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Substance Risk Evaluation for Determining Environmental Emergency Planning under the *Environmental Emergency Regulations* Set under the *Canadian Environmental Protection Act, 1999* (CEPA 1999)

Benzene, (chloromethyl)- (Benzyl Chloride) (CAS No. 100-44-7)

Risk Evaluation Conclusion:

- **Threshold quantity of 4.5 tonnes (minimum concentration 1%) due to aquatic toxicity**
- **Is a candidate for the *Environmental Emergency Regulations***

1.0 INTRODUCTION

The *Environmental Emergency Regulations*, developed under Part 8 of CEPA 1999 (Government of Canada, 2011), establish a list of substances for which fixed facilities must notify Environment Canada that they store or use the substance on-site, by providing notices to Environment Canada, reporting when the substance is released into the environment, and developing an environmental emergency plan (E2 plan) for each substance stored or used at a fixed facility at or above specified threshold quantities.

To determine if a substance is a candidate to be added to the *Environmental Emergency Regulations*, Environment Canada developed a risk evaluation methodology based on the following hazard categories:

- Physical: flammable and combustible or oxidizing substances, or those having a potential to cause vapour cloud explosions or pool fires.
- Human Health: substances that are toxic by inhalation, are carcinogenic, or are corrosive.
- Environmental Health: substances that are: corrosive, persistent, bioaccumulative, or aquatically toxic.

For more information on the methodology for setting threshold quantities in the Environmental Emergency Regulations, please refer to Environment Canada (2015).

Benzene, (chloromethyl)- (CAS No. 100-44-7) was selected for risk evaluation because it is a substance (under the Government of Canada's Chemicals Management Plan [http://www.ec.gc.ca/ese-ees/default.asp?lang=En&n=EF864A36-1]) that, if spilled, could be immediately harmful to humans and/or the environment.

Following the risk evaluation, Environment Canada recommends that this substance be proposed for addition to Schedule 1 of the *Environmental Emergency Regulations* at a threshold quantity of 4.5 tonnes with a minimum concentration of 1%.

2.0 SUMMARY OF THE RISK EVALUATION

2.1 Physical Hazard: Flammable, Combustible or Oxidizing Substances

Because benzene, (chloromethyl)- has a flash point of 67°C (Government of Canada, 2009) and has a boiling point of 179°C (HSDB, 2008), this substance does not havethe possibility of a vapour cloud explosion.

Therefore, a threshold of 15,600 tonnes is set for this substance as a result of its potential for combustibility.

2.2 Physical Hazard: Potential for Pool Fires

Environment Canada determined, via the Process Hazard Analysis Software Tools (PHAST) software, that benzene, (chloromethyl)- is capable of causing a pool fire at a quantity of 67 tonnes.

2.3 Human Health Hazard: Inhalation Toxicity

Because benzene, (chloromethyl)- does not have a vapour pressure greater than 10 mmHg (1.33 kPa) at 25°C (ChemIDPlus, 2008), the substance does not have sufficient volatility to constitute an inhalation danger.

Therefore, no threshold is set for the inhalation toxicity to humans.

2.4 Human Health Hazard: Carcinogenicity

Because benzene, (chloromethyl)- is classified in Group 2A (probably carcinogenic) of the International Agency for Research on Cancer (IARC, 1999) and Group B (likely to be carcinogenic) of the U.S. Environmental Protection Agency (U.S. EPA, 2005), and because the substance does not have a half-life longer than five years in any medium, no threshold is set for the carcinogenicity of this substance.

2.5 Human and Environmental Health Hazard: Corrosive Substances

The measured pH is greater than 2 and less than 11.5, therefore the substance is not considered corrosive and there is no associated threshold with this category.

2.6 Environmental Health Hazard: Persistent, Bioaccumulative, or Aquatically Toxic

Lethal concentration

The acute (short-term) aquatic toxicity for benzene, (chloromethyl)- has been determined to be moderately toxic based on studies of the most sensitive species, Fathead minnow (*Pimephales promelas*), with a concentration (LC50 96 hours) of 5 mg/L (Curtis, *et al*., 1978).

Persistence

Environment Canada determined that benzene, (chloromethyl)- is non-persistent in water according to our risk evaluation methodology (Environment Canada, 2015).

Bioaccumulation

Environment Canada determined that benzene, (chloromethyl)- is slightly bioaccumulative according to our risk evaluation methodology (Environment Canada, 2015).

Threshold

Following the evaluation of the aquatic toxicity, the threshold is set at 4.5 tonnes.

2.7 Assigned Concentration

Benzene, (chloromethyl)- is subject to the Environmental Emergency Regulations for aquatic toxicity. The minimum concentration assigned in the category for aquatic toxicity is either 10% (not a carcinogen) or 1% (a carcinogen). Since benzene, (chloromethyl)- is classified as IARC (Group 2A) and USEPA (Group B), then the minimum concentration set for benzene, (chloromethyl)- is 1% (Environment Canada, 2015).

2.8 Assigned Threshold

Following the risk evaluation methodology developed under section 200 of CEPA 1999, the categories (flammability, combustibility, oxidizers, inhalation toxicity, aquatic toxicity, carcinogenicity, corrosiveness, pool fires) having the lowest scientific threshold will be compared against other risk management considerations. For example, the threshold will be compared to other provincial and federal legislation or voluntary programs that may already provide adequate management of the risk from an environmental emergency. Proposed thresholds may also be modified based on policy and other considerations as assessed during the public consultation period. For more information regarding the determination of thresholds, please refer to the *Implementation Guidelines for the Environmental Emergency Regulations 2011* (Environment Canada, 2011).

Other Considerations

At this time, there are no other considerations to take into account for this substance that would result in an increase or a decrease in the calculated threshold quantity.

Findings

A proposed threshold of 4.5 tonnes is assigned for benzene, (chloromethyl)- based on its assessed aquatic toxicity and a minimum concentration of 1% is assigned based on its carcinogenicity. The threshold quantity and its respective concentration will not be finalized until after public consultation.

3.0 CONCLUSION

Information concerning the quantities of benzene, (chloromethyl)- (CAS No. 100-44-7) in use in Canada indicates that the substance exists in commerce. Following the risk evaluation and policy considerations of benzene, (chloromethyl)- and taking into consideration the quantities in use in Canada, Environment Canada recommends that this substance be proposed for addition to Schedule 1 of the *Environmental Emergency Regulations* under CEPA 1999 at a threshold quantity of 4.5 tonnes at a minimum concentration of 1%.

When doing the emergency planning of a substance, it is important to take into consideration not only the most stringent assigned threshold quantity, but all of the other higher-threshold quantities that are noted in association with this substance. Other notable thresholds of concern also determined for this substance are: 67 tonnes for pool fire; and 15,600 tonnes for combustibility.

Even if the quantity of a substance in use is below the threshold quantity indicated in the *Environmental Emergency Regulations*, Environment Canada recommends that emergency planning be applied to this substance in order to minimize, or prevent, any impacts on humans or the environment in the event of a release of the substance.

4.0 REFERENCES

ChemIDPlus. 2008. Benzene, (chloromethyl)-. U.S. National Library of Medicine. Available from: http://chem.sis.nlm.nih.gov/chemidplus/rn/100-44-7

Curtis, MW, Copeland, TL, and Ward, CH. 1978. Aquatic toxicity of substances proposed for spill prevention regulation, in Proceedings of the 1978 National conference on Control of Hazardous Material Spills (Miami, FL: Oil Spill Control Association of America), pp. 99-103.

Environment Canada. 2011. Implementation Guidelines for the Environmental Emergency Regulations 2011. Available from: http://www.ec.gc.ca/lcpe-cepa/default.asp?lang=En&n=1FB6D405-1

Environment Canada. 2015. Summary of Risk Evaluation Framework for Determining Quantity Thresholds and Concentrations for Substances under the Environmental Emergency Regulations Set under the Canadian Environmental Protection Act, 1999 (CEPA 1999). Environment Canada. Available from: https://www.ec.gc.ca/ee-ue/B2B4A2B2-D46D-460F-BCD9-C742A0F79191/ue-summary-ref-en.pdf

Government of Canada. 2009. Environment Canada, Health Canada. Final Screening Assessment for Benzene, (chloromethyl)- (CAS RN 100-44-7). Available from: http://www.ec.gc.ca/ese-ees/default.asp?lang=En&n=EF864A36-1

Government of Canada. 2011. Environmental Emergency Regulations, Canadian Environmental Protection Act, 1999. Environment Canada. Registered on December 8, 2011. Available from: http://www.gazette.gc.ca/rp-pr/p2/2011/2011-12-21/html/sor-dors294-eng.html

HSDB (Hazardous Substances Data Bank). 2008. Benzene, (chloromethyl)-. United States National Library of Medicine. Available from: http://toxnet.nlm.nih.gov/cgi-bin/sis/search2/r?dbs+hsdb:@term+@DOCNO+368

IARC (International Agency for Research on Cancer). 1999. Volume 71. Re-Evaluation of Some Organic Chemicals, Hydrazine and Hydrogen Peroxide. IARC Monographs Database on Cancer Risks to Humans. International Agency for Research on Cancer, World Health Organization. Available from: http://monographs.iarc.fr/ENG/Monographs/vol71/

U.S. EPA (United States Environmental Protection Agency). 2005. Guidelines for Carcinogenic Risk Assessment. Available from: http://www.epa.gov/risk/guidelines-carcinogen-risk-assessment

5.0 FURTHER READING

Ketcheson K, Shrives J. 2010. Comparison of Threshold Quantities for Substances with Final AEGL-2 and IDLH Values under CEPA's Environmental Emergency Regulations. In: Proceedings of the Thirty-third Arctic and Marine Oilspill Program Technical Seminar on Environmental Contamination and Response. Environment Canada: Ottawa (ON). pp. 843-861.

U.S. EPA (U.S. Environmental Protection Agency). 1994. List of Regulated Toxic and Flammable Substances and Thresholds for Accidental Release Prevention. Federal Register, 59(20). Document Number 94-1556. 31. Washington (DC). Available from: http://www.epa.gov/sites/production/files/2013-11/documents/appendix-a-final.pdf