concentration) values from long-term tests for organisms representing three tropl and algae)". The board of experts agreed on a final PNEC value of is 5.1 mg/L.

Typical Point Source Environmental Exposure Assessment on Methyl Tert-butyl Ether (MTBE)

The 2nd component of the environmental risk assessment of a product is the typical point source exposure assessment. MTBE can enter the environment at all stages of petroleum fuel production, transportation, storage and use. MTBE may emit through vehicle exhaust gas can enter soil, surface water, shallow groundwater and plant roots along with precipitation or dust.

In order to carry out environmental exposure assessment (PEC) of MTBE, this study assessed the environmental risks in the aquatic (surface water) compartment of typical point sources of MTBE in mainland China, according to the "Technical Guidelines for Environmental and Health Exposure Assessment of Chemical Substances (Trial)".

The CET (cost-effective threshold) model, which was developed by the Nanjing Institute of Environmental Science of the Ministry of Ecology and Environment, is recommended to predict the environmental exposure concentration in surface water in accordance with the "Technical Guidelines for Environmental and Health Exposure Assessment of Chemical Substances (Trial)".

This study conducted an exposure assessment based on the surface water concentration of MTBE in typical point source areas, according to the "Technical Guidelines for Environmental and Health Exposure Assessment of Chemical Substances (Trial)". The study concluded the predicted environmental concentration (PEC) of MTBE is 0.324 mg/l.

Typical Point Source of Environmental Risk Characterization on Methyl Tert-Butyl Ether (MTBE)

The research on the environmental risk characterization of MTBE in typical point source areas was carried out in accordance to the "Technical Guidelines for Characterization of Environmental and Health Risks of Chemical Substances (Trial)". Based on the environmental hazard assessment and exposure assessment of chemical substances, the degree of risk that chemical substances pose to the ecological environment was analysed and determined.

Combining the results of environmental hazard assessment and exposure assessment of chemical substances calculates the risk characterization for MTBE.

The quotient method is applied to assess the environmental risk for the assessed object separately based on the predicted environmental concentration (PEC) and the corresponding predicted no-effect concentration (PNEC).

The study concludes that the RCR for MTBE in surface water in typical point sources is calculated at 0.064. If the RCR is <1, the product is considered as "safe" or “low environmental risk”.

Source Asian Clean Fuels Association

In Conversation September 2021

In Conversation with: Mr. Jeff Hove, Executive Director Fuels Institute

In this issue of our “In Conversation with” we talked to Mr. Jeff Hove, acting Vice President and Executive Director at the Fuels Institute. In recent years we have seen some initiatives to consider policies to ban the sale of vehicles equipped with internal

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In Conversation with: Dr. Tilak Doshi, Managing Director of Doshi Consulting

In this issue of our “In Conversation with” we talked to Dr Tilak Doshi, an energy sector consultant based in Singapore. Dr Doshi shared his views and observations about the global “2050 decarbonisation” plan and move towards Electric Vehicles

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In Conversation with: Dr Sanjay C Kuttan

In this issue of our “In Conversation with” we talked to Dr Sanjay C Kuttan, Chairman of the Sustainable Infrastructure Committee at Sustainable Energy Association of Singapore (SEAS).

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