Proposed Re-evaluation Decision PRVD2022-21

Sodium Hypochlorite, Calcium Hypochlorite and Their Associated End-use Products

Consultation Document

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Proposed re-evaluation decision

Under the *Pest Control Products Act*, all registered pesticides must be re-evaluated regularly by Health Canada's Pest Management Regulatory Agency (PMRA) 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 various sources such as 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.

This document presents the proposed regulatory decision for the re-evaluation of hypochlorite cluster (that is, available chlorine, present as calcium hypochlorite; available chlorine, present as sodium hypochlorite; and sodium hypochlorite), including any proposed amendments (risk mitigation measures) to protect human health and the environment, as well as the science evaluation on which the proposed decision is based.

Products containing sodium hypochlorite or calcium hypochlorite are registered as antimicrobials in industrial settings, commercial ornamental water systems, municipal water treatment of sewage and industrial effluent, certain indoor hard surfaces, laundry additive, and swimming pools and spas. They are registered as commercial- and domestic-class products. In addition, sodium hypochlorite and calcium hypochlorite are listed in Schedule 2 of the Pest Control Products Regulations. These scheduled products are also included in the re-evaluation. Calcium hypochlorite products are formulated as solids and sodium hypochlorite products are formulated as liquids. Currently registered technical grade active ingredients, manufacturing concentrates, and end-use products containing sodium hypochlorite or calcium hypochlorite are listed in Appendix I. Registered uses of sodium hypochlorite and calcium hypochlorite considered during the current re-evaluation are summarized in Appendix II.

In addition, some registered sodium hypochlorite products contain uses not regulated under the *Pest Control Products Act*. These include uses on beef carcass, poultry carcass, agriculture and dairy, food process plants, poultry reprocessing, poultry water immersion, fish process plant water, disinfectant uses in health care facilities and schools, and the claim "removes stains, disinfects and deodorizes." These uses and claims were not assessed in the current re-evaluation. Health Canada is proposing a new set of regulations under the *Food and Drugs Act* that will include surface sanitizers (currently regulated under the *Pest Control Products Act*) and surface disinfectants (currently regulated under the Food and Drug Regulations), collectively referred to as biocides. For more information about what is being proposed, please refer to *Canada Gazette*, Part I, Volume 156, Number 19: Biocides Regulations.

Sodium hypochlorite and calcium hypochlorite are non-selective and broad-spectrum antimicrobial agents. They are effective in controlling and preventing the growth of bacteria, algae, fungi, and viruses when used in aqueous solution. When the proposed label updates are followed (Appendix III), potential risks to human health (dietary, occupational, residential and bystander) and the environment (aquatic and terrestrial organisms) are considered to be acceptable.

Under the authority of the *Pest Control Products Act* and based on an evaluation of currently available scientific information, products containing sodium hypochlorite and calcium hypochlorite (Appendix I) are being proposed for continued registration in Canada, with proposed label amendments, including:

- updated signal words, precautionary statements, first aid statements, and personal protective equipment (PPE) requirements for users handling domestic-class swimming pool products;
- addition of PPE (protective eyewear) to all commercial-class calcium hypochlorite product labels;
- addition of the statement "Do not apply in windy conditions" to the granular domestic-class calcium hypochlorite product labels;
- updated environmental precautionary statements; and
- updated storage and disposal statements.

Refer to Appendix III for all proposed label amendments.

All products containing sodium hypochlorite and calcium hypochlorite regulated under the *Pest Control Products Act* in Canada are subject to this proposed re-evaluation decision. This document is subject to a public consultation,[1] during which written comments and additional information may be submitted to PMRA Publications. The final re-evaluation decision will be published taking into consideration the comments and information received during the consultation period.

Next steps

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

All comments received during the 90-day public consultation period will be taken into consideration in preparation of the re-evaluation decision document[2], which could result in revised risk mitigation measures. The re-evaluation decision document will include the final re-evaluation decision, the reasons for it and a summary of comments received on the proposed re-evaluation decision with Health Canada's responses.

Other information

When Health Canada makes its re-evaluation decision, it will publish a Re-evaluation Decision on calcium hypochlorite and sodium hypochlorite (based on the Science Evaluation of PRVD2022-21). In addition, the test data referenced in this consultation document will be available for public inspection, upon application, in the PMRA's Reading Room.

[1] "Consultation statement" as required by subsection 28(2) of the *Pest Control Products Act*.
[2] "Decision statement" as required by subsection 28(5) of the *Pest Control Products Act*.

Additional scientific information

Additional scientific data are not required at this time.

Science evaluation

1.0 Use description of sodium hypochlorite and calcium hypochlorite

Sodium hypochlorite and calcium hypochlorite are registered for use as biocides in swimming pools and spas, industrial settings, (for example, commercial recirculating cooling water systems, air washers, heat transfer systems, small equipment cooling systems, cooling tower and evaporative condensers, beverage pasteurizers, pulp and paper mill water systems, municipal water treatment of sewage and industrial effluent), commercial ornamental water systems, and certain indoor hard surfaces (Appendix II). Users must ensure chlorine residual rates remain within the recommended ranges displayed on the label (for example, 1-3 part per million (ppm) for swimming pools) and adjust the volume of the product accordingly. The application rates and frequency of application vary based on site, level of fouling, and environmental parameters. Most product labels recommend adding the product to the water in a way that ensures sufficient mixing, involving a metered pump, or manual slug additions. For commercial ornamental water systems, the product is added to water directly. Most product labels for commercial swimming pool uses recommend automatic feeder systems for application. For sanitizing hard surfaces (such as uses in farms), the product is sprayed or applied directly to the surfaces. For use as laundry additive, the product is added directly to the water. Some commercial end-use products containing sodium hypochlorite registered for municipal water treatment of sewage and industrial wastewater treatment currently do not include specific directions of use on the product labels. The PMRA is proposing specific directions for use in municipal water treatment of sewage and industrial effluent treatment for these products (Appendix III).

2.0 Human health assessment

Toxicology summary: The toxicological properties of sodium hypochlorite and calcium hypochlorite are extensively documented in the published literature.

Systemically, sodium hypochlorite is of low acute toxicity by the oral and dermal routes. Calcium hypochlorite is moderately acutely toxic by the oral route, of low acute toxicity by the dermal route, and slightly acutely toxic by the inhalation route.

Sodium hypochlorite and calcium hypochlorite are not dermal sensitizers; however, topically, they are both corrosive to eyes and skin (USEPA, 2012). In addition, sodium hypochlorite is also known to be irritating and/or corrosive to the respiratory tract (ECHA, 2020).

Chronic studies are not required due to the high oxidative reactivity of both sodium hypochlorite and calcium hypochlorite. In the presence of oxygen, they react easily with organic matter and convert readily into sodium chloride and calcium chloride, respectively. Based on their high oxidative reactivity and low toxicity of the breakdown products, no toxicology reference values have been established for sodium hypochlorite and calcium hypochlorite. In addition, there was no evidence to indicate that sodium hypochlorite and calcium hypochlorite are carcinogenic, genotoxic, neurotoxic, or developmental or reproductive toxicants. Therefore, a qualitative approach was used for the health assessment for sodium hypochlorite and calcium hypochlorite.

In conclusion, the most significant hazard associated with sodium hypochlorite and calcium hypochlorite is related to their corrosive properties, which could result in severe irreversible irritation of the eyes, the skin, or the lungs. Therefore, all currently registered sodium hypochlorite and calcium hypochlorite technical grade active ingredient, manufacturing concentrate, commercial- and domestic-class product labels must include (if not already included) the signal words "danger corrosive to eyes and skin" on the primary display panel. In addition, since some product labels do not include the correct signal words, label amendments are proposed for consistency and to meet the current labelling standards.

> All technical grade active ingredient, manufacturing concentrate, commercial- and domestic-class product products containing calcium hypochlorite must include the signal words "WARNING POISON" and "DANGER CORROSIVE TO EYES AND SKIN" and all products containing sodium hypochlorite must include the signal words "DANGER CORROSIVE TO EYES AND SKIN" in the primary display panel of all labels (Appendix III).
>
> All currently registered technical grade active ingredient, manufacturing concentrate, commercial- and domestic-class product labels must also include precautionary statements on the secondary panel. Calcium hypochlorite secondary label panels must include "May be fatal if swallowed, CORROSIVE to the eye. DO NOT get in eyes. Corrosive to the skin. DO NOT get on skin. Harmful if inhaled. Avoid breathing dusts and fumes." Sodium hypochlorite secondary label panels must include "CORROSIVE to the eye. DO NOT get in eyes. Corrosive to the skin. DO NOT get on skin. Harmful if swallowed or inhaled. Avoid breathing vapour and sprays." (Appendix III).
>
> All registered sodium hypochlorite and calcium hypochlorite technical grade active ingredient, manufacturing concentrate, commercial- and domestic-class product labels must include standard first aid statements as per the 2022 PMRA Guidance Document, *First Aid Labelling Statements*.

Occupational exposure and risk assessment: Based on the registered use pattern (Appendix II), sodium hypochlorite and calcium hypochlorite are registered in industrial process uses for recirculating cooling water systems, heat transfer systems, and municipal water treatment of sewage and industrial effluent; swimming pools and spas. In addition, sodium hypochlorite is registered for uses for cooling tower, air washers, beverage pasteurizers, pulp & paper mill water systems, ornamental water systems, sanitizing for hard surfaces, and laundry additive. There is potential for occupational exposure to workers mixing/loading/applying commercial end-use products of sodium hypochlorite and calcium hypochlorite. The most significant hazard of calcium hypochlorite and sodium hypochlorite is related to their corrosive properties, which can result in severe irritation of the eyes and skin. Personal protective equipment (PPE) currently required on sodium hypochlorite commercial products include long-sleeved shirt, long pants, chemical-resistant gloves, protective eyewear (goggles or face shield), socks and shoes. No additional PPE is proposed for sodium hypochlorite commercial product labels as a result of this re-evaluation. Current PPE requirements on calcium hypochlorite commercial products are the same as for sodium hypochlorite, but without the protective eyewear. Based on the corrosive properties of calcium hypochlorite, additional PPE (that is,

protective eyewear) is proposed to be added to all commercial calcium hypochlorite product labels (Appendix III). When the proposed label instructions are followed, potential occupational risk is considered acceptable.

Non-occupational exposure and risk assessment: Residential users may be exposed to sodium hypochlorite or calcium hypochlorite when handling domestic swimming pool products or entering treated sites (for example, swimming pools or spas). To mitigate potential risk to human health, labels for all domestic pool products containing sodium hypochlorite or calcium hypochlorite are proposed to be updated to instruct users to wear eye protection, protective clothing and rubber gloves. As indicated on the labels of sodium hypochlorite and calcium hypochlorite, both commercial applicators and residential users are required to maintain chlorine levels in the water between 1-3 ppm for pools and 3-5 ppm for spas and to wear eye protection, protective clothing and rubber gloves, as per Health Canada guidance information for swimming pool and spa chemicals. When sodium hypochlorite or calcium hypochlorite end-use products are used according to label directions, post-application exposure to swimmers and individuals using spas is considered acceptable.

Some commercial products containing sodium hypochlorite are registered for sanitizing hard surfaces, but no products containing calcium hypochlorite are registered for this use. Therefore, residential exposure could also occur when entering areas where hard surfaces have been treated with registered commercial sodium hypochlorite products. However, residues of sodium hypochlorite are expected to degrade very rapidly on surfaces due to its high reactivity. In addition, commercial products containing sodium hypochlorite registered for sanitizing hard surfaces currently require a 2-hour restricted-entry interval (REI) after indoor spray or fogging application to minimise potential post-application exposure. When commercial end-use products of sodium hypochlorite are applied according to label directions, potential risk from exposure to sodium hypochlorite is considered acceptable.

By stander exposure could occur when commercial-class end-use products are used. Based on the registered use pattern for commercial products, the potential for bystander exposure to sodium hypochlorite or calcium hypochlorite is considered low during use in industrial settings. Therefore, potential bystander risk is considered acceptable.

Dietary Exposure and risk assessment: Sodium hypochlorite and calcium hypochlorite are not registered for food or feed uses under the *Pest Control Products Act*. Antimicrobial uses of sodium hypochlorite on certain food and feed hard surfaces (for example, farmhouse) and in pulp and paper mills could result in indirect contact of sodium hypochlorite residues with food and/or feed; however, these residues degrade very rapidly due to the high reactivity of sodium hypochlorite. Based on the registered use pattern of sodium hypochlorite and calcium hypochlorite, contamination of drinking water is not expected to occur. To prevent direct contact of treated liquids with food or beverages, the following statement is proposed to be added to commercial products registered for pasteurizer uses, when closed loading and transfer systems are not used: "*The water in the systems treated with this product must not come into direct contact with food or beverage. Residual chemicals from the product on the exterior of the cans, bottles or other containers are effectively removed by potable water wash at discharge end*".

Therefore, dietary exposure to sodium hypochlorite and calcium hypochlorite is not expected to pose a health risk when the end-use products are applied according to the proposed updated label directions.

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). Sodium hypochlorite and calcium hypochlorite are not registered for food or feed uses under the *Pest Control Products Act* and exposure to drinking water is not expected to occur from the registered use pattern. When sodium hypochlorite and calcium hypochlorite are used according to the proposed updated label directions, the aggregate risk from potential dietary (food and drinking water) and non-occupational (dermal and inhalation) exposures is considered acceptable. As such, an aggregate assessment is not required.

Cumulative assessment: The *Pest Control Products Act* requires that Health Canada consider the cumulative exposure to pest control products with a common mechanism of toxicity. Accordingly, an assessment of potential common mechanism of toxicity with other pesticides was undertaken. While sodium hypochlorite and calcium hypochlorite may share a common moiety with other chlorine-based active ingredients, the most significant hazard associated with sodium and calcium hypochlorite relates to their corrosive properties, which is predominantly relevant for those handling end-use products. Associated risks for this scenario are mitigated through use of PPE. Further, based on the high oxidative reactivity of sodium and calcium hypochlorite and their rapid breakdown to sodium or calcium chloride, which are of low toxicity, a qualitative approach was used for the health assessment. No health concerns were identified, and thus cumulative risks are considered acceptable.

3.0 Environment assessment

In aqueous solution, sodium hypochlorite and calcium hypochlorite rapidly hydrolyse to hypochlorous acid and chlorine, which also react rapidly with organic matter and convert to inorganic chloride. Therefore, these two active ingredients are not expected to be persistent or bioaccumulate in the environment.

Based on the current use pattern for sodium hypochlorite and calcium hypochlorite, exposure to non-target terrestrial organisms is expected to be minimal.

Sodium hypochlorite and calcium hypochlorite are highly toxic to aquatic organisms. Aquatic organisms could be exposed to sodium hypochlorite and calcium hypochlorite from discharges or effluent associated with industrial uses. Uses in swimming pools and spas, and as laundry additives are expected to have minimal environmental exposure. To further mitigate risks to aquatic organisms, it is proposed that all registered sodium hypochlorite and calcium hypochlorite product labels include an environmental precaution statement to inform users of sodium hypochlorite and calcium hypochlorite toxicity to aquatic organisms. In addition, labels for products with industrial uses are proposed to include a statement informing users that the product must be used in accordance with federal or provincial legislation (for example, *Fisheries Act*) to minimize exposure of aquatic organisms to residues of chlorine resulting from sodium hypochlorite and calcium hypochlorite.

Standard storage statements and disposal statements are also proposed to be added to all product labels. All label amendments proposed for domestic-class products would apply to scheduled products used in swimming pools.

All products registered for commercial ornamental water systems uses include the statement "not for use in ornamental water systems containing fish". No additional risk mitigation measures are required for this use.

Sodium hypochlorite and calcium hypochlorite do not meet all Track 1 criteria. Therefore, as per the Toxic Substances Management Policy, they are not considered Track 1 substances.

4.0 Incident reports

As of 1 September 2022, 57 human and 5 domestic animal incident reports involving calcium or sodium hypochlorite had been reported to the PMRA.

Human Incidents:

Analysis of the reported human incidents determined that 52 incidents were probably related to the reported exposure to either calcium hypochlorite or sodium hypochlorite, the majority of which involved exposure to calcium hypochlorite. These incidents all occurred in Canada. The remaining five incidents involving calcium or sodium hypochlorite had "insufficient information" on the reported exposure scenario or on the onset of symptoms to determine a causality level and were not investigated further. Seven of the 52 human incidents were determined to have resulted from product misuse (that is, product pre-mixed in a bucket instead of direct application, product mixed with other chemicals, etc.). The remainder of incidents (45 of 52 incidents) reported exposure through inhalation of product fumes or dust during application or opening of the product container (26 individuals), ocular exposure (16 individuals), dermal exposure (4 individuals), or accidental ingestion of product (4 individuals). Five incidents involved a granular product containing calcium hypochlorite, occurred following blow-back of product during application, and resulted in eye or nasal irritation (4 incidents reported ocular exposure and 1 incident reported inhalation exposure). Symptoms were mostly acute and minor in severity and involved irritation, dryness, or a burning sensation of the eyes, skin, throat, nose, and mouth, coughing, and vomiting.

The human incident data indicate potential effects from exposure to the granular products during application under windy conditions due to product blow-back. To address the potential effects, the following statement is proposed for granular domestic-class calcium hypochlorite products: "Do not apply in windy conditions." The labels of calcium hypochlorite products reported in the incident data contain precautionary statements which, when adhered to, reduce the risk of toxic gases being released from the product and the risk of inhalation exposure to the product. In addition, the labels inform the user to avoid breathing product dust and fumes as it can cause irritation to the nose and throat. These label statements for limiting the effects from inhalation exposure are consistent across domestic class products such that no further mitigation statements are proposed to address potential concerns from inhalation exposure.

The labels for domestic-class products containing calcium hypochlorite identified in the incidents indicate that the product is corrosive and can cause skin and eye damage. The proposed correct signal words, precautionary statement and additional PPE (Section 2.0) would also address the potential effects reported in human incident reports.

Domestic Animal Incidents:

Regarding the five reported domestic animal incidents, three incidents occurred in the United States and two incidents occurred in Canada. One of the three American domestic animal death incidents was considered to be probably associated with exposure to calcium hypochlorite following misuse of the product. The remaining two American domestic animal death incidents were determined to be unrelated to exposure to a pest control product containing calcium hypochlorite or sodium hypochlorite and were not investigated further. The two domestic animal incidents that occurred in Canada (minor and moderate in severity) were considered to be associated with product exposure, with dogs experiencing skin irritation and general sickness. Due to the small number of incidents to domestic animals reported in Canada with minor to moderate severity, no further risk mitigation measures are required.

Environment Incident:

As of 1 September 2022, no environmental incidents involving products containing sodium hypochlorite or calcium hypochlorite were submitted to Health Canada.

The USEPA EIIS (Ecological Incident Information System) database was queried for environmental incidents that occurred in the United States involving these active ingredients, and two incidents have been reported for sodium hypochlorite. These were both related to fish mortality and were each assigned a certainty index of "highly probable". One incident occurred in 1994 affecting brown trout, trout, and smallmouth bass at a New York filtration plant, with 324 fish mortalities. It was "undetermined" what caused the incident. The second incident occurred in 2008 in California involving intentional misuse causing mortality of 49 rainbow trout.

5.0 Value assessment

Excessive bacteria and algae growth in swimming pools is a human health concern. Large concentrations of algae and organic matter can also damage pool liners, pumps, and filters, leading to economic loss. The presence of bacterial and fungal slime in industrial process waters can interfere with equipment function and cause premature wearing of materials. Sodium hypochlorite and calcium hypochlorite are non-selective and broad-spectrum biocides. They are effective in controlling and preventing the growth of bacteria, algae, fungi, and viruses when used in aqueous solution. Therefore, they are a valuable tool for sanitation of water used in swimming pools and industrial processes.

6.0 Other considerations

In 2021, the Government of Canada completed a draft screening assessment for sodium hypochlorite and calcium hypochlorite (Canada, 2021). The draft assessment considered risk to human health to be low and determined that sodium hypochlorite and calcium hypochlorite do not meet the criteria under paragraph 64(c) of the *Canadian Environmental Protection Act* (CEPA).

Appendix I Registered products containing calcium hypochlorite and sodium hypochlorite

Table 1 Registered products containing calcium hypochlorite[1]

Registration number	Marketing class*	Registrant	Product name	Formulation type	Guarantee
18123	T	Axiall, LLC.	Repak Calcium Hypochlorite	Solid	Calcium Hypochlorite 68.63%
21958	T	Innovative Water Care, LLC	Calcium Hypochlorite Granular 65	Granular	Calcium Hypochlorite 65.0%
21959	T	Innovative Water Care, LLC	Calcium Hypochlorite Granular 70	granular	Calcium Hypochlorite 70.0%
22828	T	Innovative Water Care, LLC	Calcium Hypochlorite Tablets 65%	Tablet	Calcium Hypochlorite 65%
22829	T	Innovative Water Care, LLC	Calcium Hypochlorite Tablets 70%	Tablet	Calcium Hypochlorite 70.0%
23256	T	Axiall, LLC.	Pittabs Calcium Hypochlorite Tablets	Tablet	Calcium Hypochlorite 68.63%
23258	T	Innovative Water Care, LLC	Calcium Hypochlorite Granular 75%	Granular	Calcium Hypochlorite 75%
25243	T	Sani Marc Inc.	Chlore Sani-Marc Chlorinating Granules	Soluble Granules	Calcium Hypochlorite 65%
27919	T	Sani Marc Inc.	Break Up Clg 70%	Soluble Granules	Calcium Hypochlorite 72.3%
28227	T	RBF International Ltee	R-B 70 Chlore Tablet	Tablet	Calcium Hypochlorite 70%
28228	T	RBF International Ltee	R-B 70 Chlore Granular	Soluble Granules	Calcium Hypochlorite 70%
28397	T	Intrachem Industries Inc.	GF-Chlore 70G	Granular	Calcium Hypochlorite 70.5%
28398	T	Intrachem Industries Inc.	GF-Chlore 70 T	Tablet	Calcium Hypochlorite 70.5%
28405	T	Sani Marc Inc.	Sani-Marc Chlore	Solid	Calcium Hypochlorite 65%
29583	T	Sani Marc Inc.	Sani-March Chlore-1	Soluble Granules	Calcium Hypochlorite 65.0%
31009	T	Intrachem Industries Inc.	GF-Chlore 65G	Granular	Calcium Hypochlorite 69.64%

Registration number	Marketing class*	Registrant	Product name	Formulation type	Guarantee
31287	T	Intrachem Industries Inc.	Intra-Chlor 65G	Granular	Calcium Hypochlorite 69.64%
31288	T	Intrachem Industries Inc.	Intra-Chlor 70G	Granular	Calcium Hypochlorite 70.5%
31289	T	Intrachem Industries Inc.	Intra-Chlor 70T	Tablet	Calcium Hypochlorite 70.5%
31736	T	RBF International Ltee	RBF Cal Hypo Gran 70	Solid	Calcium Hypochlorite 70.5%
31737	T	RBF International Ltee	RBF Cal Hypo Gran 65	Solid	Calcium Hypochlorite 69.64%
31739	T	Intrachem Industries Inc.	Intra-Chlor 65T	Tablet	Calcium Hypochlorite 69.64%
31744	T	RBF International Ltee	RBF Cal Hypo Tab 70	Tablet	Calcium Hypochlorite 70.5%
32281	T	Axiall, LLC.	Repak Q	Solid	Calcium Hypochlorite 68.63%
32558	T	RBF International Ltee	RBF Cal Hypo Granular 65-2	Granular	Calcium Hypochlorite 67%
32559	T	RBF International Ltee	RBF Cal Hypo Granular 70-2	Granular	Calcium Hypochlorite 72%
32651	T	Sani Marc Inc.	Sani Marc Chlore-2	Solid	Calcium Hypochlorite 69%
32956	T	Haixing Eno Chemical Co., Ltd	Eno Chlor Cal Hypo	Granular	Calcium Hypochlorite 70%
33102	T	Sani Marc Inc.	Sani Marc Chlore-3	Soluble Granules	Calcium Hypochlorite 70%
31573	M	Sani Marc Inc.	Industrial Cal Hypo 65	Soluble Granules	Calcium Hypochlorite 65%
33214	M	Sani Marc Inc.	Industrial Cal Hypo 70	Soluble Granules	Calcium Hypochlorite 70%
22468	C	Innovative Water Care, LLC	Pulsar Plus Dry Chlorinator Briquettes	Tablet	Calcium Hypochlorite 65%
23425	C	Norweco Inc.	Bio-Sanitizer Tablets	Tablet	Calcium Hypochlorite 66.57%
24052	C	Axiall, LLC.	Accu-Tab SI Calcium Hypochlorite Tablets	Tablet	Calcium Hypochlorite 64.42%

Registration number	Marketing class*	Registrant	Product name	Formulation type	Guarantee
30669	C	Axiall, LLC.	Versachlor System Chlorinating Tablets	Tablet	Calcium Hypochlorite 68.46%
31529	C	Innovative Water Care, LLC	CCH Chlorinating Tabs	Tablet	Calcium Hypochlorite 65%
23324	D	Innovative Water Care, LLC	HTH® Extra Super Shock For Swimming Pools	Granular	Calcium Hypochlorite 75%
28401	D	KIK Holdco Company Inc.	Bioguard Burnout Extreme	Granular	Calcium Hypochlorite 47%
28502	D	KIK Holdco Company Inc.	Omni Breakout Extra	Soluble Granules	Calcium Hypochlorite 47%
28503	D	KIK Holdco Company Inc.	Pro Guard Chlorinating Granules	Soluble Granules	Calcium Hypochlorite 47%
28601	D	Innovative Water Care, LLC	HTH Regular Chlorinating Granules	Granular	Calcium Hypochlorite 47%
29098	D	Sani Marc Inc.	Calcium Hypochlorite 48%	Soluble Granules	Calcium Hypochlorite 48%
29394	D	Innovative Water Care, LLC	GLB® Super Shock	Granular	Calcium Hypochlorite 75%
30161	D	Innovative Water Care, LLC	HTH Super Chlorinating Granules	Granular	Calcium Hypochlorite 52.1%
30258	D	KIK Holdco Company Inc.	Bioguard Burn-Out3	Granular	Calcium Hypochlorite 57.9%
30658	D	Innovative Water Care, LLC	HTH Green to Blue I	Soluble Granules	Calcium Hypochlorite 52.1%
30935	D	KIK Holdco Company Inc.	Omni Breakout Total	Granular	Calcium Hypochlorite 57.9%
30936	D	KIK Holdco Company Inc.	Omni Breakout Extra II	Granular	Calcium Hypochlorite 57.9%
32235	D	Innovative Water Care, LLC	HTH Chlorinating Granules	Granular	Calcium Hypochlorite 47%
32357	D	Easy 123 Pool Care LLC	Clorox Pool&Spa Quick-Shock Treatment	Granular	Calcium Hypochlorite 57.9%

Registration number	Marketing class*	Registrant	Product name	Formulation type	Guarantee
32358	D	Easy 123 Pool Care LLC	Clorox Pool&Spa Quick-Shock Chlorinating Granules	Granular	Calcium Hypochlorite 57.9%
33836	D	Sani Marc Inc.	Sani Marc PMF – Piscine	Tablet	Calcium Hypochlorite 50.9% Zinc Oxide 0.4%

[1] As of 24 October 2022, excluding discontinued products or products with a submission for discontinuation as well as scheduled products.
*T = Technical Grade Active Ingredient, M = Manufacturing Concentrate, C = Commercial, D = Domestic

Table 2 Registered products containing sodium hypochlorite[1]

Registration number	Marketing class*	Registrant	Product name	Formulation type	Guarantee
22709	T	The Clorox Company of Canada, Ltd.	Javex Ta	Solution	Sodium Hypochlorite 10.3%
23344	T	Brenntag Canada Inc.	Sodium Hypochlorite 10.8%	Solution	Sodium Hypochlorite 10.9%
25136	T	UBA Inc.	19% W/V Sodium Hypochlorite	Solution	Sodium Hypochlorite 14.5%
25619	T	Olin Corporation	Sodium Hypochlorite Solution	Solution	Sodium Hypochlorite 15.8%
26206	T	The Clorox Company of Canada, Ltd.	Javex Sodium Hypochlorite Solution	Solution	Sodium Hypochlorite 14.3%
26615	T	Hawkins, Inc.	Vertex CSS-16	Solution	Sodium Hypochlorite 15.6%
26684	T	KIK Holdco Company Inc., DBA Lavo	Lavo 12% Trade	Solution	Sodium Hypochlorite 10.3%
26868	T	DPC Industries Inc	Dixichlor Max Sodium Hypochlorite Solution Technical	Solution	Sodium Hypochlorite 12.5%
27344	T	KIK Holdco Company Inc., DBA Lavo	Lavo 19% Trade	Solution	Sodium Hypochlorite 15.8%
27346	T	KIK Holdco Company Inc., DBA Lavo	Lavo 15.5% Technical	Solution	Sodium Hypochlorite 16.6%
27459	T	KIK Holdco Company Inc., DBA Lavo	PL 12% Trade	Solution	Sodium Hypochlorite 10.3%

Registration number	Marketing class*	Registrant	Product name	Formulation type	Guarantee
27873	T	Olin Canada ULC D.B.A. Olin Chlor Alkali Products	High Strength Hypochlorite	Solution	Sodium Hypochlorite 15.7%
27962	T	The Clorox Company of Canada, Ltd.	Javex – 16 Sodium Hypochlorite	Solution	Sodium Hypochlorite 16.58%
28118	T	KIK Corporation	KIK Sodium Hypochlorite 12% Technical	Solution	Sodium Hypochlorite 10.7%
30656	T	Cleartech Industries Inv.	Hypochlor-16	Liquid	Sodium Hypochlorite 13.35%
30850	T	Occidental Chemical Corporation	Hypo-Alkaline Bleach Solution Technical	Liquid	Sodium Hypochlorite 12.9%
21271	M	UBA Inc.	12% Sodium Hypochlorite	Solution	Sodium Hypochlorite 10.3%
29788	M	KIK Holdco Company Inc., DBA Lavo	L-12% Trade	Solution	Sodium Hypochlorite 10.3%
29797	M	KIK Holdco Company Inc., DBA Lavo	PPL 12% Trade	Solution	Sodium Hypochlorite 10.3%
12419	C	KIK Holdco Company Inc., DBA Lavo	Lavo 12 Sodium Hypochlorite	Solution	Sodium Hypochlorite 10.3%
13731	C	Brenntag Canada Inc.	Sodium Hypochlorite	Solution	Sodium Hypochlorite 10.3%
15692	C	Charlotte Products Ltd.	Swish-Brite 12	Solution	Sodium Hypochlorite 10.3%
17076	C	Solenis Canada ULC	CSW 20 Microbiocide	Solution	Sodium Hypochlorite 10.3%
17363	C	Univar Canada Ltd.	Guardsman-12 Sodium Hypochlorite	Liquid	Sodium Hypochlorite 10.3%
17469	C	Suez Water Technologies & Solutions Canada	Spectrus OX1205C	Solution	Sodium Hypochlorite 10.3%
18417	C	Nalco Canada ULC	Formula MMD-3404 Industrial Liquid Microbicide	Solution	Sodium Hypochlorite 10.3%
20643	C	Les Produits Sanitaires Lepine Inc.	Sanbec 12	Solution	Sodium Hypochlorite 10.3%

Registration number	Marketing class*	Registrant	Product name	Formulation type	Guarantee
21674	C	Les Produits Industriels Jean-Paul Cote Inc.	JPC 12	Solution	Sodium Hypochlorite 10.3%
22749	C	KIK Holdco Company Inc., DBA Lavo	Old Dutch 12 Concentrated Bleach	Solution	Sodium Hypochlorite 10.3%
24387	C	Glen Chemicals Ltd.	Clor-12 Chlorinating Liquid	Solution	Sodium Hypochlorite 10.3%
24655	C	Groulx & Robertson	Javel – 12 Sodium Hypochlorite	Solution	Sodium Hypochlorite 10.3%
24922	C	Advance Chemicals Limited	Advance 12A	Solution	Sodium Hypochlorite 10.3%
24954	C	Buckman Laboratories of Canada Ltd.	Busan 1125 Antimicrobial Agent	Solution	Sodium Hypochlorite 10.3%
25152	C	UBA Inc.	Javel-12 Sodium Hypochlorite	Solution	Sodium Hypochlorite 10.3%
25327	C	Chemco Products Inc.	Eclipse 633 Microbicide	Solution	Sodium Hypochlorite 10.3%
25478	C	Nalco Canada ULC	Stabrex ST70	Solution	Sodium Hypochlorite 6.36% Sodium Bromide 9.23%
25506	C	The Clorox Company of Canada, Ltd.	Javex – 12 Sodium Hypochlorite by Clorox	Solution	Sodium Hypochlorite 10.3%
25506.02	C	The Clorox Company of Canada, Ltd.	Atlantic-12 Sodium Hypochlorite	Solution	Sodium Hypochlorite 10.3%
26675	C	DPC Industries Inc	Dixichlor Max Sodium Hypochlorite Solution	Solution	Sodium Hypochlorite 11.9%
27035	C	NCH Canada Inc.	Actichlor Chlorinating Liquid	Solution	Sodium Hypochlorite 10.3%
27296	C	Klenzoid Canada Inc.	Algaecide – C	Solution	Sodium Hypochlorite 10.3%
28171	C	Olin Canada ULC D.B.A. Olin Chlor Alkali Products	Sodium Hypochlorite 11%	Solution	Sodium Hypochlorite 11%
28172	C	Olin Canada ULC D.B.A. Olin Chlor Alkali Products	Sodium Hypochlorite 12.5%	Solution	Sodium Hypochlorite 12.9%

Registration number	Marketing class*	Registrant	Product name	Formulation type	Guarantee
28279	C	UBA Inc.	UBA Sodium Hypochlorite	Solution	Sodium Hypochlorite 10.3%
28717	C	Produits Chimiques Magnus Ltee	Magnatrol 40A	Solution	Sodium Hypochlorite 10.3%
28933	C	Controlchem Canada Ltd.	Controlchem 2621 Liquid Microbicide	Solution	Sodium Hypochlorite 10.3%
28934	C	Controlchem Canada Ltd.	Controlchem 2620 Liquid Microbicide	Solution	Sodium Hypochlorite 10.3%
29008	C	Quatic Industries Limited	Q-Chlor	Solution	Sodium Hypochlorite 10.3%
29141	C	Nalco Canada ULC	Stabrex ST70Can For Kits	Solution	Sodium Hypochlorite 6.36% Sodium Bromide 9.23%
29183	C	The Clorox Company of Canada, Ltd.	Clorox Commercial Solutions Javex® 12 Bleach by Clorox	Solution	Sodium Hypochlorite 10.3%
29203	C	KIK Holdco Company INC., DBA Lavo	Sodium Hypochlorite 12	Solution	Sodium Hypochlorite 11%
29243	C	Jutzi Water Technologies Inc.	Formula MB 3050	Solution	Sodium Hypochlorite 10.3%
29852	C	KIK Holdco Company Inc., DBA Lavo	OD-12%	Solution	Sodium Hypochlorite 10.3%
29876	C	Flochem Ltd.	Flochem-12B Sodium Hypochlorite Solution	Solution	Sodium Hypochlorite 10.3%
30045	C	Javel Bois-Francs Inc.	Javel BF-12	Solution	Sodium Hypochlorite 9.8%
30174	C	Aquarian Chemicals Inc.	Aquarian C611	Solution	Sodium Hypochlorite 10.3%
30242	C	Quebec-O-Chimie Inc.	Unica 910	Solution	Sodium Hypochlorite 10.3%
30243	C	Chemisphere Inc.	Clo-12 Liquid Microbiocide	Solution	Sodium Hypochlorite 10.3%
30317	C	Kemira Chemicals, Inc.	Fennosan H-12	Solution	Sodium Hypochlorite 10.3%
30514	C	Megalab Inc.	HYPO 12	Solution	Sodium Hypochlorite 10.3%

Registration number	Marketing class*	Registrant	Product name	Formulation type	Guarantee
30754	C	Cleartech Industries Inc.	Hypochlor-12	Solution	Sodium Hypochlorite 10.3%
31164	C	Occidental Chemical Corporation	Hypo-Alkaline Bleach Solution EUP	Solution	Sodium Hypochlorite 10.3%
31206	C	Acégriculture des Bois-Francs Inc.	ACG-12	Solution	Sodium Hypochlorite 9.8%
31414	C	1221122 Ontario Ltd. DBA Keytech	Biotech V	Solution	Sodium Hypochlorite 10.3%
31600	C	Irving Blending & Packaging	Irving 12-Sodium Hypochlorite	Solution	Sodium Hypochlorite 10.3%
32555	C	Solesco Inc	Solubact-Ox	Solution	Sodium Hypochlorite 10.3%
32744	C	PPG Canada Inc.	PPG Chemclor	Solution	Sodium Hypochlorite 10.3%
32870	C	RBF International Ltee	Chem Experts Krystal 12	Solution	Sodium Hypochlorite 10.3%
33031	C	Solesco Inc	Solubact-Br	Solution	Sodium Hypochlorite 6.36% Sodium Bromide 9.23%
33058	C	PMC Water Systems Services Inc	C-3612	Solution	Sodium Hypochlorite 10.3%
33059	C	Nalco Canada ULC	Stabrex ST70Can	Solution	Sodium Hypochlorite 6.36% Sodium Bromide 9.23%
33080	C	Kencro Chemicals Limited	Kenchlor-12	Solution	Sodium Hypochlorite 10.3%
33585	C	Chemtreat, Inc.	SodiumhypoC	Solution	Sodium Hypochlorite 10.3%
33812	C	Traitement D'Eau Expert	TEE-200A	Solution	Sodium Hypochlorite 10.3%
33844	C	Sodorox Chemicals Ltd.	Sodorox Sodium Hypochlorite 12.5%	Solution	Sodium Hypochlorite 12.9%
33855	C	Sodorox Chemicals Ltd.	Sodorox Sodium Hypochlorite 11%	Solution	Sodium Hypochlorite 11%
34131	C	RBF International Ltee	Chem Experts Krystal 12-Liquid Shock	Solution	Sodium Hypochlorite 10.3%
34203	C	Kurita Canada Inc.	Biotrol C12.5	Solution	Sodium Hypochlorite 10.3%

Registration number	Marketing class*	Registrant	Product name	Formulation type	Guarantee
34265	C	Omnichem Inc.	Oxychlor12	Solution	Sodium Hypochlorite 10.3%
28971	D	KIK Corporation	Shock Chlorinating Liquid For Pools	Solution	Sodium Hypochlorite 10.7%
30454	D	KIK Corporation	Kem-Tek Chlorinating Liquid For Pools	Solution	Sodium Hypochlorite 10.7%

[1] As of 24 October 2022, excluding discontinued products or products with a submission for discontinuation as well as scheduled products.
*T = Technical Grade Active Ingredient, M = Manufacturing Concentrate, C = Commercial, D = Domestic

Appendix II Summary of registered calcium hypochlorite and sodium hypochlorite uses

Marketing class	Use site		Formulation	Application rate (ppm available chlorine)
Sodium hypochlorite				
Commercial	Aqua Non-food Sites	Ornamental Water Systems	Solution	0.6–5.2 ppm
	Indoor Hard Surfaces	Farms (hard surfaces)	Solution	200–240 ppm
		General sanitation/disinfection/bleaching		722 ppm
	Industrial Process Fluids	Recirculating Cooling Water Systems, Heat Transfer Systems, Cooling Tower, Air Washers, Beverage Pasteurizers	Solution	0.6–103 ppm
		Pulp & Paper Mill Water Systems	Solution	1–9.7 ppm
		Municipal water treatment of sewage and industrial effluent	Solution	Not provided
	Other Indoor Surfaces, Water and Air	Laundry	Solution	4120–6587 ppm
	Swimming Pools	Swimming Pools	Solution	1–38 ppm
Domestic	Swimming Pools	Swimming Pools	Solution	1–40 ppm
Calcium hypochlorite				
Commercial	Industrial Process Fluids	Recirculating Cooling Tower & Heat Exchange Systems	Tablets	1–10 ppm
		Municipal water treatment of sewage and industrial effluent	Tablets	≥ 0.5 ppm
	Swimming Pools	Swimming Pools & Spas	Tablets	1–10 ppm
Domestic	Swimming Pools	Swimming Pools	Tablets	1–33 ppm
			Granules	

ppm = parts per million

Appendix III Label amendments for products containing sodium hypochlorite and calcium hypochlorite

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

1. Technical grade active ingredient and manufacturing concentrate products:

1.1 Replace the term "guarantee" with "active ingredient".

1.2 For products containing calcium hypochlorite, the following are required:

1.2.1 On primary display panel include the following signal words:
"WARNING POISON
DANGER CORROSIVE TO EYES AND SKIN"

1.2.2 In the Section titled **PRECAUTION STATEMENTS**, include the following:
"May be fatal if swallowed
CORROSIVE to the eye. DO NOT get in eyes.
Corrosive to the skin. DO NOT get on skin.
Harmful if inhaled. Avoid breathing dusts and fumes."

1.3 For products containing sodium hypochlorite, the following are required:

1.3.1 On primary display panel include the following signal words:
"DANGER
CORROSIVE TO EYES AND SKIN"

1.3.2 In the Section titled **PRECAUTION STATEMENTS**, include the following:
"Harmful if swallowed
CORROSIVE to the eye. DO NOT get in eyes.
Corrosive to the skin. DO NOT get on skin.
Harmful if inhaled. Avoid breathing vapour or mist."

1.4 All registered sodium hypochlorite and calcium hypochlorite product labels must include standard first aid statements as per the new PMRA Guidance Document, *First Aid Labelling Statements* (Canada, 2022), where applicable.

1.5 In the Section titled **ENVIRONMNETAL PRECAUTIONARY STATEMENT**, include the following:
"Toxic to aquatic organisms.
DO NOT discharge effluent containing this product into sewer systems, lakes, streams, ponds, estuaries, oceans, or other waters."

1.6 The following statement must be included in a section entitled **STORAGE:**
"Store this product away from food or feed."

1.7 The following statement must be included in a section entitled **DISPOSAL:**

"Canadian manufacturers should dispose of unwanted active ingredients and containers in accordance with municipal and provincial regulations. For additional details and clean up of spills, contact the manufacturer and the provincial regulatory agency."

2. Commercial-class products:

2.1 Replace the term "guarantee" with "active ingredient".

2.2 For products containing calcium hypochlorite, the following are required:

2.2.1 On primary display panel include the following signal words:
"WARNING POISON
DANGER CORROSIVE TO EYES AND SKIN"

2.2.2 In the Section titled **PRECAUTION STATEMENTS**, include the following:
"May be fatal if swallowed
CORROSIVE to the eye. DO NOT get in eyes.
Corrosive to the skin. DO NOT get on skin.
Harmful if inhaled. Avoid breathing dusts and fumes.
Wear long-sleeved shirt, long pants, chemical-resistant gloves, protective eyewear (googles or face shield), socks and shoes when handling this product."

2.3 For products containing sodium hypochlorite, the following are required:

2.3.2 On primary display panel include the following signal words
"DANGER
CORROSIVE TO EYES AND SKIN"

2.3.3 In the Section titled **PRECAUTION STATEMENTS**, include the following:
"CORROSIVE to the eye. DO NOT get in eyes.
Corrosive to the skin. DO NOT get on skin.
Harmful if swallowed or inhaled. Avoid breathing vapour and sprays."
Wear long-sleeved shirt, long pants, chemical-resistant gloves, protective eyewear (googles or face shield), socks and shoes when handling this product.

2.3.4 For commercial products registered for beverage pasteurizer uses with closed loading and transfer systems, add the following in the Section titled **DIRECTIONS FOR USE**:
"For use with closed loading and transfer systems only."

2.3.5 For commercial products registered for beverage pasteurizer uses not using closed loading and transfer systems, add the following in the Section titled **DIRECTIONS FOR USE**:

"NOTE: The water in the systems treated with this product must not come into direct contact with food or beverage. Residual chemicals from the product on the exterior of the cans, bottles or other containers are effectively removed by potable water wash at discharge end."

2.4 In the Section titled **ENVIRONMNETAL PRECAUTIONARY STATEMENT**, include the following for products registered for industrial uses:

"Toxic to aquatic organisms.
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 or provincial legislation.
Consult with provincial regulatory authorities on any authorizations or other requirements for use of this product and management of any resulting discharge or release of effluents containing this product"

2.5 In the Section tilted ENVIRONMNETAL PRECAUTIONARY STATEMENT, include the following for products <u>not</u> registered for industrial uses:

"Toxic to aquatic organisms.
This registration is granted under the *Pest Control Products Act* and does not exempt the user from any other legislative requirements."

2.6 The following statement must be included in a section entitled **STORAGE**:

"Store this product away from food or feed."

2.7 Add the following statement to a section entitled **DISPOSAL:**

"Follow provincial instruction for any required additional cleaning of the container prior to its disposal.

Make the empty container unsuitable for further use.

Dispose of the container in accordance with provincial requirements.

For information on disposal of unused, unwanted product, contact the manufacturer or the provincial regulatory agency. Contact the manufacturer and the provincial regulatory agency in case of a spill, and for clean-up of spills."

2.8 Add the following directions of use to commercial end-use products containing sodium hypochlorite registered for use in municipal water treatment of sewage and industrial effluent:

Directions for Use

1. [End-use product name] is only to be used in automatic feeding devices designed for wastewater sanitation.
2. Fill and adjust feeding device according to manufacturer's recommendations, and monitor chlorine residual/coliform level as required by applicable regulatory agency.
3. On the average, satisfactory disinfection of wastewater effluent can be obtained when the chlorine residual is 0.5 ppm after 15 minutes contact. Although the chlorine residual is the critical factor in disinfection, the importance of correlating chlorine residual with bacteria kill must be emphasized.

3. Domestic-class products

3.1 Replace the term "guarantee" with "active ingredient".

3.2 For products containing calcium hypochlorite, the following are required:

3.2.1 On primary display panel include the following signal words:

"WARNING POISON
DANGER CORROSIVE TO EYES AND SKIN"

3.2.2 In the Section titled **PRECAUTION STATEMENTS**, include the following:

"May be fatal if swallowed
CORROSIVE to the eye. DO NOT get in eyes.
Corrosive to the skin. DO NOT get on skin.
Harmful if inhaled. Avoid breathing dusts and fumes.
Do not apply in windy conditions.
Wear eye protection, protective clothing, and rubber gloves when handling this product."

3.3 For products containing sodium hypochlorite, the following are required:

3.3.1 On primary display panel include the following signal words:

"DANGER
CORROSIVE TO EYES AND SKIN"

3.3.2 In the Section tilted **PRECAUTION STATEMENTS**, include the following:

"CORROSIVE to the eye. DO NOT get in eyes.
Corrosive to the skin. DO NOT get on skin.
Harmful if swallowed or inhaled. Avoid breathing vapour or sprays

Wear eye protection, protective clothing, and rubber gloves when handling this product."

3.4 In the Section titled **ENVIRONMNETAL PRECAUTIONARY STATEMENT**, include the following:

"Toxic to aquatic organisms.
This registration is granted under the Pest Control Products Act and does not exempt the user from any other legislative requirements."

3.5 Add the following statement to a section titled **DISPOSAL:**

"DO NOT reuse empty container. Dispose the empty container with household garbage."

"Unused or partially used products should be disposed at provincially or municipally designated hazardous waste disposal sites."

3.6 The following statement must be included in a section entitled **STORAGE:**

"Store this product away from food or feed."

All label amendments proposed for domestic-class products as result of this re-evaluation would apply to scheduled products used in swimming pools.

References

PMRA number	Reference
890815	Canada, 2004. Proposed Acceptability for Continuing Registration PACR2004-42, Re-evaluation of Sodium and Calcium Hypochlorite.
1048834	Canada, 2005. Re-evaluation Decision Document RRD2005-09, Sodium and Calcium Hypochlorite.
3354865	Canada, 2012. Wastewater Systems Effluent Regulations.
3354864	Canada, 2021. Draft Screening Assessment, Acids and Bases Groups.
3354867	USEPA, 2012. Sodium Hypochlorite and Calcium Hypochlorite: Human Health Risk Assessment Scoping Document in Support of Registration Review. EPA-HQ-OPP-2012-0004-0004.
3354866	ECHA, 2020. Evaluation of Active Substances Assessment Report, Active Chlorine Released from Sodium Hypochlorite.
3354868	USEPA, 2017. Sodium Hypochlorite, Calcium Hypochlorite, and Potassium Hypochlorite Proposed Interim Registration Review Decision Case Numbers: 0029 and 5076. EPA-HQ-OPP-2014-0157-0005.