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Proposed Re-evaluation Decision

PRVD2026-03

Ammonium Bromide and Its Associated End-use Products

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For more information, please contact:

Publications

Pesticides Regulatory Directorate
Healthy Environments and Consumer Safety Branch
Health Canada
2 Constellation Drive
8th floor, A.L. 2608 A
Ottawa, Ontario K1A 0K9

Internet:

canada.ca/pesticides
pmra.publications-arla@hc-sc.gc.ca

Information Service:

1-800-267-6315
pmra.info-arla@hc-sc.gc.ca

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Proposed re-evaluation decision for ammonium bromide and associated end use products

Under the authority of the *Pest Control Products Act*, all registered pesticides must be regularly re-evaluated by Health Canada to ensure that they continue to meet health and environmental safety standards and continue to have value. The re-evaluation considers data and information from pesticide manufacturers, incident reports and other regulatory agencies. Health Canada applies internationally accepted risk assessment methods, risk management approaches and policies to all re-evaluations.

Ammonium bromide is an antimicrobial registered for the prevention of algal, bacterial and fungal slimes in pulp and paper mill whitewater systems and starch slurries. It can be used in paper and paperboard components that contact food. Ammonium bromide itself has no pesticidal activity. The end-use product containing a 35% aqueous solution of ammonium bromide must be used in conjunction with commercially available 12.5% aqueous solution of sodium hypochlorite, in an enclosed feeder/delivery system, to form the residual biocide, expressed as total chlorine (bromide-activated chloramine, BAC).

There are two technical grade active ingredient products and two commercial class end-use products. The commercial-class products must be used with a closed loading and transfer system. Currently registered products containing ammonium bromide can be found in the Pesticide Product Information Database and in Appendix I.

This document presents the proposed re-evaluation decision for ammonium bromide, including any proposed mitigation measures to protect human health and the environment, as well as the Science evaluation on which the proposed decision is based. All products containing ammonium bromide that are registered in Canada are subject to this proposed re-evaluation decision. This document is subject to a 90-day public consultation period,¹ during which the public (including the pesticide manufacturers and stakeholders) may submit written comments and additional information to Pesticides Regulatory Directorate Publications. The final re-evaluation decision will be published after taking into consideration the comments received during the consultation period that are directly related to this proposed re-evaluation decision.

Proposed re-evaluation decision for ammonium bromide

Health Canada, under the authority of the *Pest Control Products Act*, has conducted all evaluations considered necessary with respect to the health and environmental risks and value of ammonium bromide based on available scientific information in accordance with subsection 16(6) of the *Pest Control Products Act*. Health Canada is proposing for public consultation, pursuant to section 28 of the *Pest Control Products Act*, the continued registration of ammonium bromide and associated end-use products registered for sale and use in Canada under section 21 of the *Pest Control Products Act*.

¹ “Consultation statement” as required by subsection 28(2) of the *Pest Control Products Act*.

Ammonium bromide is an important biocide registered for use in pulp and paper mills. Based on the current use-pattern of ammonium bromide, the potential dietary, occupational, residential and environmental risks are considered to be acceptable when products containing ammonium bromide are used according to updated label directions. As a result of re-evaluation, updates to the personal protective equipment (PPE) requirement and directions to further minimize a potential for water contamination are proposed (Appendix III).

Proposed mitigation measures

Registered pesticide product labels include specific directions for use. Directions include risk mitigation measures to protect human health, the environment and ensure the product has acceptable value which must be followed by law. The proposed mitigation measures, as a result of the re-evaluation of ammonium bromide, are summarized below. Refer to Appendix III for details.

Human health

To protect workers, the following risk mitigation measures are proposed:

- Personal protective equipment consisting of coveralls over a long-sleeved shirt and long pants for workers handling the concentrate and coming in contact with treated process fluids.
- A label statement defining a closed mixing/transfer system as per current labelling standards.

Environment

To protect the environment, the following risk mitigation measures are proposed:

- To further minimize the potential for exposure of non-target aquatic organisms, additional statement requiring that if chloramine is detected in the effluent, it must be neutralized to undetectable levels.
- Storage and effluent discharge label statements as per current labelling standards.

Next steps

Upon publication of this proposed re-evaluation decision, the public, including the registrants and stakeholders are encouraged to submit comments during the 90-day public consultation period.

Health Canada will accept written comments on this proposal up to 90 days from the date of publication of this document. Comments on the proposed decision can be submitted during the consultation period to Health Canada through Pesticides Regulatory Directorate Publications, or the Public Engagement Portal (Public Engagement Forms - Consultation Comment). For more information or if you have questions, contact the Pesticides Information Service.

Before making a re-evaluation decision on ammonium bromide under section 21 of the *Pest Control Products Act*, the comments received during the consultation period that are directly related to this proposed decision, such as comments directed to the Science evaluation, will be

taken into consideration in preparation of the final re-evaluation decision document. A science-based approach will be applied in making a final decision on ammonium bromide. In accordance with subsection 28(5) of the *Pest Control Products Act*, Health Canada will then publish a final re-evaluation decision document, which will include the decision, the reasons for it, a summary of the comments received directly related to the proposed re-evaluation decision during the consultation period, and Health Canada's response to these comments.

Refer to Appendix I for details on specific products impacted by this proposed decision.

Other information

The relevant confidential test data on which the proposed decision is based (as referenced in References Section of this document) are available for public inspection, upon application, in Pesticides Regulatory Directorate's Reading Room. For more information, please contact the Pesticides Information Service.

Additional scientific information

No additional scientific data are being requested at this time.

Science evaluation

Ammonium bromide is an antimicrobial registered for the prevention of algal, bacterial and fungal slimes in pulp and paper mill whitewater systems and starch slurries. It can be used in paper and paperboard components that contact food. Ammonium bromide itself has no pesticidal activity. The end-use product containing a 35% aqueous solution of ammonium bromide must be used in conjunction with commercially available 12.5% aqueous solution of sodium hypochlorite, in enclosed feeder/delivery system, to form the residual biocide, expressed as total chlorine (bromide-activated chloramine, BAC).

There are two technical grade active ingredient products and two commercial class end-use products. Both technical grade products are formulated as solids while the two commercial-class products are formulated as solutions. The commercial-class products must be used with a closed loading and transfer system. The maximum allowed concentration of residual biocide ranges from 0.5 to 5 ppm in whitewater systems and up to 10 ppm in starch slurries. In paper and paperboard components that contact food, the residual biocide concentration must be maintained between 0.5 and 5 ppm.

Appendix I lists all products containing ammonium bromide that are registered under the authority of the *Pest Control Products Act*. Appendix II lists all the uses for which ammonium bromide is presently registered.

1.0 Human health assessment

1.1 Toxicology summary

The technical grade ammonium bromide is of low acute toxicity by the oral and dermal routes and is considered to be moderately toxic via the inhalation route in rats. Ammonium bromide is mildly irritating to the rabbit eye, non-irritating to rabbit skin and is not considered to be a dermal sensitizer. The required hazard warning label statements are included on the product labels. BAC, a residual biocide, formed from ammonium bromide and sodium hypochlorite in water, is very reactive and degrades rapidly to form breakdown products including nitrogen, nitrate, ammonium, chloride and bromide. BAC will not become systemically available and will not be distributed beyond the site of first contact due to its rapid breakdown. As for the BAC breakdown products that may appear in treated paper products, no concern related to the dermal sensitization potential was identified. Further, exposure to bromate is not expected under the registered use pattern as its formation is unlikely given that the chemical reaction of ammonium bromide and sodium hypochlorite is carried out under an enclosed system.

The toxicological database for ammonium bromide is limited but considered sufficient in the light of a negligible potential for occupational or the general public exposure under the registered use pattern. No toxicological reference values have been established for ammonium bromide and a qualitative approach to characterization of potential human health risks from exposure to ammonium bromide was considered adequate. For any further use expansions, deficiencies in the toxicological database, including neurotoxicity, chronic/carcinogenicity, and reproductive toxicity, will need to be addressed.

1.2 Dietary exposure and risk assessment

There are no direct food or feed uses registered in Canada. The use of ammonium bromide in paper and paperboard components that contact food pulp is not of concern. A residual biocide is not persistent in the aquatic system and rapidly degrades to breakdown products including nitrogen, nitrate, ammonium, chloride and bromide, which are already found in natural and effluent waters. In addition, as monochloramine is used in drinking water disinfection, there is no drinking water exposure concern related to the chloramine presence in drinking water.

When commercial-class products containing ammonium bromide are used according to the updated label directions, the dietary risk is considered acceptable.

1.3 Occupational and non-occupational exposure and risk assessment

1.3.1 Occupational exposure and risk assessment

There is a potential for occupational dermal and inhalation exposure while handling the commercial-class products containing ammonium bromide, during clean-up and repair. In addition, mill workers can be exposed to BAC breakdown products, including nitrogen, nitrate, ammonium, chloride and bromide, in downstream of application site.

The current commercial-class products labels require workers to use a closed loading and transferring system and to wear personal protective equipment (PPE) when handling the concentrate and contacting treated process fluids. Due to the use of a closed mixing/transfer system, potential handler exposure is expected to be negligible. Based on the low quantities of breakdown products measured in treated paper and the lack of sensitization triggers for those breakdown products, dermal exposure of mill workers to treated paper and paperboard products is not of concern. Potential exposure of mill workers to breakdown products, specifically bromide, in process fluids was also considered. Taking into consideration the label directions, the frequency and duration of potential exposure, the risk from exposure to bromide in the process fluids is not expected to be of concern.

For consistency with other ammonia-based active ingredients that produce chloramine (that is ammonium carbamate and ammonium sulfate) that are also registered for use in pulp and paper mills and have a similar acute toxicity profile as ammonium bromide, an update to the PPE requirement is proposed. Coveralls over a long-sleeved shirt and long pants and chemical-resistant gloves are proposed for workers handling ammonium bromide and contacting treated process fluids. A standard label statement related to the closed mixing/transfer system is also proposed as per current labelling standards. The occupational handler and mill worker risks are considered acceptable when commercial-class products containing ammonium bromide are used according to the updated label directions.

1.3.2 Non-occupational exposure and risk assessment

Residential handler and bystander exposures are not anticipated under the current conditions of use. For individuals coming in contact with finished paper and paperboard products, the main concern is a dermal sensitization potential. The residue level of BAC breakdown products (including chloride, bromide, ammonia and nitrate) in finished paper products is expected to be negligible and no sensitization triggers for BAC breakdown products have been identified. Therefore, when ammonium bromide is used according to the current label directions, the residential risk is considered acceptable.

1.4 Aggregate exposure and risk assessment

Aggregate exposure is the total exposure to a single pesticide that may occur from food, drinking water, residential and other non-occupational sources, and from all known or plausible exposure routes (oral, dermal and inhalation). When ammonium bromide is used according to the updated label directions, the aggregate risk from potential dietary (food contact paper and drinking water) and non-occupational exposure (dermal contact with treated paper) is considered acceptable.

1.5 Cumulative assessment

The *Pest Control Products Act* requires that Health Canada considers the cumulative non-occupational exposure to pesticides with a common mechanism of toxicity, based on the likelihood that people may be exposed to more than one of these pesticides at the same time. Accordingly, an assessment of potential common mechanism of toxicity with other pesticides was undertaken. While ammonium bromide may share a common moiety with other ammonia-based active ingredients, under the updated label directions, the anticipated dietary and residential risk to ammonium bromide is considered acceptable. Based on these considerations, cumulative risks are considered acceptable.

1.6 Health incident reports

As of 15 January 2026, no human or domestic animal incident reports involving ammonium bromide have been reported to Health Canada.

2.0 Environmental assessment

2.1 Fate and behaviour in the environment

A residual biocide expressed as total chlorine (bromine-activated chloramine; BAC), generated in situ by reacting ammonium bromide with sodium hypochlorite is the compound that is of concern to the environment. BAC may enter the environment through effluent discharge to rivers, streams, or other waterbodies. BAC is not persistent in the aquatic system and is rapidly degraded to by-products including chloride, bromide, ammonia and nitrate, which are already found in natural and effluent waters. In addition, dilution in the receiving waters is expected to further reduce the level of BAC and its by-products. The presence of secondary treatment facilities minimizing effluent load from pulp and paper mills is also expected to reduce the level of BAC entering the environment. The label statement addressing the potential discharge of effluent is proposed to be updated as per current standards. In addition, a standard storage statement is proposed to be added to the product labels (Appendix III).

2.2 Environmental risk characterization

BAC is toxic to freshwater alga and vascular plants and to both freshwater and marine invertebrates and fish. The current end-use product labels include the required hazard warning label statements. The environmental risk assessment integrates the environmental exposure and ecotoxicology information to estimate the potential for adverse effects on non-target species. This integration is achieved by comparing exposure concentrations with concentrations to which adverse effects occur. The potential risk to non-target aquatic organisms was assessed qualitatively. The level of a residual biocide discharged to the environment through effluent is expected to be low due to its rapid degradation in water. However, since the chemical is toxic to aquatic organisms, the following label statement is proposed to minimize the potential exposure of non-target aquatic organisms: “If chloramine is detected in the effluent, it must be neutralized to undetectable levels by the addition of sodium metabisulfite or other suitable means”. The proposed label statement is consistent with the requirements for other ammonia-based active ingredients that produce chloramine (that is ammonium carbamate and ammonium sulfate) that are also registered for use in pulp and paper mills. The risk to non-target aquatic organisms resulting from the use of commercial-class products containing ammonium bromide in pulp and paper mills is considered acceptable when updated product label directions are followed. Terrestrial exposure is not anticipated under the registered use pattern.

Ammonium bromide is an inorganic salt and does not meet the criteria for persistence, bioaccumulation and toxicity. The residual biocide, BAC, is not a Track-1 substance as it does not meet all Track-1 criteria as per the Toxic Substance Management Policy.

2.3 Environmental incident reports

As of 15 January 2026, no environmental incident reports involving ammonium bromide have been reported to Health Canada.

3.0 Value assessment

Ammonium bromide has acceptable value and is an effective slimicide used in pulp and paper mill whitewater systems and starch slurries. Ammonium bromide, used in conjunction with sodium hypochlorite (12.5%) and the feeder/delivery system, forms a residual biocide, expressed as total chlorine. A residual biocide is effective in controlling algal, bacterial, and fungal slimes, as it affects protein-associated processes. It also inhibits nucleic acid and protein synthesis and inhibits bacterial growth.

List of abbreviations

| | |
|------|-----------------------------------|
| BAC | Bromide-activated chloramine |
| PMRA | Pest Management Regulatory Agency |
| PPE | Personal protective equipment |

**Appendix I Registered products containing ammonium bromide in Canada
as of 30 January 2026**

| Registration number | Marketing class | Registrant | Product name | Formulation type | Active ingredient |
|----------------------------|------------------------|------------------------|--|-------------------------|--------------------------|
| 28687 | Technical | Bromine Compounds Ltd. | Fuzzicide (Ammonium Bromide) | Solid | 99% |
| 28984 | Technical | Bromine Compounds Ltd. | Fuzzicide (Ammonium Bromide) - Compact | Solid | 99% |
| 28688 | Commercial | ICL - IP America Inc. | Fuzzicide Solution | Solution | 35% |
| 28964 | Commercial | Solenis Canada ULC | Spectrum XD3899 Microbiocide Agent | Solution | 35% |

Appendix II Registered uses of ammonium bromide in Canada as of 12 November 2025

| Use | | Formulation | Application rate |
|----------------------|---|-------------|---|
| Pulp and paper mills | Starch slurries | Solution | 10 ppm residual biocide concentration, expressed as chlorine |
| | Whitewater systems | | 0.5–5.0 ppm residual biocide concentration, expressed as chlorine |
| | Paper and paperboard components that contact food | | 0.93 kg product/1000 kg dry weight fibre, 0.5–5.0 ppm residual biocide concentration between, expressed as chlorine |

Appendix III Proposed label updates for products containing ammonium bromide

Information on labels of currently registered products should not be removed unless it contradicts the label statements provided below.

Label updates for commercial-class products

I. Under PRECAUTIONS section, add the label statement as follows:

Wear coveralls over long sleeved shirt and long pants, goggles or face shield, chemical-resistant gloves, socks and chemical-resistant footwear during mixing, loading, application, clean-up and repair and when contacting treated process fluids.

For use with closed loading and transfer systems only (i.e., dry coupling).

A closed transfer system is defined as a procedure for removing a pesticide from its original container, rinsing the emptied container and transferring the pesticide and rinse solution through connecting hoses pipes, and coupling that are sufficiently tight to prevent exposure of any person to the pesticide or rinse solution. Furthermore, the closed transfer system must be equipped with a dry coupling system that is designed to drip less than 2 mL per coupling.

II. Under DIRECTIONS FOR USE section:

1) Replace:

DO NOT discharge effluent containing the biocide produced by the feeder into sewer systems, lakes, streams, ponds, estuaries, oceans or other waters.

With:

This registration is granted under the *Pest Control Products Act* and does not exempt the user from any other legislative requirements. Use of this product and management of any resulting discharge or release of effluents containing this product must also be in accordance with the *Fisheries Act* and with any other applicable federal, provincial and territorial legislation. Consult with federal, provincial and territorial regulatory authorities, where the pesticide application is to occur, on any authorizations or other requirements for use of this product and management of any resulting discharge or release of effluents containing this product.

2) Add:

If chloramine is detected in the effluent, it must be neutralized to undetectable levels by the addition of sodium metabisulfite or other suitable means.

III. Under STORAGE section, add the label statement as follows:

Add:

Store this product away from food or feed.

References

A. Information considered for the re-evaluation

Published information

| PMRA Document Number | Reference |
|----------------------|---|
| 1463333 | Canada, 2007. Evaluation Report, Ammonium Bromide Fuzzicide. ERC2007-09. 13 November 2007. |
| 2177082 | Canada, 2012. Proposed Registration Decision, Ammonium Bromide Fuzzicide. PRD2012-08. 23 March 2012. |
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| 2371140 | Canada, 2014. Evaluation Report for Category B, Subcategory 4.1 Application. Conversion to full registration without consultation. Fuzzicide (Ammonium Bromide) – Compact. Application No. 2009-1311. |