Pest Management Regulatory Agency
Agence de réglementation de la lutte antiparasitaire

Regulatory Note REG2003-08

Foramsulfuron Technical Herbicide, Option 2.25 SC Herbicide, and Option 35 DF Herbicide

The active ingredient Foramsulfuron Technical Herbicide and the associated end-use products, Option 2.25 SC Herbicide and Option 35 DF Herbicide, containing foramsulfuron and the safener isoxadifen-ethyl, have been granted temporary registration under Section 17 of the Pest Control Products Regulations, for the control of grasses and broadleaf weeds in field corn.

This Regulatory Note provides a summary of data reviewed and the rationale for the proposed regulatory decision regarding these products.

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Foreword

Health Canada's Pest Management Regulatory Agency (PMRA) has issued temporary registration for Foramsulfuron Technical Herbicide and the associated end-use products (EPs), Option 2.25 SC Herbicide and Option 35 DF Herbicide, for the control of grasses and broadleaf weeds in field corn. A third EP containing foramsulfuron, Tribute Solo 32 DF Herbicide, also contains the active ingredient (a.i.) iodosulfuron-methyl-sodium and is not discussed in this document, with the exception of the risk assessment for occupational exposure (see the PMRA Regulatory Note on iodosulfuron-methyl-sodium). These products were reviewed as workshare submissions within the North American Free Trade Agreement's Technical Working Group on Pesticides (NAFTA TWG) Joint Review Program by Health Canada's PMRA and the United States (US) Environmental Protection Agency (EPA).

The data package was provided partially in electronic format and the contents were formatted in accordance with an international standard developed under the auspices of the Organisation for Economic Co-operation and Development (OECD).

Methods for analysing foramsulfuron in some environmental media are available to research and monitoring agencies upon request to the PMRA, although additional analytical methodology has been requested at this time.

Bayer CropScience Inc. (formerly Aventis CropScience Canada Co.) will be carrying out additional chemistry, storage stability, environmental chemistry, and environmental toxicity studies as a condition of this temporary registration. Following the review of this information, the PMRA will publish a proposed registration decision document and request comments from interested parties before proceeding with a final regulatory decision.

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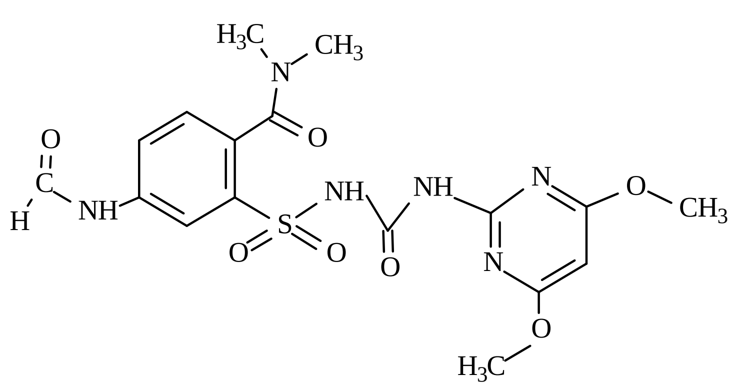
1.0 The active substance, its properties and uses

Foramsulfuron is a sulfonylurea herbicide. Three end-use products (EPs) containing foramsulfuron are proposed for registration: Option 2.25 SC Herbicide, Option 35 DF Herbicide, and Tribute Solo 32 DF Herbicide. All three EPs contain the safener isoxadifen-ethyl. Tribute Solo 32 DF Herbicide also contains the active ingredient (a.i.) iodosulfuron-methyl-sodium (see the PMRA Regulatory Note on iodosulfuron-methyl-sodium). Only the active ingredient, Option 2.25 SC Herbicide, and Option 35 DF Herbicide are discussed in this document.

1.1 Identity (Organisation for Economic Co-operation and Development (OECD) 2.1.1)

Active substance	Foramsulfuron
Function	Herbicide
Chemical name:	
1. International Union of Pure and Applied Chemistry (IUPAC)	N,N-dimethyl-2-[3-(4,6-dimethoxypyrimidin-2-yl)ureidosulfonyl]-4-formylaminobenzamide
2. Chemical Abstracts Service (CAS)	2-[[[[(4,6-dimethoxy-2-pyrimidinyl)amino]carbonyl]amino]sulfonyl]-4-(formylamino)-N,N-dimethylbenzamide
CAS Number:	173159-57-4
Molecular formula	$C_{17}H_{20}N_6O_7S$
Molecular weight	452.49
Structural formula	

Nominal purity of active substance	98.22% (95.27–100)
Identity of relevant impurities of toxicological, environmental, or other significance	The technical grade foramsulfuron does not contain any impurity or microcontaminant known to be a Toxic Substances Management Policy (TSMP) Track-1 substance as identified in App. II of DIR99-03.

1.2 Physical and chemical properties (OECD 2.1.2)

Table 1.2.1 Technical product: Foramsulfuron Technical Herbicide

Property	Result	Comment
Colour and physical state	Light beige powder	
Odour	Slightly acidic	
Melting point/range	194.5°C	
Boiling point/range	Not applicable	
Specific gravity	1.45 at 20.5°C	
Vapour pressure	**T, °C** **v.p. (Pa)** 20 4.2×10^{-11} 25 1.3×10^{-10}	Foramsulfuron is non-volatile under field conditions.
Henry's Law constant	**T, °C** **1/H** **K(atm·m^3/mol)** 20 4.22×10^{14} 5.70×10^{-17} 25 1.39×10^{14} 1.76×10^{-16}	Foramsulfuron is non-volatile from moist soils or water.
Ultraviolet (UV)/visible spectrum	**medium** **ε (L/mol × cm)** neutral 0.33×10^4 (λ =291 nm) basic 0.37×10^4 (λ =291 nm) No absorbance at λ > 300 nm	Foramsulfuron decomposes in acidic medium. There is no absorption above 300 nm, thus foramsulfuron has a low potential for phototransformation under normal environmental conditions.
Solubility in water at 20°C	**pH** **g/L** 5 0.037 7 3.290 8 94.580	Under acidic conditions, foramsulfuron is soluble in water. Under basic and neutral conditions, foramsulfuron is very soluble in water.

Property	Result	Comment
Solubility in organic solvents	**Solvent** **g/L** Acetone 1.925 Acetonitrile 1.111 1,2-dichloroethane 0.185 Ethyl acetate 0.362 Heptane <0.010 Methanol 1.660 p-Xylene <0.010	
n-octanol–water partition coefficient (K_{ow}) at 20˚C	**pH** **log K_{ow}** 2.0 1.44 7 −0.78 9 −1.97	Foramsulfuron is unlikely to bioconcentrate in aquatic organisms.
Dissociation constant	pK_a = 4.60 at 21.5°C	
Stability (temperature, metals)	Data on stability to metals and metal ions are not applicable. The technical grade active ingredient is stored in steel drums with an inner polyethylene lining. Exposure to metal (stainless steel) during formulation process is reduced to an insignificant minimum and the EP is packed in suitable plastic containers.	

Table 1.2.2a EP: Option 2.25 SC Herbicide

Property	Result
Colour	Beige
Odour	Aromatic
Physical state	Liquid
Formulation type	Suspension
Guarantee	Foramsulfuron: 22.5 g/L (limits: 21.4–23.6 g/L) Isoxadifen-ethyl: 22.5 g/L
Formulants	The product contains 33.36% of the petroleum distillate, Solvesso 200, which is a USEPA Inert List 2 compound.
Container material and description	HDPE with polyamide liner
Density	0.9652 g/cm^3 at 20°C

Property	Result
pH of dispersion in water	5.2 (1%); 5.9 (10%)
Oxidizing or reducing action	No oxidizing effect
Storage stability	The results of a one-year, room temperature storage stability study are required.
Explodability	Not explosive

Table 1.2.2b EP: Option 35 DF Herbicide

Property	Result
Colour	Yellow-brownish
Odour	Weak aromatic
Physical state	Solid
Formulation type	Wettable granules
Guarantee	35% (33.95–36)
Container material and description	Polyethylene bottles
Bulk density	Tap density: 0.64 g/mL
pH of 1% dispersion in water	5.3
Oxidizing or reducing action	No chemical incompatibility when in contact with oxidizing (ammonium nitrate) or reducing agents (zinc powder)
Storage stability	Stability data showed no significant reduction in active content after storage for 14 days at 54°C.
Explodability	Not explosive

1.3 Details of uses and further information (OECD 2.1.3)

Foramsulfuron belongs to the general class of herbicides termed sulfonyl ureas. Foramsulfuron inhibits the activity of acetolactate synthase (ALS) which is the key enzyme in the biosynthesis of the branch-chain amino acids, isoleucine, leucine and valine. Although the actual sequence of phytotoxic processes is unclear, plant death results from events occurring in response to inhibition of the ALS enzyme.

Foramsulfuron behaves like both a contact and systemic herbicide in post-emergence application to weed species. Uptake by the target plant is immediate upon application and phytotoxic effects within the plant are also immediate. The visible symptoms of herbicidal action are the almost immediate arresting of growth, followed by leaf yellowing, inhibition of anthocyanin production, and finally, progressive shoot necrosis. Depending on the weed species and environmental conditions, plant death will usually occur between one and three weeks after herbicide application

Foramsulfuron is formulated alone in two EPs. Option 35 DF Herbicide is a dry flowable formulation that has a guarantee of foramsulfuron at 35%, which must be applied with Hasten spray additive. Option 2.25 SC Herbicide is a suspension formulation that has a guarantee of foramsulfuron of 22.5 g/L, which does not require the addition of Hasten spray additive. Both Option 35 DF Herbicide and Option 2.25 SC Herbicide must be applied with liquid nitrogen fertilizer.

Foramsulfuron is also formulated with the active ingredient iodosulfuron-methyl-sodium in one EP, Tribute Solo 32 DF. For information on the EP containing iodosulfuron-methyl-sodium, please refer to the PMRA Regulatory Note on iodosulfuron-methyl-sodium.

Both Option 35 DF and Option 2.25 SC contain a built-in safener, isoxadifen-ethyl, which has no herbicidal activity when applied alone; however, when applied in conjunction with foramsulfuron, isoxadifen-ethyl encourages rapid inactivation of the herbicide in field corn without compromising herbicide effectiveness.

Option 35 DF is a selective herbicide for use as a post-emergence application to field corn grown in Eastern Canada utilizing conventional tillage systems, for the control of specific broadleaf and grass weeds. Option 35 DF must be applied with Hasten spray additive at 1.0% v/v (volume/volume) (i.e., 1 L Hasten/100 L spray solution) and 2.5 L/ha of 28% liquid nitrogen fertilizer in a minimum spray volume of 150 L/ha with a maximum of one application per year using ground equipment only.

There are two rates of application for Option 35 DF Herbicide. Option 35 DF applied at a rate of 43 g product/ha (15 g a.i./ha) is effective for the control of quackgrass (*Agropyron repens*) fall panicum (*Panicum dichotomiflorum*), green foxtail (*Setaria viridis*), proso millet (*Panicum miliaceum*), witchgrass (*Panicum capillare*), common chickweed (*Stellaria media*), wild mustard (*Sinapis arvensis*), wormseed mustard (*Erysimum cheiranthoides*), eastern black nightshade (*Solanum ptycanthum*), redroot pigweed (*Amaranthus retroflexus*), and velvetleaf (*Abutilon theophrasti*). Option 35 DF applied at a rate of 100 g/ha (35 g a.i./ha) is effective for the control of barnyard grass (*Echinochloa crusgalli*), large crabgrass (*Digitaria sanguinalis*), yellow foxtail (*Setaria glauca*), bristly foxtail (*Setaria verticillata*), lambsquarters (*Chenopodium album*), and the suppression of common ragweed (*Ambrosia artemisiifolia*).

The data provided indicated that a rate lower than 35 g a.i./ha of Option 35 DF may provide acceptable control of barnyard grass, large crabgrass, yellow foxtail, bristly foxtail, and lambsquarters. Additional data may be requested in order to establish the lowest effective rate for control of these weeds.

Soybeans, field corn, sweet corn, alfalfa, spring barley, spring canola, red clover, spring oats, sugar beets, and dry common beans (kidney, navy, cranberry) may be planted 10 months after application of Option 35 DF. Winter wheat may be planted 4 months after application of Option 35 DF.

Option 35 DF may be tankmixed with Aatrex Nine-0 at 0.930–1.24 kg/ha, Aatrex 480 at 1.68–2.24 L/ha, Banvel II at 0.300 L/ha, Marksman at 2.5 L/ha or Peak + Banvel at 13.3 g/ha + 0.300 L/ha.

Option 2.25 SC is a selective herbicide for use as a post-emergence application to field corn grown in Eastern Canada utilizing conventional tillage systems, for the control of specific broadleaf and grass weeds. Option 2.25 must be applied with 2.5 L/ha of 28% liquid nitrogen fertilizer in a minimum spray volume of 150 L/ha with a maximum of one application per year using ground equipment only.

There are two rates of application for Option 2.25 SC Herbicide. Option 2.25 SC applied at a rate of 0.67 L/ha (15 g a.i./ha) is effective for the control of quackgrass (*Agropyron repens*) fall panicum (*Panicum dichotomiflorum*), green foxtail (*Setaria viridis*), proso millet (*Panicum miliaceum*), witchgrass (*Panicum capillare*), common chickweed (*Stellaria media*), wild mustard (*Sinapis arvensis*), wormseed mustard (*Erysimum cheiranthoides*), eastern black nightshade (*Solanum ptycanthum*), redroot pigweed (*Amaranthus retroflexus*), and velvetleaf (*Abutilon theophrasti*). Option 2.25 SC applied at a rate of 1.56 L/ha (35 g a.i./ha) is effective for the control of barnyard grass (*Echinochloa crusgalli*), large crabgrass (*Digitaria sanguinalis*), yellow foxtail (*Setaria glauca*), bristly foxtail (*Setaria verticillata*), lambsquarters (*Chenopodium album*), and the suppression of common ragweed (*Ambrosia artemisiifolia*).

Soybeans, field corn, sweet corn, alfalfa, spring barley, spring canola, red clover, spring oats, sugar beets, and dry common beans (kidney, navy, cranberry) may be planted 10 months after application of Option 2.25 SC. Winter wheat may be planted 4 months after application of Option 2.25 SC.

Option 2.25 SC Herbicide may be tankmixed with Aatrex Nine-0 at 0.930–1.24 kg/ha, Aatrex 480 at 1.68–2.24 L/ha, Banvel II at 0.300 L/ha, Marksman at 2.5 L/ha or Peak + Banvel at 13.3 g/ha + 0.300 L/ha.

2.0 Methods of analysis (OECD 2.2)

2.1 Analytical methods for analysis of the active substance as manufactured (OECD 2.2.1)

A reversed phase high performance liquid chromatography/ultraviolet (HPLC/UV) method was provided for the determination of the active substance, Foramsulfuron, in the technical product. Based on the validation data and the chromatograms provided, the method was assessed to be sufficiently specific, precise, and accurate (Appendix I, Table 1).

2.2 Method for formulation analysis

A reversed phase HPLC/UV method was provided for simultaneous determination of foramsulfuron and isoxadifen-ethyl present in Option 2.25 SC Herbicide. Based on the validation data and the chromatograms provided, the method was assessed to be specific, precise, and accurate for use as an enforcement analytical method (Appendix I, Table 2).

A reversed phase HPLC/UV method was provided for simultaneous determination of foramsulfuron present in Option 35 DF Herbicide. Based on the validation data and the chromatograms provided, the method was assessed to be specific, precise, and accurate for use as an enforcement analytical method (Appendix I, Table 2).

2.3 Analytical methods for residue analysis (OECD 2.2.3)

2.3.1 Methods for environmental residue analysis

Two chromatographic methods were submitted for the determination of the parent compound, foramsulfuron (AE F130360), and its major transformation product (TP) AE F092944 in soil. Based on the validation data and the chromatograms provided, the methods were assessed to be sufficiently sensitive, precise, accurate, and specific for the determination (Appendix I, Table 3).

The method for the determination of foramsulfuron in sediment was not provided.

An HPLC/UV method was provided for the determination of the parent compound, foramsulfuron, in drinking water and surface water. Based on the validation data and chromatograms provided, the method was assessed to be sufficiently sensitive, precise, accurate, and specific for the determination (Appendix I, Table 3).

An analytical method was provided for the determination of the parent compound and major TP in maize. It was extended to the residue method for plant matrix. A waiver request based on a low *n*-octanol–water partition coefficient (K_{ow}) for a specific and sensitive method in animal matrix is not acceptable.

2.3.2 Multi-residue methods for residue analysis

Foramsulfuron and AE F153745 were screened using Protocols A, C, E, F, and G. The compounds were not evaluated under Protocol B because neither is an acid or a phenol. The analytes were evaluated using Protocols E and F, which first involved determination of their behaviour through the Florisil cleanup steps. No recovery of either compound was observed from the Florisil columns, and therefore, no further testing under Protocols E and F was conducted. Protocol D testing was not conducted because the previous testing (under Protocols E and F) indicated that there would be no recovery if Florisil column cleanup was used, and there would be insufficient peak sensitivity if a more selective detector was used. Foramsulfuron was tested under Protocol G; however, because the resulting peak had poor shape and low sensitivity, it was determined that it was unsuitable for quantitation and no further testing was conducted. With respect to Protocol C, acceptable responses (within the correct relative retention time window) were only obtained using a DB1-type column under Level II conditions and may be suitable for the analysis of foramsulfuron and AE F153745.

2.3.3 Methods for residue analysis of plants and plant products

The proposed method determines residues of foramsulfuron and AE F153745, although the metabolite AE F153745 is not defined as the residue of concern. Briefly, samples are extracted with acetonitrile:water (80:20, v:v) and filtered under vacuum. The extract is concentrated by evaporation, and acetonitrile is added. The extract is partitioned twice with hexane, and the hexane phases are discarded. The aqueous phase is concentrated and diluted with 20 millimolar (mM) ammonium acetate buffer. The extract is then cleaned up on a Bond Elut C-18 solid phase extraction (SPE) column, using ethyl acetate to elute residues of foramsulfuron and AE F153745. The eluate is concentrated by evaporation and diluted with 20 mM acidified ammonium acetate buffer for HPLC analysis, and then mass spectrometry (MS) detection with electrospray ionization in the positive ion mode. The reported method limits of quantitation (LOQs) are 0.01 ppm for residues of foramsulfuron in corn grain; 0.02 ppm for residues of AE F153745 in corn grain; and 0.05 ppm each for residues of foramsulfuron and AE F153745 in corn forage and stover. Individual recoveries outside the 70–120% range were observed in only a few instances. The extraction efficiency indicated that residues of foramsulfuron were recovered at 83% from corn grain, 85% from forage, and 86% from whole ears. The extraction efficiency also indicated that residues of AE F153745 were recovered at 94% from corn grain, 85% from forage, and 91% from whole ears. The standard deviations measured with respect to recoveries following spiking at the LOQ did appear to indicate that the method had adequate accuracy and precision. The detector response was linear (correlation coefficients: $r = 0.9603$; $r = 0.9605$) in the range of 0 to 40 ng/mL (injected) for foramsulfuron and AE F153745, respectively. Representative chromatograms of control corn matrices showed no interference from corn components or from reagents, solvents, and glassware. The independent laboratory validation of the enforcement method proposed for the analysis of residues of foramsulfuron and the metabolite AE F153745 in field corn matrices was adequate and reliable.

2.3.4 Methods for residue analysis of food of animal origin

Maximum Residue Limits (MRLs) are not required for livestock commodities when no detectable residue is observed in feed items from crop field trials that reflect the proposed use of the pesticide (Chemistry Residue Guidelines DIR98-02, Section 2). Therefore, there was no enforcement method conducted for the analysis of food of animal origin.

3.0 Impact on human and animal health (OECD 2.3)

3.1 Integrated toxicological summary (Summary table in Appendix II, Table 1)

A detailed review of the toxicological database available for the technical grade active ingredient (TGAI), foramsulfuron, has been completed. The existing database is considered to be adequate and complete.

In rats, absorption of [^{14}C-phenyl] foramsulfuron following oral administration at doses of 10 or 1000 mg/kg bw was limited (approximately 20%), with rapid elimination. Maximum concentrations in the blood were attained within 1 and 4 hours of dosing for the low- and high-dose groups, respectively. The $t_{1/2}$ for elimination from the plasma was 5.4 and 18.5 hours in low-dose females and males, respectively, and 2.4–2.9 hours for high-dose rats. The primary route of excretion was via the feces; 86.8–97.1% of the dose was excreted in the feces and 5.1–5.8% in the urine in low-dose group and 1.3–1.5% in the urine in the high-dose group within 3 days of dosing. In a 14-day repeat dose experiment, fecal excretion accounted for 61.0% in males and 88.8% in females. This sex-related difference was attributed to a substantial amount of radioactivity remaining in the carcass/gastro-intestinal tract (GIT) of males (24.5%) compared to females (3.1%) at sacrifice (2 days post-dosing). In bile duct-cannulated rats, fecal excretion accounted for 75.6% of the dose, while urinary and bile excretion accounted for 12.7% and 4.2% in males and females, respectively. The low levels of urinary and biliary excretion in the low-dose rats and the reduced level of urinary excretion in the high-dose rats indicated that absorption of [^{14}C-phenyl] foramsulfuron was limited. Maximum concentrations of [^{14}C-phenyl] foramsulfuron were observed 0.5–4 hours post-dose, with the exception of the thyroid and adrenals in the high-dose group. Average concentrations of radioactivity were ≤0.003 µg/g in all tissues from low-dose animals and ranged from below background to 78.7 µg/g in tissues from high-dose animals 72 hours after dosing. The relative distribution in tissues was similar for both sexes and dose groups, with the highest concentrations found in the liver, kidney, thyroid, and adrenals (high-dose only). Repeated dosing at 10 mg/kg/day resulted in little or no accumulation of [^{14}C-phenyl] foramsulfuron with the exception of the liver, where concentrations of [^{14}C-phenyl] foramsulfuron increased by 2.5–2.8× between day 1 (0.08–0.11 µg/g) and day 14 (0.22–0.28 µg/g) of dosing. Metabolism of [^{14}C-phenyl] foramsulfuron following single low- and high-dosing was similar between sexes and dose groups, with the parent compound being the major residue recovered in the feces (72.3–80.4% dose). The parent compound was also the major metabolite found in the feces of repeat-dose males (64.3%) and females (98.1%). Metabolites identified in the feces and urine included the cleavage product AE F153745 (1.6–11.0% dose) and the free amine metabolite AE F130619 (0.8–3.5% dose). Minor amounts of unknown metabolites were also detected in the feces ($\leq$5.9% dose) and urine ($\leq$3.9% dose).

Foramsulfuron technical herbicide has low acute toxicity by the oral, dermal, and inhalation routes of exposure. It is non-irritating to the skin, minimally irritating to the eye, and is not considered to be a potential skin sensitizer. The formulation Option 35 DF has low acute toxicity by the oral, dermal, and inhalation routes of exposure. It is moderately irritating to the skin, mildly irritating to the eye, and is a potential skin sensitizer. The formulants were on the USEPA List 3, 4A, or 4B, or the Canadian Registered Products List, and were of no toxicological concern.

In a 28-day dermal toxicity study in rats, foramsulfuron did not affect mortality, clinical signs, body weight (bw), body-weight gain, food consumption, hematology, clinical chemistry, organ weight, or gross pathology. At 1000 mg/kg bw/day, sebaceous hyperplasia at the application site and slight lymphocytic infiltration of the liver was observed in male rats only. The no observed adverse effect level (NOAEL) for systemic toxicity was 1000 mg/kg bw/day (limit dose).

In mice, decreased leukocytes, lymphocytes, and monocytes were observed in the high dose (6400 ppm) males in the 90-day study; however, these changes were not corroborated by other findings indicative of leukopenia, such as altered bone marrow histology or splenomegaly. No other effect on clinical signs, bw, body-weight gain, food consumption, hematology, gross pathology, or histopathological findings was observed. The NOAEL for the 90-day dietary study was 6400 ppm (equivalent to 1002 and 1179 mg/kg bw/day in males and females, respectively), the highest dose tested. In the 78-week combined dietary/oncogenicity study, no treatment-related effect was noted and no increase in tumour incidence was observed. The NOAEL for the 78-week study was 8000 ppm (equivalent to 1115.1 and 1375.5 mg/kg bw/day in males and females, respectively), the highest dose tested. There was no evidence of carcinogenic potential of foramsulfuron in mice.

In rats, no treatment-related or adverse finding was noted in the 90-day dietary study nor in the 2-year combined dietary/oncogenicity study. The NOAEL for the 90-day dietary study was 20 000 ppm (equivalent to 1568 and 1786 mg/kg bw/day in males and females, respectively), the highest dose tested. The NOAEL for the 2-year study was 20 000 ppm (equivalent to 849 and 1135 mg/kg bw/day in males and females, respectively), the highest dose tested. There was no evidence of carcinogenic potential of foramsulfuron in rats.

Foramsulfuron was tested in a battery of in vitro (bacterial and mammalian cell gene mutation assays, unscheduled DNA synthesis assay, and mammalian cell chromosomal abberation assay) and in vivo (mouse micronucleus assay) mutagenicity studies. Foramsulfuron showed weak clastogenic activity in primary human lymphocytes in absence of exogenous metabolic activation; however, there was no evidence of genotoxic potential in any other assay. Therefore, the weight of evidence suggests that foramsulfuron was not genotoxic under the conditions of the tests performed.

Rat and rabbit developmental toxicity studies and a 2-generation rat reproduction study indicated that foramsulfuron was neither teratogenic nor a reproductive toxicant. In the rat 2-generation reproductive study, there was no treatment-related effect on parental systemic toxicity, reproductive function, reproductive parameters, litter parameters, or offspring toxicity at dose levels up to and including 15 000 ppm (equivalent to 1082 and 1229 mg/kg bw/day in P males and females, respectively; equivalent to 1349 and 1434 mg/kg bw/day on F_1 parental males and females, respectively), the limit dose. The NOAEL for parental, offspring, and reproductive toxicity was 15 000 ppm (equivalent to 1082 and 1229 mg/kg bw/day in parental (P) generation males and females, respectively; equivalent to 1349 and 1434 mg/kg bw/day in first filial (F_1) generation males and females, respectively). On the basis of the parental and offspring NOAELs, there was no indication that neonates were more sensitive to exposure to foramsulfuron.

In the rat developmental study there was no adverse treatment-related maternal or developmental finding at dose levels up to and including 1000 mg/kg bw/day, the limit dose. The NOAEL for maternal and developmental toxicity was 1000 mg/kg bw/day, no lowest observed adverse effect level (LOAEL) was observed. In the rabbit developmental study, reddish urine was observed in a few dams during days 10–12 of gestation. However, there was no adverse treatment-related finding for any reproductive or developmental parameters at dose levels up to and including 500 mg/kg bw/day. The NOAEL for maternal and developmental toxicity was 500 mg/kg bw/day; no LOAEL was observed. On the basis of the maternal and developmental NOAELs noted in the rat and rabbit developmental studies, there was no quantitative evidence to suggest an increased susceptibility of the fetus to *in utero* exposure to foramsulfuron.

3.1.1 Acute toxicity—formulation: Option 2.25 Herbicide

Option 2.25 Herbicide, containing 22.5% foramsulfuron technical and 22.5% isoxadifen-ethyl, a safener, was considered to be of low acute toxicity by the oral, dermal and inhalation routes in rats (oral and dermal LD_{50} >5 g/kg bw; LC_{50} >5 mg/L). The formulation was minimally irritating to the rabbit eye but was moderately irritating to the rabbit skin. Results of skin sensitization testing in guinea pigs, based on the Buehler method, showed a positive response in 2/20 animals, indicating that the test formulation could be a potential skin sensitizer. Thus, the hazard signal words "**POTENTIAL SKIN SENSITIZER**" should be displayed on product labels.

In an acute oral toxicity study, Sprague-Dawley (SD) rats, 5/sex, were given by gavage a single dose of undiluted AE F130360 + AE F122006, 22.5 + 22.5 g/L oil flowable at 5000 mg/kg bw. After dosing, the rats were observed daily for clinical signs and mortality. Individual body weights were recorded just prior to dosing, and at weekly intervals. All surviving animals were killed and subjected to a macroscopic examination at study termination on day 15. One male and one female rat died within minutes of dosing. Necropsy revealed minimal darkened tissue and prominent blood vessels in the lungs. Clinical signs observed in the majority of the rats included piloerection, hunched posture, waddling/unsteady gait, lethargy, walking on toes and pallid extremities. Other less common signs were partially closed eyelids and thin/ungroomed appearance. All rats were normal by day 9. Most rats had normal body weight gain during the study period. One female showed a low weight gain on day 15 when compared with other females. At sacrifice, gross pathological findings were thickening of the stomach wall and gaseous distension of the duodenum. Based on the mortality data, the acute oral LD_{50} for both male and female rats was >5000 mg/kg bw. Thus, the test formulation was considered of low acute toxicity via the oral route.

In an acute dermal toxicity study, SD rats, 5/sex, were given a single topical application of AE F130360 + AE F122006, 22.5 + 22.5 g/L oil flowable at 5000 mg/kg bw. The application site was occluded for 24 h. After dosing, the rats were observed daily for clinical signs and mortality. Individual body weights were recorded just prior to dosing and at weekly intervals. At terminal sacrifice, all rats were examined for gross pathological changes. There were no deaths or systemic clinical signs during the study period. A predominantly slight to well-defined irritation reaction was noted in all rats on days 2–3, and desquamation by day 4. Most test skin sites were normal by day 12. Most rats gained weight satisfactorily. Lower weight gain was observed in two females, while one female showed a weight loss by day 8. At terminal sacrifice, there were no macroscopic abnormalities. Based on the mortality data, the acute dermal LD_{50} was >5000 mg/kg bw, indicating that the test material was of low acute toxicity by the dermal route.

In an acute inhalation toxicity study, SD rats, 5/sex, were exposed for 4 hours to an aerosol of AE F130360 + AE F122006, 22.5 + 22.5 g/L oil flowable at 5.25 mg/L (actual; nominal = 77 mg/L) in a nose-only inhalation chamber. The mass median aerodynamic diameter (MMAD) and geometric standard deviation (GSD) of the aerosol were 4.64 µm ± 2.15, with 42.3% of the aerosol measured <4 µm. The rats were observed daily for clinical signs and mortality for 14 days. Individual body weights were recorded just prior to dosing and at weekly intervals. All surviving animals were killed and subjected to a macroscopic examination at study termination on day 15. There were no deaths. Wet fur, hunched posture, piloerection, increased respiratory rate and red/ brown staining around the snout were commonly noted during the study. All rats recovered and appeared normal within 1–5 days after exposure. All rats showed normal body-weight gain. At study termination, there were no gross pathological findings. Based on the mortality data, the acute inhalation LC_{50} for both male and female rats was >5.25 mg/L. Thus, the test formulation was considered of low acute toxicity via the inhalation route.

In a primary eye irritation study, 4 male NZW rabbits were each given a single ocular dose of 0.1 mL of the test material. The test material was instilled into the conjunctival sac of one eye which remained unrinsed. Reaction of the treated eye was assessed 1 hour, and 1, 2, 3 and(or) 4 days after instillation. Assessment was based on a prescribed numerical system similar to that of Draize. Treatment had no effects on clinical signs.

Irritation reaction was observed in all treated eyes, which showed a diffuse crimson colouration of the conjunctiva, and swelling up to partial eversion of the eyelids. There was no damage to the cornea or iris. The reactions were resolved within 3–4 days. The maximum mean irritation score was 12/110 observed at 1 hour. The primary irritation index, based on the mean scores on days 1, 2 and 3, was 3.1/110. Based on the maximum mean score of 12/110, the test material was considered minimally irritating to the rabbit eye.

In a primary skin irritation study, 3 male NZW rabbits were each given a single dermal dose of 0.5 mL of the test material under a semi-occlusive dressing. At the end of a 4-h exposure period, the dressing was removed and the test skin site was washed with warm water to remove residual test substance. All rabbits were observed daily for signs of systemic toxicity. Skin reaction was assessed, using a numerical system similar to that of Draize, about 60 min after removal of the dressing, and on days 2, 3, 4, and then daily if necessary up to day 14. Dermal exposure to the test formulation did not result in clinical signs of toxicity. Well-defined to moderate erythema and slight to moderate oedema were observed at all test skin sites. The reactions persisted up to day 8, when the conditions improved. Desquamation was evident at some test skin sites from day 5. The reactions were totally subsided by day 11 (2 rabbits) or day 15 (1 rabbit). The primary irritation index was 4.7/8, and the maximum mean irritation score was 5/8 observed at days 4 and 5, indicating that the test formulation was moderately irritating to the skin of rabbits. The hazard warning words “**WARNING—SKIN IRRITANT**” must be displayed on the product labels.

The dermal sensitization potential of AE F130360 + AE F122006, 22.5 + 22.5 g/L oil flowable was assessed in a study based on the method of Buehler. Twenty female guinea pigs were used in the test group and 10 females were used in the negative control group. A study using hexyl cinnamic aldehyde, a known sensitizer, was conducted separately and the findings were used to support the reliability of the test protocol. Based on the findings of a preliminary range finding study, the undiluted test formulation was used for induction applications, which were performed by topical application on days 1, 8 and 15. Two weeks after the last induction application, a naive test skin site was challenged with a 25%, v/v, of the test formulation in sterile water. The test skin sites were assessed for reactions based on a numerical system similar to that of Draize after each induction (24 h) and challenge (24 and 48 h) application. The test animals were observed daily for clinical signs of toxicity. Body weight was recorded at the beginning and end of the study. Topical application of the test formulation did not elicit signs of systemic toxicity. All animals showed normal body weight gain. After the induction applications, slight to moderate dermal reaction sometimes accompanied by necrotic patches were observed for all test animals. No dermal reaction was observed in the negative control animals. Following the challenge application, there were no dermal reactions in 18/20 test animals. The remaining two test animals gave positive responses. Because of the positive response in two guinea pigs and the skin reaction being similar to that in most animals after the first induction application with a 4-fold higher concentration of the test formulation (25 versus 100 %), the test formulation could be considered a potential skin sensitizer. Thus, the hazard warning words “**POTENTIAL SKIN SENSITIZER**” should be displayed on the product labels.

3.2 Determination of acceptable daily intake (ADI)

The most appropriate NOAEL recommended for the ADI is 849 mg/kg bw/day (the highest dose tested) as determined in the 2-year rat dietary study. A safety factor of 100× is recommended (10× for intraspecies variation, 10× for interspecies variation). The recommended ADI to 8.49 mg/kg bw/day.

$$\text{ADI} = \frac{\text{NOAEL}}{\text{SF}} = \frac{849 \text{ mg/kg bw/d}}{100} = 8.49 \text{ mg/kg bw/day}$$

3.3 Acute reference dose (ARfD)

No ARfD was determined as foramsulfuron was considered unlikely to present an acute hazard. There was no significant treatment-related finding in the acute, short-term, 2-generation reproduction, or developmental toxicity studies to indicate a concern in acute dietary risk.

3.4 Toxicological endpoint for assessment of occupational and bystander risks—acceptable operator exposure level/margin of exposure (AOEL/MOE) (OECD 2.3.4)

Foramsulfuron technical herbicide has low acute toxicity by the oral, dermal, and inhalation routes of exposure. It is non-irritating to the skin, minimally irritating to the eye, and is not considered to be a potential skin sensitizer. The formulations, Option 2.25 SC and Option 35 DF, have low acute toxicity by the oral, dermal, and inhalation routes of exposure. Both are moderately irritating to the skin, mildly irritating to the eye, and are potential skin sensitizers. Hasten Adjuvant has low acute toxicity by the oral, dermal, and inhalation routes of exposure, is mildly irritating to the skin, minimally irritating to the eye, and is not considered to be a potential skin sensitizer

Absorption of foramsulfuron following oral administration at doses of 10 or 1000 mg/kg bw was limited (approximately 20%), with rapid elimination. The primary route of excretion was via the feces(>85% of the dose). Little or no accumulation of foramsulfuron was observed except in the liver, where concentrations increased slightly (2×) during a 2-week dosing period. The metabolism of foramsulfuron was similar between sexes and dose groups, with the parent compound being the major residue recovered in the feces. Minor metabolites identified in the feces and urine included a cleavage product and a free amine metabolite.

Following subchronic and chronic dietary studies in mouse (90-day, 78-week), rat (90-day, 2-year) and dog (90-day, 1-year), no significant toxicological effect was noted at doses up to and including the limit dose of approximately 1000 mg/kg bw/day. In the combined dietary/oncogenicity studies in mouse (78-week) and rat (2-year), there was no evidence of carcinogenic potential of foramsulfuron in either species at doses up to and including 8000 ppm (equivalent to 1115.1 and 1375.5 mg/kg bw/day in male and female mice, respectively) and 20 000 ppm (equivalent to 849 and 1135 mg/kg bw/day in male and female rats, respectively).

In a 28-day dermal toxicity study in rats, treatment with foramsulfuron did not affect mortality, clinical signs, bw, body-weight gain, food consumption, hematology, clinical chemistry, organ weight, gross pathology, nor microscopic pathology. Sebaceous hyperplasia at the application site was observed in male rats only at the highest dose tested. The NOAEL was 1000 mg/kg bw/day (limit dose).

In the rat 2-generation reproductive study, there was no treatment-related effect on parental systemic toxicity, reproductive function, reproductive parameters, litter parameters, or offspring toxicity at dose levels up to and including 15 000 ppm. The NOAEL for parental, offspring, and reproductive toxicity was 15 000 ppm (equivalent to 1082 and 1229 mg/kg bw/day in P generation males and females, respectively; equivalent to 1349 and 1434 mg/kg bw/day in F_1 generation males and females, respectively); no LOAEL was observed. In the rat developmental study there was no adverse treatment-related maternal or developmental finding at dose levels up to and including 1000 mg/kg bw/day, the limit dose. The NOAEL for maternal and developmental toxicity was 1000 mg/kg bw/day; no LOAEL was observed. In the rabbit developmental study, there was no adverse treatment-related finding for any reproductive or developmental parameters at dose levels up to and including 500 mg/kg bw/day. The NOAEL for maternal and developmental toxicity was 500 mg/kg bw/day; no LOAEL was observed. On the basis of the maternal and developmental NOAELs in the 2-generation rat reproduction study and the developmental toxicity studies, there was no indication of increased susceptibility of the neonates or fetus, respectively. Foramsulfuron was not considered to be teratogenic or a reproductive toxicant in rats or rabbits.

Based on the above-noted observations, the short-term nature of the occupational exposure, and the predominantly dermal route of exposure for workers, it was considered appropriate to base the occupational risk assessment on the 28-day rat dermal study. The NOAEL was 1000 mg/kg bw/day, the limit dose.

3.5 Impact on human or animal health arising from exposure to the active substance or to impurities contained in it (OECD 2.3.6)

3.5.1 Operator exposure assessment

There are three proposed EPs that contain foramsulfuron: Option 2.25 SC Herbicide, Option 35 DF Herbicide, and Tribute Solo 32DF Herbicide. Option 2.25 SC Herbicide is formulated as a suspension and has a guarantee of the active ingredient of 22.5 grams of foramsulfuron per litre. Option 35 DF Herbicide is formulated as a wettable granule with a guarantee of the active ingredient of 35% foramsulfuron and Tribute Solo 32DF

Herbicide is formulated as a wettable granule with a guarantee of the active ingredient of 30% foramsulfuron. All three proposed EPs also contain a safener, isoxadifen-ethyl. In addition, Tribute Solo 32DF Herbicide also contains another active ingredient, iodosulfuron-methyl-sodium at a guarantee of the active ingredient of 2%.

All three EPs are proposed for use on field corn as post-emergent herbicides. All three proposed products would be applied by ground equipment. One application per season is proposed on the proposed label for the three EPs. Custom applicators or farmers could apply these products to field corn. Custom applicators typically treat 140 ha/day and farmers typically treat 80 ha/day. The proposed maximum application rate for Option 2.25 SC Herbicide and Option 35 DF Herbicide is 35 g of foramsulfuron per hectare and for Tribute Solo 32DF Herbicide is 30 g of foramsulfuron. Both Option 35 DF Herbicide and Tribute Solo 32DF Herbicide may be mixed with Hasten spray additive at a rate of 1.75 L per hectare.

It is expected from the proposed use pattern that farmers would be exposed one day per season and that custom applicators would be exposed up to 30 days per season (short-term exposure).

The proposed labels for all three EPs specify that protective clothing including goggles and chemical-resistant gloves be worn when handling or mixing the products and that chemical resistant gloves be worn while cleaning and repairing spray equipment. There is a proposed re-entry interval of 12 hours on the proposed labels of all three EPs. The labels specify that if workers enter fields within the 12-hour re-entry interval, they should wear long-sleeved shirts, long pants, protective eyewear, boots, and chemical-resistant gloves.

Dermal absorption

A chemical-specific in vivo dermal absorption study entitled, “In Vivo Dermal Absorption in the Male Rat”, was submitted. A limitation in the study was the high recovery of the administered dose in the non-occlusive coverings (7–23%). The amount of the administered dose retained by the non-occlusive covering is not considered available for absorption. Therefore, the percent dermal absorption was recalculated based on the percent of the dose available for absorption.

A dermal absorption value of 24% was established from the chemical-specific dermal absorption study. This value is based on the results obtained from the low-dose group at an exposure period of 10 h. This estimate is considered conservative since the majority of the administered dose is retained in the skin and is not considered likely to become systemically available in total.

However, the 28-day dermal toxicology study was considered the most appropriate for risk assessment purposes. Therefore, a dermal absorption value was not required.

Exposure assessment
Pesticide Handlers Exposure Database (PHED Version 1.1) assessments were conducted to derive estimates of occupational exposure for mixer/loaders and applicators. The data were based on high confidence PHED runs, adequate numbers of replicates and A + B grade data. The PHED estimates generated conform with NAFTA Guidelines for using and reporting PHED data. PHED data do not provide exposure estimates for clean-up and repair activities nor do they quantify the variability of exposure estimates. Exposure via the inhalation route was a minor component of overall exposure. Total systemic exposure was determined by summing dermal deposition estimates and inhalation estimates.

Exposure estimates are presented on the basis of the best-fit measure of central tendency, i.e., summing the measure of central tendency for each body part most appropriate to the distribution of data for that body part. Exposure estimates were derived for individuals wearing a single layer of clothing (long-sleeved shirt and long pants) and gloves, with the exception of the groundboom applicator in which exposure was estimated for applicators not wearing gloves (insufficient gloved replicates). Exposure estimates and margins of exposure derived for mixer/loader/applicators are presented in Table 3.6.1.

Table 3.6.1 Mixer/loader/applicator exposure

EP	Occupational Scenario	Exposure [1] (mg/kg bw/day)	Margin of Exposure (based on a NOAEL of 1000 mg/kg bw/day) [2]
Option 2.25 SC Herbicide	Mixer/loader + groundboom application (farmer)	0.00347	>285 000
	Mixer/loader + groundboom application (custom)	0.00607	>160 000
Option 35 DF Herbicide	Mixer/loader + groundboom application (farmer)	0.00795	>125 000
	Mixer/loader + groundboom application (custom)	0.01391	>70 000
Tribute Solo 32DF Herbicide	Mixer/loader + groundboom application (farmer)	0.00681	>145 000
	Mixer/loader + groundboom application (custom)	0.01192	>80 000

1 Based on mixer/loaders wearing a single layer and gloves, and groundboom applicators wearing a single layer without gloves. Exposure refers to the sum of dermal deposition and inhalation estimates. Dermal deposition estimates were not adjusted for dermal absorption since a NOAEL from the rat 28-day dermal study will be used for risk assessment purposes.
2 Based on the rat 28-day dermal study.

These margins of exposure are acceptable.

3.5.2 Bystanders

For the proposed agricultural use scenario, bystander exposure during and after application was considered minimal compared to mixer/loader/applicator and reentry worker scenarios and, therefore, not quantified.

3.5.3 Workers

There is a potential for short-term exposure to workers scouting or irrigating field corn treated with Option 2.25 SC Herbicide, Option 35 DF Herbicide and Tribute Solo 32DF Herbicide. Since the proposed products are to be applied at the 1–8-leaf stage of field corn, no other post-application activity is expected to concur with application. The applicant did not submit chemical-specific data to address potential post-application exposure; therefore, a Tier 1 exposure assessment for workers was conducted using standard default assumptions. These standard defaults include an assumption that 20% of the application rate is dislodgeable and available for potential exposure on the day of application, and workers spend 8 hours per day scouting or irrigating treated field corn. Since the applicant is a member of the Agricultural Re-entry Task Force, the ARTF transfer coefficient for scouting and irrigation of corn plants of 1000 cm^2/hr will be used for risk assessment purposes.

A summary of post-application exposure estimates and margins of exposure for Option 2.25 SC Herbicide, Option 35 DF Herbicide, and Tribute Solo 32DF Herbicide, on the day of application, are presented in Table 3.6.3.

Table 3.6.3 Post-application exposure estimates for Option 2.25 SC Herbicide, Option 35 DF Herbicide, and Tribute Solo 32DF Herbicide

End-use product	Post-application worker scenario	Exposure[1] (mg/kg bw/day)	Margin of exposure (based on a NOAEL of 1000 mg/kg bw/day) [2]
Option 2.25 SC Herbicide and Option 35 DF Herbicide	Scouting and irrigation	0.008	125 000
Tribute Solo 32DF Herbicide	Scouting and irrigation	0.00686	>145 000

1 Exposure estimates were calculated using the following formula:

$$\frac{\text{DFR Value } (\mu g/cm^2) \times \text{Transfer Coefficient } (cm^2/hr) \times \text{Hours Worked per Day (hr)} \times \text{Conversion Factor } (1mg/1000\mu g)}{\text{Body Weight (70 kg)}}$$

2 Based on the rat 28-day dermal study.

These margins of exposure are considered acceptable.

4.0 Residues (Summary tables in Appendix III, Tables 1 and 2)

4.1 Residue summary

Nature of the residue in plants

Foramsulfuron (radiolabelled in the phenyl and pyrimidyl rings) was applied foliarly to V4–V6 growth stage field corn (37–44 days after planting) at either 60 g a.i./ha or the exaggerated rate of 240–261 g a.i./ha. The predominant residue, foramsulfuron, was found in both phenyl (PH) and pyrimidyl (PY) labelled field corn matrices (greater than 10% of the total radioactive residues (TRRs)). The other metabolites identified (less than 10% of the total radioactive residues (TRRs)) were AE F130619 (PH- and PY-labelled commodities), AE 1532745 (PH-labelled commodities) and AE F092944 (PY-labelled commodities). The metabolism of foramsulfuron in field corn is well understood. Therefore, the parent is the residue of concern to be used in the risk assessment and expression of the maximum residue limit.

Confined accumulation in rotational crops

Foramsulfuron (radiolabelled in both phenyl and pyrimidyl rings) was applied to sandy loam soil at 62.2–65.6 g a.i./ha (approximately twice the maximum proposed seasonal rate) for the 119-day plantback interval, and at 92.6–93.2 g a.i./ha (approximately threefold the maximum proposed seasonal rate) for all other plantback intervals. Radishes, soybeans, and wheat were planted 119 days after treatment (DAT) at the 62.2–65.6 g a.i./ha rate; and 30 DAT (soybeans only), 59 DAT (radishes and wheat only), and 269 DAT (wheat only for [PH] plot and wheat and soybeans for [PY] plot) at the 92.6–93.2 g a.i./ha rate. TRRs, expressed as [^{14}C]foramsulfuron equivalents, accumulated at levels greater than or equal to 0.01 ppm in the following rotational crop commodities: 59-, 119-, and 269-DAT [PH] wheat straw (0.011–0.014 ppm equivalents); 59-DAT [PY] wheat forage (0.014 ppm equivalents); 59-DAT [PY] wheat grain (0.014 ppm equivalents); 59-, 119-, and 269-DAT [PY] wheat straw (0.022–0.090 ppm equivalents); 30-DAT [PY] soybean forage (0.019 ppm equivalents); and 30- and 269-DAT soybean hulls (0.010–0.017 ppm equivalents). Residues of foramsulfuron and metabolites were not identified in soil nor in the rotational crops.

Field accumulation in rotational crops

A 50% wettable dispersible granule (WG) formulation containing 1:1 foramsulfuron with the safener isoxadifen-ethyl was applied to soil (silty clay loam and clay soil) at either 60 g a.i./ha, or 2 sequential applications at a rate of 60 and 30 g a.i./ha for a total of 90 g a.i./ha/season (approximately twofold to threefold). Soybeans and winter wheat were planted at a number of time intervals post-treatment (44–48, 51–66, and 122–159 DAT). Only soybean samples were analysed. Residues of foramsulfuron in soybean matrices (forage, hay, and seeds) were all less than their respective LOQs (<0.05 ppm for both metabolites in forage; <0.05 ppm for both metabolites in hay; <0.01 ppm for foramsulfuron in seed and <0.02 ppm for AE F153745 in seed). Supervised residue trials will not be required for the establishment of an MRL on the secondary crops.

Nature of the residue in animals
Foramsulfuron, radiolabelled in the phenyl ring, was administered orally to 6 laying hens (*Warrens Strain*) at a dose level of 1.5 mg/bird/day, equivalent to 10 ppm in the diet for 14 consecutive days. The predominant residues in the various matrices was foramsulfuron and AE F153745 in liver and egg yolks. The main route of elimination of radioactivity in poultry was in the excreta (93.37% excreted). Foramsulfuron, radiolabelled in the phenyl ring, was administered orally to a dairy cow (*British Friesian*) with a mean daily dose of 187.4 mg (equivalent to 15.99 ppm in the diet) for 7 consecutive days, then sacrificed 22 hours after the last dosing. The main route of elimination of radioactivity in cow was in the excreta (75.22% in feces). The TRRs (expressed as foramsulfuron equivalents) were 0.001–0.006 ppm (milk); 0.025 ppm (liver), 0.036 ppm (kidney); 0.004 ppm (muscle); and 0.010–0.024 ppm (fat). The predominant residues in the various matrices was foramsulfuron and AE F153745. However, only the parent is the residue of concern to be used in the risk assessment and expression of the MRL.

Methods for residue analysis of plants and plant products
An analytical method using high-performance liquid chromatography and mass selective detection (HPLC-MSD) was proposed for data gathering and enforcement purposes (company method number CF/03/98). The method limit of quantitation (LOQ) for foramsulfuron (defined as the ROC) was reported as 0.01 ppm for corn grain, and 0.05 ppm in forage and stover. The method LOQ for AE F153745 was reported as 0.02 ppm for corn grain, and 0.05 ppm for forage and stover. This method was found to give acceptable recoveries in the range of 70–120% for the analysis of field corn matrices. The independent laboratory validation did support the reliability and reproducibility of method CF/03/98. The extraction efficiency indicated that residues of foramsulfuron were recovered at 83% from corn grain, 85% from forage, and 86% from whole ears. The extraction efficiency also indicated that residues of AE F153745 were recovered at 94% from corn grain, 85% from forage, and 91% from whole ears. The multi-residue methods protocol could only adequately recover foramsulfuron and AE F153745 using gas-liquid chromatography with a 100% methyl siloxane column (DB-1), at temperatures ranging from 130 to 250°C (Protocol C, level II conditions).

Storage stability data
Samples from the submitted field and processing studies were stored frozen from harvest to analysis for 63–657 days (approximately 2–22 months) for corn forage, 141–624 days (approximately 5–21 months) for corn stover, and 22–586 days (approximately 1–19 months) for corn grain. The data presented in the freezer storage stability study indicated that residues of foramsulfuron were stable at −10 ± 10˚C for up to 468 days (approximately 15 months) in or on corn grain; up to 243 days (approximately 8 months) in/on corn forage; and up to 209 days (approximately 7 months) in or on corn stover. The data provided do not support the storage conditions and intervals of samples from the submitted field trial studies.

Crop field trials
Twenty-three (23) field trials were conducted over the 1997 to 1998 period: in the US Zones 1 (2 trials), 2 (1 trial), 5 (18 trials), 6 (2 trials); and in Canadian Zones 5 (2 trials) and 5B (4 trials). The trials were conducted with a 50% WG formulation (each comprised of 50% foramsulfuron and isoxadifen-ethyl) and harvested at 60–120 days (grain), 38-66 days (forage) or 65–151 days (stover) following two sequential spray applications to field corn at 27–64 g a.i./ha/application (for total application rates of 80–94 g a.i./ha, or approximately two to three times the maximum proposed seasonal rate). Residues of foramsulfuron and the metabolite AE F153745 were less than the reported LOQs of 0.01 ppm for residues of foramsulfuron in corn grain, 0.02 ppm for residues of AE F153745 in corn grain, and 0.05 ppm each for residues of foramsulfuron and AE F153745 in corn forage and stover. Therefore, the proposed maximum residue limit of 0.01 ppm on field corn grain is adequate.

Processed food/feed
Foramsulfuron and isoxadifen-ethyl (formulated as a 50% WG) was applied to field corn, which was harvested after 100 days following two spray applications (with a three-day retreatment interval), at 150 g a.i./ha followed by 300 g a.i./ha, for a total rate of 450 g a.i./ha (13-fold to 15-fold). The field corn samples were processed into germ, grits, flour, and meal (dry milling); germ and starch (wet milling); and grain dust. Residues of foramsulfuron and the metabolite AE F153745 were below the respective method LOQs (<0.01 ppm for foramsulfuron in grain , <0.02 ppm for AE F153745 in grain and <0.05 ppm for both metabolites in forage and stover). Therefore, no further analysis of processed field corn commodities was required, and no concentration factor was estimated.

Meat/milk/poultry/eggs
Based on data from the ruminant and poultry metabolism studies, in which animals were dosed at 200-fold to 228-fold (cow) and 1000-fold (hen) the maximum theoretical dietary burden (MTDB) of 0.07 ppm for dairy, 0.08 ppm for beef, and 0.01 ppm for poultry, there is no reasonable expectation that finite residues of foramsulfuron will occur in livestock commodities (Residue Chemistry Guidelines Dir98-02, Section 2). Therefore, livestock feeding studies and MRLs for livestock commodities are not required at this time.

Dietary risk assessment
The proposed domestic use of foramsulfuron on field corn does not pose an unacceptable chronic dietary (both food and water) risk to any segment of the population, including infants, children, adults, and seniors.

5.0 Fate and behaviour in the environment

Studies on the environmental fate and behaviour of foramsulfuron were provided by the registrant. Data Evaluation Reports (DERs) were also provided for many studies by the USEPA.

5.1 Physical and chemical properties relevant to the environment

The physical and chemical properties of foramsulfuron that are relevant to the environment are presented in Table 5.1. Foramsulfuron is soluble in water. The vapour pressures and Henry's Law constant, as determined for two temperatures, indicate that foramsulfuron is non-volatile under field conditions or from moist soils or water. The *n*-octanol-water partition coefficients at various pHs indicate that foramsulfuron is unlikely to bioaccumulate in aquatic organisms at environmentally relevant pHs. The dissociation constant (pK_a) indicates that foramsulfuron may be mobile at environmentally relevant pHs. Data on the UV–visible light absorption spectrum indicate that foramsulfuron has a low potential for phototransformation under normal environmental conditions.

Table 5.1 Physical and chemical properties of foramsulfuron relevant to the environment

Property	Value	Comments
Water solubility (mg/L)	pH Solubility (mg/L) 5 37.2 7 3 293 8 94 577	Under acidic conditions, foramsulfuron is soluble in water. Under basic and neutral conditions, foramsulfuron is very soluble in water.
Vapour pressure (Pa)	4.2×10^{-11} Pa (at 20°C) 1.3×10^{-10} Pa (at 25°C)	Foramsulfuron is non-volatile under field conditions.
Henry's Law constant	**T, °C 1/H** 20 4.22×10^{14} 25 1.39×10^{14}	Foramsulfuron is non-volatile from moist soils or water.
n-octanol–water partition coefficient (at 20°C)	**pH log K_{ow} K_{ow}** 2.0 1.44 27.5 7 −0.78 0.166 9 −1.97 0.0106	Foramsulfuron is unlikely to bioconcentrate in aquatic organisms.
pK_a	4.60 (at 21.5°C)	Foramsulfuron is an acid and will be present as an ionized form at environmentally relevant pHs. Thus, foramsulfuron may be mobile at environmentally relevant pHs.
UV–visible absorption	**pH ϵ (L/mol·cm)** neutral 0.33×10^4 (λ = 291 nm) basic 0.37×10^4 (λ = 291 nm)	According to the Chemistry Evaluation Service, foramsulfuron decomposes in acidic medium. As there is no absorption above 300 nm, foramsulfuron has a low potential for phototransformation under normal environmental conditions.

5.2 Abiotic transformation

Studies on the hydrolysis and phototransformation of foramsulfuron in water were reviewed. Hydrolysis half-lives were 3.7, 10.1, 128, and 132 days in buffered solutions at pH 4, pH 5, pH 7, and pH 9, respectively. Therefore, hydrolysis is not a principal route of transformation of foramsulfuron at environmentally relevant pHs. Although no major TP was formed at 25°C, the TP AE F130619 retained the sulfonylurea bridge. Given additional time under ambient temperatures and typical environmental pHs, AE F130619 would be expected to be a major TP with comparable or greater persistence than the parent compound.

The phototransformation of foramsulfuron on soil cannot be determined based on the submitted data; however, as there is no light absorption above 300 nm, foramsulfuron has a low potential for phototransformation under normal environmental conditions. The resistance to phototransformation was confirmed by the results of the study conducted in water where it was found that foramsulfuron is stable to phototransformation. As foramsulfuron is not expected to be volatile, studies on the phototransformation in air were not required.

Therefore, the submitted data indicate that foramsulfuron does not readily transform through abiotic processes in soil or water. Although volatilization is not predicted by the physico-chemical parameters of vapour pressure and Henry's Law constant, if the compound were to evaporate, the results of atmospheric modelling indicate that foramsulfuron would not remain stable in the atmosphere and would be rapidly transformed.

5.3 Biotransformation

The biotransformation of foramsulfuron was reviewed under various conditions including aerobic soils, anaerobic soils, aerobic water-sediment systems, and anaerobic sediment-water systems. The biotransformation of a major TP (AE F130619) was also examined in aerobic soil.

In the aerobic soils tested, including sandy loam, loamy sand, silty clay loam, and clay loam, the DT_{50}s for foramsulfuron ranged from 1.2 to 9.5 days; therefore, foramsulfuron is non-persistent in aerobic soils. Two major TPs (AE F130619 and AE F092944) were identified in soils from both Europe and the US Two minor TPs were common to both European and US soils (AE F153745 and AE F148003) with the additional formation of AE F099095 in the European aerobic soils. Since, under anaerobic conditions, the DT_{50} in a flooded sandy loam soil exceeded 180 days (approximately 230 days), foramsulfuron is considered to be persistent in anaerobic soils. Five minor TPs (AE F153745, AE F130619, AE F148003, AE F092944, and AE F099095) were identified in the anaerobic soil.

In soils, the registrant stated that transformation of foramsulfuron proceeds via hydrolysis of the formamide moiety to yield AE F130619 and hydrolysis of the sulfonylurea bridge to yield AE F153745 and AE F092944, identifying AE F130619 as the only TP that retains the sulfonylurea linkage. Since, under aerobic conditions, the major TP AE F130619 declines rapidly with DT_{50}s of less than a day in four soils (encompassing three soil textures), AE F130619 is classifed as non-persistent in aerobic soils. However, under anaerobic conditions, AE F130619 appears to be persistent in soil. AE F092944, the second major TP in aerobic soils, appears to be persistent in aerobic soils with an estimated half-life of hundreds of days, although the exact degree of persistence was not determined.

The biotransformation of foramsulfuron was examined in two aerobic water/sediment systems using a silty clay loam and a sand sediment. The first-order half-lives (average two radiolabels) were 31 days for the silty clay loam and 38 days for the sand system, which classifies foramsulfuron as slightly persistent in aerobic water/sediment systems. First-order half-lives in sediment were 43 and 46 days, for the silty clay loam and sand sediments, respectively, indicating that foramsulfuron is slightly to moderately persistent in the sediment of aerobic aquatic systems. Unextracted residues peaked at approximately 80% and 50% of the applied radioactivity in the silty clay loam and sand systems, respectively, after 200 days; however, these residues decreased substantially by the next and final sampling time (i.e., after one year). Two major TPs (AE 0338795 and AE F153745) and five minor TPs (AE F130619, AE F092944, AE F148003, AE F159255, and AE 0014940) were identified in the aerobic aquatic system.

The biotransformation of foramsulfuron was examined in an anaerobic water/sediment system with silty clay loam sediment. The first-order half-life for the system was 39 days, classifying foramsulfuron as slightly persistent in anaerobic water/sediment systems. The first-order half-life in the sediment phase was 61 days for sediments and a mean DT_{50} of 45 days was also determined, indicating that foramsulfuron is slightly to moderately persistent in the sediment of anaerobic aquatic systems. Unextracted residues peaked at 31% of the applied radioactivity after one year. One major TP (AE 0338795) and five minor minor TPs (AE F153745, AE F130619, AE F092944, AE F148003, and AE F099095) were identified in the anaerobic aquatic system.

From the aerobic and anaerobic aquatic biotransformation studies, the TPs AE 0338795 (major) and AE F130619 (minor) were the only identified compounds that retained the sulfonylurea linkage. In the aerobic study, up to 30% of the applied radioactivity consisted of unidentified compounds. In the anaerobic study, the unknowns in the water fraction peaked at 54% of the applied radioactivity from 87 to 365 days after treatment, of which a maximum of 14% of the applied radioactivity was isolated as a single compound. There is evidence to indicate that the unidentified compounds in the aerobic and anaerobic studies retain the sulfonylurea bridge.

5.4 Mobility

Foramsulfuron was found to be weakly adsorbed to soil, with adsorption significantly correlated with cation exchange capacity. Based on adsorption K_{oc} values ranging from 38 to 151, foramsulfuron is classified as having high to very high mobility in soils, and therefore, may be expected to leach to sources of drinking water. Foramsulfuron is not expected to volatilize under field conditions nor from moist soils or water.

The adsorption/desorption characteristics of the three major TPs AE F153745, AE F130619, and AE F092944 were examined. Adsorption K_{oc} values for AE F153745 ranged from 35 to 63 with a mean of 49, while for AE F130619, adsorption K_{oc} values ranged from 40 to 144 with a mean of 73. Therefore, AE F153745 and AE F130619 are classified as having high to very high mobility. For AE F153745, adsorption was significantly correlated with cation exchange capacity and percentage of organic carbon. However, for AE F130619, there was no significant correlation between the adsorption K_d values and the various soil parameters (organic carbon, pH, clay content). Adsorption of AE F130619 appears to be determined by a combination of organic carbon, cation exchange capacity, clay content, and pH.

Adsorption K_{oc} values for AE F092944 ranged from 89 to 11 289 with a mean adsorption K_{oc} value of 1860. For most of the soils tested, AE F092944 had low to moderate mobility; however, the compound was immobile in silt loam and had high mobility in one loamy sand tested. Adsorption was correlated with the silt content of the soils; however, there was no significant correlation between sorption behaviour and the percentage of organic carbon, pH, or clay content of the soils. For soils with a pH $\leq$6.1, adsorption was correlated with sand, silt, clay content, and cation exchange capacity.

5.5 Dissipation and accumulation under field conditions

The dissipation of foramsulfuron was studied under terrestrial field conditions only. Four sites in Canada and the US were used, with three sites in Ecoregion 8.1 (Mixed Wood Plains) and one site in Ecoregion 9.2 (Temperate Prairies). In addition to the parent compound, only one TP (AE F092944) was measured; this TP was only found at two of the field sites. Other major TPs identified in laboratory studies, but not included in the terrestrial field study are AE F153745, AE 0338795, and AE F130619. As only small amounts of the applied herbicide were detected as parent or AE F092944, an attempt to identify the other major TPs is a reasonable expectation.

Residues of foramsulfuron (AE F130360) and AE F092944 were essentially confined to the surface soil to a depth of 7.5 cm, with three detections of the parent compound in the 7.5–15 cm soil horizon. Although there was no obvious evidence of leaching of either foramsulfuron (AE F130360) or the TP (AE F1092944) at any trial location, the potential for leaching could not be suitably determined as the water balance was not determined during the study and only one TP was measured. An attempt was not made to model field dissipation; therefore, it could not be determined if and when conditions were favourable for leaching. Furthermore, it could not be satisfactorily determined whether potential leached amounts of parent or TPs could have escaped detection by leaching below the maximum depth sampled during the time between sampling intervals or by insufficiently low detection limits and recoveries in the sampled soil profile, or by both. The reported precipitation and irrigation data indicated that the study plots generally received less than typical amounts of water during critical early stages.

The results of the field dissipation study were similar to the results of laboratory studies. Based on first-order kinetics regression half-lives ranging from 11 to 18 days, foramsulfuron (AE F130360) is non-persistent to slightly persistent under terrestrial field conditions found in Ecoregion 8.1 (Mixed Wood Plains) and Ecoregion 9.2 (Temperate Prairies). In general, the residue levels of the TP AE F092944 were too low to permit the reliable calculation of dissipation. Although the submitted field study had numerous deficiencies and the pattern of dissipation of foramsulfuron (AE F130360) under field conditions (bare soil) was not adequately described, additional field studies are not requested at this time. The submitted study provides sufficient supplemental data that is consistent with the laboratory studies of the fate and behaviour of foramsulfuron, and indicate a relatively short residency time in soil and the formation of large fractions of recalcitrant soil residues.

5.6 Bioaccumulation

Data were not submitted on the bioaccumulation of foramsulfuron. The K_{ow}s for foramsulfuron vary with pH. Under acidic conditions (pH 2.0), the K_{ow} is 27.5 (log K_{ow}=1.44). Under neutral (pH 7) and basic conditions (pH 9), the K_{ow}s are 0.166 (log K_{ow}=−0.78) and 0.0106 (log K_{ow}=−1.97), respectively. Therefore, given that the log K_{ow} values are much less than 3, there is limited potential for the compound to bioaccumulate in organisms.

5.7 Summary of fate and behaviour in the terrestrial environment

The phototransformation of foramsulfuron on soil cannot be determined based on the submitted data; however, as there is no light absorption above 300 nm, foramsulfuron has a low potential for phototransformation under normal environmental conditions. Since foramsulfuron is not expected to volatilize from moist soils under field conditions, studies on the phototransformation in air were not required.

Biotransformation is a principal route of transformation of foramsulfuron in aerobic soils. DT_{50} values ranged from 1.2 to 9.5 days indicating that foramsulfuron is non-persistent in aerobic soils. Under aerobic conditions, two major TPs (AE F130619 and AE F092944) and three minor TPs (AE F153745, AE F148003, and AE F099095) were identified. Under anaerobic conditions, the DT_{50} in a flooded soil exceeded 180 days; therefore, foramsulfuron is considered to be persistent in anaerobic soils. Five minor TPs (AE F153745, AE F130619, AE F148003, AE F092944, and AE F099095) were identified in the anaerobic soil. In soils, AE F130619 is the only identified TP that retains the sulfonylurea linkage. Under aerobic conditions, AE F130619 is non-persistent; however, under anaerobic conditions, the compound is persistent. The second major TP in aerobic soils, AE F092944, is also persistent.

Foramsulfuron was found to be weakly adsorbed to soil, with adsorption significantly correlated to cation exchange capacity. Laboratory data indicate that foramsulfuron has high to very high mobility in soils and, thus, may be expected to leach to sources of drinking water. Foramsulfuron is not expected to volatilize under field conditions or from moist soils or water. The major TPs AE F153745 and AE F130619 have high to very high mobility in soils and, thus, could be expected to leach to ground water. Adsorption of AE F153745 was significantly correlated with cation exchange capacity and percentage of organic carbon; however, there was no significant correlate for AE F130619. In most soils, the TP AE F092944 had low to moderate mobility; however, the compound was immobile in silt loam and had high mobility in loamy sand. Adsorption of AE F092944 was correlated with the silt content of the soils, while for acidic soils (pH $\leq$6.1), adsorption was correlated with sand, silt, clay content, and cation exchange capacity.

The dissipation of foramsulfuron was studied under terrestrial field conditions at four sites in Canada and the US Residues of foramsulfuron (AE F130360) and the one measured TP (AE F092944) were confined to the surface soil to a depth of 7.5 cm, with only three detections of the parent compound in the 7.5–15 cm soil horizon. The potential for leaching could not be suitably determined. The first-order half-lives of 11 to 18 days indicate that foramsulfuron is non-persistent to slightly persistent under field conditions found in Ecoregion 8.1 (Mixed Wood Plains) and Ecoregion 9.2 (Temperate Prairies). In general, the residue levels of the TP AE F092944 were too low to permit the reliable calculation of dissipation. Although the submitted field study had numerous deficiencies and the pattern of dissipation of foramsulfuron (AE F130360) under field conditions (bare soil) was not adequately described, additional field studies are not requested at this time as the results are consistent with the laboratory studies and indicate a relatively short residency time in soil and the formation of large fractions of recalcitrant soil residues.

Summaries of the environmental fate and behaviour of foramsulfuron in the terrestrial environment are presented in Appendix IV, Table 1.

5.8 Summary of fate and behaviour in the aquatic environment

Foramsulfuron may be expected to enter the aquatic environment primarily through direct over-spray and spray drift. As foramsulfuron and major TPs are weakly sorbed to soil, run-off via sorption to soil particles is not expected to be a principal route of entry into aquatic systems. The compound is, however, very soluble and leaching to ground water may be possible. Although the potential for leaching was not supported by the submitted field study, the study had significant discrepancies and omitted any measure of water balance, and the study plots generally received less than typical amounts of water during the critical early stages of the study.

Foramsulfuron is resistant to both hydrolysis and phototransformation in water and is non-volatile from water surfaces. Although no major TP was formed in water, the TP AE F130619 retained the sulfonylurea bridge and could potentially become a major TP in water given sufficient time for formation under ambient temperatures and typical environmental pHs. Furthermore, AE F130619 is expected to have comparable or greater persistence than the parent compound in water.

Biotransformation is a route of transformation of foramsulfuron in aquatic systems. In the aerobic water/sediment system, first-order half-lives ranged from 31 to 38 days, indicating that foramsulfuron is slightly persistent in aerobic water/sediment systems. The first-order half-lives in sediment ranged from 43 to 46 days, indicating that foramsulfuron is slightly to moderately persistent in the sediment of aerobic aquatic systems. Two major TPs (AE 0338795 and AE F153745) and five minor TPs (AE F130619, AE F092944, AE F148003, AE F159255, and AE 0014940) were identified in the aerobic aquatic system. In the anaerobic sediment/water system, the first-order half-life was 39 days, indicating that foramsulfuron is slightly persistent in anaerobic aquatic systems. For sediment, the first-order half-life was 61 days and a mean DT_{50} of 45 days was also determined, indicating that foramsulfuron is slightly to moderately persistent in the sediment of anaerobic aquatic systems. One major TP (AE 0338795) and five minor minor TPs (AE F153745, AE F130619, AE F092944, AE F148003, and AE F099095) were identified in the anaerobic aquatic system.

From the aerobic and anaerobic aquatic biotransformation studies, the TPs AE 0338795 (major) and AE F130619 (minor) were the only identified compounds that retained the sulfonylurea linkage. Large amounts of non-extractable residues formed in both the aerobic and anaerobic aquatic systems. From the aerobic and anaerobic aquatic biotransformation studies, large quantities of compounds were unidentified, and the results indicate that these unidentified compounds retain the sulfonylurea bridge.

Foramsulfuron is not expected to volatilize from water surfaces and data are not available on the dissipation of foramsulfuron under aquatic field conditions.

The K_{ow} values at various pH levels indicate that there is a limited potential for foramsulfuron to bioaccumulate in organisms.

Summaries of the environmental fate and behaviour of foramsulfuron in the aquatic environment are presented in Appendix IV, Table 2.

5.9 Expected environmental concentrations (EECs)

Due to the presence of the safener compound in the EPs, expected environmental concentrations (EECs) were calculated for the active ingredient alone, as well as for each EP. The EECs in environmental compartments of concern (soil and water) were estimated based on calculations made using simple scenarios. These concentrations were used as initial approximations for estimating the potential exposure to wildlife. Although there are three proposed EPs that contain foramsulfuron, only two are discussed in this document (Option 2.25 SC Herbicide and Option 35 DF Herbicide). The third EP, Tribute Solo 32 DF Herbicide, which contains the active ingredients foramsulfuron and iodosulfuron-methyl-sodium, is discussed in the PMRA Regulatory Note on iodosulfuron-methyl-sodium. Although the use and application patterns are similar among the three EPs, the amount of the active ingredient applied differs slightly. The maximum application rate of Option 2.25 SC Herbicide and Option 35 DF Herbicide is 35 g a.i./ha for each product; however, for Tribute Solo 32 DF Herbicide, the maximum application rate is slightly lower at 30 g foramsulfuron/ha (plus 2 g iodosulfuron-methyl-sodium/ha).

For the risk assessment, it was assumed that a single application was made at the maximum proposed Canadian label rate; for toxicity studies conducted with the active ingredient, the maximum rate of 35 g a.i./ha was used for the risk assessment, while for toxicity studies conducted with the EPs, the maximum label rates of 1.56 L EP/ha and 100 g EP/ha were used for Option 2.25 SC Herbicide and Option 35 DF Herbicide, respectively. The scenarios assume that the concentrations in the various environmental compartments are obtained immediately following the single application.

5.9.1 Soil

The EECs in soil were calculated assuming one application to bare soil at the maximum proposed Canadian label rate using a soil bulk density of 1.5 g/cm^3 and a soil depth of 15 cm. The EECs in soil are summarized in Table 5.9.1.

For foramsulfuron, the maximum proposed rate of 35 g a.i./ha was used, resulting in an EEC of foramsulfuron in soil of 0.016 mg a.i./kg soil dry weight (dw).

For Option 2.25 SC Herbicide, the maximum proposed rate of 1.56 L EP/ha was used. Using the reported specific gravity for the EP of 0.96 kg/L, the maximum application rate is equivalent to 1500 g EP/ha. The resulting EEC of Option 2.25 SC Herbicide in soil is 0.667 mg EP/kg soil dw.

For Option 35 DF Herbicide, the maximum proposed rate of 100 g EP/ha was used, resulting in an EEC of Option 35 DF Herbicide in soil of 0.044 mg EP/kg soil dw.

5.9.2 Aquatic systems

The EECs in water are those resulting from direct over-spray to aquatic systems. The scenario used for the calculations is that in which a body of water 30 cm deep is over-sprayed at the maximum proposed Canadian label application rate. Although this scenario may be unrealistic for ground application, it is useful as a first approximation and is used to compare the EECs in aquatic systems and no observed effect concentrations (NOECs) from environmental toxicology studies. The EECs in water are summarized in Table 5.9.1.

The EEC foramsulfuron in water is based on the maximum rate of 35 g a.i./ha. The resultant EEC in water is calculated as 0.012 mg a.i./L water.

For Option 2.25 SC Herbicide, the maximum proposed rate of 1.56 L EP/ha was used. The resulting EEC of Option 2.25 SC Herbicide in water is 0.50 mg EP/L.

For Option 35 DF Herbicide, the maximum proposed rate of 100 g EP/ha was used to calculate an EEC of Option 35 DF Herbicide in water of 0.033 mg EP/L.

Table 5.9.1 Summary of EECs in soil and water

Medium	Estimated Environmental Concentration (EEC)		
	Foramsulfuron	Option 2.25 SC Herbicide	Option 35 DF Herbicide
Soil (mg/kg soil dw)	0.016 mg a.i./kg dw	0.667 mg EP/kg dw	0.044 mg EP/kg dw
Water (mg/L)	0.012 mg a.i./L	0.50 mg EP/L	0.033 mg EP/L

Based on the proposed use pattern of the Option EPs in areas where field corn is grown, residues of foramsulfuron in potential sources of drinking water in these areas (i.e., reservoirs, dugouts, and groundwater) were modelled using the models LEACHM for groundwater and PRZM/EXAMS for surface water.

From the Level I assessment of concentrations of foramsulfuron in sources of drinking water, the EECs submitted for the human health assessment were 1.10 µg a.i./L and 0.53 µg a.i./L for acute and chronic exposures, respectively. Water model input parameters for the screening assessment are summarized in Appendix IV, Table 3.

5.9.3 Vegetation and other food sources

Data were not provided on concentrations of foramsulfuron or the EPs on foliar crops immediately after application. Thus, in the absence of these data, concentrations of foramsulfuron and the EPs on vegetation and insects resulting from direct over-spray were estimated using a nomogram developed by the USEPA from the data of Hoerger and Kenaga (1972) and Kenaga (1973), and modified according to Fletcher et al. (1994), for use in ecological risk assessment (Urban and Cook 1986). The EECs of foramsulfuron and the EPs for typical components of the diets of wild birds and mammals are provided in Appendix IV, Tables 4–6. Based on the EECs of typical dietary items, the EECs in the diets of representative non-target species are provided in Table 5.9.2 (see also Appendix IV, Table 7).

Table 5.9.2 Maximum EECs in diets of birds and mammals

Organism	Maximum EEC		
	Foramsulfuron (mg a.i./kg dw diet)	Option 2.25 SC Herbicide (mg EP/kg dw diet)	Option 35 DF Herbicide (mg EP/kg dw diet)
Bobwhite quail	6.13	263	17.5
Mallard duck	1.18	50.7	3.38
Rat	17.7	757	504
Mouse	17.6	752	50.1
Rabbit	26.4	1130	75.4

6.0 Effects on non-target species

6.1 Effects on terrestrial organisms

The acute 14-d NOEC and LC_{50} values of foramsulfuron, its TP, AE F153745, and Option 35 DF Herbicide to the earthworm (*Eisenia foetida*) were all 1000 and >1000 mg (a.i., TP, EP)/kg dw of artificial substrate, respectively. For Option 2.25 SC Herbicide, the NOEC (based on mortality), and LC_{50} values were 180 and 452 mg EP/kg substrate, respectively.

The 72-h acute oral LD_{50} values of foramsulfuron, Option 2.25 SC Herbicide, and Option 35 DF Herbicide to honey bees (*Apis mellifera* L.) were >163 µg a.i./bee, >226.32 µg EP/bee, and >27.95 µg EP/bee, respectively. The corresponding NOEL values were 163 µg a.i./bee, 65.22 µg EP/bee, and 27.95 µg EP/bee, respectively. The 72-h acute contact LC_{50} values of foramsulfuron, Option 2.25 SC Herbicide, and Option 35 DF Herbicide to honey bees (*Apis mellifera* L.) were >1.9 µg a.i./bee, >392.2 µg EP/bee, and >137.6 µg EP/bee, respectively, with corresponding NOEC values of 1.9 µg a.i./bee, 392.2 µg EP/bee, and 137.6 µg EP/bee, respectively. Overall, the two EPs were classified as practically non-toxic to honey bees in accordance with the classification of Atkins et al. (1981). Foramsulfuron is classified as practically non-toxic to bees on an acute oral basis. Based on the highest concentration tested in the acute contact test with bees, foramsulfuron would be classified as highly toxic on an acute contact basis; however, studies with the EP indicate that, as applied in the field, foramsulfuron is practically non-toxic to honeybees.

The effects on the beneficial capacity of beneficial arthropods (combined effect on lethal and sublethal parameters) as a result of contact exposure to residues on an inert substrate (glass or sand) were assessed for Option 2.25 and Option 35 DF Herbicide. Option

2.25 SC Herbicide was harmful to the parasitoid *Aphidius rhopalosiphi* at 1.3× the maximum proposed application rate and slightly harmful at 10% of the proposed maximum application rate in Canada, which is representative of effects in the field boundary as a result of spray drift. It was slightly harmful to the predatory mite, *Typhlodromus pyri* at 1.3× the application rate and slightly harmful to the ground-dwelling predator *Aleochara bilineata* at 10% and 1.3× the application rate. Option 2.25 SC Herbicide was harmless to the ground-dwelling predators *Poecilus cupreus* and *Pardosa* spp. and to the foliage predator *Chrysoperla carnea*. Option 35 DF Herbicide was moderately harmful to the parasitoid *Aphidius rhopalosiphi* at 1.3× the application rate and slightly harmful at 10% of the proposed maximum application rate. Option 35 DF Herbicide was slightly harmful to the predatory mite *Typhlodromus pyri* at 10% and 1.3× the proposed maximum application rate and was harmless to the ground-dwelling predators *Poecilus cupreus* and *Pardosa* spp.

The acute 14-d oral NOEC and LD_{50} values of foramsulfuron, Option 2.25 SC Herbicide and Option 35 DF Herbicide to the bobwhite quail (*Colinus virginianus*) and mallard duck (*Anas platyrynchos*) were 2000 and >2000 mg (a.i., EP, EP)/kg bw, respectively. The corresponding subacute 8-d dietary NOEC and LD_{50} values were 4950 and >4950 mg (a.i., EP, EP)/kg diet for the bobwhite quail, respectively, and 4450 and >4450 mg (a.i., EP, EP)/kg diet for mallard ducks, respectively. From the 20-week reproductive studies with foramsulfuron, the NOECs based on mortality and reproduction were 1073 mg a.i./kg diet for both avian species. Foramsulfuron, Option 2.25 SC Herbicide, and Option 35 DF Herbicide are all classified as, at most, slightly toxic based on the dietary study, and are practically non-toxic based on an acute oral route of exposure, in accordance with the classification scheme of the USEPA (1985).

Foramsulfuron, Option 2.25 SC Herbicide and Option 35 DF Herbicide have a low acute oral, dermal, and inhalation toxicity to rats. Foramsulfuron was non-irritating to the rabbit eye but was minimally irritating to rabbit skin. Results of skin sensitization testing in guinea pigs showed that the technical active substance was not a sensitizer; Option 2.25 SC Herbicide was minimally irritating to the rabbit eye but was moderately irritating to the rabbit skin. Results of skin sensitization testing in guinea pigs, based on the Buehler's method, showed a positive response in 2 of 20 animals, indicating that the Option 2.25 SC Herbicide could be a potential skin sensitizer. Option 35 DF Herbicide was mildly irritating to the rabbit eyes and moderately irritating to rabbit skin, and was a dermal sensitizer in guinea pigs.

In dietary tests, the NOAEL values of foramsulfuron for rats, mice, and dogs were 1568/1786, 1002/1178, and 1000/1000 mg/kg bw/d in males/females, respectively. Adverse effects were not observed for the dog and mouse; however, male mice exposed to 1002 mg/kg bw/d exhibited lower leukocytes, lymphocytes, and monocytes. There was no indication of leukopenia, altered bone marrow or histology, nor splenomegaly. In the chronic oncogenicity tests, the NOAEL values for mice and rats were 1115/1375 and 849/1135 mg/kg in males/females, respectively. No adverse effect was observed, nor increased incidence of tumours. In the multi-generation reproduction study with rats (effects on pregnancy and fetuses), foramsulfuron did not cause adverse treatment-related effects in either generation (NOAEL: 1082/1229 mg/kg bw/d for P generation offspring and reproduction in males/females, respectively, and NOAEL: 1349/1434 mg/kg bw/d for F1 generation offspring and reproduction in males/females, respectively). Overall, no adverse effect on parental systemics, offspring effects, or reproductive performance was observed throughout the test.

Studies on the effect of the EP Option 2.25 SC Herbicide and Option 35 DF Herbicide on seedling emergence and vegetative vigour of monocot plants [corn (*Zea mays*), onion (*Allium cepa*), perrenial rye-grass (*Lolium perenne*), and wheat (*Triticum aestivum*)] and dicot plants [carrot (*Daucus carota*), cucumber (*Cucumis sativus*), lettuce (*Lactuca sativa*), radish (*Raphanus sativus*), soybean (*Glycine max*), and tomato (*Lycopersicon esculentum*)] were performed. The most sensitive EC_{25} value from a seedling emergence study conducted with Option 35 DF Herbicide was 131 g EP/ha (ryegrass). The most sensitive monocot EC_{25} values in vegetative vigour (weight) studies were 52 g EP/ha (ryegrass) with Option 2.25 SC Herbicide and 0.31 g EP/ha (oats) with Option 35 DF Herbicide. The most sensitive dicot EC_{25} values in vegetative vigour (weight) studies were 22.8 g EP/ha (radish) and 1.08 g EP/ha (radish) for Option 2.25 SC Herbicide and Option 35 DF Herbicide, respectively.

Summaries of the environmental toxicity of foramsulfuron and the formulated EPs to terrestrial organisms are presented in Appendix IV, Table 8.

6.2 Effects on aquatic organisms

The acute 48-h NOEC values of foramsulfuron, Option 2.25 SC Herbicide, and Option 35 DF Herbicide to the water flea (*Daphnia magna*) were 102.5 mg a.i./L, 10 mg EP/L, and 100 mg EP/L, respectively, with corresponding LC_{50} values greater than the reported NOEC values (e.g., for foramsulfuron, the LC_{50} for daphnids is >102.5 mg a.i./L). The chronic 21-d NOEC values for foramsulfuron and Option 2.25 SC Herbicide were 102.5 mg a.i./L (based on mortality) and 0.4 mg EP/L (based on reproduction), respectively. Foramsulfuron and Option 35 DF Herbicide are classified as practically non-toxic, while Option 2.25 SC Herbicide is classified as, at most, slightly toxic, based on acute toxicity in accordance with the classification scheme of the U.S EPA (1985).

For rainbow trout (*Onchorhynchus mykiss*), the acute 96-h LC_{50} values for foramsulfuron, Option 2.25 SC Herbicide, and Option 35 DF Herbicide were >100.9 mg a.i./L, 14 mg EP/L, and 3.4 mg EP/L, respectively. The corresponding NOECs were 100.9 mg a.i./L, 11 mg EP/L (3.9 mg EP/L for sublethal effects), and 1.25 mg EP/L (1.8 mg EP/L for sublethal effects), respectively. For bluegill sunfish (*Lepomis macrochirus*), the LC_{50} values were >102.7 mg a.i./L, 7.8 mg EP/L, and 3.7 mg EP/L, respectively, while NOECS were 102.7 mg a.i./L, 3.9 mg EP/L (6.5 mg EP/L for sublethal effects), and 2.5 mg EP/L, for foramsulfuron, Option 2.25 SC Herbicide, and Option 35 DF Herbicide, respectively. The 28-d chronic NOEC value of Option 2.25 SC Herbicide with rainbow trout was 0.65 mg EP/L, based on sublethal effects. Foramsulfuron is classified as practically non-toxic to rainbow trout and bluegill sunfish based on acute toxicity in accordance with the USEPA (1985). In contrast, the formulated EPs have higher acute toxicity to fish than the a.i.: Option 2.25 SC Herbicide is slightly toxic to rainbow trout and moderately toxic to bluegill sunfish; Option 35 DF Herbicide is moderately toxic to both rainbow trout and bluegill sunfish.

The acute 96-h EC_{50} values of foramsulfuron to blue-green algae *(Anabaena flos-aquae)* were 6.8, 3.3, and 8.1 mg/L, based on density, biomass, and growth rate, respectively. The most sensitive NOEC based on biomass was 0.33 mg a.i./L. For the green algae *Pseudokirchnerielia subcapitata*, the acute EC_{50} values of foramsulfuron were 12, 12.5, and 86.2 mg a.i./L for density, biomass, and growth rate, respectively. For Option 2.25 SC Herbicide, the acute EC_{50} values for *P. subcapitata* were 4.3, 3.5, and >5 mg EP/L for density, biomass, and growth rate, respectively. The most sensitive NOEC values were 1.2 mg a.i./L (cell density) for foramsulfuron and 1.3 mg EP/L (biomass) for Option 2.25 SC Herbicide. For the diatom *Navicula pelliculosa*, the 96-h acute EC_{50} and NOEC values of foramsulfuron were >112 and 112 mg a.i./L, respectively.

The acute 7-d EC_{50} values of foramsulfuron to duckweed *(Lemna gibba)* were 0.52, 1.0, and 0.65 µg/L for frond numbers, growth rate, and biomass, respectively. The most sensitive NOEC, based on frond number was 0.33 µg a.i./L. The acute EC_{50} values for the TP (AE F15375) were all >100 mg TP/L.

Summaries of the environmental toxicity of foramsulfuron and the formulated EPs to aquatic organisms are presented in Appendix IV, Table 9.

6.3 Effects on biological methods of sewage treatment

As data are not required, data were not submitted.

6.4 Risk characterization

Risk assessment integrates the exposure and ecotoxicology data to estimate the potential for adverse effects. The PMRA currently conducts a deterministic risk assessment of pest control products. Environmental risk is characterized using the margin of safety (MOS) method, which is the ratio of the toxicity endpoint to the EEC. Unless otherwise stated, the degree of risk to terrestrial and aquatic organisms was classified according to the following index developed by the Environmental Assessment Division of the PMRA:

Margin of Safety (MOS)	Risk Qualifier
≥ 10	Negligible risk
1 to <10	Low risk
0.1 to <1	Moderate risk

Margin of Safety (MOS)	Risk Qualifier
0.01 to <0.1	High risk
0.001 to <0.01	Very high risk
<0.001	Extremely high risk

PMRA, 2002

The submitted toxicity studies were conducted using the parent compound alone and/or using the formulated EPs that contain the a.i., the safener (isoxadifen-ethyl), and other formulants. Data were not submitted on the toxicity of TPs of fenbuconazole to terrestrial or aquatic organisms. Therefore, the terrestrial and aquatic risk assessments are based on toxicity of the parent compound or the formulated EP.

6.4.1 Environmental behaviour

As summarized in Sections 5.7 and 5.8, foramsulfuron is non-persistent in aerobic soils, but is persistent in soils under anaerobic conditions. The major TP AE F130619 is non-persistent under aerobic conditions, but is persistent under anaerobic conditions. Note that AE F130619 is a TP that retains the sulfonylurea linkage. A second major TP in aerobic soils, AE F092944, is persistent, but does not contain the sulfonylurea linkage.

Foramsulfuron and two major TPs AE F153745 and AE F130619 have high to very high mobility in soils and, therefore, may be expected to leach to sources of drinking water. The potential for leaching could not be confirmed from the submitted field studies because of the lack of data on water balance at the field sites and the measurement of only one TP. In field studies, foramsulfuron was non-persistent to slightly persistent in the Ecoregions where the studies were conducted (Ecoregion 8.1: Mixed Wood Plains and Ecoregion 9.2: Temperate Prairies).

Since foramsulfuron may be expected to enter the aquatic environment primarily through direct over-spray and spray drift, thus there is potential for exposure to foramsulfuron in non-target terrestrial and aquatic organisms. As foramsulfuron and two of its major TPs (AE F153745 and AE F130619) are weakly sorbed to soil, run-off via sorption to soil particles is not expected to be a principal route of entry into aquatic systems. Foramsulfuron is, however, very soluble and leaching to ground water may be possible, although this was not indicated in field study, which had significant discrepancies. Based on the physicochemical properties of foramsulfuron, volatilization is not an expected route of exposure of non-target organisms.

In aquatic systems, foramsulfuron is slightly persistent in aerobic water/sediment systems and slightly to moderately persistent in the sediment of aerobic aquatic systems. In the anaerobic aquatic systems, foramsulfuron is slightly persistent and is slightly to moderately persistent in the sediment of these systems. From the aerobic and anaerobic aquatic biotransformation studies, the TPs AE 0338795 (major) and AE F130619 (minor) retained the sulfonylurea linkage, as did large quantities of unidentified compounds.

In addition to acute exposure, there is potential for exposure of soil- and sediment-dwelling organisms to residues of foramsulfuron. Further exposure of terrestrial organisms can be expected from the consumption of contaminated vegetation.

6.4.2 Terrestrial organisms

A summary table of the risks to terrestrial organisms is provided in Appendix IV, Table 10.

Earthworms
One scientifically valid and acceptable toxicity study was conducted with earthworms and foramsulfuron. The NOEC was 1000 mg a.i./kg soil. The EEC of foramsulfuron in soil (0.016 mg a.i./kg soil) is below the NOEC. The MOS is 62 500; therefore, foramsulfuron poses a negligible risk to earthworms at the proposed application rate.

In a toxicity study with a TP of foramsulfuron, exposure to AE F153745 did not result in any significant toxicological effect on earthworms at concentrations up to 1000 mg TP/kg dw of artificial substrate. Thus, the NOEC is 1000 mg TP/kg substrate. For a gross approximation of the risk of the TP to earthworms, assuming 100% transformation of the a.i. to AE F153745 results in an EEC in soil of 0.016 mg TP/kg substrate. Using the scenario of 100% transformation, the MOS is, therefore, identical to that of the parent compound (62 500), so the TP AE F153745 poses negligible risk to earthworms at the proposed application rate.

From toxicity studies conducted with earthworms and the EPs, the NOECs were 180 mg EP/kg soil and 1000 mg EP/kg soil for Option 2.25 SC Herbicide and Option 35 DF Herbicide, respectively. The maximum application rates of Option 2.25 SC Herbicide and Option 35 DF Herbicide correspond to soil concentrations of 0.667 mg EP/kg soil and 0.044 mg EP/kg soil, respectively. These were used as the EECs of the EPs in soil. The EECs are below the NOECs with resultant margins of safety of 270 and 22 700 for Option 2.25 SC Herbicide and Option 35 DF Herbicide, respectively. Therefore, the EPs also pose negligible risks to earthworms at the proposed application rate.

Bees
One scientifically valid and acceptable acute oral toxicity study was conducted with honey bees and the a.i.. Based on the application rate used in the study (163 µg a.i./bee), foramsulfuron is practically non-toxic to bees according to the classification scheme of Atkins et al. (1981). The acute oral LD_{50} and NOEC for honey bees were >163 and 163 µg a.i./bee, respectively, equivalent to an application rate of 183 kg a.i./ha. The maximum seasonal application rate of 0.035 kg a.i./ha is lower than the NOEC with a MOS of 5230. Therefore, foramsulfuron poses a neglible risk to honey bees from an acute oral route of exposure at the proposed application rate. Toxicity studies with the EPs also

suggest that the formulated products do not pose a risk to honey bees from an acute contact route of exposure.

One scientifically valid and acceptable acute contact toxicity study was conducted with honey bees and the a.i.. Based on the single, low application rate used in the study (1.9 µg a.i./bee), foramsulfuron appears to be at most moderately toxic to bees according to the classification scheme of Atkins et al. (1981); however, the studies with the EPs suggest that foramsulfuron would be much less than highly toxic. Therefore, the EPs are expected to pose neglible risks to honey bees from an acute contact route of exposure at the proposed application rates.

Predators and parasites
Studies on the contact toxicity of foramsulfuron to beneficial predators and parasites were conducted with the EPs. The toxicity of Option 2.25 SC Herbicide was found to range from harmless to harmful at the rates tested, according to the classification scheme of Hassan et al. (1994). Similarly, Option 35 DF Herbicide was found to range from harmless to moderately harmful to beneficial invertebrates.

Birds
Wild birds, such as bobwhite quail (*Colinus virginianus*) and mallard duck (*Anas platyrhynhcos*), could be exposed to residues of foramsulfuron by consuming sprayed vegetation or contaminated prey. From Section 5.9.3, the EECs of foramsulfuron, Option 2.25 SC Herbicide, and Option 35 DF Herbicide in the diet of the bobwhite quail are 6.13 mg a.i./kg dw, 263 mg EP/kg dw, and 17.5 mg EP/kg dw, respectively. For the mallard duck, the EECs of foramsulfuron, Option 2.25 SC Herbicide, and Option 35 DF Herbicide are 1.18 mg a.i./kg dw, 50.7 mg EP/kg dw, and 3.38 mg EP/kg dw, respectively. This risk assessment examines acute oral exposure to bobwhite quail, acute dietary exposure to bobwhite quail and mallard duck, and chronic exposure for reproductive effects with both avian species.

Three acceptable toxicity studies were submitted on the acute oral exposure of bobwhite quail to foramsulfuron, Option 2.25 SC Herbicide, and Option 35 DF Herbicide. The NOECs were 2000 mg a.i./kg bw for foramsulfuron and 2000 mg EP/kg bw for each of the respective EPs. The average body weight (BWI) was 187 g and the food consumption (FC) was 0.0146 kg dw/ind/d. Therefore, the daily intake (DI = FC × EEC) is 0.089 mg a.i./ind/d for foramsulfuron, 3.84 mg EP/ind/d for Option 2.25 SC Herbicide, and 0.256 mg EP/ind/d for Option 35 DF Herbicide. Expressed on a per individual basis, the $NOEL_{(ind)}$s were 374 mg a.i./ind for foramsulfuron and 374 mg EP/ind for each of the EPs. Based on the predicted daily intake and the $NOEL_{(ind)}$, the maximum number of days of intake of foramsulfuron, Option 2.25 SC Herbicide, and Option 35 DF Herbicide by a wild bobwhite quail, equivalent to the dose administered by gavage that had no observable effect on the laboratory population are 4180, 97, and 1460 days, respectively.

These values indicate that the application of foramsulfuron and the EPs at the maximum proposed label rates poses negligible risk to acutely exposed wild bird populations, such as the bobwhite quail.

The LD_{50}s from separate acute dietary studies with bobwhite quail and mallard duck were >4950 and >4450 mg a.i./kg diet, respectively. According to the USEPA classification scheme, foramsulfuron is considered no more than slightly toxic when birds are acutely exposed. The NOECs were 4950 and 4450 mg a.i./kg dw diet for bobwhite quail and mallard duck, respectively. The EECs in the diet of the bobwhite quail and the mallard duck are expected to be 6.13 and 1.18 mg a.i./kg dw, respectively. Thus, the margins of safety for bobwhite quail and mallard duck are 810 and 3770, respectively. Therefore, foramsulfuron is considered to pose a negligible dietary risk to birds at the proposed maximum application rate.

Two chronic studies were submitted that examined reproductive effects in bobwhite quail and mallard duck. For both species, the NOEL and LOAEL were 1073 and >1073 mg a.i./kg diet, respectively. For bobwhite quail, the NOEL exceeds the EEC in the diet of 6.13 mg a.i./kg diet with a resultant MOS of 175. For mallard duck, the NOEL also exceeds the EECs in the diet of 1.18 mg a.i./kg diet with a resultant MOS of 910. The margins of safety indicate a negligible risk of reproductive effects occurring in birds following long-term dietary exposure to foramsulfuron.

Wild mammals

Wild mammals could be exposed to residues of foramsulfuron as a result of the consumption of sprayed vegetation or contaminated prey. From Section 5.9.3, the EECs of foramsulfuron in the diets of rats, mice, and rabbits are 17.7, 17.6, and 26.4 mg a.i./kg dw, respectively. Based on the submitted data, this risk assessment examines the potential acute risk to wild mammals through studies conducted with rats.

In the assessment of the acute risk to rats, default values were used for food consumption (FC; 0.060 kg dw/ind/day) and body weight per individual (BWI; 0.350 kg bw/ind). The EECs were 17.7 mg a.i./kg dw for foramsulfuron, EEC was 757 mg EP/kg dw for Option 2.25 SC Herbicide, and 504 mg EP/kg dw for Option 35 DF Herbicide. Daily intakes ($DI = FC \times EEC$) were calculated as 1.06 mg a.i./ind/day for foramsulfuron, 45.4 mg EP/ind/day for Option 2.25 SC Herbicide, and 30.2 mg EP/ind/day for Option 35 DF Herbicide.

The LD_{50}s in these studies were >5000 mg a.i./kg bw for foramsulfuron and Option 2.25 SC Herbicide, respectively, and 2788 mg a.i./kg bw for Option 35 DF Herbicide. Expressed on a per individual basis, the $LD_{50\ (ind)}$s ($LD_{50} \times BWI$) are 1510 mg a.i./ind for foramsulfuron and 1750 and 976 mg EP/ind for Option 2.25 SC Herbicide and Option 35 DF Herbicide, respectively. Thus, the number of days of intake by a wild rat to accumulate a dose equivalent to that administered by gavage to laboratory rats that killed 50% of the laboratory population would be 1420, 38, and 32 days for foramsulfuron, Option 2.25 SC Herbicide, and Option 35 DF Herbicide, respectively.

As NOELs were not available, one-tenth of the LD_{50} was used as the NOEL for each respective study. Thus, the maximum number of days of intake by a wild rat to attain a dose equivalent to that administered by gavage to a laboratory population of rats that had no observable effect is also one-tenth of the number of days required to accumulate a dose equivalent to that administered by gavage that killed 50% of the laboratory population. From the studies with the a.i., Option 2.25 SC Herbicide, and Option 35 DF Herbicide, the maximum numbers of days of intake to reach the laboratory dosage that had no observable effect are 142, 3.8, and 3.2 days, respectively.

Based on the above assessments, applications of foramsulfuron and the EPs at the maximum proposed label rates poses a negligible acute risk to populations of wild mammals that are exposed through consumption of sprayed dietary items.

Dietary studies were conducted with foramsulfuron on both rats and mice. The most sensitive NOAELs were for male rats and male mice at 1568 and 1002 mg a.i./kg bw/d, respectively (equivalent to 20 000 and 15 000 mg a.i./kg dw, respectively). Using EECs of 17.7 and 17.6 mg a.i./kg dw for rats and mice, respectively, the margins of safety are 1130 and 850 indicating negligible dietary risk to wild mammals.

In a reproductive study conducted with rats, the most sensitive NOAEL was 1082 mg a.i./kg bw/d for males, equivalent to 15 000 mg a.i./kg dw. Using an EEC of 17.7 mg a.i./kg dw, the MOS is 850, which indicates a negligible reproductive risk to rats.

Non-target terrestrial plants

All toxicity studies with non-target terrestrial plants were conducted with the EPs. From two studies conducted on the phytotoxic effects of Option 2.25 SC Herbicide on the vegetative vigour of crop species, the most sensitive EC_{25} was determined to be 22.8 g EP/ha. As the EEC of this EP is 1500 g EP/ha, a very low MOS of 0.015 was calculated. This indicates that Option 2.25 SC Herbicide poses a high risk to non-target terrestrial plants. The phytotoxic effects of this EP on seedling emergence have not been determined.

One study was conducted on the phytotoxic effects of Option 35 DF Herbicide on seedling emergence and three studies were conducted on the effects on the vegetative vigour of crop species. From the seedling emergence study, the most sensitive EC_{25} was 131 g EP/ha. At an EEC of 100 g EP/ha, a MOS of 1.3 was calculated for seedling emergence indicating a low risk of phytotoxic effects of Option 35 DF Herbicide to non-target terrestrial plants. From the vegetative vigour studies with Option 35 DF Herbicide, the most sensitive EC_{25} was 0.31 g EP/ha, resulting in a much lower MOS of 0.003. The MOS indicates a very high risk of phytotoxic effects on the vegetative vigour of non-target plants.

The effects of the formulated EPs on non-crop plants have not been demonstrated.

Summary of risk to terrestrial organisms
An assessment of the environmental safety associated with the use of foramsulfuron and its associated EPs has identified risks to non-target terrestrial vascular plants. The most sensitive endpoints are reported in Appendix IV, Table 10. Using the proposed use pattern of one application per year at the maximum rate of 1.56 L/ha, Option 2.25 SC Herbicide poses a high risk to non-target plants when tested on crop species used in standard phytotoxicity tests. At the proposed maximum single application rate of 100 g/ha, Option 35 DF Herbicide poses a low risk to the emergence of seedlings on non-target plants, but a very high risk to the vegetative vigour of non-target plants when tested on crop species used in standard phytotoxicity tests. The effects of the formulated EPs on non-crop plants have not been demonstrated.

The risks to earthworms, bees, wild birds, and wild mammals are expected to be negligible. Although there may be potential risks to beneficial predators and parasites, these risks have not been quantified through the submitted data. Furthermore, the risks to terrestrial organisms resulting from exposure to major TPs of foramsulfuron are unknown.

6.4.3 Aquatic organisms

A summary table of the risks to aquatic organisms is provided in Appendix IV, Table 11.

Non-target freshwater invertebrates
From studies on the acute toxicity of foramsulfuron and its EPs to *Daphnia magna*, the NOECs were 102.5 mg a.i./L for foramsulfuron, 3.6 mg EP/L for Option 2.25 SC Herbicide, and 25 mg EP/L for Option 35 DF Herbicide. The EEC of foramsulfuron in water is 0.012 mg a.i./L. For the EPs, the EECs in water are 0.50 and 0.033 mg EP/L for Option 2.25 SC Herbicide and Option 35 DF Herbicide, respectively. The EECs are below the 48-h NOECs of 102.5 mg a.i./L for foramsulfuron and 3.6 and 25 mg EP/L for Option 2.25 SC Herbicide and Option 35 DF Herbicide, respectively. The corresponding margins of safety are 8540, 7.2, and 760 for foramsulfuron, Option 2.25 SC Herbicide, and Option 35 DF Herbicide, respectively. Based on the acute studies with *Daphnia magna*, foramsulfuron and Option 35 DF Herbicide pose a negligible acute risk to pelagic freshwater invertebrates at the proposed application rate; however, Option 2.25 SC Herbicide poses a low risk to freshwater invertebrates.

One valid study was submitted to illustrate the chronic toxicity of foramsulfuron to *Daphnia magna*. In a chronic life-cycle toxicity test, the 21-d NOEC and LOEC for mortality were 102.5 and >102.5 mg a.i./L.

Non-target marine invertebrates
Although studies were conducted on the toxicity of foramsulfuron to marine invertebrates, there is limited potential for marine/estuarine exposure under the given use patterns (Use Site Categories [USC] 7, 13, and 14 for use on corn). As these studies are conditionally required and no exposure is expected, the studies were not reviewed.

Freshwater fish
Acceptable studies were submitted on the acute toxicity of foramsulfuron and the two EPs to freshwater fish. In toxicity tests with foramsulfuron, the 96-h LC_{50} values for the coldwater fish *Onchorynchus mykiss* (rainbow trout) and for the warmwater fish *Lepomis macrochirus* (bluegill sunfish) were >100.9 and >102.7 mg a.i./L, respectively. Therefore, according to the USEPA classification scheme, foramsulfuron is classified as practically non-toxic to freshwater fish. The EEC of foramsulfuron in water (0.012 mg a.i./L) is below the 96-h NOECs of 100.9 and 102.7 mg a.i./L for rainbow trout and bluegill sunfish, respectively. The respective margins of safety are 8410 and 8560; therefore, foramsulfuron poses a negligible risk to freshwater fish at the maximum proposed application rate.

From toxicity tests with Option 2.25 SC Herbicide, the 96-h LC_{50} values for the rainbow trout and bluegill sunfish were 14 and 7.8 mg EP, respectively, resulting in classifications of slightly toxic to rainbow trout and moderately toxic to bluegill sunfish according to the USEPA classification scheme. The EEC of Option 2.25 SC Herbicide in water (0.50 mg EP/L) is below the 96-h NOECs of 11 and 3.9 mg EP/L for mortality and for sublethal effects, respectively, in rainbow trout. Thus, for rainbow trout, the margins of safety are 22 and 7.8 for mortality and for sublethal effects, respectively, indicating that Option 2.25 SC Herbicide poses a negligible risk for mortality in coldwater fish, but poses a low risk for sublethal effects at the maximum proposed application rate. For bluegill sunfish, the EEC in water is below the 96-h NOEC for mortality of 3.9 mg EP/L resulting in a MOS of 7.8. Therefore, Option 2.25 SC Herbicide poses a low risk for mortality in warmwater fish at the maximum proposed application rate.

In toxicity tests with Option 35 DF Herbicide, the 96-h LC_{50} values were 3.4 and 3.7 mg EP/L for rainbow trout and bluegill sunfish, respectively. Therefore, according to the USEPA classification scheme, Option 35 DF Herbicide is classified as moderately toxic to freshwater fish. The EEC of Option 35 DF Herbicide in water (0.033 mg EP/L) is below the 96-h NOECs of 1.25 and 2.5 mg EP/L for rainbow trout and bluegill sunfish, respectively. The respective margins of safety are 38 and 76; therefore, Option 35 DF Herbicide poses a negligible risk to freshwater fish at the maximum proposed application rate.

In a 28-d chronic study of the toxicity of Option 2.25 SC Herbicide to rainbow trout, the NOECs for sublethal effects and for mortality were 0.65 and 5 mg EP/L. In the accepted study, various sublethal endpoints affected included reduced bw and length, and the resultant NOEC was, thus, 1.8 mg EP/L. The EEC of Option 2.25 SC Herbicide in water (0.50 mg EP/L) is slightly less than the sublethal NOEC of 0.65 mg EP/L, resulting in a MOS of 1.3, and is less than the NOEC for mortality of 5 mg EP/L, resulting in a MOS of 10. Therefore, the chronic toxicity study indicates that Option 2.25 SC Herbicide may pose a low risk for sublethal effects to freshwater fish at the maximum proposed application rate; however, it is expected that the chronic risk to fish will be negligible based on the fate of the active ingredient in water and the single application pattern.

Based on the *n*-octanol–water partition coefficient (log K_{ow} = −0.78 at pH 7), foramsulfuron is not expected to bioconcentrate in fish.

Marine/estuarine fish
A study was submitted on the toxicity of foramsulfuron to a marine species of fish; however, as no marine/estuarine exposure is expected and this study is conditionally required for Canadian Regulatory purposes under the given use patterns (USC 7, USC 13, and USC 14 for use on corn), this study was not reviewed.

Freshwater algae
Studies were reviewed on the phytotoxicity of foramsulfuron to a blue-green alga (*Anabaena flos-aquae*), a green alga (*Pseudokirchneriella subcapitata*), and a diatom (*Navicula pelliculosa*). A study of the toxicity of the EP Option 2.25 SC Herbicide to the green alga *P. subcapitata* was also reviewed.

The species most sensitive to foramsulfuron was *A. flos-aquae* with a 96-h NOEC of 0.33 mg a.i./L (calculated as one-tenth of the LC_{50}). The EEC of foramsulfuron in water (0.012 mg a.i./L) is below the NOEC. The resultant MOS of 28 indicates that foramsulfuron poses a negligible risk to freshwater algae at the maximum proposed application rate.

In the study with Option 2.25 SC Herbicide, the most sensitive endpoint was biomass at 1.3 mg EP/L, which exceeds the EEC of Option 2.25 SC Herbicide in water (0.50 mg EP/L). The resultant MOS is 2.6. Therefore, Option 2.25 SC Herbicide poses a low risk to freshwater algae at the maximum proposed application rate.

Marine algae
Although a study was submitted on the toxicity of foramsulfuron to a marine species of diatom, this type of study is conditionally required for Canadian Regulatory purposes. Based on the limited potential for marine/estuarine exposure under the given use patterns (USC 7, USC 13, and USC 14 for use on corn), this study was not reviewed.

Aquatic vascular plants
From the three studies reviewed on the phytotoxicity of foramsulfuron to *Lemna gibba*, the most sensitive NOEC was 0.33 µg a.i./L based on frond number. The EEC of foramsulfuron in water (0.012 mg a.i./L) greatly exceeds the NOEC resulting in a MOS of 0.028. This indicates that foramsulfuron poses a high risk to aquatic vascular plants at the maximum proposed application rate.

Summary of risk to aquatic organisms
An assessment of the environmental safety associated with the use of foramsulfuron and its associated EPs has identified risks to some aquatic organisms. The most sensitive endpoints are presented in Appendix IV, Table 11. At the maximum rate of 35 g a.i./ha, the technical active ingredient foramsulfuron poses a high risk to aquatic vascular plants. Any toxicological risk resulting from exposure to the major TPs has not been determined,

although the TP AE F153745 was non-toxic to earthworms at concentrations up to 1000 mg TP/kg soil and the EC_{50} for the aquatic vascular plant *Lemna gibba* was >100 mg TP/L.

The risks of exposure to foramsulfuron to freshwater invertebrates, fish, and algae is expected to be negligible; however, the formulated products have demonstrated an increased risk over that of the technical active ingredient. Under a scenario using the proposed use pattern of one application per year at the maximum rate of 1.56 L/ha, the formulated EP Option 2.25 SC Herbicide poses a low risk to freshwater invertebrates, freshwater fish, and freshwater algae; however, the potential risk to aquatic vascular plants has not been determined. The phytotoxic risk of the formulated EP Option 35 DF Herbicide to aquatic vascular plants has not been determined.

6.5 Risk mitigation

Environmental concerns

Based on the data submitted and on the existing data requirements for USCs 7, 13, and 14, an assessment of the environmental safety associated with the use of foramsulfuron has been conducted. Application of the TGAI foramsulfuron and the formulated EPs using a scenario of a single application at a maximum rate of 35 g a.i./ha (equivalent to 1.56 L EP/ha for Option 2.25 SC Herbicide and 100 g EP/ha for Option 35 DF Herbicide) has identified areas of concern, particularly with non-target terrestrial and aquatic vascular plants.

Foramsulfuron (TGAI) will pose a risk to the following organisms:

- aquatic vascular plants (e.g., *Lemna gibba*) (High risk)
- Concerns with the toxicological risk of major TPs to terrestrial and aquatic organisms were not determined.

Option 2.25 SC Herbicide (EP) will pose a risk to the following organisms:

- non-target terrestrial vascular plants (High risk)
- The potential risk to aquatic vascular plants has not been determined.

Option 35 DF Herbicide (EP) will pose a risk to the following organisms:

- non-target terrestrial vascular plants (Very high risk)
- The potential risk to aquatic vascular plants has not been determined.

Label statements and buffer zones

Based on the proposed application rates, buffer zones to protect sensitive terrestrial and aquatic habitats are recommended to mitigate risks. The following label amendments are required for the TGAI and each of the EPs.

Foramsulfuron Technical Herbicide

No change to the label is recommended at this time.

Option 2.25 SC Herbicide

On the container label, under "Environmental Precautions and Information", replace all of the proposed text with the following:

> "Toxic to fish and other aquatic organisms. Very small quantities of spray solution may severely injure susceptible terrestrial plants. Observe buffer zones specified in the booklet under Directions for Use.
>
> This product may be harmful to beneficial predatory or parasitic arthropods. The best available application technique that minimizes off-target drift should be used, to reduce effects on beneficial arthropods in the field boundary.
>
> Do not apply in areas where there is a potential for run-off. If rainfall is imminent, delay spraying. Do not apply, drain, or flush spray equipment on or near desirable trees or other plants, on areas where their roots may extend, or in locations where the chemical may be washed or moved into contact with their roots.
>
> This product contains a petroleum distillate that is moderately to highly toxic to aquatic organisms. Avoid contamination of aquatic systems during applications. Do not contaminate these systems through direct application, disposal of waste, or cleaning equipment.
>
> USE ONLY FOR RECOMMENDED PURPOSES AND AT RECOMMENDED RATES."

In the booklet, under "Section 4: Environmental Precautions and Information", replace all of the proposed text with the following:

> "Toxic to fish and other aquatic organisms. Very small quantities of spray solution may severely injure susceptible terrestrial plants. Observe buffer zones specified under Directions for Use (see Section 8: Tank Mixes and Section 10: Application Instructions, Cautions and Recropping Guidelines).
>
> This product may be harmful to beneficial predatory or parasitic arthropods. The best available application technique that minimizes off-target drift should be used, to reduce effects on beneficial arthropods in the field boundary.

Do not apply in areas where there is a potential for run-off. If rainfall is imminent, delay spraying. Do not apply, drain, or flush spray equipment on or near desirable trees or other plants, on areas where their roots may extend, or in locations where the chemical may be washed or moved into contact with their roots.

This product contains a petroleum distillate that is moderately to highly toxic to aquatic organisms. Avoid contamination of aquatic systems during applications. Do not contaminate these systems through direct application, disposal of waste, or cleaning equipment.

USE ONLY FOR RECOMMENDED PURPOSES AND AT RECOMMENDED RATES."

In the booklet, under "Section 8: Tank Mixes", add the following statement to the end of the first paragraph:

"When a tank mixture is used, consult the labels of the tank-mix partners and observe the largest (most restrictive) buffer zone of the products involved in the tank mixture."

In the booklet, under "Section 10: Application Instructions, Cautions and Recropping Guidelines", under the subtitle "Application Instructions", add the following statements to the bottom of the section:

"**Ground boom application:**
Do not apply during periods of dead calm or when winds are gusty.

Over-spray or drift to sensitive habitats must be avoided. A buffer zone of 20 metres is required between the downwind point of direct application and the closest edge of sensitive terrestrial habitats such as grasslands, forested areas, shelter belts, woodlots, hedgerows, pastures, rangelands, and shrublands. A buffer zone of 15 metres is required between the downwind point of direct application and the closest edge of sensitive aquatic habitats such as lakes, rivers, sloughs, ponds, coulees, prairie potholes, creeks, marshes, streams, reservoirs, and wetlands. Do not contaminate these habitats when cleaning and rinsing spray equipment or containers."

Option 35 DF Herbicide
On the container label, under "Environmental Precautions and Information", replace all of the proposed text with the following:

> “Toxic to fish and other aquatic organisms. Very small quantities of spray solution may severely injure susceptible terrestrial plants. Observe buffer zones specified in the booklet under Directions for Use.
>
> This product may be harmful to beneficial predatory or parasitic arthropods. The best available application technique that minimizes off-target drift should be used, to reduce effects on beneficial arthropods in the field boundary.
>
> Do not apply in areas where there is a potential for run-off. If rainfall is imminent, delay spraying. Do not apply, drain, or flush spray equipment on or near desirable trees or other plants, on areas where their roots may extend, or in locations where the chemical may be washed or moved into contact with their roots.
>
> USE ONLY FOR RECOMMENDED PURPOSES AND AT RECOMMENDED RATES.”

In the booklet, under “Section 4: Environmental Precautions and Information”, replace all of the proposed text with the following:

> “Toxic to fish and other aquatic organisms. Very small quantities of spray solution may severely injure susceptible terrestrial plants. Observe buffer zones specified under Directions for Use (see Section 8: Tank Mixes and Section 10: Application Instructions, Cautions, and Recropping Guidelines).
>
> This product may be harmful to beneficial predatory or parasitic arthropods. The best available application technique that minimizes off-target drift should be used, to reduce effects on beneficial arthropods in the field boundary.
>
> Do not apply in areas where there is a potential for run-off. If rainfall is imminent, delay spraying. Do not apply, drain, or flush spray equipment on or near desirable trees or other plants, on areas where their roots may extend, or in locations where the chemical may be washed or moved into contact with their roots.
>
> USE ONLY FOR RECOMMENDED PURPOSES AND AT RECOMMENDED RATES.”

In the booklet, under “Section 8: Tank Mixes”, add the following statement to the end of the first paragraph:

> “When a tank mixture is used, consult the labels of the tank-mix partners and observe the largest (most restrictive) buffer zone of the products involved in the tank mixture.”

In the booklet, under “Section 10: Application Instructions, Cautions, and Recropping Guidelines”, under the subtitle “Application Instructions”, add the following statements to the bottom of the section:

> **“Ground boom application:**
> Do not apply during periods of dead calm or when winds are gusty.
>
> Over-spray or drift to sensitive habitats must be avoided. A buffer zone of 34 metres is required between the downwind point of direct application and the closest edge of sensitive terrestrial habitats such as grasslands, forested areas, shelter belts, woodlots, hedgerows, pastures, rangelands, and shrublands. A buffer zone of 15 metres is required between the downwind point of direct application and the closest edge of sensitive aquatic habitats such as lakes, rivers, sloughs, ponds, coulees, prairie potholes, creeks, marshes, streams, reservoirs, and wetlands. Do not contaminate these habitats when cleaning and rinsing spray equipment or containers.”

7.0 Efficacy

7.1 Mode of action

Foramsulfuron belongs to the general class of herbicides termed sulfonyl ureas. Foramsulfuron inhibits the activity of acetolactate synthase (ALS), which is the key enzyme in the biosynthesis of the branch-chain amino acids, isoleucine, leucine, and valine. Although the actual sequence of phytotoxic processes is unclear, plant death results from events occurring in response to inhibition of the ALS enzyme.

Foramsulfuron behaves like both a contact and systemic herbicide when it is applied post-emergent to weed species. Uptake by the target plant is immediate upon application and phytotoxic effects within the plant are also immediate. The visible symptoms of herbicidal action are almost immediate arresting of growth, followed by leaf yellowing, inhibition of anthocyanin production, and, finally, progressive shoot necrosis. Depending on the weed species and environmental conditions, plant death will usually occur between one and three weeks after herbicide application

7.2 Effectiveness against pests

7.2.1 Option 35 DF + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha

Small plot field trials were conducted in Ontario and Quebec over three years. Treatments were conducted at the proposed label rate and the reduced application rate so as to confirm that the requested label rates are the lowest to provide effective and consistent control on a weed specific basis.

Efficacy was assessed as a visual rating of percent control and reported at least twice during the year of treatment, on a weed-specific basis.

Velvetleaf (*Abutilon theophrasti*)
The proposed application rate for the claim of control for velvetleaf is Option 35 DF at 100 g/ha (35 g a.i./ha) at the 1–4-leaf stage. The control of velvetleaf with Option 35 DF was reported in 24 trials conducted over 2 years in Ontario under conventional tillage practices. The mean control of velvetleaf with Option 35 DF applied at 100 g/ha (35 g a.i./ha) was 93% (*n* = 17) at 14–40 DAT and 95% (*n* = 18) at 41 or more DAT. The mean control of velvetleaf with Option 35 DF applied at 43 g/ha (15 g a.i./ha) was 93% (*n* = 14) at 14–40 DAT and 92% (*n* = 15) at 41 or more DAT. The data provided support a claim of Velvetleaf (*Abutilon theophrasti*) control at the 1–4-leaf stage in field corn with an application of Option 35 DF at 43 g/ha (15 g a.i./ha).

Quackgrass (*Agropyron repens*)
The proposed application rate for the claim of control for quackgrass is Option 35 DF at 43 g/ha (15 g a.i./ha) at the 3–6-leaf stage up to tillering. The control of quackgrass with Option 35 DF was reported in 23 trials conducted over 2 years in Ontario under conventional tillage practices. The mean control of quackgrass with Option 35 DF applied at 43 g/ha (15 g a.i./ha) was 85% (*n* = 14) at 14–40 DAT and 92% (*n* = 12) at 41 or more DAT. The data provided support a claim of quackgrass (*Agropyron repens*) control at the 3–6-leaf stage up to tillering in field corn with an application of Option 35 DF at 43 g/ha (15 g a.i./ha).

Redroot pigweed (*Amaranthus retroflexus*)
The proposed application rate for the claim of control for redroot pigweed is Option 35 DF at 100 g/ha (35 g a.i./ha) at the 1–7-leaf stage. The control of redroot pigweed with Option 35 DF was reported in 60 trials conducted over 2 years in Ontario under conventional tillage practices. The mean control of redroot pigweed with Option 35 DF applied at 100 g/ha (35 g a.i./ha) was 97% (*n* = 53) at 14–40 DAT and 97% (*n* = 48) at 41 or more DAT. The mean control of redroot pigweed with Option 35 DF applied at 43 g/ha (15 g a.i./ha) was 94% (*n* = 47) at 14–40 DAT and 94% (*n* = 43) at 41 or more DAT. The data provided support a claim of redroot pigweed (*Amaranthus retroflexus*) control at the 1–7-leaf stage in field corn with an application of Option 35 DF at 43 g/ha (15 g a.i./ha).

Common ragweed (*Ambrosia artemisiifolia*)
The proposed application rate for the claim of control for common ragweed is Option 35 DF at 100 g/ha (35 g a.i./ha) at the 2–4-leaf stage. The control of common ragweed with Option 35 DF was reported in 61 trials conducted over 2 years in Ontario under conventional tillage practices. The mean control of common ragweed with Option 35 DF applied at 100 g/ha (35 g a.i./ha) was 83% (*n* = 48) at 14–40 DAT and 83% (*n* = 48) at 41 or more DAT. Based on the percentage of trials which provided control of < 80% (30% at the 14–40 DAT and 37% at the 41 or more DAT the data provided support a claim of common ragweed (*Ambrosia artemisiifolia*) suppression at the 2–4-leaf stage in field corn with an application of Option 35 DF at 100 g/ha (35 g a.i./ha).

Lambsquarters (*Chenopodium album*)
The proposed application rate for the claim of control for lambsquarters is Option 35 DF at 100 g/ha (35 g a.i./ha) at the 2–8-leaf stage. The control of lambsquarters with Option 35 DF was reported in 102 trials conducted over 2 years in Ontario under conventional tillage practices. The mean control of lambsquarters with Option 35 DF applied at 100 g/ha (35 g a.i./ha) was 91% (*n* = 84) at 14–40 DAT and 92% (*n* = 79) at 41 or more DAT. The data provided support a claim of lambsquarters (*Chenopodium album*) control at the 4–8-leaf stage in field corn with an application of Option 35 DF at 100 g/ha (35 g a.i./ha). Data indicated that a rate lower than 35 g a.i./ha of Option 35 DF may provide acceptable control of lambsquarters. Additional data may be requested in order to establish the lowest effective rate for the control of lambsquarters.

Large crabgrass (*Digitaria sanguinalis*)
The proposed application rate for the claim of control for large crabgrass is Option 35 DF at 100 g/ha (35 g a.i./ha) at the 1–6-leaf stage up to tillering. The control of large crabgrass with Option 35 DF was reported in 44 trials conducted over 2 years in Ontario under conventional tillage practices. The mean control of large crabgrass with Option 35 DF applied at 100 g/ha (35 g a.i./ha) was 92% (*n* = 36) at 14–40 DAT and 88% (*n* = 39) at 41 or more DAT. The data provided support a claim of large crabgrass (*Digitaria sanguinalis*) control at the 1–6-leaf stage up to tillering in field corn with an application of Option 35 DF at 100 g/ha (35 g a.i./ha). Data indicated that a rate lower than 35 g a.i./ha of Option 35 DF may provide acceptable control of large crabgrass. Additional data may be requested in order to establish the lowest effective rate for the control of large crabgrass.

Barnyard grass (*Echinochloa crusgalli*)
The proposed application rate for the claim of control for barnyard grass is Option 35 DF at 100 g/ha (35 g a.i./ha) at the 1–6-leaf stage up to tillering. The control of barnyard grass with Option 35 DF was reported in 16 trials conducted over 2 years in Ontario under conventional tillage practices. The mean control of barnyard grass with Option 35 DF applied at 100 g/ha (35 g a.i./ha) was 95% (*n* = 13) at 14–40 DAT and 93% (*n* = 11) at 41 or more DAT. The data provided support a claim of barnyard grass (*Echinochloa crusgalli*) control at the 1–6-leaf stage up to tillering in field corn with an application of Option 35 DF at 100 g/ha (35 g a.i./ha). Data indicated that a rate lower than 35 g a.i./ha

of Option 35 DF may provide acceptable control of barnyard grass. Additional data may be requested in order to establish the lowest effective rate for the control of barnyard grass.

Wormseed mustard (*Erysimum cheiranthoides*)
The proposed application rate for the claim of control for wormseed mustard is Option 35 DF at 100 g/ha (35 g a.i./ha) at the 1–6-leaf stage. The control of wormseed mustard with Option 35 DF was reported in 9 trials conducted over 2 years in Ontario under conventional tillage practices. The mean control of wormseed mustard with Option 35 DF applied at 100 g/ha (35 g a.i./ha) was 93% (n = 6) at 14–40 DAT and 99% (n = 6) at 41 or more DAT. The mean control of wormseed mustard with Option 35 DF applied at 43 g/ha (15 g a.i./ha) was 98% (n = 3) at 14–40 DAT and 99% (n = 3) at 41 or more DAT. The data provided support a claim of wormseed mustard (*Erysimum cheiranthoides*) control at the 5–9-leaf stage in field corn with an application of Option 35 DF at 43 g/ha (15 g a.i./ha).

Alfalfa (*Medicago sativa*)
The proposed application rate for the claim of control for alfalfa is Option 35 DF at 100 g/ha (35 g a.i./ha) at the 1–9-leaf stage. The control of alfalfa with Option 35 DF was reported in 6 trials conducted in 1 year in Ontario under conventional tillage practices. Insufficient data was provided to assess the efficacy of Option 35 DF on alfalfa; therefore, alfalfa (*Medicago sativa*) is not acceptable to appear on the Option 35 DF label.

Witchgrass (*Panicum capillare*)
The proposed application rate for the claim of control for witchgrass is Option 35 DF at 100 g/ha (35 g a.i./ha) at the 1–6-leaf stage up to tillering. The control of witchgrass with Option 35 DF was reported in 11 trials conducted over 2 years in Ontario under conventional tillage practices. The mean control of witchgrass with Option 35 DF applied at 100 g/ha (35 g a.i./ha) was 96% (n = 5) at 14–40 DAT and 99% (n = 7) at 41 or more DAT. The mean control of witchgrass with Option 35 DF applied at 43 g/ha (15 g a.i./ha) was 98% (n = 4) at 14–40 DAT and 98% (n = 5) at 41 or more DAT. The data provided support a claim of witchgrass (*Panicum capillare*) control at the at the 1–6-leaf stage up to tillering in field corn with an application of Option 35 DF at 43 g/ha (15 g a.i./ha).

Fall panicum (*Panicum dichotomiflorum*)
The proposed application rate for the claim of control for fall panicum is Option 35 DF at 100 g/ha (35 g a.i./ha) at the 1–6-leaf stage up to tillering. The control of fall panicum with Option 35 DF was reported in 25 trials conducted over 2 years in Ontario under conventional tillage practices. The mean control of fall panicum with Option 35 DF applied at 100 g/ha (35 g a.i./ha) was 95% (n = 17) at 14–40 DAT and 94% (n = 18) at 41 or more DAT. The mean control of fall panicum with Option 35 DF applied at 43 g/ha (15 g a.i./ha) was 92% (n = 14) at 14–40 DAT and 88% (n = 15) at 41 or more DAT. The data provided support a claim of fall panicum (*Panicum dichotomiflorum*) control at the

1–4-leaf stage up to tillering in field corn with an application of Option 35 DF at 43 g/ha (15 g a.i./ha).

Proso millet (*Panicum miliaceum*)
The proposed application rate for the claim of control for proso millet is Option 35 DF at 100 g/ha (35 g a.i./ha) at the 1–6-leaf stage up to tillering. The control of proso millet with Option 35 DF was reported in 29 trials conducted over 2 years in Ontario under conventional tillage practices. The mean control of proso millet with Option 35 DF applied at 100 g/ha (35 g a.i./ha) was 95% (*n* = 27) at 14–40 DAT and 97% (*n* = 29) at 41 or more DAT. The mean control of proso millet with Option 35 DF applied at 43 g/ha (15 g a.i./ha) was 91% (*n* = 23) at 14–40 DAT and 95% (*n* = 22) at 41 or more DAT. The data provided support a claim of proso millet (*Panicum miliaceum*) control at the 2–5-leaf stage up to tillering in field corn with an application of Option 35 DF at 43 g/ha (15 g a.i./ha).

Yellow foxtail (*Setaria glauca*)
The proposed application rate for the claim of control for yellow foxtail is Option 35 DF at 100 g/ha (35 g a.i./ha) at the 1–6-leaf stage up to tillering. The control of yellow foxtail with Option 35 DF was reported in 28 trials conducted over 2 years in Ontario under conventional tillage practices. The mean control of yellow foxtail with Option 35 DF applied at 100 g/ha (35 g a.i./ha) was 92% (*n* = 17) at 14–40 DAT and 93% (*n* = 23) at 41 or more DAT. The data provided support a claim of yellow foxtail (*Setaria glauca*) control at the 2–5-leaf stage up to tillering in field corn with an application of Option 35 DF at 100 g/ha (35 g a.i./ha). Data indicated that a rate lower than 35 g a.i./ha of Option 35 DF may provide acceptable control of yellow foxtail. Additional data may be requested in order to establish the lowest effective rate for the control of yellow foxtail.

Green foxtail (*Setaria viridis*)
The proposed application rate for the claim of control for green foxtail is Option 35 DF at 100 g/ha (35 g a.i./ha) at the 1–6-leaf stage up to tillering. The control of green foxtail with Option 35 DF was reported in 54 trials conducted over 2 years in Ontario under conventional tillage practices. The mean control of green foxtail with Option 35 DF applied at 100 g/ha (35 g a.i./ha) was 95% (*n* = 45) at 14–40 DAT and 96% (*n* = 47) at 41 or more DAT. The mean control of green foxtail with Option 35 DF applied at 43 g/ha (15 g a.i./ha) was 91% (*n* = 35) at 14–40 DAT and 93% (*n* = 38) at 41 or more DAT. The data provided support a claim of green foxtail (*Setaria viridis*) control at the 2–5-leaf stage up to tillering in field corn with an application of Option 35 DF at 43 g/ha (15 g a.i./ha).

Bristly foxtail (*Setaria verticillata*)
The proposed application rate for the claim of control for bristly foxtail is Option 35 DF at 100 g/ha (35 g a.i./ha) at the 1–6-leaf stage up to tillering. The control of bristly foxtail with Option 35 DF was reported in 11 trials conducted over 2 years in Ontario under conventional tillage practices. The mean control of bristly foxtail with Option 35 DF applied at 100 g/ha (35 g a.i./ha) was 86% (*n* = 9) at 14–40 DAT and 97% (*n* = 9) at 41 or

more DAT. The data provided support a claim of bristly foxtail (*Setaria verticillata*) control at the 3–5-leaf stage up to tillering in field corn with an application of Option 35 DF at 43 g/ha (15 g a.i./ha). Data indicated that a rate lower than 35 g a.i./ha of Option 35 DF may provide acceptable control of bristly foxtail. Additional data may be requested in order to establish the lowest effective rate for the control of bristly foxtail.

Wild mustard (*Sinapis arvensis*)
The proposed application rate for the claim of control for wild mustard is Option 35 DF at 100 g/ha (35 g a.i./ha) at the 1–6-leaf stage. The control of wild mustard with Option 35 DF was reported in 8 trials conducted over 2 years in Ontario under conventional tillage practices. The mean control of wild mustard with Option 35 DF applied at 100 g/ha (35 g a.i./ha) was 96% (n = 8) at 14–40 DAT and 98% (n = 8) at 41 or more DAT. The mean control of wild mustard with Option 35 DF applied at 43 g/ha (15 g a.i./ha) was 96% (n = 7) at 14–40 DAT and 98% (n = 7) at 41 or more DAT. The data provided support a claim of wild mustard (*Sinapis arvensis*) control at the 5–7-leaf stage in field corn with an application of Option 35 DF at 43 g/ha (15 g a.i./ha).

Eastern black nightshade (*Solanum ptycanthum*)
The proposed application rate for the claim of control for eastern black nightshade is Option 35 DF at 100 g/ha (35 g a.i./ha) at the 1–5-leaf stage. The control of eastern black nightshade with Option 35 DF was reported in 22 trials conducted over 2 years in Ontario under conventional tillage practices. The mean control of eastern black nightshade with Option 35 DF applied at 100 g/ha (35 g a.i./ha) was 97% (n = 17) at 14–40 DAT and 97% (n = 20) at 41 or more DAT. The mean control of eastern black nightshade with Option 35 DF applied at 43 g/ha (15 g a.i./ha) was 94% (n = 13) at 14–40 DAT and 91% (n = 15) at 41 or more DAT. The data provided support a claim of eastern black nightshade (*Solanum ptycanthum*) control at the 1–5-leaf stage in field corn with an application of Option 35 DF at 43 g/ha (15 g a.i./ha).

Common chickweed (*Stellaria media*)
The proposed application rate for the claim of control for common chickweed is Option 35 DF at 100 g/ha (35 g a.i./ha) at the 2–4-leaf stage. The control of common chickweed with Option 35 DF was reported in 7 trials conducted over 2 years in Ontario under conventional tillage practices. The mean control of with Option 35 DF applied at 100 g/ha (35 g a.i./ha) was 99% (n = 6) at 14–40 DAT and 96% (n = 7) at 41 or more DAT. The mean control of common chickweed with Option 35 DF applied at 43 g/ha (15 g a.i./ha) was 91% (n = 7) at 14–40 DAT and 95% (n = 7) at 41 or more DAT. The data provided support a claim of common chickweed (*Stellaria media*) control at the 4–6-leaf stage in field corn with an application of Option 35 DF at 43 g/ha (15 g a.i./ha).

Red clover (*Trifolium pratense*)
The proposed application rate for the claim of control for red clover is Option 35 DF at 100 g/ha (35 g a.i./ha) at the 1–9-leaf stage. The control of red clover with Option 35 DF was reported in 6 trials conducted over 2 years in Ontario under conventional tillage

practices. Data provided were insufficient to assess the efficacy of Option 35 DF on red clover; therefore, red clover (*Trifolium pratense*) is not acceptable to appear on the Option 35 DF label.

7.2.2 Option 2.25 SC + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha

Data were provided to support the claim of agronomic equivalence between Option 2.25 SC and Option 35 DF. Option 2.25 SC and Option 35 DF were tested side by side in order to establish agronomic equivalence. Option 35 DF was always applied with Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. Option 2.25 SC was always applied with Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha.

Velvetleaf (*Abutilon theophrasti*)
The control of velvetleaf with Option 2.25 SC compared to Option 35 DF was reported in 11 trials conducted over 2 years in Ontario under conventional tillage practices. The mean control of velvetleaf with Option 2.25 SC applied at 1.56 L/ha (35 g a.i./ha) was 95% (n = 9) at 14–40 DAT and 96% (n = 11) at 41 or more DAT. The mean control of velvetleaf with Option 35 DF applied at 43 g/ha (35 g a.i./ha) was 96% (n = 9) at 14–40 DAT and 97% (n = 11) at 41 or more DAT. The efficacy data provided indicate that Option 2.25 SC provides a similar level of control to Option 35 DF. Therefore, weed claims, rates of application, and weed stages on the Option 2.25 SC label will reflect those on the Option 35 DF label.

Quackgrass (*Agropyron repens*)
The control of quackgrass with Option 2.25 SC compared to Option 35 DF was reported in 10 trials conducted over 2 years in Ontario under conventional tillage practices. The mean control of quackgrass with Option 2.25 SC applied at 1.56 L/ha (35 g a.i./ha) was 92% (n = 10) at 14–40 DAT and 98% (n = 7) at 41 or more DAT. The mean control of quackgrass with Option 35 DF applied at 43 g/ha (35 g a.i./ha) was 94% (n = 10) at 14–40 DAT and 98% (n = 7) at 41 or more DAT. The efficacy data provided indicate that Option 2.25 SC provides a similar level of control to Option 35 DF. Therefore, weed claims, rates of application, and weed stages on the Option 2.25 SC label will reflect those on the Option 35 DF label.

Redroot pigweed (*Amaranthus retroflexus*)
The control of redroot pigweed with Option 2.25 SC compared to Option 35 DF was reported in 29 trials conducted over 2 years in Ontario under conventional tillage practices. The mean control of redroot pigweed with Option 2.25 SC applied at 1.56 L/ha (35 g a.i./ha) was 95% (n = 29) at 14–40 DAT and 96% (n = 28) at 41 or more DAT. The mean control of redroot pigweed with Option 35 DF applied at 43 g/ha (35 g a.i./ha) was 97% (n = 29) at 14–40 DAT and 97% (n = 28) at 41 or more DAT. The efficacy data provided indicate that Option 2.25 SC provides a similar level of control to Option 35 DF. Therefore, weed claims, rates of application, and weed stages on the Option 2.25 SC label will reflect those on the Option 35 DF label.

Common ragweed (*Ambrosia artemisiifolia*)
The control of common ragweed with Option 2.25 SC compared to Option 35 DF was reported in 29 trials conducted over 2 years in Ontario under conventional tillage practices. The mean control of common ragweed with Option 2.25 SC applied at 1.56 L/ha (35 g a.i./ha) was 74% (*n* = 27) at 14–40 DAT and 73% (*n* = 29) at 41 or more DAT. The mean control of common ragweed with Option 35 DF applied at 43 g/ha (35 g a.i./ha) was 79% (*n* = 27) at 14–40 DAT and 81% (*n* = 29) at 41 or more DAT. The efficacy data provided indicate that Option 2.25 SC provides a similar level of control to Option 35 DF. Therefore, weed claims, rates of application, and weed stages on the Option 2.25 SC label will reflect those on the Option 35 DF label.

Lambsquarters (*Chenopodium album*)
The control of lambsquarters with Option 2.25 SC compared to Option 35 DF was reported in 47 trials conducted over 2 years in Ontario under conventional tillage practices. The mean control of lambsquarters with Option 2.25 SC applied at 1.56 L/ha (35 g a.i./ha) was 86% (*n* = 47) at 14–40 DAT and 88% (*n* = 47) at 41 or more DAT. The mean control of lambsquarters with Option 35 DF applied at 43 g/ha (35 g a.i./ha) was 90% (*n* = 47) at 14–40 DAT and 90% (*n* = 47) at 41 or more DAT. The efficacy data provided indicate that Option 2.25 SC provides a similar level of control to Option 35 DF. Therefore, weed claims, rates of application, and weed stages on the Option 2.25 SC label will reflect those on the Option 35 DF label.

Large crabgrass (*Digitaria sanguinalis*)
The control of large crabgrass with Option 2.25 SC compared to Option 35 DF was reported in 23 trials conducted over 2 years in Ontario under conventional tillage practices. The mean control of large crabgrass with Option 2.25 SC applied at 1.56 L/ha (35 g a.i./ha) was 89% (*n* = 19) at 14–40 DAT and 84% (*n* = 22) at 41 or more DAT. The mean control of large crabgrass with Option 35 DF applied at 43 g/ha (35 g a.i./ha) was 91% (*n* = 19) at 14–40 DAT and 87% (*n* = 22) at 41 or more DAT. The efficacy data provided indicate that Option 2.25 SC provides a similar level of control to Option 35 DF. Therefore, weed claims, rates of application, and weed stages on the Option 2.25 SC label will reflect those on the Option 35 DF label.

Barnyard grass (*Echinochloa crusgalli*)
The control of barnyard grass with Option 2.25 SC compared to Option 35 DF was reported in 2 trials conducted in 1 year in Ontario under conventional tillage practices. The mean control of barnyard grass with Option 2.25 SC applied at 1.56 L/ha (35 g a.i./ha) was 96% (*n* = 2) at 14–40 DAT and 92% (*n* = 1) at 41 or more DAT. The mean control of barnyard grass with Option 35 DF applied at 43 g/ha (35 g a.i./ha) was 96% (*n* = 2) at 14–40 DAT and 94% (*n* = 1) at 41 or more DAT. The efficacy data provided indicate that Option 2.25 SC provides a similar level of control to Option 35 DF. Therefore, weed claims, rates of application, and weed stages on the Option 2.25 SC label will reflect those on the Option 35 DF label.

Wormseed mustard (*Erysimum cheiranthoides*)
The control of wormseed mustard with Option 2.25 SC compared to Option 35 DF was reported in 5 trials conducted over 2 years in Ontario under conventional tillage practices. The mean control of wormseed mustard with Option 2.25 SC applied at 1.56 L/ha (35 g a.i./ha) was 99% (*n* = 3) at 14–40 DAT and 99% (*n* = 5) at 41 or more DAT. The mean control of wormseed mustard with Option 35 DF applied at 43 g/ha (35 g a.i./ha) was 99% (*n* = 3) at 14–40 DAT and 99% (*n* = 5) at 41 or more DAT. The efficacy data provided indicate that Option 2.25 SC provides a similar level of control to Option 35 DF. Therefore, weed claims, rates of application, and weed stages on the Option 2.25 SC label will reflect those on the Option 35 DF label.

Alfalfa (*Medicago sativa*)
The control of alfalfa with Option 2.25 SC compared to Option 35 DF was reported in 4 trials conducted over 2 years in Ontario under conventional tillage practices. The mean control of alfalfa with Option 2.25 SC applied at 1.56 L/ha (35 g a.i./ha) was 76% (*n* = 4) at 14–40 DAT and 96% (*n* = 4) at 41 or more DAT. The mean control of alfalfa with Option 35 DF applied at 43 g/ha (35 g a.i./ha) was 78% (*n* = 4) at 14–40 DAT and 96% (*n* = 4) at 41 or more DAT. The efficacy data provided indicate that Option 2.25 SC provides a similar level of control to Option 35 DF. Therefore, weed claims, rates of application and weed stages on the Option 2.25 SC label will reflect those on the Option 35 DF label.

Witchgrass (*Panicum capillare*)
The control of witchgrass with Option 2.25 SC compared to Option 35 DF was reported in 8 trials conducted over 2 years in Ontario under conventional tillage practices. The mean control of witchgrass with Option 2.25 SC applied at 1.56 L/ha (35 g a.i./ha) was 99% (*n* = 3) at 14–40 DAT and 98% (*n* = 8) at 41 or more DAT. The mean control of witchgrass with Option 35 DF applied at 43 g/ha (35 g a.i./ha) was 98% (*n* = 3) at 14–40 DAT and 98% (*n* = 8) at 41 or more DAT. The efficacy data provided indicate that Option 2.25 SC provides a similar level of control to Option 35 DF. Therefore, weed claims, rates of application, and weed stages on the Option 2.25 SC label will reflect those on the Option 35 DF label.

Fall panicum (*Panicum dichotomiflorum*)
The control of fall panicum with Option 2.25 SC compared to Option 35 DF was reported in 8 trials conducted over 2 years in Ontario under conventional tillage practices. The mean control of fall panicum with Option 2.25 SC applied at 1.56 L/ha (35 g a.i./ha) was 95% (*n* = 8) at 14–40 DAT and 90% (*n* = 8) at 41 or more DAT. The mean control of fall panicum with Option 35 DF applied at 43 g/ha (35 g a.i./ha) was 96% (*n* = 8) at 14–40 DAT and 91% (*n* = 8) at 41 or more DAT. The efficacy data provided indicate that Option 2.25 SC provides a similar level of control to Option 35 DF. Therefore, weed claims, rates of application, and weed stages on the Option 2.25 SC label will reflect those on the Option 35 DF label.

Proso millet (*Panicum miliaceum*)
The control of proso millet with Option 2.25 SC compared to Option 35 DF was reported in 18 trials conducted over 2 years in Ontario under conventional tillage practices. The mean control of proso millet with Option 2.25 SC applied at 1.56 L/ha (35 g a.i./ha) was 93% (*n* = 18) at 14–40 DAT and 96% (*n* = 17) at 41 or more DAT. The mean control of proso millet with Option 35 DF applied at 43 g/ha (35 g a.i./ha) was 95% (*n* = 18) at 14–40 DAT and 97% (*n* = 17) at 41 or more DAT. The efficacy data provided indicate that Option 2.25 SC provides a similar level of control to Option 35 DF. Therefore, weed claims, rates of application, and weed stages on the Option 2.25 SC label will reflect those on the Option 35 DF label.

Yellow foxtail (*Setaria glauca*)
The control of yellow foxtail with Option 2.25 SC compared to Option 35 DF was reported in 12 trials conducted over 2 years in Ontario under conventional tillage practices. The mean control of yellow foxtail with Option 2.25 SC applied at 1.56 L/ha (35 g a.i./ha) was 87% (*n* = 10) at 14–40 DAT and 88% (*n* = 12) at 41 or more DAT. The mean control of yellow foxtail with Option 35 DF applied at 43 g/ha (35 g a.i./ha) was 91% (*n* = 10) at 14–40 DAT and 94% (*n* = 12) at 41 or more DAT. The efficacy data provided indicate that Option 2.25 SC provides a similar level of control to Option 35 DF. Therefore, weed claims, rates of application, and weed stages on the Option 2.25 SC label will reflect those on the Option 35 DF label.

Green foxtail (*Setaria viridis*)
The control of green foxtail with Option 2.25 SC compared to Option 35 DF was reported in 23 trials conducted over 2 years in Ontario under conventional tillage practices. The mean control of green foxtail with Option 2.25 SC applied at 1.56 L/ha (35 g a.i./ha) was 94% (*n* = 21) at 14–40 DAT and 95% (*n* = 23) at 41 or more DAT. The mean control of green foxtail with Option 35 DF applied at 43 g/ha (35 g a.i./ha) was 95% (*n* = 21) at 14–40 DAT and 96% (*n* = 23) at 41 or more DAT. The efficacy data provided indicate that Option 2.25 SC provides a similar level of control to Option 35 DF. Therefore, weed claims, rates of application, and weed stages on the Option 2.25 SC label will reflect those on the Option 35 DF label.

Bristly foxtail (*Setaria verticillata*)
The control of bristly foxtail with Option 2.25 SC compared to Option 35 DF was reported in 2 trials conducted in 1 year in Ontario under conventional tillage practices. The mean control of bristly foxtail with Option 2.25 SC applied at 1.56 L/ha (35 g a.i./ha) was 97% (*n* = 2) at 14–40 DAT and 99% (*n* = 2) at 41 or more DAT. The mean control of bristly foxtail with Option 35 DF applied at 43 g/ha (35 g a.i./ha) was 97% (*n* = 2) at 14–40 DAT and 98% (*n* = 2) at 41 or more DAT. The efficacy data provided indicate that Option 2.25 SC provides a similar level of control to Option 35 DF. Therefore, weed claims, rates of application, and weed stages on the Option 2.25 SC label will reflect those on the Option 35 DF label.

Wild mustard (*Sinapis arvensis*)
The control of wild mustard with Option 2.25 SC compared to Option 35 DF was reported in 3 trials conducted over 2 years in Ontario under conventional tillage practices. The mean control of wild mustard with Option 2.25 SC applied at 1.56 L/ha (35 g a.i./ha) was 99% (n = 3) at 14–40 DAT and 99% (n = 3) at 41 or more DAT. The mean control of wild mustard with Option 35 DF applied at 43 g/ha (35 g a.i./ha) was 99% (n = 3) at 14–40 DAT and 99% (n = 3) at 41 or more DAT. The efficacy data provided indicate that Option 2.25 SC provides a similar level of control to Option 35 DF. Therefore, weed claims, rates of application, and weed stages on the Option 2.25 SC label will reflect those on the Option 35 DF label.

Eastern black nightshade (*Solanum ptycanthum*)
The control of eastern black nightshade with Option 2.25 SC compared to Option 35 DF was reported in 9 trials conducted over 2 years in Ontario under conventional tillage practices. The mean control of eastern black nightshade with Option 2.25 SC applied at 1.56 L/ha (35 g a.i./ha) was 98% (n = 9) at 14–40 DAT and 96% (n = 9) at 41 or more DAT. The mean control of eastern black nightshade with Option 35 DF applied at 43 g/ha (35 g a.i./ha) was 97% (n = 9) at 14–40 DAT and 96% (n = 9) at 41 or more DAT. The efficacy data provided indicate that Option 2.25 SC provides a similar level of control to Option 35 DF. Therefore, weed claims, rates of application, and weed stages on the Option 2.25 SC label will reflect those on the Option 35 DF label.

Common chickweed (*Stellaria media*)
The control of common chickweed with Option 2.25 SC compared to Option 35 DF was reported in 6 trials conducted over 2 years in Ontario under conventional tillage practices. The mean control of common chickweed with Option 2.25 SC applied at 1.56 L/ha (35 g a.i./ha) was 98% (n = 6) at 14–40 DAT and 95% (n = 6) at 41 or more DAT. The mean control of common chickweed with Option 35 DF applied at 43 g/ha (35 g a.i./ha) was 99% (n = 6) at 14–40 DAT and 96% (n = 6) at 41 or more DAT. The efficacy data provided indicate that Option 2.25 SC provides a similar level of control to Option 35 DF. Therefore, weed claims, rates of application, and weed stages on the Option 2.25 SC label will reflect those on the Option 35 DF label.

Red clover (*Trifolium pratense*)
The control of red clover with Option 2.25 SC compared to Option 35 DF was reported in 5 trials conducted over 2 years in Ontario under conventional tillage practices. The mean control of red clover with Option 2.25 SC applied at 1.56 L/ha (35 g a.i./ha) was 84% (n = 2) at 14–40 DAT and 86% (n = 5) at 41 or more DAT. The mean control of red clover with Option 35 DF applied at 43 g/ha (35 g a.i./ha) was 95% (n = 2) at 14–40 DAT and 89% (n = 5) at 41 or more DAT. The efficacy data provided indicate that Option 2.25 SC provides a similar level of control to Option 35 DF. Therefore, weed claims, rates of application, and weed stages on the Option 2.25 SC label will reflect those on the Option 35 DF label.

7.2.3 Option 35 DF + Peak (active ingredient: Prosulfuron) + Banvel (active ingredient: dicamba) + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha

The efficacy of the tankmix of Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was reported in 61 trials conducted over 2 years in Ontario and Quebec under conventional tillage practices.

Velvetleaf (*Abutilon theophrasti*)
The mean control of velvetleaf with the tankmix of Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 99% (*n* = 5) at 14–40 DAT and 96% (*n* = 6) at 41 or more DAT. The data provided indicate that the level of velvetleaf control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of velvetleaf control when treated with the subject tankmix.

Quackgrass (*Agropyron repens*)
The mean control of quackgrass with the tankmix of Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 92% (*n* = 14) at 14–40 DAT and 94% (*n* = 11) at 41 or more DAT. The data provided indicate that the level of quackgrass control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of quackgrass control when treated with the subject tankmix.

Redroot pigweed (*Amaranthus retroflexus*)
The mean control of redroot pigweed with the tankmix of Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 99% (*n* = 30) at 14–40 DAT and 99% (*n* = 33) at 41 or more DAT. The data provided indicate that the level of redroot pigweed control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of redroot pigweed control when treated with the subject tankmix.

Common ragweed (*Ambrosia artemisiifolia*)
The mean control of common ragweed with the tankmix of Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 98% (*n* = 31) at 14–40 DAT and 98% (*n* = 30) at 41 or more DAT. The data provided indicate that the level of common ragweed control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha +

Peak at 10 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of common ragweed control when treated with the subject tankmix.

Lambsquarters (*Chenopodium album*)
The mean control of lambsquarters with the tankmix of Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 97% (*n* = 44) at 14–40 DAT and 98% (*n* = 42) at 41 or more DAT. The data provided indicate that the level of lambsquarters control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of lambsquarters control when treated with the subject tankmix.

Large crabgrass (*Digitaria sanguinalis*)
The mean control of large crabgrass with the tankmix of Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 93% (*n* = 19) at 14–40 DAT and 87% (*n* = 21) at 41 or more DAT. The data provided indicate that the level of large crabgrass control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of large crabgrass control when treated with the subject tankmix.

Barnyard grass (*Echinochloa crusgalli*)
The mean control of barnyard grass with the tankmix of Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 96% (*n* = 12) at 14–40 DAT and 92% (*n* = 9) at 41 or more DAT. The data provided indicate that the level of barnyard grass control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of barnyard grass control when treated with the subject tankmix.

Wormseed mustard (*Erysimum cheiranthoides*)
Data were not provided.

Alfalfa (*Medicago sativa*)
The mean control of alfalfa with the tankmix of Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 95% (*n* = 6) at 14–40 DAT and 99% (*n* = 6) at 41 or more DAT. The data provided indicate that the level of alfalfa control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer

(28% UAN) at 2.5 L/ha. The data provided support the claim of alfalfa control when treated with the subject tankmix.

Witchgrass (*Panicum capillare*)
The mean control of witchgrass with the tankmix of Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 99% (*n* = 4) at 14–40 DAT and 96% (*n* = 7) at 41 or more DAT. The data provided indicate that the level of witchgrass control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of witchgrass control when treated with the subject tankmix.

Fall panicum (*Panicum dichotomiflorum*)
The mean control of fall panicum with the tankmix of Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 97% (*n* = 9) at 14–40 DAT and 93% (*n* = 10) at 41 or more DAT. The data provided indicate that the level of fall panicum control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of fall panicum control when treated with the subject tankmix.

Proso millet (*Panicum miliaceum*): The mean control of proso millet with the tankmix of Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 95% (*n* = 14) at 14–40 DAT and 97% (*n* = 13) at 41 or more DAT. The data provided indicate that the level of proso millet control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of proso millet control when treated with the subject tankmix.

Yellow foxtail (*Setaria glauca*)
The mean control of yellow foxtail with the tankmix of Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 95% (*n* = 13) at 14–40 DAT and 88% (*n* = 20) at 41 or more DAT. The data provided indicate that the level of yellow foxtail control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of yellow foxtail control when treated with the subject tankmix.

Green foxtail (*Setaria viridis*)
The mean control of green foxtail with the tankmix of Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid

Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 95% (*n* = 29) at 14–40 DAT and 95% (*n* = 31) at 41 or more DAT. The data provided indicate that the level of green foxtail control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of green foxtail control when treated with the subject tankmix.

Bristly foxtail (*Setaria verticillata*)
Data were not provided.

Wild mustard (*Sinapis arvensis*)
The mean control of wild mustard with the tankmix of Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 99% (*n* = 1) at 14–40 DAT and 100% (*n* = 1) at 41 or more DAT. The data provided indicate that the level of wild mustard control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of wild mustard control when treated with the subject tankmix.

Eastern black nightshade (*Solanum ptycanthum*)
The mean control of eastern black nightshade with the tankmix of Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 99% (*n* = 11) at 14–40 DAT and 98% (*n* = 15) at 41 or more DAT. The data provided indicate that the level of eastern black nightshade control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of eastern black nightshade control when treated with the subject tankmix.

Common chickweed (*Stellaria media*)
The mean control of common chickweed with the tankmix of Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 99% (*n* = 6) at 14–40 DAT and 98% (*n* = 6) at 41 or more DAT. The data provided indicate that the level of control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of common chickweed control when treated with the subject tankmix.

Red clover (*Trifolium pratense*)
The mean control of red clover with the tankmix of Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 98% (*n* = 3) at 14–40 DAT and 100% (*n* = 5) at 41 or more DAT. The data provided indicate that the level of red clover control is

acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of red clover control when treated with the subject tankmix.

7.2.4 Option 35 DF + Banvel II (active ingredient: dicamba) + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha

The efficacy of the tankmix of Option 35 DF at 35 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was reported in 25 trials conducted over 2 years in Ontario and Quebec under conventional tillage practices.

Velvetleaf (*Abutilon theophrasti*)
The mean control of velvetleaf with the tankmix of Option 35 DF at 35 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 98% (n = 2) at 14–40 DAT and 99% (n = 2) at 41 or more DAT. The data provided indicate that the level of velvetleaf control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of velvetleaf control when treated with the subject tankmix.

Quackgrass (*Agropyron repens*)
The mean control of quackgrass with the tankmix of Option 35 DF at 35 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 80% (n = 2) at 14–40 DAT and 80% (n = 2) at 41 or more DAT. The data provided indicate that the level of quackgrass control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of quackgrass control when treated with the subject tankmix.

Redroot pigweed (*Amaranthus retroflexus*)
The mean control of redroot pigweed with the tankmix of Option 35 DF at 35 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 99% (n = 10) at 14–40 DAT and 99% (n = 10) at 41 or more DAT. The data provided indicate that the level of redroot pigweed control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of redroot pigweed control when treated with the subject tankmix.

Common ragweed (*Ambrosia artemisiifolia*)
The mean control of common ragweed with the tankmix of Option 35 DF at 35 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer

(28% UAN) at 2.5 L/ha was 92% (*n* = 13) at 14–40 DAT and 93% (*n* = 11) at 41 or more DAT. The data provided indicate that the level of common ragweed control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of common ragweed control when treated with the subject tankmix.

Lambsquarters (*Chenopodium album*)
The mean control of lambsquarters with the tankmix of Option 35 DF at 35 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 97% (*n* = 23) at 14–40 DAT and 97% (*n* = 22) at 41 or more DAT. The data provided indicate that the level of lambsquarters control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of lambsquarters control when treated with the subject tankmix.

Large crabgrass (*Digitaria sanguinalis*)
The mean control of large crabgrass with the tankmix of Option 35 DF at 35 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 86% (*n* = 3) at 14–40 DAT and 80% (*n* = 4) at 41 or more DAT. The data provided indicate that the level of large crabgrass control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of large crabgrass control when treated with the subject tankmix.

Barnyard grass (*Echinochloa crusgalli*)
The mean control of barnyard grass with the tankmix of Option 35 DF at 35 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 98% (*n* = 7) at 14–40 DAT and 84% (*n* = 5) at 41 or more DAT. The data provided indicate that the level of barnyard grass control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of barnyard grass control when treated with the subject tankmix.

Wormseed mustard (*Erysimum cheiranthoides*)
Data were not provided.

Alfalfa (*Medicago sativa*)
Data were not provided.

Witchgrass (*Panicum capillare*)
The mean control of witchgrass with the tankmix of Option 35 DF at 35 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 96% (*n* = 1) at 14–40 DAT and 89% (*n* = 1) at 41 or more DAT. The data provided indicate that the level of witchgrass control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of witchgrass control when treated with the subject tankmix.

Fall panicum (*Panicum dichotomiflorum*)
The mean control of fall panicum with the tankmix of Option 35 DF at 35 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 99% (*n* = 1) at 14–40 DAT and 100% (*n* = 1) at 41 or more DAT. The data provided indicate that the level of fall panicum control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of fall panicum control when treated with the subject tankmix.

Proso millet (*Panicum miliaceum*)
The mean control of proso millet with the tankmix of Option 35 DF at 35 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 96% (*n* = 2) at 14–40 DAT and 95% (*n* = 2) at 41 or more DAT. The data provided indicate that the level of proso millet control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of proso millet control when treated with the subject tankmix.

Yellow foxtail (*Setaria glauca*)
The mean control of yellow foxtail with the tankmix of Option 35 DF at 35 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 88% (*n* = 6) at 14–40 DAT and 86% (*n* = 10) at 41 or more DAT. The data provided indicate that the level of yellow foxtail control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of yellow foxtail control when treated with the subject tankmix.

Green foxtail (*Setaria viridis*)
The mean control of green foxtail with the tankmix of Option 35 DF at 35 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 92% (*n* = 10) at 14–40 DAT and 93% (*n* = 9) at 41 or more DAT. The data provided indicate that the level of green foxtail control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Banvel at 144 g a.i./ha +

Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of green foxtail control when treated with the subject tankmix.

Bristly foxtail (*Setaria verticillata*)
Data were not provided.

Wild mustard (*Sinapis arvensis*)
The mean control of wild mustard with the tankmix of Option 35 DF at 35 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 92% (n = 3) at 14–40 DAT and 98% (n = 3) at 41 or more DAT. The data provided indicate that the level of wild mustard control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of wild mustard control when treated with the subject tankmix.

Eastern black nightshade (*Solanum ptycanthum*)
The mean control of eastern black nightshade with the tankmix of Option 35 DF at 35 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 99% (n = 2) at 14–40 DAT and 100% (n = 4) at 41 or more DAT. The data provided indicate that the level of eastern black nightshade control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of eastern black nightshade control when treated with the subject tankmix.

Common chickweed (*Stellaria media*)
The mean control of common chickweed with the tankmix of Option 35 DF at 35 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 92% (n = 2) at 14–40 DAT and 85% (n = 2) at 41 or more DAT. The data provided indicate that the level of common chickweed control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of common chickweed control when treated with the subject tankmix.

Red clover (*Trifolium pratense*)
The mean control of red clover with the tankmix of Option 35 DF at 35 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 100% (n = 1) at 41 or more DAT. The data provided indicate that the level of red clover control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of red clover control when treated with the subject tankmix.

7.2.5 Option 35 DF + Marksman (active ingredient: atrazine + dicamba) + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha

The efficacy of the tankmix of Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was reported in 30 trials conducted over 2 years in Ontario and Quebec under conventional tillage practices.

Velvetleaf (*Abutilon theophrasti*)
The mean control of velvetleaf with the tankmix of Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 97% (*n* = 3) at 14–40 DAT and 99% (*n* = 3) at 41 or more DAT. The data provided indicate that the level of velvetleaf control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of velvetleaf control when treated with the subject tankmix.

Quackgrass (*Agropyron repens*)
The mean control of quackgrass with the tankmix of Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 89% (*n* = 7) at 14–40 DAT and 93% (*n* = 7) at 41 or more DAT. The data provided indicate that the level of quackgrass control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of quackgrass control when treated with the subject tankmix.

Redroot pigweed (*Amaranthus retroflexus*)
The mean control of redroot pigweed with the tankmix of Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 99% (*n* = 17) at 14–40 DAT and 99% (*n* = 19) at 41 or more DAT. The data provided indicate that the level of redroot pigweed control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of redroot pigweed control when treated with the subject tankmix.

Common ragweed (*Ambrosia artemisiifolia*)
The mean control of common ragweed with the tankmix of Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 98% (*n* = 19) at 14–40 DAT and 98% (*n* = 17) at 41 or more DAT. The data provided indicate that the level of common ragweed control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28%

UAN) at 2.5 L/ha. The data provided support the claim of common ragweed control when treated with the subject tankmix.

Lambsquarters (*Chenopodium album*)
The mean control of lambsquarters with the tankmix of Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 99% (*n* = 28) at 14–40 DAT and 98% (*n* = 26) at 41 or more DAT. The data provided indicate that the level of lambsquarters control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of lambsquarters control when treated with the subject tankmix.

Large crabgrass (*Digitaria sanguinalis*)
The mean control of large crabgrass with the tankmix of Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 92% (*n* = 9) at 14–40 DAT and 91% (*n* = 10) at 41 or more DAT. The data provided indicate that the level of large crabgrass control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of large crabgrass control when treated with the subject tankmix.

Barnyard grass (*Echinochloa crusgalli*)
The mean control of barnyard grass with the tankmix of Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 91% (*n* = 9) at 14–40 DAT and 96% (*n* = 7) at 41 or more DAT. The data provided indicate that the level of barnyard grass control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of barnyard grass control when treated with the subject tankmix.

Wormseed mustard (*Erysimum cheiranthoides*)
The mean control of wormseed mustard with the tankmix of Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 99% (*n* = 1) at 14–40 DAT and 99% (*n* = 1) at 41 or more DAT. The data provided indicate that the level of wormseed mustard control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of wormseed mustard control when treated with the subject tankmix.

Alfalfa (*Medicago sativa*)
Data were not provided.

Witchgrass (*Panicum capillare*)
The mean control of witchgrass with the tankmix of Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 98% (n = 2) at 14–40 DAT and 98% (n = 2) at 41 or more DAT. The data provided indicate that the level of witchgrass control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of witchgrass control when treated with the subject tankmix.

Fall panicum (*Panicum dichotomiflorum*)
The mean control of fall panicum with the tankmix of Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 98% (n = 2) at 14–40 DAT and 96% (n = 2) at 41 or more DAT. The data provided indicate that the level of fall panicum control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of fall panicum control when treated with the subject tankmix.

Proso millet (*Panicum miliaceum*)
The mean control of proso millet with the tankmix of Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 94% (n = 5) at 14–40 DAT and 97% (n = 5) at 41 or more DAT. The data provided indicate that the level of proso millet control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of proso millet control when treated with the subject tankmix.

Yellow foxtail (*Setaria glauca*)
The mean control of yellow foxtail with the tankmix of Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 85% (n = 6) at 14–40 DAT and 88% (n = 9) at 41 or more DAT. The data provided indicate that the level of yellow foxtail control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of yellow foxtail control when treated with the subject tankmix.

Green foxtail (*Setaria viridis*)
The mean control of green foxtail with the tankmix of Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 94% (n = 15) at 14–40 DAT and 94% (n = 15) at 41 or more DAT. The data provided indicate that the level of green foxtail control is

acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of green foxtail control when treated with the subject tankmix.

Bristly foxtail (*Setaria verticillata*)
Data were not provided.

Wild mustard (*Sinapis arvensis*)
The mean control of wild mustard with the tankmix of Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 99% (n = 2) at 14–40 DAT and 99% (n = 2) at 41 or more DAT. The data provided indicate that the level of wild mustard control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of wild mustard control when treated with the subject tankmix.

Eastern black nightshade (*Solanum ptycanthum*)
The mean control of eastern black nightshade with the tankmix of Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 99% (n = 5) at 14–40 DAT and 99% (n = 6) at 41 or more DAT. The data provided indicate that the level of eastern black nightshade control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of eastern black nightshade control when treated with the subject tankmix.

Common chickweed (*Stellaria media*)
The mean control of common chickweed with the tankmix of Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 98% (n = 3) at 14–40 DAT and 98% (n = 3) at 41 or more DAT. The data provided indicate that the level of common chickweed control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of common chickweed control when treated with the subject tankmix.

Red clover (*Trifolium pratense*)
The mean control of red clover with the tankmix of Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 100% (n = 1) at 14–40 DAT and 100% (n = 2) at 41 or more DAT. The data provided indicate that the level of red clover control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28%

UAN) at 2.5 L/ha. The data provided support the claim of red clover control when treated with the subject tankmix.

7.2.6 Option 35 DF + Aatrex Nine-0 (active ingredient: atrazine) + Hasten spray adjuvant at 1.0% v/v+ Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha

The efficacy of the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex Nine-0 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was reported in 14 trials conducted over 2 years in Ontario and Quebec under conventional tillage practices.

Velvetleaf (*Abutilon theophrasti*)
The mean control of velvetleaf with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex Nine-0 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 94% (*n* = 2) at 14–40 DAT and 99% (*n* = 2) at 41 or more DAT. The data provided indicate that the level of velvetleaf control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex Nine-0 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of velvetleaf control when treated with the subject tankmix.

Quackgrass (*Agropyron repens*)
The mean control of quackgrass with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex Nine-0 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 90% (*n* = 8) at 14–40 DAT and 96% (*n* = 6) at 41 or more DAT. The data provided indicate that the level of quackgrass control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex Nine-0 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of quackgrass control when treated with the subject tankmix.

Redroot pigweed (*Amaranthus retroflexus*)
The mean control of redroot pigweed with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex Nine-0 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 99% (*n* = 9) at 14–40 DAT and 99% (*n* = 9) at 41 or more DAT. The data provided indicate that the level of redroot pigweed control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex Nine-0 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of redroot pigweed control when treated with the subject tankmix.

Common ragweed (*Ambrosia artemisiifolia*)
The mean control of common ragweed with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex Nine-0 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 96% (*n* = 8) at 14–40 DAT and 99% (*n* = 8) at 41

or more DAT. The data provided indicate that the level of common ragweed control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex Nine-0 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of common ragweed control when treated with the subject tankmix.

Lambsquarters (*Chenopodium album*)
The mean control of lambsquarters with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex Nine-0 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 97% (n = 13) at 14–40 DAT and 98% (n = 13) at 41 or more DAT. The data provided indicate that the level of lambsquarters control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex Nine-0 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of lambsquarters control when treated with the subject tankmix.

Large crabgrass (*Digitaria sanguinalis*)
The mean control of large crabgrass with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex Nine-0 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 95% (n = 5) at 14–40 DAT and 90% (n = 6) at 41 or more DAT. The data provided indicate that the level of large crabgrass control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex Nine-0 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of large crabgrass control when treated with the subject tankmix.

Barnyard grass (*Echinochloa crusgalli*)
The mean control of barnyard grass with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex Nine-0 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 94% (n = 2) at 14–40 DAT and 98% (n = 2) at 41 or more DAT. The data provided indicate that the level of barnyard grass control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex Nine-0 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of barnyard grass control when treated with the subject tankmix.

Wormseed mustard (*Erysimum cheiranthoides*)
Data were not provided.

Alfalfa (*Medicago sativa*)
The mean control of alfalfa with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex Nine-0 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 90% (n = 4) at 14–40 DAT and 98% (n = 4) at 41 or more DAT. The data provided indicate that the level of alfalfa control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex Nine-0 at 840 g a.i./ha +

Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of alfalfa control when treated with the subject tankmix.

Witchgrass (*Panicum capillare*)
The mean control of witchgrass with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex Nine-0 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 98% (*n* = 1) at 41 or more DAT. The data provided indicate that the level of witchgrass control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex Nine-0 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of witchgrass control when treated with the subject tankmix.

Fall panicum (*Panicum dichotomiflorum*)
The mean control of fall panicum with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex Nine-0 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 97% (*n* = 2) at 14–40 DAT and 90% (*n* = 2) at 41 or more DAT. The data provided indicate that the level of fall panicum control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex Nine-0 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of fall panicum control when treated with the subject tankmix.

Proso millet (*Panicum miliaceum*)
The mean control of proso millet with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex Nine-0 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 97% (*n* = 5) at 14–40 DAT and 97% (*n* = 5) at 41 or more DAT. The data provided indicate that the level of proso millet control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex Nine-0 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of proso millet control when treated with the subject tankmix.

Yellow foxtail (*Setaria glauca*)
The mean control of yellow foxtail with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex Nine-0 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 93% (*n* = 4) at 14–40 DAT and 94% (*n* = 4) at 41 or more DAT. The data provided indicate that the level of yellow foxtail control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex Nine-0 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of yellow foxtail control when treated with the subject tankmix.

Green foxtail (*Setaria viridis*)
The mean control of green foxtail with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex Nine-0 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 94% (n = 9) at 14–40 DAT and 94% (n = 11) at 41 or more DAT. The data provided indicate that the level of green foxtail control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex Nine-0 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of green foxtail control when treated with the subject tankmix.

Bristly foxtail (*Setaria verticillata*)
Data were not provided.

Wild mustard (*Sinapis arvensis*)
The mean control of wild mustard with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex Nine-0 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 99% (n = 1) at 14–40 DAT and 99% (n = 1) at 41 or more DAT. The data provided indicate that the level of wild mustard control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex Nine-0 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of wild mustard control when treated with the subject tankmix.

Eastern black nightshade (*Solanum ptycanthum*)
The mean control of eastern black nightshade with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex Nine-0 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 99% (n = 1) at 14–40 DAT and 99% (n = 2) at 41 or more DAT. The data provided indicate that the level of eastern black nightshade control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex Nine-0 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of eastern black nightshade control when treated with the subject tankmix.

Common chickweed (*Stellaria media*)
The mean control of common chickweed with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex Nine-0 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 94% (n = 1) at 41 or more DAT. The data provided indicate that the level of common chickweed control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex Nine-0 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of common chickweed control when treated with the subject tankmix.

Red clover (*Trifolium pratense*)
The mean control of red clover with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex Nine-0 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 99% (*n* = 2) at 14–40 DAT and 100% (*n* = 3) at 41 or more DAT. The data provided indicate that the level of red clover control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex Nine-0 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of red clover control when treated with the subject tankmix.

7.2.7 Option 35 DF + Aatrex 480 (active ingredient: atrazine) + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha

The efficacy of the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was reported in 22 trials conducted over 2 years in Ontario and Quebec under conventional tillage practices.

Velvetleaf (*Abutilon theophrasti*)
The mean control of velvetleaf with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 90% (*n* = 4) at 14–40 DAT and 98% (*n* = 4) at 41 or more DAT. The data provided indicate that the level of velvetleaf control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of velvetleaf control when treated with the subject tankmix.

Quackgrass (*Agropyron repens*)
The mean control of quackgrass with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 94% (*n* = 4) at 14–40 DAT and 95% (*n* = 4) at 41 or more DAT. The data provided indicate that the level of quackgrass control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of quackgrass control when treated with the subject tankmix.

Redroot pigweed (*Amaranthus retroflexus*)
The mean control of redroot pigweed with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 98% (*n* = 15) at 14–40 DAT and 98% (*n* = 15) at 41 or more DAT. The data provided indicate that the level of redroot pigweed control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28%

UAN) at 2.5 L/ha. The data provided support the claim of redroot pigweed control when treated with the subject tankmix.

Common ragweed (*Ambrosia artemisiifolia*)
The mean control of common ragweed with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 96% (n = 11) at 14–40 DAT and 98% (n = 12) at 41 or more DAT. The data provided indicate that the level of common ragweed control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of common ragweed control when treated with the subject tankmix.

Lambsquarters (*Chenopodium album*)
The mean control of lambsquarters with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 96% (n = 21) at 14–40 DAT and 98% (n = 21) at 41 or more DAT. The data provided indicate that the level of lambsquarters control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of lambsquarters control when treated with the subject tankmix.

Large crabgrass (*Digitaria sanguinalis*)
The mean control of large crabgrass with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 92% (n = 10) at 14–40 DAT and 92% (n = 11) at 41 or more DAT. The data provided indicate that the level of large crabgrass control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of large crabgrass control when treated with the subject tankmix.

Barnyard grass (*Echinochloa crusgalli*)
The mean control of barnyard grass with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 97% (n = 2) at 14–40 DAT and 95% (n = 1) at 41 or more DAT. The data provided indicate that the level of barnyard grass control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of barnyard grass control when treated with the subject tankmix.

Wormseed mustard (*Erysimum cheiranthoides*)
The mean control of wormseed mustard with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 99% (*n* = 1) at 14–40 DAT and 99% (*n* = 1) at 41 or more DAT. The data provided indicate that the level of wormseed mustard control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of wormseed mustard control when treated with the subject tankmix.

Alfalfa (*Medicago sativa*)
The mean control of alfalfa with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 78% (*n* = 2) at 14–40 DAT and 98% (*n* = 2) at 41 or more DAT. The data provided indicate that the level of alfalfa control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of alfalfa control when treated with the subject tankmix.

Witchgrass (*Panicum capillare*)
The mean control of witchgrass with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 96% (*n* = 1) at 14–40 DAT and 98% (*n* = 2) at 41 or more DAT. The data provided indicate that the level of witchgrass control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of witchgrass control when treated with the subject tankmix.

Fall panicum (*Panicum dichotomiflorum*)
The mean control of fall panicum with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 94% (*n* = 2) at 14–40 DAT and 96% (*n* = 3) at 41 or more DAT. The data provided indicate that the level of fall panicum control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of fall panicum control when treated with the subject tankmix.

Proso millet (*Panicum miliaceum*)
The mean control of proso millet with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 94% (*n* = 8) at 14–40 DAT and 98% (*n* = 8) at 41 or more DAT. The data provided indicate that the level of proso millet control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex 480 at

840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of proso millet control when treated with the subject tankmix.

Yellow foxtail (*Setaria glauca*)
The mean control of yellow foxtail with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 87% (*n* = 6) at 14–40 DAT and 93% (*n* = 7) at 41 or more DAT. The data provided indicate that the level of yellow foxtail control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of yellow foxtail control when treated with the subject tankmix.

Green foxtail (*Setaria viridis*)
The mean control of green foxtail with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 92% (*n* = 13) at 14–40 DAT and 95% (*n* = 14) at 41 or more DAT. The data provided indicate that the level of green foxtail control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of green foxtail control when treated with the subject tankmix.

Bristly foxtail (*Setaria verticillata*)
Data were not provided.

Wild mustard (*Sinapis arvensis*)
The mean control of wild mustard with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 99% (*n* = 1) at 14–40 DAT and 99% (*n* = 1) at 41 or more DAT. The data provided indicate that the level of wild mustard control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of wild mustard control when treated with the subject tankmix.

Eastern black nightshade (*Solanum ptycanthum*)
The mean control of eastern black nightshade with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 99% (*n* = 4) at 14–40 DAT and 99% (*n* = 5) at 41 or more DAT. The data provided indicate that the level of eastern black nightshade control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid

Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of eastern black nightshade control when treated with the subject tankmix.

Common chickweed (*Stellaria media*)
The mean control of common chickweed with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 98% (n = 2) at 14–40 DAT and 98% (n = 2) at 41 or more DAT. The data provided indicate that the level of common chickweed control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of common chickweed control when treated with the subject tankmix.

Red clover (*Trifolium pratense*)
The mean control of red clover with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 99% (n = 1) at 14–40 DAT and 98% (n = 2) at 41 or more DAT. The data provided indicate that the level of red clover control is acceptable when treated with the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of red clover control when treated with the subject tankmix.

7.2.8 Option 2.25 SC +Aatrex 480 (active ingredient: atrazine) + Liquid Nitrogen Fertilizer (28% UAN) at 2.25 L/ha

A limited quantity of data was provided to support tankmix options with Option 2.25 SC. The rationale for the use of the limited data package to support the tankmix options with Option 2.25 SC is based on the fact that Option 2.25 SC has been established to be agronomically equivalent to Option 35 DF when applied alone. The data package provided to support the tankmix option with Option 35 DF was adequate. Therefore, limited bridging data indicating no reduction in the level of weed control when Option 2.25 SC is applied in a tankmix with the same herbicide tankmix options as listed on the Option 35 DF label will be sufficient to support tankmix options on the Option 2.25 SC label.

A total of 5 trials conducted in 1 year compared the level of weed control for Option 2.25 SC + Liquid Nitrogen Fertilizer and Option 2.25 SC + Aatrex 480 + Liquid Nitrogen Fertilizer.

Redroot pigweed (*Amaranthus retroflexus*)
The mean control of redroot pigweed with Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 96% (n = 3) at 14–40 DAT and 95% (n = 2) at 41 or more DAT. The mean control of redroot pigweed with the tankmix of Option 2.25 SC at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Liquid Nitrogen Fertilizer (28%

UAN) at 2.5 L/ha was 96% (*n* = 3) at 14–40 DAT and 99% (*n* = 2) at 41 or more DAT. The data provided indicate that the level of redroot pigweed control is acceptable when treated with the tankmix of Option 2.25 SC at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of redroot pigweed control when treated with the subject tankmix.

Common ragweed (*Ambrosia artemisiifolia*)
The mean control of common ragweed with Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 69% (*n* = 3) at 14–40 DAT and 64% (*n* = 4) at 41 or more DAT. The mean control of common ragweed with the tankmix of Option 2.25 SC at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 95% (*n* = 3) at 14–40 DAT and 96% (*n* = 4) at 41 or more DAT. The data provided indicate that the level of common ragweed control is acceptable when treated with the tankmix of Option 2.25 SC at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of common ragweed control when treated with the subject tankmix.

Lambsquarters (*Chenopodium album*)
The mean control of lambsquarters with Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 82% (*n* = 5) at 14–40 DAT and 80% (*n* = 5) at 41 or more DAT. The mean control of lambsquarters with the tankmix of Option 2.25 SC at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 99% (*n* = 5) at 14–40 DAT and 99% (*n* = 5) at 41 or more DAT. The data provided indicate that the level of lambsquarters control is acceptable when treated with the tankmix of Option 2.25 SC at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of lambsquarters control when treated with the subject tankmix.

Large crabgrass (*Digitaria sanguinalis*)
The mean control of large crabgrass with Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 76% (*n* = 2) at 14–40 DAT and 79% (*n* = 3) at 41 or more DAT. The mean control of large crabgrass with the tankmix of Option 2.25 SC at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 85% (*n* = 2) at 14–40 DAT and 83% (*n* = 3) at 41 or more DAT. The data provided indicate that the level of large crabgrass control is acceptable when treated with the tankmix of Option 2.25 SC at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of large crabgrass control when treated with the subject tankmix.

Witchgrass (*Panicum capillare*): The mean control of witchgrass with Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 99% (*n* = 1) at 14–40 DAT and 97% (*n* = 1) at 41 or more DAT. The mean control of witchgrass with the tankmix of Option 2.25 SC at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 90% (*n* = 1) at 14–40 DAT and 93% (*n* = 1) at 41 or more DAT. The data provided indicate that the level of witchgrass control is acceptable when treated with the tankmix of Option 2.25 SC at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of witchgrass control when treated with the subject tankmix.

Yellow foxtail (*Setaria glauca*)
The mean control of yellow foxtail with Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 48% (n = 1) at 14–40 DAT and 57% (n = 1) at 41 or more DAT. The mean control of yellow foxtail with the tankmix of Option 2.25 SC at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 85% (n = 1) at 14–40 DAT and 95% (n = 1) at 41 or more DAT. The data provided indicate that the level of yellow foxtail control is acceptable when treated with the tankmix of Option 2.25 SC at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of yellow foxtail control when treated with the subject tankmix.

Green foxtail (*Setaria viridis*)
The mean control of green foxtail with Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 99% (n = 1) at 14–40 DAT and 99% (n = 1) at 41 or more DAT. The mean control of green foxtail with the tankmix of Option 2.25 SC at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 88% (n = 1) at 14–40 DAT and 96% (n = 1) at 41 or more DAT. The data provided indicate that the level of green foxtail control is acceptable when treated with the tankmix of Option 2.25 SC at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of green foxtail control when treated with the subject tankmix.

Eastern black nightshade (*Solanum ptycanthum*)
The mean control of eastern black nightshade with Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 98% (n = 1) at 14–40 DAT and 98% (n = 1) at 41 or more DAT. The mean control of eastern black nightshade with the tankmix of Option 2.25 SC at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 98% (n = 1) at 14–40 DAT and 99% (n = 1) at 41 or more DAT. The data provided indicate that the level of eastern black nightshade control is acceptable when treated with the tankmix of Option 2.25 SC at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of eastern black nightshade control when treated with the subject tankmix.

Common chickweed (*Stellaria media*)
The mean control of common chickweed with Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 92% (n = 1) at 14–40 DAT and 98% (n = 1) at 41 or more DAT. The mean control of common chickweed with the tankmix of Option 2.25 SC at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 98% (n = 1) at 14–40 DAT and 99% (n = 1) at 41 or more DAT. The data provided indicate that the level of common chickweed control is

acceptable when treated with the tankmix of Option 2.25 SC at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of common chickweed control when treated with the subject tankmix.

7.2.9 Option 2.25 SC + Banvel II (active ingredient: dicamba) + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha

A limited quantity of data was provided to support tankmix options with Option 2.25 SC. The rationale for the use of the limited data package to support the tankmix options with Option 2.25 SC is based on the fact that Option 2.25 SC has been established to be agronomically equivalent to Option 35 DF when applied alone. The data package provided to support the tankmix option with Option 35 DF was adequate. Therefore, limited bridging data indicating no reduction in the level of weed control when Option 2.25 SC is applied in a tankmix with the same herbicide tankmix options as listed on the Option 35 DF label will be sufficient to support tankmix options on the Option 2.25 SC label.

A total of 5 trials conducted in 1 year compared the level of weed control for Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer at 2.25 L/ha and Option 2.25 SC + Banvel II + Liquid Nitrogen Fertilizer.

Redroot pigweed (*Amaranthus retroflexus*)
The mean control of redroot pigweed with Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 96% (n = 3) at 14–40 DAT and 95% (n = 2) at 41 or more DAT. The mean control of redroot pigweed with the tankmix of Option 2.25 SC at 35 g a.i./ha + Banvel II at 144 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 98% (n = 3) at 14–40 DAT and 96% (n = 2) at 41 or more DAT. The data provided indicate that the level of redroot pigweed control is acceptable when treated with the tankmix of Option 2.25 SC at 35 g a.i./ha + Banvel II at 144 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of redroot pigweed control when treated with the subject tankmix.

Common ragweed (*Ambrosia artemisiifolia*)
The mean control of common ragweed with Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 69% (n = 3) at 14–40 DAT and 64% (n = 4) at 41 or more DAT. The mean control of common ragweed with the tankmix of Option 2.25 SC at 35 g a.i./ha + Banvel II at 144 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 89% (n = 3) at 14–40 DAT and 94% (n = 4) at 41 or more DAT. The data provided indicate that the level of common ragweed control is acceptable when treated with the tankmix of Option 2.25 SC at 35 g a.i./ha + Banvel II at 144 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of common ragweed control when treated with the subject tankmix.

Lambsquarters (*Chenopodium album*)
The mean control of lambsquarters with Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 82% (*n* = 5) at 14–40 DAT and 80% (*n* = 5) at 41 or more DAT. The mean control of lambsquarters with the tankmix of Option 2.25 SC at 35 g a.i./ha + Banvel II at 144 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 97% (*n* = 5) at 14–40 DAT and 97% (*n* = 5) at 41 or more DAT. The data provided indicate that the level of lambsquarters control is acceptable when treated with the tankmix of Option 2.25 SC at 35 g a.i./ha + Banvel II at 144 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of lambsquarters control when treated with the subject tankmix.

Large crabgrass (*Digitaria sanguinalis*)
The mean control of large crabgrass with Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 76% (*n* = 2) at 14–40 DAT and 79% (*n* = 3) at 41 or more DAT. The mean control of large crabgrass with the tankmix of Option 2.25 SC at 35 g a.i./ha + Banvel II at 144 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 88% (*n* = 2) at 14–40 DAT and 89% (*n* = 3) at 41 or more DAT. The data provided indicate that the level of large crabgrass control is acceptable when treated with the tankmix of Option 2.25 SC at 35 g a.i./ha + Banvel II at 144 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of large crabgrass control when treated with the subject tankmix.

Witchgrass (*Panicum capillare*)
The mean control of witchgrass with Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 99% (*n* = 1) at 14–40 DAT and 97% (*n* = 1) at 41 or more DAT. The mean control of witchgrass with the tankmix of Option 2.25 SC at 35 g a.i./ha + Banvel II at 144 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 91% (*n* = 1) at 14–40 DAT and 88% (*n* = 1) at 41 or more DAT. The data provided indicate that the level of witchgrass control is acceptable when treated with the tankmix of Option 2.25 SC at 35 g a.i./ha + Banvel II at 144 at 840 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of witchgrass control when treated with the subject tankmix.

Green foxtail (*Setaria viridis*)
The mean control of green foxtail with Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 99% (*n* = 1) at 14–40 DAT and 99% (*n* = 1) at 41 or more DAT. The mean control of green foxtail with the tankmix of Option 2.25 SC at 35 g a.i./ha + Banvel II at 144 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 99% (*n* = 1) at 14–40 DAT and 98% (*n* = 1) at 41 or more DAT. The data provided indicate that the level of green foxtail control is acceptable when treated with the tankmix of Option 2.25 SC at 35 g a.i./ha + Banvel II at 144 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of green foxtail control when treated with the subject tankmix.

Eastern black nightshade (*Solanum ptycanthum*)
The mean control of eastern black nightshade with Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 98% (*n* = 1) at 14–40 DAT and 98% (*n* = 1) at 41 or more DAT. The mean control of eastern black nightshade with the tankmix of Option 2.25 SC at 35 g a.i./ha + Banvel II at 144 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 98% (*n* = 1) at 14–40 DAT and 97% (*n* = 1) at 41 or more DAT. The data provided indicate that the level of eastern black nightshade control is acceptable when treated with the tankmix of Option 2.25 SC at 35 g a.i./ha + Banvel II at 144 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of eastern black nightshade control when treated with the subject tankmix.

Common Chickweed (*Stellaria media*)
The mean control of common chickweed with Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 92% (*n* = 1) at 14–40 DAT and 98% (*n* = 1) at 41 or more DAT. The mean control of common chickweed with the tankmix of Option 2.25 SC at 35 g a.i./ha + Banvel II at 144 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 98% (*n* = 1) at 14–40 DAT and 98% (*n* = 1) at 41 or more DAT. The data provided indicate that the level of common chickweed control is acceptable when treated with the tankmix of Option 2.25 SC at 35 g a.i./ha + Banvel II at 144 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of common chickweed control when treated with the subject tankmix.

7.2.10 Option 2.25 SC + Marksman (active ingredient: atrazine + dicamba) + Liquid Nitrogen Fertilizer (28% UAN)

A limited quantity of data was provided to support tankmix options with Option 2.25 SC. The rationale for the use of the limited data package to support the tankmix options with Option 2.25 SC is based on the fact that Option 2.25 SC has been established to be agronomically equivalent to Option 35 DF when applied alone. The data package provided to support the tankmix option with Option 35 DF was adequate. Therefore, limited bridging data indicating no reduction in the level of weed control when Option 2.25 SC is applied in a tankmix with the same herbicide tankmix options as listed on the Option 35 DF label will be sufficient to support tankmix options on the Option 2.25 SC label.

A total of 5 trials conducted in 1 year compared the level of weed control for Option 2.25 SC + Liquid Nitrogen Fertilizer and Option 2.25 SC + Marksman + Liquid Nitrogen Fertilizer.

Redroot pigweed (*Amaranthus retroflexus*)
The mean control of redroot pigweed with Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 96% (*n* = 3) at 14–40 DAT and 95% (*n* = 2) at 41 or more DAT. The mean control of redroot pigweed with the tankmix of Option 2.25 SC at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Liquid Nitrogen Fertilizer (28%

UAN) at 2.5 L/ha was 99% (*n* = 3) at 14–40 DAT and 98% (*n* = 2) at 41 or more DAT. The data provided indicate that the level of redroot pigweed control is acceptable when treated with the tankmix of Option 2.25 SC at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of redroot pigweed control when treated with the subject tankmix.

Common ragweed (*Ambrosia artemisiifolia*)
The mean control of common ragweed with Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 69% (*n* = 3) at 14–40 DAT and 64% (*n* = 3) at 41 or more DAT. The mean control of common ragweed with the tankmix of Option 2.25 SC at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 97% (*n* = 3) at 14–40 DAT and 99% (*n* = 4) at 41 or more DAT. The data provided indicate that the level of common ragweed control is acceptable when treated with the tankmix of Option 2.25 SC at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of common ragweed control when treated with the subject tankmix.

Lambsquarters (*Chenopodium album*)
The mean control of lambsquarters with Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 82% (*n* = 5) at 14–40 DAT and 80% (*n* = 5) at 41 or more DAT. The mean control of lambsquarters with the tankmix of Option 2.25 SC at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 99% (*n* = 5) at 14–40 DAT and 99% (*n* = 5) at 41 or more DAT. The data provided indicate that the level of lambsquarters control is acceptable when treated with the tankmix of Option 2.25 SC at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of lambsquarters control when treated with the subject tankmix.

Large crabgrass (*Digitaria sanguinalis*)
The mean control of large crabgrass with Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 76% (*n* = 2) at 14–40 DAT and 79% (*n* = 3) at 41 or more DAT. The mean control of large crabgrass with the tankmix of Option 2.25 SC at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 86% (*n* = 2) at 14–40 DAT and 81% (*n* = 3) at 41 or more DAT. The data provided indicate that the level of large crabgrass control is acceptable when treated with the tankmix of Option 2.25 SC at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of large crabgrass control when treated with the subject tankmix.

Witchgrass (*Panicum capillare*)
The mean control of witchgrass with Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 99% (*n* = 1) at 14–40 DAT and 97% (*n* = 1) at 41 or more DAT. The mean control of witchgrass with the tankmix of Option 2.25 SC at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 93% (*n* = 1) at 14–40 DAT and 94% (*n* = 1) at 41 or more DAT. The data

provided indicate that the level of witchgrass control is acceptable when treated with the tankmix of Option 2.25 SC at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of witchgrass control when treated with the subject tankmix.

Green foxtail (*Setaria viridis*)
The mean control of green foxtail with Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 99% (*n* = 1) at 14–40 DAT and 99% (*n* = 1) at 41 or more DAT. The mean control of green foxtail with the tankmix of Option 2.25 SC at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 94% (*n* = 1) at 14–40 DAT and 96% (*n* = 1) at 41 or more DAT. The data provided indicate that the level of green foxtail control is acceptable when treated with the tankmix of Option 2.25 SC at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of green foxtail control when treated with the subject tankmix.

Eastern black nightshade (*Solanum ptycanthum*)
The mean control of eastern black nightshade with Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 98% (*n* = 1) at 14–40 DAT and 98% (*n* = 1) at 41 or more DAT. The mean control of eastern black nightshade with the tankmix of Option 2.25 SC at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 98% (*n* = 1) at 14–40 DAT and 99% (*n* = 1) at 41 or more DAT. The data provided indicate that the level of eastern black nightshade control is acceptable when treated with the tankmix of Option 2.25 SC at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of eastern black nightshade control when treated with the subject tankmix.

Common chickweed (*Stellaria media*)
The mean control of common chickweed with Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 92% (*n* = 1) at 14–40 DAT and 98% (*n* = 1) at 41 or more DAT. The mean control of common chickweed with the tankmix of Option 2.25 SC at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 98% (*n* = 1) at 14–40 DAT and 99% (*n* = 1) at 41 or more DAT. The data provided indicate that the level of common chickweed control is acceptable when treated with the tankmix of Option 2.25 SC at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of common chickweed control when treated with the subject tankmix.

7.2.11 Option 2.25 SC + Peak (active ingredient: prosulfuron) Banvel II (active ingredient: dicamba) + Liquid Nitrogen Fertilizer (28% UAN)

A limited quantity of data was provided to support tankmix options with Option 2.25 SC. The rationale for the use of the limited data package to support the tankmix options with Option 2.25 SC is based on the fact that Option 2.25 SC has been established to be agronomically equivalent to Option 35 DF when applied alone. The data package provided to support the tankmix option with Option 35 DF was adequate. Therefore, limited bridging data indicating no reduction in the level of weed control when Option 2.25 SC is applied in a tankmix with the same herbicide tankmix options as listed on the Option 35 DF label will be sufficient to support tankmix options on the Option 2.25 SC label.

A total of 5 trials conducted in 1 year compared the level of weed control for Option 2.25 SC + Liquid Nitrogen Fertilizer and Option 2.25 SC + Peak + Banvel II + Liquid Nitrogen Fertilizer.

Redroot pigweed (*Amaranthus retroflexus*)
The mean control of redroot pigweed with Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 96% (*n* = 3) at 14–40 DAT and 95% (*n* = 2) at 41 or more DAT. The mean control of redroot pigweed with the tankmix of Option 2.25 SC at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel II at 144 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 99% (*n* = 3) at 14–40 DAT and 99% (*n* = 2) at 41 or more DAT. The data provided indicate that the level of redroot pigweed control is acceptable when treated with the tankmix of Option 2.25 SC at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel II at 144 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of redroot pigweed control when treated with the subject tankmix.

Common ragweed (*Ambrosia artemisiifolia*)
The mean control of common ragweed with Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 69% (*n* = 3) at 14–40 DAT and 64% (*n* = 4) at 41 or more DAT. The mean control of common ragweed with the tankmix of Option 2.25 SC at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel II at 144 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 99% (*n* = 3) at 14–40 DAT and 99% (*n* = 4) at 41 or more DAT. The data provided indicate that the level of common ragweed control is acceptable when treated with the tankmix of Option 2.25 SC at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel II at 144 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of common ragweed control when treated with the subject tankmix.

Lambsquarters (*Chenopodium album*)
The mean control of lambsquarters with Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 82% (*n* = 5) at 14–40 DAT and 80% (*n* = 5) at 41 or more DAT. The mean control of lambsquarters with the tankmix of Option 2.25 SC at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel II at 144 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 98% (*n* = 5) at 14–40 DAT and 99% (*n* = 5) at 41 or more DAT. The data provided indicate that the level of lambsquarters control is acceptable when treated with the tankmix of Option 2.25 SC at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel II at 144 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha.

The data provided support the claim of lambsquarters control when treated with the subject tankmix.

Large crabgrass (*Digitaria sanguinalis*)
The mean control of large crabgrass with Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 76% (*n* = 3) at 14–40 DAT and 79% (*n* = 3) at 41 or more DAT. The mean control of large crabgrass with the tankmix of Option 2.25 SC at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel II at 144 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 95% (*n* = 2) at 14–40 DAT and 85% (*n* = 3) at 41 or more DAT. The data provided indicate that the level of large crabgrass control is acceptable when treated with the tankmix of Option 2.25 SC at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel II at 144 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of large crabgrass control when treated with the subject tankmix.

Witchgrass (*Panicum capillare*)
The mean control of witchgrass with Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 99% (*n* = 1) at 14–40 DAT and 97% (*n* = 1) at 41 or more DAT. The mean control of witchgrass with the tankmix of Option 2.25 SC at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel II at 144 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 82% (*n* = 1) at 14–40 DAT and 88% (*n* = 1) at 41 or more DAT. The data provided indicate that the level of witchgrass control is acceptable when treated with the tankmix of Option 2.25 SC at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel II at 144 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of witchgrass control when treated with the subject tankmix.

Green foxtail (*Setaria viridis*)
The mean control of green foxtail with Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 99% (*n* = 1) at 14–40 DAT and 99% (*n* = 1) at 41 or more DAT. The mean control of green foxtail with the tankmix of Option 2.25 SC at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel II at 144 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 99% (*n* = 1) at 14–40 DAT and 99% (*n* = 1) at 41 or more DAT. The data provided indicate that the level of green foxtail control is acceptable when treated with the tankmix of Option 2.25 SC at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel II at 144 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of green foxtail control when treated with the subject tankmix.

Eastern black nightshade (*Solanum ptycanthum*)
The mean control of eastern black nightshade with Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 98% (*n* = 1) at 14–40 DAT and 98% (*n* = 1) at 41 or more DAT. The mean control of eastern black nightshade with the tankmix of Option 2.25 SC at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel II at 144 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 98% (*n* = 1) at 14–40 DAT and 98% (*n* = 1) at 41 or more DAT. The data provided indicate that the level of eastern black nightshade control is acceptable when treated with the tankmix of Option 2.25 SC at 35 g

a.i./ha + Peak at 10 g a.i./ha + Banvel II at 144 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of eastern black nightshade control when treated with the subject tankmix.

Common chickweed (*Stellaria media*)
The mean control of common chickweed with Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 92% (n = 1) at 14–40 DAT and 98% (n = 1) at 41 or more DAT. The mean control of common chickweed with the tankmix of Option 2.25 SC at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel II at 144 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 98% (n = 1) at 14–40 DAT and 99% (n = 1) at 41 or more DAT. The data provided indicate that the level of common chickweed control is acceptable when treated with the tankmix of Option 2.25 SC at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel II at 144 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. The data provided support the claim of common chickweed control when treated with the subject tankmix.

7.3 Phytotoxicity to target plants (including different cultivars) or to target plant products

7.3.1 Option 35 DF + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN)

Option 35 DF is proposed for use as a post-emergence herbicide to control specific broadleaf and grass weeds in field corn up to the 8-leaf stage or 5–6 visible collars (the leaf is counted once the next leaf is visible in the whorl).

Weed-free trials

Visual crop tolerance
Twenty-nine (29) trials conducted over 3 years in Ontario and Quebec, utilizing 15 varieties under conventional tillage practices reported visual crop tolerance of field corn following application of the maximum requested rate of Option 35 DF at 35 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. Nine (9) trials conducted over 2 years utilizing 8 varieties reported field corn tolerance following application of 2× the maximum requested rate (70 g a.i./ha + 2.0% v/v + 5.0 L/ha) and 15 trials conducted in 1 year utilizing 5 varieties reported field corn tolerance following overlapping or sequential application of the maximum requested rate of Option 35 DF at 35 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha.

NOTE: **There may be more data points (n) reported than trials as one trial may have tested more than one variety and each variety is considered a data point.**

Mean reported visual crop tolerance, expressed as percentage of crop injury, for the maximum requested application rate of Option 35 DF at 35 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 11.0% (*n* = 29) at 14–40 DAT and 2.9% (*n* = 29) at 41 or more DAT.

Mean reported visual crop tolerance, expressed as percentage of crop injury, for 2× the maximum requested application rate of Option 35 DF at 70 g a.i./ha + Hasten spray adjuvant at 2.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 5.0 L/ha was 11.9% (*n* = 17) at 14–40 DAT and 3.5% (*n* = 17) at 41 or more DAT.

Mean reported visual crop tolerance, expressed as percentage of crop injury, for overlapping or sequential applications of the requested maximum application rate of Option 35 DF at 35 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 13.8% (*n* = 15) at 14–40 DAT and 4.7% (*n* = 15) at 41 or more DAT.

Crop yield
Twenty-nine (29) trials conducted over 2 years in Ontario and Quebec under conventional tillage practices reported field corn yield following application of the maximum requested rate of Option 35 DF at 35 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. Sixteen (16) trials reported field corn yield following application of 2× the maximum requested rate (70 g a.i./ha + 2.0% v/v + 5.0 L/ha) and 15 trials reported field corn yield following overlapping or sequential application of the maximum requested rate of Option 35 DF at 35 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha.

Mean reported crop yield, expressed as percentage of the untreated, weed-free check, for the maximum requested application rate of Option 35 DF at 35 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 98.3% (*n* = 28).

Mean reported crop yield, expressed as percentage of the untreated, weed-free check, for 2× the maximum requested application rate of Option 35 DF at 70 g a.i./ha + Hasten spray adjuvant at 2.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 5.0 L/ha was 94.4% (*n* = 16).

Mean reported crop yield, expressed as percentage of the untreated, weed-free check, for overlapping or sequential applications of the requested maximum application rate of Option 35 DF at 35 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 91.2% (*n* = 15)

Weedy trials

Visual crop tolerance
One hundred and twenty-three (123) trials conducted over 3 years in Ontario and Quebec, utilizing 26 varieties under conventional tillage practices reported visual crop tolerance of field corn following application of the maximum requested rate of Option 35 DF at 35 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha.

Mean reported tolerance, expressed as percentage of crop injury, for the maximum requested application rate of Option 35 DF at 35 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 5.2% (n = 120) at 14–40 DAT and 1.4% (n = 114) at 41 or more DAT.

Crop yield
Ninety-two (92) trials conducted over 2 years in Ontario and Quebec under conventional tillage practices reported field corn yield following application of the maximum requested rate of Option 35 DF at 35 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha.

Mean reported crop yield, expressed as percentage of the untreated check, for the maximum requested application rate of Option 35 DF at 35 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 184% (n = 92).

7.3.2 Option 2.25 SC + Liquid Nitrogen Fertilizer (28% UAN)

Option 2.25 SC is proposed to be used as a post-emergence herbicide to control specific broadleaf and grass weeds in field corn up to the 8-leaf stage or 5–6 visible collars (the leaf is counted once the next leaf is visible in the whorl).

Weed-free trials

Visual crop tolerance
Eleven (11) trials conducted over 2 years in Ontario, utilizing 8 varieties under conventional tillage practices reported visual crop tolerance of field corn following application of the maximum requested rate of Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. Eight (8) trials conducted over 2 years utilizing 7 varieties reported field corn tolerance following application of 2× the maximum requested rate (70 g a.i./ha + 2.0% v/v + 5.0 L/ha) and 6 trials conducted in 1 year utilizing 5 varieties reported field corn tolerance following overlapping or sequential application of the maximum requested rate of Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha.

NOTE: **There may be more data points (n) reported than trials as one trial may have tested more than one variety and each variety is considered a data point.**

Mean reported visual crop tolerance, expressed as percentage of crop injury, for the maximum requested application rate of Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 10.1% (n = 14) at 14–40 DAT and 1.7% (n = 14) at 41 or more DAT.

Mean reported visual crop tolerance, expressed as percentage of crop injury, for 2× the maximum requested application rate of Option 2.25 SC at 70 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 5.0 L/ha was 14.9% (n = 8) at 14–40 DAT and 5.6% (n = 8) at 41 or more DAT.

Mean reported visual crop tolerance, expressed as percentage of crop injury, for overlapping or sequential applications of the requested maximum application rate of Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 14.9% (n = 9) at 14–40 DAT and 3.8% (n = 9) at 41 or more DAT.

Crop yield

Thirteen (13) trials conducted over 2 years in Ontario under conventional tillage practices reported field corn yield following application of the maximum requested rate of Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. Eight (8) trials reported field corn yield following application of 2× the maximum requested rate (70 g a.i./ha + 2.0% v/v + 5.0 L/ha) and 8 trials reported field corn yield following overlapping or sequential application of the maximum requested rate of Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha.

Mean reported crop yield, expressed as percentage of the untreated, weed-free check, for the maximum requested application rate of Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 98.0% (n = 13).

Mean reported crop yield, expressed as percentage of the untreated, weed-free check, for 2× the maximum requested application rate of Option 2.25 SC at 70 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 5.0 L/ha was 83.9% (n = 8).

Mean reported crop yield, expressed as percentage of the untreated, weed-free check, for overlapping or sequential applications of the requested maximum application rate of Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 93.1% (n = 8)

Weedy trials

Visual crop tolerance
Forty-seven (47) trials conducted over 2 years utilizing 14 varieties in Ontario under conventional tillage practices reported visual crop tolerance of field corn following application of the maximum requested rate of Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha.

NOTE: There may be more data points (n) reported than trials as one trial may have tested more than one variety and each variety is considered a data point.

Mean reported tolerance, expressed as percentage of crop injury, for the maximum requested application rate of Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 4.8% (*n* = 55) at 14–40 DAT and 1.0% (*n* = 51) at 41 or more DAT.

Crop yield
Thirty-five (35) trials conducted over 2 years in Ontario under conventional tillage practices reported field corn yield following application of the maximum requested rate of Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha.

Mean reported crop yield, expressed as percent of untreated check, for the maximum requested application rate of Option 2.25 SC at 35 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 166% (*n* = 39).

7.3.3 Option 35 DF + Peak (active ingredient: Prosulfuron) + Banvel (active ingredient: dicamba) + Hasten spray adjuvant + Liquid Nitrogen Fertilizer (28% UAN)

Visual crop tolerance
Fifty-four (54) trials conducted over 2 years in Ontario and Quebec under conventional tillage practices reported visual crop tolerance of field corn following application of the tankmix of Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha.

Mean reported visual crop tolerance, expressed as percentage of crop injury, for the tankmix of Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 5.3% (*n* = 54) at 14–40 DAT and 1.3% (*n* = 52) at 41 or more DAT.

Crop yield
Forty-four (44) trials conducted over 2 years in Ontario and Quebec under conventional tillage practices reported field corn yield following application of the tankmix of Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha.

Mean reported crop yield, expressed as percent of untreated check, for the tankmix of Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha. was 179% (*n* = 44).

7.3.4 Option 35 DF + Banvel II (active ingredient: dicamba) + Hasten spray adjuvant + Liquid Nitrogen Fertilizer (28% UAN)

Visual crop tolerance
Twenty-three (23) trials conducted over 2 years in Ontario and Quebec under conventional tillage practices reported visual crop tolerance of field corn following application of the tankmix of Option 35 DF at 35 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha.

Mean reported visual crop tolerance, expressed as percentage of crop injury, for the tankmix of Option 35 DF at 35 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 4.0% (*n* = 23) at 14–40 DAT and 1.0% (*n* = 21) at 41 or more DAT.

Crop yield
Sixteen (16) trials conducted over 2 years in Ontario and Quebec under conventional tillage practices reported field corn yield following application of the tankmix of Option 35 DF at 35 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha.

Mean reported crop yield, expressed as percentage of the untreated check, for the tankmix of Option 35 DF at 35 g a.i./ha + Banvel at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 241% (*n* = 16).

7.3.5 Option 35 DF + Marksman (active ingredients: atrazine + dicamba) + Hasten spray adjuvant + Liquid Nitrogen Fertilizer (28% UAN)

Visual crop tolerance
Thirty (30) trials conducted over 2 years in Ontario and Quebec under conventional tillage practices reported visual crop tolerance of field corn following application of the tankmix of Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha.

Mean reported visual crop tolerance, expressed as percentage of crop injury, for the tankmix of Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 5.1% (*n* = 30) at 14–40 DAT and 1.0% (*n* = 28) at 41 or more DAT.

Crop yield
Twenty-two (22) trials conducted over 2 years in Ontario and Quebec under conventional tillage practices reported field corn yield following application of the tankmix of Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha.

Mean reported crop yield, expressed as percentage of the untreated check, for the tankmix of Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 201% (*n* = 22).

7.3.6 Option 35 DF + Aatrex Nine-0 (active ingredient: atrazine) + Hasten spray adjuvant + Liquid Nitrogen Fertilizer (28% UAN)

Visual crop tolerance
Fourteen (14) trials conducted in 1 year in Ontario and Quebec under conventional tillage practices reported visual crop tolerance of field corn following application of the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex Nine-0 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha.

Mean reported visual crop tolerance, expressed as percentage of crop injury, for the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex Nine-0 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 5.4% (*n* = 14) at 14–40 DAT and 1.1% (*n* = 14) at 41 or more DAT.

Crop yield
Eleven (11) trials conducted over 2 years in Ontario and Quebec under conventional tillage practices reported field corn yield following application of the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex Nine-0 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha.

Mean reported crop yield, expressed as percentage of the untreated check, for the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex Nine-0 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 147% (*n* = 11).

7.3.7 Option 35 DF + Aatrex 480 (active ingredient: atrazine) + Hasten spray adjuvant + Liquid Nitrogen Fertilizer (28% UAN)

Visual crop tolerance
Twenty-one (21) trials conducted over 2 years in Ontario and Quebec under conventional tillage practices reported visual crop tolerance of field corn following application of the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha.

Mean reported visual crop tolerance, expressed as percentage of crop injury, for the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 4.2% (n = 21) at 14–40 DAT and 0.2% (n = 21) at 41 or more DAT.

Crop yield
Sixteen (16) trials conducted over 2 years in Ontario and Quebec under conventional tillage practices reported field corn yield following application of the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha.

Mean reported crop yield, expressed as percentage of the untreated check, for the tankmix of Option 35 DF at 35 g a.i./ha + Aatrex 480 at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 181% (n = 16).

7.3.8 Option 2.25 SC + Peak (active ingredient: Prosulfuron) + Banvel II (active ingredient: dicamba) + Liquid Nitrogen Fertilizer (28% UAN)

NOTE: A limited quantity of data was provided to support tankmix options with Option 2.25 SC. The rationale for the use of the limited data package to support the tankmix options with Option 2.25 SC is based on the fact that Option 2.25 SC has been established to be agronomically equivalent to Option 35 DF when applied alone. The data package provided to support the tankmix option with Option 35 DF was adequate. Therefore, limited bridging data indicating no increase in crop injury when Option 2.25 SC is applied in a tankmix with the same herbicide tankmix options as listed on the Option 35 DF label will be sufficient to support tankmix options on the Option 2.25 SC label.

Visual crop tolerance
Five (5) trials conducted in 1 year in Ontario under conventional tillage practices reported visual crop tolerance of field corn following application of the tankmix of Option 2.25 SC at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel II at 144 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha and Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel II at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha.

Mean reported visual crop tolerance, expressed as percentage of crop injury, for the tankmix of Option 2.25 SC at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel II at 144 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 6.0% (n = 5) at 14–40 DAT and 0.6% (n = 5) at 41 or more DAT and for Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel II at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 3.8% (n = 5) at 14–40 DAT and 0.6% (n = 5) at 41 or more DAT.

Crop yield

Three (3) trials conducted in 1 year in Ontario under conventional tillage practices reported field corn yield following application of the tankmix of Option 2.25 SC at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel II at 144 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha and Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel II at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha.

Mean reported crop yield, expressed as percentage of the untreated check, for the tankmix of Option 2.25 SC at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel II at 144 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 264% (n = 3) and Option 35 DF at 35 g a.i./ha + Peak at 10 g a.i./ha + Banvel II at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 324% (n = 3).

7.3.9 Option 2.25 SC + Banvel II (active ingredient: dicamba) + Liquid Nitrogen Fertilizer (28% UAN)

Visual crop tolerance

Five (5) trials conducted in 1 year in Ontario under conventional tillage practices reported visual crop tolerance of field corn following application of the tankmix of Option 2.25 SC at 35 g a.i./ha + Banvel II at 144 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha and Option 35 DF at 35 g a.i./ha + Banvel II at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha.

Mean reported visual crop tolerance, expressed as percentage of crop injury, for the tankmix of Option 2.25 SC at 35 g a.i./ha + Banvel II at 144 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 6.0% (n = 5) at 14–40 DAT and 0.6% (n = 5) at 41 or more DAT and for Option 35 DF at 35 g a.i./ha + Banvel II at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 5.6% (n = 5) at 14–40 DAT and 0.4% (n = 5) at 41 or more DAT.

Crop yield

Three (3) trials conducted in 1 year in Ontario under conventional tillage practices reported field corn yield following application of the tankmix of Option 2.25 SC at 35 g a.i./ha + Banvel II at 144 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha and Option 35 DF at 35 g a.i./ha + Banvel II at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha.

Mean reported crop yield, expressed as percentage of the untreated check, for the tankmix of Option 2.25 SC at 35 g a.i./ha + Banvel II at 144 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 275% (n = 3) and Option 35 DF at 35 g a.i./ha + Banvel II at 144 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 317% (n = 3).

7.3.10 Option 2.25 SC + Marksman (active ingredients: atrazine + dicamba) + Liquid Nitrogen Fertilizer (28% UAN)

Visual crop tolerance

Five (5) trials conducted in 1 year in Ontario under conventional tillage practices reported visual crop tolerance of field corn following application of the tankmix of Option 2.25 SC at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha and Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha.

Mean reported visual crop tolerance, expressed as percentage of crop injury, for the tankmix of Option 2.25 SC at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 3.6% (n = 5) at 14–40 DAT and 0.6% (n = 5) at 41 or more DAT and for Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 3.8% (n = 5) at 14–40 DAT and 0.6% (n = 5) at 41 or more DAT.

Crop yield

Three (3) trials conducted in 1 year in Ontario under conventional tillage practices reported field corn yield following application of the tankmix of Option 2.25 SC at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha and Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha.

Mean reported crop yield, expressed as percentage of the untreated check, for the tankmix of Option 2.25 SC at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 299% (n = 3) and Option 35 DF at 35 g a.i./ha + Marksman at 1000 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 324% (n = 3).

7.3.11 Option 2.25 SC + Aatrex 840 (active ingredient: atrazine) + Liquid Nitrogen Fertilizer (28% UAN)

Visual crop tolerance

Five (5) trials conducted in 1 year in Ontario under conventional tillage practices reported visual crop tolerance of field corn following application of the tankmix of Option 2.25 SC at 35 g a.i./ha + Aatrex at 840 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha and Option 35 DF at 35 g a.i./ha + Aatrex at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha.

Mean reported visual crop tolerance, expressed as percentage of crop injury, for the tankmix of Option 2.25 SC at 35 g a.i./ha + Aatrex at 840 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 3.4% (n = 5) at 14–40 DAT and 0.4% (n = 5) at 41 or more DAT and for Option 35 DF at 35 g a.i./ha + Aatrex at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 3.4% (*n* = 5) at 14–40 DAT and 0.6% (*n* = 5) at 41 or more DAT.

Crop yield
Three (3) trials conducted in 1 year in Ontario under conventional tillage practices reported field corn yield following application of the tankmix of Option 2.25 SC at 35 g a.i./ha + Aatrex at 840 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha and Option 35 DF at 35 g a.i./ha + Aatrex at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha.

Mean reported crop yield, expressed as percentage of the untreated check, for the tankmix of Option 2.25 SC at 35 g a.i./ha + Aatrex at 840 g a.i./ha + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 322% (*n* = 3) and Option 35 DF at 35 g a.i./ha + Aatrex at 840 g a.i./ha + Hasten spray adjuvant at 1.0% v/v + Liquid Nitrogen Fertilizer (28% UAN) at 2.5 L/ha was 310% (*n* = 3).

7.4 Impact on succeeding crops

Eighteen (18) trials conducted in Ontario and the US over 4 reporting periods (1996/1997, 1998/1999, 1999/2000, 2000/2001) were provided in support of the proposed recropping claims on the Option 35 DF and Option 2.25 SC.

Soybeans
A recropping interval of 10 months is proposed for soybeans following an application of Option 35 DF or Option 2.25 SC at 35 g a.i./ha.

Ten (10) trials reported visual crop tolerance and crop yield of soybeans seeded 10 months following an application of Option 35 DF or Option 2.25 SC. Visual tolerance and yield were reported for the maximum requested rate of 35 g a.i./ha (1× max rate), as well as 45 g a.i./ha (1.3× max rate), 60 g a.i./ha (1.7× max rate), 70 g a.i./ha (2× max rate), 90 g a.i./ha (2.6× max rate), and 180 g a.i./ha (5.2× max rate).

The mean reported visual tolerance, expressed as percentage of crop injury, at the rate of 35 g a.i./ha (1× max rate) was 1.0% (*n* = 1), at 45 g a.i./ha (1.3× max rate) was 0% (*n* = 5), at 60 g a.i./ha (1.7× max rate) was 5.0% (*n* = 3), at 70 g a.i./ha (2× max rate) was 1.0% (*n* = 3), at 90 g a.i./ha (2.6× max rate) was 0% (*n* = 5), and at 180 g a.i./ha (5.2× max rate) was 0.25% (*n* = 4).

The mean reported crop yield, expressed as percentage of the untreated check, at the rate of 35 g a.i./ha (1× max rate) was 92% (*n* = 1), at 45 g a.i./ha (1.3× max rate) was 111% (*n* = 5), at 60 g a.i./ha (1.7× max rate) was 107% (*n* = 2), at 70 g a.i./ha (2× max rate) was 84% (*n* = 1), at 90 g a.i./ha (2.6× max rate) was 114% (*n* = 5), and at 180 g a.i./ha (5.2× max rate) was 118% (*n* = 4).

The data support the recropping of soybeans 10 months following an application of Option 35 DF or Option 2.25 SC at the proposed maximum rate of 35 g a.i./ha.

Winter wheat
A recropping interval of 4 months is proposed for winter wheat following an application of Option 35 DF or Option 2.25 SC at 35 g a.i./ha.

Four (4) trials reported visual crop tolerance and crop yield of winter wheat seeded 4 months following an application of Option 35 DF or Option 2.25 SC. Visual tolerance and yield were reported for the application rates of 45 g a.i./ha (1.3× max rate), 90 g a.i./ha (2.6× max rate), and 180 g a.i./ha (5.2× max rate).

The mean reported visual tolerance, expressed as percentage of crop injury, at the rate of 45 g a.i./ha (1.3× max rate) was 0% (n = 4), at 90 g a.i./ha (2.6× max rate) was 0% (n = 4) and at 180 g a.i./ha (5.2× max rate) was 0% (n = 4).

The mean reported crop yield, expressed as percentage of the untreated check, at the rate of 45 g a.i./ha (1.3× max rate) was 105% (n = 4), at 90 g a.i./ha (2.6× max rate) was 109% (n = 4) and at 180 g a.i./ha (5.2× max rate) was 104% (n = 4).

The data support the recropping of winter 4 months following an application of Option 35 DF or Option 2.25 SC at the proposed maximum rate of 35 g a.i./ha.

Alfalfa
A recropping interval of 10 months is proposed for alfalfa following an application of Option 35 DF or Option 2.25 SC at 35 g a.i./ha.

Nine (9) trials reported visual crop tolerance of alfalfa seeded 10 months following an application of Option 35 DF or Option 2.25 SC. Visual tolerance and yield were reported for the application rates of 45 g a.i./ha (1.3× max rate), 60 g a.i./ha (1.7× max rate), 70 g a.i./ha (2× max rate), 90 g a.i./ha (2.6× max rate), and 180 g a.i./ha (5.2× max rate).

The mean reported visual tolerance, expressed as percentage of crop injury, at the rate of 45 g a.i./ha (1.3× max rate) was 0.5% (n = 4), at 60 g a.i./ha (1.7× max rate) was 3.3% (n = 3), at 70 g a.i./ha (2× max rate) was 0% (n = 2), at 90 g a.i./ha (2.6× max rate) was 0% (n = 4), and at 180 g a.i./ha (5.2× max rate) was 0.75% (n = 4).

The data support the recropping of alfalfa 10 months following an application of Option 35 DF or Option 2.25 SC at the proposed maximum rate of 35 g a.i./ha.

Spring barley
A recropping interval of 10 months is proposed for spring barley following an application of Option 35 DF or Option 2.25 SC at 35 g a.i./ha.

Seven (7) trials reported visual crop tolerance and crop yield of spring barley seeded 10 months following an application of Option 35 DF or Option 2.25 SC. Visual tolerance and yield were reported for the application rates of 45 g a.i./ha (1.3× max rate), 70 g a.i./ha (2× max rate), 90 g a.i./ha (2.6× max rate), and 180 g a.i./ha (5.2× max rate).

The mean reported visual tolerance, expressed as percentage of crop injury, at the rate of 45 g a.i./ha (1.3× max rate) was 1.2% (n = 4), at 70 g a.i./ha (2× max rate) was 0.6% (n = 3), at 90 g a.i./ha (2.6× max rate) was 1.0% (n = 4), and at 180 g a.i./ha (5.2× max rate) was 0.75% (n = 4).

The mean reported crop yield, expressed as percentage of the untreated check, at 45 g a.i./ha (1.3× max rate) was 114% (n = 4), at 70 g a.i./ha (2× max rate) was 102% (n = 3), at 90 g a.i./ha (2.6× max rate) was 130% (n = 4), and at 180 g a.i./ha (5.2× max rate) was 121% (n = 4).

The data support the recropping of spring barley 10 months following an application of Option 35 DF or Option 2.25 SC at the proposed maximum rate of 35 g a.i./ha.

Dry common bean

The proposed claim for dry common beans was supported by trials testing 4 varieties: kidney bean, navy bean, cranberry bean, and white bean. Based on the data provided, there appears to be varietal differences in the level of tolerance common dry beans exhibit to applications of Option 35 DF or Option 2.25 SC. As per Regulatory Directive 93-14 “Classification of Beans on Label and Research Requirements”, based on the limited number of varieties tested and the apparent varietal differences in terms of crop tolerance (white bean had higher, but still acceptable, visual crop injury compared to other varieties tested) only the dry common bean varieties that have demonstrated acceptable crop tolerance will be acceptable to appear on the label of Option 35 Df and Option 2.25 SC. If subsequent crop tolerance information is provided indicating no varietal differences among dry common beans in terms of tolerance to Option 35 DF and Option 2.25 SC, then this limitation may be removed.

Kidney bean

A recropping interval of 10 months is proposed for kidney beans following an application of Option 35 DF or Option 2.25 SC at 35 g a.i./ha.

Five (5) trials reported visual crop tolerance of kidney beans seeded 10 months following an application of Option 35 DF or Option 2.25 SC. Visual tolerance was reported for the application rate of 60 g a.i./ha (1.7× max rate).

The mean reported visual tolerance, expressed as percentage of crop injury, at the rate of 60 g a.i./ha (1.7× max rate) was 1.0% (n = 5).

The data support the recropping of kidney beans 10 months following an application of Option 35 DF or Option 2.25 SC at the proposed maximum rate of 35 g a.i./ha.

Navy bean
A recropping interval of 10 months is proposed for navy beans following an application of Option 35 DF or Option 2.25 SC at 35 g a.i./ha.

Five (5) trials reported visual crop tolerance and crop yield of navy beans seeded 10 months following an application of Option 35 DF or Option 2.25 SC. Visual tolerance and yield were reported for the application rates of 60 g a.i./ha (1.7× max rate) and 70 g a.i./ha (2× max rate).

The mean reported visual tolerance, expressed as percentage of crop injury, at the rate of 60 g a.i./ha (1.7× max rate) was 0% (n = 2) and at 70 g a.i./ha (2× max rate) was 7.9% (n = 3).

The mean reported crop yield, expressed as percentage of the untreated check, at 70 g a.i./ha (2× max rate) was 93% (n = 3).

The data support the recropping of navy beans 10 months following an application of Option 35 DF or Option 2.25 SC at the proposed maximum rate of 35 g a.i./ha.

Cranberry bean
A recropping interval of 10 months is proposed for cranberry beans following an application of Option 35 DF or Option 2.25 SC at 35 g a.i./ha.

Five (5) trials reported visual crop tolerance of cranberry beans seeded 10 months following an application of Option 35 DF or Option 2.25 SC. Visual tolerance was reported for the application rates 45 g a.i./ha (1.3× max rate), 70 g a.i./ha (2× max rate), 90 g a.i./ha (2.6× max rate), and 180 g a.i./ha (5.2× max rate).

The mean reported visual tolerance, expressed as percentage of crop injury, at the rate of 45 g a.i./ha (1.3× max rate) was 0% (n = 2), at 70 g a.i./ha (2× max rate) was 6.5% (n = 3), at 90 g a.i./ha (2.6× max rate) was 0% (n = 2), and at 180 g a.i./ha (5.2× max rate) was 0% (n = 2).

The data support the recropping of cranberry beans 10 months following an application of Option 35 DF or Option 2.25 SC at the proposed maximum rate of 35 g a.i./ha.

White bean
A recropping interval of 10 months is proposed for white beans following an application of Option 35 DF or Option 2.25 SC at 35 g a.i./ha.

Two (2) trials reported visual crop tolerance and crop yield of white beans seeded 10 days following an application of Option 35 DF or Option 2.25 SC. Visual tolerance and yield were reported for the application rates of 45 g a.i./ha (1.3× max rate), 90 g a.i./ha (2.6× max rate), and 180 g a.i./ha (5.2× max rate).

The mean reported visual tolerance, expressed as percentage of crop injury, at the rate of 45 g a.i./ha (1.3× max rate) was 6.0% (*n* = 2), at 90 g a.i./ha (2.6× max rate) was 7% (*n* = 2), and at 180 g a.i./ha (5.2× max rate) was 9% (*n* = 2).

The mean reported crop yield, expressed as percentage of the untreated check, at 45 g a.i./ha (1.3× max rate) was 112% (*n* = 1), at 90 g a.i./ha (2.6× max rate) was 102% (*n* = 1), and at 180 g a.i./ha (5.2× max rate) was 98% (*n* = 1).

The proposed label has a 10-month recropping interval for white beans. The crop in these trials was planted 10–11 days after application and there are indications of some visual crop injury. Data are not sufficient to draw a scientific conclusion as to the tolerance of white beans seeded 10 months after an application of Option 35 DF or Option 2.25 SC as proposed on the label.

Spring canola
A recropping interval of 10 months is proposed for spring canola following an application of Option 35 DF or Option 2.25 SC at 35 g a.i./ha.

Ten (10) trials reported visual crop tolerance and crop yield of spring canola seeded 10 months following an application of Option 35 DF or Option 2.25 SC. Visual tolerance and yield were reported for the maximum requested rate of 35 g a.i./ha (1× max rate), as well as 45 g a.i./ha (1.3× max rate), 60 g a.i./ha (1.7× max rate), 70 g a.i./ha (2× max rate), 90 g a.i./ha (2.6× max rate), and 180 g a.i./ha (5.2× max rate).

The mean reported visual tolerance, expressed as percentage of crop injury, at the rate of 35 g a.i./ha (1× max rate) was 0% (*n* = 1), at 45 g a.i./ha (1.3× max rate) was 2.0% (*n* = 4), at 60 g a.i./ha (1.7× max rate) was 0% (*n* = 3), at 70 g a.i./ha (2× max rate) was 0% (*n* = 3), at 90 g a.i./ha (2.6× max rate) was 1.0% (*n* = 4), and at 180 g a.i./ha (5.2× max rate) was 1.25% (*n* = 4).

The mean reported crop yield, expressed as percentage of the untreated check, at 35 g a.i./ha (1× max rate) was 114% (*n* = 1), at 45 g a.i./ha (1.3× max rate) was 141% (*n* = 3), at 60 g a.i./ha (1.7× max rate) was 116% (*n* = 1), at 70 g a.i./ha (2× max rate) was 137% (*n* = 1), at 90 g a.i./ha (2.6× max rate) was 3% (*n* = 126), and at 180 g a.i./ha (5.2× max rate) was 130% (*n* = 3).

The data support the recropping of spring barley 10 months following an application of Option 35 DF or Option 2.25 SC at the proposed maximum rate of 35 g a.i./ha.

Red clover
A recropping interval of 10 months is proposed for red clover following an application of Option 35 DF or Option 2.25 SC at 35 g a.i./ha.

Four (4) trials reported visual crop tolerance of red clover seeded 10 months following an application of Option 35 DF or Option 2.25 SC. Visual tolerance was reported for the application rates of 45 g a.i./ha (1.3× max rate), 90 g a.i./ha (2.6× max rate), and 180 g a.i./ha (5.2× max rate).

The mean reported visual tolerance, expressed as percentage of crop injury, at the rate of 45 g a.i./ha (1.3× max rate) was 1% (*n* = 4), at 90 g a.i./ha (2.6× max rate) was 0% (*n* = 4), and at 180 g a.i./ha (5.2× max rate) was 0.75% (*n* = 4).

The data support the recropping of red clover 10 months following an application of Option 35 DF or Option 2.25 SC at the proposed maximum rate of 35 g a.i./ha.

Field corn
A recropping interval of 10 days is proposed for field corn following an application of Option 35 DF or Option 2.25 SC at 35 g a.i./ha.

Seven (7) trials reported visual crop tolerance of field corn seeded 10 months following an application of Option 35 DF or Option 2.25 SC. Visual tolerance was reported for the application rates of 45 g a.i./ha (1.3× max rate), 70 g a.i./ha (2× max rate), 90 g a.i./ha (2.6× max rate), and 180 g a.i./ha (5.2× max rate).

The mean reported visual tolerance, expressed as percentage of crop injury, at the rate of 45 g a.i./ha (1.3× max rate) was 0% (*n* = 4), at 70 g a.i./ha (2× max rate) was 0% (*n* = 3), at 90 g a.i./ha (2.6× max rate) was 0% (*n* = 4), and at 180 g a.i./ha (5.2× max rate) was 0.75% (*n* = 4).

The data support the recropping of field corn 10 months following an application of Option 35 DF or Option 2.25 SC at the proposed maximum rate of 35 g a.i./ha. However, data are insufficient to draw a scientific conclusion as to the tolerance of field corn seeded as a salvage crop 10 days after an application of Option 35 DF or Option 2.25 SC as proposed on the label.

Sweet corn
A recropping interval of 10 days is proposed for sweet corn following an application of Option 35 DF or Option 2.25 SC at 35 g a.i./ha.

Four (4) trials reported visual crop tolerance of sweet corn seeded 10 months following an application of Option 35 DF or Option 2.25 SC. Visual tolerance was reported for the application rates 45 g a.i./ha (1.3× max rate), 90 g a.i./ha (2.6× max rate), and 180 g a.i./ha (5.2× max rate).

The mean reported visual tolerance, expressed as percentage of crop injury, at the rate of 45 g a.i./ha (1.3× max rate) was 0% (*n* = 4), 90 g a.i./ha (2.6× max rate) was 0% (*n* = 4), and at 180 g a.i./ha (5.2× max rate) was 0.75% (*n* = 4).

The data support the recropping of 10 months following an application of Option 35 DF or Option 2.25 SC at the proposed maximum rate of 35 g a.i./ha. However, data are insufficient to draw a scientific conclusion as to the tolerance of sweet corn seeded as a salvage crop 10 days after an application of Option 35 DF or Option 2.25 SC as proposed on the label.

Spring oats
A recropping interval of 10 months is proposed for spring oats following an application of Option 35 DF or Option 2.25 SC at 35 g a.i./ha.

Seven (7) trials reported visual crop tolerance and crop yield of spring oats seeded 10 months following an application of Option 35 DF or Option 2.25 SC. Visual tolerance and yield were reported for the application rates of 45 g a.i./ha (1.3× max rate), 70 g a.i./ha (2× max rate), 90 g a.i./ha (2.6× max rate), and 180 g a.i./ha (5.2× max rate).

The mean reported visual tolerance, expressed as percentage of crop injury, at the rate of 45 g a.i./ha (1.3× max rate) was 0.75% (n = 4), at 70 g a.i./ha (2× max rate) was 2.7% (n = 3), at 90 g a.i./ha (2.6× max rate) was 1.25% (n = 4), and at 180 g a.i./ha (5.2× max rate) was 0.25% (n = 4).

The mean reported crop yield, expressed as percentage of the untreated check, at 45 g a.i./ha (1.3× max rate) was 104% (n = 3), at 70 g a.i./ha (2× max rate) was 110% (n = 2), at 90 g a.i./ha (2.6× max rate) was 104% (n = 3), and at 180 g a.i./ha (5.2× max rate) was 110% (n = 3).

The data support the recropping of spring oats 10 months following an application of Option 35 DF or Option 2.25 SC at the proposed maximum rate of 35 g a.i./ha.

Sugar beets
A recropping interval of 10 months is proposed for sugar beets following an application of Option 35 DF or Option 2.25 SC at 35 g a.i./ha.

Ten (10) trials reported visual crop tolerance of sugar beets seeded 10 months following an application of Option 35 DF or Option 2.25 SC. Visual tolerance was reported for the application rates of 45 g a.i./ha (1.3× max rate), 60 g a.i./ha (1.7× max rate), 90 g a.i./ha (2.6× max rate), and 180 g a.i./ha (5.2× max rate).

The mean reported visual tolerance, expressed as percentage of crop injury, at the rate of 45 g a.i./ha (1.3× max rate) was 1.75% (n = 4), at 60 g a.i./ha (1.7× max rate) was 2.2% (n = 6), at 90 g a.i./ha (2.6× max rate) was 1.0% (n = 4), and at 180 g a.i./ha (5.2× max rate) was 1.75% (n = 4).

The data support the recropping of sugar beets 10 months following an application of Option 35 DF or Option 2.25 SC at the proposed maximum rate of 35 g a.i./ha.

Timothy
A recropping interval of 10 months is proposed for timothy following an application of Option 35 DF or Option 2.25 SC at 35 g a.i./ha.

Two (2) trials reported visual crop tolerance and crop yield of timothy seeded 10 months following an application of Option 35 DF or Option 2.25 SC. Visual tolerance was reported for the application rates of 45 g a.i./ha (1.3× max rate), 90 g a.i./ha (2.6× max rate), and 180 g a.i./ha (5.2× max rate).

The mean reported visual tolerance, expressed as percentage of crop injury, at the rate of 45 g a.i./ha (1.3× max rate) was 0% (n = 2), at 90 g a.i./ha (2.6× max rate) was 0% (n = 2), and at 180 g a.i./ha (5.2× max rate) was 0% (n = 2).

Data are insufficient to draw a scientific conclusion as to the tolerance of timothy seeded 10 months after an application of Option 35 DF or Option 2.25 SC as proposed on the label.

7.5 Sustainability

7.5.1 Survey of alternatives

7.5.1.1 Non-chemical control practices

Non-chemical means of weed control include cultivation and crop rotation. The post-emergent use of Option 35 DF or Option 2.25 SC in conventionally tilled field corn would not exclude the use of cultivation. Recropping data indicate that winter wheat may be planted in the fall of the year of application of Option 35 DF or Option 2.25 SC and numerous crops may be planted the year following application of Option 35 DF or Option 2.25 SC.

7.5.1.2 Chemical control practices

Application of Option 35 DF or Option 2.25 SC would not exclude the sequential use of other herbicides with different modes of action for control of annual and perennial weeds not controlled by the product alone or when tank mixed.

There are numerous grass and broadleaf weed herbicides, with different modes of action, that may be used alone or in various tankmix combinations for use in field corn. Alternative a.i.s that include, but are not limited to, diflufenzopyr/dicamba (Group 4), dimethenamid (Group 15), flumetsulam/clopyralid (Groups 2 & 4), metolachlor (Group 15), s-metolachlor (Group 15), nicosulfuron (Group 2), nicosulfuron/rimsulfuron (Group 2), rimsulfuron (Group 2), pendimethalin (Group 3), 2,4-D (Group 4), MCPA (Group 4), metribuzin (Group 5), bromoxynil (Group 6), bentazon (Group 6), and linuron (Group 7) are presently commercially available.

7.5.2 Contribution to risk reduction

Option 35 DF or Option 2.25 SC alone will provide control of certain broadleaf and grassy weeds in field corn at a low rate of a.i. per hectare.

7.5.3 Information on the occurrence or possible occurrence of the development of resistance

To address the issue of development of herbicide resistance, the Option 35 DF and Option 2.25 SC label will be amended to include the resistance-management statement as outlined on the Regulatory Directive entitled *Voluntary Pesticide Resistance-Management Labelling Based on Target Site/Mode of Action* (DIR99-06) as follows.

Herbicide resistance management

For resistance management, Option 35 DF or Option 2.25 SC is a Group 2 herbicide. Any weed population may contain or develop plants naturally resistant to Tribute Solo 32DF and other Group 2 herbicides. The resistant biotypes may dominate the weed population if these herbicides are used repeatedly in the same field. Other resistance mechanisms that are not linked to the site of action, but specific for individual chemicals, such as enhanced metabolism, may also exist. Appropriate resistance-management strategies should be followed.

To delay herbicide resistance:

1. Where possible, rotate the use of Option 35 DF or Option 2.25 SC or other Group 2 herbicides with different herbicide groups that control the same weeds in a field.

2. Use tank mixtures with herbicides from a different group when such use is permitted.

3. Herbicide use should be based on an Integrated Pest Management (IPM) program that includes scouting, historical information related to herbicide use, and crop rotation, and considers tillage (or other mechanical), cultural, biological, and other chemical control practices.

4. Monitor treated weed populations for resistance development.

5. Prevent movement of resistant weed seeds to other fields by cleaning harvesting and tillage equipment and planting clean seed.

6. Contact your local extension specialist or certified crop advisors for any additional pesticide resistance-management and/or integrated weed-management recommendations for specific crops and weed biotypes.

7. For further information or to report suspected resistance, contact Bayer representative or call Bayer CropScience Inc. toll-free at 1-888-283-6847.

7.6 Conclusions

Option 35 DF is a selective herbicide for use as a post-emergence application to field corn grown in Eastern Canada, utilizing conventional tillage systems, for the control of specific broadleaf and grass weeds. Option 35 DF must be applied with Hasten spray additive at 1.0% v/v (volume/volume) (i.e., 1 L Hasten/100 L spray solution) and 2.5 L/ha of 28% liquid nitrogen fertilizer in a minimum spray volume of 150 L/ha with a maximum of one application per year using ground equipment only.

There are two rates of application for Option 35 DF. Option 35 DF applied at a rate of 43 g product/ha (15 g a.i./ha) is effective for the control of quackgrass (*Agropyron repens*) fall panicum (*Panicum dichotomiflorum*), green foxtail (*Setaria viridis*), proso millet (*Panicum miliaceum*), witchgrass (*Panicum capillare*), common chickweed (*Stellaria media*), wild mustard (*Sinapis arvensis*), wormseed mustard (*Erysimum cheiranthoides*), eastern black nightshade (*Solanum ptycanthum*), redroot pigweed (*Amaranthus retroflexus*), and velvetleaf (*Abutilon theophrasti*). Option 35 DF applied at a rate of 100 g/ha (35 g a.i./ha) is effective for the control of barnyard grass (*Echinochloa crusgalli*), large crabgrass (*Digitaria sanguinalis*), yellow foxtail (*Setaria glauca*), bristly foxtail (*Setaria verticillata*), and lambsquarters (*Chenopodium album*), and the suppression of common ragweed (*Ambrosia artemisiifolia*).

The data provided indicated that a rate lower than 35 g a.i./ha of Option 35 DF may provide acceptable control of barnyard grass, large crabgrass, yellow foxtail, bristly foxtail, and lambsquarters. Additional data may be requested in order to establish the lowest effective rate for control of these weeds.

Soybeans, field corn, sweet corn, alfalfa, spring barley, spring canola, red clover, spring oats, sugar beets and dry common beans (kidney, navy, cranberry) may be planted 10 months after application of Option 35 DF. Winter wheat may be planted 4 months after application of Option 35 DF.

Option 35 DF may be tankmixed with Aatrex Nine-0 at 0.930–1.24 kg/ha, Aatrex 480 at 1.68–2.24 L/ha, Banvel II at 0.300 L/ha, Marksman at 2.5 L/ha or Peak + Banvel at 13.3 g/ha + 0.300 L/ha.

Option 2.25 SC is a selective herbicide for use as a post-emergence application to field corn grown in Eastern Canada utilizing conventional tillage systems, for the control of specific broadleaf and grass weeds. Option 2.25 must be applied with 2.5 L/ha of 28% liquid nitrogen fertilizer in a minimum spray volume of 150 L/ha with a maximum of one application per year using ground equipment only.

There are two rates of application for Option 2.25 SC/ha. Option 2.25 SC applied at a rate of 0.67 L/ha (15 g a.i./ha) is effective for the control of quackgrass (*Agropyron repens*), fall panicum (*Panicum dichotomiflorum*), green foxtail (*Setaria viridis*), proso millet (*Panicum miliaceum*), witchgrass (*Panicum capillare*), common chickweed (*Stellaria media*), wild mustard (*Sinapis arvensis*), wormseed mustard (*Erysimum cheiranthoides*), eastern black nightshade (*Solanum ptycanthum*), redroot pigweed (*Amaranthus retroflexus*), and velvetleaf (*Abutilon theophrasti*). Option 2.25 SC applied at a rate of 1.56 L/ha (35 g a.i./ha) is effective for the control of barnyard grass (*Echinochloa crusgalli*), large crabgrass (*Digitaria sanguinalis*), yellow foxtail (*Setaria glauca*), bristly foxtail (*Setaria verticillata*), and lambsquarters (*Chenopodium album*), and the suppression of common ragweed (*Ambrosia artemisiifolia*).

Soybeans, field corn, sweet corn, alfalfa, spring barley, spring canola, red clover, spring oats, sugar beets, and dry common beans (kidney, navy, cranberry) may be planted 10 months after application of Option 2.25 SC. Winter wheat may be planted 4 months after application of Option 2.25 SC.

Option 2.25 SC may be tankmixed with Aatrex Nine-0 at 0.930–1.24 kg/ha, Aatrex 480 at 1.68–2.24 L/ha, Banvel II at 0.300 L/ha, Marksman at 2.5 L/ha, or Peak + Banvel at 13.3 g/ha + 0.300 L/ha.

8.0 Toxic Substances Management Policy (TSMP) considerations

During the review of Foramsulfuron Technical Herbicide, Option 2.25 SC Herbicide, and Option 35 DF Herbicide, the PMRA has taken into account the federal Toxic Substances Management Policy (TSMP)[1] and has followed its Regulatory Directive DIR99-03[2]. It has been determined that this product does not meet TSMP Track-1 criteria:

- Foramsulfuron does not meet the criteria for persistence. Its values for half-life in water (up to 38 days), soil (up to 18 days), and sediment (up to 61 days) are below the TSMP Track-1 cut-off criteria for water (≥182 days), soil (≥182 days), and sediment (≥365 days). Although data on the persistence in air were not available, the vapour pressure and Henry's Law constant indicate that foramsulfuron will not volatilize from water or moist soil under field conditions; therefore, long-range atmospheric transport of foramsulfuron is not likely to occur.

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1 The federal Toxic Substances Management Policy is available through Environment Canada's Web Site at www.ec.gc.ca/toxics

2 The PMRA's Strategy for Implementing the Toxic Substances Management Policy, Dir99-03, is available through the Pest Management Information Service: Phone 1-800-267-6315 within Canada or 1-613-736-3799 outside Canada (long distance charges apply); Fax (613) 736-3798; E-Mail pminfoserv@hc-sc.gc.ca; or through our Web Site at www.hc-sc.gc.ca/pmra-arla

- Foramsulfuron is not bioaccumulative. At an environmentally relevant pH, the *n*-octanol–water partition coefficient (log K_{ow}) is −0.78, which is below the TSMP Track-1 cut-off criterion of ≥5.0.

- The toxicity of foramsulfuron and its EPs, Option 2.25 SC Herbicide and Option 35 DF Herbicide, is summarized in Sections 3.6, 4.7 and 6.4. Although the EPs are predicted to pose a high to very high risk to aquatic plants following a direct over-spray, this risk can be adequately mitigated to minimize exposure to aquatic and terrestrial habitats.

- Foramsulfuron (technical grade) does not contain any by-products or microcontaminants that meet the TSMP Track-1 criteria. Impurities of toxicological concern are not expected to be present in the raw materials nor are they expected to be generated during the manufacturing process.

- Foramsulfuron is toxic and poses a high to very high risk to certain non-target organisms (in particular, plant species); however, the PMRA has determined that under conditions of use according to the registered labels for the end-use products, including any required mitigative measures (e.g., buffer zones), foramsulfuron will not enter the Canadian environment in a quantity or concentration or under conditions that have or may have an immediate or long-term harmful effect on the environment or its biological diversity; that constitute or may constitute a danger to the environment on which life depends; or that constitute or may constitute a danger in Canada to human life or health. Thus, foramsulfuron does not meet the TSMP criterion for toxicity (see Sections 3.6, 4.7 and 6.4).

The formulated product does not contain any formulant known to contain TSMP Track-1 substances. Whether or not foramsulfuron forms any major TPs that meets the TSMP Track-1 criteria cannot be determined at this time: *n*-octanol–water partition coefficients are required for major transformation products (TPs) to determine whether the compounds meet the criterion for bioaccumulation. Should a major TP meet the TSMP criterion for bioaccumulation, further data will be requested to address the TSMP.

As the four TSMP Track-1 criteria for anthropogenicity, persistence, bioaccumulation, and toxicity are not met for the active ingredient foramsulfuron, the PMRA has determined that foramsulfuron does not meet TSMP Track-1 criteria and is not subject to virtual elimination.

9.0 Regulatory decision (OECD 3.2 and 3.3)

Foramsulfuron Technical Herbicide and the associated end-use products Option 2.25 SC Herbicide and Option 35 DF Herbicie have been granted temporary registration for use for the control of grasses and broadleaf weeds on field corn, pursuant to Section 17 of the Pest Control Products Regulations, subject to the following conditions:

- submission of analytical data of five batches
- submission of n-octanol-water partitioning coefficient, K_{ow} for major transformation products
- submission of analytical methods for sediment, water, and biota;
- submission of data on soil storage stability. .
- submission of data on product storage stability;
- submission of data on storage stability on field corn;
- submission of seedling emergence study
- submission of study of the toxicity to *Lemna gibba*;
- submission of efficacy trials

List of abbreviations

a.i.	active ingredient
ADI	acceptable daily intake
ALS	acetolactate synthase
AOEL	acceptable operator exposure level
ArfD	acute reference dose
ARTF	Agricultural Re-entry Task Force
bw	body weight
bwg	body-weight gain
BWI	average body weight per individual
CAS	Chemical Abstracts Service
CEPA	*Canadian Environmental Protection Act*
CV	coefficient of variation
d	day
DAT	days after treatment
DFR	dislodgeable foliar residue
DNA	deoxyribonucleic acid
DT_{50}	dissipation time 50%
dw	dry weight
EC_{25}	concentration effective against 25% of test organisms
EC_{50}	median effective concentration
ECD	electron capture detection
EEC	expected environmental concentration
EP	end-use product
EPA	Environmental Protection Agency (US)
EXPRES	Expert System for Pesticide Regulatory Evaluation and Simulation
FAO	Food and Agriculture Organization (United Nations)
FOB	functional observational battery
GAP	good agricultural practices
GC	gas chromatography
GD	gestation day
GIT	gastrointestinal tract
h	hour
ha	hectare
HAFT	highest average field trial
HDPE	high-density polyethylene
HPLC	high performance liquid chromatography
ILV	independent laboratory validation
K_d	Freundlich adsorption coefficient
K_{oc}	organic carbon adsorption coefficient
K_{ow}	*n*-octanol–water partition coefficient
LC	liquid chromatography
LC_{50}	median lethal concentration
LD_{50}	median lethal dose
LER	lowest effective rate

LOAEL	lowest observed adverse effect level
LOD	limit of detection
LOQ	limit of quantitation
LP	leaching potential
MAS	maximum average score
M/L/A	mixer/loader/applicator
mM	millimolar
MMAD	mass median aerodynamic diameter
MOE	margin of exposure
MOS	margin of safety
MRL	maximum residue limit
MRM	multiresidue method
MS	mass spectrometry
MSD	mass selective detection
n	number
ng	nanogram
nm	nanometre
NOAEL	no observed adverse effect level
NOEC	no observed effect concentration
NOEL	no observed effect level
OC	organic carbon content
OECD	Organisation for Economic Co-operation and Development
pH	$-\log_{10}$ hydrogen ion concentration
PHED	Pesticide Handlers Exposure Database
PHI	pre-harvest interval
pK_a	dissociation constant
PMRA	Pest Management Regulatory Agency
ppm	parts per million
r	correlation coefficient
RfD	reference dose
ROC	residue of concern
RP	reversed phase
SPE	solid phase extraction
TC	transfer coefficient
TGAI	technical grade of active ingredient
TP	transformation product
TRR	total radioactive residue
TSMP	Toxic Substances Management Policy
$t_{½}$	half-life
UAN	urea ammonium nitrogen
UDS	unscheduled DNA synthesis
UF	uncertainty factor
US	United States of America
USC	use site category
UV	ultraviolet
WG	wettable dispersible granule

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Appendix I Methods of analysis

Table 1 Analytical methods for analysis of the active substance as manufactured

Product	Analyte	Method type	Linearity range %	Recovery (%)	RSD (%)	LOQ %	Method
TGAI	Foramsulfuron	RPLC/UV at 233 nm	46–233	99.7	0.34	N/R	Accepted
	Major organic impurities	RPLC/UV at 233 nm	0.05–2.5	81.4–118.8	0.43–8.5	0.01–0.04	Accepted

Table 2 Methods for formulation analysis

Product	Analyte	Method ID	Method type	Linearity range (%)	Mean Recovery (%) (n)	RSD (%) (n)	Method
Option 2.25 SC Herbicide	Foramsulfuron	AL054/99-0	RPLC/UV at 233 nm	26–167	100 (5)	0.29 (5)	Accepted
	Isoxadifen-ethyl			26–167	100.2 (5)	0.56 (5)	Accepted
Option 35 DF	Foramsulfuron	—	RPLC/UV at 233 nm	1.58–10.54	99.9 (5)	0.29 (5)	Accepted

Table 3 Methods for environmental residue analysis

Method validation data for residue of foramsulfuron in soil, water, and plant matrices.								
Matrix	Method	Spike level	Overall mean % Recovery (n)				LOQ	[1]Method
			AE F130360	RSD (%)	AE F092944	RSD (%)		
Soil	LC/UV GC/MS	0.002–0.05 µg/mL	86 (12)	11	106 (12)	15	0.002 µg/g	A
Sediment	Method for the determination of foramsulfuron in sediment was not provided							R
Drinking water	LC/UV	0.1 & 1.0 µg/L	96.5 (12)	12	Not analysed		0.1 µg/L	A
Surface water		0.1 & 1.0 µg/L	101.5 (17)	17	Not analyzed			A
Maize kernel	LC/UV	0.02 & 0.04 mg/kg	92 (4)	14	100 (4)	10	0.01 mg/kg	
Animal matrix	Waiver request based on low K_{ow} is not acceptable							R

[1]A = acceptable, R = requested

Appendix II Toxicology

Table 1 Toxicology summary table

Metabolism			
Rate and extent of absorption: Absorption of [^{14}C-phenyl] foramsulfuron following oral administration at doses of 10 or 1000 mg/kg bw was limited (approximately 20%), with rapid elimination. Maximum concentrations in the blood were attained within 1 and 4 hours of dosing for the low- and high-dose groups, respectively. The $t_{1/2s}$ for elimination from the plasma were 5.4 and 18.5 hours in low-dose females and males, respectively, and 2.4–2.9 hours for high-dose rats. **Excretion:** The primary route of excretion is via the feces; 86.8–97.1% of the dose was excreted in the feces and 5.1–5.8% in the urine in low-dose group and 1.3–1.5% in the urine in the high-dose group within 3 days of dosing. In a 14-day repeat dose experiment, fecal excretion accounted for 61.0% in males and 88.8% in females. This sex-related difference was attributed to a substantial amount of radioactivity remaining in the carcass/G.I.T. of males (24.5%) compared to females (3.1%) at sacrifice (2 days after dosing). In bile duct-cannulated rats, fecal excretion accounted for 75.6% of the dose, while urinary and bile excretion accounted for 12.7% and 4.2%, respectively. The low levels of urinary and biliary excretion in the low-dose rats and the reduced level of urinary excretion in the high-dose rats indicated that absorption of [^{14}C-phenyl] foramsulfuron is limited. **Distribution/target organ(s):** Maximum concentrations of [^{14}C-phenyl] foramsulfuron were observed 0.5 and 4 hours after dosing, with the exception of the thyroid and adrenals in the high-dose group. Average concentrations of radioactivity were ≤0.003 µg/g in all tissues from low-dose animals and ranged from below background to 78.7 µg/g in tissues from high-dose animals 72 hours after dosing. The relative distribution in tissues was similar for both sexes and dose groups, with the highest concentrations found in the liver, kidney, thyroid, and adrenals (high-dose only). Repeated dosing at 10 mg/kg/day resulted in little or no accumulation of [^{14}C-phenyl] foramsulfuron with the exception of the liver, where concentrations of [^{14}C-phenyl] foramsulfuron increased by 2.5–2.8× between day 1 (0.08–0.11 µg/g)and day 14 (0.22–0.28 µg/g) of dosing. **Metabolism/Toxicologically significant compound(s):** Metabolism of [^{14}C-phenyl] foramsulfuron following single low- and high-dosing was similar between sexes and dose groups, with the parent compound being the major metabolite (74.4–80.8%) recovered in the feces (72.3–80.4% dose). The parent compound was also the major metabolite found in the feces of repeat-dose males (64.3%) and females (98.1%). Minor metabolites identified in the feces and urine included the cleavage product AE F153745 (1.6–11.0% dose) and the free amine metabolite AE F130619 (0.8–3.5% dose). Minor amounts of unknown metabolites were also detected in the feces (≤5.9% dose) and urine (≤3.9% dose).			
Study	**Species, strain, and doses**	**NOAEL & LOAEL mg/kg bw/day**	**Target organ, significant effects, comments**
Acute studies—technical			
Oral	Rat/Sprague-Dawley CD (5/sex) 5000 mg/kg bw (limit dose) in 1% methyl cellulose	LD_{50} >5000 mg/kg bw	Low acute toxicity Piloerection, hunched posture, white-soft feces observed on days 1–2, fully resolved by day 4.
Dermal	Rat/Sprague-Dawley CD (5/sex) 2000 mg/kg bw (limit dose) in 1% methyl cellulose	LD_{50} >2000 mg/kg bw	Low acute toxicity No treatment-related clinical sign of toxicity was observed.

Study	Species, strain, and doses	NOAEL & LOAEL mg/kg bw/day	Target organ, significant effects, comments
Inhalation (4-hour nose-only)	Rat/Sprague-Dawley CD (5/sex) 5.04 mg/L	LC_{50} >5.04 mg/L	Low acute toxicity Wet fur, hunched posture, piloerection, altered respiration rate, staining on eyes, nose, head on day 1 only.
Skin irritation	Rabbit/NZW (6 males) 0.5 g	MIS (1 hr) = 0 MAS (24, 48, 72 hrs) = 0	Non-irritating No dermal irritation or clinical signs of toxicity was observed.
Eye irritation	Rabbit/NZW (6 males) 0.1 mL	MIS (1 hr) = 6.33/110 MAS (24, 48, 72 h) = 0.78/110	Minimally irritating Conjunctival redness in 2 of 6 eyes at 1 hr, redness and discharge resolved by 48 hrs.
Skin sensitization (Magnusson/Kligman)	Guinea pig/Duncan Hartley (15 males) 2.5% w/v intradermal injection; 60% w/v topical induction; 30% and 60% w/v topical challenge	Negative	Not a sensitizer
Acute studies—Formulation [Option 35 DF] (35.63% Foramsulfuron)			
Oral	Rat/Sprague-Dawley CD (5/sex) 2000, 2600, 5000 mg/kg bw (F) 2000, 3600, 5000 mg/kg bw (M)	LD_{50} = 2788 mg/kg bw (F)	Low acute toxicity 100% mortality at high dose, 1 female died at 2600 mg/kg bw, all deaths by day 3. Piloerection, hunched posture, abnormal gait, abnormal respiration, cold extremities, congestion, all signs resolved by day 7.
Dermal	Rat/Sprague-Dawley CD (5/sex) 5000 mg/kg bw	LD_{50} >5000 mg/kg bw	Low acute toxicity Irritation at test site resolved by day 9.
Inhalation (4-hour nose-only)	Rat/Sprague-Dawley CD (5/sex) 5.32 mg/L	LC_{50} >5.32 mg/L	Low acute toxicity 1 male died; wet fur, respiratory abnormalities, hunched posture, all signs resolved by day 4. At necropsy, enlarged lungs with dark foci (5 animals) or red lungs with dark patches (1 animal).

Study	Species, strain, and doses	NOAEL & LOAEL mg/kg bw/day	Target organ, significant effects, comments
Skin irritation	Rabbit/NZW (1 male, 2 female) 0.5 g	MIS (1 hr) = 3.5/8 MAS (24, 48, 72 h) = 3.0/8	Moderately irritating "WARNING: SKIN IRRITANT" Well-defined erythema and moderate edema, resolved by day 11.
Eye irritation	Rabbit/NZW (4 male) 0.1 mL (1 washed, 3 unwashed)	MIS (1 hr) = 13.3/110 MAS (24, 48, 72 h) = 8.4/110	Mildly Irritating "CAUTION: EYE IRRITANT" Slight redness persisting to 72 h resolved by day 7. Moderate to heavy discharge resolved by 24 h.
Skin sensitization (Buehler)	Guinea pig/Duncan Hartley (20 females test group, 10 control group) 100% w/v induction; 75% w/v challenge	Positive	Potential skin sensitizer
Short term			
28-day dermal	Rat/Sprague-Dawley Crl: CDBR (5/sex/dose) 0, 10, 100 or 1000 mg/kg bw/day	NOAEL = 1000 mg kg bw/day (limit dose) No LOAEL was observed.	♂ **1000 mg/kg bw day:** Sebaceous hyperplasia at dose site (4 of 5 rats) Minimal to slight lymphocytic infiltration of liver (3 of 5 rats) ♀**1000 mg/kg bw day:** Slight redness at dose site (last week of study)
90-day dietary (4-week off-dose period)	Rat/Sprague-Dawley Crl: CDBR (10/sex/dose) 0, 20, 200, 5000, or 20 000 ppm in diet equal to: ♂: 0, 1.54, 15.4, 388, or 1568 mg/kg bw/day ♀: 0, 1.81, 19.4, 475, or 1786 mg/kg bw/day	NOAEL = ♂: 1568 mg/kg bw/day ♀: 1786 mg/kg bw/day No LOAEL was observed.	No adverse effect was observed.
90-day dietary	Mouse/Crl: CD-1 (ICR) BR (10/sex/dose) 0, 64, 3200, or 6400 ppm in diet equal to: ♂: 0, 10.5, 498, or 1002 mg/kg bw/day ♀: 0, 14.6, 822, or 1178 mg/kg bw/day	NOAEL = 6400 ppm ♂: 1002 mg/kg bw/day ♀: 1178 mg/kg bw/day No LOAEL was observed.	♂ **1002 mg/kg bw day:** Lowered leukocytes, lymphocytes, and monocytes No indication of leukopenia, altered bone marrow histology, or splenomegaly

Study	Species, strain, and doses	NOAEL & LOAEL mg/kg bw/day	Target organ, significant effects, comments
90-day dietary	Dog/Beagle (4/sex/dose) 0, 10, 250, or 1000 mg/kg bw/day	NOAEL = 1000 mg kg bw/day (limit dose) No LOAEL was observed.	No adverse effect was observed.
12-month dietary	Dog/Beagle (4/sex/dose) 0, 5, 100, or 1000 mg/kg bw/day	NOAEL = 1000 mg kg bw/day (limit dose) No LOAEL was observed.	No adverse effect was observed.
Chronic toxicity/oncogenicity			
78-week dietary	Mouse/CRL:CD-1 (ICR) BR (51/sex/dose) 0, 40, 800, or 8000 ppm in diet equal to: ♂: 0, 5.4, 108.9, or 1115.1 mg/kg bw/day ♀: 0, 6.5, 133.7, or 1357.5 mg/kg bw/day	NOAEL = 8000 ppm (limit dose) ♂: 1115.1 mg/kg bw/day ♀: 1375.5 mg/kg bw/day No LOAEL was observed.	No adverse effect was observed. No increase in tumour incidence was observed
2-year dietary	Rat/Sprague-Dawley Crl:CD (IGS) BR (70/sex/dose) 0, 100, 600, 6000, or 20 000 ppm in diet equal to: ♂: 0, 4.5, 25, 246, or 849 mg/kg bw/day ♀: 0, 5.6, 35, 339 or 1135 mg/kg bw/day	NOAEL = 20 000 ppm (limit dose) ♂: 849 mg/kg bw/day ♀: 1135 mg/kg bw/day No LOAEL was observed.	No adverse effect was observed. No increase in tumour incidence was observed.

Study	Species, strain, and doses	NOAEL & LOAEL mg/kg bw/day	Target organ, significant effects, comments
Reproduction and developmental toxicity			
Multi-generation reproductive	Rat/Sprague-Dawley Crl:CDBR (30/sex/dose) 0, 100, 1225,or 15 000 ppm in diet equal to: P parental animals: ♂: 0, 7, 85, or 1082 mg/kg bw/day ♀: 0, 8, 99, or 1229 mg/kg bw/day F_1 parental animals: ♂: 0, 9, 106, or 1349 mg/kg bw/day ♀: 0, 9, 116, or 1434 mg/kg bw/day	**P parental systemic** NOAEL ≥15 000 ppm (limit dose) ♂: 1082 mg/kg bw/day ♀: 1229 mg/kg bw/day **F_1 parental systemic** NOAEL ≥15 000 ppm (limit dose) ♂: 1349 mg/kg bw/day ♀: 1434 mg/kg bw/day No LOAEL for parental systemic toxicity was observed. **Offspring (P generation)** NOAEL ≥15 000 ppm (limit dose) ♂: 1082 mg/kg bw/day ♀: 1229 mg/kg bw/day **Offspring (F_1 generation)** NOAEL ≥15 000 ppm (limit dose) ♂: 1349 mg/kg bw/day ♀: 1434 mg/kg bw/day No LOAEL for offspring toxicity was observed. **Reproductive (P generation)** NOAEL ≥15 000 ppm (limit dose) ♂: 1082 mg/kg bw/day ♀: 1229 mg/kg bw/day **Reproductive (F_1 generation)** NOAEL ≥15 000 ppm (limit dose) ♂: 1349 mg/kg bw/day ♀: 1434 mg/kg bw/day No LOAEL for reproductive performance was observed.	Parental systemic effects: No adverse effect was observed. Offspring effects: No adverse effect was observed. Reproductive performance: No adverse effect was observed. Evidence did not indicate increased sensitivity of neonate to exposure to foramsulfuron.
Developmental toxicity	Rat/Hoe:WISKf(SPF71) Wistar (23/dose) ♀: 0, 5, 71, or 1000 mg/kg bw/day in 1% aqueous methylcellulose from GD 7–16.	Maternal and developmental NOAEL = 1000 mg/kg bw/day (limit dose) No maternal or developmental LOAEL was observed.	No adverse effect was observed. Evidence did not suggest an increased sensitivity of fetus to *in utero* exposure to foramsulfuron.

Study	Species, strain, and doses	NOAEL & LOAEL mg/kg bw/day	Target organ, significant effects, comments
Developmental toxicity	Rabbit/Himalayan (15/dose) ♀: 0, 5, 50, or 500 mg/kg bw/day in 1% aqueous methylcellulose from GD 6–18	Maternal NOAEL = 500 mg/kg bw/day Maternal LOAEL >500 mg/kg bw day Developmental NOAEL = 500 mg/kg bw/day No developmental LOAEL was observed.	**500 mg/kg bw/day:** Reddish urine observed in 6 animals for 1–3 days on GD 10–12, and on GD 15–17 in one animal No adverse effect was observed. Evidence did not suggest an increased sensitivity of fetus to *in utero* exposure to foramsulfuron.

Genotoxicity

Study	Species and strain or cell type and concentrations or doses	Results
Gene mutations in bacteria	*Salmonella typhimurium* strains TA 98, TA 100, TA 1535,and TA 1537; *E. Coli* WP2uvrA *Salmonella*: 0.032, 0.16, 0.8, 4.0, 20.0, 100, 500, 2500, or 5000 µg/plate; with and without liver S9 activation. Ethanol used as a solvent. *E. Col*i: 4, 20, 100, 500, 2500, or 5000 µg/plate; with and without liver S9 activation. Ethanol used as a solvent.	Non-mutagenic Assay was validated with positive control groups.
Gene mutations in mammalian cells in vitro	Chinese hamster lung V79 fibroblasts (HPRT locus) 250, 500, 1000, or 2000 µg/mL with or without liver S9 activation. Ethanol used as a solvent.	Non-mutagenic Assay was validated with positive control groups.
Unscheduled DNA synthesis (in vivo/in vitro)	Primary rat hepatocytes (18 male SD rats) (5/dose and 3/positive control) 600 or 2000 mg/kg (single oral dose; primary cultures scored for UDS 2 and 14 hours after dose administration)	Negative for UDS induction Assay was validated with positive control groups.
Chromosome aberrations in vitro	Primary human lymphocytes 18-2400 µg/mL with (3 h) and without (21 or 45 h) liver S9 activation	Weak clastogenic activity in the absence of S9 activation Assay was validated with positive control groups.
Micronucleus assay (in vivo)	Male and female SHOE:NMRI mice (5/sex/dose/sacrifice time) 200, 1000, or 2000 mg/kg in 1% methyl cellulose (single oral dose 10 mL/kg; bone marrow harvested 12, 24, or 48 hours after dosing)	Non-mutagenic Assay was validated with positive control groups.

Appendix III Residues

Table 1 Integrated food residue chemistry summary

Directions for use of foramsulfuron			
Crop	**Formulation**	**Method/Timing**	**Rates**
Field corn	Tribute™ Solo 32DF WG	Applied as broadcast high volume spraying to 1–8-leaf stage or 5–6 visible collars on the corn plant (the leaf is counted once the next leaf is visible in the whorl)	1 application of 15 g or 30 g foramsulfuron/ha + 1.0% v/v Hasten + 2.5L/ha of 28% UAN
	Option™ 35 DF WG		1 application of 15 g or 35 g a.i./ha + 1.0% v/v Hasten + 2.5L/ha of 28% UAN
	Option™ 2.25 SC		1 application of 15 g or 35 g a.i./ha + 2.5L/ha of 28% UAN

Physicochemical properties	
Melting point/range	194.5°C
pH	4.5 (1% dilution in double-distilled water)
Density	1.45
Water solubility (mg/L at 20°C)	pH 5 (37.2); pH 7 (3293); pH 8 (94 577)
Solvent solubility (mg/L at 20°C)	Acetone (1925); Acetonitrile (1111); 1,2-dichloroethane (185); Ethyl acetate (362); Heptane (<10); Methanol (1660); p-Xylene (<600)
Vapour pressure (Pa)	20°C (4.2×10^{-11}); 25°C (1.3×10^{-10})
Dissociation constant (pK_a)	4.60 at 21.5°C
n-octanol–water partition coefficient LogK_{ow} at 20˚C	pH 2 (Log K_{ow} = 1.44); pH 7 (Log K_{ow} = −0.78); pH 9 (Log K_{ow} = −1.97)
UV/visible absorption spectrum ε(L/mol*cm)	pH neutral 0.33×10^4 (λ =291 nm); pH basic 0.37×10^4 (λ =291 nm); The product decomposes in acidic medium. No absorption above 300 nm

Analytical methodology	
Parameters	**Plant matrices**
Method ID	CF/03/98
Type	Data gathering and enforcement
Analytes	Foramsulfuron, AE F153745
Instrumentation	HPLC with MS detection with electrospray ionization in the positive ion mode; ODS/B column; gradient mobile phase (methanol, acetonitrile and 20 mM acidified ammonium acetate buffer)

Parameters	Plant matrices	
LOQ	0.01 ppm for residues of foramsulfuron in corn grain; 0.02 ppm for residues of AE F153745 in corn grain; 0.05 ppm each for residues of foramsulfuron and AE F153745 in corn forage and stover.	
Standard	External standard	
ILV	An independent laboratory method validation (ILV) was conducted to verify the reliability and reproducibility of method CF/03/98 for the determination of foramsulfuron and AE F153745 residues in plant matrices. The values obtained indicate that method CF/03/98 is reliable.	
Extraction	Solid/liquid extraction; acetonitrile:water (80:20), partitioned with hexane	
Radiovalidation	Foramsulfuron: 83% for grain, 85% for forage, and 86% for whole ears. AE F153745: 94% for grain, 85% for forage, and 91% for whole ears.	
Multiresidue method	Foramsulfuron and AE F153745 were adequately recovered using Protocol C (FDA Multiresidue Method Guidelines in PAM Vol. 1, Appendix II (I/94)) only by using a DB-1 column under level II conditions.	
Nature of the residue in plants		
Crop	**Corn**	
Radiolabel	Phenyl	Pyrimidyl
Test site	field	greenhouse
Treatment	foliar	foliar
Rate (1 application only)	60 g a.i./ha or 261 g a.i./ha	60 g a.i./ha or 240 g a.i./ha
EP	water-dispersible granule	
PHI (days)	77	106
Major metabolites (>10% of the TRRs)	Foramsulfuron (AE F130360)	
Minor metabolites	AE F130619, AE F153745, and AE F092944	
Proposed metabolic pathway	Foramsulfuron is metabolized in corn via two routes. One route involves hydrolysis of the sulfonylurea bridge resulting in formation of AE F153745 and AE F092944. The other route involves hydrolysis of the formamide moiety of the phenyl ring, yielding AE F130619. The petitioner stated that these metabolites are then further degraded, yielding highly polar, water-soluble components.	
ROC	Foramsulfuron	
Confined rotational crop study—soybean, radish and wheat		
Formulation used for trial	Foramsulfuron, water-dispersible granule	
Application rate and timing	62.2–65.6 g a.i./ha (twofold the maximum proposed seasonal rate) applied once to bare soil, and crops planted at 119 DAT; 92.6–93.2 g a.i./ha (threefold the maximum proposed seasonal rate) applied once to bare soil, and crops planted at 30, 59 and 269 DAT.	

Succeeding crops	Identified metabolites
PH Label—Wheat Straw	None identified
PY Label—Soybean forage, wheat forage, wheat grain, wheat straw	None identified
ROC	Foramsulfuron

Nature of the residue in livestock

Species	Radiolabel	Dose level	Sacrifice
Cow (*British Friesian*)	[U-^{14}C phenyl-]Foramsulfuron; 12.87 µCi/mg	187.4 mg/kg bw/day for 7 consecutive days Equivalent to 15.99 ppm in the diet	22 hrs after final administration
18.2% of total administered dose in edible tissues/organs and milk; 6.6% in urine; 75.2% in feces.			
Hen (*Warrens strain*)	[U-^{14}C phenyl-]Foramsulfuron; 996.2 µCi/mg	1.5 mg/bird/day for 14 consecutive days Equivalent to 10 ppm in the diet	22 hrs after final administration
6.6% of total administered dose in edible tissues/organs and eggs; 93.4% excreted.			

	Cow	Hen
Major metabolites (>10% of the TRRs)	Muscle, fat, kidney, and milk: Foramsulfuron, AE F153745 Liver: Foramsulfuron	Egg yolk (10 days): Foramsulfuron Egg yolk (14 days): AE F153745 Liver: Foramsulfuron, AE F153745
Proposed metabolic pathway	Hen: Foramsulfuron is either rapidly cleared or poorly absorbed in poultry because systemic distribution to tissues is low. Much of the administered dose was eliminated as unchanged parent. Cow: Foramsulfuron was mainly excreted as unchanged compound. AE F153745 was the only identifiable cleavage product.	
ROC	Foramsulfuron, for expression of maximum residue limits	

Storage stability

Residues of foramsulfuron and AE F153745 were stable for up to approximately 15 months (468 days) in oron corn grain, up to 8 months (243 days) in or on forage, and up to 7 months (209 days) in or on stover. However, the periods evaluated did not cover the interval between storage and analysis of the corn samples in the supervised trials.

Crop field trials—Corn treatment

Over the 1997 to 1998 period, 23 field trials were conducted: in the US Zones 1 (2 trials), 2 (1 trial), 5 (18 trials), 6 (2 trials); and in Canada Zones 5 (2 trials) and 5B (4 trials). Treatments were conducted at two to three times the maximum proposed seasonal rate.

Commodity	Total Applic. Rate, g a.i./ha	PHI (days)	Analyte	Residue Levels (ppm)		
				Min.	Max.	HAFT
Forage	80–94	37–67	Foramsulfuron	<0.05	<0.05	<0.05
Grain	80–94	60–120	Foramsulfuron	<0.01	<0.01	<0.01
Stover	80–94	65–151	Foramsulfuron	<0.05	<0.05	<0.05
Forage	80–94	37–67	AE F153745	<0.05	<0.05	<0.05

Crop field trials—Corn treatment						
Grain	80–94	60–120	AE F153745	<0.02	<0.02	<0.02
Stover	80–94	65–151	AE F153745	<0.05	<0.05	<0.05
PROPOSED MAXIMUM RESIDUE LIMITS (MRLs)						
Field corn			0.01 ppm			
Field accumulation in rotational crops—soybeans, wheat						
The application rate for soybeans was 60 g a.i./ha, and 90 g a.i./ha for wheat. Residues of foramsulfuron and AE F153745 were reported. Wheat samples were collected but not analysed. Residues of foramsulfuron and AE F153745 were below method LOQ in soybean forage (<0.05 ppm for both metabolites), hay (<0.05 ppm for both metabolites) and seed (<0.01 ppm for foramsulfuron; <0.02 ppm for AE F153745).						
PROCESSED FOOD AND FEED						
Residues of foramsulfuron and AE F153745 were less than the method LOQ for corn forage (<0.05 ppm), stover (<0.05 ppm) and grain (<0.01 ppm for foramsulfuron; <0.02 ppm for AE F153745). Therefore, no further analysis of the processed commodities was conducted. No concentration factor was considered for the petitioned uses.						
LIVESTOCK FEEDING						
Based on the lactating cow and poultry metabolism studies conducted at highly exaggerated rates compared to the maximum theoretical dietary burden, no finite residue of foramsulfuron equivalents is expected in the livestock tissues. A feeding study was therefore considered unnecessary at this time.						

Table 2 Overview of plant/animal metabolism studies and risk assessment

Plant metabolism study	
Crops (n=1)	**Foramsulfuron**
	Field corn
ROC for monitoring and enforcement	Foramsulfuron
ROC for risk assessment	Foramsulfuron
Metabolic profile in diverse crops	Only one crop was studied
Animal studies	
Animals (n=2)	Cow and hen
ROC for monitoring and enforcement	Foramsulfuron
ROC for risk assessment	Foramsulfuron
Metabolic profile in livestock	Similar
Fat soluble residue	No

Dietary risk from food and water			
Chronic non-cancer dietary risk **ADI = 8.49 mg/kg bw** **EEC (chronic) = 0.53 µg a.i./L (90th percentile)** **EEC (acute) = 1.10 µg a.i./L (90th percentile)**	**Population**	**Estimated risk (% of ADI)**	
		Food (MRLs)	**Food + EEC**
	All infants <1 yr old	0	0
	Children 1 to 2 yrs	0	0
	Children 3 to 5 yrs	0	0
	Children 6 to 12 yrs	0	0
	Youth 13 to 19 yrs	0	0
	Adults 20 to 49 yrs	0	0
	Adults 50+ yrs	0	0
	Females 13 to 49 yrs	0	0
	Total Population	0	0

Appendix IV Environmental assessment

Table 1 Fate and behaviour in the terrestrial environment

Property	Test substance	Value	Comments
Abiotic transformation			
Phototransformation on soil	foramsulfuron (AE F130360)	Not determined	Insufficient data.
Biotransformation			
Biotransformation in aerobic soil	foramsulfuron (AE F130360)	DT_{50}: 1.2–3.5 d (clay loam) DT_{50}: 6.6 d (loamy sand) DT_{50}: 8.7 d (silty clay loam) DT_{50}: 9.5 d (sandy loam)	Biotransformation is a principal route of transformation of foramsulfuron in aerobic soils. Foramsulfuron is non-persistent in soils under aerobic conditions.
	major TP AE F130619	DT_{50}: 0.2–0.3 d (loam) DT_{50}: 0.4 d (sand) DT_{50}: 0.8 d (sandy loam)	The major TP AE F130619 is non-persistent in soils under aerobic conditions.
Biotransformation in anaerobic soil	foramsulfuron (AE F130360)	DT_{50}: 229.8 d (sandy loam)	Foramsulfuron is persistent in sandy loam soil under anaerobic conditions.
Mobility			
Adsorption/desorption in soil	foramsulfuron (AE F130360)	Adsorption K_{oc} (mL/g): silty clay loam: 151 loamy sand: 51–89 clay: 63 sand: 38	In the soils tested, foramsulfuron had high to very high mobility.
	major TP AE F153745	Adsorption K_{oc} (mL/g): sand: 63 sandy loam: 50 clay loam: 35 loam sediment: 48	In the soils and sediment tested, the TP AE F153745 had high to very high mobility.

Property	Test substance	Value	Comments
	major TP AE F130619	Adsorption K_{oc} (mL/g): loam: 144 sandy loam: 63 sand: 44 clay loam: 40	In the soils tested, the TP AE F130619 had high to very high mobility.
	major TP AE F092944	Adsorption K_{oc} (mL/g): silt loam: 11 289 silty clay: 917 sandy loam: 395–696 loamy sand: 89–663 sand: 211	For most of the soils tested, the TP AE F092944 had low to moderate mobility; however, the compound was immobile in silt loam and had high mobility in one loamy sand tested.
Field studies			
Field dissipation		DT_{50} for Ecoregion 8.1, Mixed Wood Plains (Ontario sites and New York): 11–18 d DT_{50} for Ecoregion 9.2, Temperate Prairies (Missouri): 13 d	Non-persistent to slightly persistent under field conditions
Field leaching	No data	–	No data

Table 2 Fate and behaviour in the aquatic environment

Property	Test material	Value	Comments
Abiotic transformation			
Hydrolysis	foramsulfuron (AE F130360)	pH 4: 4.5 d pH 5: 10.6 d pH 7: 156 d pH 9: 176 d	Not a principal route of transformation
	major TP AE F130619	pH 7: 140 d	
Phototransformation in water	foramsulfuron (AE F130360)	77–106 d	Not a route of transformation

Property	Test material	Value	Comments
Biotransformation			
Biotransformation in aerobic water	Not applicable	No value	This was addressed by the study on biotransformation in aerobic sediment–water systems.
Biotransformation in aerobic water/sediment systems	foramsulfuron (AE F130360)	First order half-lives (and DT_{50}s) **Total System** Silt clay loam: 31 d (DT_{50}=34 d) Sand: 38 d (DT50=55 d) **Sediment** Silt clay loam: 43 d (DT_{50}=55 d) Sand: 46 d (DT_{50}=43 d)	Foramsulfuron is slightly persistent in aerobic water/sediment systems and slightly to moderately persistent in the sediment phase.
Biotransformation in anaerobic water/sediment systems	foramsulfuron (AE F130360)	First order half-lives (and DT_{50}s) **Total System** Silty clay loam: 39 d (DT_{50}=31 d) **Sediment** Silty clay loam: 61 d (DT_{50}=45d)	Foramsulfuron is slightly persistent in anaerobic water/sediment systems and slightly to moderately persistent in the sediment phase.
Partitioning			
Adsorption/desorption in sediment	Not applicable	–	No study submitted
Field studies			
Field dissipation	Not applicable	–	No aquatic field study submitted.

Table 3 Parameters used for PRZM-EXAMS and LEACHM water modelling (Level I—screening assessment)

Item		Value
Name of the crop that uses the maximum label rate		**Corn**
Maximum allowable rate per year		0.035 kg a.i./ha
Maximum number of applications per year		1
Minimum interval between applications		not applicable
Timing of applications		May to June
Method of application		ground
Solubility in water at pH 7		3293 mg/L
Vapour pressure		3.15×10^{-13} mm Hg (at 20°C)
Henry's Law constant		5.70×10^{-17} atm·m^3/mol (at 20°C)
K_{ow}		0.166
Hydrolysis half-life	**pH 4**	3.7 d
	pH 5	10.1 d
	pH 7	128 d
	pH 9	132 d
Phototransformation half-life in soil		Not available
Aerobic soil biotransformation DT_{50}		9.5 d
Aerobic aquatic biotransformation DT_{50}		38 d
Anaerobic aquatic biotransformation DT_{50}		39 d
Adsorption K_d		0.31
Adsorption K_{oc}		38

Table 4 Maximum EEC of foramsulfuron in vegetation and insects following direct over-spray

Matrix	EEC (mg EP/kg fw)[a]	Fresh/dw ratios	EEC (mg EP/kg dw)
Short range grass	7.49	3.3[b]	24.7
Leaves and leafy crops	3.92	11[b]	43.1
Long grass	3.43	4.4[b]	15.1
Forage crops	4.2	5.4[b]	22.7
Small insects	1.82	3.8[c]	6.92
Pods with seeds	0.375	3.9[c]	1.46
Large insects	0.311	3.8[c]	1.18
Grain and seeds	0.311	3.8[c]	1.18
Fruit	0.469	7.6[c]	3.56

[a] Based on correlations reported in Hoerger and Kenaga (1972) and Kenaga (1973), and modified according to Fletcher et al. (1994)
[b] Fresh/dw ratios from Harris (1975)
[c] Fresh/dw ratios from Spector (1956)

Table 5 Maximum EEC of Option 2.25 SC Herbicide in vegetation and insects following direct over-spray

Matrix	EEC (mg a.i./kg fw)[a]	Fresh/dw ratios	EEC (mg a.i./kg dw)
Short range grass	321	3.3[b]	1060
Leaves and leafy crops	168	11[b]	1850
Long grass	147	4.4[b]	647
Forage crops	180	5.4[b]	972
Small insects	78	3.8[c]	296
Pods with seeds	16	3.9[c]	62.6
Large insects	13.3	3.8[c]	50.7
Grain and seeds	13.3	3.8[c]	50.7
Fruit	20.1	7.6[c]	153

[a] Based on correlations reported in Hoerger and Kenaga (1972) and Kenaga (1973), and modified according to Fletcher et al. (1994)
[b] Fresh/dw ratios from Harris (1975)
[c] Fresh/dw ratios from Spector (1956)

Table 6 Maximum EEC of Option 35 DF Herbicide in vegetation and insects following direct over-spray

Matrix	EEC (mg EP/kg fw)[a]	Fresh/dw ratios	EEC (mg EP/kg dw)
Short range grass	21.4	3.3[b]	70.6
Leaves and leafy crops	11.2	11[b]	123
Long grass	9.8	4.4[b]	43.1
Forage crops	12	5.4[b]	64.8
Small insects	5.2	3.8[c]	19.8
Pods with seeds	1.07	3.9[c]	4.17
Large insects	0.89	3.8[c]	3.38
Grain and seeds	0.89	3.8[c]	3.38
Fruit	1.34	7.6[c]	10.2

[a] Based on correlations reported in Hoerger and Kenaga (1972) and Kenaga (1973), and modified according to Fletcher et al. (1994)
[b] Fresh/dw ratios from Harris (1975)
[c] Fresh/dw ratios from Spector (1956)

Table 7 Maximum EECs in diets of birds and mammals

Organism	Matrix	Maximum EEC		
		Foramsulfuron (mg a.i./kg dw diet)	Option 2.25 SC Herbicide (mg EP/kg dw diet)	Option 35 DF Herbicide (mg EP/kg dw diet)
Bobwhite quail	30% small insects 15% forage crops 55% grain	6.13	263	17.5
Mallard duck	30% large insects 70% grain	1.18	50.7	3.38
Rat	70% short grass 20% grain and seeds 10% large insects	17.7	757	504
Mouse	25% short grass 50% grain and seeds 25% leaves and leafy crops	17.6	752	50.1
Rabbit	25% short grass 25% leaves and leafy crops 25% long grass 25% forage crops	26.4	1130	75.4

Table 8 Summary of effects of foramsulfuron, Option 2.25 SC Herbicide, and Option 35 DF Herbicide on terrestrial organisms

Organism	Exposure	Test substance	Endpoint value	Degree of toxicity[a]
Earthworm	14-d acute	Foramsulfuron (98%)	LC_{50}: >1000 mg a.i./kg dw artificial substrate NOEC (weight gain and mortality): =1000 mg a.i./kg dw LOEC: >1000 mg a.i./kg dw	—
		AE F153745 (TP) (97.8%)	LC_{50}: >1000 mg TP/kg dw artificial substrate NOEC (weight gain and mortality): =1000 mg TP/kg dw LOEC: >1000 mg TP/kg dw	—
		Option 2.25 SC	LC_{50}: 452 mg EP/kg dw artificial substrate NOEC (mortality): =180 mg EP/kg dw LOEC: 319 mg EP/kg dw	—
		Option 35 DF	LC_{50}: >1000 mg EP/kg dw artificial substrate NOEC (weight gain and mortality): =1000 mg EP/kg dw LOEC: >1000 mg EP/kg dw	—
Bee	72-h acute contact	Foramsulfuron (98%)	LC_{50}: >1.9 µg a.i./bee (highest concentration tested) NOEC: = 1.9 µg a.i./bee LOEC: >1.9 µg a.i./bee	Falls within classification category of highly toxic (Atkins et al. 1981), based on the highest concentration tested
		Option 2.25 SC	LC_{50}: >392.2 µg EP/bee NOEC: = 392.2 µg EP/bee LOEC: >392.2 µg EP/bee	Practically non-toxic (Atkins et al. 1981)[b]
		Option 35 DF	LC_{50}: >137.6 µg EP/bee NOEC: = 137.6 µg EP/bee LOEC: >137.6 µg EP/bee	Practically non-toxic (Atkins et al. 1981)
	72-h acute oral	Foramsulfuron (98%)	LD_{50}: >163 µg a.i./bee NOEL: = 163 µg a.i./bee LOEL: >163 µg a.i./bee	Practically non-toxic (Atkins et al. 1981)

Organism	Exposure	Test substance	Endpoint value	Degree of toxicity[a]
		Option 2.25 SC	LD_{50}: >226.32 µg EP/bee NOEL (mortality): = 65.22 µg EP/bee LOEL: 199.66 µg EP/bee	Practically non-toxic (Atkins et al. 1981)
		Option 35 DF	LD_{50}: >27.95 µg EP/bee NOEL (mortality): = 27.95 µg EP/bee LOEL: >27.95 µg EP/bee	Practically non-toxic (Atkins et al. 1981)
Parasitoid (*Aphidius rhopalosiphi*)	Contact	Option 2.25 SC	45–100% (E)	Harmful at 1.3× and slightly harmful at 10%[b, c]
		Option 35 DF	49–99% (E)	Moderately harmful at 1.3× and slightly harmful at 10%[b c]
Predatory mite (*T. Pyri*)	Contact	Option 2.25 SC	−8–70% (E)	Slightly harmful at 1.7× and harmless at 17%[b, c]
		Option 35 DF	24–60% (E)	Slightly harmful at 1.3× and harmless at 10%[b, c]
Ground-dwelling predator (*P. Cupreus*)	Contact	Option 2.25 SC	−12 to −22% (E)	Harmless [b]
		Option 35 DF	19–47% (E)	Harmless [b]
Ground-dwelling predator (*Pardosa* spp)	Contact	Option 2.25 SC	2–8% (E)	Harmless [b]
		Option 35 DF	-2–12% (E)	Harmless [b]
Ground-dwelling predator (*A. Bilineata*)	Contact	Option 2.25 SC	34–68% (E)	Slightly harmful at 1.3× and 10%[b, c]
Foliage-dwelling predator (*Chrysoperla carnea*)	Contact	Option 2.25 SC	17–44% (E)	Harmless [b]
Birds				
Bobwhite quail (*Colinus virginianus*)	14-d acute oral	Foramsulfuron (98%)	LD_{50}: >2000 mg a.i./kg bw NOEC: = 2000 mg a.i./kg bw LOEC: >2000 mg a.i./kg bw	Practically non-toxic

Organism	Exposure	Test substance	Endpoint value	Degree of toxicity[a]
		Option 2.25 SC	LD_{50}: >2000 mg EP/kg bw NOEC: = 2000 mg EP/kg bw LOEC: >2000 mg EP/kg bw	Practically non-toxic
		Option 35 DF	LD_{50}: >2000 mg EP/kg bw NOEC: = 2000 mg EP/kg bw LOEC: >2000 mg EP/kg bw	Practically non-toxic
	8-d dietary	Foramsulfuron (98%)	LD_{50}: >4950 mg a.i./kg diet NOEC: = 4950 mg a.i./kg diet LOEC: >4950 mg a.i./kg diet	At most slightly toxic
	20-week reproduction	Foramsulfuron (97%)	NOEC (M+R)[d]: = 1073 mg a.i./kg diet LOEC: >1073 mg a.i./kg diet	—
Mallard duck (*Anas platyrhynchos*)	8-d dietary	Foramsulfuron (98%)	LD_{50}: >4450 mg a.i./kg diet NOEC: = 4450 mg a.i./kg diet LOEC: >4450 mg a.i./kg diet	At most slightly toxic
	20-week reproduction	Foramsulfuron (97%)	NOEC(M+R)[d]: = 1073 mg/kg diet LOEC: >1073 mg a.i./kg diet	—
Mammals				
Rat	Acute oral	Foramsulfuron	LD_{50}: >5000 mg a.i./kg bw	Low toxicity
		Option 2.25 SC	LD_{50}: >5000 mg EP/kg bw	Low toxicity
		Option 35 DF	LD_{50}: 2788 mg EP/kg bw	Low toxicity
	Dietary (90-d)	Foramsulfuron	NOAEL= ♂: 1568 mg/kg bw/d ♀: 1786 mg/kg bw/d	—

Organism	Exposure	Test substance	Endpoint value	Degree of toxicity[a]
	2-Generation Reproduction	Foramsulfuron	NOAEL(parental systemic) ♂: 1082 mg/kg bw/d ♀: 1229 mg/kg bw/d NOAEL (P generation offspring and reproductive) ♂: 1082 mg/kg bw/d ♀: 1229 mg/kg bw/d NOAEL (F1 generation offspring and reproductive) ♂: 1349 mg/kg bw/d ♀: 1434 mg/kg bw/d	—
Mouse	Dietary (90-d)	Foramsulfuron	NOAEL: ♂: 1002 mg/kg bw/d ♀: 1178 mg/kg bw/d	—
Dog/Beagle	Dietary (12-month)	Foramsulfuron	NOAEL: 1000 mg/kg bw/d	—
Vascular plants				
Vascular plants	Seedling emergence	Option 35 DF	The most sensitive species was ryegrass (monocot) EC_{25}: 131 g EP/ha, NOEC: 85.7 g EP/ha.	
	Vegetative vigour (shoot weight and height)	Option 2.25 SC	Study 1. Most sensitive monocot was ryegrass (based on weight) EC_{25}: 52 g EP/ha. Most sensitive dicot was radish (based on weight) EC_{25}: 22.8 g EP/ha.	
	Vegetative vigour (shoot weight and height)	Option 35 DF	Study 1. Most sensitive monocot was oats (based on weight) EC_{25}: 0.31 g EP/ha. Most sensitive dicot was radish (based on weight) EC_{25}: 1.08 g EP/ha.	

[a] Toxicity classification in accordance with the USEPA (1985), unless otherwise stated

[b] For laboratory tests conducted with inert substrates, beneficial capacity <30% = harmless; 30–79% = slightly harmful; 80–99% = moderately harmful; >99% = harmful, according to the classification scheme of Hassen et al. (1994).

[c] For toxicity studies with beneficial insects, Option 2.25 SC Herbicide was applied at 0.16–0.27, 2–2.67, or 4–5.33 L EP/ha equivalent to 10–17% (drift) to the field boundary, 1.3–1.7× (130–170%) and 2.6–3.4× (260–340%) the proposed maximum field application rate in Canada (1.56 L EP/ha); Option 35 DF Herbicide was applied at 10, 129, or 257 g EP/ha, equivalent to 10% (drift) to the field boundary, and 1.3× (130%) and 2.6× (260%) the proposed maximum field application rate in Canada (which is 100 g EP/ha). For toxicity studies with beneficial insects, E= Reduction in beneficial capacity.

[d] For the avian toxicity tests: M=mortality; R=reproductive effects (effects on egg production, quality and viability, hatching success, chick survival, and weight).

Table 9 Summary of effects of foramsulfuron, Option 2.25 SC Herbicide, and Option 35 DF Herbicide on aquatic organisms

Organism	Exposure	Test substance	Endpoint value	Degree of toxicity
Daphnia magna	48-h acute	Foramsulfuron (98%)	LC_{50}: >102.5 mg a.i./L NOEC: = 102.5 mg a.i./L (M) LOEC: >102.5 mg a.i./L (M)	Practically non-toxic
		Option 2.25 SC	LC_{50}: >10 mg EP/L NOEC: = 3.6 mg EP/L (M) LOEC: = 2.2 mg EP/L (M)	At most as slightly toxic
		Option 35 DF	LC_{50}: >100 mg EP/L NOEC:= 25 mg EP/L (Q) LOEC: = 50 mg EP/L (Q)	Practically non-toxic
	Chronic (21-d reproduction)	Foramsulfuron (98%)	LC_{50}: >102.5 mg a.i./L NOEC:= 102.5 mg a.i./L (M) LOEC: = >102.5 mg a.i./L (M)	—
		Option 2.25 SC	LC_{50}: >3.2 mg EP/L NOEC:= 0.4 mg EP/L (R) LOEC: = 0.8 mg EP/L (R)	—
Rainbow trout	96-h acute	Foramsulfuron (98%)	LC_{50}: >100.9 mg a.i./L NOEC:= 100.9 mg a.i./L (M+Sublethal effects) LOEC: >100.9 mg a.i./L	Practically non-toxic
		Option 2.25 SC	LC_{50}: 14 mg EP/L NOEC:= 11 mg EP/L (M) NOEC:= 3.9 mg EP/L (Sublethal effects)	Slightly toxic
		Option 35 DF	LC_{50}: 3.4 mg EP/L NOEC:= 1.25 mg EP/L (M + Sublethal effects) LOEC: = 1.8 mg EP/L (M)	Moderately toxic
	28-d chronic	Option 2.25 SC	NOEC:= 5 mg EP/L (M) NOEC: = 0.65 mg EP/L (sublethal effects) LOEC: = 1.1 mg EP/L (sublethal effects)	—
Bluegill sunfish	96-h acute	Foramsulfuron (98%)	LC_{50}: >102.7 mg a.i./L NOEC:= 102.7 mg a.i./L (M + Sublethal effects) LOEC: >102.7 mg a.i./L	Practically non-toxic

Organism	Exposure	Test substance	Endpoint value	Degree of toxicity
		Option 2.25 SC	LC_{50}: = 7.8 mg EP/L NOEC:= 3.9 mg EP/L (M) NOEC:= 6.5 mg EP/L (Sublethal effects)	Moderately toxic
		Option 35 DF	LC_{50}: = 3.7 mg EP/L NOEC:= 2.5 mg EP/L (M + Sublethal effects) LOEL: 5 mg EP/L (M)	Moderately toxic
Freshwater algae (*Anabaena flos-aquae*)	96-h acute	Foramsulfuron (94.2%)	E_bC_{50}: = 3.3 mg a.i./L E_rC_{50}: = 8.1 mg a.i./L NOEC (biomass): 0.33 mg a.i./L (1/10th EC_{50}) (most sensitive endpoint)	—
Freshwater algae (*Pseudokirchnerielia subcapitata*)	96-h acute	Foramsulfuron (94.2%)	E_bC_{50}: = 12.5 mg a.i./L E_rC_{50}: = 86.2 mg a.i./L NOEC (cell density): 1.2 mg a.i./L (1/10th EC_{50}) (most sensitive endpoint)	—
		Option 2.25 SC	E_bC_{50}: = 3.5 mg EP/L E_rC_{50}: >5 mg EP/L NOEC (biomass): 1.3 mg EP/L (most sensitive endpoint)	—
Diatoms (*Navicula pelliculosa*)	96-h acute	Foramsulfuron (94.2%)	E_bC_{50}: >112 mg a.i./L E_rC_{50}: >112 mg a.i./L NOEC: = 112 mg a.i./L (all endpoints)	—
Vascular plants (*Lemna gibba*)	7-d acute	Foramsulfuron (98%)	EC_{50}: 0.52 µg a.i./L (frond number) EC_{50}: 1.0 µg a.i./L (growth rate) EC_{50}: 0.65 µg a.i./L (biomass) NOEC: 0.33 µg a.i./L (frond number) (most sensitive endpoint)	
		AE F15375 (96%) (TP of Foramsulfuron)	EC_{50}: >100 mg TP/L (growth rate) EC_{50}: >100 mg TP/L (biomass) NOEC = 100 mg TP/L	

Notes:

1 M = based on mortality; Q = quiescence (immobility for less than 15 seconds with gentle prodding), R = reproduction (neonate production).

2 Sublethal effects for the fish study include lethargy and loss of equilibrium.

3 E_dC_{50}= EC_{50} for cell density; E_bC_{50}= EC_{50} for biomass (area under the growth curve) and E_rC_{50} = EC_{50} for growth curve.

Table 10 Risk to terrestrial organisms

Organism	Exposure	Test substance	Endpoint value	EEC	MOS	Risk
Invertebrates						
Earthworm	Acute	foramsulfuron	NOEC: 1000 mg a.i./kg dw	0.016 mg a.i./kg dw	62 500	Negligible risk
		AE F153745 (TP)	NOEC: 1000 mg TP/kg dw	—	—	Not determined
		Option 2.25 SC	NOEC: 180 mg EP/kg dw	0.667 mg EP/kg dw	270	Negligible risk
		Option 35 DF	NOEC: 1000 mg EP/kg dw	0.044 mg EP/kg dw	22 700	Negligible risk
Bee	Oral	foramsulfuron	NOEL: 183 kg a.i./ha	—	—	Practically non-toxic
		Option 2.25 SC	NOEL: 65.22 µg EP/bee	1500 g EP/ha	—	(Expected to have negligible risk)
		Option 35 DF	NOEL: 27.95 µg EP/bee	100 g EP/ha	—	(Expected to have negligible risk)
	Contact	foramsulfuron	NOEC: 2.1 kg a.i./ha	—	—	Practically non-toxic
		Option 2.25 SC	NOEL: 65.22 µg EP/bee	1500 g EP/ha	—	(Expected to have negligible risk)
		Option 35 DF	NOEL: 27.95 µg EP/bee	100 g EP/ha	—	(Expected to have negligible risk)
Birds						
Bobwhite quail	Acute	foramsulfuron	NOEC: 2000 mg a.i./kg bw	6.13 mg a.i./kg dw	4180 days[a]	Negligible risk

Organism	Exposure	Test substance	Endpoint value	EEC	MOS	Risk
		Option 2.25 SC	NOEC: 2000 mg EP/kg bw	263 mg EP/kg dw	97 days[b]	Negligible risk
		Option 35 DF	NOEC: 2000 mg EP/kg bw	17.5 mg EP/kg dw	1460 days[c]	Negligible risk
	Dietary	foramsulfuron	NOEC: 4950 a.i./ kg dw	6.13 mg a.i./kg dw	810	Negligible risk
	Reproduction	foramsulfuron	NOEC: 1073 mg a.i./kg dw	6.13 mg a.i./kg dw	175	Negligible risk
Mallard duck	Acute	foramsulfuron	Refer to Bobwhite quail acute toxicity.			
	Dietary	foramsulfuron	NOEC: 4450 mg a.i./kg dw	1.18 mg a.i./kg dw	3770	Negligible risk
	Reproduction	foramsulfuron	NOEC: 1073 mg a.i./kg dw	1.18 mg a.i./kg dw	910	Negligible risk
Mammals						
Rat	Acute	foramsulfuron	LD_{50}: >5000 mg a.i./kg bw	17.7 mg a.i./kg dw	142 days[d]	Negligible risk
		Option 2.25 SC	LD_{50}: >5000 mg EP/kg bw	757 mg EP/kg dw	3.8 days[e]	Negligible risk
		Option 35 DF	LD_{50}: 2788 mg EP/kg bw	504 mg EP/kg dw	3.2 days[f]	Negligible risk
	Dietary	foramsulfuron	NOEC: 20 000 mg a.i./kg dw	17.7 mg a.i./kg dw	1130	Negligible risk
	Reproduction	foramsulfuron	NOEC: 15 000 mg a.i./kg dw	17.7 mg a.i./kg dw	850	Negligible risk
Mouse	Dietary	foramsulfuron	NOEC: 15 000 mg a.i./kg dw	17.6 mg a.i./kg dw	850	Negligible risk

Organism	Exposure	Test substance	Endpoint value	EEC	MOS	Risk
Vascular plants						
Non-target terrestrial vascular plants	Vegetative vigour	Option 2.25 SC	EC_{25}: 22.8 g EP/ha	1500 g EP/ha	0.015	High risk
		Option 35 DF	EC_{25}: 0.31 g EP/ha	100 g EP/ha	0	Very high risk

[a] For the acute oral toxicity of foramsulfuron to bobwhite quail, food consumption (FC) was 0.0146 kg dw/ind/day, body weight per individual (BWI) was 0.187 kg bw/ind. The EEC was 6.13 mg a.i./kg dw. Therefore, the daily intake (DI = FC × EEC) was 0.089 mg a.i./ind/day. The $NOEL_{(ind)}$ (=NOEL × BWI) was 374 mg a.i./ind. The number of days for a wild population to reach the NOEL in the laboratory population was calculated as $NOEL_{(ind)}$ / DI (=4180 d).

[b] For the acute oral toxicity of Option 2.25 SC Herbicide to bobwhite quail, FC and BWI were as per the assessment of the risk of foramsulfuron to bobwhite quail. The EEC was 263 mg EP/kg dw. Therefore, the daily intake (DI = FC × EEC) was 3.84 mg EP/ind/day. The $NOEL_{(ind)}$ (=NOEL × BWI) was 374 mg EP/ind. The number of days for a wild population to reach the NOEL in the laboratory population was calculated as $NOEL_{(ind)}$ / DI (=97 d).

[c] For the acute oral toxicity of Option 35 DF Herbicide to bobwhite quail, FC and BWI were as per the assessment of the risk of foramsulfuron to bobwhite quail. The EEC was 17.5 mg EP/kg dw. Therefore, the daily intake (DI = FC × EEC) was 0.256 mg EP/ind/day. The $NOEL_{(ind)}$ (=NOEL × BWI) was 374 mg EP/ind. The number of days for a wild population to reach the NOEL in the laboratory population was calculated as $NOEL_{(ind)}$ / DI (=1460 d).

[d] For the acute oral toxicity of foramsulfuron to rats, one-tenth of the LD_{50} was used as the NOEL. Default values of 0.060 kg dw/ind/day for food consumption (FC) and 0.350 kg bw/ind for BWI were used. The EEC was 17.7 mg a.i./kg dw. Therefore, the daily intake (DI = FC × EEC) was 1.06 mg a.i./ind/day. The $NOEL_{(ind)}$ (=NOEL × BWI) was 151 mg a.i./ind. The number of days for a wild population to reach the NOEL in the laboratory population was calculated as $NOEL_{(ind)}$ / DI (=142 d).

[e] For the acute oral toxicity of Option 2.25 SC Herbicide to rats, one-tenth of the LD_{50} was used as the NOEL. Default values were used for FC and BWI as per the assessment of the risk of foramsulfuron to rats. The EEC was 757 mg EP/kg dw. Therefore, the daily intake (DI = FC × EEC) was 45.4 mg EP/ind/day. The $NOEL_{(ind)}$ (=NOEL × BWI) was 175 mg EP/ind. The number of days for a wild population to reach the NOEL in the laboratory population was calculated as $NOEL_{(ind)}$ / DI (=3.8 d).

[f] For the acute oral toxicity of Option 35 DF Herbicide to rats, one-tenth of the LD_{50} was used as the NOEL. Default values were used for FC and BWI as per the assessment of the risk of foramsulfuron to rats. The EEC was 504 mg EP/kg dw. Therefore, the daily intake (DI = FC × EEC) was 30.2 mg EP/ind/day. The $NOEL_{(ind)}$ (=NOEL × BWI) was 97.7 mg EP/ind. The number of days for a wild population to reach the NOEL in the laboratory population was calculated as $NOEL_{(ind)}$ / DI (=3.2 d).

Table 11 Risk to aquatic organisms

Organism	Exposure	Test substance	Endpoint value	EEC	MOS	Risk
Freshwater species						
Daphnia magna	Acute	foramsulfuron	NOEC: 102.5 mg a.i./L	0.012 mg a.i./L	8540	Negligible risk
		Option 2.25 SC	NOEC: 3.6 mg EP/L	0.50 mg EP/L	7.2	Low risk
		Option 35 DF	NOEC: 25 mg EP/L	0.033 mg EP/L	760	Negligible risk
	Chronic	foramsulfuron	NOEC: 102.5 mg a.i./L	—	NA	No classification
		Option 2.25 SC	NOEC: 0.4 mg EP/L	—	NA	
Rainbow trout	Acute	foramsulfuron	NOEC: 100.9 mg a.i./L	0.012 mg a.i./L	8410	Negligible risk
		Option 2.25 SC	NOEC: 11 mg EP/L (mortality) NOEC: 3.9 mg EP/L (sublethal)	0.50 mg EP/L	227.8	Negligible risk for mortality Low risk for sublethal effects
		Option 35 DF	NOEC: 1.25 mg EP/L	0.033 mg EP/L	38	Negligible risk
	Chronic	Option 2.25 SC	NOEC: 5 mg EP/L (mortality) NOEC: 0.65 mg EP/L (sublethal)	0.05 mg EP/L	10 for mortality 1.3 for sublethal effects	Negligible risk is expected based on the fate of the a.i. and the application pattern
Bluegill sunfish	Acute	foramsulfuron	NOEC: 102.7 mg a.i./L	0.012 mg a.i./L	8560	Negligible risk

Organism	Exposure	Test substance	Endpoint value	EEC	MOS	Risk
		Option 2.25 SC	NOEC: 3.9 mg EP/L	0.50 mg EP/L	7.8	Low risk
		Option 35 DF	NOEC: 2.5 mg EP/L	0.033 mg EP/L	76	Negligible risk
	Chronic	—	No data	—	Not applic-able	Not determined
Freshwater algae	Acute	foramsulfuron	NOEC: 0.33 mg a.i./L	0.012 mg a.i./L	28	Negligible risk
		Option 2.25 SC	NOEC: 1.3 mg EP/L	0.50 mg EP/L	2.6	Low risk
Aquatic vascular plants	Dissolved	foramsulfuron	NOEC: 0.00033 mg a.i./L	0.012 mg a.i./L	0.028	High risk
		AE F153745 (TP)	EC_{50}: >100 mg TP/L	—	—	Not determined