Proposed Re-evaluation Decision PRVD2018-14

Chlorimuron-ethyl and Its 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 regularly re-evaluated by Health Canada's Pest Management Regulatory Agency (PMRA) to ensure that they continue to meet current health and environmental safety standards and continue to have value. The re-evaluation considers data and information from pesticide manufacturers, published scientific reports, and other regulatory agencies. The PMRA applies internationally accepted risk assessment methods as well as current risk management approaches and policies.

Chlorimuron-ethyl is a commercial herbicide registered for use on soybeans in Eastern Canada for the control of broadleaf weeds.

This document presents the proposed regulatory decision for the re-evaluation of chlorimuron-ethyl including proposed risk mitigation measures to further protect human health and the environment, as well as the science evaluation on which the proposed decision was based. All products containing chlorimuron-ethyl registered in Canada are subject to this proposed re-evaluation decision. This document is subject to a 90-day public consultation period, during which the public, including the pesticide manufacturers and stakeholders, may submit written comments and additional information to the PMRA Publication Section. The final re-evaluation decision will be published taking into consideration the comments and information received.

Outcome of Science Evaluation

Dietary risks from food and drinking water are not of concern when products containing chlorimuron-ethyl are used according to label directions. Canadian MRLs for chlorimuron-ethyl are currently specified for soybeans and no changes are proposed.

Occupational risks to handlers and postapplication risks are not of concern when chlorimuron-ethyl is used according to label directions. To protect workers entering treated sites a restricted-entry interval (REI) of 12 hours is proposed for agricultural uses.

Chlorimuron-ethyl is not expected to pose risks of concern to the environment when used according to the proposed label directions, which include advisory statements and spray buffer zones.

Proposed Regulatory Decision for Chlorimuron-ethyl

Under the authority of the *Pest Control Products Act* and based on the evaluation of currently available scientific information, Health Canada is proposing that products containing chlorimuron-ethyl are acceptable for continued registration in Canada, provided that the proposed risk mitigation measures are implemented. No uses are proposed for cancellation.

Registered pesticide product labels include specific directions for use. Directions include risk mitigation measures to protect human health and the environment that must be followed by law.

As a result of the re-evaluation of chlorimuron-ethyl, further risk mitigation measures as summarized below for product labels are being proposed.

Human Health

- To protect workers entering treated sites a standard REI of 12 hours is proposed for agricultural uses.

- To protect bystanders, a standard statement is proposed indicating to apply only when the potential for drift is minimal to areas of human habitation or areas of human activity such as houses, cottages, schools and recreational areas.

Environment

- Updated spray buffer zones ranging from 1 to 20 meters to mitigate the impact on sensitive non-target terrestrial and aquatic habitats.

- Standard environmental precautionary label statements to protect non-target terrestrial plants and freshwater plants and algae

- An advisory label statement to reduce run-off potential.

International Context

Chlorimuron-ethyl is currently acceptable for use in other Organisation for Economic Cooperation and Development (OECD) member countries, including Japan, New Zealand, and the United States. As of 24 October 2017, no decision by an OECD member country to prohibit all uses of chlorimuron-ethyl for health or environmental reasons has been identified.

Next Steps

The public, including manufacturers and stakeholders, are encouraged to submit comments during the 90-day public consultation period.

All comments received during the public consultation period will be taken into consideration in preparation of the re-evaluation decision document. The re-evaluation decision document will include final re-evaluation decision, the reasons for it and a summary of comments received on the proposed re-evaluation decision with the PMRA's responses.

Additional Scientific Information

No additional data are required.

Science Evaluation

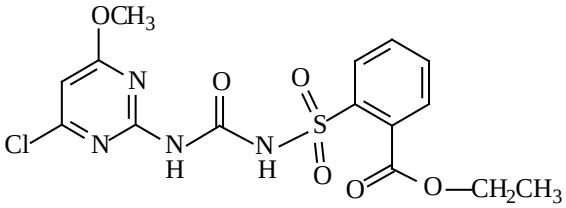
1.0 Introduction

This herbicide belongs to the sulfonylurea family (WSSA Group 2, HRAC Group B). Following foliar uptake, susceptible plants quickly stop growing and plant death occurs within 7–21 days.

Chlorimuron-ethyl is registered for use exclusively on soybeans in Eastern Canada for the control of broadleaf weeds

2.0 Technical Grade Active Ingredient

2.1 Identity

Common name		Chlorimuron-ethyl
Function		Herbicide
Chemical Family		Sulfonylurea
Chemical name		
1	**International Union of Pure and Applied Chemistry (IUPAC)**	Ethyl 2-(4-chloro-6-methoxypyrimidin-2-ylcarbamoylsulfamoyl)benzoate
2	**Chemical Abstracts Service (CAS)**	Ethyl 2-[[[[(4-chloro-6-methoxy-2-pyrimidinyl)amino]carbonyl]amino]sulfonyl]benzoate
CAS Registry Number		90982-32-4
Molecular Formula		$C_{15}H_{15}ClN_4O_6S$
Structural Formula		
Molecular Weight		414.8

Registration Number	Purity of the Technical Grade Active Ingredient
25432	97.8%
29924	96.0%

2.2 Physical and Chemical Properties

Property	Result
Vapour pressure at 25°C	4.9×10^{-7} mPa
Ultraviolet (UV)/visible spectrum	No absorbance at $\lambda > 300$ nm.
Solubility in water at 20–25°C	pH Solubility (mg/L) 5 9.0 7 1200
n-Octanol/water partition coefficient	log K_{ow}= 0.11; K_{ow}= 1.3 at pH 7
Dissociation constant at 20–25ºC	pKa = 4.2

2.3 Registered Uses

Appendix I lists all chlorimuron-ethyl products that are registered under the authority of the *Pest Control Products Act* as of 31 March 2017. There are currently nine registered end-use products, two technical grade active ingredients and one manufacturing concentrate containing chlorimuron-ethyl. Appendix II lists all the commercial-class uses for which chlorimuron-ethyl is presently registered.

3.0 Impact on Human and Animal Health

Chlorimuron-ethyl is a sulfonylurea herbicide. A detailed review of the toxicological database for chlorimuron-ethyl was conducted. The database is complete, consisting of the standard array of toxicity studies currently required for hazard assessment purposes. Some studies were generated prior to development of Good Laboratory Practices (GLP) testing protocols, but were supplemented with required information in order to be acceptable in accordance to international testing protocols and GLP in place at that time. The scientific quality of the data is acceptable and the database is considered adequate to define the majority of the toxic effects that may result from exposure to chlorimuron-ethyl.

In rats, radiolabelled chlorimuron-ethyl was absorbed by the gastrointestinal (GI) tract following single or high dose gavage administration, or by repeated low-dose dietary administration. It was extensively metabolized with the same metabolites present in feces, urine and tissues. Following low dose administration, metabolites were found mainly in the GI tract and liver, and additionally in fat, kidneys, skin, bones and hide at the high dose level. The major metabolites were hydroxylated analogs listed in Appendix III, Table 3. Rapid excretion of chlorimuron-ethyl occurred via urine and feces, in approximately equal proportions after single low and high dose administration, with a half-life of approximately 50 hours. Total tissue residues compromised a small amount (<0.35%) of the administrated dose 168 hours post-treatment. No significant sex differences were noted in excretion or metabolism data, regardless of dosing regimen.

In acute toxicity studies chlorimuron-ethyl was of low oral, and inhalation toxicity in the rat and low dermal toxicity in the rabbit. It was minimally irritating to the rabbit eye and guinea pig skin. There was no evidence of sensitization in a supplemental sensitization study in guinea pigs,

however, due to methodological and reporting limitations chlorimuron-ethyl was considered a potential dermal sensitizer.

In short-term, repeat dose dietary toxicity studies in rodents, common effects included decreased body weight and increased liver weights. An increased incidence of liver centrilobular hypertrophy (mouse) and cytoplasmic margination of centrilobular hepatocytes (rat) was observed, which increased in severity and frequency with increasing dose level. Hematology changes, such as decreased red blood cell (RBC) number and hematocrit, and increased monocyte number, were noted in one or both sexes. Hematological changes were difficult to interpret in the absence of historical control data and possible in vitro hemolysis of blood samples. The results are suggestive of anemia, particularly at high-dose levels in rats. Increases in several organ weights were also noted but these effects were considered non-adverse as there were no histopathology findings.

In dogs, hepatic effects were noted with repeated dietary exposure as evidenced by enlarged livers, hepatocytic swelling, and iron in sinusoidal cells. At higher dose levels, bile retention, and extramedullary hematopoiesis were also observed. As noted in rats, findings in dogs were also suggestive of anemia including decreases in RBC numbers, hematocrit, haemoglobin levels, and increased reticulocyte count. Anemia was further indicated by clinical signs of pale or yellow gums, dehydration and languid behavior. Increased neutrophil and monocyte numbers were noted in females. In addition, thin appearance, decreased body weights, and clinical chemistry effects (increased serum aspartate aminotransferase (AST), alkaline phosphatase (ALP), alanine transaminase phosphatase (ALT) activity were present. Organ atrophy was noted in the thymus, prostate, uterus, cervix, vagina, and testes. Additional effects in the testis included hypospermatogenesis and decreased weight. Ovary weight was also reduced. Organ atrophy was not observed in the one year dog study; however, lower dose levels were used in this study compared to the 90-day dog study.

Repeat dose dermal exposure in rats resulted in some erythema at the site of application. Increased adrenal weights indicated systemic exposure, but there was no indication of systemic toxicity up to the limit dose of testing. No repeat-dose inhalation study was available.

In an 18-month dietary carcinogenicity study in mice, there was no evidence of oncogenicity up to the highest dose tested; however a maximum tolerated dose was not achieved. There was no evidence of oncogenicity in rats following long-term dietary exposure, and no evidence of genotoxicity in a battery of studies.

No treatment-related effects on spleen or thymus weights or on the humoral immune response were observed in a 28-day rat dietary immunotoxicity study.

A one-generation dietary rat reproduction toxicity study was considered supplemental due to low animal numbers in the treatment groups. In this study, decreased pup body weights at weaning and decreased litter weights on PND 4 were noted. At a higher dose level, a reduced number of live pups at birth occurred in the presence of decreased body weight and body weight gains in the dams. In a two-generation dietary reproductive toxicity study in rats, reduced body weights were noted during the premating period in F0 dams, and at LD 22 for F0, F1 and F2 dams. Body weight and food consumption data were not collected during the reproductive period. Effects in the offspring included lower pup body weights on PND 4, and at weaning (PND21). In addition, decreased cellularity in the internal granular layer and increased cellularity in the external

germinal layer of the cerebellum was noted in $F2_b$ weanlings (PND 22) at the high dose level. This effect resembled changes consistent with under-nutrition, with no degeneration or necrosis present (Sima et al., 1975). It is not known if this effect occurred in other litter cohorts, as the young were discarded after sacrifice in the $F1_a$, $F1_b$ and $F2_a$ litters.

In a gavage developmental toxicity study in rabbits, an increased incidence of partially ossified hyoid was noted in the presence of maternal toxicity. Maternal toxicity included decreased body-weight gains, body weight loss and reduced food consumption. There was no evidence of treatment-related malformation in rabbits.

In a rat gavage developmental toxicity study, an increased incidence of partially ossified or unossified sternebrae occurred at the same dose levels resulting in decreased body weight gains in the dams. At a higher dose level, increased incidences of skeletal variations (bipartite and dumbelled centra vertebrae; increased rib ossification centres) and malformation (microphthalmia) were noted. At this same dose level, effects on maternal bodyweight became more significant and an increase in total litter resorption was noted.

In an acute gavage neurotoxicity study, decreased motor activity was observed. In addition, males showed an increased incidence of low arousal. At the highest dose, in addition to the effects already noted, body-weight gain was reduced; body temperature was decreased, with increased incidences of “curled posture” and “appearing asleep” noted. Most effects occurred on the day of dosing. In a short-term dietary neurotoxicity study in rats, female body weight and body weight gain were reduced at the mid- and high-dose levels. Hind limb splay was reduced at the high dose level in both sexes. Additionally, increased arousal was noted in females at the highest dose level tested. Neither neurotoxicity study showed any treatment-related alterations in gross or microscopic neuropathology. Except for the effect on the cerebellum in the offspring in the reproductive toxicity study, no other repeat-dose study in the database showed evidence for a neurotoxic effect.

The toxicology reference values used for human health risk assessment are summarized in Appendix III, Table 1. The results of toxicology studies conducted in laboratory animals with chlorimuron-ethyl are summarized in Appendix III, Table 2. The summary of major metabolites of chlorimuron-ethyl is presented in Appendix III, Table 3.

Epidemiology

The Agricultural Health Study, a large prospective cohort study of licensed pesticide applicators and their families in Iowa and North Carolina, examined the relationship between wheeze and pesticide use. Thirteen pesticides were associated with wheeze. Among the herbicides, chlorimuron-ethyl had the highest odds ratio (OR = 1.62, 95% confidence interval: 1.25, 2.10). The study investigators noted that chlorimuron-ethyl is only available in a dry formulation, which may make it more likely to result in exposure via the respiratory route. They also indicated that they were unable to determine if chlorimuron-ethyl itself or any of the other ingredients in the pesticide product was responsible for the association with wheeze symptoms (Hoppin et al., 2006). No other relevant published scientific studies had adequate information to support their use in risk assessment.

3.1 *Pest Control Products Act* Hazard Characterization

For assessing risks from potential residues in food or from products used in or around homes or schools the *Pest Control Products Act* requires the application of an additional 10-fold factor to threshold effects to take into account completeness of the data with respect to the exposure of, and toxicity to, infants and children, and potential prenatal and postnatal toxicity. A different factor may be determined to be appropriate on the basis of reliable scientific data.

With respect to the completeness of the toxicity database as it pertains to the toxicity to infants and children. The database contains the standard complement of required studies including developmental toxicity studies in rats and rabbits, and a multi-generation reproductive toxicity study in rats. A supplemental 1-generation reproductive toxicity study in rats was also available.

With respect to potential prenatal and postnatal toxicity, there was no indication of increased susceptibility of young compared to parental animals in the developmental toxicity studies. Minor developmental effects, increased incidence of skeletal/ossification variations, were observed in both species in the presence of maternal toxicity (decreased body weight and/or body-weight gain). Increased incidences of malformation (microphthalmia) and total resorptions were noted in the presence of maternal toxicity in the rat developmental toxicity; however these serious findings were noted at a dose level 4-fold higher than the LOAEL, providing an additional 4-fold margin of protection to these effects. Altered cellularity in the cerebellum was observed in $F2_b$ rat pups at a dose that was maternally toxic (decreased body weight) in the two-generation reproductive toxicity study.

Overall, the database is adequate for determining the sensitivity of the young and effects on the young are well-characterized. The effect on the cerebellum in the two generation reproductive toxicity study was considered a serious endpoint for which concern was tempered by the presence of maternal toxicity. Therefore, the 10-fold *Pest Control Products Act* factor (PCPA factor) was reduced to 3-fold for scenarios in which this endpoint was used to establish the point of departure. For exposure scenarios involving other sub-populations, including children, the risk was considered well-characterized and the PCPA factor was reduced to 1-fold.

3.2 Dietary Exposure and Risk Assessment

In a dietary exposure assessment, the PMRA determines how much of a pesticide residue may be ingested with the daily diet. Exposure to chlorimuron-ethyl from potentially treated imported foods is also included in the assessment. Dietary exposure assessments are age-specific and incorporate the different eating habits of the population at various stages of life (infants, children, adolescents, adults and seniors). For example, the assessments take into account differences in children's eating patterns, such as food preferences and the greater consumption of food relative to their body weight when compared to adults. Dietary risk is then determined by the combination of the exposure and the toxicity assessments. High toxicity may not indicate high risk if the exposure is low. Similarly, there may be risk from a pesticide with low toxicity if the exposure is high.

The PMRA considers limiting use of a pesticide when exposure exceeds 100% of the reference dose. The PMRA's Science Policy Note SPN2003-03 Assessing Exposure from Pesticides, A User's Guide, presents detailed acute, chronic and cancer risk assessment procedures.

Sufficient information was available to adequately assess the dietary risk from exposure to chlorimuron-ethyl. Acute and chronic dietary exposure and risk assessments were conducted using the Dietary Exposure Evaluation Model - Food Commodity Intake Database™ (DEEM-FCID™, Version 4.02, 05-10-c) program, which incorporates consumption data from the National Health and Nutrition Examination Survey, What We Eat in America (NHANES/ WWEIA) 2005-2010 available through the Centers for Disease Control and Prevention's (CDC) National Center for Health Statistics (NCHS). Further details on the consumption data are available in Science Policy Note SPN 2014-01: General Exposure Factor Inputs for Dietary, Occupational and Residential Exposure Assessments. For more information on dietary risk estimates and the residue chemistry information used in the dietary assessment, see Appendix IV and V.

3.2.1 Determination of Acute Reference Dose (ARfD)

All Populations

To estimate acute dietary risk, the gavage developmental toxicity study in rats with a maternal NOAEL of 30 mg/kg bw/day was selected. At the maternal LOAEL of 150 mg/kg bw/day, decreased body weight gain was observed within the first 2 days of dosing and study is therefore relevant to an acute risk assessment. Standard uncertainty factors of 10-fold for interspecies extrapolation and 10-fold for intraspecies variability were applied. As discussed in the *Pest Control Products Act* Hazard Characterization Section, the PCPA factor was reduced to 1-fold for this scenario, thus the composite assessment factor (CAF) is 100.

The ARfD is calculated according to the following formula:

$$\text{ARfD (gen. pop)} = \frac{\text{NOAEL}}{\text{CAF}} = \frac{30 \text{ mg/kg bw}}{100} = 0.3 \text{ mg/kg bw of chlorimuron-ethyl}$$

The ARfD provides a margin of 500 to the NOAEL of 150 mg/kg bw/day for microphthalmia and total resorptions noted in rat developmental toxicity study.

3.2.2 Acute Dietary Exposure and Risk Assessment

The acute dietary risk was calculated considering the highest ingestion of chlorimuron-ethyl that would be likely on any one day, and using food and drinking water consumption and food and drinking water residue values. The expected intake of residues is compared to the ARfD, which is the dose at which an individual could be exposed on any given day and expect no adverse health effects. When the expected intake of residues is less than the ARfD, the acute dietary exposure is not of concern.

The acute dietary exposure and risk assessments were conducted for the general population and all subpopulations. The acute analysis was conducted using residue values taken from MRLs and tolerances. No refinement was made for the percent crop treated estimate. Drinking water contribution to the exposure was accounted for by direct incorporation of the appropriate estimated environmental concentration (EEC), obtained from water modelling (see Section 3.3), into DEEM (Dietary Exposure Evaluation Model). DEEM default processing factors were applied. Experimental processing factors were used when values were higher than default DEEM processing factors.

The acute dietary (food and drinking water) exposure estimates, at the 95th percentile, are approximately 0.3% of the ARfD for the general population and range from 0.24% for youth 13-19 years of age and adults aged 50 years and older, to 1% of the ARfD for all infants, and are therefore not of concern.

3.2.3 Determination of Acceptable Daily Intake (ADI)

To estimate risk of repeated dietary exposure, the rat dietary two-generation reproductive toxicity study with an offspring NOAEL of 13 mg/kg bw/day was selected. At the offspring LOAEL of 140 mg/kg bw/day, decreased cellularity in the internal granular layer and increased cellularity in the external germinal layer in the cerebellum were observed in $F2_b$ pups on PND 22. Standard uncertainty factors of 10-fold for interspecies extrapolation and 10-fold for intraspecies variability were applied. As discussed in the *Pest Control Products Act* Hazard Characterization section, a 10-fold PCPA factor was reduced to 3-fold when using this study for risk assessment. The composite assessment factor (CAF) is thus 300.

The ADI is calculated according to the following formula:

$$\text{ADI} = \frac{\text{NOAEL}}{\text{CAF}} = \frac{\text{13 mg/kg bw/day}}{300} = 0.04 \text{ mg/kg bw/day of chlorimuron-ethyl}$$

The ADI provides a margin of 3750-fold to the NOAEL for malformations and total resorptions observed in rats, and a margin of 4000 to the NOAEL in the 18-month mouse oncogenicity study, which was the highest dose tested, although maximum tolerated dose was not achieved.

3.2.4 Chronic Dietary Exposure and Risk Assessment

The chronic dietary risk was calculated using the average consumption of different foods and drinking water and the average residue values on those foods and in drinking water. The estimated exposure was then compared to the ADI. When the estimated exposure is less than the ADI, the chronic dietary exposure is not of concern.

The chronic assessment was conducted using residue values taken from MRLs and tolerances. No refinement was made for the crop reside or percent crop treated estimate. Drinking water contribution to the exposure was accounted for by direct incorporation of the appropriate estimated environmental concentration (EEC), obtained from water modelling (see Section 3.3), into DEEM. DEEM default processing factors were applied. Experimental processing factors were used when values were higher than default DEEM processing factors.

The chronic dietary exposure estimate from food and water for the general population represents 0.9% of the ADI. Chronic exposure estimates for population subgroups range from 0.6% for youth 13–19 years of age, to 3.1% of the ADI for all infants. Thus, chronic exposure to chlorimuron-ethyl residues in food and drinking water is not of concern.

3.2.5 Determination of Cancer Potency Factor

There was no evidence of oncogenicity in rats or mice; however the dosing was not considered adequate in mice. As noted above, the toxicology reference values selected for risk assessment

provide an adequate margin to the highest dose level tested in the mouse oncogenicity study, which was also the NOAEL.

3.3 Exposure from Drinking Water

Residues of chlorimuron-ethyl in potential drinking water sources were estimated from modelling, as described below.

3.3.1 Concentrations in Drinking Water

Chlorimuron-ethyl is registered for use on soybeans, a field crop, therefore, modelling the EECs of chlorimuron-ethyl residues in drinking water sources was required. EECs were determined for the combined residue of chlorimuron-ethyl, sulfonamide (IN-B4450), pyrimidine-amine (IN-N6186), demethyl-chlorimuron ethyl (IN-L8330) and dechloro-chlorimuron ethyl in potential sources of drinking water. EECs were calculated using the Pesticides in Water Calculator (PWC V1.52) model. Modelling for surface water used a standard Level 1 scenario, which is a small reservoir adjacent to an agricultural field. EECs in groundwater were calculated by selecting the highest EEC from several selected scenarios representing different regions of Canada. All scenarios were run for 50 years. The use pattern modelled was a single application of 9 g a.i./ha. The EECs resulting from this Level 1 assessment were calculated using conservative inputs with respect to application timing, and geographic scenario. These EECs should therefore allow for future use expansion into other crops at this application rate and method.

The highest groundwater daily peak EEC value of 0.015 ppm and yearly average EEC value of 0.015 ppm for chlorimuron-ethyl were used in the acute and the chronic dietary exposure assessments, respectively (please refer to the Environmental Assessment Section of this document for details).

3.3.2 Drinking Water Exposure and Risk Assessment

Drinking water exposure estimates were combined with food exposure estimates, with EEC point estimates incorporated directly in the dietary (food and drinking water) assessments. Please refer to Sections 3.2.2 and 3.2.4 for details.

3.4 Occupational Exposure and Risk Assessment

Occupational risk is estimated by comparing potential exposures with the most relevant endpoint from toxicology studies to calculate a MOE. This is compared to a target MOE incorporating uncertainty factors protective of the most sensitive subpopulation. If the calculated MOE is less than the target MOE, it does not necessarily mean that exposure will result in adverse effects, but mitigation measures to reduce risk would be required.

3.4.1 Toxicology Endpoint Selection for Occupational Risk Assessment

3.4.1.1 Short-term dermal and inhalation routes

For short- and intermediate-term occupational exposures via the dermal and inhalation routes, the offspring NOAEL of 13 mg/kg bw/day from the two-generation reproductive toxicity study in rats was selected for risk assessment. Offspring toxicity was observed in this study in the form of decreased cellularity in the internal granular layer and increased cellularity in the external

germinal layer in $F2_b$ pups on PND 22. Worker populations could include pregnant or lactating women and therefore these endpoints were considered appropriate for the occupational risk assessment. The 21-day dermal toxicity study in rats did not assess the endpoint of concern, namely developmental effects in pups following pre-natal or post-natal exposure. A repeated dose inhalation toxicity study was not available.

The target MOE for these scenarios is 300, which includes uncertainty factors of 10-fold for interspecies extrapolation and 10-fold for intraspecies variability as well as a factor of 3-fold for the reasons outlined in the *Pest Control Products Act* Hazard Characterization Section. The selection of this study and MOE is considered to be protective of all populations, including nursing infants and the unborn children of exposed female workers.

3.4.1.2 Cancer Risk Assessment

There was no evidence of oncogenicity in rats or mice; however the dosing was not considered adequate in mice. As noted previously, the toxicology reference values selected for risk assessment provide an adequate margin to the highest dose level tested in the mouse oncogenicity study, which was also the NOAEL.

3.4.1.3 Dermal Absorption

There are no dermal absorption data available in the literature nor were any submitted by the registrant. For the purpose of this risk assessment, the dermal absorption was assumed to be 100%.

3.4.2 Occupational Exposure and Risk Assessment

Workers can be exposed to chlorimuron-ethyl through mixing, loading, or applying the pesticide, and when entering a treated site to conduct postapplication activities such as scouting.

3.4.2.1 Mixer, Loader, and Applicator Exposure and Risk Assessment

There are potential exposures to mixers, loaders, and applicators. The following scenarios were assessed:

- Open mixing/loading of wettable granule and dry flowable products
- Open cab groundboom application of liquids

Based on the number of applications and the timing of application, workers applying chlorimuron-ethyl would generally have a short (<30 days) duration of exposure.

Handler exposure was estimated based on the following personal protection**:**

Baseline PPE: Long sleeved shirt, long pants, and chemical-resistant gloves.

Dermal and inhalation exposures were estimated using data from the Agricultural Handler Exposure Task Force (AHETF). The AHETF was formed in 2001 with the objective of providing more up-to-date generic exposure data to replace the data currently being used in the Pesticide Handlers Exposure Database Version 1.1 (PHED).

Mixer/loader/applicator exposure estimates were based on the best available data at this time. Route specific MOEs for mixer/loader and applicators for agricultural crops are outlined in Appendix VI, Table 1. Calculated dermal, inhalation, and combined (total exposure from dermal and inhalation routes) MOEs for mixer/loaders and applicators of chlorimuron-ethyl exceeded target MOEs for all scenarios and are not of concern.

3.4.2.2 Postapplication Worker Exposure and Risk Assessment

The postapplication occupational risk assessment considered exposures to workers who enter treated sites to conduct agronomic activities involving foliar contact (e.g., scouting). Based on the use pattern, there is potential for short-term (<30 days) postapplication exposure to chlorimuron-ethyl residues for workers.

Activity-specific transfer coefficients (TC) from the Agricultural Re-entry Task Force (ARTF) were used to estimate postapplication exposure resulting from contact with treated foliage at various times after application. A TC is a factor that relates worker exposure to dislodgeable residues. TCs are specific to a given crop and activity combination, for example, hand harvesting apples or scouting late season corn, and reflect standard clothing worn by adult workers. Postapplication exposure activities include, but are not limited to, scouting and hand weeding.

Dislodgeable foliar residues (DFR) refer to the amount of residue that can be dislodged or transferred from a surface, such as the leaves of a plant. There were no chemical-specific DFR studies submitted to the PMRA for the re-evaluation of chlorimuron-ethyl; therefore the following defaults were used:

- A default peak value of 25% of the application rate with a dissipation rate of 10% per day

For workers entering a treated site, restricted-entry intervals (REIs) were calculated to determine the minimum length of time required before people can safely enter after application. An REI is the duration of time that must elapse before residues decline to a level where performance of a specific activity results in exposures above the target MOE.

The PMRA is primarily concerned with the potential for dermal exposure for workers performing postapplication activities in crops treated with a foliar spray. Based on the vapour pressure of chlorimuron-ethyl, inhalation exposure is not likely to be of concern provided that the minimum 12-hour REI is followed.

Calculated dermal MOEs for worker postapplication exposure to chlorimuron-ethyl in commercial crops exceeded target MOEs and are not of concern. REIs were set at the standard minimum value of 12 hours for all postapplication activities. The postapplication exposure assessment is outlined in Appendix VI, Table 2.

3.4.3 Aggregate Assessment

Aggregate endpoints were not required because there are no residential.

3.4.4 Cumulative Assessment

The *Pest Control Products Act* requires that the PMRA consider the cumulative exposure to pesticides with a common mechanism of toxicity. For the current evaluation, the PMRA did not identify information indicating that chlorimuron-ethyl shares a common mechanism of toxicity with other pest control products. Therefore, there is no requirement for a cumulative assessment at this time.

3.5 Incident Reports – Health and Domestic Animals

As of 23 June 2017, one human incident, one domestic animal incident, and 3 packaging failure incidents involving chlorimuron-ethyl have been reported to the PMRA. The human incident occurred in the United States and involved the death of an individual following exposure to a product that contained chlorimuron-ethyl and other active ingredients. It was considered unlikely that the reported effects were related to the product exposure. In the United States, one domestic animal incident was reported, it was speculated that a donkey ingested the product, but there was no witnessed exposure, therefore it could not be assessed for causality. No injury or exposure occurred following the packaging failure incidents.

Based on these incident reports, no additional action is required.

4.0 Environmental Assessment

4.1 Fate and Behaviour in the Environment

A summary of environmental fate data for chlorimuron-ethyl is presented in Appendix VII, Table 1.

Terrestrial Environment

Chlorimuron-ethyl enters the terrestrial environment when it is used as an herbicide on a variety of crops. Based on its physical and chemical properties chlorimuron-ethyl is very soluble in water and is not expected to volatilize under field conditions or from water and moist soils. Chlorimuron-ethyl is unlikely to persist in the atmosphere and is not expected to undergo long range transport. Hydrolysis is the major route of dissipation at pH below 7 and phototransformation on soil may also contribute to the dissipation of chlorimuron-ethyl in the environment. Foliar dissipation studies indicate that chlorimuron-ethyl is released from plant leaves with a DT_{50} ranging from 5.57 to 15 days.

Assessment of mobility (adsorption/desorption, soil TLC, soil column leaching, criteria of Cohen and GUS score, laboratory and field dissipation studies) indicates that chlorimuron-ethyl and its major transformation products can be mobile in soil and therefore have the potential to leach to groundwater. Laboratory aerobic biotransformation studies indicate that chlorimuron-ethyl and its transformation products are non-persistent to moderately persistent in soils. No valid Canadian field dissipation studies were submitted to the PMRA. An available field dissipation study conducted on four non-equivalent ecoregion soils located in the United States contradicts laboratory study data. It indicates that chlorimuron-ethyl is slightly persistent in soils and that it is immobile, being generally found in the upper soil horizons (0–10 cm depth). Without field

evidence for Canadian equivalent ecoregions, laboratory fate studies that suggest moderate persistence and the potential for mobility in soil were used in this assessment.

The lability of chlorimuron-ethyl to leach is supported by the groundwater modelling results which do predict some residues in groundwater (see Water Monitoring Information section for more details). However, chlorimuron-ethyl is not detected in Canadian groundwater and American monitoring studies indicate that chlorimuron-ethyl is rarely detected in groundwater with less than 1% of all samples having detections of chlorimuron-ethyl (11 out of 10 468 samples).

Chlorimuron-ethyl is not expected to bioaccumulate in terrestrial organisms based on studies reviewed on bluegill sunfish and rats, as well as a low Log K_{ow} of 0.11.

Aquatic Environment

Chlorimuron-ethyl is not registered for direct application to water in Canada. Chlorimuron-ethyl may reach the aquatic environment through spray drift and runoff from the application site. When chlorimuron-ethyl reaches the aquatic environment, it is not expected to persist in the water column due to hydrolysis, photolysis and microbial transformation. The transformation product, dimethyl chlorimuron-ethyl is expected to be persistent and to partition to sediment. Hydrolysis is expected to contribute significantly to the dissipation of chlorimuron-ethyl from the water column at environmentally relevant pHs below 7. Phototransformation of chlorimuron-ethyl in water is not expected to be a major route of dissipation. Chlorimuron-ethyl is slightly to moderately persistent in natural aquatic environments in anaerobic and aerobic conditions, respectively.

Available monitoring data indicates chlorimuron-ethyl is detected in surface water (9% of Canadian samples with maximum detection of 0.162 µg/L. Although monitoring information indicates chlorimuron-ethyl is rarely detected in Canadian groundwater, it does have properties that indicate that leaching to groundwater is a possibility.

Chlorimuron-ethyl is not expected to bioaccumulate in organisms in aquatic environments.

4.2 Environmental Risk Characterization

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 at which adverse effects occur. Estimated environmental exposure concentrations (EECs) are concentrations of pesticide in various environmental media, such as food, water, soil and air. The EECs are estimated using standard models which take into consideration the application rate(s), chemical properties and environmental fate properties, including the dissipation of the pesticide between applications. Ecotoxicology information includes acute and chronic toxicity data for various organisms or groups of organisms from both terrestrial and aquatic habitats including invertebrates, vertebrates, and plants. Toxicity endpoints used in risk assessments may be adjusted to account for potential differences in species sensitivity as well as varying protection goals (i.e. protection at the community, population, or individual level). Toxicity data for chlorimuron-ethyl are presented in Appendix VIII, Table 1 and Table 2. Toxicity data from other sulfonylureas were

used in the risk assessment when toxicity information for chlorimuron-ethyl was not available (Appendix VIII, Table 3 to Table 7).

The estimated EEC values (soil and aquatic) are presented in Appendix IX, Tables 1 and Table 2.

Initially, a screening level risk assessment is performed to identify specific uses that do not pose a risk to non-target organisms, and to identify those groups of organisms for which there may be a potential risk. The screening level risk assessment uses simple methods, conservative exposure scenarios and sensitive toxicity endpoints. For characterizing acute risk, acute toxicity values (LC_{50}, LD_{50}, and EC_{50}) from the relevant toxicity studies are divided by an uncertainty factor. The uncertainty factor is used to account for differences in inter- and intra-species sensitivity. Thus, the magnitude of the uncertainty factor depends on the group of organisms that are being evaluated (10 for fish, 2 for aquatic invertebrates). The EC_{50} is the effective concentration estimated to cause an effect to 50 percent of the test population. Similarly, the LC_{50} or LD_{50} is the lethal concentration or lethal dose estimated to cause mortality to 50% of the test population. When assessing chronic risk, the NOEC or NOEL is used and an uncertainty factor is not applied.

Integration of the environmental exposure and ecotoxicology is achieved by comparing exposure concentrations with concentrations at which adverse effects occur to derive a risk quotient. A risk quotient (RQ) is calculated by dividing the exposure estimate by an appropriate toxicity value [RQ=exposure/(toxicity/uncertainty factor)], and the risk quotient is then compared to the level of concern (Appendix X, Table 1 to Table 14). The LOC = 1 for all organisms with the exception of honeybees (acute LOC=0.4) and beneficial terrestrial arthropods (LOC=2).

If the screening level risk quotient is below the level of concern, the risk is considered negligible and no further risk characterization is necessary. If the RQ exceeds the LOC, then a "presumption of risk" exists, and a more refined assessment for effects, exposure and risk characterization may be conducted to better characterize the potential risk in the environment. Refinements to the risk assessment may continue until the risk is adequately characterized or no further refinements are possible.

4.2.1 Risks to Non-Target Terrestrial Organisms

For assessment of risk, toxicity endpoints from the most sensitive test species were used as surrogates for the wide range of species that can be potentially exposed following exposure to chlorimuron-ethyl. Toxicity information for chlorimuron-ethyl or surrogate from other sulfonylureas (when toxicity information for chlorimuron was not available) were used in the risk assessment.

At the screening level, risks to earthworms, honeybees, predators, parasitoids, birds, and wild mammals were not of concern (Appendix X, Table 1 to Table 5). However, potential risks to terrestrial plants were identified (Appendix X, Table 6). As an herbicide, chlorimuron-ethyl is relatively toxic to terrestrial vascular plants. Terrestrial buffer zones are proposed to protect non-target plants from spray drift (Appendix XII).

4.2.2 Risks to Non-Target Aquatic Organisms

A summary of aquatic toxicity data is presented in Appendix X, Table 7. Risks to freshwater invertebrates, freshwater fish, estuarine/marine invertebrates and fish are not of concern (Appendix X, Table 7, Table 8, Table 10 and Table 11). However, potential risks were identified for freshwater green algae and vascular plants (Appendix X, Table 9). The refined assessment indicated there is no risk of concern to these freshwater organisms (Appendix X, Table 12).

Runoff Assessment

Aquatic organisms can also be exposed to chlorimuron-ethyl as a result of runoff into a body of water. The linked models Pesticide Root Zone Model (PRZM) and Exposure Analysis Modeling System (EXAMS) were used to predict EECs resulting from runoff of chlorimuron-ethyl following application. The RQ values for runoff derived for acute exposure exceed the LOC for the algae and the duckweed at the highest EECs with RQ values of 1.28 and 4.80, respectively and at the lowest EECs for the duckweed only (RQ of 1.28) (Appendix V, Table 13).

Further Risk Characterization Using Canadian Freshwater Monitoring Data

There was sufficient chlorimuron-ethyl monitoring data available to conduct a risk assessment using monitoring data. The LOC was exceeded for algae and duckweed when using the conservative maximum concentration value from American data (0.852 µg/L). The LOC was slightly exceeded for duckweed only when the maximum concentration from Canadian monitoring data (0.162 µg/L) was used (Appendix V, Table 14). Hazard statements are proposed for product labels to reduce runoff (Appendix I).

4.3 Incident Reports - Environment

As of October 30, 2017, no environmental incident reports involving chlorimuron-ethyl had been submitted to the PMRA.

5.0 Value

5.1 Value of chlorimuron-ethyl

Chlorimuron-ethyl is registered exclusively for use in Eastern Canada on soybeans for post-emergence control of broadleaf weeds. It possesses residual weed control activity and prior to seeding burndown on all soybeans or as an in-crop treatment on glyphosate tolerant soybeans. It is also used alone on conventional (non-GMO or Identity Preserved) soybeans. These uses have made chlorimuron-ethyl an integral component of an overall weed management program in soybeans.

6.0 Pest Control Product Policy Considerations

6.1 Toxic Substances Management Policy Considerations

The Toxic Substances Management Policy (TSMP) is a federal government policy developed to provide direction on the management of substances of concern that are released into the environment. During the review process, chlorimuron-ethyl and its transformation products were assessed in accordance with the PMRA Regulatory Directive DIR99-03 and evaluated against the Track 1 criteria. The PMRA has reached the following conclusions:

Chlorimuron-ethyl does not meet Track 1 criteria, and is not considered a Track 1 substance. See Appendix XI, Table 1 for comparison with Track 1 criteria.

Chlorimuron-ethyl is not expected to form any transformation products that meet all Track 1 criteria.

The use of chlorimuron-ethyl is not expected to result in the entry of TSMP Track-1 substances into the environment.

6.2 Formulants and Contaminants of Health or Environmental Concern

During the review process, contaminants in the technical and formulants and contaminants in the end-use products are compared against the *List of Pest control Product Formulants and Contaminants of Health or Environmental Concern* maintained in the *Canada Gazette*[1]. The list is used as described in the PMRA Notice of Intent NOI2005-01[2] and is based on existing policies and regulations including: DIR99-03; and DIR2006-02[3], and taking into consideration the Ozone-depleting Substance Regulations, 1998, of the *Canadian Environmental Protection Act* (substances designated under the Montreal Protocol). The PMRA has reached the following conclusions:

Technical grade chlorimuron-ethyl and related commercial end-use products as well as other domestic formulations of chlorimuron-ethyl do not contain any formulants of health or environmental concern identified in the *Canada Gazette.*

The use of formulants in registered pest control products is assessed on an ongoing basis through the PMRA formulant initiatives and Regulatory Directive DIR2006-02.[4]

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1 *Canada Gazette*, Part II, Volume 139, Number 24, SI/2005-114 (2005-11-30) pages 2641–2643: *List of Pest Control Product Formulants and Contaminants of Health or Environmental Concern* and in the order amending this list in the *Canada Gazette*, Part II, Volume 142, Number 13, SI/2008-67 (2008-06-25) pages 1611-1613. *Part 1 Formulants of Health or Environmental Concern, Part 2 Formulants of Health or Environmental Concern that are Allergens Known to Cause Anaphylactic-Type Reactions and Part 3 Contaminants of Health or Environmental Concern.*

2 NOI2005-01, *List of Pest Control Product Formulants and Contaminants of Health or Environmental Concern* under the New *Pest Control Products Act.*

3 DIR2006-02, PMRA Formulants Policy.

4 DIR2006-02, PMRA Formulants Policy.

7.0 Conclusions of Science Evaluation?

Chlorimuron-ethyl is an important herbicide used in soybean production in eastern Canada to control a variety of broadleaved weeds.

With respect to human health, to protect workers entering treated sites, a restricted-entry interval (REI) of 12 hours is proposed for agricultural uses. To protect bystanders, a standard statement indicating to apply only when the potential for drift to areas of human habitation or areas of human activity such as houses, cottages, schools and recreational areas is minimal is proposed.

Chlorimuron-ethyl is unlikely to pose risks of concern to the environment when used according to the proposed label directions which include new and updated advisory statements and spray buffer zones.

List of Abbreviations

↑	increased
↓	decreased
♂	male
♀	female
A/G	albumin/globulin
abs	absolute
ADI	acceptable daily intake
a.i.	Active ingredient
AHEFT	Agricultural Handlers Exposure Task Force
ALP	alkaline phosphatase
ALT	alanine transaminase
ARfD	acute reference dose
ARTF	Agricultural Re-entry Task Force
ASAE	American Society of Agricultural Engineers
AST	aspartate aminotransferase
atm	atmosphere
ATPD	Area treated per day
bw	Body weight
bwg	bodyweight gain
ºC	degree in Celsius
Ca	calcium
CEPA	Canadian Environmental Protection Act
CHE	chlorimuron-ethyl
Cl	chlorine
cm^2	Centimeters squared
cm^2/hr	Centimeters squared per hour
CR	Chemical Resistant
DA	Dermal absorption
DACO	data code
DF	Dry Flowable
DFR	Dislodgeable foliar residue
DT_{50}	time required for 50% dissipation of the initial concentration
EC_{50}	effective concentration on 50% of the population
EDE	estimated daily exposure
EEC	environmental exposure concentration
ERS-1	Exposure Re-evaluation Section 1
EP	End use product
EXAMS	exposure-analysis-modeling-system
F0	parental animals
F1	1st generation offspring
F1a,b	1st generation offspring in two consecutive litters, a= first and b=second
F2	2nd generation offspring
F2a,b	2nd generation offspring in two consecutive litters, a= first and b=second
fc	food consumption
fe	food efficiency

FIR	food ingestion rate
g	grams
GD	gestation day
GI	gastrointestinal
GLP	good laboratory practices
GUS	groundwater ubiquity score
H	Henry's law constant
ha	Hectare
Hb	haemoglobin
Hct	haematocrit
HD	high-dose
HED	Health Evaluation Directorate
HPLC-UV	High Peformance Liquid Chromatography with Electronic photoconductivity dector
HPLC-UV	High Peformance Liquid Chromatography with UV Detection
hr(s)	hour(s)
K+	potassium
kg	Kilogram
K_{ow}	octanol water partition coefficient
L	litre(s)
LC_{50}	lethal concentration to 50%
LD	lactation day
LD_{50}	lethal dose to 50%
LOAEL	lowest observed adverse effect level
LOC	level of concern
m	Meters
max	Maximum
MCH	mean corpuscular hemoglobin
MCHC	mean corpuscular hemoglobin concentration
MCV	mean corpuscular volume
MD	mid-dose
MEA	Method Efficiency Factor
mg	Milligram
min	Minutes
MIS	maximum irritation score
M/L/A	Mixer/Loader/Applicator
mm Hg	Millimeters of mercury
MOE	Margin of exposure
MTD	Maximum tolerated dose
Na	sodium
NA	Not Applicable
NAFTA	North American Free Trade Agreement
NOAEL	No Observed Adverse Effect Level
NOEC	no-observed-effect-concentration
NOEL	no-observed-effect-level
nss	not statistically significant
OR	odds ratio

PCPA	Pest Control Product Act
PHED	Pesticide Handlers Exposure Database
PHI	Pre-harvest Interval
PMRA	Pest Management Regulatory Agency
PND	postnatal day
PPBD	Pesticide Properties Data Base
PPE	Personal Protective Equipment
ppm	parts per million
PRZM	Pesticide Root Zone Model
RBC	red blood cells
REI	Restricted-entry Interval
rel.	relative
RQ	risk quotient
SFO	single first order kinetics
ss	statistically significant
SUs	sulfonylureas
t1/2	half life
TC	Transfer co-efficient
TGAI	technical grade active ingredient
TLC	thin layer chromatography
TSMP	toxic substances management policy
µg	Microgram
USC	Use Site Category
USEPA	United States Environmental Protection Agency
WG	Wettable Granule
wt	weight

Appendix I Products containing chlorimuron-ethyl that are registered in Canada excluding discontinued products or products with a submission for discontinuation as of 31 March 2017, based upon the PMRA's Electronic Pesticide Regulatory System (e-PRS) database.

Registration Number	Marketing Class	Registrant (Code)	Product Name	Formulation Type	Net Contents	Guarantee
25433	Commercial	E.I. Du Pont Canada Company	Classic 25 DF Herbicide	Wettable granules	36–18 000 g (1–500 × 36 g water soluble bags)	25%
25784			Reliance STS Toss-N-Go Herbicide		171.2 g (4 × 42.8 g water soluble bags)	Chlorimuron ethyl: 21% Thifensulfuron methyl: 12%
29416			Classic Grande Herbicide		14–14400 g	25%
30803			SB-01Herbicide		176 g–bulk	Chlorimuron ethyl: 5.14% Flumioxazin: 40.59%
31494			Guardian plus WDG Herbicide		176 g–bulk	Chlorimuron ethyl: 5.14% Flumioxazin: 40.59%
32086			DuPont SB-02 Herbicide		234.4 g–1000 kg	Chlorimuron ethyl: 1.54% Metribuzin 70.4%
29624		3044873 Nova Scotia Company	Agactives Chlorette	Wettable Granules	14–14400 g	25%
30475		Nufarm Agriculture Inc.	Nufarm Chaperone Herbicide	Water Dispersible Granules	36 g–20 kg	25%
25539	Manufacturing Concentrate	E.I. Du Pont Canada Company	Chlorimuron Ethyl 25 DF Manufacturing Concentrate	Wettable Granules	1–600 kg	25%
25432	Technical Grade Active	E.I. Du Pont Canada Company	Chlorimuron Ethyl Technical Herbicide	Solid	50–500 kg	97.80%
29924		Nufarm Agriculture Inc.	Nufarm Chlorimuron-Ethyl Technical	Solid	1–1000 kg	96%

Appendix II Registered Commercial Class uses of chlorimuron-ethyl in Canada as of 31 March 2017. Uses from discontinued products or products with a submission for discontinuation are excluded[1]

Use Site Category	Sites[2]	Weeds	Application Method and Equipment	Maximum Application Rate (g a.i./ha)	
				Single	Cumulative Per Year
Industrial Oil Seed Crops and Fibre Crops Terrestrial Feed crops Terrestrial Food crops	Soybeans (conventional or glyphosate tolerant) Eastern Canada only	Common ragweed, redroot pigweed, velvetleaf, yellow nutsedge, dandelion (top growth control – 4 to 6 weeks), Wild carrot and volunteer adzuki beans (URMULE)	Ground	9	9
Industrial Oil Seed Crops and Fibre Crops Terrestrial Feed crops Terrestrial Food crops	Soybeans (Sulfonylurea tolerant) Eastern Canada only	Redroot pigweed, lady's thumb, wild mustard, common ragweed, velvetleaf, lamb's-quarters	Ground	9	9

1. The maximum number of applications is once per year.
2. Sites are as either stated on the label or interpreted by the PMRA so as to achieve consistency in naming.

Appendix III Toxicity Information for Health Risk Assessment

Table 1 Toxicology Reference Values for the Human Health Risk Assessment

Exposure Scenario	RfD	Point of Departure and Endpoint	CAF or Target MOE[1]
Acute Dietary (All populations)	ARfD = 0.3 mg/kg bw	NOAEL = 30 mg/kg bw/day (maternal ↓bwg (GD7-9) at the LOAEL=150 mg/kg bw/day	100
Chronic Dietary (All populations)	ADI = 0.04 mg/kg bw/day	NOAEL = 13 mg/kg bw/day (♀) (↓ cellularity in the internal granular layer and ↑ cellularity in the external germinal layer in the cerebellum at the LOAEL of 140 mg/kg bw/day in the rat two-generation reproductive toxicity study)	300
Short- and Intermediate - Term Dermal[2] and Inhalation[3]		NOAEL = 13 mg/kg bw/day (♀) (↓ cellularity in the internal granular layer and ↑ cellularity in the external germinal layer in the cerebellum at LOAEL of 140 mg/kg bw/day in the rat two-generation reproductive toxicity study)	300
Cancer Risk Assessment	Not considered to be oncogenic at doses tested		

[1] CAF (Composite assessment factor) refers to the total uncertainty and PCPA factors for dietary and residential risk assessment; MOE refers to the target margin of exposure for occupational assessment.

[2] Since an oral NOAEL was selected, a dermal absorption factor 100% was used in a route-to-route extrapolation

[3] Since an oral NOAEL was selected, an inhalation absorption factor of 100% (default value) was used in route-to-route extrapolation.

Table 2 Toxicity Profile

(Effects are known or assumed to occur in both sexes unless otherwise noted; in such cases, sex-specific effects are separated by semi-colons. Organ weight effects reflect both absolute organ weights and relative organ to bodyweights unless otherwise noted)

Toxicokinetic and Metabolism Studies	
Study/Species	**Results/Effects**
Absorption, Distribution, Metabolism, Elimination - Oral Gavage	Dose regimen: Single low-dose :16 mg/kg bw [phenyl-14C] (33.6µCi/rat) or Single low-dose: 16 mg/kg bw pyrimidine2-14C] (33.2 µCi/rat)

Sprague Dawley rat PMRA #1156114 MRIDs 00154749 00149578	Diet: 100 ppm unlabeled for 14d then single dose 16 mg/kg bw [phenyl-14C] (33.6 µCi/rat) Single high-dose 3000 mg/kg bw [phenyl-14C] (42 µCi/rat) and 750 mg/rat unlabeled Absorption: absorbed by the GI tract when administered orally in single low- or high-dose at ~50% Metabolism: extensively metabolized (~80%) with the same metabolites present in feces, urine and tissues (different proportions, mainly in the GI tract and liver at the low dose, and additionally in fat, kidneys, skin, bones and hide at high dose). Major metabolites were hydroxylated analogs, including HOPY-DPX-F6025, ODM-DPX-F6025, HPY-DPX-F6025, DI-HOPY-DPX-F6025, DPX-F6025 Excretion: excretion in urine and feces in approximately equal proportions at both high- and lose-dose with a half-life of ~50 hrs. Total tissue residue was < 0.35% of the total single low-dose and 2–3% after high-dose 168 hrs post-treatment. Incorporation in tissues was insignificant at 168 hrs Metabolite distribution was approximately the same for all dose regimens and for both sexes
Acute Toxicity Studies	
Study/Species	**Results/Effects**
Acute Oral Toxicity - Gavage Sprague Dawley rat PMRA# 1156106 1161172	LD_{50} = 4102/4236 mg/kg bw (♂/♀) **Low acute oral toxicity** Clinical signs included lethargy, ataxia, lacrimation, weakness, prostration, hyperemia, diarrhea and weight loss
Acute dermal toxicity New Zealand White rabbit PMRA #1156107 MRID 00131566	> 2000 mg/kg bw **Low acute dermal toxicity**
Acute Inhalation Toxicity - nose-only Sprague Dawley rat PMRA # 1156108 1156109 MRID 40843203	LC_{50} > 5.6 mg/L Low toxicity **Low acute inhalation toxicity**
Eye Irritation	**Minimally irritating to the eye**

New Zealand White rabbit PMRA # 1156110 1161173	
Dermal Irritation Hartley Guinea pigs PMRA # 1156111 1161174	**Minimally irritating to the skin**
Dermal Sensitization Hartley Guinea pigs PMRA # 1156111 1161174	Mild irritation was observed in both test and control pigs at the 60% concentration One treated animal found dead (day 1 after challenge) without additional information. Supplemental Study **Potential sensitizer**
Subchronic Toxicity Studies	
Study/Species	**Results/Effects**
Four-week range-finding and 90-day oral toxicity study - Diet CD-1 mice PMRA #1156101	90-day study: NOAEL = 1030/1151 mg/kg bw/day (♂/♀) **≥ 27/30 mg/kg bw/day:** ↑ liver wt (not adverse) (♂) **≥ 268/381 mg/kg bw/day:** centrilobular hepatocellular hypertrophy (not adverse) **1030/1151 mg/kg bw/day**: ↓ bwg, ↑ liver wt (not adverse)(♀)
90 day study listed with one generation reproductive toxicity study - Diet Sprague Dawley rat PMRA # 1156112 1161176	Systemic NOAEL = 173/8 mg/kg bw/day (♂/♀) **≥ 173/209 mg/kg bw/day**: ↑ rel adrenal wt (not adverse), altered MCH and MCHC (↓ 1 month in ♀ and month 2 ♂, but ↑ month 3 ♂), ↓ RBC (month 1: ♀; month 3: ♂); ↓ spleen wt (not adverse),↑ serum Ca (month 1 and 2) (♂); ↓ bw, ↓bwg, ↓ fe, ↑ abs adrenal wt (not adverse),↑ rel kidney wt (not- adverse), ↓ hematocrit (month 1), ↑ serum K (month 1) ↑ incidence of cytoplasmic margination of centrilobular hepatocytes (adaptive)(♀) **551/672 mg/kg bw/day**: alopecia, ↑ abs liver wt (adaptive), ↑ serum cholesterol, creatine, total protein, albumin, globulin (month 1 and 2 ♂ and month 3♀) and ↓ urine vol (after month 1 only); ↓ bw, ↓ bwg, ↓ fe, ↓ abs lung wt (not adverse), ↑ rel brain wt (not adverse), ↑ pituitary wts (not adverse), ↑ rel testis wt (not adverse), ↑ rel kidney wt (not adverse), ↑ rel liver wt, ↑ incidence of cytoplasmic margination of centrilobular hepatocytes, ↓ platelets, ↓ hematocrit (month 3) (♂); 1 undetermined cause of death (♀day 68), ↑ abs spleen wt (not adverse), ↑ monocytes, albumin (♀)

90-Day study in dogs - Diet Beagle dog PMRA # 1156102 1176108	NOAEL=2.9 mg/kg bw/day (♂/♀) **≥ 42.7 mg/kg bw/day:** ↑ incidence of enlarged liver and liver cells, and ↑ rel liver wt (adaptive), hepatocytic swelling, iron in the sinusoidal cells, ↑ ALP, ↓ Hct, RBC, ↑ reticulocyte count, MCV; ↑ abs liver wt (♂); ↓ albumin (♀ss) **176.5 mg/kg bw/day:** pale or yellow gums, thin appearance, dehydration and languid behaviour, ↓ bw, bw loss, ↓ fc, anemia: ↓ RBC, ↓Hct, Hb levels, ↑ reticulocytes, ↑ bile retention, ↑ extramedullary hematopoiesis, ↓ A/G ratio, ↓ Ca, ↓uric acid, ↓ cholesterol,↑ globulin, ↑ AST and ↑ ALT (transient), ↓ albumin, atrophy of thymus; hypospermatogenesis (↓ sperm and abnormal sperm), atrophy of prostate, ↓ testes wt (♂); atrophy of uterus, cervix, vagina, and ↓ovaries wt, ↑ abs liver wt (♀)
1-Year Oral Toxicity - Diet Beagle Dog PMRA # 1156104 1161177	NOAEL= 10/9 mg/kg bw/day (♂/♀) **51/55 mg/kg bw/day**: ↓ RBC ↓Hb and Hct; ↑ ALP (♂); ↓ bw and bwg, ↑ rel liver wt, ↓ abs & rel spleen wt, ↑ neutrophils and monocytes count (♀)
21-Day Dermal Toxicity New Zealand White rabbits PMRA #2314899	NOAEL (systemic) ≥ 1000 mg/kg bw (limit dose) (♂/♀) NOAEL (dermal irritation) = 100 mg/kg bw/day (♂) NOAEL (dermal irritation) = 400 mg/kg bw/day (♀) **≥ 400 mg/kg bw/day:** ↑ erythema at the site of application (♂) **1000 mg/kg bw/day:** ↑ erythema and edema at the site of application (♀)
Neurotoxicity Studies	
Study/Species	**Results/Effects**
Acute Oral Neurotoxicity - Gavage Sprague Dawley rat PMRA # 2314900 2542722	**NOAEL = 100 mg/kg bw** **≥ 500 mg/kg bw**: ↓ mean number and duration of movements on day 0; ↑ low arousal on day 0 (♂); **2000 mg/kg:** ↓ bwg (♂: day 0–7, ♀: days 0–17), ↑ curled up posture, ↓ rearing on day 0 and 7 (♂) and day 0 (♀)) ; ↓ body temperature (day 0), body weight loss day 0–1 (♂); ↑ rats appearing to be sleeping (♀) There were no treatment-related alterations in gross histopathology or microscopic neuropathology.
90-day neurotoxicity - Diet Sprague Dawley rat PMRA # 2314901 2542723 Positive controls:	**NOAEL = 71/35 mg/kg bw/day (♂/♀)** **≥ 90 mg/kg bw/day** ↓ bw, bwg and fe (♀) **220/259 mg/kg bw/day**: ↓ hind limb splay (wk 12 ♂, wk 4, 8, 12 in ♀);), ↓ fc, ↑ arousal (wk 13) (♀) There were no treatment-related alterations in gross histopathology or microscopic neuropathology.

2548753 2548754 2548755	
Chronic Toxicity/Carcinogenicity Studies	
Study/Species	**Results/Effects**
18-month oncogenicity - Diet CD - 1 mouse PMRA #1156103	NOAEL = 160/216 mg/kg bw/day **No evidence of oncogenicity up to the dose tested** **MTD not reached**
2-Year oncogenicity study (component of combined Oncogenicity – (Two generation, four-litter reproduction study) - Diet Sprague Dawley rat PMRA # 1156113 1156116 1156117 1161178	NOAEL = 10 mg/kg bw/day **≥ 10 mg/kg bw/day**: ↓ spleen wt, ↓ Hct; ↑ incidence of stained/wet perineum (♂); ↑ rel liver wt (♀) **110 mg/kg bw/day**: ↓ bw, altered kidney wt ↑♂/↓♀); ↑ rel brain wt (not adverse), ↑ rel testes wt (not adverse)(♂); ↓ bwg, fc and fe, ↓ abs heart wt (not adverse), ↓abs spleen wt (not adverse) (♀) **No evidence of oncogenicity**
Developmental/Reproductive Toxicity Studies	
Study/Species	**Results/Effects**
1-generation reproductive toxicity (component of combined Reproductive Toxicity - 90-day oral toxicity study) - Diet CD rat PMRA # 1156112 1161176	<u>Parental Toxicity</u> **@ 551 mg/kg bw/day**: ↓ dam bw and bwg <u>Reproductive Toxicity</u> **551 mg/kg bw/day**: ↓ live pups/litter (PND 0) <u>Offspring Toxicity</u> **≥ 173 mg/kg bw/day**: ↓ pup bw at weaning; ↓ litter wts on PND4 Supplemental
Two-generation, four-litter reproduction (2 litters/generation) - Diet (component of the two-year oncogenicity study) Sprague Dawley rat	<u>Parental Toxicity</u> **Parental NOAEL = 110/13 (♂/♀) mg/kg bw/day** **110/140 mg/kg bw/day**: ↓ bw F0 (premating nss), ↓ bw F1a /F1b dam, F2 a, F2b (at weaning, as there was no bw data collection during gestation and lactation) (♀) <u>Reproductive Toxicity</u> **Reproductive NOAEL = 13 mg/kg bw/day**

PMRA # 1156113 1156116 1156117 1161178	**110 mg/kg bw/day:** ↓ pup bw and litter wt in F2b at 24hrs <u>Offspring Toxicity</u> **Offspring NOAEL = 13 mg/kg bw/day** **110/140 mg/kg bw/day:** ↓ pup bw (all on PND 21, F1a: F2b on PND 4; ↓ cellularity in the internal granular layer and ↑ cellularity in the external germinal layer in the cerebellum in F2b (the only generation with histopathological examination; other cohorts were discarded)
Developmental Toxicity - Gavage Sprague Dawley rat PMRA # 1156118 1161179 1161180	<u>Maternal Toxicity</u> **Maternal NOAEL = 30 mg/kg bw/day** **≥ 150 mg/kg bw/day**: ↓ bwg (GD 7–9) **600 mg/kg bw/day:**↑ alopecia, ↓ bw; ↓ mean bwg, ↓ fc; ↑total litter resorptions <u>Developmental Toxicity</u> **Developmental NOAEL = 30 mg/kg bw/day** **≥ 150 mg/kg bw/day:** ↑ partially ossified and unossified sternebrae (developmental delay) **600 mg/kg bw/day:** ↓ bw, ↑ incidence of skeletal variations (bipartite and dumbbelled centra) and extra ossification center on the ribs); ↑ avg. % of malformed foetuses/litter (but 1 litter with 5 fetuses with multiple malformations D); ↑ microphthalmia (10/4 litters vs 1/1 litter in control); ↑ total resorptions (2 litters vs 0 in control) **Evidence of malformations in** presence of maternal toxicity **No evidence of sensitivity of the young**
Developmental Toxicity - Gavage New Zealand White rabbits PMRA #1156119	<u>Maternal Toxicity</u> **Maternal NOAEL = 48 mg/kg bw/day** **Maternal LOAEL = 300 mg/kg bw/day** **@300 mg/kg bw/day**: 1 mortality (cause unknown GD 9); ↓ bw, fc and bw loss <u>Developmental Toxicity</u> **Developmental NOAEL = 48 mg/kg bw/day** **Developmental LOAEL = 300 mg/kg bw/day** **@ 300mg/kg bw/day**: ↑ skeletal variations (partially ossified hyoid) **No evidence of malformation** **No evidence of sensitivity of the young**

Genotoxicity Studies	
Study/Species	**Results/Effects**
Reverse Mutation (in vitro) Salmonella typhimurium strains: TA1535, TA1537, TA98 and TA100 PMRA # 1156121 1156122	Negative with or without metabolic activation
Unscheduled DNA synthesis rat hepatocytes PMRA #1156120	Negative
Point Mutation Assay CHO/HGPRT Assay for gene mutation PMRA #1156123	Negative with or without metabolic activation
Chromosomal Aberrations Bone marrow chromosome (in vivo, gavage) Sprague Dawley rat PMRA #1156124	Negative with or without metabolic activation Not clastogenic
Immunotoxicity Studies	
Study/Species	**Results/Effects**
28-Day Immunotoxicity study - Diet Sprague Dawley rat PMRA #2314902 PMRA #2314903	NOAEL = 95 mg/kg bw/day No treatment-related effects on spleen or thymus wts or on the humoral immune response **184 mg/kg bw/day:** ↓bw and overall bwg **No evidence of immunotoxicity**

Table 3 Summary of the major metabolites of Chlorimuron-ethyl in rats

Coded Name	**Chemical Name**
HOPY-DPX-F6025	ethyl 2-{[(4-hydroxy-6-methoxypyrimidin-2-yl)carbamoyl]sulfamoyl}benzoate

Coded Name	Chemical Name
ODM-DPX-F6025	ethyl 2-{[(4-chloro-6-hydroxypyrimidin-2-yl)carbamoyl]sulfamoyl}benzoate
HPY-DPX-F6025	ethyl 2-{[(4-chloro-5-hydroxy-6-methoxypyrimidin-2-yl)carbamoyl]sulfamoyl}benzoate
DI-HOPY-DPX-F6025	ethyl 2-{[(4,6-dihydroxypyrimidin-2-yl)carbamoyl]sulfamoyl}benzoate
DPX-F6025	ethyl 2-{[(4-chloro-6-methoxypyrimidin-2-yl)carbamoyl]sulfamoyl}benzoate

Appendix IV Dietary Exposure and Risk Estimates

Table 1 Dietary Exposure and Risk Estimates for Chlorimuron-ethyl

Population Subgroup	Acute Dietary[1] (Food and Drinking Water) 95th percentile of expousre		Chronic Dietary[2] (Food and Drinking Water)	
	Dietary Exposure (mg/kg bw)	%ARfD	Dietary Exposure (mg/kg bw/day)	%ADI
General Population (total)	0.000860	0.29	0.000345	0.9
All Infants (< 1 year old)	0.002906	0.97	0.001230	3.1
Children 1–2 years old	0.001383	0.46	0.000540	1.4
Children 3–5 years old	0.001065	0.36	0.000439	1.1
Children 6–12 years old	0.000816	0.27	0.000317	0.8
Youth 13–19 years old	0.000707	0.24	0.000254	0.6
Adults 20–49 years old	0.000831	0.28	0.000335	0.8
Adults 50+ years old	0.000716	0.24	0.000320	0.8
Females 13-–49 years old	0.000833	0.28	0.000329	0.8

[1]Acute Reference Dose (ARfD) of 0.3 mg/kg bw for all population subgroups

[2]Acceptable Daily Intake (ADI) of 0.04 mg/kg bw/day for all population subgroups

Appendix V Food Residue Chemistry Summary

Chlorimuron-ethyl is a pyrimidinylsulfonylurea herbicide registered in Canada for use on soybeans. It inhibits the activity of two enzymes, acetolactate synthase (ALS) and acetohydroxy acid synthase (AHAS), involved in branched chain amino acid synthesis. Consequently cell division and plant growth are stopped without the essential amino acids valine and isoleucine. It is applied pre-planting for burn-off, post-planting and pre-emergent or post-planting post-emergence at a maximum 1–3 trifoliate timing of soybeans.

To improve potency, current label statements permit chlorimuron-ethyl to be tank-mixed with 2,4D-ester, saflufenacil, glyphosate, metribuzin and quizalofop-p-ethyl. Chlorimuron-ethyl can be used alone but coformulations are available with flumioxazin, thifensulfuron methyl and metribuzin. End-use products are formulated wettable granules or water dispersible granules. Chlorimuron-ethyl can be applied by ground foliar application. The maximum label application rate is 9 g a.i./ha on soybeans.

The nature of the residue in livestock and plant commodities is adequately understood based on acceptable metabolism studies in lactating cows, laying hens, soybeans and peanuts. The residue definition (RD) in all commodities for enforcement and risk assessment is expressed as the parent chlorimuron-ethyl.

Maximum Residue Limits (MRLs) have been established on soybeans and published in the *PMRA MRL database* for MRLs regulated under the *Pest Control Products Act*. No changes to the MRLs are proposed for chlorimuron-ethyl.

Analytical methods were previously reviewed and found to be adequate for data collection and enforcement. The reviewed methods use HPLC-UV, HPLC-EPD and LC-MS/MS with recoveries within the 70%–120% range and LOQ of 0.01–0.05 ppm. All methods were validated as data-gathering methods and some were found adequate as enforcement methods.

No data gap or data deficiencies according to residue chemistry guidelines (OECD Guidelines for the Testing of Chemicals, Section 5) were identified for chlorimuron-ethyl. Sufficient field trial residue data is available to adequately assess the dietary exposure and risk from chlorimuron-ethyl. Freezer storage stability data for animal commodities may be required for future use expansion. Estimation of potential contamination of drinking water sources, i.e., modelling of environmental concentrations (EECs) was conducted. The dietary exposure and risk assessment included the reviewed food and water residue values based on the current uses.

The dietary (acute and chronic) risk assessment for chlorimuron-ethyl is an unrefined assessment using the most conservative residue data available (MRLs, tolerances, highest experimental or default processing factors and considered all crops to be completely treated). Since the risk estimates are well below the PMRA’s level of concern, no refinements to the residue data are necessary at this time.

Appendix VI Agricultural Mixer/Loader/Applicator and Postapplication Risk Assessment

Table 1 Commercial Mixer/Loader/Applicator Exposure and Risk Assessment

Application Equipment	Scenario	Max Rate (kg a.i./ha)	Area Treated per Day (ha/day)	Dermal Exposure[a] (mg/kg bw/day)	Inhalation Exposure[b] (mg/kg bw/day)	Dermal MOE[c]	Inhalation MOE[c]	Combined MOE[d]
Open M/L (dry flowable[e]), single layer with gloves; Open cab application, single layer with gloves								
Groundboom (custom)	MLA	0.009	360	0.0044	9.51E-04	2900	14000	2400

M/L = mix/load, A = apply, MOE = margin of exposure

[a] Dermal exposure (mg/kg bw/day) = (dermal unit exposure × ATPD × maximum application rate × 100% dermal absorption)/80 kg body weight

[b] Inhalation exposure (mg/kg bw/day) = (inhalation unit exposure × ATPD × maximum application rate)/80 kg body weight

[c] Based on a NOAEL of 13 mg/kg bw/day, target = 300

[d] Combined MOE = 1/[1/dermal MOE + 1/inhalation MOE]

[e] Two of the EPs are packaged in water soluble bags which is covered off by the dry flowable scenario

Table 2 Postapplication Risk Assessment

Crop	Activity	TC[a] (cm^2/hr)	Rate (kg a.i./ha)	Number of Applications per year	MOE[b] (Day 0)	REI[c]
USC 7, 13, 14:						
Soybean	Scouting	1100	0.009	1	5300	12 hours
	Hand weeding	70			83000	

USC = use site category, REI = restricted-entry interval

Since no DFR studies were submitted, a peak default DFR value of 25% of the application rate was used.

[a] TC = transfer coefficient

[b] Based on an oral NOAEL of 13 mg/kg bw/day and a target MOE of 300

[c] If the target MOE is met, the minimum REI for agricultural uses was set at 12 hours.

Appendix VII Environmental Exposure and Risk Assessment

Table 1 Fate and Behaviour of Chlorimuron-ethyl and Transformation Products in Terrestrial and Aquatic Environments

Type of study	Medium	Temp (°C)	pH[4]	Reported DT_{50} (day)[2]	Calculated DT_{50} by the PMRA (days)	Kinetic model used by the PMRA	Comments[3, 5, 6]	PMRA #
Hydrolysis	Pheny-labelled	25	5	18–19.0		SFO	Unstable at low pH	1156136
	Pyrimidine-labelled		5	17–26.0		SFO		
	Pheny-labelled		7	Stable		SFO	Stable in neutral and alkaline milieu	
	Pyrimidine-labelled		7	Stable		SFO		
	Pyrimidine-labelled		7	2117.0		SFO		USEPA HYDROWIN™v2.0
	Pyrimidine-labelled		8	212.5		SFO		
	Pheny-labelled		9	Stable		SFO		1156136
	Pyrimidine-labelled		9	Stable		SFO		
Phototransformation on soil	Flanagan silt loam - Pyrimidine-labelled		5.8	Irr. 19.7 Dark 42.6	36.7	SFO	Slightly persistent	1156159
	Flanagan silt loam Phenyl-labelled		5.8	Irr. 19.7 Dark 45.6	34.7	SFO		
	Indian laterite soil		6.1	11.1	23.4	SFO	Slightly persistent	2818368
	Indian red soil		7.4	11.1	12.9	SFO	Non-persistent	
	Indian Alluvial soil		8.1	20.7	11.5	SFO	Non-persistent	
	80th percentile				**35.1**		Slightly persistent	
Phototransformation in water	Aqueous buffer solution	Sunlight	4.0	Irr. 4.35 Dark: stable	4.35	SFO	Non-persistent	2818370
	Aqueous buffer solution	Artificial	5.0	Irr. 12.00 Dark: 30.00	39.8	SFO	Moderately persistent	1156167
	Aqueous buffer solution	Artificial	7.0	Irr. 26.00 Dark: 612.00	94.9	SFO	Moderately persistent	
	Distilled water	Sunlight	7.0	Irr. 9.20 Dark: stable	9.20	SFO	Non-persistent	2818370
	Aqueous buffer solution	Sunlight	7.0	Irr. 9.53 Dark: stable	9.53	SFO	Non-persistent	
	Tap water	Sunlight	8.44	Irr. 5.99 Dark: stable	5.99	SFO	Non-persistent	
	Irrigation water	Sunlight	8.7	Irr. 4.49 Dark: stable	4.49	SFO	Non-persistent	
	Aqueous buffer solution	Sunlight	9.0	Irr. 11.79	11.79	SFO	Non-persistent	

Type of study	Medium	Temp (ºC)	pH[4]	Reported DT_{50} (day)[2]	Calculated DT_{50} by the PMRA (days)	Kinetic model used by the PMRA	Comments[3, 5, 6]	PMRA #
				Dark: stable				
	Aqueous buffer solution	Artificial	9.0	Irr. 30.00 Dark: 208.00	110.1	SFO	Moderately persistent	1156167
Photransformation in air	12 hours of sunlight	NA	NA	3.008 hr	0.25	NA	No volatilization expected and rapid atmospheric photo-oxidation breakdown of CHE. No long range transport expected	USEPA AOPWIN™v1.92 A
Aerobic soil biotransformation	Woodstown sandy loam	25	4.9	11–14.0	77.3	SFO	Moderately persistent	1156126
	Flanagan silt loam	25	5.4	12–14.0	114.0	DFOP	Moderately persistent	
	Marienstein silt loam	20	7.2	19.4	13.7	SFO	Non-persistent	2818371
	Granby sandy loam	25	5.2	17–22.0	17.0	SFO	Slightly persistent	1168481
	Illinois clay loam	20	5.5	14–29.0	16.1	t_r IORE	Slightly persistent	2817074
	Dakota clay loam	20	5.9	14–61.0	74.2	t_r IORE	Moderately persistent	
	PMRA 80th centile half-life at 20ºC				**77.6**		Moderately persistent	
Soil lab dissipation	Alluvial soil A	Clay loam	7.2	13.8–12.4	13.8-12.4	SFO	Non-persistent	2818380
	Coastal saline soil B	Clay loam	7.2	11.8–11.3	11.8-11.3	SFO	Non-persistent	
	Laterite soil C	Clay loam	5.1	10.8–11.2	10.8-11.2	SFO	Non-persistent	
	PMRA 90th percentile confidence on the mean				**12.5**		Non-persistent	
Aerobic aquatic biotransformation	Goose River water/clay loam sediment system	20	8.3 (w)[4] 8.0 (s)	28–62.0	50.8	Slow $t_{1/2}$	Moderately persistent	2717075
	Choptank river water/sand sediment system	20	6.9 (w) 6.7 (s)	28–79.0	59.0	SFO	Moderately persistent	
	PMRA 80th centile half-life at 20ºC				**57.7**			
Anaerobic aquatic biotransformation	Pennsylvania silt loam N-sterile	25	6.8	2–3.0	32.6	SFO	Slightly persistent	1156127
	Florida sandy loam N-sterile	25	6.3	3–11.0	12.6	SFO	Non-persistent	
	PMRA 80th centile half-life at 20ºC				**27.9**		Slightly persistent	
Foliar dissipation	CHE release from leaves	NR	NR	15.0	15.0	NA		2818374
		NR	NR	10.0	10.0	NA	Default PMRA DT_{50}	
		NR	NR	5.6	5.6	NA	Based on de-esterification of CHE on leaves	2818373 2818374

Type of study	Medium	Temp (ºC)	pH[4]	Reported DT_{50} (day)[2]	Calculated DT_{50} by the PMRA (days)	Kinetic model used by the PMRA	Comments[3, 5, 6]	PMRA #
Type of study	**Medium**	**Temp (ºC)**	**pH**	**OC (%)**	**PMRA Kd value**	**PMRA Koc value**	**Mobility**	**PMRA #**
Soil adsorption/desorption	Cecil sandy loam	NR	6.50	1.21	0.4	35.5	Very high	1156170
	Flanagan silt loam	NR	5.40	2.49	0.2	7.6	Very high	
	Keyport silt loam	NR	5.20	4.35	7.4	170.1	Medium	
	Woodstown sandy loam	NR	6.60	0.64	3.2	500.0	Medium	
	Dothan sandy loam	NR	5.70	0.70	1.0	139.1	Medium	2818376
	Lucedale fine sandy loam	NR	5.70	0.58	1.0	174.7	Medium	
	Decatur silt loam	NR	6.00	0.87	1.0	113.2	High	
	Eutaw clay	NR	6.90	1.74	1.0	58.3	High	
	Sumter clay	NR	7.70	1.74	1.0	58.6	High	
	Hiwassee loam	NR	5.70	2.33	NR	NR	NA	
	Dundee silt loam (no cover crop)	NR	6.44	1.36	0.8	57.4	High	2818377
	Miami silt loam CT	NR	6.45	1.78	0.6	31.0	Very high	2389725
	Miami silt loam NT	NR	6.65	3.06	1.0	31.0	Very high	
	Drummer silty clay loam CT	NR	4.52	1.92	2.1	108.0	High	
	Drummer silty clay loam NT	NR	6.25	4.60	6.5	142.0	High	
	Dundee silt loam CT	NR	5.67	1.31	1.6	125.0	High	
	Dundee silt loam NT	NR	5.41	1.53	2.2	141.0	High	
	BE alfisol (N China)	NR	5.70	1.14	0.4	32.0	Very high	2818378
	BS Mollisol (N China)	NR	6.32	3.29	2.0	60.0	High	
	Chongqing Sandy clay loam	NR	7.78	0.88	1.6	178.0	Medium	2818379
	Jiangxi clay	NR	4.26	4.02	13.1	326.0	Medium	
	Jiangxi sandy loam	NR	5.12	2.13	6.7	316.0	Medium	
	Sichuan silt loam	NR	4.86	2.07	3.8	183.0	Medium	
	Shandong sand	NR	5.73	0.14	0.6	426.0	Medium	
	Heilongjiang loamy sand	NR	6.09	2.42	7.5	309.0	Medium	
	Shanxi loamy sand	NR	7.41	1.26	1.6	125.0	High	
	Shandong sandy loam	NR	7.49	0.99	1.1	113.0	High	
	Marienstein soil	NR	7.20	0.9	0.3	28.9	Very high	2818371
	PMRA 20th centile				**0.6**	**39.9**	**Very high mobility**	

Type of study	Medium	Temp (ºC)	pH	Rf value	Index value	Mobility	Mean	PMRA #
Thin Layer Chromatography	Cecil Sandy loam (MD)	NR	6.5	0.59	3	Intermediate mobility	3 Intermediate mobility	1156170
	Flanagan silt loam (IL)	NR	5.4	0.41	3	Intermediate mobility		
	Keyport silt loam (DE)	NR	5.2	0.18	2	Low mobility		

Type of study	Medium	Temp (ºC)	pH[4]	Reported DT_{50} (day)[2]	Calculated DT_{50} by the PMRA (days)	Kinetic model used by the PMRA	Comments[3, 5, 6]	PMRA #
	Woodstown sandy loam (DE)	NR	6.6	0.71	4	Mobile		
Type of study	**Medium**	**Temp (ºC)**	**pH**	**%OM**	**Soil depth detection (cm)**	**Kd**	Comments	
Soil column leaching	Cecil Sandy loam (MD)	NR	6.5	2.1	25.0	< 0.03	CHE is leaching through soil columns	1161183
	Flanagan silt loam (IL)	NR	5.8	4.3	25.0	0.28		
	Keyport silt loam (DE)	NR	5.6	5.6	25.0	> 1.6		
	Woodstown sandy loam (DE)	NR	6.6	1.1	25.0	< 0.03		
Type of study	**Properties**	**Criteria of Cohen *et al.*, (1984) indicating a potential for leaching**			**Value**		**Comments**	**Meet criteria**
Criteria of Cohen (1984)	Solubility in water	> 30 mg/L			1200 mg/L		Vey soluble	Yes
	K_d	< 5 and usually < 1 or 2			0.6 mL/g		Very highly mobile	Yes
	K_{oc}	< 300			39.9 mL/g		Very highly mobile	Yes
	Henry's law constant	$< 10^{-2}$ atm m^3/mol			6.8×10^{-16} atm m^3/mole		Not volatile	Yes
	p*K*a	Negatively charged (either fully or partially) at ambient pH			p*K*a = 4.2 (weak acid)		Behave like an anion – Mobile	Yes
	Hydrolysis half-life	> 140 d (>20 weeks)			2117 days at pH 7		Stable	Yes
	Soil phototransformation half-life	> 7 d (1 week)			35.1 d		Slightly persistent	Yes
	Soil biotransformation half-life (non-sterile)	> 14–21 days (>2–3 weeks)			DT_{50} = 76.6 days		Moderately persistent	Yes
	PMRA Interpretation						All criteria were met suggesting chlorimuron-ethyl has high potential for leaching	
ETF GUS Score	PMRA repr. DT_{50} in soil = 76.6 d; PMRA 20th centile Koc = 39.9 mL/g; GUS = log10 (76.6) × (4 – log 10(39.9)) ;					GUS score = 4.51	Chlorimuron-ethyl is expected to be a leacher substance	
Type of study	**Medium**				**Reported DT_{50} (day)**	**Comments**		**PMRA #**
ETF volatilization	Vapour pressure = 2.0×10^{-10} Pa (20°C) Henry's Law Constant = 6.8×10^{-16} atm m^3/mole USEPA AOPWIN™v1.92A ; atmospheric half-life USEPA EPI Suite software v4.11 - Volatilization half-life from river model USEPA EPI Suite software v4.11 - Volatilization half-life from lake model				0.25 days 2.73×10^{10} days 2.98×10^{11} days	Overall, chlorimuron-ethyl is not considered to be volatile and is not expected to have a long range transport in the atmosphere		USEPA EPISuite v4.11 (2000)
Type of study	**Medium**		**pH**	**Reported DT_{50} (day)**	**Max soil depth detection (cm)**		**Comments**	**PMRA #**
Terrestrial Field Dissipation, Foreign non-equivalent	Keyport silt loam, Newark, Delaware			14.0	20		11.7% at 20 cm depth at 546 DAT[1]	1156131
				49.0	10		9.8% at 10 cm depth at	

Type of study	Medium	Temp (ºC)	pH[4]	Reported DT_{50} (day)[2]	Calculated DT_{50} by the PMRA (days)	Kinetic model used by the PMRA	Comments[3, 5, 6]	PMRA #
ecoregion	Flanagan silt loam, Rochelle, Illinois						546 DAT	
	Dundee silt loam, Stoneville, Mississippi			14.0	20		6.8% at 20 cm depth at 546 DAT	
	Norfolk loamy sand, Fayetteville, North Carolina			14.0	32		9% a.i. at 32 cm depth at 112 DAT	
	90th percentile confidence on the mean			**33.3**				

Type of study	Medium at 0.5 mg a.i./L		Duration	Peak BCF	28-d BCF	42-d BCF	Comments	PMRA#
Bioaccumulation	Bluegill sunfish - muscle Bluegill sunfish - viscera Bluegill sunfish – remaining carcass Bluegill sunfish – whole fish		28 21 35 21	0.07 2.1 0.1 0.2	0.07 0.8 0.0 0.1	0.0 0.1 0.0 0.03	Low bioconcentration factor and low potential for bioaccumulation	2389725 1156142
	Octanol/water partition coeffic.	25ºC, pH 7	Log K_{ow} of 0.113				Low potential for bioaccumulation	1156169
	chlorimuron-ethyl is absorbed from the gastrointestinal tract of mammals and is eliminated equally in urine and feces with a biological half-life of about 50 hours.							2647366

atm = atmosphere

[1] DAT = Day after treatment;
[2] irr. = irradiated;
[3] Based on classification of Goring et al. 1975 for soils;
[4] for pH, (w) = water phase; (s) = sediment phase;
[5] Classification of McEwen and Stephenson and based on reported and the PMRA DT_{50} values for water;
[6] Classification of McCall *et al.* 1981 for adso

Appendix VIII Toxicity

Table 1 Terrestrial Toxicity Data

Compound	Organism	Toxicity type	Value
Earthworms			
Chlorimuron-ethyl technical	Earthworms *Eisenia fetida*	Acute	LC_{50} > 4050 mg a.i/kg soil
Low surrogate Flupyrsulfuron-methyl-sodium technical	Earthworms *Eisenia fetida*	Reproduction (chronic)	NOEC > 0.065 mg a.i/kg soil
Honey bees			
Chlorimuron-ethyl technical	Honey bees *Apis mellifera*	Acute contact	LC_{50} > 12.5 µg a.i./bee
Average 28 SU[1] a.i.	Honey bees *Apis mellifera*	Average acute contact	LC_{50} = 104.1 µg a.i./bee
Low surrogate mesosulfuron-methyl technical	Honey bees *Apis mellifera*	Min Acute oral	LC_{50} > 5.6 µg a.i./bee
Average 28 SU a.i.	Honey bees *Apis mellifera*	Average acute oral	LC_{50} = 81.0 µg a.i./bee
Parasitoids			
Low surrogate mesosulfuron-methyl technical	Parasitoid hymenopteran *Aphidius rhopalosiphi*	Acute	LR_{50} > 15.0 g a.i/ha
Average 26 SU a.i.	Parasitoid hymenopteran *Aphidius rhopalosiphi*	Average acute	LR_{50} = 124.2 g a.i./ha
Predators			
Low surrogate ethametsulfuron-methyl technical	Predatory mite *Typhlodromus pyri*	Acute	LR_{50} > 11.4 g a.i./ha
Average 26 SU a.i.	Predatory mite *Typhlodromus pyri*	Average acute	LR_{50} = 100.9 g a.i./ha
Wild Birds			
Chlorimuron-ethyl	Mallard duck *Anas platyrhynchus*	Acute oral	LD_{50} > 2510 mg a.i./kg bw
Chlorimuron-ethyl	Northern bobwhite quail *Colinus virginianus*	Dietary	LC_{50} > 5620 mg/kg diet
Chlorimuron-ethyl	Mallard duck *Anas platyrhynchus*	Dietary	LC_{50} > 5620 mg/kg diet
Chlorimuron-ethyl	Northern bobwhite quail *Colinus virginianus*	Reproduction, chronic	NOAEC (offspring survival) = 19.4 mg a.i/kg bw/d)
Chlorimuron-ethyl	Mallard duck *Anas platyrhynchus*	Reproduction, chronic	NOAEC = 134.92 mg a.i./kg bw/d (HRT)[4]
Wild Mammals			
Chlorimuron-ethyl	Rat *Rattus norvegicus*	Acute oral	LD_{50} > 2510 mg a.i./kg bw

Compound	Organism	Toxicity type	Value
Chlorimuron-ethyl	Sprague Dawley rat *Rattus norvegicus*	Acute oral	LD_{50} = 4102 mg a.i./kg bw
Chlorimuron-ethyl	Rat *Rattus norvegicus*	2-generation, reproduction, chronic	NOAEL = 17.0 mg a.i./kg/day
Chlorimuron-ethyl	Sprague Dawley rat *Rattus norvegicus*	2-generation, reproduction, chronic	NOAEL (offspring toxicity) = 13.0 mg/kg bw/d
Terrestrial Plants			
Chlorimuron-ethyl	Monocot. – onion *Allium cepa*	Seedling emergence	EC_{25} = 0.0128 g a.i./ha
Chlorimuron-ethyl	Dicot. – rapeseed *Brassica napa*	Vegetative vigour	EC_{25} = 0.018 g a.i./ha

[1] SU = sulfonyurea

Table 2 Aquatic Toxicity Data

Compound	System/ medium	Organism	Toxicity type	Value (mg a.i./L)
Freshwater Organisms				
Chlorimuron-ethyl	Static	Water flea *Daphnia magna*	Acute	EC_{50} > 100.0
Chlorimuron-ethyl	Static	Water flea *Daphnia magna*	Acute	EC_{50} = 1000.0
Chlorimuron-ethyl	Static	Crayfish *Procambrus Sp.*	Acute	EC_{50} > 1000.0[5]
Freshwater Invertebrates Chronic Exposure				
Chlorimuron-ethyl	Static	Water flea *Daphnia magna*	chronic	NOAEC = 106
Freshwater Fish Acute Exposure				
Chlorimuron-ethyl	Static, pH 8	Rainbow trout *Onchorhynchus mykiss*	Acute	LC_{50} > 12.0
Chlorimuron-ethyl	Static, pH 8	Rainbow trout *Onchorhynchus mykiss*	Acute	LC_{50} > 50.0
Chlorimuron-ethyl	Static, pH 9	Rainbow trout *Onchorhynchus mykiss*	Acute	LC_{50} > 1000
Chlorimuron-ethyl	Static, pH 7.3	Bluegill *Lepomis macrichirus*	Acute	LC_{50} > 10.0
Chlorimuron-ethyl	Static, pH 7.1	Bluegill *Lepomis macrichirus*	Acute	LC_{50} > 50.0
Chlorimuron-ethyl	Static, pH 7.0	Bluegill *Lepomis macrichirus*	Acute	LC_{50} > 100.0
Chlorimuron-ethyl	Static, pH 9.0	Channel catfish *Ictalurus punctatus*	Acute	LC_{50} = 950.0

Freshwater Fish Chronic Exposure				
Chlorimuron-ethyl	Flow-through	Rainbow trout *Onchorhynchus mykiss*	ELS	NOAEC = 8.2
Freshwater Algae Acute Exposure				
Chlorimuron-ethyl	Static	Green algae *Chlorella vulgaris*	Acute	$EC_{50\ bimass}$ = 2.75
Chlorimuron-ethyl	Static	Green algae *Chlorella pyrenoidosa*	Acute	$EC_{50\ bimass}$ = 15.31
Chlorimuron-ethyl	Static	Green algae *Scenedesmus obliquus*	Acute	$EC_{50\ bimass}$ = 11.83
Chlorimuron-ethyl	Static	Green algae *Scenedesmus quadricauda*	Acute	$EC_{50\ bimass}$ = 0.10
Chlorimuron-ethyl	Static	Green algae *Raphidocelis subcapitata*	Acute	$EC_{50\ bimass}$ = 5.53
Chlorimuron-ethyl	Static	Green algae *Selenastrum capricornutum*	Acute	$EC_{50\ AUGC}$[1] = 0.00077
Chlorimuron-ethyl	Static	Green algae *Anabaena flos-aquae*	Acute	$EC_{50\ CD}$[2] = 0.018
Chlorimuron-ethyl	Static	Freswater diatom *Navicula pelliculosa*	Acute	EC_{50} > 0.052 (-29%) No inhibition (HCT)[5]
Freshwater Vascular Plant Acute Exposure				
Chlorimuron-ethyl	-	Duckweed *Lemna gibba*	Acute	$EC_{50\ FC}$[3] = 0.00027
Marine/Estuarine Invertebrates Acute Exposure				
Low surrogate, Primisulfuron-methyl	NA	Eastern oyster and mysid (shrimp) *Crassostrea virginica and Mysida*	Acute	EC_{50} = 16.0
Marine/Estuarine Invertebrates Acute Exposure				
Low surrogate tribenuron-methyl	NA	mysid (shrimp) *Mysida*	Chronic	NOAEC = 1.5
Marine/Estuarine Fish Acute Exposure				
Low surrogate, Sulfometuron-methyl	NA	Sheepshead minnow *Cyprinodon variegatus*	Acute	LC_{50} > 45.0
Chlorimuron-ethyl	Static	Marine diatom *Skeletonema costatum*	Acute	EC_{50} > 0.052 (-11%) No inhibition (HCT)

[1] AUGC = Area under the growth curve;
[2] CD = Cell density;
[3] FC = frond count;
[4] (HRT) = highest concentration tested;
[6] NA = Not applicable

Table 3 Chronic Toxicity Values of Sulfonylurea Active Ingredients to Earthworms

Active	Chronic NOEC (mg a.i./kg soil)
Azimsulfuron	= 12.5
Bensulfuron-methyl	NR
Chlorsulfuron	= 187.5
Ethametsulfuron-methyl	= 27.3
Flazasulfuron	= 8.0
Flupyrsulfuron-methyl-Sodium	> 0.065
Foramsulfuron	= 5.35
Imazosulfuron	= 500.0
Iodosulfuron-methyl-sodium	= 4.63
Mesosulfuron-methyl	= 125.0
Metsulfuron-methyl	=0.83
Nicosulfuron	NR
Oxasulfuron	= 2.0
Prosulfuron	= 0.7
Rimsulfuron	NR
Thifensulfuron-methyl	= 34.3
Triasulfuron	= 50.8
Tribenuron-methyl	= 3.2
Trifloxysulfuron-sodium	NR
Triflusulfuron-methyl	250.0
Most conservative value	**> 0.065**
Average	**75.8**

Shaded and bold data value to be used in the risk assessment.

Table 4 Toxicity Values of 32 Sulfonylurea Active Ingredients to Honey Bees.

Active	Acute oral LD_{50} (µg a.i./bee)	Acute contact LD_{50} (µg a.i./bee)
Amidosulfuron	> 101.0	> 100.0
Azimsulfuron	> 187.0	> 25.0
Bensulfuron-methyl	> 51.4	> 100.0
Chlorimuron-ethyl	NR	**> 12.5**
Chlorsulfuron	> 130.0	> 100.0
Cinosulfuron	> 100.0	> 100.0
Cyclosulfamuron	> 99.0	> 106.0
Ethametsulfuron-methyl	= 40.8	= 12.5
Ethoxysulfuron	> 200.0	> 1000.0
Flazasulfuron	> 100.0	> 100.0
Flupyrsulfuron-methyl-Sodium	> 30.0	> 25.0
Foramsulfuron	>110.1	> 100.0
Halosulfuron-methyl	> 100.0	> 100.0
Imazosulfuron	= 41.6	= 100.0
Iodosulfuron-methyl-sodium	> 70.0	> 131.0
Mesosulfuron-methyl	**= 5.6**	> 13.0
Metsulfuron-methyl	> 43.0	> 12.5
Nicosulfuron	> 100.0	> 76.0

Active	Acute oral LD_{50} (µg a.i./bee)	Acute contact LD_{50} (µg a.i./bee)
Orthosulfamuron	> 109.0	> 100.0
Oxasulfuron	> 100.0	> 25.0
Primisulfuron-methyl	>18.0	> 16.0
Prosulfuron	> 100.0	> 100.0
Pyrazosulfuron-ethyl	NR	> 100.0
Rimsulfuron	= 41.1	= 27.9
Sulfometuron-methyl	NR	> 100.0
Sulfosulfuron	> 30.0	> 25.0
Thifensulfuron-methyl	> 7.1	> 100.0
Triasulfuron	> 100.0	> 100.0
Tribenuron-methyl	> 9.1	> 98.4
Trifloxysulfuron-sodium	> 25.0	> 25.0
Triflusulfuron-methyl	> 100.0	> 100.0
Tritosulfuron	= 200.0	= 200.0
Average value	**= 81.0**	**= 104.1**
Lowest endpoint value	**= 5.6**	**> 12.5**

NR = Not reported. Shaded and bold data value to be used in the risk assessment.

Table 5 Toxicity Values of Sulfonylurea Active Ingredients to Predators and Parasitoids.

Active	LR_{50} *A. rhopalosiphi* (g a.i./ha)	LR_{50} *T. pyri* (g a.i./ha)
Amidosulfuron	> 45.0	> 45.0
Azimsulfuron,	> 58.8	> 54.3
Bensulfuron-methyl	> 600.0	> 600.0
Chlorimuron-ethyl		
Chlorsulfuron	> 56.3	> 56.3
Ethametsulfuron-methyl, TGAI	> 18.8	**= 11.4**
Ethoxysulfuron	< 60.0	< 60.0
Flazasulfuron	> 50.0	> 50.0
Flupyrsulfuron-methyl-Sodium	> 20.0	> 20.0
Foramsulfuron, EP	= 5.6	= 62.2
Halosulfuron-methyl	> 300.0	> 300.0
Imazosulfuron	> 50.0	> 50.0
Iodosulfuron-methyl-sodium	> 50.0	> 50.0
Mesosulfuron-methyl, TGAI	**> 15.0**	> 15.0
Metsulfuron-methyl	> 76.8	> 40.2
Nicosulfuron	> 298.0	> 65.0
Orthosulfamuron	> 225.0	= 45.0
Oxasulfuron, EP	= 75.0	= 3.2
Prosulfuron	> 38.9	> 38.9
Rimsulfuron	> 37.5	> 27.5
Sulfosulfuron	> 29.7	> 29.7
Thifensulfuron-methyl	> 450.0	> 450.0
Triasulfuron	> 25.0	> 25.0
Tribenuron-methyl	> 300.0	> 300.0
Trifloxysulfuron-sodium	> 74.8	> 76.9

Active	LR_{50} *A. rhopalosiphi* (g a.i./ha)	LR_{50} *T. pyri* (g a.i./ha)
Triflusulfuron-methyl	> 120.0	> 120.0
Tritosulfuron	> 150.0	> 28.6
Average	**= 124.2**	**= 100.9**
Most sensitive EUP	**= 5.6**	**= 3.2**
Most sensitive Technical	**> 15.0**	**= 11.4**

Shaded and bold data value to be used in the risk assessment

Table 6 Estuarine/Marine invertebrate endpoints from 22 sulfonylureas registered in the United States

Active ingredient	Estuarine/marine invertebrates	
	Acute invertebrates (Eastern oyster or mysid)	Chronic invertebrates (mysid)
	EC_{50} value (mg a.i./L)	NOAEC value (mg a.i./L)
Bensulfuron-methyl	>130.0	N/A
Chlorimuron-ethyl	N/A	N/A
Chlorsulfuron	> 89.0	N/A
Flazasulfuron	= 107.0	N/A
Foramsulfuron	= 118.0	N/A
Halosulfuron-methyl	= 94.0	N/A
Imazosulfuron	NR	N/A
Iodosulfuron-methyl-Na	> 100.0	N/A
Mesosulfuron-methyl	> 111.0	N/A
Metsulfuron-methyl	N/A	N/A
Nicosulfuron	N/A	N/A
Orthosulfamuron	> 97.0	= 27.0
Primisulfuron-methyl	= 16.0	N/A
Prosulfuron	> 150.0	N/A
Rimsulfuron	> 110.0	N/A
Sulfometuron-methyl	> 38.2	N/A
Sulfosulfuron	> 106.0	N/A
Thifensulfuron-methyl	N/A	N/A
Triasulfuron	= 21.5	N/A
Tribenuron-methyl	> 135.0	= 1.5
Trifloxysulfuron-Na	= 60.1	N/A
Triflusulfuron-methyl	N/A	N/A
Lowest endpoint value	**16.0**	**1.5**
Average	**92.7**	**14.3**

NR = Not reported; N/A = not available

Table 7 Estuarine/Marine fish endpoints from 22 sulfonylureas registered in the United States

Active ingredient	Estuarine/marine invertebrates	
	Acute fish (Sheepshead minnow)	Chronic fish (sheepshead minnow)
	LC_{50} value (mg a.i./L)	NOAEC value (mg a.i./L)
Bensulfuron-methyl	> 123.0	N/A
Chlorimuron-ethyl	N/A	N/A
Chlorsulfuron	> 980.0	N/A

Flazasulfuron	> 140.0	N/A
Foramsulfuron	> 93.6	N/A
Halosulfuron-methyl	> 125.0	N/A
Imazosulfuron	N/A	N/A
Iodosulfuron-methyl-Na	> 100.0	N/A
Mesosulfuron-methyl	> 105.0	N/A
Metsulfuron-methyl	N/A	N/A
Nicosulfuron	N/A	N/A
Orthosulfamuron	> 123.0	N/A
Primisulfuron-methyl	> 100.0	N/A
Prosulfuron	> 155.0	N/A
Rimsulfuron	> 110.0	N/A
Sulfometuron-methyl	> 45.0	N/A
Sulfosulfuron	> 101.0	N/A
Thifensulfuron-methyl	N/A	N/A
Triasulfuron	> 100.0	N/A
Tribenuron-methyl	> 132.0	N/A
Trifloxysulfuron-Na	> 103.0	N/A
Triflusulfuron-methyl	N/A	N/A
Lowest endpoint value	> 45.0	N/A
Average	> 167.5	N/A

N/A = not available

Appendix IX Estimated Environmental Concentration

Table 1 The Estimated Environmental Concentration of Chlorimuron-ethyl in Soil

Application Equipment	Timing	No. of appl.	Droplet size	Max appli. rate (g a.i./ha)	Soil EEC 15 cm depth[1] (mg a.i./kg soil)	Refined drift (%)	Refined Soil EEC 15 cm depth for drift (mg a.i./kg soil)
Groundboom	Pre and post emergence, early Spring	1	Medium	9.0	0.004	6	0.00024

[1]based on soil DT_{50} of 77.6 days

Table 2 The Estimated Environmental Concentration of Chlorimuron-ethyl in Water (mg a.i./L) at 15 and 80 cm Depth as a Result of Direct Application

Application Equipment	Timing	No. of appl.	Droplet size	Max appli. rate (g a.i./ha)	EEC in 15 cm water depth[1] (mg a.i./L)	EEC in 80 cm water depth[1] (mg a.i./L)
Groundboom	Pre and post emergence, early Spring	1	Medium	9.0	0.006	0.0011

[1]based on aquatic DT_{50} of 57.7 days

Appendix X Risk Assessment for Non-target Organisms

Table 1 Screening Level Risk Assessment for Earthworms (*Eisenia fetida*)

Formulation Type	Reported Endpoint	Value (mg a.i./kg soil)	EEC (mg a.e./kg soil)	RQ	LOC exceeded
Acute Toxicity					
Chlorimuron-ethyl technical	½ 14d-LC_{50}	> 2025	0.004	< 2.0E-6	No
Chronic					
Flupyrsulfuron-methyl-Sodium	NOEC	0.065	0.004	0.06	No

Risk quotient (RQ) = EEC/endpoint. Shaded value indicate RQ > LOC.

Table 2 Screening Level Risk Assessment for Honey Bees

Measurement Endpoint	Compound	Exposure Route	Single Appli. rate (kg a.i./ha)	Exposure Estimate µg a.i./bee [2]	Acute Effect LD_{50} Endpoint (µg a.i./bee)	RQ	LOC (0.4) exceeded
Foliar Applications							
Individual Survival (adults)	chlorimuron-ethyl	Contact	0.009 (soybean)	0.02	> 12.5	< 0.002	No
Individual Survival (adults)	Surrogate mesosulfuron-methyl	Dietary		0.26	5.6	0.046	No
	Average Sus[31]			0.26	81.0	0.003	No
Measurement Endpoint	**Compound**	**Exposure Route**	**Briggs EEC**	**Total nectar worker dose (µg a.i./bee) [2]**	**Acute Effect LD_{50} Endpoint (µg a.i./bee)**	**RQ**	**LOC (0.4) exceeded**
Soil applications							
Individual Survival (adults)	Surrogate mesosulfuron-methyl	Diet	(0.0038/1000)	0.00111	5.6	0.0002	No
	Average Sus[31]	Diet		0.00111	81.0	0.00001	No

[1] Sus = sulfonylureas;
[2]For foliar contact exposure, the exposure estimate = (2.4 µg a.i./bee) × (application rate in kg a.i./ha); For foliar dietary exposure, the exposure estimate = (29 µg a.i./bee) × (application rate in kg a.i./ha). This is based on 98 µg a.i./g per 1 kg a.i./ha × 0.292 g/day (28.6 µg a.i./bee per kg a.i./ha); For Soil application dietary exposure, the exposure estimate = (Briggs EEC calculated by the model Bee-REX) × (adult (0.292 g/day) worker bees and concentration in pollen and nectar).

Table 3 Screening Level Risk Assessment for Predators and Parasitoids

Organism	Compound	Exposure Route	Single Appl. rate (g a.i./ha)	Acute Effect LR_{50} Endpoint (g a.i./ha)	RQ	LOC (2.0) exceeded
Foliar Application						
Predators						
Aphidius rhopalosiphi	Surrogate mesosulfuron methyl	Glass plate	9.0	> 15.0	< 0.60	No
	Average Sus[1]	Glass plate		124.2	0.07	No
Parasitoids						
Typhlodromus pyri	Surrogate ethametsulfuron-methyl	Glass plate	9.0	> 11.4	< 0.8	No
	Average Sus	Glass plate		100.9	0.09	No

[1] Sus = sulfonylureas

Table 4 Screening Level Risk Assessment for Wild Birds Using Maximum Nomogram Values

Animal size and endpoint type	Toxicity (mg a.i./kg bw/d)	Feeding Guild (food item)	EDE[1] (mg a.i./kg bw)	RQ	LOC exceeded
Small Bird (0.02 kg)					
Acute	251.00	Insectivore	0.73	0.003	No
Reproduction	19.39	Insectivore	0.73	0.038	No
Medium Sized Bird (0.1 kg)					
Acute	251.00	Insectivore	0.57	0.002	No
Reproduction	19.39	Insectivore	0.57	0.029	No
Large Sized Bird (1 kg)					
Acute	251.00	Herbivore (short grass)	0.37	0.001	No
Reproduction	19.39	Herbivore (short grass)	0.37	0.019	No

[1] EDE = Estimated Daily Exposure. EDE = (FIR/BW) × EEC, where the food ingestion rate (FIR) is based on equations from Nagy (1987), BW is the generic body weight of the organism, and the EEC is the estimated environmental concentration.

Table 5 Screening Level Risk Assessment for Wild Mammals Using Maximum Nomogram Values

Animal size and endpoint type	Toxicity (mg a.i./kg bw/d)	Feeding Guild (food item)	EDE (mg a.i./kg bw)	RQ	LOC exceeded
Small Mammal (0.015 kg)					
Acute	410.20	Insectivore	0.42	0.001	No
Reproduction	13.00	Insectivore	0.42	0.032	No
Medium Sized Mammal (0.035 kg)					
Acute	410.20	Herbivore (short grass)	0.82	0.002	No
Reproduction	13.00	Herbivore (short grass)	0.82	0.063	No
Large Sized Mammal (1 kg)					
Acute	410.20	Herbivore (short grass)	0.44	0.001	No
Reproduction	13.00	Herbivore (short grass)	0.44	0.034	No

Table 6 Risk Assessment (on-field and off-field) and Risk Quotients for Terrestrial and Wetland Vascular Plants (Seedling Emergence and Vegetative Vigour)

Organism	Exposure	Species	Endpoint value (g a.i/ha)	Site	EEC	RQ[1]	Exceed LOC
Non-Target Terrestrial and Wetland Plants							
Terrestrial Vascular plants	Seedling emergence	Onion; *Allium cepa*	EC_{25} = 0.0128	On-field	9.0 g a.i./ha	**703.1**	**YES**
				Off-field[2]	0.54 g a.i./ha	**42.2**	**YES**
	Vegetative vigour	Rapeseed; *Brassica napus*	EC_{25} = 0.0175	On-field	9.0 g a.i./ha	**514.3**	**YES**
				Off-field[2]	0.54 g a.i./ha	**30.9**	**YES**
Semi-aquatic vascular plants (wetland)	Vegetative vigour	Fowl mannagrass, *Glyceria striata*	EC_{50} = 0.630	On-field	9.0 g a.i./ha	**14.3**	**YES**
				Off-field[2]	0.54 g a.i./ha	0.9	No

[1] Shaded cells and **bold values** indicate that the level of concern is exceeded (RQ > 1);
[2] Off-field = groundboom technology and 6% drift); [3] soil depth of 3cm for seedling emergence.

Table 7 Screening Level Risk Assessment for Freshwater Invertebrates

Organism	Species	Exposure	Endpoint	Value (mg a.i./L)	Appli. rate (g a.i./ha)	Depth (cm)	EEC (mg a.i./L)	RQ[1]	Exceed LOC
Water flea	*Daphnia magna*	Acute	½ EC_{50}	> 50.0	9.0	80	0.0011	< 0.00002	No
	Daphnia magna	Chronic	NOAEC	106	9.0	80	0.0011	0.00001	No

[1] Single species freshwater invertebrate toxicity endpoints used in the acute exposure risk assessment (RA) are derived by dividing the EC_{50}, LC_{50} from the appropriate laboratory study by a factor of two (2).

Table 8 Screening Level Risk Assessment for Freshwater Fish and Amphibians

Organism	Species	Exposure	Endpoint	Value (mg a.i./L)	Appli. rate (g a.i./ha)	Water depth (cm)	EEC (mg a.i./L)	RQ[1]	Exceed LOC
Amphibian (surrogate)	*Lepomis macrochirus*	Acute	1/10 LC_{50}	> 1.0	9.0	15	0.006	< 0.006	No
Bluegill	*Lepomis macrochirus*	Acute	1/10 LC_{50}	> 1.0	9.0	80	0.0011	< 0.001	No
Rainbow trout	*Onchorhynchus mykiss*	Chronic	NOAEC	8.2	9.0	80	0.0011	0.122	No

[1] Single species freshwater fish toxicity endpoints used in the acute exposure risk assessment (RA) are derived by dividing the LC_{50} from the appropriate laboratory study by a factor of ten (10). Amphibian risk assessment is based on the surrogate rainbow trout endpoint in 15 cm water depth.

Table 9 Screening Level Risk Assessment for Freshwater Algae and Plants

Organism	Species	Exposure	Endpoint	Value (mg a.i./L)	Applic. rate (g a.i./ha)	Water depth (cm)	EEC (mg a.i./L)	RQ[1]	Exceed LOC
Freshwater algae									
Green algae	*Chlorella vulgaris*	Acute	1/2 EC_{50}	1.38	9.0	80	0.0011	0.0008	No
Green algae	*Chlorella pyrenoidosa*	Acute	1/2 EC_{50}	7.66	9.0	80	0.0011	0.0001	No
Green algae	*Scenedesmus obliquus*	Acute	1/2 EC_{50}	5.92	9.0	80	0.0011	0.0002	No
Green algae	*Scenedesmus quadricauda*	Acute	1/2 EC_{50}	0.05	9.0	80	0.0011	0.0220	No
Green algae	*Raphidocelis subcapitata*	Acute	1/2 EC_{50}	2.77	9.0	80	0.0011	0.0004	No
Green algae	*Selenastrum capricornutum*	Acute	1/2 EC_{50}	0.0004	9.0	80	0.0011	**2.7500**	**YES**
Green algae	*Anabaena flos-aquae*	Acute	1/2 EC_{50}	0.009	9.0	80	0.0011	0.1220	No
Freswater diatom	*Navicula pelliculosa*	Acute	1/2 EC_{50}	> 0.026	9.0	80	0.0011	< 0.0423	No
Freshwater plants									
Duckweed	*Lemna gibba*	Acute	1/2 EC_{50}	0.0001	9.0	80	0.0011	**11.0**	**YES**

[1] Single species freshwater algae and plant toxicity endpoints used in the acute exposure risk assessment (RA) are derived by dividing the EC_{50} from the appropriate laboratory study by a factor of two (2). Shaded cells and **bold values** indicate that the level of concern is exceeded the LOC of 1.0.

Table 10 Screening Level Risk Assessment for Marine/Estuarine Invertebrates

Organism	Species	Exposure	Endpoint	Value (mg a.i./L)	Applic. rate (g a.i./ha)	Water depth (cm)	EEC (mg a.i./L)	RQ[1]	Exceed LOC
Marine/estuarine Invertebrates Acute Exposure									
Eastern oyster and mysid shrimp	*Crassostrea virginica and Mysida*	Acute	½ EC_{50}	8.0	9.0	80	0.0011	0.0001	No
Marine/Estuarine Invertebrates Chronic Exposure									
Mysid shrimp	*Mysida*	Chronic	NOEC	1.5	9.0	80	0.0011	0.0007	No
Marine/Estuarine Fish Acute Exposure									
Sheepshead minnow	*Cyprinodon variegatus*	Acute	1/10 LC_{50}	> 4.5	9.0	80	0.0011	< 0.0002	No

[1] Single species marine/estuarine algae toxicity endpoints used in the acute exposure risk assessment (RA) are derived by dividing the EC_{50} from the appropriate laboratory study by a factor of two (2).

Table 11 Screening Level Risk Assessment for Marine/Estuarine Algae

Organism	Species	Exposure	Endpoint	Value (mg a.i./L)	Applic. rate (g a.i./ha)	Water depth (cm)	EEC (mg a.i./L)	RQ[1]	Exceed LOC
Freshwater algae									
Marine diatom (algae)	*Skeletonema costatum*	Acute	1/2 EC_{50}	> 0.026	9.0	80	0.0011	< 0.0423	No

[1] Single species marine/estuarine algae toxicity endpoints used in the acute exposure risk assessment (RA) are derived by dividing the EC_{50} from the appropriate laboratory study by a factor of two (2).

Table 12 Refinement of the Risk Assessment for Freshwater Algae and Plants

Organism	Species	Exposure	Endpoint	Value (mg a.i./L)	Applic. rate (g a.i./ha)	Water depth (cm)	6% drift EEC (mg a.i./L)	RQ[1]	Exceed LOC
Freshwater algae									
Green algae	*Selenastrum capricornutum*	Acute	1/2 EC_{50}	0.0004	9.0	80	0.000066	0.17	No
Freshwater plants									
Duckweed	*Lemna gibba*	Acute	1/2 EC_{50}	0.0001	9.0	80	0.000066	0.66	No

[1] Single species freshwater algae and plant toxicity endpoints used in the acute exposure risk assessment (RA) are derived by dividing the EC_{50} from the appropriate laboratory study by a factor of two (2).

Table 13 Risk Assessment for Freshwater Algae and Plants Following Run-off

Organism	Species	Exposure	Endpoint[1]	Value (mg a.i./L)	Applic. rate (g a.i./ha)	Water depth (cm)	Modelled EEC[2] (mg a.i./L)	RQ[1]	Exceed LOC
Freshwater algae									
Green algae	*Selenastrum capricornutum*	Acute	1/2 EC_{50}	0.0004	9.0	80	L = 0.00026	0.65	No
Green algae	*Selenastrum capricornutum*	Acute	1/2 EC_{50}	0.0004	9.0	80	H = 0.00051	**1.28**	**YES**
Freshwater plants									
Duckweed	*Lemna gibba*	Acute	1/2 EC_{50}	0.0001	9.0	80	L =	**2.40**	**YES**

Organism	Species	Exposure	Endpoint[1]	Value (mg a.i./L)	Applic. rate (g a.i./ha)	Water depth (cm)	Modelled EEC[2] (mg a.i./L)	RQ[1]	Exceed LOC
							0.00024		
Duckweed	*Lemna gibba*	Acute	1/2 EC_{50}	0.0001	9.0	80	H = 0.00048	**4.80**	**YES**

[1] Single species freshwater algae and plant toxicity endpoints used in the acute exposure risk assessment (RA) are derived by dividing the EC_{50} from the appropriate laboratory study by a factor of two (2).
[2]EEC values were obtained from Level 1 aquatic ecoscenario of the simulation model PRZM/EXAMS. L = low EEC and H = High EEC. Shaded cells and **bold values** indicate that the level of concern is exceeded the LOC of 1.0.

Table 14 Further Risk Characterization for Freshwater Algae and Plant Using Canadian and American Freshwater Monitoring Data

Organism	Species	Exposure	Endpoint[1]	Value (mg a.i./L)	Applic. rate (g a.i./ha)	Water depth (cm)	Monitoring EEC[2] (mg a.i./L)	RQ[1]	Exceed LOC
Freshwater algae									
Green algae	*Selenastrum capricornutum*	Acute	1/2 EC_{50}	0.0004	9.0	80	USA = 0.000852	**2.13**	**YES**
Green algae	*Selenastrum capricornutum*	Acute	1/2 EC_{50}	0.0004	9.0	80	CDN = 0.000162	0.41	No
Freshwater plants									
Duckweed	*Lemna gibba*	Acute	1/2 EC_{50}	0.0001	9.0	80	USA = 0.000852	**8.52**	**YES**
Duckweed	*Lemna gibba*	Acute	1/2 EC_{50}	0.0001	9.0	80	CDN = 0.000162	**1.62**	**YES**

[1] Single species freshwater algae and plant toxicity endpoints used in the acute exposure risk assessment (RA) are derived by dividing the EC_{50} from the appropriate laboratory study by a factor of two (2).
[2]EEC values were obtained from Level 1 aquatic ecoscenario of the simulation model PRZM/EXAMS. L = low EEC and H = High EEC. Shaded cells and **bold values** indicate that the level of concern is exceeded the LOC of 1.0.

Appendix XI Toxic Substances Management Policy Considerations-Comparison to TSMP Track 1 Criteria

TSMP Track 1 Criteria	TSMP Track 1 Criterion value		Chlorimuron-ethyl Endpoints
CEPA toxic or CEPA toxic equivalent[1]	Yes		Yes
Predominantly anthropogenic[2]	Yes		Yes
Persistence[3]:	Soil	Half-life ≥ 182 days	77.6 days (aerobic soil) (no data for anaerobic soil)
	Water	Half-life ≥ 182 days	59.8 days (whole water: sediment in aerobic system)
	Sediment	Half-life ≥ 365 days	Not reported
	Air	Half-life ≥ 2 days or evidence of long range transport	chlorimuron-ethyl is considered to be of very low volatility, with a vapour pressure of less than 2.0×10^{-10} (20°C) and a Henry's Law Constant of 6.8×10^{-16} atm m^3/mole. Risk to escape from treated soils or water bodies in order to reach the upper atmosphere is minimal. Atmospheric half-life is 3hr/12 hrs of sunlight
Bioaccumulation[4]	Log $K_{ow} \geq 5$		Log $K_{ow} = 0.11$
	BCF ≥ 5000		BCF = 0.07–2.1
	BAF ≥ 5000		N/A
Is the chemical a TSMP Track 1 substance (all four criteria must be met)?			No, does not meet TSMP Track 1 criteria.

[1]All pesticides will be considered toxic or toxic equivalent as defined by the *Canadian Environmental Protection Act* for the purpose of initially assessing a pesticide against the TSMP criteria. Assessment of the toxicity criterion may be refined if required (i.e., all other TSMP criteria are met).
[2]The policy considers a substance "predominantly anthropogenic" if, based on expert judgement, its concentration in the environment medium is largely due to human activity, rather than to natural sources or releases.
[3] If the pesticide and/or the transformation product(s) meet one persistence criterion identified for one media (soil, water, sediment or air) than the criterion for persistence is considered to be met.
[4]Field data (e.g., BAFs) are preferred over laboratory data (e.g., BCFs) which, in turn, are preferred over chemical properties (e.g., log K_{ow}).

Appendix XII Label Amendments for Products Containing Chlorimuron-ethyl

1 Technical

Remove the following statement under the **''PRECAUTIONS:''**

- Do not contaminate any body of water.

and **add** the following statement:

- **DO NOT** discharge effluent containing this product into sewer systems, lakes, streams, ponds, estuaries, oceans or other waters.

Add the following title "**ENVIRONMENTAL PRECAUTIONS to replace ENVIRONMENTAL HAZARDS**": before the section entitled **STORAGE** and add the following statement:

- **TOXIC to freshwater vascular plants and algae**

- **TOXIC to non-target terrestrial plants**

Remove the following statement under the "**DISPOSAL AND DECONTAMINATION**"

Canadian formulators of this technical should dispose of unwanted active and containers in accordance with municipal and provincial regulations. 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 the case of a spill, and for clean-up of spills.

and **add** the following statement:

Canadian manufacturers must dispose of unwanted active ingredients and containers in accordance with municipal or provincial regulations. For additional details and cleanup of spills, contact the manufacturer or the provincial regulatory agency.

2 Commercial Class Products

The following statement is required for all agricultural and commercial pesticide products:

- "Do not enter or allow worker entry into treated areas during the restricted-entry interval (REI) of 12 hours."

Add to ENVIRONMENTAL PRECAUTIONS:

- **TOXIC to non-target terrestrial plants.** Observe buffer zones specified under DIRECTIONS FOR USE.

- **TOXIC to freshwater plants and algae**. Observe buffer zones specified under DIRECTIONS FOR USE.

- **To reduce runoff from treated areas into aquatic habitats:**
  Avoid application to areas with a moderate to steep slope, compacted soil or clay.
  Avoid application when heavy rain is forecast.
  Contamination of aquatic areas as a result of runoff may be reduced by including a vegetative strip between the treated area and the edge of the water body.

Add to GENERAL DIRECTIONS FOR USE

The following statement is required for all agricultural and commercial pesticide products.

- As this product is not registered for the control of pests in aquatic systems, **DO NOT** use to control aquatic pests

- **DO NOT** contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes**.**

For **field applications using conventional boom sprayers** (agricultural or commercial products), the following statements are required:

Add to DIRECTIONS FOR USE:

Field sprayer application: **DO NOT** apply during periods of dead calm. Avoid application of this product when winds are gusty. **DO NOT** apply with spray droplets smaller than the American Society of Agricultural Engineers (ASAE S572.1) medium classification. Boom height must be 60 cm or less above the crop or ground.

DO NOT apply by air.

Buffer zones:

Spot treatments using hand-held equipment **DO NOT** require a buffer zone.

The buffer zones specified in the table below are required between the point of direct application and the closest downwind edge of sensitive terrestrial habitats (such as grasslands, forested areas, shelter belts, woodlots, hedgerows, riparian areas and shrublands) and sensitive freshwater habitats (such as lakes, rivers, sloughs, ponds, prairie potholes, creeks, marshes, streams, reservoirs and wetlands).

		Buffer Zones (metres) Required for the Protection of:

Method of application	Crop	Freshwater Habitat of Depths:		Terrestrial Habitat:
		Less than 1 m	Greater than 1 m	
Field sprayer	Soybean	1	1	20

For tank mixes, consult the labels of the tank-mix partners and observe the largest (most restrictive) buffer zone of the products involved in the tank mixture and apply using the coarsest spray (ASAE) category indicated on the labels for those tank mix partners.

The buffer zones for this product, with the exception of the freshwater habitat, can be modified based on weather conditions and spray equipment configuration by accessing the Buffer Zone Calculator on the Pest Management Regulatory Agency web site.

References

A. Information Considered in the Chemistry Assessment

Reg. No. 25432

PMRA Document Number	Reference
1644459	1983, DPX-F6025 Chemical and Physical Properties Data for the DPX-F6025 Experimental Use Permit, DACO: 2.14.1, 2.14.2, 2.14.3, 2.14.4, 2.14.5, 2.14.6, 2.14.8, 2.14.10, 2.14.12, 2.14.13, 2.5, 2.6, 2.7, 2.8, 2.9 CBI
1644460	2006, Chlorimuron Ethyl (DPX-F6025): Determination of the Appearance (Physical State, Color, and Odour), Melting Point, Boiling, and Density, DACO: 2.14.1, 2.14.2, 2.14.3, 2.14.4, 2.14.5, 2.14.6
1644462	1996, Vapor Pressure Determination of Chlorimuron Ethyl (DPX-F6025), DACO: 2.14.7, 2.14.9 CBI
1644463	1983, Octanol/Water Partition Coefficient of DPX-F6025, DACO: 2.14.11 CBI
1644464	1996, Long-Term Storage Stability and Corrosion Characteristics of Technical-Grade Chlorimuron Ethyl (DPX-F6025), DACO: 2.14.13 CBI
1717756	1984, [CBI Removed] Technical Data Sheet, DACO: 2.14,2.5,2.7
1717755	1994, [CBI Removed] Vapour Pressure of Sulfonylurea Herbicides, DACO: 2.14.9
1644449	2006, Technical Grade Chlorimuron Ethyl [DPX-F6025] Manufacturing Description and Formation of Impurities, DACO: 2.11.1, 2.11.2, 2.11.3, 2.11.4, 2.12.1 CBI
1717760	[CBI Removed] Technical Chlorimuron Ethyl - Description of Beginning materials and Discussion of Formation of Impurities
2772549	2015, Batch Analysis of Chlorimuron ethy [DPX-F6025] Technical - confidential, DACO: 2.13.4 CBI
2772551	2015, Batch Analysis of Chlorimuron ethyl [DPX-F6025] Technical - confidential, DACO: 2.13.4 CBI
2772550	2015, Batch Analysis of Chlorimuron ethyl [DPX-F6025] Technical - non-confidential, DACO: 2.13.4 CBI
2772552	2015, Batch Analysis of Chlorimuron ethyl [DPX-F6025] Technical - non confidential, DACO: 2.13.4 CBI
1715238	1995, CHE-DQD-1 Determination of [CBI Removed] Chlorimuron Ethyl (DPX-F6025), DACO: 2.16

Reg. No. 29924

PMRA Document Number	Reference
1829833	2008, Chlorimuron ethyl Technical Product Chemistry, DACO: 2.14.1, 2.14.10, 2.14.11, 2.14.12, 2.14.13, 2.14.2, 2.14.3, 2.14.4, 2.14.5, 2.14.6, 2.14.7, 2.14.8, 2.14.9 CBI
1829832	2008, Storage Stability and Corrosion Characteristics of Chlorimuron ethyl Technical, DACO: 2.14.14 CBI
1829830	2008, Technical Chlorimuron-ethyl NUP 06083, Product Identity and Composition, DACO: 2.11.1, 2.11.2, 2.11.3, 2.11.4, 2.12.1, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9 CBI
2708579	2016, 2010-4262_Defic. Resp. Letter_13DEC2016, DACO: 2.13.3
1829831	2008, Preliminary Analysis of Chlorimuron ethyl Technical, DACO: 2.13.1,2.13.2,2.13.3,2.13.4 CBI
1913176	2010, Final Report for "Supplemental Impurity Analysis of Chlorimuron-Ethyl Technical", DACO: 2.13 CBI

B. Information Considered in the Toxicological Assessment

Toxicology

A. List of Studies/Information Submitted by Registrant

PMRA document number	Reference
1156101	Four-week range finding and ninety-day feeding study in mice with benzoic acid, 2-[[[[(4-chloro-6-methoxy-2-pyrimidinyl)amino]carbonyl]-amino]sulfonyl]-, ethyl ester (INF-6025) (4661;337-83) Final report, DACO: 4.3.1
1156102	13-week subchronic dietary study in dogs final report (H-14851;HLO-463-83;MR-4778-001), DACO: 4.3.1
1156103	Long term feeding study in mice with benzoic acid, 2-[[[[(4-chloro-6-methoxy-2-pyrimidinyl)amino]carbonyl]amino]sulfonyl]-, ethyl ester (INF-6025) (4801-001;94-85) final report, DACO: 4.4.1
1156104, 1161177	One-year feeding study in dogs with INF-6025 (232-85;7047-001) and Supplement, DACO: 4.4.1
1156106, 1161172	Median lethal dose (LD50) OF INF-6025-34 in rats- EPA proposed guidelines (HLR 318-83;4581-096;14,851) and Supplement, DACO: 4.2.1
1156107	EPA skin absorption LD50 in rabbits INF-6025 Final Report (201-611), DACO: 4.2.2
1156108	Inhalation median lethal concentration (LC50) OF INF-6025-30 by EPA guidelines (MR 4581-088;195-84), DACO: 4.2.3
1156109	Acute inhalation toxicity study with INF-6025-30 in male and female rats revised (4581-088;195-84), DACO: 4.2.3
1156110	Eye irritation test in rabbits (416-82;4581-032), DACO: 4.2.4
1156111, 1161173, 1161174	Primary skin irritation and sensitization test on guinea pigs (9-83;4581-032) and Supplement, DACO: 4.2.5
1156112, 1161176	Ninety-day feeding and one-generation reproduction study in rats with benzoic acid 2-[[[[(4-chloro-6-methoxy-2-pyrimidinyl)-amino]carbonyl]amino]sulfonyl]-, ethyl ester (INF-6025) (4660;306-83) Final report, DACO: 4.3.1,4.5.1
1156113, 1156116, 1156117, 1161178	Long term feeding and two-generation, four-litter reproduction study in rats with benzoic acid, 2-[[[[(4-chloro-6-methoxy-2-pyrimidinyl)amino]carbonyl]amino]sulfonyl]-,ethyl ester (INF-6025)(4800-001;357-84) and Supplement, DACO: 4.4.1,4.5.1
1156114	Metabolism of [phenyl-14C(U)] and [pyrimidine-2-14C] DPX-F6025 by male and female rats (BY O.R. Hunt)(AMR-220-84), DACO: 6.4 (should be 4.5.9)
1156118, 1161179, 1161180	Embryo-fetal toxicity and teratogenicity study of INF-6025 by gavage in the rat (4700-001;336-83) and Supplement, DACO: 4.5.2
1156119	INF-6025 developmental toxicity study in rabbits dosed by gavage on days 7-19 of gestation (7179-001;14-85), DACO: 4.5.2
1156120	Unscheduled DNA synthesis/rat hepatocytes in vitro (208-83;MR 4581-061), DACO: 4.5.4
1156121	Mutagenicity evaluation in Salmonella typhimurium (459-82;MR 4581-032), DACO: 4.5.4
1156122	Mutagenicity evaluation in Salmonella typhimurium (Revision 1)(459-82;MR 4581-032), DACO: 4.5.4
1156123	CHO/HGPRT assay for gene mutation (270-83;4581-061), DACO: 4.5.4
1156124	In vivo bone marrow chromosome study in rats (H#14,823) final report (HLO-340-83;MR-4581-088), DACO: 4.5.4
1176108	Good laboratory practice compliance statement and lesion grading system for Dupont report

	NO.HLO-463-83. Date stamped-"received health evaluation division AUG 21 1995". [13-week subchronic dietary study in dogs final report H-14851;HLO-463-83;MR-4778-001], DACO: 4.3.1
2314900, 2542722	Chlorimuron-ethyl (DPX-F6025) Technical: Acute Oral Neurotoxicity Study in Rats. DACO:4.5.12
2314901, 2542723	Chlorimuron-ethyl (DPX-F6025) Technical: Subchronic Oral Neurotoxicity Study in Rats. DACO:4.5.13
2314899	Repeated Dose Dermal Toxicity: 21-Day Study with Chlorimuron Ethyl Technical in Rabbits. (HLO-1997000121, WIL-189080). Final report. DACO: 4.3.5
2314902	2011, Chlorimuron-ethyl (DPX-F6025) Technical: 28 Day Immunotoxicity Feeding Study in Rats, DACO: 4.8
2314903	Chlorimuron-ethyl Immunotoxicity Study: Justifications for test species and dose selection. DACO: 4.8
2548753	Neurotoxicity Evaluation of Amphetamine in Rats (Positive Control Study). Unpublished report, HL-1997-00686.DACO:5.5.12
2548754	Neurotoxicity Evaluation of Carbaryl and Scopolamine in Rats. Unpublished report, DuPont-7378. DACO:5.5.12
2548755	Positive Control Study: Neurotoxicity Evaluation of Carbaryl, Triadimefon, Trimethyltin, and Acrylamide. Unpublished report, DuPont-18145-1270. DACO:5.5.12

B. Published Information

PMRA Document Number	Reference
	Sima A, Persson L. (1975). The effect of pre- and postnatal undernutrition on the development of the rat cerebellar cortex. I. Morphological observations. Neurobiology. 5(1):23-34.
2799786	Jane A. Hoppin, David M. Umbach, Stephanie J. London1, Charles F. Lynch, Michael C. R. Alavanja, and Dale P. Sandler (2006). Pesticides associated with Wheeze among Commercial Pesticide Applicators in the Agricultural Health Study. American Journal of Epidemiology 163(12):1129-1137

C. Information Considered in the Dietary Assessment

A. Studies/Information Submitted by Registrant

PMRA Document Number	Reference
1036442	Metabolism Of [Phenyl(U)-14C]- And [Pyrimidine-2-14C]Chlorimuron Ethyl In Soybean
1036443	Comments To Address The Residue Questions Concerning Classic Herbicide Temporary Registration (#1036444; #1036447)
1036445	Independent Laboratow Validation Of The Method Entitled Analytical Enforcement Method (Column Switching/Heart Cut) For The Determination Of Residues Of Chlorimuron Ethyl (DPX-F6025)) In Soybean (Seed)
1036446	Testing Of DPX-F6025 Through FDA Multi-Residue Protocol A
1036452	Analytical Method For The Quantitation Of DPX-M6316 (Harmony) In Soybeans.
1037020	[14C] Chlorimuron Ethyl, Absorption, Distribution, Metabolism And Excretion Following Repeated Oral Administration To The Dairy Goat For Three Consecutive Days, Duration Of Storage Prior To Analysis.

1037021	[14C] Chlorimuron Ethyl, Absorption, Distribution, Metabolism And Excretion Following Repeated Oral Administration To The Laying Hen For Seven Consecutive Days, Duration Of Storage Prior To Analysis.
1156017	Analysis Of Dpx-F6025 In Soybeans By Liquid Chromatography (Amr-459-85;0324d)(By J.L. Prince)(Concert)
1156020	Analytical Enforcement Method (Column Swithching/Heart Cut) For The Determination Of Residues Of Chlorimuron Ethyl (Dpx-F6025) In Soybean (Seed)
1156021	A Method For Analysis Of The Herbicide, Dpx-M6316 In Soybeans By Liquid Chromatography.
1156022	Chlorimuron Ethyl: Comparison Of The Magnitude Of Residues Of Two Formulations In Soybeans (Amr-1212-88)(Concert)
1156023	Dpx-F6025 Freezer Storage Study - (Dpx-F6025) (Chlor1/Res 2)(Concert)
1156114	Metabolism Of [Phenyl-14c(U)] And [Pyrimidine-2-14c] Dpx-F6025 By Male And Female Rats (By O.R. Hunt)(Amr-220-84)(Chlorimuron Ethyl)
1156115	Metabolism Of [Phenyl-14c(U)] Dpx-F6025 And [Pyrimidine-2-14c] Dpx-F-6025 In Field-Grown Soybeans (By Edmund Stevenson)(Amr-313-85;0647h/0066h)(Chlorimuron Ethyl)
1156125	Greenhouse Study Of [Pyrimidine-2-14-C] Dpx-F6025 In Rotational Crops (By Mary K. Koeppe)(Amr-491-86)(Chlorimuron Ethyl)
1161181	[14c] Chlorimuron Ethyl: Absorption, Distribution, Metabolism And Excretion Following Repeat Oral Administration To The Dairy Goat For Three Consecutive Days. Final Report.(Amr2768-93;550/13-1011;550/13).
1161182	[14c] Chlorimuron Ethyl: Absorption, Distribution, Metabolism And Excretion Following Repeated Oral Administration To The Laying Hen For Seven Consecutive Days. Final Report.(Amr2767-93;550/14-1011;550/14).
1166190	Magnitude Of Residues Of Chlorimuron-Ethyl (Dpx-F6025) In Soybeans Following Post-Emergence Broadcast Application (Rcbt 93-600;94-0068)(Reliance Sts)
1166416	Crop Rotation Study With 14c-Dpx-F6025 In The Greenhouse. (Amr-268-84;0625h/0063h) (May 23, 1996)
1166624	Metabolism Of 14c- Dpx-F6025 In Soybeans (Interim Report)(Amr-141-83)(Chlorimuron-Ethyl Technical)
1166625	Metabolism And Laboratory Fractionation Studies With 14c-Dpx-F6025 In Soybeans (0626h/0063;Amr-271-84)(Chlorimuron-Ethyl Technical)
1166641	Rationale For Data Waiver On Soybean Processing And Fodder/Forage Residue Studies For Chlorimuron-Ethyl (Dpx-F6025) Herbicide (Reliance Sts Herbicide)
1166642	Magnitude Of The Residues In Soybeans After Aerial Treatment With Classic Herbicide (Amr-780-87)(Reliance Sts Herbicide)
1167808	Quantitation Of Dpx-F6025 Residues In Crops (By R. Guinivan)(Amr-130-83)(Chlorimuron Ethyl Technical)(June 17 1996)
1190811	Independent Laboratory Validation Of The Method Entitled "Analytical Enforcement Method (Column Switching/Heart Cut) For The Determination Of Residues Of Chlorimuron Ethyl (Dpx-F6025) In Soybean (Seed)", Amended Report, M.E. Gresham, March 8, 1996 Amended August 20, 1996 (Amr3488-95;42781) [Reliance Sts;Subn.#99-0338;Regn.#25784]
1190815	Testing Of Dpx-F6025 Through Fda Multi-Residue Protocol A, A.M. Labare, Completed November 15, 1989 (Amr1450-89;89010;457rr) [Reliance Sts;Subn.#99-0338;Regn.#25784]
1379440	Waiver Request For Metabolism/Toxicokinetic Studies
1379441	H.M. BROWN And S.M. NEIGHBORS; SOYBEAN METABOLISM OF CHLORIMURON ETHYL: PHYSIOLOGICAL BASIS FOR SOYBEAN SELECTIVITY. PESTICIDE BIOCHEMISTRY AND PHYSIOLOGY, 1987 VOL(29), Pages 112-120
1379442	Novel Food Information-Food Biotechnology Glyphosate Tolerant Soybean 40-3-2
1379443	Safety Assessment Of Genetically Altered Soybean
1379444	Metabolism Of (Phenyl (U)-14c)-And (Pyrimidine-2-14c) Chlorimuron Ethyl In Soybean (#1379446)
1379448	Waiver Request For Food, Feed And Tobacco Residue Studies
1379450	Chlorimuron Ethyl: Comparison Of The Magnitude Of Residues Of Two Formulations In

	Soybeans
1753221	Analytical Method For The Determination Of Nicosulfuron, Thifensulfuron Methyl, Ethametsulfuron Mthyl, Rimsulfuron, Tribenuron Methyl, And Chlorimuron Ethyl In Oily Crop Matrices Using SPE Purification And LC/MS/MS Detection
1753222	Independent Laboratory Validation Of Analytical Method Dupont-13412 For The Determination Of Thifensulfuron Methyl, Ethametsulfuron Methyl, Rimsulfuron, Tribenuron Methyl And Chlorimuron Ethyl In Olives And Soybean Seed Using SPE Purification And LC/MS/MS Detection
1753223	Independent Laboratory Validation Of A Multi-Residue Method For The Analysis Of Sulfonylurea Herbicides In Crops, Dupont-13412 Revision
1753224	Magnitude Of Sulfonylurea Residues In/On, Aspirated Grain Fractions And Processed Practions (Starch, Grits, Flour, Refined Oil (Wet Milling), Refined Oil (Dry Milling) And Meal (Dry Milling) Of A Field Corn Line Containing Event DP-098140-6 Following A Variety Of Tank Mix Applications Of Two Glyphosates And Rimsulfuron, Tribenuron Methyl, Chlorimuron Ethyl, And Metsulfuron Methyl Containing Herbicides At Maximum Label Rates-United States And Canadian Locations, Season 2006 (#1932004)
1753225	Magnitude And Decline Of Sulfonylurea Residues In/On Green Plant, Forages, Stover And Seed Of A Field Corn Line Containing Event DP-098140-6 Following A Variety Of Tank Mix Applications Of Two Glyphosates And Rimsulfuron, Tribenuron Methyl, Chlorimuron Ethyl, And Metsulfuron Methyl Containing Herbicides At Maximum Label Rates-United States And Canadian Locations, Season 2006 (#1753226; #1753227; #1753228; #1932010; #1932014; #1932016; #1932017)
1753230	Request And Justification For A Waiver Of Livestock Feeding Studies With Chlorimuron Ethyl In Support Of Registration And Establishment Of Tolerances On Field Corn And Soybeans
1903177	Metabolism Of Sulfonylurea Herbicides In Wild Type And Optimum GAT Crops (#1903188)
1903178	Freezer Storage Stability Of Rimsulfuron And Chlorimuron Ethyl In Crops Representative Of Soybean And Corn (#1903190)
1932009	Magnitude Of Residues Of Rimsulfuron, Tribenuron Methyl, And Chlorimuron Ethyl, In/On Aspirated Grain Fractions And Processed Fractions (Refined Oil, Meal And Hulls) Of A Soybean Line Containing Event DP 356043 5 Following Applications Of Rimsulfuron, Tribenuron Methyl And Chlorimuron Ethyl Containing Herbicides-United States Locations, Season 2006
1932012	Magnitude And Decline Of Sulfonylurea Residues In/On Forage, Hay And Seed Of A Soybean Line Containing Event DP-356043 With The GAT And The GM-HRA Genes Following A Variety Of Tank Mix Applications Of Two Glyphosate Fromulation And Rimsulfuron, Tribenuron Methyl, Chlorimuron Ethyl, And Metsulfuron Methyl Containing Herbicides At Proposed Maximum Label Rates-United States And Canadian Locations, Season 2006 (#1932013)
1932018	[14 C] Chlorimuron Ethyl:Metabolism In Maize
1932019	Plant Metabolism Study Of 14C-DPX-F6025 In Peanuts

D. Information Considered in the Occupational and Non-Occupational Assessment

A. Studies/Information Provided by Task Forces

PMRA Document Number	Reference
2115788	Agricultural Reentry Task Force (ARTF). 2008. Data Submitted by the ARTF to Support Revision of Agricultural Transfer Coefficients. Submission# 2006-0257.
1913109	AHETF, 2009. Agricultural Handler Exposure Scenario Monograph: Open Cab Groundboom Application of Liquid Sprays. Report Number AHE1004. December 23, 2009.
2572744	AHETF, 2015. Agricultural Handler Exposure Scenario Monograph: Open Pour Mixing and Loading Dry Flowable Formulations. Report Number AHE1001-1. March 31, 2015.

E. Information Considered in the Environmental Assessment

A. List of Studies/Information Submitted by Registrant

i) Unpublished Information

PMRA Document Number	Reference
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1156148	Photodegradation of 14-C-Dpx-F6025 on Soil (By P.T. Hardesty)(Amr-192-84;0528h/0050h)(Chlorimuron Ethyl), DACO 8.2.1
1156159	Photodegradtion of [Phenyl-14c(U)] Dpx-F6025 and [Pyrimidine-2-14c] Dpx-F6025 on Soil (By R.F. Dietrich)(Amr-449-85;0691h/)(Chlorimuron Ethyl), DACO 8.2.1
1156166	Aqueous Photolysis of 14c-Dpx-F6025 (By Priscilla L. Friedman)(Amr-299-84;0639h/0064h)(Chlorimuron Ethyl), DACO 8.2.1
1156167	Photodegradation of [Phenyl-14c(U)] Dpx-F6025 and [Pyrimidine-2-14c] Dpx-F6025 in Water (By R.F. Dietrich)(A,R-456-85;0694h)(Chlorimuron Ethyl), DACO 8.2.1
1156168	Identification of the Major Aqueous Photoproduct of Dpx-F6025 Addendum To Amr-456-85 (0694h/0076h;0802h/0079h)(Chlorimuron Ethyl), DACO 8.2.1
1156169	Octanol/Water Partition Coefficient of Dpx-F6025 (By L.W. Neal)(Amr-142-83)(Chlorimuron Ethyl), DACO 8.2.1
1190819	Letter To J.A. Tompkins From R.M. Vaught Re Dupont Chlorimuron Ethyl (Epa Reg No. 352-528) Pesticide Fact Sheet Correction Request, Re: Epa #82.1 Issued July 30, 1987 Water Solubility Value Error, November 13, 1998 Fact Sheet Issued July 30, 1987 [Reliance Sts;Subn.#99-0338;Regn.#25784;Submitted December 23, 1998;Volume 1 of 1 Part 8, Environmental Chemistry and Fate], DACO 8.2.1
1156128	Analysis of Sulfonylureas in Water by Liquid Chromatography (By E.W. Zahnow)(Amr-356-85a)(Revised 2/13/86)(Chlorimuron Ehtyl), DACO 8.2.2.1
1156129	Analysis of Dpx-F6025 in Soil by Liquid Chromatography (By E.W. Zahnow)(Amr-444-85;0305d)(Chlorimuron Ethyl), DACO 8.2.2.1
1156130	Analysis of Dpx-F6025 in Soil by Liquid Chromatography Supplement No.1 and No.2 (Amr-444-85)(Chlorimuron Ethyl), DACO 8.2.2.1
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1190818	An Enzyme-Linked Immunosorbent Assay (Elisa) Method For the Determination of Residues of Sulfonylureas in Water and Soil, J.C. Strahan, C.L. Rankin, Completed March 9, 1995 Revision 1 July 14, 1995 (Amr2438-92) [Reliance Sts;Subn.#99-0338;Regn.#25784;Submitted December 23, 1998;Volume 1 of 1 Part 8, Environmental Chemistry and Fate], DACO 8.2.2.1, 8.2.2.3
1156126	Aerobic Soil Metabolism of 14c-Dpx-F6025 (By P.T. Hardesty)(Amr-138-83;0425h/0060h)(Revision 2 9/18/84), DACO 8.2.3.1
1156127	Anaerobic Aquatic Metabolism of 14c-Labelled Dpx-F6025 (By E.M. Venzon, P.T.Hardesty)(Amr-322-85)(Chlorimuron Ethyl), DACO 8.2.3.1
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1166192	Chlorimuron Dissipation in Pond Water and Soil Report (January 14 1996)(Chlorimuron Ethyl Technical), DACO 8.2.3.4.2, 8.2.3.5.2
1168481	Chlorimuron Dissipation in Granby Sl Soil At 5 and 25 C (July 31 1996) Final Report,

	DACO 8.2.3.4.2, 8.3.2.1
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1168482	Chorimuron Dissipation in Pond Water At Two Temperatures (July 31 1996)(Chlorimuron Ethyl) Final Report, DACO 8.2.3.5.2
1156170	Batch Equilibrium (Adsorption/Desorption) and Soil Thin-Layer Chromatography Studies With Dpx-F6025 [Phenyl-14c] (By Thomas M. Priester)(Amr-198-84;0532h/0050h)(Chlorimuron Ethyl), DACO 8.2.4.1
1161183	Soil Column Leaching Behavior of [Phenyl-14c(U)] Dpx-F6025 by A.C. Barefoot.(Amr-306-84).(Chlorimuron-Ethyl)., DACO 8.2.4.1
1156131	Terrestrial Dissipation of 14c-Labeled Dpx-F6025 (Amr-352-85)(E.M. Venzon and P.T. Hardesty)(Chlorimuron Ethyl), DACO 8.3.2.3
1166920	Dissipation of Residues of Chlorimuron Ethyl Herbicide Ina Canadian Soil. (Can-94-903) (December 19, 1995., DACO 8.3.2.3
1166931	Rationale For Waiver For Aquatic Field Soil Dissipation Data For Chlorimuron-Ethyl Herbicide. (1995), DACO 8.3.3.3
1156144	Acute Toxicity of Chlorimuron Ethyl Technical to Soil Orgainsims (Adult Earthworms) (001/91/004/91), Daco 9.2.3.1
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1163956	Rationale For Waiver on Acute Oral LD50 to the Honeybee Chlorimuron-Ethyl, Daco 9.2.4.1
1163954	Rationale For Waiver on Data For Toxicity to Predators and Parasites of the Target Pest (Chlorimuron-Ethyl Technical), Daco 9.2.5, 9.2.6
1166161	Determination of the Influence of Chlorimuron-Ethyl (Cas #90982-32-4) on Soil Microflora Activity (G96143)(March 1996)(Chlorimuron Ethyl Technical), Daco 9.2.7
1156145	48-Hour LC50 to Daphnia Magna (107-83;4581-088)(Chlorimuron Ethyl), Daco 9.3.1
1156146	48-Hour EC50 to Daphnia Magna (442-84;4581-220)(Chlorimuron Ethyl), Daco 9.3.1
1156147	Acute Toxicity of H-16,331 the Crayfish (Hlo-524-86;Mr-4581-386;Ese No. 86-342)(Chlorimuron Ethyl), Daco 9.3.1
1156135	96-Hour LC50 to Rainbow Trout (142-83;4581-088)(Chlorimuron Ethyl), Daco 9.5.2.1
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1156138	96-Hour LC50 to Bluegill Sunfish (139-83;4581-088)(Chlorimuron Ethyl), Daco 9.5.2.1
1156140	96-Hour LC50 to Bluegill Sunfish (377-83;4581-088)(Chlorimuron Ethyl), Daco 9.5.2.1
1156141	Static Acute 96-Hour LC50of Inf-6025-30 to Channel Catfish (Hlr-334-86;4581-386)(Chlorimuron Ethyl), Daco 9.5.2.1
1156142	Residue Studies With 14c-Phenyl-Labeled Dpx-F6025 in Bluegill Sunfish (Amr-193-84;521-83;7013-001)(Chlorimuron Ethyl), Daco 9.5.5
1156133	Acute Oral Ld50- Mallard Duck H-14823 Final Report (Hlo-134-83;Mr-4581-088)(Chlorimuron Ethyl), Daco 9.6.2.1
1163953	Rationale For Waiver on Acute Oral LD50 tothe Bobwhite Quail Chlorimuron-Ethyl, Daco 9.6.2.1
1156132	An Eight-Day Dietary LC50In Bobwhite Quail With H-14823 Final Report (Hlo-236-83;Mr-4581-088)(Chlorimuron Ethyl), Daco 9.6.2.4
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1166188	Off Target Deposition From Multiple Swath Ground Application of Metsulfuron Methyl Herbicide (By F. Huston & M.R. Grenier)(Chlorimuron –Ethyl Technical)(Mets/Eco 3 Rep), Daco 9.8.1
1156149	Determination of the Toxicity of Chlorimuron Ethyl Technical to Chlorella Vulgaris (005/91) Revised December 12 1991, Daco 9.8.2
1166186	Chlorimuron Ethyl (Dpx-F6025-153): Influence on Growth and Reproduction of Four Select Algal Species (112a-126;Amr 3024-94), Daco 9.8.2, 9.8.3
1190824	Influence of Thifensulfuron Methyl on Seed Germination, Seedling Emergence, and Vegetative Vigor of Several Terrestrial Plants, R.A. Mckelvey and H. Kuratle, Completed January 21, 1993 (Amr2071-91) [Reliance Sts;Subn.#99-0338;Regn.#25784;Submitted December 23, 1998;Volume 1 of 1 Part 9, Environmental Toxicology] Page 50 Missing, Daco 9.8.4
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