Current as of June 21st, 2016

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

Acrylamide
(2-Propenamide) (CAS No. 79-06-1)

Risk Evaluation Conclusion:

- **Threshold Quantity of 9.1 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).

Acrylamide (CAS No. 79-06-1) 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&xml=FF4FCD6E-B330-7266-D1FD-B44C48A6BC9B]) 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 9.1 tonnes with a minimum concentration of 1%.

2.0 SUMMARY OF THE RISK EVALUATION

2.1 Physical Hazard: Flammable, Combustible or Oxidizing Substances

Because acrylamide has a flash point of 138°C (CHEMINFO, 2007) and decomposes before reaching its boiling point, this substance does not have the possibility of a vapour cloud explosion.

Therefore no threshold is set for this substance as a result of its potential for flammability or combustibility.

2.2 Physical Hazard: Potential for Pool Fires

Environment Canada determined, via the Process Hazard Analysis Software Tools (PHAST) software, that acrylamide is not capable of causing a pool fire at a quantity of 9.1 tonnes.

2.3 Human Health Hazard: Inhalation Toxicity

Because acrylamide does not have a vapour pressure greater than 10 mmHg (1.33 kPa) at 25°C (HSDB, 2005), 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 acrylamide is classified in Group 2A (probably carcinogenic) of the International Agency for Research on Cancer (IARC, 1999) and Group B (likely to be carcinogen) 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 acrylamide has been determined to be slightly toxic based on studies of the most sensitive species, Bluegill Sunfish (*Lepomis macrochirus*), with a concentration (LC50 96 hours) of 100 mg/L (Krautter *et al*., 1986).

Persistence

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

Bioaccumulation

Environment Canada determined that acrylamide is practically non-bioaccumulative according to our risk evaluation methodology (Environment Canada, 2015).

Threshold

Following the evaluation of the aquatic toxicity, the threshold is set at 9.1 tonnes.

2.7 Assigned Concentration

Acrylamide is subject to the Environmental Emergency Regulations for carcinogenicity and aquatic toxicity. The minimum concentration assigned in the category for aquatic toxicity is either 10% (not a carcinogen) or 1% (a carcinogen). Since acrylamide is classified as IARC (Group 2A) and U.S. EPA (Group B), then the minimum concentration set for acrylamide 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 9.1 tonnes is assigned for acrylamide 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 acrylamide (CAS No. 79-06-1) in use in Canada indicates that the substance exists in commerce. Following the risk evaluation and policy considerations of acrylamide 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 9.1 tonnes at a minimum concentration of 1%.

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

CHEMINFO Database. 2007. Acrylamide solution. Canadian Centre for Occupational Health and Safety. Available from: http://ccinfoweb2.ccohs.ca/cheminfo/records/744E.html

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 2-Propenamide (Acrylamide) (CAS RN 79-06-1). Available from: http://www.ec.gc.ca/ese-ees/default.asp?lang=En&xml=FF4FCD6E-B330-7266-D1FD-B44C48A6BC9B

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). 2005. Acrylamide. National Library of Medicine-US (NLM). Available from: http://toxnet.nlm.nih.gov/cgi-bin/sis/search2/r?dbs+hsdb:@term+@DOCNO+191

IARC (International Agency for Research on Cancer). 1999. Volume 60. Some Industrial Chemicals. 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/vol60/index.php

Krautter, GR, RW Mast, HC Alexander, CH Wolf, MA Friedman, FJ Koschier, and CM Thompson. 1986. Acute Aquatic Toxicity Tests with Acrylamide Monomer and Macroinvertebrates and Fish. Environ.Toxicol.Chem. 5(4):373-377.

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