Proposed Interim Registration Review Decision for 22 Sulfonylurea (SU) Herbicides

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I. Introduction

This document is the Environmental Protection Agency's (EPA or the Agency) *Proposed Interim Registration Review Decision for 22 Sulfonylurea (SU)* Herbicides, and is being issued pursuant to 40 CFR sections 155.56 and 155.58. A registration review decision is the Agency's determination whether a pesticide meets, or does not meet, the standard for registration in the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). The Agency may issue, when it determines it to be appropriate, an Interim Registration Review Decision before completing a registration review. Among other things, the Interim Registration Review Decision may: 1) require new risk mitigation measures; 2) impose interim risk mitigation measures; 3) identify additional data or other information required to complete the review; and 4) include schedules for submitting the required data, conducting the new risk assessment, and completing the registration review.

The Agency is issuing a single proposed interim decision (PID) for the 22 SU herbicides because this class of chemicals exhibits a common herbicidal mode of action, shows similar ecological effects, and involves minimal potential human health effects. In addition, this single proposed interim decision ensures a consistent approach to mitigating potential risk and provides equity to stakeholders when implementing regulatory changes for chemicals in this group. The 22 SUs were assessed together in a single ecological risk assessment to ensure consistency in data evaluation and risk assessment assumptions. A separate human health risk assessment was conducted for each SU because the family does not share a common human health risk assessment endpoint. For further information on a specific SU covered in this PID, see the chemical's individual public docket, available on www.regulations.gov. The list of SU docket numbers appears in Table 1.

Note that all uses of the sulfonylurea herbicide ethametsulfuron have been cancelled, and the compound is therefore not assessed in this document. The cancellation of ethametsulfuron is the result of a voluntary request on the part of the chemical's registrant, and took place prior to EPA's planned opening of a Registration Review docket. The final cancellation order for ethametsulfuron published in the Federal Register Notice (FRN) on 2/20/2013[1].

Table 1: Sulfonylurea Herbicides Included in this Proposed Interim Decision

Chemical Name	Docket Number	Year First Registered
Bensulfuron-methyl	EPA-HQ-OPP-2011-0663	1989
Chlorimuron-ethyl	EPA-HQ-OPP-2010-0478	1989
Chlorsulfuron	EPA-HQ-OPP-2012-0878	1982
Flazasulfuron	EPA-HQ-OPP-2011-0994	2007
Foramsulfuron	EPA-HQ-OPP-2012-0387	2002
Halosulfuron-methyl	EPA-HQ-OPP-2011-0745	1994
Imazosulfuron	EPA-HQ-OPP-2015-0625	2010
Iodosulfuron-methyl-sodium	EPA-HQ-OPP-2012-0717	1993
Mesosulfuron-methyl	EPA-HQ-OPP-2012-0833	2004
Metsulfuron-methyl	EPA-HQ-OPP-2011-0375	1986
Nicosulfuron	EPA-HQ-OPP-2012-0372	1990
Orthosulfamuron	EPA-HQ-OPP-2011-0438	2007

[1] https://www.regulations.gov/document?D=EPA-HQ-OPP-2009-1017-0037

Chemical Name	Docket Number	Year First Registered
Primisulfuron-methyl	EPA-HQ-OPP-2011-0844	1990
Prosulfuron	EPA-HQ-OPP-2011-1010	1995
Rimsulfuron	EPA-HQ-OPP-2012-0178	1994
Sulfometuron-methyl	EPA-HQ-OPP-2012-0433	1982
Sulfosulfuron	EPA-HQ-OPP-2011-0434	1999
Thifensulfuron-methyl	EPA-HQ-OPP-2011-0171	1989
Triasulfuron	EPA-HQ-OPP-2012-0115	1992
Tribenuron-methyl	EPA-HQ-OPP-2010-0626	1989
Trifloxysulfuron-sodium	EPA-HQ-OPP-2013-0409	2003
Triflusulfuron-methyl	EPA-HQ-OPP-2012-0605	1996

FIFRA, as amended by the Food Quality Protection Act (FQPA) of 1996, mandated the continuous review of existing pesticides. All pesticides distributed or sold in the United States generally must be registered by the EPA based on scientific data showing that they will not cause unreasonable risks to human health or to the environment when used as directed on product labeling. The registration review program is intended to make sure that, as the ability to assess and reduce risk evolves and as policies and practices change, all registered pesticides continue to meet the statutory standard of no unreasonable adverse effects. Changes in science, public policy, and pesticide use practices will occur over time. Through the registration review program, the Agency periodically re-evaluates pesticides to make sure that as these changes occur, products in the marketplace can continue to be used safely. Information on this program is provided at http://www2.epa.gov/pesticide-reevaluation. In 2006, the Agency implemented the registration review program pursuant to FIFRA section 3(g) and will review each registered pesticide every 15 years to determine whether it continues to meet the FIFRA standard for registration.

The SUs are broad-spectrum herbicides registered in the United States for use in controlling broadleaf weeds, grasses, and sedges on numerous agricultural and non-agricultural use sites, including major crops (*e.g.*, corn, soybean, wheat, rice, cotton) and specialty crops (*e.g.*, fruit and nut orchards, grapes, chicory, chinquapin, endive), as well as forestry, rangeland, rights-of-way, and turf. As noted in Table 1, only two SU chemicals, chlorsulfuron and sulfometuron-methyl, were registered prior to 1984 and were subject to reregistration.

Due to the fact that this PID assesses 22 compounds rather than a single compound, the format of this document differs slightly from PIDs previously published by EPA. The body of this PID is organized in five sections:

1) This Introduction, which includes this summary and a summary of public comments received concerning the ecological preliminary risk assessment and human health preliminary risk assessments and EPA's responses;
2) Use and Usage, which describes how and why the SUs are used, including information on benefits and their uses;
3) Scientific Assessments, which summarizes EPA's ecological and human health risk assessments, any revisions to the preliminary risk assessments, and risk conclusions;
4) Proposed Interim Registration Review Decision, which describes the mitigation measures proposed to address risks of concern and the regulatory rationale for EPA's proposed interim registration review decision; and

5) Next Steps and Timeline for completion of the 22 SU registration review cases.

In addition to Appendix A: Summary of Proposed Actions for the Sulfonylureas and Appendix B: Sulfonylurea Label Table, which are standard attachments to the Agency's single-chemical PIDs, this PID also includes a series of 22 Appendices, gathered together as Appendix C: Chemical Specific Appendices. These appendices contain the proposed interim registration review decision for each of the 22 SU compounds. This PID also includes Appendix D: Summary of Registration Review Timeline for the Sulfonylureas, Appendix E. Chemical Use and Usage, Appendix F. Human Health Incidents for the Sulfonylureas Herbicides, Appendix G. Terrestrial Plant Incidents for the Sulfonylureas Herbicides, and Appendix H: Information to Be Provided on All SU Product Labels.

Pursuant to 40 CFR section 155.50, EPA formally initiated registration review for each of the 22 SUs included in this assessment. For a summary highlighting significant events that have occurred during the registration review of each SU compound, including the publication of Preliminary Work Plans (PWP), Final Work Plans (FWP), Generic Data Call-Ins (GDCI), Preliminary Human Health Risk Assessments (Human Health PRA), and the Preliminary Ecological Risk Assessment (Ecological PRA) issued for these 22 SUs, see Appendix D: Summary of Registration Review Timeline for the Sulfonylureas.

On September 25, 2015 Draft Human Health and Ecological Risk Assessments for the SUs published for a 60 day comment period. Over 50 submitters, including registrants, universities, non-governmental organizations, extension agents, crop and trade organizations, state departments of transportation, and the U.S. Department of Agriculture, provided comments on the technical aspects of these assessments and the benefits of maintaining the availability of these chemicals. These comments did not impact the general risk assessment conclusions. However, some changes did impact the specific risk quotients for some of the SU chemicals. These changes, along with a comprehensive response to all the comments received can be found in these three memos: *Response to Comments on Preliminary Risk Assessment for 22 Sulfonylurea Herbicides*, dated June 1, 2016; *Response to Comments on the Health Effects Divisions Sulfonylurea Risk Assessments*, dated June 3, 2016; and *Sulfonylurea Herbicides: Usage, Response to Comments, Herbicide Resistance Management Measures and Grower Impacts from Potential Risk Mitigation Measures*, dated June 28, 2016. Additional comments specific to individual SU compounds are also referenced in Appendix C of this document. This PID is "interim" because endangered species, endocrine disruption, and pollinator assessments have not yet been completed for the SUs.

II. Use and Usage

The SUs are used nationally on numerous agricultural and non-agricultural use sites (see Appendix E). The use sites cover major crops (*e.g.*, corn, soybean, wheat, rice, cotton) and specialty crops (*e.g.*, fruit and nut orchards, grapes, chicory, chinquapin, endive), as well as forestry, rangeland and turf. SUs are applied pre-emergence and/or post-emergence for control of broadleaf weeds, grasses, and sedges. The national annual average total area treated with SUs was over 70 million acres from 2010-2014 for agricultural uses. See the benefits assessment document *Sulfonylurea Herbicides: Usage, Response to Comments, Herbicide Resistance*

Management Measures and Grower Impacts from Potential Risk Mitigation Measures, dated June 28, 2016, for additional use and usage information regarding the SU herbicides.

III. SCIENTIFIC ASSESSMENTS

A. Human Health

A summary of the Agency's human health risk assessments for the SU herbicides is presented below. The Agency considered the most up-to-date science policies and risk assessment methodologies when considering the human health analysis of the SU herbicides for registration review. The human health risk assessment for each of the SU herbicides can be found in each chemical's public docket, which can be accessed at http://www.regulations.gov/. The docket numbers for the 22 chemicals described in this assessment are listed in Table 1. For additional discussion of the human health assessments for the SUs, see the *Response to Comments on the Health Effects Divisions Sulfonylurea Risk Assessments*, dated June 3, 2016.

1. Risk Conclusions

Dietary Assessment

The Agency reviewed each of the SU herbicides for potential acute and chronic dietary risks. For certain SU herbicides, dietary risk was not estimated because no applicable endpoint was identified in the hazard database (*e.g.*, chlorsulfuron, foramsulfuron). Dietary risk estimates were based on exposures from food, drinking water, or both, depending upon each chemical's use profile. Dietary risk analysis incorporates both exposure to and toxicity of a given pesticide, and is expressed as a percentage of a level of concern (LOC). The LOC is the dose at or below which the Agency predicts there will be no unreasonable adverse health effects to any human population subgroup, including sensitive members of such population subgroups. For dietary risk, this LOC is referred to as the population adjusted dose (PAD), which reflects the reference dose (RfD), either acute or chronic, adjusted to account for the FQPA safety factor. When dietary exposure is calculated to be below 100% of either the acute or chronic PAD, EPA does not consider there to be dietary risks of concern.

Dietary risk estimates for all population subgroups, including the most highly exposed subgroups, did not exceed the Agency's level of concern (LOC) for either acute or chronic exposure for any SU chemical. For all population subgroups, dietary exposures to respective SU herbicides were not of concern, ranging from <1% - 13% of the acute population adjusted doses (aPAD) and from <1% - 63% of the chronic population adjusted doses (cPAD).

Residential Assessment

Residential exposure to SU herbicides varies. Some SU herbicides do not have residential exposures (*e.g.*, orthosulfamuron), others are intended for professional application in residential settings which results in only residential post-application exposures (*e.g.*, iodosulfuron). Still others have residential uses which may result in both residential handler and residential post-application exposures (*e.g.*, halosulfuron). All estimated residential handler and residential post-application risks resulted in margins of exposure (MOEs) greater than the Agency's LOC (MOE $\geq$ LOC of 100), ranging from approximately 2,100 – 990,000,000. An MOE is the ratio of that

substance's toxicity, as expressed by a no-observed-adverse-effect level (NOAEL), to the estimated dose or exposure concentration of human intake. Because the residential assessment MOEs for the SUs are orders of magnitude above the LOC of 100, the Agency has concluded that the SU's residential MOEs do not represent risks of concern.

The Agency also screened all of the SU herbicides for potential exposure and human health risk that may result from spray drift deposition to a residential site. All estimates of potential risk from residential spray drift exposure resulted in MOEs greater than the LOC (MOEs $\geq$ LOC of 100), ranging from approximately 3,000 – 460,000, and therefore do not represent risks of concern.

Aggregate Assessment

For aggregate assessments, dietary (food and/or drinking water) and residential exposures are combined. If the registered uses of a SU herbicide do not result in residential exposures, then the aggregate exposures are equivalent to the dietary exposures (*e.g.*, chlorimuron). For the SU herbicides that have residential exposures, handler and/or post-application (*e.g.*, trifloxysulfuron-sodium, metsulfuron-methyl), the aggregate exposures resulted in risk estimates ranging from MOEs of approximately 3,200 – 110,000. Because these estimates of potential risk resulted in MOEs greater than the LOC (MOEs $\geq$ LOC of 100), they do not represent risks of concern.

Occupational Assessment

Occupational assessments were conducted assuming baseline personal protective equipment (PPE) (*i.e.*, long sleeve shirt, pants, socks and shoes) and, where specified by the label, additional PPE. All occupational exposure scenarios (dermal and/or inhalation) resulted in MOEs that are greater than the LOC of 100, ranging from 180 to 18,000,000, and therefore do not represent risks of concern.

2. Human Incidents

Prior to issuing PRAs for each of the 22 SU compounds, the Agency completed a review of all SU herbicide incidents in the EPA's Office of Pesticide Programs (OPP) Incident Data Systems (IDS), and the Centers for Disease Control and Prevention/National Institute for Occupational Safety and Health (CDC/NIOSH) Sentinel Event Notification System for Occupational Risk-Pesticides (SENSOR) database. The available data vary by chemical, but the IDS database covers the time period from 2006 to 2015 and the SENSOR-Pesticides database includes information from 1998 to 2011. The number of reported human health incidents involving the SUs varies by chemical[2], but based on the overall low frequency and severity of incident cases reported for each of the SU herbicides in both databases, there does not appear to be a concern at this time that would warrant further investigation. The Agency will continue to monitor the incident information and, if a concern is triggered, additional analysis will be conducted. For additional details, see the draft human health risk assessments and human incident report summaries for each SU in the chemical-specific dockets. See Table 1 for the list of chemical-specific docket numbers.

[2] See Appendix F. Human Health Incidents for the Sulfonylureas Herbicides

B. Ecological

The most current Agency science policies and risk assessment methodologies were used to prepare a quantitative risk assessment in support of the registration review of the SU herbicides, a summary of which is presented below. For a detailed discussion of the ecological assessment, see the *Preliminary Ecological Risk Assessment for Registration Review of 22 Sulfonylurea Herbicides,* dated August 26, 2015, and the *Response to Comments on Preliminary Risk Assessment for 22 Sulfonylurea Herbicides*, dated June 1, 2016. The ecological assessment can be viewed in all 22 public dockets (Table 1) for the SU herbicides. Additional ecological risk analysis can be found in the Problem Formulations previously published for each of the 22 SUs. These documents can also be found in the SU public dockets.

A risk assessment was conducted, which examines risks to wildlife associated with the labeled uses. Although this risk assessment analyzed risks from a range of terrestrial plant toxicity data, a comprehensive endangered and threatened (listed) species assessment was not completed for the SUs.

EPA is currently working with its federal partners and other stakeholders to implement an interim approach for assessing potential risk to listed species and their designated critical habitats. Once the scientific methods necessary to complete risk assessments for listed species and their designated critical habitats are finalized, the Agency will complete its endangered species assessment for the SUs. As such, the risk conclusions described below focus on non-listed species.

1. Risk Conclusions

1.1. Terrestrial Assessment

Effects to Birds

Neither acute nor chronic risks to non-listed birds are expected from the SUs. The avian acute endpoints for the SU compounds are non-definitive and range from >1744 mg/kg/bw [3] to > 4650 mg/kg/bw. Because the highest doses tested are well above any to which the Agency expects birds will be exposed, the toxicity data indicate no acute risks of concern. Chronic (no observed adverse effect concentration or NOAEC) endpoints for birds ranged from 28 ppm to 128 ppm. As with the acute avian endpoints, these chronic hazard values do not raise risk concerns for birds from the SUs in light of the application rates for these chemicals. As birds are the surrogate for reptiles and terrestrial-phase amphibians, these conclusions also apply to those taxa.

Effects to Mammals

An analysis of the acute toxicity data for mammals showed that 17 of the SU herbicides resulted in a Lethal Dose (LD)$_{50}$ value[4] of >5000 mg/kg-bw, and the LD$_{50}$ values for the 4 remaining chemicals ranged from 546 mg/kg-bw to >3750 mg/kg-bw. A mammalian LD$_{50}$ was unavailable

[3] bw = bodyweight

[4] LD$_{50}$ is the median dose resulting in lethality of 50% of the animals tested.

for imazozulfuron. These LD_{50} values (representing acute hazard) did not yield risk concerns for the Agency. The available NOAECs/LOAELs (representing chronic hazard) ranged from 25 ppm to 15000 ppm and 1.9 mg/kg-bw to 5000 mg/kg-bw, respectively. LOCs[5] were not exceeded for non-listed mammals.

Effects to Invertebrates

Limited ecotoxicity data for terrestrial invertebrates is available for the SU compounds. The available data indicate that the SU compounds are of low toxicity to terrestrial invertebrates. Based on these data, the potential risk to terrestrial invertebrates is expected to be minimal. However, given the importance of pollinators in the environment, the Agency proposes to require a more complete dataset in order to assess potential risk to pollinators. See the ecological Data Needs portion of Section IV. Risk Characterization and Proposed Interim Registration Review Decision, as well as Appendix C, for additional information regarding EPA's anticipated pollinator data needs for each of the SU compounds.

Effects to Terrestrial Plants

Both runoff and spray drift have the potential to negatively impact terrestrial plants. Exposure to SUs may result in adverse effects to plants inhabiting terrestrial or wetland areas located adjacent to or downwind from an application site. The standard measurement endpoint for assessing risk to terrestrial plants is the Inhibition Concentration $(IC)_{25}$, which is the concentration that results in a 25% inhibition in plant height or standing biomass. The Agency determines a risk to be of concern when the Risk Quotient (RQ) is equal to or greater than 1 (*i.e.*, when the EEC, or expected environmental concentration, of a pesticide equals to or exceeds the IC_{25} of that pesticide on a tested plant species). At the screening level, the most sensitive tested species (*i.e.*, test species with the lowest IC_{25}) is used to determine the RQ. The SU risk assessment includes additional evaluation of all of the tested plants that make up the distribution of toxicity values available.

For the SUs, the terrestrial plant RQs from spray drift only (*i.e.*, assuming no runoff) have a wide range. The spray drift-only RQs calculated by TerrPlant for the most sensitive tested plant species, out of the 10 species tested for each SU, range from 0.44 (RQ<1, no risks of concern) for imazosulfuron to 1203 (RQ>1, risks of concern) for iodosulfuron-methyl-Na. The distances where RQs fell below EPA's LOC were also analyzed using the AgDrift model. Because spray drift is reduced with distance, the further the distance from the edge of the field, the lower the expected exposure. However, for some SUs, even at a distance of 1,000 feet from the edge of the field (i.e., at the limit of the AgDrift model), RQs would still exceed the LOC of 1.

The Agency analyzed the effect of droplet size on the risk to terrestrial plants in adjacent fields from spray drift. Results suggest that increasing droplet size spectra (DSS) to coarse, very coarse, or extremely coarse can significantly reduce exposures to non-target plants from spray drift, particularly at distances further from the treated field for both ground and aerial applications. This in turn can reduce the number of RQ exceedances for the SUs at various distances from the edge of the treated field, because coarser droplets the distance from the edge of the treated field where risks to non-targets may occur.

[5] For standard LOC values used in ecological risk assessment, see https://www.epa.gov/pesticide-science-and-assessing-pesticide-risks/technical-overview-ecological-risk-assessment-risk.

In addition to risks from spray drift, risks to adjacent fields from a combination of runoff and spray drift were also incorporated into EPA's analysis of the SUs. For risks to terrestrial plants from runoff in dry areas, the RQs range from <0.1 (the lower bound of the TerrPlant model) for triflusulfuron-methyl to 727 for chlorimuron-ethyl. For risks to terrestrial plants from runoff in semi-aquatic areas, the RQs range from 0.14 for triflusulfuron-methyl to 4000 for chlorimuron-ethyl.

For both aquatic and terrestrial plants, the Agency found that risk conclusions were very similar whether parent-only or parent-plus-degradate calculations were considered. Available toxicity data for SU degradates strongly suggest they are not nearly as toxic to plants as the intact parent SU herbicides. Therefore, the stressor of concern for plants is the parent SU only.

1.2 Aquatic Assessment

Effects to Aquatic Non-Plant Taxa

Based on the available ecotoxicity data for the SU herbicides, these chemicals range from slightly toxic to practically non-toxic to freshwater invertebrates, freshwater fish, estuarine/marine invertebrates, and estuarine/marine fish on an acute basis. On a chronic basis, the SU compounds indicated no risks of concern to any of the tested aquatic animal species. The Agency concludes that there are no direct risks of concern from SU herbicides to fish or aquatic invertebrates, either freshwater or estuarine/marine. Freshwater fish are assumed to be representative of aquatic-phase amphibians in this assessment.

Effects to Aquatic Plants

A screening-level assessment for risks to vascular and non-vascular aquatic plants was completed. For vascular plants, the LOC (RQ > 1) was exceeded for 16 SU herbicides. The RQ, which was calculated as the ratio of the EEC to the 50% effect on growth (IC_{50}), ranged from less than 1 (mesosulfuron-methyl, tribenuron-methyl, iodosulfuron-methyl-Na, bensulfuron-methyl, and rimsulfuron) to 105 (halosulfuron).

Estimated risks to non-vascular plants (algae) were generally less than risks to vascular plants (duckweed). For non-vascular plants, three SUs (chlorimuron-ethyl, sulfometuron-methyl, and halosulfuron-methyl) exceeded the LOC of 1, and the maximum RQ was 5.3.

2. Ecological Incidents

As of December 2014, a review of the Ecological Incident Information System (EIIS) and EPA's Aggregate Incident Database (IDS), covering the time period of 1984 to 2014, found 935 terrestrial plant incidents across the SU herbicides. These incident reports are accompanied by varying degrees of confidence in the certainty of the association with a specific chemical, application or misapplication, as well as with the legality of the use of the chemical. Incidents were predominantly reported for damage to non-target crop plants. Non-target plant incidents reported on crops suggest that other non-target plants exposed to drift or run-off are also impacted. However, due to the economic value of crop plants relative to other non-crop plants, it is possible that the Agency may receive fewer reports of damage to non-target plants other than to crops and high-value ornamentals.

In addition to the summary of terrestrial plant incidents included in Appendix G: Terrestrial Plant Incidents for the Sulfonylureas Herbicides, sulfometuron-methyl was alleged to be the cause of a large ecological incident caused by wind-driven erosion of soil containing sulfometuron residues (EIIS Incident Report number 1011666-001). This one highly probable incident allegedly resulted from an application of Oust herbicide (containing sulfometuron-methyl) made by the Bureau of Land Management (BLM) in the fall of 2000 to approximately 22,000 acres of Idaho forest and grassland that had been severely damaged by wildfires. Investigations by the Idaho Department of Agriculture reported that following the aerial application of Oust at a rate of 0.0625 lb ai/A, drought and windy conditions (up to 20-40 mph) caused erosion of dry, Oust-treated soil. Thousands of acres were alleged to have been affected and crop damage was estimated to be in excess of $78 million.

In addition, wildlife incidents have also been reported for some of the SUs; however, evaluation of the incident reports together with the toxicity profile of these chemicals suggest SUs were not the primary cause of these incidents. For additional information on the incidents reported for the SUs, see page 58 of the August 26, 2015 *Preliminary Ecological Risk Assessment for Registration Review of 22 Sulfonylurea Herbicides*. More details on the available ecological incident reports for individual chemicals may be found in the problem formulation documents in the chemical-specific dockets in Regulations.gov (see Table 1 for the list of SU docket numbers).

3. Ecological Risk Characterization

3.1 Terrestrial Plants

As a class, the SUs are toxic to many plants at levels well below either average or typical application rates. The Agency's ecological risk assessment for the SUs indicated there are risks to non-target terrestrial plants both adjacent to, and at various distances from the edge of the application site. This analysis provides a range of risks from exposure to the SUs for non-listed, non-target terrestrial plants, under a range of conditions affecting spray drift. Risks to listed species will be assessed before the Agency completes registration review. As described below, changes in application practices which reduce spray drift can greatly reduce the size of the area receiving off-site transport of SUs and therefore the associated risks from exposure of SUs to terrestrial plants.

Terrestrial plant risk assessments typically compare exposure from spray drift to the most sensitive plant endpoint from the vegetative vigor or seedling emergence study. The ecological risk assessment for the SUs (available in the public docket for each SU listed in Table 1) includes an analysis of seedling emergence and vegetative vigor IC_{25} information from 10 test plant species per SU as well as an evaluation of the differences in exposure resulting from the use of a wide spectrum of droplet sizes during application.

For each SU, data from an assortment of both monocot and dicot test species were collected. The available terrestrial plant data suggest that grasses were generally less sensitive to SUs than non-grasses.

Droplet size can have a significant impact on the distance at which spray drift results in exposure beyond the edge of the intended application site. In general, smaller pesticide spray droplets are

expected to drift further off-site than larger droplets. The SU ecological risk assessment analyzed the effects of droplet size for the SUs by assessing the number of RQ exceedances beyond the edge of the application site using three different aerial application droplet size spectra: medium to coarse, coarse to very coarse, and very coarse to ultra coarse[6]. As expected, the analysis showed a decrease in the number of RQ exceedances from the edge of the field as droplet size increases and as distance from the application site increases. That is, the further one moves from an SU application site, the less non-target drift is found with larger droplets.

The SU ecological assessment also indicated that using larger droplet sizes during SU applications can significantly reduce the number of RQ exceedances at any given distance from the application site. For example, when analyzing all 22 SUs and all the test species in aggregate, the number of exceedances at 1000 feet from the application site for very coarse to ultra coarse droplets is roughly half the number of exceedances for medium to coarse droplets.

Although the spray drift analysis in the SU ecological assessment focused on aerial applications, the same general trends are expected to hold true for ground applications across droplet spectra. Ground application boom heights were also analyzed for effects on RQ exceedances and, while not as significant as droplet size, lowering the boom height results in a decreased number of RQ exceedances. Estimated RQs associated with ground applications can be found in the *Preliminary Ecological Risk Assessment for Registration Review of 22 Sulfonylurea Herbicides* and in the *Response to Comments on Preliminary Risk Assessment for 22 Sulfonylurea Herbicides*, dated June 1, 2016.

The risk assessment concludes that SUs are likely to pose a significant risk to non-target plants in adjacent areas through combined exposure via runoff and spray drift. Soil mobility studies indicate that the SUs can be characterized as "mobile" to "moderately mobile." Additionally, SUs tend to be hydrophilic, do not volatilize, and are generally resistant to degradation. These characteristics of the SUs are conducive to off-site transport via runoff, resulting in the possibility of damage to both aquatic and terrestrial plants adjacent to a treated field. Runoff distances from the edge of the application area are difficult to quantify, especially for channelized flow, but based on general fate dynamics, it can be expected that runoff exposure decreases with distance from the application site.

Although the terrestrial plant risk assessment for the SUs takes the full distribution of plant endpoints into consideration, the available plant toxicity studies introduces a measure of uncertainty into the conclusions. The plant species tested to model the effects of non-target exposure to SUs (and other pesticides) are mostly domesticated crop species (such as carrots and corn) rather than wild plant species. Although these test species may not be the specific plants of concern for non-target damage from the use of SUs, the test species are intended to be representative of the range of non-target grasses and non-grasses that may be found in areas adjacent to pesticide application sites. The Agency realizes that one cannot test all possible non-target plant species and notes that, while the required test species have not been selected at random, it is difficult to say how well they represent the spectrum of plants in the environment.

[6] "Ultra coarse" droplets are even coarser than "extremely coarse" droplets, and "extremely coarse" droplets are in turn coarser than "very coarse" droplets.

Nonetheless, the Agency has strived to design its tests and assessments to be protective of the range of non-target monocot and dicot species that may be found in the environment.

3.2 Aquatic Plants

Most SUs pose some level of risk to vascular and non-vascular aquatic plants, although the risk is not as great as to terrestrial plants. Sixteen of the 22 SUs had Tier 1 RQs that equaled or exceeded the LOC for vascular aquatic plants and 3 SUs exceeded the LOC for non-vascular plants. These RQs represent the potential risk to aquatic plants in water bodies directly adjacent to a treated field, because the Agency's aquatic exposure model is an edge-of-field model. As noted above, the amount of runoff and the likelihood that it might reach surface water through runoff both decline with distance from a treated field. Significant reductions in exposure to aquatic plants can be achieved by reductions in spray drift, which would reduce the number of water bodies receiving inputs of SUs by drift, and reduce the amount deposited in those waterbodies that are still close enough to be affected by spray drift.

3.3 Listed Species

Although the Agency is not making a complete endangered species finding at this time and the risk conclusions described in this document pertain to non-listed species; the proposed label changes to address concern for and reduce spray drift impact to non-target (non-listed) terrestrial plants are also expected to reduce the extent of exposure and may reduce risk to the following listed taxa whose range and/or critical habitat co-occur with the use of the SUs: terrestrial and semi-aquatic plants; terrestrial invertebrates; birds; terrestrial and aquatic-phase amphibians; reptiles; mammals; freshwater and marine/estuarine fish and invertebrates.

EPA has not yet fully evaluated risks to listed species at this time. The Agency will complete its endangered species assessment and any necessary consultation with the National Marine Fisheries Service and the U.S. Fish and Wildlife Service (the Services) for the SUs prior to completing the registration review for these compounds.

C. Endangered Species Assessment

In November 2013, the EPA, along with the Services and the United States Department of Agriculture (USDA), released a summary of their joint Interim Approaches for assessing risks to endangered and threatened species from pesticides. The Interim Approaches were developed jointly by the agencies in response to the National Academy of Sciences' (NAS) recommendations and reflect a common approach to risk assessment shared by the agencies as a way of addressing scientific differences between the EPA and the Services. The NAS report outlines recommendations on specific scientific and technical issues related to the development of pesticide risk assessments that EPA and the Services must conduct in connection with their obligations under the Endangered Species Act (ESA) and Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA).

The Joint Interim Approaches were released prior to a stakeholder workshop held on November 15, 2013. In addition, the EPA presented the Joint Interim Approaches at the December 2013 Pesticide Program Dialogue Committee (PPDC) and State-FIFRA Issues Research and Evaluation Group (SFIREG) meetings. The agencies also held stakeholder workshops, in April and October 2014, and in April 2015, allowing opportunities for stakeholders to comment on the

Interim Approaches. Additional workshops are planned to enhance stakeholder involvement. As part of a phased, iterative process for developing the Interim Approaches, the agencies will also consider public comments on the Interim Approaches in connection with the development of draft biological evaluations completed as part of registration review for pilot chemicals. The details of the joint Interim Approaches are contained in the white paper Interim Approaches for National-Level Pesticide Endangered Species Act (ESA) Assessments Based on the Recommendations of the National Academy of Sciences April 2013 Report, dated November 1, 2013.

The agencies are continuing to develop and work toward implementation of the Interim Approaches assessing the potential risks of pesticides to listed species and their critical habitat. Therefore the ecological risk assessment supporting this PID for SU herbicides does not contain an ESA analysis that includes effects determinations for specific listed species or critical habitat. EPA has not yet completed effects determinations for specific species or habitats. For this PID, EPA's evaluation assumed that, for all taxa of non-target wildlife and plants, listed species and designated critical habitats may be present in the vicinity of the application of SU herbicides. Based on the results of previous risk assessments and a review of currently available toxicity data, EPA has determined that the only taxa for which risks are above EPA's LOC for listed and non-listed species are for terrestrial and aquatic plants. Once the scientific methods being developed by the agencies have been fully vetted, this assessment will allow EPA to focus its future evaluations on the types of species where the potential for effects exists. Once the agencies have fully developed and implemented the scientific methodology for evaluating risks for listed species and critical habitats, these methods will be applied to subsequent analyses for SU herbicides as part of completing this registration review.

D. Description of Benefits

The SUs are herbicides used throughout the United States for control of broadleaf weeds, grasses, and sedges on agricultural and non-agricultural use sites. The SUs are effective at low application rates (ounces rather than pounds per acre) and several different application timings against a wide range of weed species. The wide application timing spectrum of the SU compounds also adds to their utility as they can be applied either as a preplant, pre-emergent, or post-emergent treatment. The SUs are acknowledged by EPA and certain stakeholders to be important to weed management in minor agricultural crops, to invasive species management, and to herbicide resistance management. Further, although the Agency lacks specific data about the use of compounds in industrial, rights-of-way (ROW) vegetative management and on turf and sod farms, comments received during the Preliminary Risk Assessment comment period indicate that the SU compounds are of particular benefit for these use sites.

Although there is some overlap between different SU compounds in their lists of registered uses, the SUs are not necessarily substitutes for each other. As a class, the SUs are beneficial tools in a wide variety use sites. A public comment from the USDA on the sulfonylurea PRAs highlights three critical areas of importance for the use of SU compounds: weeds management in minor crops, invasive weed management, and herbicide resistance management. Certain SU herbicides are among the few herbicide tools available for use on minor, high cash value crops (e.g., halosulfuron and imazosulfuron on vegetable crops). Other SU herbicides such as chlorsulfuron, metsulfuron, rimsulfuron, sulfometuron and sulfosulfuron are used alone or in mixtures for

managing invasive annual and perennial grass and broadleaf species, both annual and perennial species in pasture, range, Conservation Reserve Program land, forest, native grass establishment, and restoration. Key invasive species controlled by select SU herbicides includes cheat grass, yellow star thistle, Canada thistle, and others. The US Forest Service also uses SUs to control noxious weeds on lands under its jurisdiction. This wide variety of specialty uses for the SUs, combined with their lack of health risk concerns for humans or animals, makes the SUs an important class of herbicidal tools. For additional details on the benefits of the SU herbicides, see the benefits assessment document *Sulfonylurea Herbicides: Usage, Response to Comments, Herbicide Resistance Management Measures and Grower Impacts from Potential Risk Mitigation Measures*, dated June 28, 2016.

E. Endocrine Disruptor Screening Program

As required by FIFRA and FFDCA, EPA reviews numerous studies to assess potential adverse outcomes from exposure to chemicals. Collectively, these studies include acute, subchronic and chronic toxicity, including assessments of carcinogenicity, neurotoxicity, developmental, reproductive, and general or systemic toxicity. These studies include endpoints which may be susceptible to endocrine influence, including effects on endocrine target organ histopathology, organ weights, estrus cyclicity, sexual maturation, fertility, pregnancy rates, reproductive loss, and sex ratios in offspring. For ecological hazard assessments, EPA evaluates acute tests and chronic studies that assess growth, developmental and reproductive effects in different taxonomic groups. As part of its most recent registration decisions for the SUs, EPA reviewed these data and selected the most sensitive endpoints for relevant risk assessment scenarios from the existing hazard database. However, as required by FFDCA section 408(p), the SUs are subject to the endocrine screening part of the Endocrine Disruptor Screening Program (EDSP).

EPA has developed the EDSP to determine whether certain substances (including pesticide active and other ingredients) may have an effect in humans or wildlife similar to an effect produced by a "naturally occurring estrogen, or other such endocrine effects as the Administrator may designate." The EDSP employs a two-tiered approach to making the statutorily required determinations. Tier 1 consists of a battery of 11 screening assays to identify the potential of a chemical substance to interact with the estrogen, androgen, or thyroid (E, A, or T) hormonal systems. Chemicals that go through Tier 1 screening and are found to have the potential to interact with E, A, or T hormonal systems will proceed to the next stage of the EDSP where EPA will determine which, if any, of the Tier 2 tests are necessary based on the available data. Tier 2 testing is designed to identify any adverse endocrine-related effects caused by the substance, and establish a dose-response relationship between the dose and the E, A, or T effect.

Under FFDCA section 408(p), the Agency must screen all pesticide chemicals. Between October 2009 and February 2010, EPA issued test orders/data call-ins for the first group of 67 chemicals, which contains 58 pesticide active ingredients and 9 inert ingredients[7]. A second list of chemicals identified for EDSP screening was published on June 14, 2013[8] and includes some

[7] www.regulations.gov

[8] See http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OPPT-2009-0477-0074 for the final second list of chemicals.

pesticides scheduled for registration review and chemicals found in water. The SUs are not on either the first or second list. For further information on the status of the EDSP, the policies and procedures, the lists of chemicals, future lists, the test guidelines and the Tier 1 screening battery, please visit our website.[9]

In this PID, EPA is making no human health or environmental safety findings associated with the EDSP screening of the SUs. Before completing this Registration Review, the Agency will make EDSP FFDCA section 408(p) determinations for each of the 22 SUs.

IV. Risk Characterization and Proposed Interim Registration Review Decision

A. Proposed Risk Mitigation Measures

In evaluating potential risk mitigation for the SUs, EPA considered the risks, the benefits, and the use pattern of these compounds. EPA believes that there is potential direct risk to non-target plants from the use of the SU herbicides. The Agency is proposing mitigation for these risks after weighing both the potential risks and the potential benefits associated with use of these compounds.

Sensitivity of Modelled Risks from Sulfonylureas to Potential Mitigation Variables
The terrestrial plant risk assessment for the SUs, which compares estimated exposure to the toxicity endpoint for the most sensitive plant tested, indicates that all SUs except imazosulfuron pose a risk to non-target terrestrial plants. Further analysis with the AgDrift model helps distinguish which SUs pose a greater and lesser risk, by calculating how far exposures of concern would extend from the treated field. This analysis also allows consideration of different application methods and spray drift parameters. This is important, because the effects distance for the most sensitive species is usually in hundreds of feet and is often beyond 1000 feet for standard assumptions such as aerial application and a medium droplet size spectrum (DSS).

An evaluation of the effect of application methods and different spray drift parameters is shown in Table 2. Three representative SUs were selected to represent the range of calculated RQs, from lower to higher: nicosulfuron, prosulfuron and sulfometuron methyl. With aerial application and a medium droplet size, all three SUs have effects at distances greater than 1000 ft for the most sensitive species. This is shown for illustrative purposes, as these conditions do not reflect all SU labels (*e.g.*, sulfometuron labels require users to apply an extremely coarse DSS).

AgDrift indicates that application using a larger DSS would lead to a significant reduction in the distance to which exposures of concern would occur, although the effect depends on the toxicity of the individual SU. For instance, if aerial application was made with a very coarse DSS, the effect areas for nicosulfuron and prosulfuron would be reduced from over 1000 feet each to 114 and 249 feet, respectively. The effect area for sulfometuron-methyl should be expected to be smaller as well, but it would still be beyond the 1000-foot limit calculated by AgDrift. The mitigation achieved by using a ground application is significant, as well. For ground applications, the distance at which the most sensitive plant tested would receive an exposure of

[9] http://www.epa.gov/endo/

concern with nicosulfuron would only be 60 feet for a medium DSS and 14 feet for a very coarse DSS, while for prosulfuron these distances would be 268 feet and 32 feet, respectively.

To help inform risk management decisions, it can be useful to look at other points on the distribution of tested species to help clarify the value of changing the DSS. For instance, instead of looking at only the most sensitive of the 10 species tested, one could look at the 20th percentile of the distribution, or even the 50th. An analysis of this type is presented below in Table 2 for three example SUs: nicosulfuron, prosulfuron, and sulfometuron. Of these three SUs, sulfometuron is toxic to the most sensitive plant tested at much lower levels than either nicosulfuron or prosulfuron. Table 2 better shows the benefit of increasing the DSS for a more toxic SU like sulfometuron by considering more than just the most sensitive plant tested. If one were to apply sulfometuron with a medium DSS, all plants from the most sensitive to those at the 50th percentile of the distribution would receive exposures of concern beyond 1000 feet. However, a ground application with a very coarse DSS would only have an exposure of concern for the most sensitive plant to 706 feet, the 20th percentile plants to 258 feet, and the 50th percentile plant to 119 feet. Increasing the DSS would not eliminate the risk to non-target plants, but would significantly reduce the footprint for risks of concern.

Table 2. Effects of spray application practice on the effects distance for the most sensitive vegetative vigor test species, the 20% species, and median species as estimated with AgDrift.

	Vegetative Vigor Effects Distance (ft)					
Example Chemical	**Most Sensitive**		**20% of Tested Species**		**50% of Tested Species**	
Aerial Spray						
Droplet Size:	Medium	Very Coarse	Medium	Very Coarse	Medium	Very Coarse
nicosulfuron	>1000	114	174	75	69	26
prosulfuron	>1000	249	338	128	256	102
sulfometuron methyl	>1000	>1000	>1000	>1000	>1000	>1000
Ground Spray						
Droplet Size:	Medium	Very Coarse	Medium	Very Coarse	Medium	Very Coarse
nicosulfuron	60	14	28	9	9	4
prosulfuron	268	32	76	16	50	13
sulfometuron methyl	>1000	706	>1000	258	> 1000	119

Table 3 summarizes results for all SUs, considering the 20th percentile toxicity endpoint in the distribution, meaning that the endpoint is protective of 80% of the plants tested in our guideline plant studies. That is to say, this table shows the number of SUs out of 22 that have risks only to the top 20 percent of the distribution with the same set of application practices as for the previous table. For example, 13 of the 22 SUs are not protective of 80% of the species at 1000 ft. when a medium spray is applied aerially, but that number drops to 9 of 22 if the same application is performed with a very coarse DSS. Almost all of the 22 SUs would have risks of concern for the 20th percentile plant on the distribution using a medium DSS, whether for aerial or ground application. This number drops to only 7 SUs for ground spray with a very coarse DSS at 100 feet from the edge of the treated field. This shows the effectiveness of increasing the DSS, but

also that some of the SUs would require an even larger DSS in order to protect plants off of the treated field.

Table 3. Number of SUs (out of 22) for which Exposure to the 20th Percentile Plant Poses Risk Concerns at Varying Distances, Based on Vegetative Endpoints

Application Practice	Buffer Width		
	1000 ft.	100 ft.	66 ft
Medium Ground Spray	8	19	20
Very Coarse Ground Spray	1	7	8
Medium Aerial Spray	13	21	21
Very Coarse Aerial Spray	9	20	21

Care should be taken in the interpretation of percentiles of the distribution of tested species to those that might represent the general population of plants in the environment. The plant species used for vegetative vigor and seedling emergence tests are mostly agricultural crops, and were selected at least partly because they are easy to propagate in the laboratory. How the distribution of toxicity for test species relates to distributions for all species or for the species that occur in a particular habitat is uncertain. However, even with these limitations on interpretation, calculating the estimated changes in the extent of risk associated with different fractions of the test species distribution can be used to make more informed risk management decisions.

Justification for Focusing on Spray Drift Reduction for the Sulfonylureas
As mentioned above, the risk assessment indicated that SUs pose a risk to terrestrial plants adjacent to a treated field via runoff and spray drift exposure, and to plants hundreds of feet away from a treated field through exposure by spray drift. Calculations with the spray drift exposure model AgDrift indicate that for many SUs, the potential distance where risk is below EPA's LOC for terrestrial plants could occur beyond 1000 feet, the validated limit at which the Agency's model is able to simulate exposure. Mitigation measures are possible to reduce both runoff and spray drift, but the balance of risk reduction that can be achieved with the cost to users is different for the two exposure routes.

Given the considerable off-field distance to which SUs could cause adverse effects to terrestrial plants through spray drift exposure, a greater number of plants and plant communities are likely to be affected by drift as compared to by runoff to an adjacent field or waterbody. This effect is compounded by the fact that some spray drift would be expected with each application, and that wind direction at the time of application can be different each time an SU is applied. Those plants that are directly downwind would be subject to the greatest exposure from spray drift from the adjacent field. Runoff may be an additional source of exposure depending on gradient and may require a significant rain event soon after application for the greatest impact.

There are a number of application parameters that can be adjusted to reduce spray drift without posing a large burden on the grower. The most effective of these is to use the coarsest spray droplet size spectrum that would still be efficacious for target weed control. Depending on the DSS applied, the distance to which an exposure of concern for terrestrial plants would occur could shrink by hundreds of feet. While reducing spray drift would reduce exposure to all non-target plants, for a number of the SUs, the ecological risk assessment indicates that this reduction

of the area of effect would not only reduce the risks predicted for plants similar to the most sensitive plant tested, but to the majority of plants tested in submitted vegetative vigor studies. In addition, other application parameters can also be used to reduce spray drift, such as wind speed restrictions, setting a maximum height of spray above the plant canopy, and the avoidance of application during temperature inversions.

The potential impacts of the proposed spray drift mitigation were assessed. Some spray drift management requirements being proposed may result in impacts to growers. In particular, adopting an extremely coarse droplet size requirement for all SU uses may reduce the efficacy of some SU herbicides, particularly those that require good coverage of foliage. Grower response to reduced SU performance could include increasing application rate, increasing the number of applications, increasing application rates of tank-mix partners, making an additional herbicide application, or changing to a different herbicide(s). Additional analysis is discussed in the memo *Sulfonylurea Herbicides: Usage, Response to Comments, Herbicide Resistance Management Measures and Grower Impacts from Potential Risk Mitigation Measures.*

The 22 SUs considered in this PID were registered over a period of several decades, and may have had label changes over time as new uses were added. Many of the SUs already have spray drift language on their labels similar to that described above. However, the same language does not always appear on all products for a particular SU, nor is there consistency in the label language across the SUs as a class. Critically, much of the current label language is written as spray drift advisories, which are not enforceable, requiring new measures to reduce spray drift. The Agency proposes to achieve consistency across this whole family of SU herbicides by adding enforceable spray drift reduction language to reduce the footprint of potential exposure to non-target plants.

The Agency prioritized this approach of managing spray drift for the SUs because while other options, like buffer zones, could also lead to some reduction in risk to plants, these alternative strategies would not have as great an impact for reducing risk. Moreover, the addition of an in-field buffer would only reduce the field's spray drift effect area by an area equal to the size of the buffer itself.

Adding managed vegetative buffer strips may be one strategy to help mitigate risk concerns from runoff for the SUs, but the effectiveness of such a measure would be limited by the small fraction of SUs that would be entrained on the sediment trapped by such vegetation. Additionally, vegetative buffers are more expensive to maintain than in-field buffers. The mobility of the SUs would also limit the effectiveness of viable no-spray buffers, which would need to be considered in relation to the cost to the users. See Section IV: Risk Characterization and Proposed Interim Registration Review Decision, for additional discussion on this topic.

As described in the memo *Sulfonylurea Herbicides: Usage, Response to Comments, Herbicide Resistance Management Measures and Grower Impacts from Potential Risk Mitigation Measures,* managed vegetative buffer strips are estimated to cost between $160 to $750 dollars per acre to establish, and $40 to $240 per acre afterwards in yearly maintenance costs. These costs are in addition to the potential costs from taking agricultural land out of production to establish managed vegetative buffer strips in the first place. The costs from managed vegetative buffer strips vary widely with the size of the buffer and the crop being planted. Because of the

added expense of maintaining the vegetation in a managed vegetated buffer strip, vegetated buffers are more costly than in-field buffers.

However, even in-field buffers, which can be a useful tool in mitigating potential risks from spray drift, could be an additional cost to growers due to costs from not applying an herbicide in the buffer zone. To assess the potential financial impacts of adding buffers to SU labels, EPA conducted a cost estimate analysis for in-field buffers of 25, 50 and 100 ft. along one side of a rectangular field using four sample agricultural crops: almonds, apples, corn, and pistachios. This work included factoring in data about the average field size for each crop, as surveyed by the Farm Service Agency (FSA). This analysis assumes that the area within the buffer is removed from production to estimate the potential impact of the buffer on a grower. It is important to note, however, that buffers may not necessarily result in the entire buffer area being removed from production. Growers may be able to use another product or application method in the buffer, although this may not always be feasible.

After calculating the impacts of in-field buffers, EPA concluded that many crops have the potential to experience a high economic impact. For example, estimated costs from an in-field buffer for pistachio fields at the 50^{th} percentile size or smaller with a 25 ft. spray drift in-field buffer reach $197 per acre from removing agricultural land from production. On the high end of the spectrum for estimated costs from an in-field buffer, apple fields at the 10^{th} percentile size or smaller with a 100 ft. spray drift in-field buffer may see a possible loss of $5,188 per acre. In general, high value per acre crops with smaller field sizes would be more highly impacted by the addition of buffers. Additional details of this analysis can be found in the memo *Sulfonylurea Herbicides: Usage, Response to Comments, Herbicide Resistance Management Measures and Grower Impacts from Potential Risk Mitigation Measures*, dated June 28, 2016.

Buffers do not change how far individual spray droplets will travel during a pesticide application, but simply shift the location of the edge of the effect area from that application. In contrast, increasing droplet size decreases the size of the effect area itself. The imposition of buffers could remove land from cultivation which could, in the case of many crops, result in a cost-prohibitive level of loss to the grower. This could lead some growers to switch to using various non-SU herbicides that may might pose direct risks to taxa beyond non-target plants (*i.e.* birds, invertebrates, and mammals). The finding that SUs do not pose risks of concern to human health or to other animals is a benefit of the SUs as a class. In developing this proposed interim decision for the SUs, it is not the EPA's intention to push growers to use SU-alternative products that may pose higher risks to the health of either humans or wildlife. While buffers and spray drift mitigation restrictions can both be valuable tools for managing risk from pesticide applications, the Agency believes that focusing on spray drift mitigation is preferable in the case of the SU herbicides.

By reducing the exposure footprint of spray drift from SU applications, it will reduce the number of non-target plants and plant communities exposed to SUs. In addition, the mitigation measures proposed in this assessment to reduce exposure to non-target terrestrial plants will also reduce exposure to aquatic plants.

In addition, although this PID mainly considers the potential risk to non-listed species under FIFRA, the mitigation measures proposed in this document will also reduce the likelihood that

SUs will directly affect listed species, the critical habitats of those listed species, or any listed species that has a relationship with a listed plant (i.e., pollinators), by reducing the area of potential exposure. The Final Registration Review Decision for the SUs will include an evaluation of risk to listed species, and include consultation with the Services, if necessary. If the measures described in this PID are not sufficient to enable the Agency to make a No Effect call under the ESA, the Agency will consult with the Services, and additional mitigation may be necessary.

In summary, the intention of the Agency is to require measures to reduce spray drift in order to provide the most significant risk reductions while not causing prohibitive impacts. The Agency proposes to require extremely coarse droplets for the 22 SUs. However, the Agency recognizes that this requirement may affect the efficacy of some SU products. The Agency welcomes comments that will help inform what measures are most appropriate for the interim decision. The proposed mitigation may result in risk to plants in adjacent fields at some distances from the treated field from spray drift under certain conditions. The Agency is proposing additional spray drift advisory language to labels, which would inform users of those conditions, to help them adjust the timing or methods of application to further reduce the potential for exposure.

The Agency is aware that some current SU product labels already have mandatory spray drift reduction measures, and that some specify mandatory buffer restrictions. The Agency is open to reviewing these existing mitigation measures on a case-by-case basis, and are interested in hearing from stakeholders about this topic. This PID does not remove or modify existing buffer restrictions currently on SU labels. All such restrictions on current SU labels remain in effect.

Proposed Label Changes

1. Proposed Required Language for SU Product Labels

The Agency is proposing the following spray drift mitigation language to be included on all SU product labels. These would be mandatory, enforceable statements and would supersede any existing language already on product labels (either advisory or mandatory) covering the same topics. The Agency is also proposing that SU registrants add certain advisory language on SU product labels, as appropriate (see Section IV A.2 on Advisory Language for SU Product Labels and Appendix B: Sulfonylurea Label Table for additional details). Registrants will need to ensure that any existing advisory language left on labels does not contradict or modify the new mandatory spray drift statements proposed in this PID and included in the Interim Registration Review Decision, once published.

It is an EPA priority that SU product labels feature the coarsest spray droplet size spectrum that would still be efficacious for target weed control. There are currently some SU labels that require certain applications to be made using extremely coarse droplets. The proposed mitigation language in this PID would expand that requirement for using extremely coarse droplets to all aerial and ground applications of all 22 SU compounds. The Agency is aware that this type of mitigation may impact the efficacy of certain applications, and may not be feasible for certain products in which an SU compound is co-formulated with other herbicides that require finer droplets in order to be efficacious. EPA is therefore interested in soliciting public comments regarding the effects of droplet size on the efficacy of SU and their co-formulants.

In addition to including the following spray drift restrictions on SU labels, the Agency is proposing that all references to volumetric mean diameter (VMD) information for spray droplets be removed from all SU labels where such information currently appears. The new language specified below, which cites ASABE S572.1, would eliminate the need for VMD information because the droplet size category is easier to recognize and understand for the user.

Aerial Applications:

(1) When applying aerially to crops, do not release spray at a height greater than 10 ft above the crop canopy, unless a greater application height is necessary for pilot safety.
(2) Applicators are required to use an Extremely Coarse droplet size (ASABE S572.1).
(3) When applying to crops via aerial application equipment, the spray boom must be mounted on the aircraft so as to minimize drift caused by wing tip or rotor blade vortices. The boom length must not exceed 75% of the wingspan or 90% of the rotor blade diameter.
(4) When applying to crops via aerial application equipment, applicators must use ½ swath displacement upwind at the downwind edge of the field.
(5) Nozzles must be oriented so the spray is directed toward the back of the aircraft.
(6) Do not apply when wind speeds exceed 10 miles per hour at the application site.
(7) Do not apply during temperature inversions.

Ground Boom Applications:

(1) When using ground application equipment, apply with nozzle height no more than 2 feet above the ground or crop canopy.
(2) Applicators are required to use an Extremely Coarse droplet size (ASABE S572.1).
(3) Do not apply when wind speeds exceed 10 miles per hour at the application site.
(4) Do not apply during temperature inversions.

Additional Required Labelling Action:

- Remove information about VMD from all SU labels where such information currently appears.

2. Proposed Advisory Language for SU Product Labels

In addition to enforceable spray drift mitigation language, EPA is proposing additional advisory statements to address a variety of potential ecological concerns. The categories of advisory language for the SUs include spray drift mitigation, pollinator protection, runoff prevention, and wind-blown soil particles. While virtually all of the SU herbicide labels currently contain some advisory drift statements, it could be confusing to users to see variation in such statements on different SU labels. Therefore, EPA is proposing that all SU labels be required to adopt consistent advisory text. The statements EPA is proposing can be found in Appendix B.

Spray Drift Mitigation Advisory Language

The enforceable drift statements proposed in this PID will directly impact the amount of drift that could result from applications of SU herbicides, but will not eliminate the exposure to non-target plants. Therefore it will be beneficial to users to have additional information about drift that could influence the choices they make at the time of application. EPA is proposing advisory

spray drift language be required on labels to help guide users in making applications using the best techniques to reduce drift. In order to help differentiate the enforceable text from the advisory text, EPA is proposing these statements be separated on the labels and that enforceable text be placed within a spray drift box.

Pollinator Advisory Language
As mentioned above, some of the proposed advisory language for the SUs concerns potential risks to pollinators. The protection of pollinating organisms is a priority for the Agency. Currently available data, as well as the ALS inhibition MOA for the SUs, suggests that using sulfonylurea herbicides does not directly impact the health of pollinators. However, it is possible that spray drift and runoff from sulfonylurea applications may negatively impact the forage and habitat of pollinators. EPA has therefore drafted proposed pollinator protection advisory language to be required on SU labels to address this concern.

Windblown Soil Particles Advisory Language
Previous incidents involving soil treated with sulfonylurea herbicides have raised concerns about SU use and off-target movement of SUs via windblown soil particles. The statement in Appendix B is proposed to be added as advisory language to all SU labels. Note that for certain SUs for which the proposed or a similar statement is already on labels as a mandatory statement, this SU PID does not demote that required language to advisory status.

Runoff Prevention Advisory Language
As noted previously, there are both spray drift and runoff concerns from SU applications. Furthermore, these two exposure pathways of spray drift and runoff could potentially coincide, resulting in greater exposure and, therefore, greater expected adverse effects. While the Agency is focusing on mitigation measures for the SUs designed to reduce spray drift rather than runoff, EPA is also proposing a weather advisory statement that is anticipated to help reduce risks from runoff.

3. Chemical-Specific Product Label Changes

The universe of currently registered SU herbicide products spans a wide range of initial registration dates and varying timelines for prior registration actions by the Agency. As such, there is wide variation in the degree to which SU labels contain various application parameters now considered standard pesticide labeling practice. Certain labeling elements, such as the formulation type and pounds of active ingredient (ai) per gallon of product, is proposed to be added to all SU product labels that do not already contain this information. Guidance on the list of elements proposed to be included on all SU product labels can be found in Appendix H: Information to Be Provided on All SU Product Labels. Proposed chemical-specific required label changes of this nature are described in Appendix C of this assessment.

4. Herbicide Resistance Management

The development and spread of herbicide resistant weeds in agriculture is a widespread problem that has the potential to fundamentally change production practices in U.S. agriculture. While herbicide resistant weeds have been known since the 1950s, the number of species and their geographical extent, has been increasing rapidly. Currently there are 249 weed species worldwide with confirmed herbicide resistance, especially since the turn of the century. In the United States there are 155 weed species with confirmed resistance to one or more herbicides.

Management of herbicide resistant weeds, both in controlling established resistant weeds and in slowing or preventing the development of new resistant weeds, is a complex problem without a simple solution. Coordinated efforts of growers, agricultural extension, academic researchers, scientific societies, pesticide registrants, and state and federal agencies are required to address this problem.

OPP is proposing measures for the pesticide registrants to provide growers and users with detailed information and recommendations to slow the development and spread of herbicide resistant weeds. This is part of a more holistic, proactive approach recommended by crop consultants, commodity organizations, professional/scientific societies, researchers, and the registrants themselves. OPP's approach is measured, based on the inherent risk of weed resistance developing for a given herbicide, considering the target weeds and the agronomic practices of the registered crops. Situations with the least concern for the development of herbicide resistant weeds will have the fewest resistance management elements and the situations with the highest concern will have additional resistance management elements.

Implementation Timeline and Opportunities for Public Comment on Herbicide Resistance Approach

OPP is proposing to implement herbicide resistance measures for existing chemicals during registration review, and to implement herbicide resistance measures for new chemicals and new uses at the time of registration. In registration review, proposed herbicide resistance elements will be included in every herbicide PID. Comments on these chemical specific measures are welcomed. The Agency has also issued a draft Pesticide Registration Notice (PRN)[10] that provides additional guidance to registrants. All stakeholders are encouraged to comment on both the measures in the PID and on the PRN.

Public comments received on both the SU PID and the draft PRN will be considered prior to a final decision for the registration review of the SUs.

SU-Specific Herbicide Resistance Measures

SUs act to inhibit acetolactate synthase (ALS), a key enzyme in the biosynthesis of the branched-chain amino acids in plants. These herbicides are classified by the Weed Science Society of America (WSSA) as belonging to mechanism of action (MOA) Group 2. This MOA has a number of confirmed resistant weeds with over 150 confirmed cases of weed resistance worldwide and 48 cases of resistant weed species in the U.S.

The Group 2 herbicides are of the highest concern for weed resistance development because the MOA already has a large number of confirmed herbicide resistant weed species in the U.S. Group 2 herbicides are also used on large acreage crops, such as wheat, with many reported resistant weeds, and they have seven commercialized herbicide resistant crops. Proposed herbicide resistance management elements for the SUs include:

[10] See https://www.gpo.gov/fdsys/pkg/FR-2016-06-03/pdf/2016-13157.pdf.

On the label

1. List Mechanism of Action (MOA) WSSA Group 2.
2. List seasonal and annual maximum number of applications and rates for all crops.
3. List best management practices for Herbicide Resistance (as appropriate to crop).
4. State that user should scout before and after application.
5. List the definition of likely resistance on label.
6. State that user should report lack of performance to the registrant or their representative.
7. List confirmed resistant weeds in a separate table and list specified rates for these weeds with the table.
8. For formulated products containing multiple herbicides that are in different MOA groups, for each herbicide list the weeds controlled and their minimum specified rate on the label.

Reporting, Education, and Stewardship

9. Registrant should report new cases of likely and confirmed resistance to EPA and users yearly. This will be in addition to any adverse effects reporting.
10. For sites/crops of high concern, registrants should provide growers with:
    - Resistance Management Plan
    - Remedial Action Plan
    - Educational materials on herbicide resistance management.

B. Tolerances

A number of the SU herbicides are registered for use on food and feed items. Tolerances are established in 40 CFR § Part 180 for residues in/on all food and feed commodities for those SU herbicides with food uses. The Agency has reviewed existing tolerances and/or exemptions to ensure they are supported by adequate residue chemistry data. During registration review, the Agency also reviewed tolerances with respect to international harmonization, to ensure that tolerance expressions are updated with respect to coverage and compliance. A number of changes to the tolerances for the SUs have been identified, included corrections to commodity definitions, updates to crop group tolerances, and harmonization of U.S. tolerances with Codex. These changes are detailed in the human health risk assessment documents for each of the individual SU herbicides and can be found in the public docket as specified in Table 1. Details on tolerance considerations for each respective SU compound can also be found in this assessment in Appendix C. In accordance with FFDCA, the Agency will be conducting rulemaking to implement the tolerance changes identified for each SU herbicide.

C. Anticipated Data Needs

a. Human Health

The human health database for all SU herbicides is adequate to support registration review and no additional toxicity or exposure data needs have been identified at this time. However, certain human health information previously requested by the Agency, such as analytical reference standards, is still outstanding for certain chemicals and must be submitted. For details on human

health issues related to each SU compound, including outstanding data needs, see Appendix C of this document.

b. Ecological

As noted in Appendix D, Data Call-Ins (DCIs) have previously been issued for 21 of the 22 SU compounds covered in this assessment as part of registration review. In some cases, data for the SUs have been submitted and are currently in Agency review, or have yet to be submitted. EPA plans to continue reviewing all DCI data submissions for the SUs, and reminds registrants that the issuance of this PID does not waive any previously called-in data requirements. A summary of outstanding data for each SU chemical is included in Appendix C for each SU compound. Data submitted to the Agency in response to the SU DCIs will be used as appropriate in future assessment work by EPA.

Consistent with EPA's June 2014 *Guidance for Assessing Pesticide Risks to Bees*[11], EPA has begun to require pollinator data where applicable. EPA intends to issue DCIs for all of the SUs to obtain these data. In the near future, EPA will provide further information and guidance on this effort. The pollinator studies that could be required are included in Table 4 below. The Agency will require data it believes are needed to help inform the pollinator risk assessment. Specific information on the pollinator data needs anticipated for each of the SU compounds can be found in Appendix C of this PID.

Table 4. Potential Pollinator Data Requirements for the SUs

Guideline #	Study
850.3020*	Honey bee acute contact toxicity
850.3030*	Honey bee toxicity of residues on foliage
850.3040**	Field testing for pollinators (Tier 3 study)
Non-Guideline* (OECD 213)	Honey bee adult acute oral toxicity
Non-Guideline* (OECD 237)	Honey bee larvae acute oral toxicity
Non-Guideline*	Honey bee adult chronic oral toxicity
Non-Guideline*	Honey bee larvae chronic oral toxicity
Non-Guideline**	Residues in pollen and nectar/field residue analysis (Tier 2 study)
Non-Guideline** (OECD 75)	Semi-field testing for pollinators (tunnel or colony feeding studies) (Tier 2 study)

*Tier 1 (Laboratory-based studies)
**Tier 2 and 3 (Semi-field and full field colony-level studies) The need for a higher tier test for pollinators will be determined based upon lower-tiered tests and/or other lines of data and the need for a refined pollinator risk assessment.

D. Proposed Interim Registration Review Decision

[11] http://www2.epa.gov/sites/production/files/2014-06/documents/pollinator_risk_assessment_guidance_06_19_14.pdf

EPA has completed a quantitative human health risk assessment and a quantitative ecological risk assessment of the 22 SU herbicides. The Agency determined that there are no human health risks of concern at this time. The Agency also determined that there are no direct ecological risks of concern for all taxa, other than non-target terrestrial and aquatic plants, at this time.

In accordance with 40 CFR Sections 155.56 and 155.58, the Agency is issuing this *Proposed Interim Registration Review Decision for the 22 SU Herbicides*. Except for the EDSP, ESA, and pollinator components of this case, the Agency has made the following proposed interim registration review decision for this group of chemicals:

- There are no human health risks of concern at this time.
- There are no direct ecological risks of concern for all taxa, other than non-target terrestrial and aquatic plants, at this time.
- Certain tolerance amendments are necessary for a number of SU herbicides. Additional details for chemical-specific changes are provided in Appendix C.
- Based upon a lack of data, the Agency has not fully assessed potential risk from SU herbicides to terrestrial invertebrates. In the future, the Agency will require additional pollinator data and fully evaluate risk to insect pollinators.
- The Agency is proposing certain required changes to the product specific labeling to reduce potential risk to non-target plants from spray drift. These proposed label changes are detailed in section IV.A.1 of this document and in the label table in Appendix B.
- In this Proposed Interim Registration Review Decision for the SU herbicides, EPA is making no human health or environmental safety findings associated with the EDSP screening, risk to pollinators, nor is it making a complete endangered species finding. The Agency's final registration review decision for these 22 SU herbicides will be issued once an effects determination for listed species is made, and ESA Section 7 consultation with the Services has taken place, if necessary; an EDSP FFDCA section 408(p) determination has been made; and a pollinator risk assessment has been completed.

V. Next Steps and Timeline

A. Interim Registration Review Decision

A Federal Register Notice will announce the availability of this proposed interim registration review decision for the SU herbicides and allow a 60-day comment period. Comments will be accepted in each respective compound's docket, and are welcomed from all interested stakeholders, including but not limited to academic researchers and extension specialists, chemical registrants, commodity groups, environmental advocacy groups, other governmental agencies, trade associations, and general members of the public. Public comments submitted to any one of the 22 SU dockets that are relevant to all of the SUs will be considered, as appropriate, for the SUs as a group. The Agency welcomes both comments on specific SUs and the SUs collectively. Commenters seeking to make general comments on the PID do not need to submit identical comments to multiple SU dockets.

EPA particularly solicits information regarding the following topics:

- Herbicide resistance management.
- Information on spray droplet size and SU product efficacy. It is an EPA priority that SU product labels feature the coarsest spray droplet size spectrum that would still be efficacious for target weed control
- Current buffer restrictions on some SU product labels.
- The advisory language proposed in Appendix B of this PID.
- The suitability of advisory language to prevent off-target movement of SUs via runoff and windblown soil particles for all SU end-use products.
- Use/usage information on non-agricultural uses of the SUs.

If there are no significant comments or additional information submitted to the dockets during the comment period that leads the Agency to change its proposed decision, EPA may issue an interim registration review decision for these SU herbicides. However, a final decision for the SU herbicides may be issued without having previously issued an interim decision. The Agency's final registration review decision for these 22 SU herbicides will be issued once an effects determination for listed species is made, and ESA Section 7 consultation with the Services has taken place, if necessary; an EDSP FFDCA section 408(p) determination has been made; and a pollinator risk assessment has been completed.

B. Implementation of Mitigation Measures

Once the Interim Registration Review Decision is issued in final form, registrants will be required to submit proposed amended labels that include the label changes outlined in Appendices B and C to the Agency within 60 days of issuance of the Interim Registration Review Decision. The proposed mitigation measures and proposed label amendments are described in Appendices A, B, and C below.

VI. Appendices for the SU Proposed Interim Registration Review Decision

Appendix A: Summary of Proposed Actions for the SUs

Registration Review Case#: 631, 3136, 7205, 7206, 7216, 7217, 7218, 7220, 7221, 7227, 7233, 7235, 7236, 7247, 7252, 7253, 7260, 7263, 7270, 7271, 7281,7403
PC Code: 085601, 108209, 118601, 118602, 119009, 119011, 122009, 122010, 122011, 122020, 122021, 128721, 128820, 128845, 128887, 128901, 128969, 128973, 129002, 129008, 129009, 129031
Chemical Type: Herbicide
Chemical Family: Sulfonylurea
Mechanism of Action: WSSA Group 2 (ALS inhibitors)

Affected Population(s)	Source of Exposure	Route of Exposure	Duration of Exposure	Risk(s) of Concern	Proposed Action(s)
• Terrestrial Plants • Aquatic plants	• Runoff • Spray drift	• Foliar and root absorption	• Acute	• Acute toxicity	• Require spray drift reduction language. • Require herbicide resistance management language on label.

Appendix B: Sulfonylurea Label Table

The label table below specifies the mitigation language that is proposed to be added to product labels for all 22 SU compounds. Refer to Appendix C to determine whether additional label language is proposed to be added to the labels for a particular SU compound in addition to this language proposed for all SUs, and to Appendix H for a list of information that is proposed to be provided on all SU product labels as a matter of labelling consistency. It is proposed that registrants also update ground and surface water advisory statements on SU product labels as per the Agency's Label Review Manual, available publically at https://www.epa.gov/pesticide-registration/label-review-manual, and as outlined in Appendix C.

Summary of Proposed Labeling Changes for All SUs		
Description	**Proposed Labeling Language for All SU Products**	**Placement on Label**
End Use Products		
HERBICIDE RESISTANCE MANAGEMENT: Herbicide Mechanism of Action	**"Group 2 HERBICIDE"**	Front Panel, upper right quadrant, surrounded by a black (or suitable color) rectangle
HERBICIDE RESISTANCE MANAGEMENT: Weed Resistance Management	• List herbicide mechanism of action (MOA) group number • List seasonal and annual maximum number of applications and rates. • Resistance management language from PR Notice 2001-5 and/or Best Management Practices (appropriate to crop) from Weed Science Society of America (WSSA) & Herbicide Resistance Action Committee (HRAC), and/or HRAC proposed guidelines for herbicide labels. • "Users should scout before and after application." • Include the definition of likely resistance. • "Users should report lack of performance to registrant or their representative." • List confirmed resistant weeds in separate table and list specified rates for these weeds with the table. • For formulated products containing multiple herbicides that are in different MOA groups, for each herbicide list the weeds controlled and their minimum specified rate on the label.	Directions for Use, prior to directions for specific crops under the heading "WEED RESISTANCE MANAGEMENT"
Enforceable Spray Drift Management Language for products that allow aerial applications	**"SPRAY DRIFT** **<u>Aerial Applications</u>**: • When applying aerially to crops, do not release spray at a height greater than 10 ft above the crop canopy, unless a greater application height is necessary for pilot safety. • Applicators are required to use an Extremely Coarse droplet size (ASABE S572.1). • When applying to crops via aerial application equipment, the spray boom must be mounted on the	Directions for Use, in a box titled "Spray Drift" under the headings "Aerial Applications"

Summary of Proposed Labeling Changes for All SUs		
Description	**Proposed Labeling Language for All SU Products**	**Placement on Label**
	aircraft so as to minimize drift caused by wing tip or rotor blade vortices. The boom length must not exceed 75% of the wingspan or 90% of the rotor blade diameter. • When applying to crops via aerial application equipment, applicators must use ½ swath displacement upwind at the downwind edge of the field. • Nozzles must be oriented so the spray is directed toward the back of the aircraft. • Do not apply when wind speeds exceed 10 miles per hour at the application site. • Do not apply during temperature inversions." Additional Required Labelling Action: • Registrants must remove information about volumetric mean diameter from all labels where such information currently appears.	
Enforceable Spray Drift Management Language for products that allow ground boom applications	**"SRPAY DRIFT** **<u>Ground Boom Applications:</u>** • When using ground application equipment, apply with nozzle height no more than 2 feet above the ground or crop canopy. • Applicators are required to use an Extremely Coarse droplet size (ASABE S572.1). • Do not apply when wind speeds exceed 10 miles per hour at the application site. • Do not apply during temperature inversions." Additional Required Labelling Action: - Registrants must remove information about volumetric mean diameter from all labels where such information currently appears.	Directions for Use, in a box titled "Spray Drift" under the headings "Ground Boom Applications"
Advisory Spray Drift Management Language for all products that allow aerial or ground boom applications	**"SPRAY DRIFT ADVISORIES** The interaction of many equipment and weather-related factors determines the potential for spray drift. The applicator is responsible for considering all these factors when making application decisions. **IMPORTANCE OF DROPLET SIZE** The most effective way to reduce drift potential is to apply large droplets. The best drift management strategy is to apply the largest droplets that provide sufficient coverage and control. The presence of sensitive species nearby, the environmental conditions, and pest pressure may affect how an applicator balances drift control and coverage. APPLYING	Directions for Use, just below the Spray Drift box, under the heading "Spray Drift Advisories"

Summary of Proposed Labeling Changes for All SUs		
Description	**Proposed Labeling Language for All SU Products**	**Placement on Label**
	LARGER DROPLETS REDUCES DRIFT POTENTIAL, BUT WILL NOT PREVENT DRIFT IF APPLICATIONS ARE MADE IMPROPERLY OR UNDER UNFAVORABLE ENVIRONMENTAL CONDITIONS! See Wind, Temperature and Humidity, and Temperature Inversions sections of this label. **Controlling Droplet Size – Ground Boom** ***(note to registrants:*** *remove if ground boom is prohibited on product labels)* • Volume - Use high flow rate nozzles to apply the highest practical spray volume. Nozzles with higher rated flows produce larger droplets. • Pressure - Use the lower spray pressures recommended for the nozzle. Higher pressure reduces droplet size and does not improve canopy penetration. WHEN HIGHER FLOW RATES ARE NEEDED, USE A HIGHER-CAPACITY NOZZLE INSTEAD OF INCREASING PRESSURE. • Nozzle Type - Use a nozzle type that is designed for the intended application. With most nozzle types, narrower spray angles produce larger droplets. Consider using low-drift nozzles. **Controlling Droplet Size – Aircraft** ***(note to registrants:*** *remove if aerial application is prohibited on product labels)* • Number of Nozzles - Use the minimum number of nozzles with the highest flow rate that provide uniform coverage. • Nozzle Orientation - Orienting nozzles so that the spray is emitted backwards, parallel to the airstream will produce larger droplets than other orientations. AVOIDING SPRAY DRIFT IS THE RESPONSIBILITY OF THE APPLICATOR. • Nozzle Type - Solid stream nozzles (such as disc and core with swirl plate removed) oriented straight back produce larger droplets than other nozzle types. • Boom Length - Longer booms increase drift potential. Therefore a shorter boom length is recommended. • Application Height - Application more than 10 ft. above the canopy increases the potential for spray drift. **BOOM HEIGHT** Setting the boom at the lowest referenced height (if specified) which provides uniform coverage reduces the exposure of droplets to evaporation and wind. For ground equipment, the boom should remain level with the crop and have minimal bounce. **DRIFT REDUCTION TECHNOLOGY (DRT)** The EPA Drift Reduction Technology (DRT) Program was developed to encourage the manufacture, marketing, and use of spray technologies scientifically verified to significantly reduce pesticide drift. The use of DRTs should result in significantly less pesticide from spray applications drifting and being deposited in areas not targeted by those applications,	

Summary of Proposed Labeling Changes for All SUs		
Description	**Proposed Labeling Language for All SU Products**	**Placement on Label**
	compared to spray technologies that do not meet the minimum DRT standard. EPA-verified drift reduction technologies (DRTs) and their ratings will be added to the following webpage as they become available: https://www.epa.gov/reducing-pesticide-drift/epa-verified-and-rated-drift-reduction-technologies **WIND** Drift potential increases at wind speeds of less than 3 mph (due to inversion potential) or more than 10 mph. However, many factors, including droplet size and equipment type determine drift potential at any given wind speed. AVOID APPLICATIONS DURING GUSTY OR WINDLESS CONDITIONS. Note: Local terrain can influence wind patterns. Every applicator needs to be familiar be familiar with local wind patterns and how they affect spray drift. **TEMPERATURE AND HUMIDITY** When making applications in hot and dry conditions, set up equipment to produce larger droplets to reduce effects of evaporation. **TEMPERATURE INVERSIONS** Drift potential is high during a temperature inversion. Temperature inversions restrict vertical air mixing, which causes small suspended droplets to remain close to the ground and move laterally in a concentrated cloud. Temperature inversions are characterized by increasing temperature with altitude and are common on nights with limited cloud cover and light to no wind. They begin to form as the sun sets and often continue into the morning. Their presence can be indicated by ground fog; however, if fog is not present, inversions can also be identified by the movement of smoke from a ground source or an aircraft smoke generator. Smoke that layers and moves laterally in a concentrated cloud (under low wind conditions) indicates an inversion, while smoke that moves upward and rapidly dissipates indicates good vertical air mixing. **SHIELDED SPRAYERS** Shielding the boom or individual nozzles can reduce the effects of wind. However, it is the responsibility of the applicator to verify that the shields are preventing drift and not interfering with uniform deposition of the product."	
Pollinator Advisory Statement for Commercial Agricultural Products	"POLLINATOR ADVISORY STATEMENT: This product may adversely impact the forage and habitat of local pollinators, including the monarch butterfly (and its larvae), birds, or bats if reaches non-target areas. Protect pollinators by following label directions to minimize spray drift."	Directions for Use

Summary of Proposed Labeling Changes for All SUs		
Description	**Proposed Labeling Language for All SU Products**	**Placement on Label**
Pollinator Advisory Statement for Landscape/Maintenance /Residential Products	"POLLINATOR ADVISORY STATEMENT: This product may adversely impact the forage and habitat of local pollinators, such as the monarch butterfly (and its larvae), birds, or bats. Protect wildlife by following label directions, and making only directed applications."	Directions for Use
Runoff Prevention Advisory	"To protect the environment, do not allow pesticide to enter or run off into storm drains, drainage ditches, gutters or surface waters. Applying this product in calm weather when rain is not predicted for the next 24 hours will help to ensure that wind or rain does not blow or wash pesticide off the treatment area. Rinsing application equipment over the treated area will help avoid run off to water bodies or drainage systems."	Directions for Use under the heading "Runoff Prevention"
Windblown Soil Particles Advisory	"WINDBLOWN SOIL PARTICLES: Understanding the risks associated with the application of [*insert product name*] essential to aid in preventing off-site injury to desirable vegetation and agricultural crops. The risk of off-site movement both during and after application may be affected by a number of site specific factors such as the nature, texture and stability of the soil, the intensity and direction of prevailing winds, vegetative cover, site slope, rainfall, drainage patterns, and other local physical and environmental conditions. A careful evaluation of the potential for off-site movement from the intended application site, including movement of treated soil by wind or water erosion, must be made prior to using [*insert product name*]. This evaluation is particularly critical where desirable vegetation or crops are grown on neighboring land for which the use of [*insert product name*] is not labeled. If prevailing local conditions may be expected to result in off-site movement and cause damage to neighboring desirable vegetation or agricultural crops, do not apply [*insert product name*]. Leave treated soil undisturbed to reduce the potential for [*insert product name*] movement by soil erosion due to wind or water. Before applying [*insert product name*] the user must read and understand all label directions, precautions and restrictions completely, including these requirements for a site specific evaluation. If you do not understand any of the instructions or precautions on the label, or are unable to make a site specific evaluation yourself, consult your local agricultural dealer, cooperative extension service, land managers, professional consultants, or other qualified authorities familiar with the area to be treated. If you still have questions regarding the need for site specific considerations, please call [*product manufacturer hot line*]."	Directions for Use under the heading "Windblown Soil Particles"
Label Consistency Statements	Registrants must also update labels with information listed in Appendix H.	As specified in the Label Review Manual

Appendix C: Chemical Specific Appendices

This series of 22 compound-specific appendices covers chemical-specific details beyond the generic summary in the body of the PID on topics such as use and usage, benefits, tolerances, groundwater and surface water advisory statements, proposed label updates such as specifying the maximum application rate, and proposed updates to restricted entry intervals (REIs). For additional information on labeling, see Appendix H as well as the Agency's Label Review Manual, available publically at https://www.epa.gov/pesticide-registration/label-review-manual. For mitigation language proposed to be added to product labels for all 22 SU compounds in addition to the chemical-specific label updates described in this Appendix C, refer to Appendix B.

The Agency's final registration review decision for these 22 SU herbicides will be issued once an effects determination for listed species is made, and ESA Section 7 consultation with the Services has taken place, if necessary; an EDSP FFDCA section 408(p) determination has been made; and a pollinator risk assessment has been completed. Prior to the issuance of this final decision, however, the Agency may issue an Interim Registration Review Decision. As noted in the introduction of this PID, an Interim Registration Review Decision may, among other things: 1) require new risk mitigation measures; 2) impose interim risk mitigation measures; 3) identify additional data or other information required to complete the review; and 4) include schedules for submitting the required data, conducting the new risk assessment, and completing the registration review. In this PID, we are taking steps to prepare for the implementation of interim decision measures based on the potential risks identified so far by the Agency for the SUs.

APPENDIX C.1 – Bensulfuron-methyl

C.1.A. Use and Usage and Benefits Characterization

General use, usage, and benefits information is covered in Section III.D: Characterization of Benefits, as well as in Appendix E: Chemical Use and Usage. Bensulfuron-methyl is currently only registered for use on rice.

C.1.B. Responses to Comments

The Agency has responded to ecological, human health and usage related comments in its documents *Response to Comments on Preliminary Risk Assessment for 22 Sulfonylurea Herbicides*; *Response to Comments on the Health Effects Divisions Sulfonylurea Risk Assessments*; and *Sulfonylurea Herbicides: Usage, Response to Comments, Herbicide Resistance Management Measures and Grower Impacts from Potential Risk Mitigation Measures*, which can be found in the public docket EPA-HQ-OPP-2011-0663 on Regulations.gov. The Agency did not receive any public comments specific to bensulfuron-methyl.

C.1.C. Tolerances

The existing tolerances for bensulfuron-methyl are listed in 40 CFR §180.445 and are supported by the available residue chemistry data: crayfish at 0.05 parts per million (ppm); and rice, grain at 0.02 ppm. However, the Agency proposes that the tolerance on *rice, straw* be

revoked since it is no longer an animal feed item or a regulated commodity. The residue of concern for tolerance enforcement is bensulfuron-methyl only. There are no Maximum Residue Limits (MRLs) or tolerances for bensulfuron-methyl in Canada or in the Codex system.

The Agency is proposing to modify the tolerance expression for bensulfuron-methyl according to the current compliance/measurement policy (*Interim Guidance on Tolerance Expressions*, Steve Knizner, May 27, 2009) as follows:

> *Tolerances are established for residues of bensulfuron-methyl, including its metabolites and degradates, in or on the commodities in the table below. Compliance with the tolerance levels specified below is to be determined by measuring only bensulfuronmethyl [methyl 2-[[[[[(4,6-dimethoxy-2-pyrimidinyl)amino]carbonyl]amino]sulfonyl]methyl]benzoate]*.

C.1.D. Proposed Interim Registration Review Decision for Bensulfuron-methyl

EPA has completed quantitative human health and ecological risk assessments for bensulfuron-methyl. Although the ecological risk assessment analyzed risks from a range of terrestrial plant toxicity data, a comprehensive endangered species assessment was not completed. As part of the bensulfuron-methyl registration review, the Agency required certain data under generic data call-in (GDCI) 128820-1121. All data required under the GDCI have been received or waived, except for the following:

- Aquatic field dissipation, GDLN 835.6200
- Anaerobic aquatic metabolism, GDLN 835.4400

Although these data gaps remain, EPA is proceeding with this Proposed Interim Registration Review Decision based upon the available information. The current assessment is conducted with default fate parameters. While these outstanding data would help refine the aquatic exposure assessment, the current assessment has not identified risks above the Agency's LOC for non-listed species.

In accordance with 40 CFR Sections 155.56 and 155.58, the Agency is issuing this *Proposed Interim Registration Review Decision for 22 Sulfonylurea (SU) Herbicides*, including bensulfuron-methyl, case number 7216. Except for the EDSP, ESA, and pollinator components of this case, the Agency has made the following proposed interim registration review decision for bensulfuron-methyl:

- The Agency determined that there are no human health risks of concern at this time.
- The Agency determined that there are no ecological risks of concern for any taxa, except non-target terrestrial plants, at this time.
- The Agency has identified potential risk to non-target terrestrial plants from bensulfuron-methyl. The Agency is proposing certain changes to bensulfuron-methyl labeling in order to reduce spray drift and therefore ecological exposure and risk to non-target plants. The proposed label changes are detailed in Appendix B of this document, and in the bensulfuron-methyl label table below (Table C.1.3).

- The Agency has identified herbicide resistance management concerns with all 22 SUs, including bensulfuron-methyl, and is proposing certain changes to product labels to reduce the potential of herbicide resistance. These proposed label changes are detailed in Appendix B of this document, and in the label table below (Table C.1.3).
- The Agency does not have sufficient ecotoxicity data for bensulfuron-methyl on pollinators and therefore, has not assessed the potential risk of bensulfuron-methyl to terrestrial invertebrates. In the future, the Agency will require pollinator data to evaluate risk to terrestrial invertebrates (see Table C.1.1.).
- A tolerance revocation for *rice, straw* is proposed, as well as a tolerance expression modification.

In this Proposed Interim Registration Review Decision, EPA is making no human health or environmental safety findings associated with the EDSP screening of bensulfuron-methyl, risk to pollinators, nor is it making a complete endangered species finding. The Agency's final registration review decision for bensulfuron-methyl will be issued once an effects determination for listed species is made, and ESA Section 7 consultation with the Services has taken place, if necessary; an EDSP FFDCA section 408(p) determination has been made; and a pollinator risk assessment has been completed.

C.1.D1. Proposed Data Needs for Bensulfuron-methyl

Consistent with EPA's June 2014 *Guidance for Assessing Pesticide Risks to Bees*, the Agency has begun to require ecotoxicity data for pollinators where applicable. The Agency has determined that pollinator data are needed for bensulfuron-methyl and proposes to require these data, under a DCI, as a part of the registration review of bensulfuron-methyl. The pollinator data proposed to be required are identified in Table C.17.1 below.

Table C.1.1. Potential Pollinator Data Requirements for Bensulfuron-methyl

Guideline #	Study
850.3040**	Field testing for pollinators
Non-Guideline* (OECD 213)	Honey bee adult acute oral toxicity
Non-Guideline* (OECD 237)	Honey bee larvae acute oral toxicity
Non-Guideline*	Honey bee adult chronic oral toxicity
Non-Guideline*	Honey bee larvae chronic oral toxicity
Non-Guideline**	Residues in pollen and nectar/field residue analysis
Non-Guideline** (OECD 75)	Semi-field testing for pollinators (tunnel or colony feeding studies)

*Tier 1 (Laboratory-based studies)
**Tier 2 and 3 (Semi-field and full field colony-level studies) The need for a higher tier test for pollinators will be determined based upon lower-tiered tests and/or other lines of data and the need for a refined pollinator risk assessment.

C.1.D2. Additional Bensulfuron-methyl Label Changes

As a component of bensulfuron-methyl registration review, the Agency is proposing to require that all product labels contain certain application information to ensure that users apply

bensulfuron-methyl products in a consistent manner, and that EPA's assessment and estimates of human health and ecological risks from bensulfuron-methyl products are consistent with their use. Therefore, it is proposed that all bensulfuron-methyl product labels contain certain information for each use site/use pattern on the product label. For a list of the proposed information to be placed on the label, please see Appendix H.

Table C.1.2: Bensulfuron-methyl Label Table

Summary of Proposed Labeling Changes for Bensulfuron-methyl Uses – End-Use Products		
Description	Proposed Amended Labeling Language for Bensulfuron-methyl Use Products	Placement on Label
Groundwater Label Advisory[1]	"Bensulfuron-methyl is known to leach through soil into groundwater under certain conditions as a result of label use. This chemical may leach into groundwater if used in areas where soils are permeable, particularly where the water table is shallow."	Environmental Hazard section of Precautionary Statements
Surface Water Label Advisory	"This product may impact surface water quality due to runoff of rain water. This is especially true for poorly draining soils and soils with shallow ground water. This product is classified as having high potential for reaching surface water via runoff for several months or more after application. A level, well-maintained vegetative buffer strip between areas to which this product is applied and surface water features such as ponds, streams, and springs will reduce the potential loading of bensulfuron-methyl from runoff water and sediment. Runoff of this product will be greatly reduced by avoiding applications when rainfall or irrigation is expected to occur within 48 hours."	Environmental Hazard section of Precautionary Statements
Herbicide Resistance Management	See Appendix B.	
Spray Drift Management	See Appendix B.	
Advisory Language	See Appendix B.	

1. Advisory based on detects in groundwater referenced in the Water Quality Portal (http://www.waterqualitydata.us/, June 2016).

APPENDIX C.2 – Chlorimuron-ethyl

C.2.A. Use and Usage and Benefits Characterization

General use, usage, and benefits information is covered in Section III.D: Characterization of Benefits, as well as in Appendix E: Chemical Use and Usage. For chlorimuron-ethyl, soybean accounts for 99% of the usage, and the remaining percent of chlorimuron-ethyl use includes peanuts, green beans, and sunflowers.

C.2.B. Responses to Comments

The Agency has responded to ecological, human health and usage related comments in its documents *Response to Comments on Preliminary Risk Assessment for 22 Sulfonylurea Herbicides*; *Response to Comments on the Health Effects Divisions Sulfonylurea Risk Assessments*; and *Sulfonylurea Herbicides: Usage, Response to Comments, Herbicide Resistance Management Measures and Grower Impacts from Potential Risk Mitigation Measures*, which can be found in the public docket EPA-HQ-OPP-2010-0478 on Regulations.gov. The Agency received one comment specific to chlorimuron-ethyl regarding a typing error in the risk assessment.

C.2.C. Tolerances

Tolerances are established in 40 CFR §180.429 for residues of chlorimuron-ethyl. The existing tolerances (40 CFR §180.429) are supported by the available residue chemistry data. At this time, there is a Canadian MRL for residues of chlorimuron-ethyl in soybeans at 0.05 ppm; there are no other Canadian MRLs and no Codex MRLs for chlorimuron-ethyl. The U.S. tolerance of residues of chlorimuron-ethyl in soybean, seed is 0.05 ppm and is harmonized with the Canadian MRL. The Agency has concluded that no revisions to the existing U.S. tolerances are needed during registration review.

C.2.D. Proposed Interim Registration Review Decision for Chlorimuron-ethyl

EPA has completed quantitative human health, and ecological risk assessments for chlorimuron-ethyl. Although the ecological risk assessment analyzed risks from a range of terrestrial plant toxicity data, a comprehensive endangered species assessment was not completed. As part of the chlorimuron-ethyl registration review, the Agency required certain data under generic data call-in (GDCI) GDCI-128901-1136. All data required under the GDCI have either been received or waived.

In accordance with 40 CFR Sections 155.56 and 155.58, the Agency is issuing this *Proposed Interim Registration Review Decision for 22 Sulfonylurea (SU) Herbicides*, including chlorimuron-ethyl. Except for the EDSP, ESA, and pollinator components of this case, the Agency has made the following proposed interim registration review decision for chlorimuron-ethyl:

- The Agency determined that there are no human health risks of concern at this time.
- The Agency determined that there are no ecological risks of concern for any taxa, except non-target terrestrial and aquatic plants, at this time.
- The Agency has identified potential risk to non-target terrestrial and aquatic plants from chlorimuron-ethyl. The Agency is proposing certain changes to chlorimuron-ethyl labeling in order to reduce spray drift and therefore ecological exposure and risk to non-target plants. The proposed label changes are detailed in Appendix B of this document, and in the chlorimuron-ethyl label table below (Table C.17.3).

- The Agency has identified herbicide resistance management concerns with all 22 SUs, including chlorimuron-ethyl, and is proposing certain changes to chlorimuron-ethyl product labels to reduce the potential of herbicide resistance. These proposed label changes are detailed in Appendix B of this document, and in the label table below (Table C.2.3).
- The Agency does not have sufficient ecotoxicity data for chlorimuron-ethyl on pollinators and therefore, has not assessed the potential risk of chlorimuron-ethyl to terrestrial invertebrates. In the future, the Agency will require pollinator data to evaluate risk to terrestrial invertebrates (see Table C.2.1.).

In this Proposed Interim Registration Review Decision, EPA is making no human health or environmental safety findings associated with the EDSP screening of chlorimuron-ethyl, risk to pollinators, nor is it making a complete endangered species finding. The Agency's final registration review decision for chlorimuron-ethyl will be issued once an effects determination for listed species is made, and ESA Section 7 consultation with the Services has taken place, if necessary; an EDSP FFDCA section 408(p) determination has been made; and a pollinator risk assessment has been completed.

C.2.D1. Proposed Data Needs for Chlorimuron-ethyl

Consistent with EPA's June 2014 *Guidance for Assessing Pesticide Risks to Bees*, the Agency has begun to require ecotoxicity data for pollinators where applicable. The Agency has determined that pollinator data are needed for chlorimuron-ethyl and proposes to require these data, under a DCI, as a part of the registration review of chlorimuron-ethyl. The pollinator data proposed to be required are identified in Table C.2.1 below.

Table C.2.1. Potential Pollinator Data Requirements for Chlorimuron-ethyl

Guideline #	Study
850.3040**	Field testing for pollinators
Non-Guideline* (OECD 213)	Honey bee adult acute oral toxicity
Non-Guideline* (OECD 237)	Honey bee larvae acute oral toxicity
Non-Guideline*	Honey bee adult chronic oral toxicity
Non-Guideline*	Honey bee larvae chronic oral toxicity
Non-Guideline**	Residues in pollen and nectar/field residue analysis
Non-Guideline** (OECD 75)	Semi-field testing for pollinators (tunnel or colony feeding studies)

*Tier 1 (Laboratory-based studies)
**Tier 2 and 3 (Semi-field and full field colony-level studies) The need for a higher tier test for pollinators will be determined based upon lower-tiered tests and/or other lines of data and the need for a refined pollinator risk assessment.

Table C.2.2: Chlorimuron-methyl Label Table

Summary of Proposed Labeling Changes for Chlorimuron-methyl Uses – End-Use Products		
Description	Proposed Amended Labeling Language for Chlorimuron-methyl Use Products	Placement on Label

Groundwater Label Advisory[1]	"Chlorimuron-methyl is known to leach through soil into groundwater under certain conditions as a result of label use. This chemical may leach into groundwater if used in areas where soils are permeable, particularly where the water table is shallow."	Environmental Hazard section of Precautionary Statements
Surface Water Label Advisory	"This product may impact surface water quality due to runoff of rain water. This is especially true for poorly draining soils and soils with shallow ground water. This product is classified as having high potential for reaching surface water via runoff for several months or more after application. A level, well-maintained vegetative buffer strip between areas to which this product is applied and surface water features such as ponds, streams, and springs will reduce the potential loading of chlorimuron-methyl from runoff water and sediment. Runoff of this product will be greatly reduced by avoiding applications when rainfall or irrigation is expected to occur within 48 hours."	Environmental Hazard section of Precautionary Statements
Herbicide Resistance Management	See Appendix B.	
Spray Drift Management	See Appendix B.	
Advisory Language	See Appendix B.	

1. Advisory based on detects in groundwater referenced in the Water Quality Portal (http://www.waterqualitydata.us/, June 2016).

APPENDIX C.3 – Chlorsulfuron

C.3.A. Use and Usage and Benefits Characterization

General use, usage, and benefits information is covered in Section III.D: Characterization of Benefits, as well as in Appendix E: Chemical Use and Usage. Chlorsulfuron is a broad spectrum herbicide that is registered for control of over 90 broadleaf and grass weed species either as a soil (preemergence) or foliar (post-emergence) treatment. It is registered on thirteen different crops and sites including grain crops, soybean, pasture, fallow land, rangeland, and rights-of-way (utility and railroad). The greatest crop use is on winter wheat, with an average of over 4 million acres treated during 2009-2013.

C.3.B. Responses to Comments

The Agency has responded to ecological, human health and usage related comments in its documents *Response to Comments on Preliminary Risk Assessment for 22 Sulfonylurea Herbicides*; *Response to Comments on the Health Effects Divisions Sulfonylurea Risk Assessments*; and *Sulfonylurea Herbicides: Usage, Response to Comments, Herbicide Resistance*

Management Measures and Grower Impacts from Potential Risk Mitigation Measures, which can be found in the public docket at https://www.regulations.gov/#!docketDetail;D=EPA-HQ-OPP-2012-0878.

C.3.C. Tolerances

The existing tolerances for residues of chlorsulfuron (40 CFR §180.405) are supported by the available residue chemistry data. Codex has not established MRLs for residues of chlorsulfuron. The established Canadian MRLs for residues of chlorsulfuron are harmonized with U.S. tolerances.

Proposed changes to the chlorsulfuron tolerances are as follows: the established tolerances in 40 CFR §180.405(a)(1) and 40 CFR §180.405(a)(2) should be merged into one section, 40 CFR §180.405(a). The established tolerance values are not impacted by this change. Also, it is proposed that the tolerance expression for chlorsulfuron in 40 CFR §180.405(a) should be revised to state the following:

> *(a) General. Tolerances are established for residues of chlorsulfuron, including its metabolites and degradates, in or on the commodities in the table below. Compliance with the tolerance levels specified below is to be determined by measuring only chlorsulfuron (2-chloro-N-[[(4-methoxy-6-methyl-1,3,5-triazin-2 yl)amino]carbonyl]benzenesulfonamide) in or on the commodity.*

C.3.D. Proposed Interim Registration Review Decision for Chlorsulfuron

EPA has completed quantitative human health, and ecological risk assessments for chlorsulfuron. Although the ecological risk assessment analyzed risks from a range of terrestrial plant toxicity data, a comprehensive endangered species assessment was not completed. As part of the chlorsulfuron registration review, the Agency required certain data under generic data call-in (GDCI-118601-1323). All required data was either received or waived by the Agency.

In accordance with 40 CFR Sections 155.56 and 155.58, the Agency is issuing this *Proposed Interim Registration Review Decision for 22 Sulfonylurea (SU) Herbicides*, including chlorsulfuron (case 0631). Except for the EDSP, ESA, and pollinator components of this case, the Agency has made the following proposed interim registration review decision for chlorsulfuron:

- The Agency determined that there are no human health risks of concern at this time.
- The Agency determined that there are no ecological risks of concern for any taxa, except non-target terrestrial and aquatic plants at this time.
- The Agency has identified potential risk to non-target terrestrial and aquatic plants from chlorsulfuron. The Agency is proposing certain changes to chlorsulfuron labeling in order to reduce spray drift and therefore ecological exposure and risk to non-target plants. The proposed label changes are detailed in Appendix B of this document, and in the chlorsulfuron label table below (Table C.3.3).
- The Agency has identified herbicide resistance management concerns with all 22 SUs, including chlorsulfuron, and is proposing certain changes to chlorsulfuron product labels to reduce the potential of herbicide resistance. These proposed label changes are detailed in Appendix B of this document, and in the label table below (Table C.3.3).

- The Agency does not have sufficient ecotoxicity data for chlorsulfuron on pollinators and therefore, has not assessed the potential risk of chlorsulfuron to terrestrial invertebrates. In the future, the Agency will require pollinator data to evaluate risk to terrestrial invertebrates (see Table C.3.1.).
- Certain amendments to the tolerance expression and presentation in 40 CFR §180.405 for chlorsulfuron are proposed.

In this Proposed Interim Registration Review Decision, EPA is making no human health or environmental safety findings associated with the EDSP screening of chlorsulfuron, risk to pollinators, nor is it making a complete endangered species finding. The Agency's final registration review decision for chlorsulfuron will be issued once an effects determination for listed species is made, and ESA Section 7 consultation with the Services has taken place, if necessary; an EDSP FFDCA section 408(p) determination has been made; and a pollinator risk assessment has been completed.

C.3.D1. Proposed Data Needs for Chlorsulfuron

Consistent with EPA's June 2014 *Guidance for Assessing Pesticide Risks to Bees*, the Agency has begun to require ecotoxicity data for pollinators where applicable. The Agency has determined that pollinator data are needed for chlorsulfuron and proposes to require these data, under a DCI, as a part of the registration review of chlorsulfuron. The pollinator data proposed to be required are identified in Table C.3.1 below.

Table C.3.1. Potential Pollinator Data Requirements for Chlorsulfuron

Guideline #	Study
850.3040**	Field testing for pollinators
Non-Guideline* (OECD 213)	Honey bee adult acute oral toxicity
Non-Guideline* (OECD 237)	Honey bee larvae acute oral toxicity
Non-Guideline*	Honey bee adult chronic oral toxicity
Non-Guideline*	Honey bee larvae chronic oral toxicity
Non-Guideline**	Residues in pollen and nectar/field residue analysis
Non-Guideline** (OECD 75)	Semi-field testing for pollinators (tunnel or colony feeding studies)

*Tier 1 (Laboratory-based studies)
**Tier 2 and 3 (Semi-field and full field colony-level studies) The need for a higher tier test for pollinators will be determined based upon lower-tiered tests and/or other lines of data and the need for a refined pollinator risk assessment.

C.3.D2. Additional Chlorsulfuron Label Changes

As a component of chlorsulfuron registration review, the Agency is proposing that all product labels contain certain application information to ensure that users apply chlorsulfuron products in a consistent manner, and that EPA's assessment and estimates of human health and ecological risks from chlorsulfuron products are consistent with their use. Therefore, it is proposed that all chlorsulfuron product labels include certain information for each use site/use pattern on the product label. For a list of information that is proposed to be on the label, please see Appendix H.

Table C.3.2: Chlorsulfuron Label Table

Summary of Proposed Labeling Changes for Chlorsulfuron Uses – End-Use Products		
Description	Proposed Amended Labeling Language for Chlorsulfuron Use Products	Placement on Label
Groundwater Label Advisory[1]	"Chlorsulfuron is known to leach through soil into groundwater under certain conditions as a result of label use. This chemical may leach into groundwater if used in areas where soils are permeable, particularly where the water table is shallow."	Environmental Hazard section of Precautionary Statements
Surface Water Label Advisory	"This product may impact surface water quality due to runoff of rain water. This is especially true for poorly draining soils and soils with shallow ground water. This product is classified as having high potential for reaching surface water via runoff for weeks after application. A level, well-maintained vegetative buffer strip between areas to which this product is applied and surface water features such as ponds, streams, and springs will reduce the potential loading of chlorsulfuron from runoff water and sediment. Runoff of this product will be greatly reduced by avoiding applications when rainfall or irrigation is expected to occur within 48 hours."	Environmental Hazard section of Precautionary Statements
Herbicide Resistance Management	See Appendix B.	
Spray Drift Management	See Appendix B.	
Advisory Language	See Appendix B.	

1. Advisory based on detects in groundwater referenced in the Water Quality Portal (http://www.waterqualitydata.us/, June 2016).

APPENDIX C.4 – Flazasulfuron

C.4.A. Use and Usage and Benefits Characterization

General use, usage, and benefits information is covered in Section III.D: Characterization of Benefits, as well as in Appendix E: Chemical Use and Usage. For flazasulfuron, agricultural uses were first approved in 2012. The Agency has limited use information for grapes and some citrus. The only available percent crop treated data are from 2014 which showed 4 % crop treated for oranges, and 1% crop treated for grapes.

C.4.B. Responses to Comments

The Agency has responded to ecological, human health and usage related comments in its documents *Response to Comments on Preliminary Risk Assessment for 22 Sulfonylurea*

Herbicides; *Response to Comments on the Health Effects Divisions Sulfonylurea Risk Assessments*; and *Sulfonylurea Herbicides: Usage, Response to Comments, Herbicide Resistance Management Measures and Grower Impacts from Potential Risk Mitigation Measures*, which can be found in the public docket at https://www.regulations.gov/#!docketDetail;D=EPA-HQ-OPP-2011-0994. In addition to comments on spray drift estimates, which are addressed in the Agency's Response to Comments, the technical registrant ISK Biosciences provided comments specific to flazasulfuron during the comment period on the *Preliminary Risk Assessment for 22 Sulfonylurea Herbicides*, dated August 26, 2015. These comments provided information on current label language intended to mitigate risk, and discussed the ecological risk assessment completed by EPA. EPA has considered these comments during the development of this PID.

C.4.C. Tolerances

The existing tolerances for residues of flazasulfuron in/on agricultural commodities can be found at 40 CFR §180.655, and are supported by the available residue chemistry data. No Codex, Canadian, or Mexican maximum residue limits (MRLs) have been established for residues of flazasulfuron. At this time, no revisions to the existing U.S. tolerance expression or levels are needed.

C.4.D. Proposed Interim Registration Review Decision for Flazasulfuron

EPA has completed quantitative human health, and ecological risk assessments for flazasulfuron. Although the ecological risk assessment analyzed risks from a range of terrestrial plant toxicity data, a comprehensive endangered species assessment was not completed. As part of the flazasulfuron registration review, the Agency required certain data under generic data call-in (GDCI-119011-1222). All data requirements issued under the registration review GDCI have been satisfied.

In accordance with 40 CFR Sections 155.56 and 155.58, the Agency is issuing this *Proposed Interim Registration Review Decision for 22 Sulfonylurea (SU) Herbicides*, including for flazasulfuron (case 7271). Except for the EDSP, ESA, and pollinator components of this case, the Agency has made the following proposed interim registration review decision for flazasulfuron:

- The Agency determined that there are no human health risks of concern at this time.
- The Agency determined that there are no ecological risks of concern for any taxa, except non-target terrestrial and aquatic plants, at this time.
- The Agency has identified potential risk to non-target terrestrial and aquatic plants from flazasulfuron. The Agency is proposing certain changes to flazasulfuron labeling in order to reduce spray drift and therefore ecological exposure and risk to non-target plants. The proposed label changes are detailed in Appendix B of this document, and in the flazasulfuron label table below (Table C.4.3).
- The Agency has identified herbicide resistance management concerns with all 22 SUs, including flazasulfuron, and is proposing certain changes to flazasulfuron product labels to reduce the potential of herbicide resistance. These proposed label changes are detailed in Appendix B of this document, and in the label table below (Table C.4.3).
- The Agency does not have sufficient ecotoxicity data for flazasulfuron on pollinators and therefore, has not assessed the potential risk of flazasulfuron to terrestrial invertebrates. In the future, the Agency will require pollinator data to evaluate risk to terrestrial invertebrates (see Table C.4.1.).

In this Proposed Interim Registration Review Decision, EPA is making no human health or environmental safety findings associated with the EDSP screening of flazasulfuron, risk to pollinators, nor is it making a complete endangered species finding. The Agency's final registration review decision for flazasulfuron will be issued once an effects determination for listed species is made, and ESA Section 7 consultation with the Services has taken place, if necessary, an EDSP FFDCA section 408(p) determination has been made; and a pollinator risk assessment has been completed.

C.4.D1. Proposed Data Needs for Flazasulfuron

Consistent with EPA's June 2014 *Guidance for Assessing Pesticide Risks to Bees*, the Agency has begun to require ecotoxicity data for pollinators where applicable. The Agency has determined that pollinator data are needed for flazasulfuron and proposes to require these data, under a DCI, as a part of the registration review of flazasulfuron. The pollinator data proposed to be required are identified in Table C.17.1 below.

Table C.4.1. Potential Pollinator Data Requirements for Flazasulfuron

Guideline #	Study
850.3040**	Field testing for pollinators
Non-Guideline* (OECD 213)	Honey bee adult acute oral toxicity
Non-Guideline* (OECD 237)	Honey bee larvae acute oral toxicity
Non-Guideline*	Honey bee adult chronic oral toxicity
Non-Guideline*	Honey bee larvae chronic oral toxicity
Non-Guideline**	Residues in pollen and nectar/field residue analysis
Non-Guideline** (OECD 75)	Semi-field testing for pollinators (tunnel or colony feeding studies)

*Tier 1 (Laboratory-based studies)
**Tier 2 and 3 (Semi-field and full field colony-level studies) The need for a higher tier test for pollinators will be determined based upon lower-tiered tests and/or other lines of data and the need for a refined pollinator risk assessment.

C.4.D2. Additional Flazasulfuron Label Changes

As a component of flazasulfuron registration review, the Agency is proposing that all product labels contain certain application information to ensure that users apply flazasulfuron products in a consistent manner, and that EPA's assessment and estimates of human health and ecological risks from flazasulfuron products are consistent with their use. Therefore, it is proposed that all flazasulfuron product labels contain the following information for each use site/use pattern on the product label. For a list of information that is proposed to be on the label, please see Appendix H.

Table C.4.2: Flazasulfuron Label Table

Summary of Proposed Labeling Changes for Flazasulfuron Uses – End-Use Products		
Description	Proposed Amended Labeling Language for Flazasulfuron Use Products	Placement on Label
Groundwater Label Advisory	"This chemical has properties and characteristics associated with chemicals detected in groundwater.	Environmental Hazard section

	This chemical may leach into groundwater if used in areas where soils are permeable, particularly where the water table is shallow."	of Precautionary Statements
Surface Water Label Advisory	"This product may impact surface water quality due to runoff of rain water. This is especially true for poorly draining soils and soils with shallow ground water. This product is classified as having high potential for reaching surface water via runoff for weeks after application. A level, well-maintained vegetative buffer strip between areas to which this product is applied and surface water features such as ponds, streams, and springs will reduce the potential loading of flazasulfuron from runoff water and sediment. Runoff of this product will be greatly reduced by avoiding applications when rainfall or irrigation is expected to occur within 48 hours."	Environmental Hazard section of Precautionary Statements
Herbicide Resistance Management	See Appendix B.	
Spray Drift Management	See Appendix B.	
Advisory Language	See Appendix B.	

APPENDIX C.5 – Foramsulfuron

C.5.A. Use and Usage and Benefits Characterization

General use, usage, and benefits information is covered in Section III.D: Characterization of Benefits, as well as in Appendix E: Chemical Use and Usage. For foramsulfuron, golf course use accounts for the majority of usage. The use of foramsulfuron on food crops (corn) was cancelled in 2015.

C.5.B. Responses to Comments

The Agency has responded to ecological, human health and usage related comments in its documents *Response to Comments on Preliminary Risk Assessment for 22 Sulfonylurea Herbicides*; *Response to Comments on the Health Effects Divisions Sulfonylurea Risk Assessments*; and *Sulfonylurea Herbicides: Usage, Response to Comments, Herbicide Resistance Management Measures and Grower Impacts from Potential Risk Mitigation Measures,* which can be found in the public docket EPA-HQ-OPP-2012-0387 on Regulations.gov.

C.5.C. Tolerances

Currently, foramsulfuron has an exemption from the requirement of a tolerance (40 CFR §180.1219). The Agency continues to support the tolerance exemption for this herbicide.

C.5.D. Proposed Interim Registration Review Decision for Foramsulfuron

EPA has completed quantitative human health, and ecological risk assessments for foramsulfuron. Although the ecological risk assessment analyzed risks from a range of terrestrial

plant toxicity data, a comprehensive endangered species assessment was not completed. As part of the foramsulfuron registration review, the Agency required certain data under generic data call-in (GDCI) GDCI-122020-1316. All data required under the GDCI has been received or waived.

In accordance with 40 CFR Sections 155.56 and 155.58, the Agency is issuing this *Proposed Interim Registration Review Decision for 22 Sulfonylurea (SU) Herbicides*, including foramsulfuron, Case No. 7252. Except for the EDSP, ESA, and pollinator components of this case, the Agency has made the following proposed interim registration review decision for foramsulfuron:

- The Agency determined that there are no human health risks of concern at this time.
- The Agency determined that there are no ecological risks of concern for any taxa, except non-target terrestrial and aquatic plants, at this time.
- The Agency has identified potential risk to non-target terrestrial and aquatic plants from foramsulfuron. The Agency is proposing certain changes to foramsulfuron labeling in order to reduce spray drift and therefore ecological exposure and risk to non-target plants. The proposed label changes are detailed in Appendix B of this document, and in the foramsulfuron label table below (Table C.17.3).
- The Agency has identified herbicide resistance management concerns with all 22 SUs, including foramsulfuron, and is proposing certain changes to foramsulfuron product labels to reduce the potential of herbicide resistance. These proposed label changes are detailed in Appendix B of this document, and in the label table below (Table C.17.3).
- The Agency does not have sufficient ecotoxicity data for foramsulfuron on pollinators and therefore, has not assessed the potential risk of foramsulfuron to terrestrial invertebrates. In the future, the Agency will require pollinator data to evaluate risk to terrestrial invertebrates (see Table C.17.1.).

In this Proposed Interim Registration Review Decision, EPA is making no human health or environmental safety findings associated with the EDSP screening of foramsulfuron, risk to pollinators, nor is it making a complete endangered species finding. The Agency's final registration review decision for foramsulfuron will be issued once an effects determination for listed species is made, and ESA Section 7 consultation with the Services has taken place, if necessary; an EDSP FFDCA section 408(p) determination has been made; and a pollinator risk assessment has been completed.

C.5.D1. Proposed Data Needs for Foramsulfuron

Consistent with EPA's June 2014 *Guidance for Assessing Pesticide Risks to Bees*, the Agency has begun to require ecotoxicity data for pollinators where applicable. The Agency has determined that pollinator data are needed for foramsulfuron and proposes to require these data, under a DCI, as a part of the registration review of foramsulfuron. The pollinator data proposed to be required are identified in Table C.5.1 below.

Table C.5.1. Potential Pollinator Data Requirements for Foramsulfuron

Guideline #	Study
850.3040**	Field testing for pollinators

Non-Guideline* (OECD 213)	Honey bee adult acute oral toxicity
Non-Guideline* (OECD 237)	Honey bee larvae acute oral toxicity
Non-Guideline*	Honey bee adult chronic oral toxicity
Non-Guideline*	Honey bee larvae chronic oral toxicity
Non-Guideline**	Residues in pollen and nectar/field residue analysis
Non-Guideline** (OECD 75)	Semi-field testing for pollinators (tunnel or colony feeding studies)

*Tier 1 (Laboratory-based studies)
**Tier 2 and 3 (Semi-field and full field colony-level studies) The need for a higher tier test for pollinators will be determined based upon lower-tiered tests and/or other lines of data and the need for a refined pollinator risk assessment.

C.5.D2. Additional Foramsulfuron Label Changes

As a component of foramsulfuron registration review, the Agency is proposing that all product labels contain certain application information to ensure that users apply foramsulfuron products in a consistent manner, and that EPA's assessment and estimates of human health and ecological risks from foramsulfuron products are consistent with their use. Therefore, it is proposed that all foramsulfuron product labels contain certain information for each use site/use pattern on the product label. For a list of information that is proposed to be on the label, please see Appendix H.

Table C.5.2: Foramsulfuron Label Table

Summary of Proposed Labeling Changes for Foramsulfuron Uses – End-Use Products		
Description	Proposed Amended Labeling Language for Foramsulfuron Use Products	Placement on Label
Groundwater Label Advisory	"This chemical has properties and characteristics associated with chemicals detected in groundwater. This chemical may leach into groundwater if used in areas where soils are permeable, particularly where the water table is shallow."	Environmental Hazard section of Precautionary Statements
Surface Water Label Advisory	"This product may impact surface water quality due to runoff of rain water. This is especially true for poorly draining soils and soils with shallow ground water. This product is classified as having high potential for reaching surface water via runoff for months or more after application. A level, well-maintained vegetative buffer strip between areas to which this product is applied and surface water features such as ponds, streams, and springs will reduce the potential loading of foramsulfuron from runoff water and sediment. Runoff of this product will be greatly reduced by avoiding applications when rainfall or irrigation is expected to occur within 48 hours."	Environmental Hazard section of Precautionary Statements

Herbicide Resistance Management	See Appendix B.
Spray Drift Management	See Appendix B.
Advisory Language	See Appendix B.

APPENDIX C.6 – Halosulfuron-methyl

C.6.A. Use and Usage and Benefits Characterization

General use, usage, and benefits information is covered in Section III.D: Characterization of Benefits, as well as in Appendix E: Chemical Use and Usage. From 2009 to 2013, use on rice accounted for the greatest usage of halosulfuron-methyl in terms of pounds active ingredient (a.i.) applied (average of 21,545 lbs a.i./year) and acres treated (average of 730,759 acres/year). Halosulfuron-methyl is also registered for use on a wide range of field, fruit, orchard, turf and vegetable crops.

C.6.B. Responses to Comments

The Agency has responded to ecological, human health and usage related comments in its documents *Response to Comments on Preliminary Risk Assessment for 22 Sulfonylurea Herbicides*; *Response to Comments on the Health Effects Divisions Sulfonylurea Risk Assessments*; and *Sulfonylurea Herbicides: Usage, Response to Comments, Herbicide Resistance Management Measures and Grower Impacts from Potential Risk Mitigation Measures*, which can be found in the public docket EPA-HQ-OPP-2010-0626 on Regulations.gov.

C.6.C. Tolerances

Tolerances are established in 40CFR§180.479[a][2] for residues of halosulfuron-methyl. The existing tolerances (40CFR§180.479[a][2])) are supported by the available residue chemistry data. At this time, no revisions to the existing U.S. tolerance expression are needed. However, several tolerance modifications are proposed as needed, and are presented in the table below.

Tolerance Modification needed for Halosulfuron-Methyl[12]			
Commodity	Established Tolerance (ppm)	Recommended Tolerance (ppm)	Comments
Apple	0.05	None	Remove covered by Fruit, pome, group 11-10
Pea and bean, succulent shelled, subgroup 6	0.05	None	Remove incorrect entry
Vegetable, fruiting group 8	0.05	0.05	Revise to vegetable, fruiting, group 8-10
Okra	0.05	None	Remove; covered by vegetable, fruiting, group 8-10

[12] For more detail, see page 8 of the Halosulfuron-Methyl. Human Health Draft Risk Assessment for Registration Review (DP428013, N. Keller, M. Negussie, W. Phang, 09/15/2015) located in the halosulfuron registration review docket.

Nut, tree, group 14	0.05	0.05	Establish as Nut, tree, group 14-12
Pistachio	0.05	None	Remove; covered by Nut, tree, group 14-12
Asparagus[13]	0.8	1.0	Propose increasing tolerance to harmonize with Canada's MRL

At this time, there are no Codex MRLs established for residues of halosulfuron-methyl. The US tolerances for plants are harmonized with Canadian MRLs, except for asparagus. The Agency is proposing to harmonize the asparagus tolerance with the Canadian MRL (i.e., increasing the current tolerance of 0.8 to 1.0). The US has established tolerances on crop group pome fruits whereas Canada has established an MRL on apple only. The US livestock tolerances are not harmonized and cannot be harmonized since the Canadian MRLs are lower. Livestock feedstuffs are not harmonized with Canada because Canada does not establish MRLs on feedstuffs.

C.6.D. Proposed Interim Registration Review Decision for Halosulfuron-methyl

EPA has completed quantitative human health, and ecological risk assessments for halosulfuron-methyl. Although the ecological risk assessment analyzed risks from a range of terrestrial plant toxicity data, a comprehensive endangered species assessment was not completed. As part of the halosulfuron-methyl registration review, the Agency required certain data under generic data call-in (GDCI) 128721-1213. All data required under the GDCI has either been received or waived.

In accordance with 40 CFR Sections 155.56 and 155.58, the Agency is issuing this *Proposed Interim Registration Review Decision for 22 Sulfonylurea (SU) Herbicides*, including halosulfuron-methyl, Case Number 7233. Except for the EDSP, ESA, and pollinator components of this case, the Agency has made the following proposed interim registration review decision for halosulfuron-methyl:

- The Agency determined that there are no human health risks of concern at this time.
- The Agency determined that there are no ecological risks of concern for any taxa, except non-target terrestrial and aquatic plants, at this time.
- The Agency has identified potential risk to non-target terrestrial and aquatic plants from halosulfuron-methyl. The Agency is proposing certain changes to halosulfuron-methyl labeling in order to reduce spray drift and therefore ecological exposure and risk to non-target plants. The proposed label changes are detailed in Appendix B of this document, and in the halosulfuron-methyl label table below (Table C.6.3).
- The Agency has identified herbicide resistance management concerns with all 22 SUs, including halosulfuron-methyl, and is proposing certain changes to halosulfuron-methyl product labels to reduce the potential of herbicide resistance. These proposed label changes are detailed in Appendix B of this document, and in the label table below (Table C.6.3).
- The Agency does not have sufficient ecotoxicity data for halosulfuron-methyl on pollinators and therefore, has not assessed the potential risk of halosulfuron-methyl to

[13] The Human Health Draft Risk Assessment for halosulfuron-methyl mentioned the possibility of harmonizing tolerances with Canada, and the Agency is now recommending this modification.

terrestrial invertebrates. In the future, the Agency will require pollinator data to evaluate risk to terrestrial invertebrates (see Table C.6.1.).

- Certain amendments to the tolerance(s) for halosulfuron-methyl are proposed.

In this Proposed Interim Registration Review Decision, EPA is making no human health or environmental safety findings associated with the EDSP screening of halosulfuron-methyl, risk to pollinators, nor is it making a complete endangered species finding. The Agency's final registration review decision for halosulfuron-methyl will be issued once an effects determination for listed species is made, and ESA Section 7 consultation with the Services has taken place, if necessary; an EDSP FFDCA section 408(p) determination has been made; and a pollinator risk assessment has been completed.

C.6.D1. Proposed Data Needs for Halosulfuron-methyl

Consistent with EPA's June 2014 *Guidance for Assessing Pesticide Risks to Bees*, the Agency has begun to require ecotoxicity data for pollinators where applicable. The Agency has determined that pollinator data are needed for halosulfuron-methyl and proposes to require these data, under a DCI, as a part of the registration review of halosulfuron-methyl. The pollinator data proposed to be required are identified in Table C.6.1 below.

Table C.6.1. Potential Pollinator Data Requirements for Halosulfuron-methyl

Guideline #	Study
850.3040**	Field testing for pollinators
Non-Guideline* (OECD 213)	Honey bee adult acute oral toxicity
Non-Guideline* (OECD 237)	Honey bee larvae acute oral toxicity
Non-Guideline*	Honey bee adult chronic oral toxicity
Non-Guideline*	Honey bee larvae chronic oral toxicity
Non-Guideline**	Residues in pollen and nectar/field residue analysis
Non-Guideline** (OECD 75)	Semi-field testing for pollinators (tunnel or colony feeding studies)

*Tier 1 (Laboratory-based studies)
**Tier 2 and 3 (Semi-field and full field colony-level studies) The need for a higher tier test for pollinators will be determined based upon lower-tiered tests and/or other lines of data and the need for a refined pollinator risk assessment.

C.6.D2. Additional Halosulfuron-methyl Label Changes

As a component of halosulfuron-methyl registration review, the Agency is proposing that all product labels contain certain application information to ensure that users apply halosulfuron-methyl products in a consistent manner, and that EPA's assessment and estimates of human health and ecological risks from halosulfuron-methyl products are consistent with their use. Therefore, it is proposed that all halosulfuron-methyl product labels contain certain information for each use site/use pattern on the product label. For a list of information that is proposed to be on the label, please see Appendix H.

Table C.6.2: Halosulfuron-methyl Label Table

Summary of Proposed Labeling Changes for Halosulfuron-methyl Uses – End-Use Products		
Description	Proposed Amended Labeling Language for Halosulfuron-methyl Use Products	Placement on Label
Groundwater Label Advisory[1]	"Halosulfuron-methyl is known to leach through soil into groundwater under certain conditions as a result of label use. This chemical may leach into groundwater if used in areas where soils are permeable, particularly where the water table is shallow."	Environmental Hazard section of Precautionary Statements
Surface Water Label Advisory	"This product may impact surface water quality due to runoff of rain water. This is especially true for poorly draining soils and soils with shallow ground water. This product is classified as having high potential for reaching surface water via runoff for several months or more after application. A level, well-maintained vegetative buffer strip between areas to which this product is applied and surface water features such as ponds, streams, and springs will reduce the potential loading of halosulfuron-methyl from runoff water and sediment. Runoff of this product will be greatly reduced by avoiding applications when rainfall or irrigation is expected to occur within 48 hours."	Environmental Hazard section of Precautionary Statements
Herbicide Resistance Management	See Appendix B.	
Spray Drift Management	See Appendix B.	
Advisory Language	See Appendix B.	

1. Advisory based on detects in groundwater referenced in the Water Quality Portal (http://www.waterqualitydata.us/, June 2016).

APPENDIX C.7 – Imazosulfuron

C.7.A. Use and Usage and Benefits Characterization

General use, usage, and benefits information is covered in Section III.D: Characterization of Benefits, as well as in Appendix E: Chemical Use and Usage. Imazosulfuron is registered for use on 20 crops including rice, melons, vegetables, fruits and is also registered for turfgrass and sod farm treatments (residential and commercial). Limited market data (2012 – 2014) indicate that approximately 36% of imazosulfuron is applied aerially to rice.

C.7.B. Responses to Comments

The Agency has responded to ecological, human health and usage related comments in its documents *Response to Comments on Preliminary Risk Assessment for 22 Sulfonylurea Herbicides*; *Response to Comments on the Health Effects Divisions Sulfonylurea Risk Assessments*; and *Sulfonylurea Herbicides: Usage, Response to Comments, Herbicide Resistance Management Measures and Grower Impacts from Potential Risk Mitigation Measures*, which can be found in the public docket EPA-HQ-OPP-2015-0625 on Regulations.gov. During the comment period, Valent submitted comments specific to imazosulfuron.

Comment submitted by Valent in EPA-HQ-OPP-2015-0625-0019

Comment: Comments by Valent ranged from grammatical errors, to incorrect endpoints and application rates used in the assessment. Valent also explained that in some instances, the assessment erroneously indicated data were insufficient.

Response: The Agency thanks Valent for pointing out these inaccuracies and commenting on the assessment. Errors in study classifications were a result of the Agency not relying on the latest source of data; this issue has been resolved. These and other responses can be found in the *Response to Comments on Preliminary Risk Assessment for 22 Sulfonylurea Herbicides.*

C.7.C. Tolerances

Tolerances for imazosulfuron in/on agricultural commodities are established in 40 CFR § 180.651. There are currently no Codex, Canadian, or Mexican maximum residue limits (MRLs) established for imazosulfuron. At this time, no revisions are needed to the existing U.S. tolerance expression.

C.7.D. Proposed Interim Registration Review Decision for Imazosulfuron

EPA has completed quantitative human health, and ecological risk assessments for imazosulfuron. Although the ecological risk assessment analyzed risks from a range of terrestrial plant toxicity data, a comprehensive endangered species assessment was not completed. A registration review generic data call-in was not issued for imazosulfuron, since the initial registration of this compound was in 2010. As part of the imazosulfuron initial registration, the Agency required certain data. All data required for registration has been received or waived.

In accordance with 40 CFR Sections 155.56 and 155.58, the Agency is issuing this *Proposed Interim Registration Review Decision for 22 Sulfonylurea (SU) Herbicides,* including imazosulfuron. Except for the EDSP, ESA, and pollinator components of this case, the Agency has made the following proposed interim registration review decision for imazosulfuron:

- The Agency determined that there are no human health risks of concern at this time.
- The Agency determined that there are no ecological risks of concern for any taxa, except non-target terrestrial and aquatic plants, at this time.
- The Agency has identified potential risk to non-target terrestrial and aquatic plants from imazosulfuron. The Agency is proposing certain changes to imazosulfuron labeling in order to reduce spray drift and therefore ecological exposure and risk to non-target plants. The proposed label changes are detailed in Appendix B of the SU PID document, and in the imazosulfuron label table below (Table C.7.2).

- The Agency has identified herbicide resistance management concerns with all 22 SUs, including imazosulfuron, and is proposing certain changes to imazosulfuron product labels to reduce the potential of herbicide resistance. These proposed label changes are detailed in Appendix B of SU PID, and in the label table below (Table C.7.2).
- The Agency does not have sufficient ecotoxicity data for imazosulfuron on pollinators and therefore, has not assessed the potential risk of imazosulfuron to terrestrial invertebrates. In the future, the Agency will require pollinator data to evaluate risk to terrestrial invertebrates (see Table C.7.1.).

In this Proposed Interim Registration Review Decision, EPA is making no human health or environmental safety findings associated with the EDSP screening of imazosulfuron, risk to pollinators, nor is it making a complete endangered species finding. The Agency's final registration review decision for imazosulfuron will be issued once an effects determination for listed species is made, and ESA Section 7 consultation with the Services has taken place, if necessary; an EDSP FFDCA section 408(p) determination has been made; and a pollinator risk assessment has been completed.

C.7.D1. Proposed Data Needs for Imazosulfuron

Consistent with EPA's June 2014 *Guidance for Assessing Pesticide Risks to Bees*, the Agency has begun to require ecotoxicity data for pollinators where applicable. The Agency has determined that pollinator data are needed for imazosulfuron and proposes to require these data, under a DCI, as a part of the registration review of imazosulfuron. The pollinator data proposed to be required are identified in Table C.7.1 below.

Table C.7.1. Potential Pollinator Data Requirements for Imazosulfuron

Guideline #	Study
850.3040**	Field testing for pollinators
Non-Guideline* (OECD 213)	Honey bee adult acute oral toxicity
Non-Guideline* (OECD 237)	Honey bee larvae acute oral toxicity
Non-Guideline*	Honey bee adult chronic oral toxicity
Non-Guideline*	Honey bee larvae chronic oral toxicity
Non-Guideline**	Residues in pollen and nectar/field residue analysis
Non-Guideline** (OECD 75)	Semi-field testing for pollinators (tunnel or colony feeding studies)

*Tier 1 (Laboratory-based studies)
**Tier 2 and 3 (Semi-field and full field colony-level studies) The need for a higher tier test for pollinators will be determined based upon lower-tiered tests and/or other lines of data and the need for a refined pollinator risk assessment.

C.7.D2. Additional Imazosulfuron Label Changes

As a component of imazosulfuron registration review, the Agency is proposing that all product labels contain certain application information to ensure that users apply imazosulfuron products in a consistent manner, and that EPA's assessment and estimates of human health and ecological risks from imazosulfuron products are consistent with their use. Therefore, it is proposed that all imazosulfuron product labels contain certain information for each use site/use

pattern on the product label. For a list of information that is proposed to be on the label, please see Appendix H.

Table C.7.2: Imazosulfuron Label Table

Summary of Proposed Labeling Changes for Imazosulfuron Uses – End-Use Products		
Description	Proposed Amended Labeling Language for Imazosulfuron Use Products	Placement on Label
Groundwater Label Advisory	"This chemical has properties and characteristics associated with chemicals detected in groundwater. This chemical may leach into groundwater if used in areas where soils are permeable, particularly where the water table is shallow."	Environmental Hazard section of Precautionary Statements
Surface Water Label Advisory	"This product may impact surface water quality due to runoff of rain water. This is especially true for poorly draining soils and soils with shallow ground water. This product is classified as having high potential for reaching surface water via runoff for months or more after application. A level, well-maintained vegetative buffer strip between areas to which this product is applied and surface water features such as ponds, streams, and springs will reduce the potential loading of imazosulfuron from runoff water and sediment. Runoff of this product will be greatly reduced by avoiding applications when rainfall or irrigation is expected to occur within 48 hours."	Environmental Hazard section of Precautionary Statements
Herbicide Resistance Management	See Appendix B.	
Spray Drift Management	See Appendix B.	
Advisory Language	See Appendix B.	

APPENDIX C.8 – Iodosulfuron-methyl-sodium

C.8.A. Use and Usage and Benefits Characterization

General use, usage, and benefits information is covered in Section III.D: Characterization of Benefits, as well as in Appendix E: Chemical Use and Usage. For iodosulfuron-methyl-sodium, corn accounts for 64% of the usage and soybeans account for 36%. These are the only two crops with reported usage.

C.8.B. Responses to Comments

The Agency has responded to ecological, human health and usage related comments in its documents *Response to Comments on Preliminary Risk Assessment for 22 Sulfonylurea Herbicides*; *Response to Comments on the Health Effects Divisions Sulfonylurea Risk*

Assessments; and *Sulfonylurea Herbicides: Usage, Response to Comments, Herbicide Resistance Management Measures and Grower Impacts from Potential Risk Mitigation Measures*, which can be found in the public docket EPA-HQ-OPP-2012-0717 on Regulations.gov. There were no comments specific to iodosulfuron-methyl-sodium.

C.8.C. Tolerances

Tolerances are established in 40 CFR §180.580 for residues of iodosulfuron-methyl-sodium. The existing tolerances (40 CFR §180.580) are supported by the available residue chemistry data. There are no Codex or Mexican maximum residue limits (MRLs) in/on the registered crops. However, there is a Canadian MRL for residues of iodosulfuron-methyl-sodium *per se* in/on field corn grain of 0.025 ppm (US tolerance is 0.03 ppm). Therefore, the US and Canadian corn grain tolerance/MRL is not harmonized. However, EPA generally does not set tolerances to the thousandths of a "ppm". Therefore, the current tolerance for corn is appropriate.

In accordance with the most recent guidance concerning tolerance expressions, EPA is proposing that the tolerance expression for 180.580(a) be updated as follows:

> *180.580(a) General. Tolerances are established for residues of the herbicide iodosulfuron-methylsodium, including its metabolites and degradates, in or on the commodities listed below. Compliance with the following tolerance levels is to be determined by measuring only iodosulfuron-methylsodium (sodium salt of methyl 4-iodo-2-[[[[(4-methoxy-6-methyl-1,3,5-triazin-2-yl)amino]carbonyl]amino]sulfonyl]benzoate), calculated as the stoichiometric equivalent of iodosulfuron methyl-sodium, on or on the commodity.*

C.8.D. Proposed Interim Registration Review Decision for Iodosulfuron-methyl-sodium

EPA has completed quantitative human health, and ecological risk assessments for iodosulfuron-methyl-sodium. Although the ecological risk assessment analyzed risks from a range of terrestrial plant toxicity data, a comprehensive endangered species assessment was not completed. As part of the iodosulfuron-methyl-sodium registration review, the Agency required certain data under generic data call-in (GDCI) GDCI-122021-1352. All data required under the GDCI have been received or waived, except for the following:

- *Guideline 835.6200*—Aquatic Field Dissipation Study (Only the Environmental Chemistry Method (ECM) and associated Independent Laboratory Validation (ILV) for water portions are required)

Although this data gap remains, EPA is proceeding with this Proposed Interim Registration Review Decision based upon the currently available information. While the information in the ECM/ILV is important for enforcement of pesticide standards, the results have no bearing on EPA's risk assessment or risk management findings.

In accordance with 40 CFR Sections 155.56 and 155.58, the Agency is issuing this *Proposed Interim Registration Review Decision for 22 Sulfonylurea (SU) Herbicides*, including iodosulfuron-methyl-sodium. Except for the EDSP, ESA, and pollinator components of this case,

the Agency has made the following proposed interim registration review decision for iodosulfuron-methyl-sodium:

- The Agency determined that there are no human health risks of concern at this time.
- The Agency determined that there are no ecological risks of concern for any taxa, except non-target terrestrial plants, at this time.
- The Agency has identified potential risk to non-target terrestrial plants from iodosulfuron-methyl-sodium. The Agency is proposing certain changes to iodosulfuron-methyl-sodium labeling in order to reduce spray drift and therefore ecological exposure and risk to non-target plants. The proposed label changes are detailed in Appendix B of this document, and in the iodosulfuron-methyl-sodium label table below (Table C.17.3).
- The Agency has identified herbicide resistance management concerns with all 22 SUs, including iodosulfuron-methyl-sodium, and is proposing certain changes to iodosulfuron-methyl-sodium product labels to reduce the potential of herbicide resistance. These proposed label changes are detailed in Appendix B of this document, and in the label table below (Table C.17.3).
- The Agency does not have sufficient ecotoxicity data for iodosulfuron-methyl-sodium on pollinators and therefore, has not assessed the potential risk of iodosulfuron-methyl-sodium to terrestrial invertebrates. In the future, the Agency will require pollinator data to evaluate risk to terrestrial invertebrates (see Table C.8.1.).
- Certain amendments to the tolerance(s) for iodosulfuron-methyl-sodium are proposed.

C.8.D1. Proposed Data Needs for Iodosulfuron-methyl-sodium

Consistent with EPA's June 2014 *Guidance for Assessing Pesticide Risks to Bees*, the Agency has begun to require ecotoxicity data for pollinators where applicable. The Agency has determined that pollinator data are needed for iodosulfuron-methyl-sodium and proposes to require these data, under a DCI, as a part of the registration review of iodosulfuron-methyl-sodium. The pollinator data proposed to be required are identified in Table C.8.1 below.

Table C.8.1. Potential Pollinator Data Requirements for Iodosulfuron-methyl-sodium

Guideline #	Study
850.3040**	Field testing for pollinators
Non-Guideline* (OECD 213)	Honey bee adult acute oral toxicity
Non-Guideline* (OECD 237)	Honey bee larvae acute oral toxicity
Non-Guideline*	Honey bee adult chronic oral toxicity
Non-Guideline*	Honey bee larvae chronic oral toxicity
Non-Guideline**	Residues in pollen and nectar/field residue analysis
Non-Guideline** (OECD 75)	Semi-field testing for pollinators (tunnel or colony feeding studies)

*Tier 1 (Laboratory-based studies)

**Tier 2 and 3 (Semi-field and full field colony-level studies) The need for a higher tier test for pollinators will be determined based upon lower-tiered tests and/or other lines of data and the need for a refined pollinator risk assessment.

C.8.D2. Additional Iodosulfuron-methyl-sodium Label Changes

As a component of iodosulfuron-methyl-sodium's registration review, the Agency is proposing that all product labels contain certain application information to ensure that users apply iodosulfuron-methyl-sodium products in a consistent manner, and that EPA's assessment and estimates of human health and ecological risks from iodosulfuron-methyl-sodium products are consistent with their use. Therefore, it is proposed that all iodosulfuron-methyl-sodium product labels contain certain information for each use site/use pattern on the product label. For a list of information that is proposed to be on the label, please see Appendix H.

Table C.8.2: Iodosulfuron-methyl-sodium Label Table

Summary of Proposed Labeling Changes for Iodosulfuron-methyl-sodium Uses – End-Use Products		
Description	Proposed Amended Labeling Language for Iodosulfuron-methyl-sodium Use Products	Placement on Label
Groundwater Label Advisory	"This chemical has properties and characteristics associated with chemicals detected in groundwater. This chemical may leach into groundwater if used in areas where soils are permeable, particularly where the water table is shallow."	Environmental Hazard section of Precautionary Statements
Surface Water Label Advisory	"This product may impact surface water quality due to runoff of rain water. This is especially true for poorly draining soils and soils with shallow ground water. This product is classified as having high potential for reaching surface water via runoff for weeks after application. A level, well-maintained vegetative buffer strip between areas to which this product is applied and surface water features such as ponds, streams, and springs will reduce the potential loading of iodosulfuron-methyl-sodium from runoff water and sediment. Runoff of this product will be greatly reduced by avoiding applications when rainfall or irrigation is expected to occur within 48 hours."	Environmental Hazard section of Precautionary Statements
Herbicide Resistance Management	See Appendix B.	
Spray Drift Management	See Appendix B.	
Advisory Language	See Appendix B.	

APPENDIX C.9 – Mesosulfuron-methyl

C.9.A. Use and Usage and Benefits Characterization

General use, usage, and benefits information for mesosulfuron-methyl is covered in Section III.D: Characterization of Benefits, as well as in Appendix E: Chemical Use and Usage. The crops with the most use in terms of total pounds of active ingredient applied are winter

wheat (88%) and spring wheat (12%). The crops with the most total area treated (TAT) are winter wheat (69%) spring wheat (30%), and fallow (1%).

C.9.B. Responses to Comments

The Agency has responded to ecological, human health and usage related comments in its documents *Response to Comments on Preliminary Risk Assessment for 22 Sulfonylurea Herbicides*; *Response to Comments on the Health Effects Divisions Sulfonylurea Risk Assessments*; and *Sulfonylurea Herbicides: Usage, Response to Comments, Herbicide Resistance Management Measures and Grower Impacts from Potential Risk Mitigation Measures*, which can be found in the public docket EPA-HQ-OPP-2012-0833 on Regulations.gov. Public comments specific to mesosulfuron-methyl were received from Bayer Crop Science Division, and responses can be found in the documents listed above.

C.9.C. Tolerances

Tolerances are established in 40 CFR §180.597. The existing tolerances (40 CFR §180.597) are supported by the available residue chemistry data. There are Canadian maximum residue limits (MRLs) but no Codex MRLs are established for residues of mesosulfuron-methyl in crop or livestock commodities.

The Agency notes that the tolerance expression for mesosulfuron-methyl in 40 CFR §180.597 needs to be revised in accordance with the OPP/HED Interim Guidance on Tolerance Expressions. Therefore, the Agency is proposing to update the tolerance expression for mesosulfuron-methyl to the following language:

> *"Tolerances are established for residues of mesosulfuron-methyl, including its metabolites and degradates, in or on the commodities in the table below. Compliance with the tolerance levels specified below is to be determined by measuring mesosulfuronmethyl, methyl 2-[[[[(4,6-dimethoxy-2-pyrimidinyl)amino]carbonyl]amino]sulfonyl]-4-[[(methylsulfonyl)amino]methyl]benzoate."*

C.9.D. Proposed Interim Registration Review Decision for Mesosulfuron-methyl

EPA has completed quantitative human health and ecological risk assessments for meso-sulfuron-methyl. Although the ecological risk assessment analyzed risks from a range of terrestrial plant toxicity data, a comprehensive endangered species assessment was not completed. As part of the mesosulfuron-methyl registration review, the Agency required certain data under generic data call-in (GDCI) 122009-1369. All data required under the GDCI has been received or waived, except for 850.4500 - Aquatic plant growth (freshwater green alga).

Although one data gap remains, EPA is proceeding with this Proposed Interim Registration Review Decision based upon the available information. With the proposed measures identified in this Proposed Interim Decision, the Agency believes that the uses of mesosulfuron-methyl meet the standard for registration in the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA).

In accordance with 40 CFR Sections 155.56 and 155.58, the Agency is issuing this *Proposed Interim Registration Review Decision for 22 Sulfonylurea (SU) Herbicides*, including

mesosulfuron-methyl/case number 7277. Except for the EDSP, ESA, and pollinator components of this case, the Agency has made the following proposed interim registration review decision for mesosulfuron-methyl:

- The Agency determined that there are no human health risks of concern at this time.
- The Agency determined that there are no ecological risks of concern for any taxa, except non-target terrestrial plants, at this time.
- The Agency has identified potential risk to non-target terrestrial plants from mesosulfuron-methyl. The Agency is proposing certain changes to mesosulfuron-methyl labeling in order to reduce spray drift and therefore ecological exposure and risk to non-target plants. The proposed label changes are detailed in Appendix B of this document, and in the mesosulfuron-methyl label table below (Table C.9.3).
- The Agency has identified herbicide resistance management concerns with all 22 SUs, including mesosulfuron-methyl, and is proposing certain changes to mesosulfuron-methyl product labels to reduce the potential of herbicide resistance. These proposed label changes are detailed in Appendix B of this document, and in the label table below (Table C.9.3).
- The Agency does not have sufficient ecotoxicity data for mesosulfuron-methyl on pollinators and therefore, has not assessed the potential risk of mesosulfuron-methyl to terrestrial invertebrates. In the future, the Agency will require pollinator data to evaluate risk to terrestrial invertebrates (see Table C.9.1.).
- A modification to the tolerance expression for mesosulfuron-methyl is proposed.

In this Proposed Interim Registration Review Decision, EPA is making no human health or environmental safety findings associated with the EDSP screening of mesosulfuron-methyl, risk to pollinators, nor is it making a complete endangered species finding. The Agency's final registration review decision for mesosulfuron-methyl will be issued once an effects determination for listed species is made, and ESA Section 7 consultation with the Services has taken place, if necessary; an EDSP FFDCA section 408(p) determination has been made; and a pollinator risk assessment has been completed.

C.9.D1. Proposed Data Needs for Mesosulfuron-methyl

Consistent with EPA's June 2014 *Guidance for Assessing Pesticide Risks to Bees*, the Agency has begun to require ecotoxicity data for pollinators where applicable. The Agency has determined that pollinator data are needed for mesosulfuron-methyl and proposes to require these data, under a DCI, as a part of the registration review of mesosulfuron-methyl. The pollinator data proposed to be required are identified in Table C.9.1 below.

Table C.9.1. Potential Pollinator Data Requirements for Mesosulfuron-methyl

Guideline #	Study
850.3040**	Field testing for pollinators
Non-Guideline* (OECD 213)	Honey bee adult acute oral toxicity
Non-Guideline* (OECD 237)	Honey bee larvae acute oral toxicity
Non-Guideline*	Honey bee adult chronic oral toxicity

Non-Guideline*	Honey bee larvae chronic oral toxicity
Non-Guideline**	Residues in pollen and nectar/field residue analysis
Non-Guideline** (OECD 75)	Semi-field testing for pollinators (tunnel or colony feeding studies)

*Tier 1 (Laboratory-based studies)
**Tier 2 and 3 (Semi-field and full field colony-level studies) The need for a higher tier test for pollinators will be determined based upon lower-tiered tests and/or other lines of data and the need for a refined pollinator risk assessment.

C.9.D2. Additional Mesosulfuron-methyl Label Changes

As a component of mesosulfuron-methyl registration review, the Agency is proposing that all product labels contain certain application information to ensure that users apply mesosulfuron-methyl products in a consistent manner, and that EPA's assessment and estimates of human health and ecological risks from mesosulfuron-methyl products are consistent with their use. Therefore, it is proposed that all mesosulfuron-methyl product labels contain the following information for each use site/use pattern on the product label. For a list of information that is proposed to be on the label, please see Appendix H.

Table C.9.2: Mesosulfuron-methyl Label Table

Summary of Proposed Labeling Changes for Mesosulfuron-methyl Uses – End-Use Products		
Description	Proposed Amended Labeling Language for Mesosulfuron-methyl Use Products	Placement on Label
Groundwater Label Advisory	"This chemical has properties and characteristics associated with chemicals detected in groundwater. This chemical may leach into groundwater if used in areas where soils are permeable, particularly where the water table is shallow."	Environmental Hazard section of Precautionary Statements
Surface Water Label Advisory	"This product may impact surface water quality due to runoff of rain water. This is especially true for poorly draining soils and soils with shallow ground water. This product is classified as having high potential for reaching surface water via runoff for months or more after application. A level, well-maintained vegetative buffer strip between areas to which this product is applied and surface water features such as ponds, streams, and springs will reduce the potential loading of mesosulfuron-methyl from runoff water and sediment. Runoff of this product will be greatly reduced by avoiding applications when rainfall or irrigation is expected to occur within 48 hours."	Environmental Hazard section of Precautionary Statements
Herbicide Resistance Management	See Appendix B.	
Spray Drift Management	See Appendix B.	
Advisory Language	See Appendix B.	

APPENDIX C.10 – Metsulfuron-methyl

C.10.A. Use and Usage and Benefits Characterization

General use, usage, and benefits information is covered in Section III.D: Characterization of Benefits, as well as in Appendix E: Chemical Use and Usage. From 1998-2008, the largest markets in terms of total pounds of active ingredient applied, in order from highest to lowest use, are winter wheat (58%), pasture/range (27%), and spring wheat (8%). The use of metsulfuron methyl, in terms of the acres treated from highest to lowest, are winter wheat (74%), pastureland (10%), and spring wheat (8%).

C.10.B. Responses to Comments

The Agency has responded to ecological, human health and usage related comments in its documents, *Metsulfuron: Review of Human Incidents, Preliminary Ecological Risk Assessment for Registration Review of 22 Sulfonylurea Herbicides, Metsulfuron-methyl. Draft Human Health Risk Assessment in Support of Registration Review, and Registration Review: Preliminary Problem formulation for Environmental Fate and Ecological Risk, Endangered Species, and Drinking Water Assessments for Metsulfuron-methyl (Case 7205),* which can be found in the public docket at regulations.gov Docket ID EPA-HQ-OPP-2011-0375. The Agency received one technical comment from the registrant, DuPont, concerning metsulfuron methyl specifically. These technical comments are all addressed in the response to comments documents listed above.

C.10.C. Tolerances

Tolerances are established in 40 CFR §180.428 for residues of metsulfuron methyl. The existing tolerances (40 CFR §180.428) are supported by the available residue chemistry data. The Agency does not intend to update the tolerances for metsulfuron methyl at this time.

C.10.D. Proposed Interim Registration Review Decision for Metsulfuron methyl

EPA has completed quantitative human health, and ecological risk assessments for metsulfuron methyl, including a screening-level endangered species analysis. As part of the metsulfuron methyl registration review, the Agency required certain data under generic data call-in (GDCI-122010-1306). All data required under the GDCI has been received or waived.

In accordance with 40 CFR Sections 155.56 and 155.58, the Agency is issuing this *Proposed Interim Registration Review Decision for 22 Sulfonylurea (SU) Herbicides,* including metsulfuron methyl, Case Number 7205. Except for the EDSP, ESA, and pollinator components of this case, the Agency has made the following proposed interim registration review decision for metsulfuron methyl:

- The Agency determined that there are no human health risks of concern at this time.
- The Agency determined that there are no ecological risks of concern for any taxa, except non-target terrestrial and aquatic plants, at this time.

- The Agency has identified potential risk to non-target terrestrial and aquatic plants from metsulfuron methyl. The Agency is proposing certain changes to metsulfuron methyl labeling in order to reduce spray drift and therefore ecological exposure and risk to non-target plants. The proposed label changes are detailed in Appendix B of this document, and in the metsulfuron methyl label table below (Table C.17.3).
- The Agency has identified herbicide resistance management concerns with all 22 SUs, including metsulfuron methyl, and is proposing certain changes to metsulfuron methyl product labels to reduce the potential of herbicide resistance. These proposed label changes are detailed in Appendix B of this document, and in the label table below (Table C.17.3).
- The Agency does not have sufficient ecotoxicity data for metsulfuron methyl on pollinators and therefore, has not assessed the potential risk of metsulfuron methyl to terrestrial invertebrates. In the future, the Agency will require pollinator data to evaluate risk to terrestrial invertebrates (see Table C.17.1.).
- An analytical reference standard for metsulfuron-methyl is available at EPA's National Pesticide Standards Repository (see https://www.epa.gov/pesticide-analytical-methods/national-pesticide-standard-repository). However, the Agency proposes to require analytical reference standards for metsulfuron methyl's metabolite 4-hydroxy metsulfuron methyl, to be submitted to National Pesticides Standards Repository.

In this Proposed Interim Registration Review Decision, EPA is making no human health or environmental safety findings associated with the EDSP screening of metsulfuron methyl, risk to pollinators, nor is it making a complete endangered species finding. The Agency's final registration review decision for metsulfuron methyl will be issued once an effects determination for listed species is made, and ESA Section 7 consultation with the Services has taken place, if necessary; an EDSP FFDCA section 408(p) determination has been made; and a pollinator risk assessment has been completed.

C.10.D1. Proposed Data Needs for Metsulfuron methyl

Consistent with EPA's June 2014 *Guidance for Assessing Pesticide Risks to Bees*, the Agency has begun to require ecotoxicity data for pollinators where applicable. The Agency has determined that pollinator data are needed for metsulfuron methyl and proposes to require these data, under a DCI, as a part of the registration review of metsulfuron methyl. The pollinator data proposed to be required are identified in Table C.17.1 below.

Table C.10.1. Potential Pollinator Data Requirements for Metsulfuron methyl

Guideline #	Study
850.3040**	Field testing for pollinators
Non-Guideline* (OECD 213)	Honey bee adult acute oral toxicity
Non-Guideline* (OECD 237)	Honey bee larvae acute oral toxicity
Non-Guideline*	Honey bee adult chronic oral toxicity
Non-Guideline*	Honey bee larvae chronic oral toxicity
Non-Guideline**	Residues in pollen and nectar/field residue analysis

Non-Guideline** (OECD 75)	Semi-field testing for pollinators (tunnel or colony feeding studies)

*Tier 1 (Laboratory-based studies)
**Tier 2 and 3 (Semi-field and full field colony-level studies) The need for a higher tier test for pollinators will be determined based upon lower-tiered tests and/or other lines of data and the need for a refined pollinator risk assessment.

The Agency proposes to require that the analytical reference standards for metsulfuron methyl's metabolite 4-hydroxy metsulfuron methyl be submitted to National Pesticides Standards Repository (see https://www.epa.gov/pesticide-analytical-methods/national-pesticide-standard-repository).

C.10.D2. Additional Metsulfuron methyl Label Changes

As a component of metsulfuron methyl registration review, the Agency is proposing that all product labels contain certain application information to ensure that users apply metsulfuron methyl products in a consistent manner, and that EPA's assessment and estimates of human health and ecological risks from metsulfuron methyl products are consistent with their use. Therefore, it is proposed that all metsulfuron methyl product labels contain certain information for each use site/use pattern on the product label. For a list of information that is proposed to be on the label, please see Appendix H.

Table C.10.2: Metsulfuron methyl Label Table

Summary of Proposed Labeling Changes for Metsulfuron methyl Uses – End-Use Products		
Description	Proposed Amended Labeling Language for Metsulfuron methyl Use Products	Placement on Label
Groundwater Label Advisory[1]	"Metsulfuron methyl is known to leach through soil into groundwater under certain conditions as a result of label use. This chemical may leach into groundwater if used in areas where soils are permeable, particularly where the water table is shallow."	Environmental Hazard section of Precautionary Statements
Surface Water Label Advisory	"This product may impact surface water quality due to runoff of rain water. This is especially true for poorly draining soils and soils with shallow ground water. This product is classified as having high potential for reaching surface water via runoff for weeks after application. A level, well-maintained vegetative buffer strip between areas to which this product is applied and surface water features such as ponds, streams, and springs will reduce the potential loading of metsulfuron methyl from runoff water and sediment. Runoff of this product will be greatly reduced by avoiding applications when rainfall or irrigation is expected to occur within 48 hours."	Environmental Hazard section of Precautionary Statements
Herbicide Resistance Management	See Appendix B.	

Spray Drift Management	See Appendix B.
Advisory Language	See Appendix B.

1. Advisory based on detects in groundwater referenced in the Water Quality Portal (http://www.waterqualitydata.us/, June 2016).

APPENDIX C.11 – Nicosulfuron

C.11.A. Use and Usage and Benefits Characterization

General use, usage, and benefits information is covered in Section III.D: Characterization of Benefits, as well as in Appendix E: Chemical Use and Usage. For nicosulfuron, corn accounts for 99% of the usage (2006-2010), and the remaining percent of nicosulfuron use includes sorghum, Bermudagrass, switchgrass, rangeland, pastureland, and meadows.

C.11.B. Responses to Comments

The Agency has responded to ecological, human health and usage related comments in its documents *Response to Comments on Preliminary Risk Assessment for 22 Sulfonylurea Herbicides*; *Response to Comments on the Health Effects Divisions Sulfonylurea Risk Assessments*; and *Sulfonylurea Herbicides: Usage, Response to Comments, Herbicide Resistance Management Measures and Grower Impacts from Potential Risk Mitigation Measures*, which can be found in the public docket EPA-HQ-OPP-2012-0372 on Regulations.gov.

Comment: DuPont Crop Protection provided a comment referring to the *Nicosulfuron. Human Health Draft Risk Assessment for Registration Review*, and *Drinking Water Exposure Assessment for the Registration of 22 Sulfonylurea Herbicides*. DuPont commented on a discrepancy in the drinking water values for dietary risk assessment. In the Nicosulfuron Human Health Risk Assessment, it stated that the coarse screen water number was used. However in the "Drinking Water Exposure Assessment for the Registration Review of 22 Sulfonylurea Herbicides," nicosulfuron is listed as one of the 8 compounds for which refined screen data was generated.

Response: The Agency acknowledges the discrepancy between these two documents. The *Drinking Water Exposure Assessment for Registration of 22 Sulfonylurea Herbicides* is correct, and nicosulfuron has had refined screen data generated.

C.11.C. Tolerances

Tolerances are established in 40 CFR Section180.454 for residues of nicosulfuron. The existing tolerances are supported by the available residue chemistry data and no additional residue chemistry data are needed. The tolerance expression under 40 CFR Section180.454 is correct and reflects measurement and compliance of nicosulfuron residues. However, the Section 18 tolerances in Section 180.454 (b) have expired and, therefore, needs to be revoked.

C.11.D. Proposed Interim Registration Review Decision for Nicosulfuron

EPA has completed quantitative human health, and ecological risk assessments for nicosulfuron. Although the ecological risk assessment analyzed risks from a range of terrestrial

plant toxicity data, a comprehensive endangered species assessment was not completed. As part of the nicosulfuron registration review, the Agency required certain data under generic data call-in GDCI-129008-1250. All data required under the GDCI has been received or waived.

In accordance with 40 CFR Sections 155.56 and 155.58, the Agency is issuing this *Proposed Interim Registration Review Decision for 22 Sulfonylurea (SU) Herbicides*, including Case #7227. Except for the EDSP, ESA, and pollinator components of this case, the Agency has made the following proposed interim registration review decision for nicosulfuron:

- The Agency determined that there are no human health risks of concern at this time.
- The Agency determined that there are no ecological risks of concern for any taxa, except non-target terrestrial plants, at this time.
- The Agency has identified potential risk to non-target terrestrial and aquatic plants from nicosulfuron. The Agency is proposing certain changes to nicosulfuron labeling in order to reduce spray drift and therefore ecological exposure and risk to non-target plants. The proposed label changes are detailed in Appendix B of this document, and in the nicosulfuron label table below (Table C.11.3).
- The Agency has identified herbicide resistance management concerns with all 22 SUs, including nicosulfuron, and is proposing certain changes to nicosulfuron product labels to reduce the potential of herbicide resistance. These proposed label changes are detailed in Appendix B of this document, and in the label table below (Table C.11.3).
- The Agency does not have sufficient ecotoxicity data for nicosulfuron on pollinators and therefore, has not assessed the potential risk of nicosulfuron to terrestrial invertebrates. In the future, the Agency will require pollinator data to evaluate risk to terrestrial invertebrates (see Table C.11.1.).
- Certain amendments to the tolerance(s) for nicosulfuron are proposed.

In this Proposed Interim Registration Review Decision, EPA is making no human health or environmental safety findings associated with the EDSP screening of nicosulfuron, risk to pollinators, nor is it making a complete endangered species finding. The Agency's final registration review decision for nicosulfuron will be issued once an effects determination for listed species is made, and ESA Section 7 consultation with the Services has taken place, if necessary; an EDSP FFDCA section 408(p) determination has been made; and a pollinator risk assessment has been completed.

C.11.D1. Proposed Data Needs for Nicosulfuron

Consistent with EPA's June 2014 *Guidance for Assessing Pesticide Risks to Bees*, the Agency has begun to require ecotoxicity data for pollinators where applicable. The Agency has determined that pollinator data are needed for nicosulfuron and proposes to require these data, under a DCI, as a part of the registration review of nicosulfuron. The pollinator data proposed to be required are identified in Table C.17.1 below.

Table C.11.1. Potential Pollinator Data Requirements for Nicosulfuron

Guideline #	Study
850.3040**	Field testing for pollinators

Non-Guideline* (OECD 213)	Honey bee adult acute oral toxicity
Non-Guideline* (OECD 237)	Honey bee larvae acute oral toxicity
Non-Guideline*	Honey bee adult chronic oral toxicity
Non-Guideline*	Honey bee larvae chronic oral toxicity
Non-Guideline**	Residues in pollen and nectar/field residue analysis
Non-Guideline** (OECD 75)	Semi-field testing for pollinators (tunnel or colony feeding studies)

*Tier 1 (Laboratory-based studies)
**Tier 2 and 3 (Semi-field and full field colony-level studies) The need for a higher tier test for pollinators will be determined based upon lower-tiered tests and/or other lines of data and the need for a refined pollinator risk assessment.

C.11.D2. Additional Nicosulfuron Label Changes

As a component of nicosulfuron registration review, the Agency is proposing that all product labels contain certain application information to ensure that users apply nicosulfuron products in a consistent manner, and that EPA's assessment and estimates of human health and ecological risks from nicosulfuron products are consistent with their use. Therefore, it is proposed that all nicosulfuron product labels contain certain information for each use site/use pattern on the product label. For a list of information that is proposed to be on the label, please see Appendix H.

Table C.11.2: Nicosulfuron Label Table

Summary of Proposed Labeling Changes for Nicosulfuron Uses – End-Use Products		
Description	Proposed Amended Labeling Language for Nicosulfuron Use Products	Placement on Label
Groundwater Label Advisory[1]	"Nicosulfuron is known to leach through soil into groundwater under certain conditions as a result of label use. This chemical may leach into groundwater if used in areas where soils are permeable, particularly where the water table is shallow."	Environmental Hazard section of Precautionary Statements
Surface Water Label Advisory	"This product may impact surface water quality due to runoff of rain water. This is especially true for poorly draining soils and soils with shallow ground water. This product is classified as having high potential for reaching surface water via runoff for several months or more after application. A level, well-maintained vegetative buffer strip between areas to which this product is applied and surface water features such as ponds, streams, and springs will reduce the potential loading of nicosulfuron from runoff water and sediment. Runoff of this product will be greatly reduced by avoiding applications when rainfall or irrigation is expected to occur within 48 hours."	Environmental Hazard section of Precautionary Statements

Herbicide Resistance Management	See Appendix B.
Spray Drift Management	See Appendix B.
Advisory Language	See Appendix B.

1. Advisory based on detects in groundwater referenced in the Water Quality Portal (http://www.waterqualitydata.us/, June 2016).

APPENDIX C.12 – Orthosulfamuron

C.12.A. Use and Usage and Benefits Characterization

General use, usage, and benefits information is covered in Section III.D: Characterization of Benefits, as well as in Appendix E: Chemical Use and Usage. Orthosulfamuron is registered for use to control annual and perennial broadleaf weeds and sedges in rice fields. It is applied as an early post-emergence treatment. It is used for weed control in both wet and dry seeded rice production. Approximately 3,000 lbs orthosulfamuron are applied per year on approximately 45,000 acres. Most usage occurs in Arkansas (69% total lbs applied) and Missouri (30% total lbs applied). Please see the memo *Sulfonylurea Herbicides: Usage, Response to Comments, Herbicide Resistance Management Measures and Grower Impacts from Potential Risk Mitigation Measures* for more use, usage, and benefits information.

C.12.B. Responses to Comments

The Agency has responded to ecological, human health and usage related comments in its documents *Response to Comments on Preliminary Risk Assessment for 22 Sulfonylurea Herbicides*; *Response to Comments on the Health Effects Divisions Sulfonylurea Risk Assessments*; and *Sulfonylurea Herbicides: Usage, Response to Comments, Herbicide Resistance Management Measures and Grower Impacts from Potential Risk Mitigation Measures*, which can be found in the public docket EPA-HQ-OPP-2011-0438 on Regulations.gov at *https://www.regulations.gov/#!docketDetail;D=EPA-HQ-OPP-2011-0438*. The Agency did not receive any public comments specific to orthosulfamuron.

C.12.C. Tolerances

Tolerances are established in 40 CFR §180.625 for residues of orthosulfamuron in or on rice grain. The existing tolerances are supported by the available residue chemistry data.

The Agency notes that the current tolerance expression for orthosulfamuron needs to be revised in accordance with the OPP/HED Interim Guidance on Tolerance Expressions. Therefore, the Agency is proposing to update the tolerance expression for orthosulfamuron to the following language:

> *Tolerances are established for residues of orthosulfamuron, including its metabolites and degradates, in or on the commodities in the table below. Compliance with the tolerance levels specified below is to be determined by measuring only orthosulfamuron, 1-(4,6-dimethoxypyrimidin-2-yl)-3-[2-(dimethylcarbamoyl)- phenylsulfamoyl] urea.*

In the Orthosulfamuron Draft Human Health Risk Assessment in Support of Registration Review (K.Middleton; 9/15/2015), the Agency noted that the tolerance for orthosulfamuron in/on rice straw should be deleted because rice straw is no longer considered to be a significant livestock feed item. The Agency has already taken action on this. On November 20, 2015, a Federal Register notice was issued (224 FR 72593) revoking certain tolerances on rice straw for multiple active ingredients, including orthosulfamuron.

C.12.D. Proposed Interim Registration Review Decision for Orthosulfamuron

EPA has completed quantitative human health, and ecological risk assessments for orthosulfamuron. Although the ecological risk assessment analyzed risks from a range of terrestrial plant toxicity data, a comprehensive endangered species assessment was not completed. As part of the orthosulfamuron registration review, the Agency required certain data under a generic data call-in (GDCI) [*GDCI-108209-1156]*. All data required under the GDCI has been received or waived, except for the following:

- *Guideline 835.6200*—aquatic field dissipation (slated for submission in March 2017)
- *Guideline 850.1300*—daphnid chronic toxicity (a waiver was requested and is still in review)
- *Guideline 850.1400*—fish early life (a waiver was requested and is still in review)
- *Guideline 850.6100*—environmental chemistry methods for soil and water, and associated independent laboratory validation (slated for submission in March 2017)

Although these data gaps remain, EPA is proceeding with this Proposed Interim Registration Review Decision based upon the available information. Information from guideline 850.6100 is important for enforcement purposes but does not directly impact EPA's risk assessment or risk management findings. Also, while the guideline 835.6200 would help refine the Agency's aquatic exposure assessment, the current assessment is conducted with conservative default fate parameters. The current assessment has not identified risks above the Agency's LOC for non-listed species.

In accordance with 40 CFR Sections 155.56 and 155.58, the Agency is issuing this *Proposed Interim Registration Review Decision for 22 Sulfonylurea (SU) Herbicides*, including orthosulfamuron (case number 7270). Except for the EDSP, ESA, and pollinator components of this case, the Agency has made the following proposed interim registration review decision for orthosulfamuron:

- The Agency determined that there are no human health risks of concern at this time.
- The Agency determined that there are no ecological risks of concern for any taxa, except non-target terrestrial and aquatic plants, at this time.
- The Agency has identified potential risk to non-target terrestrial and aquatic plants from orthosulfamuron. The Agency is proposing certain changes to orthosulfamuron labeling in order to reduce spray drift and therefore ecological exposure and risk to non-target plants. The proposed label changes are detailed in Appendix B of the SU PID document, and in the orthosulfamuron label table below (Table C.17.2).

- The Agency has identified herbicide resistance management concerns with all 22 SUs, including orthosulfamuron, and is proposing certain changes to orthosulfamuron product labels to reduce the potential of herbicide resistance. These proposed label changes are detailed in Appendix B of the SU PID document, and in the label table below (Table C.17.2).
- The Agency does not have sufficient ecotoxicity data for orthosulfamuron on pollinators and therefore, has not assessed the potential risk of orthosulfamuron to terrestrial invertebrates. In the future, the Agency will require pollinator data to evaluate risk to terrestrial invertebrates (see Table C.17.1.).
- Amendments to the tolerance expression and certain changes to the tolerance(s) for orthosulfamuron are proposed.

In this Proposed Interim Registration Review Decision, EPA is making no human health or environmental safety findings associated with the EDSP screening of orthosulfamuron, risk to pollinators, nor is it making a complete endangered species finding. The Agency's final registration review decision for orthosulfamuron will be issued once effects determinations for listed species are made, and ESA Section 7 consultation with the Services has taken place, if necessary; an EDSP FFDCA section 408(p) determination has been made; and a pollinator risk assessment has been completed.

C.12.D1. Proposed Data Needs for Orthosulfamuron

Consistent with EPA's June 2014 *Guidance for Assessing Pesticide Risks to Bees*, the Agency has begun to require ecotoxicity data for pollinators where applicable. The Agency has determined that pollinator data are needed for orthosulfamuron and proposes to require these data, under a DCI, as a part of the registration review of orthosulfamuron. The pollinator data proposed to be required are identified in Table C.17.1 below.

Table C.12.1. Potential Pollinator Data Requirements for Orthosulfuron

Guideline #	Study
850.3040**	Field testing for pollinators
Non-Guideline* (OECD 213)	Honey bee adult acute oral toxicity
Non-Guideline* (OECD 237)	Honey bee larvae acute oral toxicity
Non-Guideline*	Honey bee adult chronic oral toxicity
Non-Guideline*	Honey bee larvae chronic oral toxicity
Non-Guideline**	Residues in pollen and nectar/field residue analysis
Non-Guideline** (OECD 75)	Semi-field testing for pollinators (tunnel or colony feeding studies)

*Tier 1 (Laboratory-based studies)
**Tier 2 and 3 (Semi-field and full field colony-level studies) The need for a higher tier test for pollinators will be determined based upon lower-tiered tests and/or other lines of data and the need for a refined pollinator risk assessment.

C.12.D2. Additional Orthosulfamuron Label Changes

As a component of orthosulfamuron registration review, the Agency is proposing that all product labels contain certain application information to ensure that users apply orthosulfamuron products in a consistent manner, and that EPA's assessment and estimates of human health and

ecological risks from orthosulfamuron products are consistent with their use. Therefore, it is proposed that all orthosulfamuron product labels contain the following information for each use site/use pattern on the product label. For a list of information that is proposed to be on the label, please see Appendix H.

Table C.12.2: Orthosulfamuron Label Table

Summary of Proposed Labeling Changes for Orthosulfamuron Uses – End-Use Products		
Description	Proposed Amended Labeling Language for Orthosulfamuron Use Products	Placement on Label
Groundwater Label Advisory	"This chemical has properties and characteristics associated with chemicals detected in groundwater. This chemical may leach into groundwater if used in areas where soils are permeable, particularly where the water table is shallow."	Environmental Hazard section of Precautionary Statements
Surface Water Label Advisory	"This product may impact surface water quality due to runoff of rain water. This is especially true for poorly draining soils and soils with shallow ground water. This product is classified as having high potential for reaching surface water via runoff for months or more after application. A level, well-maintained vegetative buffer strip between areas to which this product is applied and surface water features such as ponds, streams, and springs will reduce the potential loading of orthosulfamuron from runoff water and sediment. Runoff of this product will be greatly reduced by avoiding applications when rainfall or irrigation is expected to occur within 48 hours."	Environmental Hazard section of Precautionary Statements
Herbicide Resistance Management	See Appendix B.	
Spray Drift Management	See Appendix B.	
Advisory Language	See Appendix B.	

APPENDIX C.13 – Primisulfuron-methyl

C.13.A. Use and Usage and Benefits Characterization

General use, usage, and benefits information for primisulfuron-methyl and the other sulfonylurea herbicides is covered in Section III.D: Characterization of Benefits, as well as in Appendix E: Chemical Use and Usage. For primisulfuron-methyl, corn accounts for 99% of the usage, and the remaining percent of primisulfuron-methyl use is on Kentucky bluegrass grown for seed or sod.

C.13.B. Responses to Comments

The Agency has responded to ecological, human health and usage related comments in its documents *Response to Comments on Preliminary Risk Assessment for 22 Sulfonylurea Herbicides*; *Response to Comments on the Health Effects Divisions Sulfonylurea Risk Assessments*; and *Sulfonylurea Herbicides: Usage, Response to Comments, Herbicide Resistance Management Measures and Grower Impacts from Potential Risk Mitigation Measures*, which can be found in the public docket EPA-HQ-OPP-2011-0844 on Regulations.gov.

C.13.C. Tolerances

Tolerances are established in 40 CFR §180.452 for residues of primisulfuron-methyl, in or on field corn and popcorn corn and various livestock commodities; these tolerances (40 CFR §180.452) are supported by the available residue chemistry data.

EPA notes that the current tolerance expression for primisulfuron-methyl in 40 CFR §180.452 needs to be revised and proposes it to be revised as follows:

(a) General. Tolerances are established for residues of primisulfuron-methyl, including its metabolites and degradates, in or on the commodities in the table below. Compliance with the tolerance levels specified below is to be determined by measuring only primisulfuron-methyl (methyl 2-[[[[[4,6-bis(difluoromethoxy)-2-pyrimidinyl]amino]carbonyl]amino]sulfonyl]benzoate) in or on the commodity.

C.13.D. Proposed Interim Registration Review Decision for Primisulfuron-methyl

EPA has completed quantitative human health, and ecological risk assessments for primisulfuron-methyl. Although the ecological risk assessment analyzed risks from a range of terrestrial plant toxicity data, a comprehensive endangered species assessment was not completed. As part of the primisulfuron-methyl registration review, the Agency required certain data under generic data call-in (GDCI) GDCI-128973-1206. All data required under the GDCI has been received or waived, except for OSCPP guidelines 850.2100 (Avian acute oral toxicity), 850.2300 (Avian Reproduction), and 870.7800 (Immunotoxicity), which have been waived.

Therefore, in accordance with 40 CFR Sections 155.56 and 155.58, the Agency is issuing this *Proposed Interim Registration Review Decision for 22 Sulfonylurea (SU) Herbicides*, including primisulfuron-methyl, case 7220. Except for the EDSP, ESA, and pollinator components of this case, the Agency has made the following proposed interim registration review decision for primisulfuron-methyl:

- The Agency determined that there are no human health risks of concern at this time.
- The Agency determined that there are no ecological risks of concern for any taxa, except to non-target terrestrial and aquatic plants, at this time.
- The Agency has identified potential risk to non-target terrestrial and aquatic plants from primisulfuron-methyl. Therefore, EPA is proposing certain changes to the primisulfuron-methyl labels to reduce spray drift and associated ecological exposure and risk to non-target plants. The proposed label changes are detailed in Appendix B of this document, and in the primisulfuron-methyl label table below (Table C.13.3).
- The Agency has identified herbicide resistance management concerns with all 22 SUs, including primisulfuron-methyl, and is proposing certain changes to primisulfuron-

methyl product labels to reduce the potential of herbicide resistance. These proposed label changes are detailed in Appendix B of this document, and in the label table below (Table C.13.3).

- The Agency does not have ecotoxicity data for primisulfuron-methyl on pollinators and therefore, has not evaluated the potential risk of primisulfuron-methyl to terrestrial invertebrates. In the future, the Agency may require pollinator data to evaluate risk to terrestrial invertebrates (see Table C.13.1.)
- EPA plans to propose changes to 40 CFR §180.452 to correct the tolerance expression for primisulfuron-methyl as described above in this Appendix.

In this Proposed Interim Registration Review Decision, EPA is making no human health or environmental safety findings associated with the EDSP screening of primisulfuron-methyl, risk to pollinators, nor is it making a complete endangered species finding. The Agency's final registration review decision for primisulfuron-methyl will be issued once an effects determination for listed species is made, and ESA Section 7 consultation with the Services has taken place, if necessary; an EDSP FFDCA section 408(p) determination has been made; and a pollinator risk assessment has been completed.

C.13.D1. Proposed Data Needs for Primisulfuron-methyl

Consistent with EPA's June 2014 *Guidance for Assessing Pesticide Risks to Bees*, the Agency has begun to require ecotoxicity data for pollinators where applicable. The Agency has determined that pollinator data are needed for primisulfuron-methyl and proposes to require these data, under a DCI, as a part of the registration review of primisulfuron-methyl. The pollinator data proposed to be required are identified in Table C.13.1.

Table C.13.1. Potential Pollinator Data Requirements for Primisulfuron-methyl

Guideline #	Study
850.3040**	Field testing for pollinators
Non-Guideline* (OECD 213)	Honey bee adult acute oral toxicity
Non-Guideline* (OECD 237)	Honey bee larvae acute oral toxicity
Non-Guideline*	Honey bee adult chronic oral toxicity
Non-Guideline*	Honey bee larvae chronic oral toxicity
Non-Guideline**	Residues in pollen and nectar/field residue analysis
Non-Guideline** (OECD 75)	Semi-field testing for pollinators (tunnel or colony feeding studies)

*Tier 1 (Laboratory-based studies)

**Tier 2 and 3 (Semi-field and full field colony-level studies) The need for a higher tier test for pollinators will be determined based upon lower-tiered tests and/or other lines of data and the need for a refined pollinator risk assessment.

C.13.D2. Additional Primisulfuron-methyl Label Changes

As a component of primisulfuron-methyl registration review, the Agency is proposing that all product labels contain certain application information to ensure that users apply primisulfuron-methyl products in a consistent manner, and that EPA's assessment and estimates of human health and ecological risks from primisulfuron-methyl products are consistent with their use. Therefore, it is proposed that all primisulfuron-methyl product labels contain certain

information for each use site/use pattern on the product label. For a list of information that is proposed to be on the label, please see Appendix H.

Table C.13.2: Primisulfuron-methyl Label Table

Summary of Proposed Labeling Changes for Primisulfuron-methyl Uses – End-Use Products		
Description	Proposed Amended Labeling Language for Primisulfuron-methyl Use Products	Placement on Label
Groundwater Label Advisory	"This chemical has properties and characteristics associated with chemicals detected in groundwater. This chemical may leach into groundwater if used in areas where soils are permeable, particularly where the water table is shallow."	Environmental Hazard section of Precautionary Statements
Surface Water Label Advisory	"This product may impact surface water quality due to runoff of rain water. This is especially true for poorly draining soils and soils with shallow ground water. This product is classified as having high potential for reaching surface water via runoff for months or more after application. A level, well-maintained vegetative buffer strip between areas to which this product is applied and surface water features such as ponds, streams, and springs will reduce the potential loading of primisulfuron-methyl from runoff water and sediment. Runoff of this product will be greatly reduced by avoiding applications when rainfall or irrigation is expected to occur within 48 hours."	Environmental Hazard section of Precautionary Statements
Herbicide Resistance Management	See Appendix B.	
Spray Drift Management	See Appendix B.	
Advisory Language	See Appendix B.	

APPENDIX C.14 – Prosulfuron

C.14.A. Use and Usage and Benefits Characterization

General use, usage, and benefits information for prosulfuron is covered in Section III.D: Characterization of Benefits, as well as in Appendix E: Chemical Use and Usage. From 2000-2010, usage for prosulfuron averaged approximately 20,000 pounds active ingredient for 1.6 million acres treated. Prosulfuron is registered for use on corn, grain sorghum, winter wheat, spring wheat, barley, rye, oats, triticale, and proso millet. Corn represented the highest percentage of national use followed by sorghum and wheat for grain.

C.14.B. Responses to Comments

The Agency has responded to ecological, human health and usage related comments in its documents *Response to Comments on Preliminary Risk Assessment for 22 Sulfonylurea Herbicides*; *Response to Comments on the Health Effects Divisions Sulfonylurea Risk Assessments*; and *Sulfonylurea Herbicides: Usage, Response to Comments, Herbicide Resistance Management Measures and Grower Impacts from Potential Risk Mitigation Measures*, which can be found in the prosulfuron public docket EPA-HQ-OPP-2011-1010 on Regulations.gov.

C.14.C. Tolerances

Tolerances are established in 40 CFR §180.481 for residues of prosulfuron. The existing tolerances for residues of prosulfuron are supported by the available residue chemistry data. Codex has not established MRLs for residues of prosulfuron. Canada has established MRLs for prosulfuron which are harmonized with U.S. tolerances. The tolerance expression for prosulfuron needs to be revised in accordance with the OPP/HED Interim Guidance on Tolerance Expressions. Therefore, the Agency is proposing to update the tolerance expression for prosulfuron to the following language:

> *(a) General. Tolerances are established for residues of prosulfuron, including its metabolites and degradates, in or on the commodities in the table below. Compliance with the tolerance levels specified below is to be determined by measuring only prosulfuron (N-[[(4-methoxy-6-methyl-1,3,5-triazin-2-yl)amino]carbonyl]-2-(3,3,3-trifluoropropyl)benzenesulfonamide) in or on the commodity.*

EPA proposes that the tolerance be updated following the issuance of the interim decision.

C.14.D. Proposed Interim Registration Review Decision for Prosulfuron

EPA has completed quantitative human health, and ecological risk assessments for prosulfuron. Although the ecological risk assessment analyzed risks from a range of terrestrial plant toxicity data, a comprehensive endangered species assessment was not completed. As part of the prosulfuron registration review, the Agency required certain data under generic data call-in in GDCI-129031-1240. All data required under the GDCI have been received or waived.

In accordance with 40 CFR Sections 155.56 and 155.58, the Agency is issuing this *Proposed Interim Registration Review Decision for 22 Sulfonylurea (SU) Herbicides*, including prosulfuron, Registration Review Case No. 7235. Except for the EDSP, ESA, and pollinator components of this case, the Agency has made the following proposed interim registration review decision for prosulfuron:

- The Agency determined that there are no human health risks of concern at this time.
- The Agency determined that there are no ecological risks of concern for any taxa, except non-target terrestrial and aquatic plants, at this time.
- The Agency has identified potential risk to non-target terrestrial and aquatic plants from prosulfuron. The Agency is proposing certain changes to prosulfuron labeling in order to reduce spray drift and therefore ecological exposure and risk to non-target plants. The proposed label changes are detailed in Appendix B of this document, and in the prosulfuron label table below (Table C.14.3).

- The Agency has identified herbicide resistance management concerns with all 22 SUs, including prosulfuron, and is proposing certain changes to prosulfuron product labels to reduce the potential of herbicide resistance. These proposed label changes are detailed in Appendix B of this document, and in the label table below (Table C.14.3).
- The Agency has limited ecotoxicity data for prosulfuron on pollinators and therefore, has not assessed the potential risk of prosulfuron to terrestrial invertebrates. In the future, the Agency will require pollinator data to evaluate risk to terrestrial invertebrates (see Table C.14.1.).
- An amendment to the tolerance expression for prosulfuron is proposed.

In this Proposed Interim Registration Review Decision, EPA is making no human health or environmental safety findings associated with the EDSP screening of prosulfuron, risk to pollinators, nor is it making a complete endangered species finding. The Agency's final registration review decision for prosulfuron will be issued once an effects determination for listed species is made, and ESA Section 7 consultation with the Services has taken place, if necessary; an EDSP FFDCA section 408(p) determination has been made; and a pollinator risk assessment has been completed.

C.14.D1. Proposed Data Needs for Prosulfuron

Consistent with EPA's June 2014 *Guidance for Assessing Pesticide Risks to Bees*, the Agency has begun to require ecotoxicity data for pollinators where applicable. The Agency has determined that pollinator data are needed for prosulfuron and proposes to require these data, under a DCI, as a part of the registration review of prosulfuron. The pollinator data proposed to be required are identified in Table C.14.1 below. As noted in the prosulfuron problem formulation, acceptable acute contact toxicity data with adult honey bees (GLN 850.3020; MRID 43080047) have already been either received or waived by the Agency for prosulfuron.

Table C.14.1. Potential Pollinator Data Requirements for Prosulfuron

Guideline #	Study
850.3040**	Field testing for pollinators
Non-Guideline* (OECD 213)	Honey bee adult acute oral toxicity
Non-Guideline* (OECD 237)	Honey bee larvae acute oral toxicity
Non-Guideline*	Honey bee adult chronic oral toxicity
Non-Guideline*	Honey bee larvae chronic oral toxicity
Non-Guideline**	Residues in pollen and nectar/field residue analysis
Non-Guideline** (OECD 75)	Semi-field testing for pollinators (tunnel or colony feeding studies)

*Tier 1 (Laboratory-based studies)
**Tier 2 and 3 (Semi-field and full field colony-level studies) The need for a higher tier test for pollinators will be determined based upon lower-tiered tests and/or other lines of data and the need for a refined pollinator risk assessment.

C.14.D2. Additional Prosulfuron Label Changes

As a component of prosulfuron registration review, the Agency is proposing that all product labels contain certain application information to ensure that users apply prosulfuron

products in a consistent manner, and that EPA's assessment and estimates of human health and ecological risks from prosulfuron products are consistent with their use. Therefore, it is proposed that all prosulfuron product labels contain certain information for each use site/use pattern on the product label. For a list of information that is proposed to be on the label, please see Appendix H.

Table C.14.2: Prosulfuron Label Table

Summary of Proposed Labeling Changes for Prosulfuron Uses – End-Use Products		
Description	Proposed Amended Labeling Language for Prosulfuron Use Products	Placement on Label
Groundwater Label Advisory[1]	"Prosulfuron is known to leach through soil into groundwater under certain conditions as a result of label use. This chemical may leach into groundwater if used in areas where soils are permeable, particularly where the water table is shallow."	Environmental Hazard section of Precautionary Statements
Surface Water Label Advisory	"This product may impact surface water quality due to runoff of rain water. This is especially true for poorly draining soils and soils with shallow ground water. This product is classified as having high potential for reaching surface water via runoff for several months or more after application. A level, well-maintained vegetative buffer strip between areas to which this product is applied and surface water features such as ponds, streams, and springs will reduce the potential loading of prosulfuron from runoff water and sediment. Runoff of this product will be greatly reduced by avoiding applications when rainfall or irrigation is expected to occur within 48 hours."	Environmental Hazard section of Precautionary Statements
Herbicide Resistance Management	See Appendix B.	
Spray Drift Management	See Appendix B.	
Advisory Language	See Appendix B.	

1. Advisory based on detects in groundwater referenced in the Water Quality Portal (http://www.waterqualitydata.us/, June 2016).

APPENDIX C.15 – Rimsulfuron

C.15.A. Use and Usage and Benefits Characterization

General use, usage, and benefits information is covered in Section III.D: Characterization of Benefits, as well as in Appendix E: Chemical Use and Usage. For rimsulfuron, the top

agricultural crops were corn, potatoes, tomatoes, and almonds. National level usage data for non-agricultural uses are not available.

C.15.B. Responses to Comments

The Agency has responded to ecological, human health and usage related comments in its documents *Response to Comments on Preliminary Risk Assessment for 22 Sulfonylurea Herbicides*; *Response to Comments on the Health Effects Divisions Sulfonylurea Risk Assessments*; and *Sulfonylurea Herbicides: Usage, Response to Comments, Herbicide Resistance Management Measures and Grower Impacts from Potential Risk Mitigation Measures*, which can be found in the public docket EPA-HQ-OPP-2012-0178 on Regulations.gov.

C.15.C. Tolerances

Tolerances are established in 40 CFR §180.478 for residues of rimsulfuron. The existing tolerances are supported by the available residue chemistry data. At this time, there are no Codex MRLs established for residues of rimsulfuron. The US tolerances for bushberry subgroup 13-07B (0.01 ppm), field corn grain, potatoes, and tomatoes are harmonized with Canada. Canada has established an MRL at 0.05 ppm on lowbush blueberries. There is a disharmony on livestock feedstuffs because Canada does not establish MRLs on feedstuffs. At this time, no revisions to the existing U.S. tolerance expression or levels are needed.

C.15.D. Proposed Interim Registration Review Decision for Rimsulfuron

EPA has completed quantitative human health, and ecological risk assessments for rimsulfuron. Although the ecological risk assessment analyzed risks from a range of terrestrial plant toxicity data, a comprehensive endangered species assessment was not completed. As part of the rimsulfuron registration review, the Agency required certain data under generic data call-in (GDCI) GDCI-129009-1302. All data required under the GDCI has been received or waived.

In accordance with 40 CFR Sections 155.56 and 155.58, the Agency is issuing this *Proposed Interim Registration Review Decision for 22 Sulfonylurea (SU) Herbicides*, including Rimsulfuron, Case No. 7218. Except for the EDSP, ESA, and pollinator components of this case, the Agency has made the following proposed interim registration review decision for rimsulfuron:

- The Agency determined that there are no human health risks of concern at this time.
- The Agency determined that there are no ecological risks of concern for any taxa, except non-target terrestrial plants, at this time.
- The Agency has identified potential risk to non-target terrestrial plants from rimsulfuron. The Agency is proposing certain changes to rimsulfuron labeling in order to reduce spray drift and therefore ecological exposure and risk to non-target plants. The proposed label changes are detailed in Appendix B of this document, and in the rimsulfuron label table below (Table C.15.3).
- The Agency has identified herbicide resistance management concerns with all 22 SUs, including rimsulfuron, and is proposing certain changes to rimsulfuron product labels to reduce the potential of herbicide resistance. These proposed label changes are detailed in Appendix B of this document, and in the label table below (Table C.17.3).
- The Agency does not have sufficient ecotoxicity data for rimsulfuron on pollinators and therefore, has not assessed the potential risk of rimsulfuron to terrestrial invertebrates. In

the future, the Agency will require pollinator data to evaluate risk to terrestrial invertebrates (see Table C.15.1.).

In this Proposed Interim Registration Review Decision, EPA is making no human health or environmental safety findings associated with the EDSP screening of rimsulfuron, risk to pollinators, nor is it making a complete endangered species finding. The Agency's final registration review decision for rimsulfuron will be issued once an effects determination for listed species is made, and ESA Section 7 consultation with the Services has taken place, if necessary; an EDSP FFDCA section 408(p) determination has been made; and a pollinator risk assessment has been completed.

C.15.D1. Proposed Data Needs for Rimsulfuron

Consistent with EPA's June 2014 *Guidance for Assessing Pesticide Risks to Bees*, the Agency has begun to require ecotoxicity data for pollinators where applicable. The Agency has determined that pollinator data are needed for rimsulfuron and proposes to require these data, under a DCI, as a part of the registration review of rimsulfuron. The pollinator data proposed to be required are identified in Table C.15.1 below.

Table C.15.1. Potential Pollinator Data Requirements for Rimsulfuron

Guideline #	Study
850.3040**	Field testing for pollinators
Non-Guideline* (OECD 213)	Honey bee adult acute oral toxicity
Non-Guideline* (OECD 237)	Honey bee larvae acute oral toxicity
Non-Guideline*	Honey bee adult chronic oral toxicity
Non-Guideline*	Honey bee larvae chronic oral toxicity
Non-Guideline**	Residues in pollen and nectar/field residue analysis
Non-Guideline** (OECD 75)	Semi-field testing for pollinators (tunnel or colony feeding studies)

*Tier 1 (Laboratory-based studies)
**Tier 2 and 3 (Semi-field and full field colony-level studies) The need for a higher tier test for pollinators will be determined based upon lower-tiered tests and/or other lines of data and the need for a refined pollinator risk assessment.

C.15.D2. Additional Rimsulfuron Label Changes

As a component of rimsulfuron registration review, the Agency is proposing that all product labels contain certain application information to ensure that users apply rimsulfuron products in a consistent manner, and that EPA's assessment and estimates of human health and ecological risks from rimsulfuron products are consistent with their use. Therefore, it is proposed that all rimsulfuron product labels contain certain information for each use site/use pattern on the product label. For a list of information that is proposed to be on the label, please see Appendix H.

Table C.15.2: Rimsulfuron Label Table

Summary of Proposed Labeling Changes for Rimsulfuron Uses – End-Use Products

Description	Proposed Amended Labeling Language for Rimsulfuron Use Products	Placement on Label
Groundwater Label Advisory	"This chemical has properties and characteristics associated with chemicals detected in groundwater. This chemical may leach into groundwater if used in areas where soils are permeable, particularly where the water table is shallow."	Environmental Hazard section of Precautionary Statements
Surface Water Label Advisory	"This product may impact surface water quality due to runoff of rain water. This is especially true for poorly draining soils and soils with shallow ground water. This product is classified as having high potential for reaching surface water via runoff for months or more after application. A level, well-maintained vegetative buffer strip between areas to which this product is applied and surface water features such as ponds, streams, and springs will reduce the potential loading of rimsulfuron from runoff water and sediment. Runoff of this product will be greatly reduced by avoiding applications when rainfall or irrigation is expected to occur within 48 hours."	Environmental Hazard section of Precautionary Statements
Herbicide Resistance Management	See Appendix B.	
Spray Drift Management	See Appendix B.	
Advisory Language	See Appendix B.	

APPENDIX C.16 – Sulfometuron-methyl

C.16.A. Use and Usage and Benefits Characterization

General use, usage, and information is covered in Section III.D: Characterization of Benefits, as well as in Appendix E: Chemical Use and Usage. Sulfometuron-methyl is only registered for non-crop uses such as: industrial sites, barrier strips, roadsides, loading docks, etc., rights-of-ways (ROW), turf, invasive species control, forestry and rangeland. The Agency has limited usage information and no market research data about the non-agricultural use of sulfometuron-methyl, however, based on comments by stakeholders, such as the railroad industry and the forestry industry, the Agency reasons that sulfometuron-methyl has utility in non-agricultural settings. Sulfometuron-methyl was ranked as one of the top ten herbicides applied in forestry between 2001 and 2006 (BEAD Chemical Profile for Registration Review: Sulfometuron-methyl), and approximately one million acres were treated in 2011 for industrial vegetative management.

C.16.B. Responses to Comments

The Agency has responded to ecological, human health and usage related comments in its documents *Response to Comments on Preliminary Risk Assessment for 22 Sulfonylurea Herbicides*; *Response to Comments on the Health Effects Divisions Sulfonylurea Risk Assessments*; and *Sulfonylurea Herbicides: Usage, Response to Comments, Herbicide Resistance Management Measures and Grower Impacts from Potential Risk Mitigation Measures*, which can be found in the public docket EPA-HQ-OPP-2012-0433 on Regulations.gov. DuPont submitted one comment, specific to sulfometuron-methyl in response to the Preliminary Risk Assessment (EPA-HQ-OPP-2012-0433-0040).

> **Comment**: DuPont commented about discrepancies between current labelled use rates, and the rate used for modelling in the *Preliminary Ecological Risk Assessment for Registration Review of 22 Sulfonylurea Herbicides*. In addition, DuPont explained that they agreed with the tiered approach used to assess SU herbicides in drinking water, in the *Drinking Water Exposure Assessment for the Registration Review of 22 Sulfonylurea Herbicides*, but noted the highly conservative nature of the predicted screening concentrations compared to potential exposures.
>
> **Agency Response**: The Agency thanks DuPont for these comments and has responded to issues related to use rates and label rates in the document, *Response to Comments on Preliminary Risk Assessment for 22 Sulfonylurea Herbicides* and has considered them as part of this PID.

C.16.C Human Health Considerations

It is noted that several sulfometuron-methyl labels require either a 4-hour or a 48-hour restricted entry interval (REI). For some of the labels, multiple active ingredients are included in the end-use product, and these additional active ingredients may require a longer REI. These REIs may be reduced from 12 hours if certain criteria are met in accordance with the pesticide Registration (PR) Notice 95-3. Upon review of the criteria for the active ingredient only, it appears that sulfometuron-methyl is consistent with the criteria in PRN 95-3 that support a 4-hour REI.

C.16.C1. Tolerances

Sulfometuron-methyl is a non-food use chemical, therefore there are no tolerances.

C.16.D. Proposed Interim Registration Review Decision for Sulfometuron-methyl

EPA has completed quantitative human health, and ecological risk assessments for sulfometuron-methyl. Although the ecological risk assessment analyzed risks from a range of terrestrial plant toxicity data, a comprehensive endangered species assessment was not completed. As part of the sulfometuron-methyl registration review, the Agency required certain data under generic data call-in (GDCI-122001-1228). All data required under the GDCI has been received or waived.

In accordance with 40 CFR Sections 155.56 and 155.58, the Agency is issuing this *Proposed Interim Registration Review Decision for 22 Sulfonylurea (SU) Herbicides*, including sulfometuron-methyl. Except for the EDSP, ESA, and pollinator components of this case, the Agency has made the following proposed interim registration review decision for sulfometuron-methyl:

- The Agency determined that there are no human health risks of concern at this time.
- The Agency determined that there are no ecological risks of concern for any taxa, except non-target terrestrial and aquatic plants, at this time.
- The Agency has identified potential risk to non-target terrestrial and aquatic plants from sulfometuron-methyl. The Agency is proposing certain changes to sulfometuron-methyl labeling in order to reduce spray drift and therefore ecological exposure and risk to non-target plants. The proposed label changes are detailed in Appendix B of the SU PID document, and in the sulfometuron-methyl label table below (Table C.16.2).
- The Agency has identified herbicide resistance management concerns with all 22 SUs, including sulfometuron-methyl, and is proposing certain changes to sulfometuron-methyl product labels to reduce the potential of herbicide resistance. These proposed label changes are detailed in Appendix B of the SU PID document, and in the label table below (Table C.16.2).
- The Agency does not have a complete set of ecotoxicity data for sulfometuron-methyl on pollinators, currently only the honeybee acute contact toxicity study (guideline 850.3020) is available. Therefore, the Agency has not fully assessed the potential risk of sulfometuron-methyl to terrestrial invertebrates. In the future, the Agency will require pollinator data to evaluate risk to terrestrial invertebrates (see Table C.16.1.).

In this Proposed Interim Registration Review Decision, EPA is making no human health or environmental safety findings associated with the EDSP screening of sulfometuron-methyl, risk to pollinators, nor is it making a complete endangered species finding. The Agency's final registration review decision for sulfometuron-methyl will be issued once an effects determination for listed species is made, and ESA Section 7 consultation with the Services has taken place, if necessary; an EDSP FFDCA section 408(p) determination has been made; and a pollinator risk assessment has been completed.

C.16.D1. Proposed Data Needs for Sulfometuron-methyl

Consistent with EPA's June 2014 *Guidance for Assessing Pesticide Risks to Bees*, the Agency has begun to require ecotoxicity data for pollinators where applicable. The Agency has determined that pollinator data are needed for sulfometuron-methyl and proposes to require these data, under a DCI, as a part of the registration review of sulfometuron-methyl. The pollinator data proposed to be required are identified in Table C.16.1 below.

Table C.16.1. Potential Pollinator Data Requirements for Sulfometuron-methyl

Guideline #	Study
850.3040**	Field testing for pollinators
Non-Guideline* (OECD 237)	Honey bee larvae acute oral toxicity
Non-Guideline*	Honey bee adult chronic oral toxicity
Non-Guideline*	Honey bee larvae chronic oral toxicity
Non-Guideline**	Residues in pollen and nectar/field residue analysis
Non-Guideline** (OECD 75)	Semi-field testing for pollinators (tunnel or colony feeding studies)

*Tier 1 (Laboratory-based studies)

**Tier 2 and 3 (Semi-field and full field colony-level studies) The need for a higher tier test for pollinators will be determined based upon lower-tiered tests and/or other lines of data and the need for a refined pollinator risk assessment.

C.16.D2. Additional Sulfometuron-methyl Label Changes

As a component of sulfometuron-methyl registration review, the Agency is proposing that all product labels contain certain application information to ensure that users apply sulfometuron-methyl products in a consistent manner, and that EPA's assessment and estimates of human health and ecological risks from sulfometuron-methyl products are consistent with their use. Therefore, it is proposed that all sulfometuron-methyl product labels contain certain information for each use site/use pattern on the product label. For a list of information that is proposed to be on the label, please see Appendix H. In addition, labels need to comply with changes specified in the amended Reregistration Eligibility Decision (RED) to mitigate risks. The label changes have been updated as part of a Reregistration Eligibility Document approved by the Agency, and can be found in the memorandum entitled *Clarifications to Sulfometuron Methyl Label Table Dated October 2011* found in docket number EPA-HQ-OPP-2008-0129 at www.regulations.gov.

Table C.16.2: Sulfometuron-methyl Label Table

Summary of Proposed Labeling Changes for Sulfometuron-methyl Uses – End-Use Products		
Description	Proposed Amended Labeling Language for Sulfometuron-methyl Use Products	Placement on Label
Groundwater Label Advisory[1]	"Sulfometuron-methyl is known to leach through soil into groundwater under certain conditions as a result of label use. This chemical may leach into groundwater if used in areas where soils are permeable, particularly where the water table is shallow."	Environmental Hazard section of Precautionary Statements
Surface Water Label Advisory	"This product may impact surface water quality due to runoff of rain water. This is especially true for poorly draining soils and soils with shallow ground water. This product is classified as having high potential for reaching surface water via runoff for several months or more after application. A level, well-maintained vegetative buffer strip between areas to which this product is applied and surface water features such as ponds, streams, and springs will reduce the potential loading of sulfometuron-methyl from runoff water and sediment. Runoff of this product will be greatly reduced by avoiding applications when rainfall or irrigation is expected to occur within 48 hours."	Environmental Hazard section of Precautionary Statements
Herbicide Resistance Management	See Appendix B.	
Spray Drift Management	See Appendix B.	

Advisory Language	See Appendix B.

1. Advisory based on detects in groundwater referenced in the Water Quality Portal (http://www.waterqualitydata.us/, June 2016).

APPENDIX C.17 – Sulfosulfuron

C.17.A. Use and Usage and Benefits Characterization

General use and usage information is covered in Section III.D: Characterization of Benefits, as well as in Appendix E: Chemical Use and Usage. For sulfosulfuron, the most recent agricultural usage information is from 2001 – 2007. During this period an average of approximately 31,000 pounds were applied, where winter wheat accounted for 99% of the use. Remaining use of sulfosulfuron is divided among spring wheat, pasture grass, rangeland, turf, and non-crop areas.

C.17.B. Responses to Comments

The Agency has responded to ecological, human health and usage related comments in its documents *Response to Comments on Preliminary Risk Assessment for 22 Sulfonylurea Herbicides*; *Response to Comments on the Health Effects Divisions Sulfonylurea Risk Assessments*; and *Sulfonylurea Herbicides: Usage, Response to Comments, Herbicide Resistance Management Measures and Grower Impacts from Potential Risk Mitigation Measures*, which can be found in the public docket EPA-HQ-OPP-2011-0434 on Regulations.gov. The Agency acknowledges that multiple comments were submitted describing the benefits of sulfonylurea herbicides, including sulfosulfuron.

C.17.C. Tolerances

Tolerances are established in 40 CFR §180.552 for residues of sulfosulfuron. The existing tolerances (40 CFR §180.552) are supported by the available residue chemistry data. There are no established Codex, Canadian or Mexican MRLs for residues of sulfosulfuron with the exception of a Canadian MRL in/on wheat grain, which is harmonized with the U.S. tolerance in/on wheat grain (0.02 ppm) with regards to both definition and limits.

The Agency notes that the current tolerance expression for sulfosulfuron needs to be revised in accordance with the OPP/HED Interim Guidance on Tolerance Expressions. Therefore, the Agency is proposing to update the tolerance expression for sulfosulfuron to the following language:

> *Tolerances are established for residues of sulfosulfuron (N-[[(4,6-dimethoxy-2-pyrimidinyl)amino]carbonyl]-2-(ethylsulfonyl)imidazo[1,2-a]pyridine-3-sulfonamide), including its metabolites and degradates, in or on the commodities in the table below. Compliance with the tolerance levels specified below is to be determined by measuring only those sulfosulfuron residues convertible to 2-(ethylsulfonyl)-imidazo[1,2-a]pyridine, expressed as the stoichiometric equivalent of sulfosulfuron.*

Tolerances for residues of sulfosulfuron in livestock commodities were re-evaluated. Based on this review, the Agency has determined that there is no reasonable expectation of finite residues of concern in swine (*i.e.*, Category 3 of 40 CFR 180.6(a)). Therefore, the Agency is proposing to remove the established tolerances for residues of sulfosulfuron in hog meat (0.005 ppm), fat (0.005 ppm) and meat byproducts (0.05 ppm). This proposal is also a consequence of the re-evaluation of the enforcement methods and the finding that the limits of quantitation for these methods is 0.01 ppm.

C.17.D. Proposed Interim Registration Review Decision for Sulfosulfuron

EPA has completed quantitative human health, and ecological risk assessments for sulfosulfuron. Although the ecological risk assessment analyzed risks from a range of terrestrial plant toxicity data, a comprehensive endangered species assessment was not completed. As part of the sulfosulfuron registration review, the Agency required certain data under generic data call-in (GDCI-085601-1061). All data requirements issued under the registration review GDCI have been satisfied.

In accordance with 40 CFR Sections 155.56 and 155.58, the Agency is issuing this *Proposed Interim Registration Review Decision for 22 Sulfonylurea (SU) Herbicides*, including sulfosulfuron (case number 7247). Except for the EDSP, ESA, and pollinator components of this case, the Agency has made the following proposed interim registration review decision for sulfosulfuron:

- The Agency determined that there are no human health risks of concern at this time.
- The Agency determined that there are no ecological risks of concern for any taxa, except non-target terrestrial and aquatic plants, at this time.
- The Agency has identified potential risk to non-target terrestrial and aquatic plants from sulfosulfuron. The Agency is proposing certain changes to sulfosulfuron labeling in order to reduce spray drift and therefore ecological exposure and risk to non-target plants. The proposed label changes are detailed in Appendix B of this document, and in the sulfosulfuron label table below (Table C.17.3).
- The Agency has identified herbicide resistance management concerns with all 22 SUs, including sulfosulfuron, and is proposing certain changes to sulfosulfuron product labels to reduce the potential of herbicide resistance. These proposed label changes are detailed in Appendix B of this document, and in the label table below (Table C.17.3).
- The Agency does not have sufficient ecotoxicity data for sulfosulfuron on pollinators and therefore, has not assessed the potential risk of sulfosulfuron to terrestrial invertebrates. In the future, the Agency will require pollinator data to evaluate risk to terrestrial invertebrates (see Table C.17.1.).
- An analytical reference standard for sulfosulfuron is available at EPA's National Pesticide Standards Repository. (see https://www.epa.gov/pesticide-analytical-methods/national-pesticide-standard-repository). However, the Agency proposes to require analytical reference standards for sulfosulfuron's metabolite ethyl sulfone chemophore, to be submitted to National Pesticides Standards Repository.
- Certain amendments to the tolerance(s) for sulfosulfuron are proposed.

In this Proposed Interim Registration Review Decision, EPA is making no human health or environmental safety findings associated with the EDSP screening of sulfosulfuron, risk to

pollinators, nor is it making a complete endangered species finding. The Agency's final registration review decision for sulfosulfuron will be issued once an effects determination for listed species is made, and ESA Section 7 consultation with the Services has taken place, if necessary; an EDSP FFDCA section 408(p) determination has been made; and a pollinator risk assessment has been completed.

C.17.D1. Proposed Data Needs for Sulfosulfuron

Consistent with EPA's June 2014 *Guidance for Assessing Pesticide Risks to Bees*, the Agency has begun to require ecotoxicity data for pollinators where applicable. The Agency has determined that pollinator data are needed for sulfosulfuron and proposes to require these data, under a DCI, as a part of the registration review of sulfosulfuron. The pollinator data proposed to be required are identified in Table C.17.1 below.

Table C.17.1. Potential Pollinator Data Requirements for Sulfosulfuron

Guideline #	Study
850.3040**	Field testing for pollinators
Non-Guideline* (OECD 213)	Honey bee adult acute oral toxicity
Non-Guideline* (OECD 237)	Honey bee larvae acute oral toxicity
Non-Guideline*	Honey bee adult chronic oral toxicity
Non-Guideline*	Honey bee larvae chronic oral toxicity
Non-Guideline**	Residues in pollen and nectar/field residue analysis
Non-Guideline** (OECD 75)	Semi-field testing for pollinators (tunnel or colony feeding studies)

*Tier 1 (Laboratory-based studies)
**Tier 2 and 3 (Semi-field and full field colony-level studies) The need for a higher tier test for pollinators will be determined based upon lower-tiered tests and/or other lines of data and the need for a refined pollinator risk assessment.

The Agency proposes that the analytical reference standards for sulfosulfuron's ethyl sulfone chemophore metabolite, which must be submitted to National Pesticides Standards Repository (see https://www.epa.gov/pesticide-analytical-methods/national-pesticide-standard-repository).

C.17.D2. Additional Sulfosulfuron Label Changes

As a component of sulfosulfuron registration review, the Agency is proposing that all product labels contain certain application information to ensure that users apply sulfosulfuron products in a consistent manner, and that EPA's assessment and estimates of human health and ecological risks from sulfosulfuron products are consistent with their use. Therefore, it is proposed that all sulfosulfuron product labels contain certain information for each use site/use pattern on the product label. For a list of information that is proposed to be on the label, please see Appendix H.

Table C.17.2: Sulfosulfuron Label Table

Summary of Proposed Labeling Changes for Sulfosulfuron Uses – End-Use Products		
Description	Proposed Amended Labeling Language for Sulfosulfuron Use Products	Placement on Label

Groundwater Label Advisory	"This chemical has properties and characteristics associated with chemicals detected in groundwater. This chemical may leach into groundwater if used in areas where soils are permeable, particularly where the water table is shallow."	Environmental Hazard section of Precautionary Statements
Surface Water Label Advisory	"This product may impact surface water quality due to runoff of rain water. This is especially true for poorly draining soils and soils with shallow ground water. This product is classified as having high potential for reaching surface water via runoff for months or more after application. A level, well-maintained vegetative buffer strip between areas to which this product is applied and surface water features such as ponds, streams, and springs will reduce the potential loading of sulfosulfuron from runoff water and sediment. Runoff of this product will be greatly reduced by avoiding applications when rainfall or irrigation is expected to occur within 48 hours."	Environmental Hazard section of Precautionary Statements
Herbicide Resistance Management	See Appendix B.	
Spray Drift Management	See Appendix B.	
Advisory Language	See Appendix B.	

APPENDIX C.18 – Thifensulfuron-methyl

C.18.A. Use and Usage and Benefits Characterization

General use, usage, and benefits information is covered in Section III.D: Characterization of Benefits, as well as in Appendix E: Chemical Use and Usage. From 2009 to 2013, use of thifensulfuron-methyl on winter/spring wheat and soybeans accounted for the vast majority of its usage both in terms of average acres treated and average pounds of active ingredient applied.

C.18.B. Responses to Comments

The Agency has responded to ecological, human health and usage related comments in its documents *Response to Comments on Preliminary Risk Assessment for 22 Sulfonylurea Herbicides*; *Response to Comments on the Health Effects Divisions Sulfonylurea Risk Assessments*; and *Sulfonylurea Herbicides: Usage, Response to Comments, Herbicide Resistance Management Measures and Grower Impacts from Potential Risk Mitigation Measures*, which can be found in the public docket EPA-HQ-OPP-2011-0171 on Regulations.gov.

C.18.C. Tolerances

The existing tolerances for residues of thifensulfuron (40 CFR §180.439) are supported by the available residue chemistry data. There are Canadian maximum residue levels (MRLs) for

residues of thifensulfuron-methyl in barley, oats, wheat, flaxseed, rapeseed, and dry soybean; these MRLs are harmonized with U.S. tolerances. There are no Codex MRLs for thifensulfuron-methyl. At this time, no revisions to the existing U.S. tolerance expression or levels are needed.

C.18.D. Proposed Interim Registration Review Decision for Thifensulfuron-methyl

EPA has completed quantitative human health, and ecological risk assessments for thifensulfuron-methyl. Although the ecological risk assessment analyzed risks from a range of terrestrial plant toxicity data, a comprehensive endangered species assessment was not completed. As part of the thifensulfuron-methyl registration review, the Agency required certain data under GDCI-128845-1164. All data required under the GDCI has been received.

In accordance with 40 CFR Sections 155.56 and 155.58, the Agency is issuing this *Proposed Interim Registration Review Decision for 22 Sulfonylurea (SU) Herbicides,* including [thifensulfuron-methyl/7206]. Except for the EDSP, ESA, and pollinator components of this case, the Agency has made the following proposed interim registration review decision for thifensulfuron-methyl:

- The Agency determined that there are no human health risks of concern at this time.
- The Agency determined that there are no ecological risks of concern for any taxa, except non-target terrestrial and aquatic plants at this time.
- The Agency has identified potential risk to non-target terrestrial and aquatic plants from thifensulfuron-methyl. The Agency is proposing certain changes to thifensulfuron-methyl labeling in order to reduce spray drift and therefore ecological exposure and risk to non-target plants. The proposed label changes are detailed in Appendix B of this document, and in the thifensulfuron-methyl label table below (Table C.19.2).
- The Agency has identified herbicide resistance management concerns with all 22 SUs, including thifensulfuron-methyl, and is proposing certain changes to thifensulfuron-methyl product labels to reduce the potential of herbicide resistance. These proposed label changes are detailed in Appendix B of this document, and in the label table below (Table C.18.2).
- The Agency does not have sufficient ecotoxicity data for thifensulfuron-methyl on pollinators and therefore, has not assessed the potential risk of thifensulfuron-methyl to terrestrial invertebrates. In the future, the Agency will require pollinator data to evaluate risk to terrestrial invertebrates (see Table C.18.1.).

In this Proposed Interim Registration Review Decision, EPA is making no human health or environmental safety findings associated with the EDSP screening of thifensulfuron-methyl, risk to pollinators, nor is it making a complete endangered species finding. The Agency's final registration review decision for thifensulfuron-methyl will be issued once an effects determination for listed species is made, and ESA Section 7 consultation with the Services has taken place, if necessary; an EDSP FFDCA section 408(p) determination has been made; and a pollinator risk assessment has been completed.

C.18.D1. Proposed Data Needs for Thifensulfuron-methyl

Consistent with EPA's June 2014 *Guidance for Assessing Pesticide Risks to Bees*, the Agency has begun to require ecotoxicity data for pollinators where applicable. The Agency has determined that pollinator data are needed for thifensulfuron-methyl and proposes to require

these data, under a DCI, as a part of the registration review of thifensulfuron-methyl. The pollinator data proposed to be required are identified in Table C.18.1 below.

Table C.18.1. Potential Pollinator Data Requirements for Thifensulfuron-methyl

Guideline #	Study
850.3040**	Field testing for pollinators
Non-Guideline* (OECD 213)	Honey bee adult acute oral toxicity
Non-Guideline* (OECD 237)	Honey bee larvae acute oral toxicity
Non-Guideline*	Honey bee adult chronic oral toxicity
Non-Guideline*	Honey bee larvae chronic oral toxicity
Non-Guideline**	Residues in pollen and nectar/field residue analysis
Non-Guideline** (OECD 75)	Semi-field testing for pollinators (tunnel or colony feeding studies)

*Tier 1 (Laboratory-based studies)
**Tier 2 and 3 (Semi-field and full field colony-level studies) The need for a higher tier test for pollinators will be determined based upon lower-tiered tests and/or other lines of data and the need for a refined pollinator risk assessment.

C.18.D2. Additional Thifensulfuron-methyl Label Changes

As a component of thifensulfuron-methyl registration review, the Agency is proposing that all product labels contain certain application information to ensure that users apply thifensulfuron-methyl products in a consistent manner, and that EPA's assessment and estimates of human health and ecological risks from thifensulfuron-methyl products are consistent with their use. Therefore, it is proposed that all thifensulfuron-methyl product labels contain certain information for each use site/use pattern on the product label. For a list of information that is proposed to be on the label, please see Appendix H.

Table C.18.2: Thifensulfuron-methyl Label Table

Summary of Proposed Labeling Changes for Thifensulfuron-methyl Uses – End-Use Products		
Description	Proposed Amended Labeling Language for Thifensulfuron-methyl Use Products	Placement on Label
Groundwater Label Advisory	"This chemical has properties and characteristics associated with chemicals detected in groundwater. This chemical may leach into groundwater if used in areas where soils are permeable, particularly where the water table is shallow."	Environmental Hazard section of Precautionary Statements
Surface Water Label Advisory	"This product may impact surface water quality due to runoff of rain water. This is especially true for poorly draining soils and soils with shallow ground water. This product is classified as having high potential for reaching surface water via runoff for days after application. A level, well-maintained vegetative buffer strip between areas to which this product is applied and surface water features such as ponds, streams, and springs will reduce the potential	Environmental Hazard section of Precautionary Statements

	loading of thifensulfuron-methyl from runoff water and sediment. Runoff of this product will be greatly reduced by avoiding applications when rainfall or irrigation is expected to occur within 48 hours."	
Herbicide Resistance Management	See Appendix B.	
Spray Drift Management	See Appendix B.	
Advisory Language	See Appendix B.	

APPENDIX C.19 – Triasulfuron

C.19.A. Use and Usage and Benefits Characterization

General use, usage, and benefits information for triasulfuron is covered in Section III.D: Characterization of Benefits, as well as in Appendix E: Chemical Use and Usage. From 1998-2010, winter wheat accounted for the largest percentage of triasufuron usage in terms of total pounds of active ingredient applied (74%) and total area treated (72%). Spring wheat accounted for 13% of the pounds applied, and 15% of total area treated. In addition to wheat, triasulfuron is also registered for use on barley, pastures, rangeland, and conservation reserve program acres.

C.19.B. Responses to Comments

The Agency has responded to ecological, human health and usage related comments in its documents *Response to Comments on Preliminary Risk Assessment for 22 Sulfonylurea Herbicides*; *Response to Comments on the Health Effects Divisions Sulfonylurea Risk Assessments*; and *Sulfonylurea Herbicides: Usage, Response to Comments, Herbicide Resistance Management Measures and Grower Impacts from Potential Risk Mitigation Measures*, which can be found in the triasulfuron public docket EPA-HQ-OPP-2012-0115 on Regulations.gov. Eight public comments were received during the risk assessment comment period. All comments are addressed by the response to comment memos cited above.

C.19.C. Tolerances

Tolerances are established in 40 CFR §180.459 for residues of triasulfuron. The existing tolerances (40 CFR §180.459) are supported by the available residue chemistry data. There are no Codex MRLs for triasulfuron. Canada has established MRLs for triasulfuron which are harmonized with U.S. tolerances.

The Agency notes that the tolerance expression for triasulfuron in 40 CFR §180.459 needs to be revised in accordance with the OPP/HED Interim Guidance on Tolerance Expressions. Therefore, the Agency is proposing to update the tolerance expression for triasulfuron following the completion of this interim decision.

> (*a) General. Tolerances are established for residues of triasulfuron, including its metabolites and degradates, in or on the commodities in the table below. Compliance with the tolerance levels specified below is to be determined by measuring only*

triasulfuron (2-(2-chloroethoxy)-N-[[(4-methoxy-6-methyl-1,3,5-triazin-2-yl)amino]carbonyl]benzenesulfonamide) in or on the commodity.

C.19.D. Proposed Interim Registration Review Decision for Triasulfuron

EPA has completed quantitative human health, and ecological risk assessments for triasulfuron. Although the ecological risk assessment analyzed risks from a range of terrestrial plant toxicity data, a comprehensive endangered species assessment was not completed. As part of the triasulfuron registration review, the Agency required certain data under generic data call-in GDCI-128969-1196. All data required under the GDCI have been received.

In accordance with 40 CFR Sections 155.56 and 155.58, the Agency is issuing this *Proposed Interim Registration Review Decision for 22 Sulfonylurea (SU) Herbicides*, including triasulfuron, Registration Review Case No. 7221. Except for the EDSP, ESA, and pollinator components of this case, the Agency has made the following proposed interim registration review decision for triasulfuron:

- The Agency determined that there are no human health risks of concern at this time.
- The Agency determined that there are no ecological risks of concern for any taxa, except non-target terrestrial and aquatic plants, at this time.
- The Agency has identified potential risk to non-target terrestrial and aquatic plants from triasulfuron. The Agency is proposing certain changes to triasulfuron labeling in order to reduce spray drift and therefore ecological exposure and risk to non-target plants. The proposed label changes are detailed in Appendix B of this document, and in the triasulfuron label table below (Table C.19.3).
- The Agency has identified herbicide resistance management concerns with all 22 SUs, including triasulfuron, and is proposing certain changes to triasulfuron product labels to reduce the potential of herbicide resistance. These proposed label changes are detailed in Appendix B of this document, and in the label table below (Table C.19.3).
- The Agency has limited ecotoxicity data for triasulfuron on pollinators and therefore, has not assessed the potential risk of triasulfuron to terrestrial invertebrates. In the future, the Agency will require pollinator data to evaluate risk to terrestrial invertebrates (see Table C.19.1.).
- Certain amendments to the tolerances for triasulfuron are proposed.

In this Proposed Interim Registration Review Decision, EPA is making no human health or environmental safety findings associated with the EDSP screening of triasulfuron, risk to pollinators, nor is it making a complete endangered species finding. The Agency's final registration review decision for triasulfuron will be issued once an effects determination for listed species is made, and ESA Section 7 consultation with the Services has taken place, if necessary; an EDSP FFDCA section 408(p) determination has been made; and a pollinator risk assessment has been completed.

C.19.D1. Proposed Data Needs for Triasulfuron

Consistent with EPA's June 2014 *Guidance for Assessing Pesticide Risks to Bees*, the Agency has begun to require ecotoxicity data for pollinators where applicable. The Agency has determined that pollinator data are needed for triasulfuron and proposes to require these data, under a DCI, as a part of the registration review of triasulfuron. The pollinator data proposed to

be required are identified in Table C.19.1 below. As noted in the triasulfuron problem formulation, acceptable acute contact toxicity data with adult honey bees (GLN 850.3020; MRIDs 41593004 and 41593005) have already been received by the Agency for triasulfuron.

Table C.19.1. Potential Pollinator Data Requirements for Triasulfuron

Guideline #	Study
850.3040**	Field testing for pollinators
Non-Guideline* (OECD 213)	Honey bee adult acute oral toxicity
Non-Guideline* (OECD 237)	Honey bee larvae acute oral toxicity
Non-Guideline*	Honey bee adult chronic oral toxicity
Non-Guideline*	Honey bee larvae chronic oral toxicity
Non-Guideline**	Residues in pollen and nectar/field residue analysis
Non-Guideline** (OECD 75)	Semi-field testing for pollinators (tunnel or colony feeding studies)

*Tier 1 (Laboratory-based studies)
**Tier 2 and 3 (Semi-field and full field colony-level studies) The need for a higher tier test for pollinators will be determined based upon lower-tiered tests and/or other lines of data and the need for a refined pollinator risk assessment.

C.19.D2. Additional Triasulfuron Label Changes

As a component of triasulfuron registration review, the Agency is proposing that all product labels contain certain application information to ensure that users apply triasulfuron products in a consistent manner, and that EPA's assessment and estimates of human health and ecological risks from triasulfuron products are consistent with their use. Therefore, it is proposed that all triasulfuron product labels contain certain information for each use site/use pattern on the product label. For a list of information that is proposed to be on the label, please see Appendix H.

Table C.19.2: Triasulfuron Label Table

Summary of Proposed Labeling Changes for Triasulfuron Uses – End-Use Products		
Description	Proposed Amended Labeling Language for Triasulfuron Use Products	Placement on Label
Groundwater Label Advisory	"This chemical has properties and characteristics associated with chemicals detected in groundwater. This chemical may leach into groundwater if used in areas where soils are permeable, particularly where the water table is shallow."	Environmental Hazard section of Precautionary Statements
Surface Water Label Advisory	"This product may impact surface water quality due to runoff of rain water. This is especially true for poorly draining soils and soils with shallow ground water. This product is classified as having high potential for reaching surface water via runoff for months or more after application. A level, well-maintained vegetative buffer strip between areas to	Environmental Hazard section of Precautionary Statements

	which this product is applied and surface water features such as ponds, streams, and springs will reduce the potential loading of triasulfuron from runoff water and sediment. Runoff of this product will be greatly reduced by avoiding applications when rainfall or irrigation is expected to occur within 48 hours."	
Herbicide Resistance Management	See Appendix B.	
Spray Drift Management	See Appendix B.	
Advisory Language	See Appendix B.	

APPENDIX C.20 – Tribenuron-methyl

C.20.A. Use and Usage and Benefits Characterization

General use, usage, and benefits information is covered in Section III.D: Characterization of Benefits, as well as in Appendix E: Chemical Use and Usage. Wheat (spring and winter), barley, and soybeans account for the majority of tribenuron-methyl usage. Tribenuron-methyl is also registered for use on a variety of other crops, including corn, cotton, dry bean/pea, fallow, oat, pasture, rice, sorghum, and sunflower.

C.20.B. Responses to Comments

The Agency has responded to ecological, human health and usage related comments in its documents *Response to Comments on Preliminary Risk Assessment for 22 Sulfonylurea Herbicides*; *Response to Comments on the Health Effects Divisions Sulfonylurea Risk Assessments*; and *Sulfonylurea Herbicides: Usage, Response to Comments, Herbicide Resistance Management Measures and Grower Impacts from Potential Risk Mitigation Measures*, which can be found in the public docket EPA-HQ-OPP-2010-0626 on Regulations.gov at https://www.regulations.gov/#!docketDetail;D=EPA-HQ-OPP-2010-0626.

C.20.C. Tolerances

The existing tolerances for tribenuron (40 CFR §180.451) are supported by the available residue chemistry data. There are Canadian MRLs for residues of tribenuron methyl in barley, oats, soybean seed, sunflower seed, and wheat at 0.05 ppm; and flaxseed and rapeseed at0.02 ppm. There are no Codex MRLs for tribenuron methyl at this time. The U.S. tolerances for residues of tribenuron methyl are harmonized with their counterpart Canadian MRLs. No revisions to the existing U.S. tolerance expression or levels are needed at this time.

C.20.D. Proposed Interim Registration Review Decision for Tribenuron-methyl

EPA has completed quantitative human health, and ecological risk assessments for tribenuron-methyl. Although the ecological risk assessment analyzed risks from a range of terrestrial plant toxicity data, a comprehensive endangered species assessment was not completed. As part of the tribenuron-methyl registration review, the Agency required certain data

under generic data call-ins (GDCI) GDCI-128887-974 and GDCI-128887-1269. All data required under these GDCIs have been received.

In accordance with 40 CFR Sections 155.56 and 155.58, the Agency is issuing this *Proposed Interim Registration Review Decision for 22 Sulfonylurea (SU) Herbicides,* including tribenuron-methyl (128887). Except for the EDSP, ESA, and pollinator components of this case, the Agency has made the following proposed interim registration review decision for tribenuron-methyl:

- The Agency determined that there are no human health risks of concern at this time.
- The Agency determined that there are no ecological risks of concern for any taxa, except non-target terrestrial plants, at this time.
- The Agency has identified potential risk to non-target terrestrial plants from tribenuron-methyl. The Agency is proposing certain changes to tribenuron-methyl labeling in order to reduce spray drift and therefore ecological exposure and risk to non-target plants. The proposed label changes are detailed in Appendix B of this document, and in the tribenuron-methyl label table below (Table C.20.3).
- The Agency has identified herbicide resistance management concerns with all 22 SUs, including tribenuron-methyl, and is proposing certain changes to tribenuron-methyl product labels to reduce the potential of herbicide resistance. These proposed label changes are detailed in Appendix B of this document, and in the label table below (Table C.20.3).
- The Agency does not have sufficient ecotoxicity data for tribenuron-methyl on pollinators and therefore, has not assessed the potential risk of tribenuron-methyl to terrestrial invertebrates. In the future, the Agency will require pollinator data to evaluate risk to terrestrial invertebrates (see Table C.20.1.).

In this Proposed Interim Registration Review Decision, EPA is making no human health or environmental safety findings associated with the EDSP screening of tribenuron-methyl, risk to pollinators, nor is it making a complete endangered species finding. The Agency's final registration review decision for tribenuron-methyl will be issued once an effects determination for listed species is made, and ESA Section 7 consultation with the Services has taken place, if necessary; an EDSP FFDCA section 408(p) determination has been made; and a pollinator risk assessment has been completed.

C.20.D1. Proposed Data Needs for Tribenuron-methyl

Consistent with EPA's June 2014 *Guidance for Assessing Pesticide Risks to Bees*, the Agency has begun to require ecotoxicity data for pollinators where applicable. The Agency has determined that pollinator data are needed for tribenuron-methyl and proposes to require these data, under a DCI, as a part of the registration review of tribenuron-methyl. The pollinator data proposed to be required are identified in Table C.20.1 below.

Table C.20.1. Potential Pollinator Data Requirements for Tribenuron-methyl

Guideline #	Study
850.3040**	Field testing for pollinators

Non-Guideline* (OECD 213)	Honey bee adult acute oral toxicity
Non-Guideline* (OECD 237)	Honey bee larvae acute oral toxicity
Non-Guideline*	Honey bee adult chronic oral toxicity
Non-Guideline*	Honey bee larvae chronic oral toxicity
Non-Guideline**	Residues in pollen and nectar/field residue analysis
Non-Guideline** (OECD 75)	Semi-field testing for pollinators (tunnel or colony feeding studies)

*Tier 1 (Laboratory-based studies)
**Tier 2 and 3 (Semi-field and full field colony-level studies) The need for a higher tier test for pollinators will be determined based upon lower-tiered tests and/or other lines of data and the need for a refined pollinator risk assessment.

C.20.D2. Additional Tribenuron-methyl Label Changes

As a component of tribenuron-methyl registration review, the Agency is proposing that all product labels contain certain application information to ensure that users apply tribenuron-methyl products in a consistent manner, and that EPA's assessment and estimates of human health and ecological risks from tribenuron-methyl products are consistent with their use. Therefore, it is proposed that all tribenuron-methyl product labels contain the following information for each use site/use pattern on the product label. For a list of information that is proposed to be on the label, please see Appendix H.

Table C.20.2: Tribenuron-methyl Label Table

Summary of Proposed Labeling Changes for Tribenuron-methyl Uses – End-Use Products		
Description	Proposed Amended Labeling Language for Tribenuron-methyl Use Products	Placement on Label
Groundwater Label Advisory	"This chemical has properties and characteristics associated with chemicals detected in groundwater. This chemical may leach into groundwater if used in areas where soils are permeable, particularly where the water table is shallow."	Environmental Hazard section of Precautionary Statements
Surface Water Label Advisory	"This product may impact surface water quality due to runoff of rain water. This is especially true for poorly draining soils and soils with shallow ground water. This product is classified as having high potential for reaching surface water via runoff for months or more after application. A level, well-maintained vegetative buffer strip between areas to which this product is applied and surface water features such as ponds, streams, and springs will reduce the potential loading of tribenuron-methyl from runoff water and sediment. Runoff of this product will be greatly reduced by avoiding applications when rainfall or irrigation is expected to occur within 48 hours."	Environmental Hazard section of Precautionary Statements

Herbicide Resistance Management	See Appendix B.
Spray Drift Management	See Appendix B.
Advisory Language	See Appendix B.

APPENDIX C.21 – Trifloxysulfuron-sodium

C.21.A. Use and Usage and Benefits Characterization

General use, usage, and benefits information is covered in Section III.D: Characterization of Benefits, as well as in Appendix E: Chemical Use and Usage. Trifloxysulfuron-sodium is registered for use on citrus, transplanted tomatoes, cotton, sugarcane and turf to control a broad spectrum of weeds, including annual and perennial broadleaf weeds, grasses, and sedges. The most recent agricultural use information for trifloxysulfuron-sodium indicates that the highest usage is on cotton followed by sugarcane.

C.21.B. Responses to Comments

The Agency has responded to ecological, human health and usage related comments in its documents *Response to Comments on Preliminary Risk Assessment for 22 Sulfonylurea Herbicides*; *Response to Comments on the Health Effects Divisions Sulfonylurea Risk Assessments*; and *Sulfonylurea Herbicides: Usage, Response to Comments, Herbicide Resistance Management Measures and Grower Impacts from Potential Risk Mitigation Measures*, which can be found in the public docket EPA-HQ-OPP-2013-0409 on Regulations.gov. The Agency acknowledges that multiple comments were submitted describing the benefits of sulfonylurea herbicides, including trifloxysulfuron-sodium. The Agency also received a comment from the National Cotton Council.

Comment submitted by the National Cotton Council in EPA-HQ-EPA-OPP-0409-0026.

Comment: The National Cotton Council commented by highlighting the value of trifloxysulfuron-sodium use in cotton. Although trifloxysulfuron-sodium use in cotton is not significant, the National Cotton Council pointed out the need to retain trifloxysulfuron-sodium as one among multiple modes of action, and that its value has increased as of recent as growers try to control glyphosate-resistant weeds.

Response: The Agency appreciates this input about the value of trifloxysulfuron-sodium.

C.21.C. Tolerances

Tolerances are established in 40 CFR §180.591 for residues of trifloxysulfuron-sodium. The existing tolerances (40 CFR §180.591) are supported by the available residue chemistry data. At this time, there are no Codex or Canadian MRLs; therefore, international harmonization is not a consideration for trifloxysulfuron-sodium during registration review.

The Agency notes that the current tolerance expression for trifloxysulfuron-sodium needs to be revised in accordance with the OPP/HED Interim Guidance on Tolerance Expressions. Therefore, the Agency is proposing to update the tolerance expression for trifloxysulfuron-sodium to the following language:

> *Tolerances are established for residues of trifloxysulfuron, including its metabolites and degradates, in or on the commodities in the table below. Compliance with the tolerance levels specified below is to be determined by measuring only trifloxysulfuron, N-[[(4,6-dimethoxy-2-pyrimidinyl)amino]carbonyl]-3-(2,2,2-trifluoroethoxy)-2-pyridinesulfonamide*

Tolerances have been established for residues of trifloxysulfuron-sodium in or on almond (0.02 ppm) and almond hulls (0.01 ppm). These tolerances were assessed in *Trifloxysulfuron-sodium. Draft Human Health Risk Assessment in Support of Registration Review*, dated September 15, 2015. However, almonds are no longer included as a use site on any trifloxysulfuron-sodium product labels. Therefore, the Agency proposes to remove the established tolerances for residues of trifloxysulfuron-sodium in or on almond and almond hulls.

C.21.D. Proposed Interim Registration Review Decision for Trifloxysulfuron-sodium

EPA has completed quantitative human health, and ecological risk assessments for trifloxysulfuron-sodium. Although the ecological risk assessment analyzed risks from a range of terrestrial plant toxicity data, a comprehensive endangered species assessment was not completed. As part of the trifloxysulfuron-sodium registration review, the Agency required certain data under generic data call-in (GDCI-119009-1386). All data required under the trifloxysulfuron-sodium registration review GDCI have been satisfied.

In accordance with 40 CFR Sections 155.56 and 155.58, the Agency is issuing this *Proposed Interim Registration Review Decision for 22 Sulfonylurea (SU) Herbicides*, including trifloxysulfuron-sodium (case number 7028). Except for the EDSP, ESA, and pollinator components of this case, the Agency has made the following proposed interim registration review decision for trifloxysulfuron-sodium:

- The Agency determined that there are no human health risks of concern at this time.
- The Agency determined that there are no ecological risks of concern for any taxa, except non-target terrestrial and aquatic plants, at this time.
- The Agency has identified potential risk to non-target terrestrial and aquatic plants from sulfosulfuron. The Agency is proposing certain changes to trifloxysulfuron-sodium labeling in order to reduce spray drift and therefore ecological exposure and risk to non-target plants. The proposed label changes are detailed in Appendix B of this document, and in the trifloxysulfuron-sodium label table below (Table C.21.3).
- The Agency has identified herbicide resistance management concerns with all 22 SUs, including trifloxysulfuron-sodium, and is proposing certain changes to trifloxysulfuron-sodium product labels to reduce the potential of herbicide resistance. These proposed label changes are detailed in Appendix B of this document, and in the label table below (Table C.21.3).
- The Agency does not have sufficient ecotoxicity data for trifloxysulfuron-sodium on pollinators and therefore, has not assessed the potential risk of trifloxysulfuron-sodium to

terrestrial invertebrates. In the future, the Agency will require pollinator data to evaluate risk to terrestrial invertebrates (see Table C.21.1.).

- Certain amendments to the tolerance(s) for trifloxysulfuron-sodium are proposed.

In this Proposed Interim Registration Review Decision, EPA is making no human health or environmental safety findings associated with the EDSP screening of trifloxysulfuron-sodium, risk to pollinators, nor is it making a complete endangered species finding. The Agency's final registration review decision for trifloxysulfuron-sodium will be issued once an effects determination for listed species is made, and ESA Section 7 consultation with the Services has taken place, if necessary; an EDSP FFDCA section 408(p) determination has been made; and a pollinator risk assessment has been completed.

C.21.D1. Proposed Data Needs for Trifloxysulfuron-sodium

Consistent with EPA's June 2014 *Guidance for Assessing Pesticide Risks to Bees*, the Agency has begun to require ecotoxicity data for pollinators where applicable. The Agency has determined that pollinator data are needed for trifloxysulfuron-sodium and proposes to require these data, under a DCI, as a part of the registration review of trifloxysulfuron-sodium. The pollinator data proposed to be required are identified in Table C.21.1 below.

Table C.21.1. Potential Pollinator Data Requirements for Trifloxysulfuron-sodium

Guideline #	Study
850.3040**	Field testing for pollinators
Non-Guideline* (OECD 213)	Honey bee adult acute oral toxicity
Non-Guideline* (OECD 237)	Honey bee larvae acute oral toxicity
Non-Guideline*	Honey bee adult chronic oral toxicity
Non-Guideline*	Honey bee larvae chronic oral toxicity
Non-Guideline**	Residues in pollen and nectar/field residue analysis
Non-Guideline** (OECD 75)	Semi-field testing for pollinators (tunnel or colony feeding studies)

*Tier 1 (Laboratory-based studies)
**Tier 2 and 3 (Semi-field and full field colony-level studies) The need for a higher tier test for pollinators will be determined based upon lower-tiered tests and/or other lines of data and the need for a refined pollinator risk assessment.

C.21.D2. Additional Trifloxysulfuron-sodium Label Changes

As a component of trifloxysulfuron-sodium registration review, the Agency is proposing that all product labels contain certain application information to ensure that users apply trifloxysulfuron-sodium products in a consistent manner, and that EPA's assessment and estimates of human health and ecological risks from trifloxysulfuron-sodium products are consistent with their use. Therefore, it is proposed that all trifloxysulfuron-sodium product labels contain certain information for each use site/use pattern on the product label. For a list of information that is proposed to be on the label, please see Appendix H.

Table C.21.2: Trifloxysulfuron-sodium Label Table

Summary of Proposed Labeling Changes for Trifloxysulfuron-sodium Uses – End-Use Products

Description	Proposed Amended Labeling Language for Trifloxysulfuron-sodium Use Products	Placement on Label
Groundwater Label Advisory	"This chemical has properties and characteristics associated with chemicals detected in groundwater. This chemical may leach into groundwater if used in areas where soils are permeable, particularly where the water table is shallow."	Environmental Hazard section of Precautionary Statements
Surface Water Label Advisory	"This product may impact surface water quality due to runoff of rain water. This is especially true for poorly draining soils and soils with shallow ground water. This product is classified as having high potential for reaching surface water via runoff for months or more after application. A level, well-maintained vegetative buffer strip between areas to which this product is applied and surface water features such as ponds, streams, and springs will reduce the potential loading of trifloxysulfuron-sodium from runoff water and sediment. Runoff of this product will be greatly reduced by avoiding applications when rainfall or irrigation is expected to occur within 48 hours."	Environmental Hazard section of Precautionary Statements
Herbicide Resistance Management	See Appendix B.	
Spray Drift Management	See Appendix B.	
Advisory Language	See Appendix B.	

APPENDIX C.22 – Triflusulfuron-methyl

C.22.A. Use and Usage and Benefits Characterization

General use, usage, and benefits information is covered in Section III.D: Characterization of Benefits, as well as in Appendix E: Chemical Use and Usage. Triflusulfuron-methyl is registered for use for selective post-emergence control of broadleaf and grass weeds in chicory, endive, and beets (garden, sugar beet, and sugar beet grown for seeds).

C.22.B. Responses to Comments

The Agency has responded to ecological, human health and usage related comments in its documents *Response to Comments on Preliminary Risk Assessment for 22 Sulfonylurea Herbicides*; *Response to Comments on the Health Effects Divisions Sulfonylurea Risk Assessments*; and *Sulfonylurea Herbicides: Usage, Response to Comments, Herbicide Resistance Management Measures and Grower Impacts from Potential Risk Mitigation Measures*, which can be found in the public docket EPA-HQ-OPP-2012-0605 on Regulations.gov.

During the public comment period on the triflusulfuron-methyl PRAs, the Agency received two public comments on triflusulfuron-methyl. Comments were submitted by DuPont Crop Protection (DuPont) and Dr. Don Morishita, University of Idaho.

Comments submitted by DuPont in EPA-HQ-OPP-2012-0605-0027.

Comment: DuPont agreed with the Agency's conclusion that there is not a need for mechanistic data or a cumulative evaluation for triflusulfuron-methyl. They also agreed with the tiered approach used to assess the SU drinking water exposure as a class. However, DuPont noted that the highly conservative nature of the predicted screening concentrations does not reflect actual potential exposures in US drinking water. DuPont provided corrected unit of solvent solubility, units for the EC_{25} values, and indicated that the corresponding parameter for the most sensitive vegetative vigor endpoints were incorrect for triflusulfuron-methyl.

Response: The Agency thanks DuPont for its comment and addressed the information in the revised risk assessments which are available in the docket.

Comments submitted by Dr. Don Morishita in EPA-HQ-OPP-2012-0605-0028.

Comment: Dr. Morishita noted how the herbicide triflusulfuron is registered for use in sugar beets while at the same time sugar beets are extremely sensitive to a number of SU herbicides including chlorsulfuron, metsulfuron, sulfometuron and others. Because of these unique characteristics of each of these SU herbicides, Dr. Morishita believes that it is important to consider each one of these individually with regard to concerns about how these herbicides can affect non-target species.

Response: The Agency thanks Dr. Morishita for his comment and the uniqueness of the SU herbicides will be taken into consideration as we proceed through the registration review process.

C.22.C. Tolerances

The existing tolerances for residues of triflusulfuron-methyl (40 CFR §180.492) are supported by the available residue chemistry data. At this time, there are no Codex or Canadian MRLs; therefore, international harmonization is not a consideration for triflusulfuron-methyl during registration review. At this time, no revisions to the existing U.S. tolerance expression or levels are needed.

C.22.D. Proposed Interim Registration Review Decision for Triflusulfuron-methyl

EPA has completed quantitative human health, and ecological risk assessments for triflusulfuron-methyl. Although the ecological risk assessment analyzed risks from a range of terrestrial plant toxicity data, a comprehensive endangered species assessment was not completed. As part of the triflusulfuron-methyl registration review, the Agency required certain data under generic data call-in (GDCI) GDCI-129002-1295. All data required under the GDCI has been received or waived.

In accordance with 40 CFR Sections 155.56 and 155.58, the Agency is issuing this *Proposed Interim Registration Review Decision for 22 Sulfonylurea (SU) Herbicides*, including

triflusulfuron-methyl/case 7236. Except for the EDSP, ESA, and pollinator components of this case, the Agency has made the following proposed interim registration review decision for triflusulfuron-methyl:

- The Agency determined that there are no human health risks of concern at this time.
- The Agency determined that there are no ecological risks of concern for any taxa, except non-target terrestrial and aquatic plants, at this time.
- The Agency has identified potential risk to non-target terrestrial and aquatic plants from triflusulfuron-methyl. The Agency is proposing certain changes to triflusulfuron-methyl labeling in order to reduce spray drift and therefore ecological exposure and risk to non-target plants. The proposed label changes are detailed in Appendix B of this document, and in the triflusulfuron-methyl label table below (Table C.22.3).
- The Agency has identified herbicide resistance management concerns with all 22 SUs, including triflusulfuron-methyl, and is proposing certain changes to triflusulfuron-methyl product label to reduce the potential of herbicide resistance. These proposed label changes are detailed in Appendix B of this document, and in the label table below (Table C.22.3).
- The Agency does not have sufficient ecotoxicity data for triflusulfuron-methyl on pollinators and therefore, has not assessed the potential risk of triflusulfuron-methyl to terrestrial invertebrates. In the future, the Agency will require pollinator data to evaluate risk to terrestrial invertebrates (see Table C.22.1.).

In this Proposed Interim Registration Review Decision, EPA is making no human health or environmental safety findings associated with the EDSP screening of triflusulfuron-methyl, risk to pollinators, nor is it making a complete endangered species finding. The Agency's final registration review decision for triflusulfuron-methyl will be issued once an effects determination for listed species is made, and ESA Section 7 consultation with the Services has taken place, if necessary; an EDSP FFDCA section 408(p) determination has been made; and a pollinator risk assessment has been completed.

C.22.D1. Proposed Data Needs for Triflusulfuron-methyl

Consistent with EPA's June 2014 *Guidance for Assessing Pesticide Risks to Bees*, the Agency has begun to require ecotoxicity data for pollinators where applicable. The Agency has determined that pollinator data are needed for triflusulfuron-methyl and proposes to require these data, under a DCI, as a part of the registration review of triflusulfuron-methyl. The pollinator data proposed to be required are identified in Table C.22.1 below.

Table C.22.1. Potential Pollinator Data Requirements for Triflusulfuron-methyl

Guideline #	Study
850.3040**	Field testing for pollinators
Non-Guideline* (OECD 213)	Honey bee adult acute oral toxicity
Non-Guideline* (OECD 237)	Honey bee larvae acute oral toxicity
Non-Guideline*	Honey bee adult chronic oral toxicity
Non-Guideline*	Honey bee larvae chronic oral toxicity

Non-Guideline**	Residues in pollen and nectar/field residue analysis
Non-Guideline** (OECD 75)	Semi-field testing for pollinators (tunnel or colony feeding studies)

*Tier 1 (Laboratory-based studies)
**Tier 2 and 3 (Semi-field and full field colony-level studies) The need for a higher tier test for pollinators will be determined based upon lower-tiered tests and/or other lines of data and the need for a refined pollinator risk assessment.

C.22.D2. Additional Triflusulfuron-methyl Label Changes

As a component of triflusulfuron-methyl registration review, the Agency is requiring that all product label contain certain application information to ensure that users apply triflusulfuron-methyl products in a consistent manner, and that EPA's assessment and estimates of human health and ecological risks from triflusulfuron-methyl products are consistent with their use. Therefore, it is proposed that all triflusulfuron-methyl product labels contain certain information for each use site/use pattern on the product label. For a list of information that is proposed to be on the label, please see Appendix H.

Table C.22.2: Triflusulfuron-methyl Label Table

Summary of Proposed Labeling Changes for Triflusulfuron-methyl Uses – End-Use Products		
Description	Proposed Amended Labeling Language for Triflusulfuron-methyl Use Products	Placement on Label
Groundwater Label Advisory	"This chemical has properties and characteristics associated with chemicals detected in groundwater. This chemical may leach into groundwater if used in areas where soils are permeable, particularly where the water table is shallow."	Environmental Hazard section of Precautionary Statements
Surface Water Label Advisory	"This product may impact surface water quality due to runoff of rain water. This is especially true for poorly draining soils and soils with shallow ground water. This product is classified as having high potential for reaching surface water via runoff for months or more after application. A level, well-maintained vegetative buffer strip between areas to which this product is applied and surface water features such as ponds, streams, and springs will reduce the potential loading of triflusulfuron-methyl from runoff water and sediment. Runoff of this product will be greatly reduced by avoiding applications when rainfall or irrigation is expected to occur within 48 hours."	Environmental Hazard section of Precautionary Statements
Label Changes Needed	• On p. 6 of end use label for Product Registration #352-569, section entitled "For Aerial Application to Sugar Beets in the Imperial Valley of California" – remove reference to Michigan and Ohio. Aerial spraying is only allowed in the Imperial Valley of California. • On p. 11 of end use label Product Registration #352-569, section entitled "Air Assisted (Air	As indicated in each bullet.

	Blast) Field Crop Sprayers" – this section must be removed (it is boilerplate language that doesn't apply to triflusulfuron-methyl). Airblast is not listed on the label as an application method.	
Herbicide Resistance Management	See Appendix B.	
Spray Drift Management	See Appendix B.	
Advisory Language	See Appendix B.	

Appendix D: Summary of Registration Review Timeline for the Sulfonylureas

The following timeline highlights significant events that have occurred during the registration review of the sulfonylureas. Documentation of these events can be found in the EPA public docket listed below for each of the individual SU cases. Public comment periods were held on all PWPs, HED PRAs, and the streamlined SU EFED PRA.

Chemical Name (Case #)	Docket Number	PWP	FWP	DCI	HED PRA Date	EFED PRA Date
Bensulfuron-methyl (7216)	EPA-HQ-OPP-2011-0663	9/9/2011	3/5/2012	2/5/2013	11/30/2015	8/26/2015
Chlorimuron-ethyl (7403)	EPA-HQ-OPP-2010-0478	3/13/2013	9/9/2013	12/24/2013	3/7/2013	8/26/2015
Chlorsulfuron (631)	EPA-HQ-OPP-2012-0878	12/7/2012	7/21/2013	6/1/2013	9/142015	8/26/2015
Flazasulfuron (7271)	EPA-HQ-OPP-2011-0994	6/3/2012	11/26/2012	4/12/2013	9/15/2015	8/26/2015
Foramsulfuron (7252)	EPA-HQ-OPP-2012-0387	12/07/2012	6/10/2013	9/10/2013	9/15/2015	8/26/2015
Halosulfuron-methyl (7233)	EPA-HQ-OPP-2011-0745	3/14/2012	9/27/2012	2/20/2013	9/15/2015	8/26/2015
Imazosulfuron (7281)	EPA-HQ-OPP-2015-0625	N/A[1]	N/A[1]	N/A[1]	7/7/2015	8/26/2015
Iodosulfuron-methyl-sodium (7253)	EPA-HQ-OPP-2012-0717	12/15/2010	6/22/2011 (amended 3/29/2012)	11/29/2012	9/15/2015	8/26/2015
Mesosulfuron-methyl (7263)	EPA-HQ-OPP-2012-0833	06/19/2013	12/13/2013	04/30/14	9/09/2015	8/26/2015
Metsulfuron-methyl (7205)	EPA-HQ-OPP-2011-0375	9/27/2011	2/29/2012	3/15/2013	9/10/2015	8/26/2015
Nicosulfuron (7227)	EPA-HQ-OPP-2012-03 72	6/11/2012	12/7/2012	04/09/2013	9/14/2015	8/26/2015
Orthosulfamuron (7270)	EPA-HQ-OPP-2011-0438	12/15/2011	5/29/2012	1/29/2013	9/15/2015	8/26/2015
Primisulfuron-methyl (7220)	EPA-HQ-OPP-2011-0844	3/21/2012	9/26/2012	2/11/2013	9/10/2015	8/26/2015
Prosulfuron (7235)	EPA-HQ-OPP-2011-1010	3/30/2012	12/11/2012	4/11/2013	9/10/2015	8/26/2015

Rimsulfuron (7218)	EPA-HQ-OPP-2012-0178	9/20/2012	3/12/2013	5/30/2013	9/14/2015	8/26/2015
Sulfometuron-methyl (3136)	EPA-HQ-OPP-2012-0433	12/11/2012	5/29/2013	9/10/2013	9/15/2015	8/26/2015
Sulfosulfuron (7247)	EPA-HQ-OPP-2011-0434	6/22/2011	11/17/2011	12/5/2012	9/16/2015	8/26/2015
Thifensulfuron-methyl (7206)	EPA-HQ-OPP-2011-0171	3/18/2011	9/29/2011	05/15/2012	9/15/2015	8/26/2015
Triasulfuron (7221)	EPA-HQ-OPP-2012-0115	3/3/2012	9/26/2012	2/14/2013	9/10/2015	8/26/2015
Tribenuron-methyl (7217)	EPA-HQ-OPP-2010-0626	3/18/2011	8/29/2011	05/04/12, 02/12/13	9/15/2015	8/26/2015
Trifloxysulfuron-sodium (7260)	EPA-HQ-OPP-2013-0409	6/7/2013	12/17/2013	4/30/2014	9/15/2015	8/26/2015
Triflusulfuron-methyl (7236)	EPA-HQ-OPP-2012-0605	9/19/2012	2/25/2013	5/30/2013	9/15/2015	8/26/2015

1. Imazosulfuron was registered in 2010 and has been included in the SU registration review process, the result is that there was no PWP, FWP, or DCI issued for this chemical. Imazosulfuron was included in the September 2015 streamlined ecological PRA covering all 22 SUs. A human health PRA specific to imazosulfuron was also published.

Appendix E. Chemical Use and Usage

The following table presents a list of prominent uses for each of the 22 sulfonylureas included in this PID.

SUs	Use Sites	Usage
Bensulfuron-methyl	agricultural use sites: rice production fields non-agricultural use sites: none	agricultural usage: The annual usage averaged approx. 15,000 pounds a.i. for 450,000 acres from 1998-2008.
Chlorimuron-ethyl	agricultural use sites: soybeans, peanuts, and field corn. There is also an SLN registration for cranberries. non-agricultural use sites: non-crop areas such as: fencerows, roadsides, equipment storage areas, and other similar areas	agricultural usage: The annual usage averaged approx. 190,000 pounds a.i. for nearly 6 million acres from 1998-2008. non-agricultural usage: Usage data are not available for the non-crop sites.
Chlorsulfuron	agricultural use sites: mung beans, barley, field corn, oats, proso millet, safflower, sorghum, soybeans, triticale, wheat cotton, pastures, rangeland, forage and fodder grasses, farm yards, and uncultivated agricultural areas (farmyards, fuel storage areas, fencerows, etc.) non-agricultural use sites: ornamental lawns and turf, ditch banks, flood plains (dry), intermittently flooded areas (dry), swamps/marshes bogs/standing water (vegetation), waterway edges, and nonagricultural uncultivated areas/soils (airports, fencerows, military installations, rights-of-way, walkways, paths, etc.)	agricultural usage: The annual usage averaged approx. 60,000 pounds a.i. for 5,000,000 acres from 2006-2010. non-agricultural usage: In 2006, very small amounts were reportedly used by lawn care operators (LCOs). The exact figures are not discernible.
Flazasulfuron	agricultural use sites: Citrus, grape, sugarcane, tree nut, and conifer. non-agricultural use sites: turf in non-residential areas including golf courses, athletic fields, industrial and commercial lawns, and sod farms	agricultural usage: The total pounds applied in 2014 was 110 for grapes (raisin), 445 for grapes (wine), and 348 for oranges. Data on flazasulfuron agricultural usage is limited as uses were approved in 2012.
Foramsulfuron	agricultural use sites: corn and sweet corn non-agricultural use sites: ornamental turf, domestic dwellings (outdoor), camp sites, schools (outdoor), and roadsides	agricultural usage: The annual usage averaged approx. 17,000 pounds a.i. for 632,000 acres from 2002-2010. non-agricultural usage: The main non-agricultural use is on golf courses which approx. doubled from 500 Ibs. a.i. in 2004 to 1,000 lbs. a.i. in 2006. Less than 500 Ibs. a.i. was reportedly used for institutional turf, landscape, and LCOs from 2004 to 2006.

Halosulfuron-methyl	agricultural use sites: nut crops, ornamentals, field crops, vegetable crops, forage crops and turf non-agricultural use sites: recreational areas, race tracks, non-crop areas, tennis courts, play grounds, right of way areas, and in golf courses	agricultural usage: The annual usage averaged approx. 30,000 pounds a.i. for 1,000,000 acres from 2008-2010. non-agricultural usage: The use in golf courses increased from less than 500 lbs. a.i. in 2002 to 2,000 lbs. a.i. in 2004 and then declined to 1,000 lbs. a.i. in 2006. For turf farms, use was almost 1,000 lbs. a.i. in 2004 and 2006. There was less than 500 lbs. a.i. used on institutional turf and for landscape in 2004 and 2006. LCOs used less than 500 lbs. a.i. in 2002 and 2004, and about 3,000 lbs. a.i. in 2006.
Imazosulfuron	agricultural use sites: melons, peppers, rice, tomatoes, and tuberous and corm vegetables non-agricultural use sites: ornamental and established turf grass	
Iodosulfuron-methyl-sodium	agricultural use sites: corn, soybeans, sorghum, wheat, and triticale non-agricultural use sites: ornamental lawns, turf, right of way and recreational areas	agricultural usage: The annual usage averaged approx. 250 pounds a.i. for 130,000 acres from 2006-2010. non-agricultural usage: Non-agricultural usage data are not available.
Mesosulfuron-methyl	agricultural use sites: durum wheat, common wheat (winter, spring), and triticale non-agricultural use sites: none	agricultural usage: The annual usage averaged approx. 8,000 for 1 million acres from 2007-2011.
Metsulfuron-methyl	agricultural use sites: There are many agricultural use sites for this herbicide and they vary from grass row crops to horticultural crops and various tree crops. non-agricultural use sites: There is a wide variety of non-agricultural use sites for this herbicide which include dewatered areas, conservation reserve areas, fallow lands, pastures, rangeland, forests, vegetation management areas, and turfgrass.	agricultural usage: The annual usage averaged approx. 31,000 pounds a.i. for approx. 9 million acres. non-agricultural usage: Non-agricultural usage data are not available.
Nicosulfuron	agricultural use sites: field corn, hay, popcorn, and sweet corn. It is also registered for weed control in bermudagrass and switchgrass. non-agricultural use sites:	agricultural usage: The annual usage averaged approx. 70,000 pounds a.i. for 3.5 million acres from 2006-2010.

	airports, barrier strips, farm yards, farm fuel storage areas, fence rows, industrial sites, lumber yards, meadows, noncrop areas, pastures, rights of way (various), roadsides, soil bank land, sewage disposal areas, storage areas, and tank farms	
Orthosulfamuron	agricultural use sites: rice non-agricultural use sites: none	agricultural usage: Use on rice averaged approx. 3,000 pounds for 45,000 treated acres from 2007-2010.
Primisulfuron-methyl	agricultural use sites: field corn (grown for grain, silage, and seed) and popcorn. There are SLN registrations for use on Kentucky bluegrass. non-agricultural use sites: none	agricultural usage: Use on corn averaged approx. 8,000 pounds for 350,000 treated acres from 2008-2010.
Prosulfuron	agricultural use sites: corn, grain sorghum, winter wheat, spring wheat, barley, rye, oats, triticale, and proso millet non-agricultural use sites: none	agricultural usage: The annual total usage averaged 20,000 pounds a.i. for 1.6 million acres from 2000-2010.
Rimsulfuron	agricultural use sites: grapes, vineyards, citrus fruits, nut crops, pome fruits, stone fruits, tropical and sub-tropical fruits, fruiting vegetables, root crop vegetables, seed and pod vegetables, corn, cotton, orchards, fruit trees, soybeans, chicory, chinquapin, and farmyards (including fuel storage areas, uncultivated areas, fallow land and barrier strips) non-agricultural use sites: non-residential use on rangeland, ornamental lawns and turf, ornamental trees, drainage systems, and uncultivated non-agricultural areas (airports, rights-of-way, roadsides, utility substations, pipeline pumping stations, sewage disposal areas, industrial sites, lumber yard, tank farms, and fencerows)	agricultural usage: The annual total usage averaged 79,000 pounds a.i. for 5,355,000 acres from 2006-2010. non-agricultural usage: No data available.
Sulfometuron-methyl	agricultural use sites: none non-agricultural use sites: non-crop areas, airports, asphalt paving, bare ground, barrier strips, fence rows, farm yards, industrial sites, lumber yards, railroads, right-of-way, roadsides, sewage disposal areas, swamps, tank farms, forest trees, ornamental lawns and turf, drainage systems, drained canals, uncultivated areas, loading docks (outdoor) and storage areas (outdoor)	non-agricultural usage: Limited information is available. In 2006, use by LCOs totaled approx. 38,000 lbs. a.i.. Sulfometuron-methyl was applied to more than 1.5 million non-agricultural acres in the late 1990s and was considered one of the top ten herbicides for forestry and timberland between 2001 and 2006.

Sulfosulfuron	agricultural use sites for hay and pasture land: fallow land, reserve bermudagrass, forage, fodder, hay, rangeland, and wheat non-agricultural use sites: airports and landing fields, private roads and walkways, exterior commercial/institutional/industrial premises, commercial storage/warehouse premises, drainage systems, exterior household/domestic dwellings, nonagricultural and utility pole rights-of-ways/fencerows/hedgerows, and nonagricultural uncultivated areas/soils. Also, ornamental trees, shrubs, and vines, herbaceous and nonflowering plants, commercial/industrial lawns, ornamental turf, golf course turf, residential/recreational lawns, sod farm, ground covers	agricultural usage: The annual total usage averaged 27,000 pounds a.i. for approx. 1 million acres from 1998-2008. non-agricultural usage: The data showed less than 500 pounds a.i. were used on golf courses nationally in 2006. There are no available usage data for residential, commercial lawns, or sod farms.
Thifensulfuron-methyl	agricultural use sites: fallow/idle land/cons. reserve, barley, canola\rape, cotton (unsp.), corn (unsp.), corn - field, flax, oats, rice, safflower (unsp.), sorghum, soybeans (unsp.), sugar beets, triticale, and wheat non-agricultural use sites: none	agricultural usage: The annual usage averaged approx. 100,000 pounds a.i. for about 10 million acres from 1998-2008. non-agricultural usage: No data available.
Triasulfuron	agricultural use sites: winter wheat, spring wheat, barley, fallow, rangeland, and pastureland. This chemical also is used for post-harvest control of weeds in cereal crops and small grains non-agricultural use sites: none	agricultural usage: The annual usage averaged 30,000 pounds a.i., treating an average of 2 million acres from 1998-2010.
Tribenuron-methyl	agricultural use sites: alfalfa, corn - pop, potato - white/irish, barley, corn sweet, pumpkin, beans - dried-type, cotton (unsp.), rice, beans - succulent (snap), cucumber, sorghum, blueberry, fallow land, cons. reserve, Sorghum (unsp.), cabbage, flax, soybeans (unsp.), canola\rape, lentils, sugar beet, carrot (including tops), melons - water, sunflower, cereal grains, mustard, sweet potato, clover, oats, tobacco, corn (silage), tomato, corn (unsp.), pasture, triticale, corn - field, peanuts (unsp.), wheat, peas (unsp.), and yam non-agricultural use sites: none	agricultural usage: The annual usage averaged approx. 54,000 pounds a.i. for almost 9 million acres from 1998-2008.
Trifloxysulfuron-Sodium	agricultural use sites: citrus, tomatoes, cotton, and sugarcane	agricultural usage:

	non-agricultural use sites: ornamental turf for lawns, golf courses, cemeteries, athletic fields, and ornamental turf grown for sod	The usage averaged approx. 5,000 pounds a.i. for 670,000 acres treated from 2004-2011. non-agricultural usage: Data are available only for golf courses for 2004 and 2006, and landscape for 2004. The usage was approx. 450 and 125 pounds a.i. respectively for golf courses in 2004 and 2006. Approx. 30 pounds a.i. was used for the landscape use in 2004.
Triflusulfuron-methyl	agricultural use sites: chicory, endive, and beets (garden, sugar beets and sugar beets grown for seeds) non-agricultural use sites: none	agricultural usage: The usage on sugar beets (the only registered use for which usage data was available), averaged approximately 16,000 pounds a.i. for 1.75 million acres treated from 2001-2010.

unsp. = "Unspecified." This means that the exact variety (ies) or cultivar(s) of crop is unspecified in available data. Information in this table was extracted from Biological and Economic Analysis Division (BEAD) Chemical Profiles (BCPs) previously published for each SU compound. Individual BCPs can be found in the SU chemical dockets, listed in Table 1. Note that no BCP was completed for imazosulfuron because this chemical was first registered in 2012. BCP production is typically triggered as a support document for a PWP, but imazosulfuron was registered recently enough that a PWP was not completed prior to the publication of the EFED and HED PRAs described in Appendix D.

Appendix F. Human Health Incidents for the Sulfonylureas Herbicides

Chemical Name	Total Number of Incident Reports across All Databases	Number of Reports and Severity
Bensulfuron-methyl	0	From 2006-2011, there were no incidents reported for bensulfuron-methyl in in either the Main or Aggregate Incident Data System (IDS) database. Bensulfuron-methyl was not included in the AHS.
Chlorimuron	5	IDS report has 3 cases from 200-2010, but there are no cases reported for single chemical chlorimuron use only in the database. NOISH has 2 reported cases, but in these cases chlorimuron ethyl was not used alone.
Chlorsulfuron	9	7 incidents reported to the Aggregate IDS. For the Main IDS, there were no incidents reported for the single chemical only in the database and 2 incidents of moderate severity reported involving more than one chemical.
Flazasulfuron	0	IDS indicated no incidents identified in either Main or Aggregate IDS, from 2006 – 2011.
Foramsulfuron	6	3 cases reported to Aggregate IDS. 3 cases reported to Main IDS, all classified as moderate severity.
Halosulfuron methyl	14	14 incidents reported to the Aggregate IDS (1/06-11/11). For the Main IDS, there were no incidents reported.
Imazosulfuron	0	N/A, no review completed during HHRA in 2015, registered in 2010 with "no info available on use in U.S."
Iodosulfuron-methyl-Na	1	Main IDS 2007-2012 has 0 incidents, but the Aggregate IDS has 1 incident (moderate severity). NOISH h1999-2008 there were 0 incidents.
Mesosulfuron-methyl	0	As of 2013, no incidents of concern were identified in the OPP IDS, CDC/NIOSH and SENSOR data bases.
Metsulfuron	59	In Aggregate IDS and Main IDS, from January 1, 2006 to June 6, 2011 there were 37 incidents (Aggregate IDS) and no incidents (Main IDS) involving Metsulfuron-methyl. An IDS analysis was conducted from January 2011 to May 26, 2015; 1 incident (Main IDS) and 19 incidents (Aggregate IDS), and 2 incidents (SENSOR) were reported for metsulfuron-methyl.
Nicosulfuron	5	5 cases of minor, unknown, or no effects incidents. None of the incidents were a single chemical incident. (0 incidents in main IDS, 5 in aggregate IDS)
Orthosulfamuron	0	No incidents in IDS as of 2011.
Primisulfuron-methyl	1	IDS reported no incidents associated with primisulfuron-methyl reported over a 9-year period from January 2006 to May 2015. Between 1998 and 2011, the Centers for Disease

		Control and Prevention/National Institute for Occupational Safety and Health (CDC/NIOSH) Sentinel Event Notification System for Occupational Risk Pesticides received one report of a case involving primisulfuron-methyl. This case involved multiple active ingredients and was rated low in severity.
Prosulfuron	1	1 case reported to Aggregate IDS (1/01/06 - 12/14/11). The Main IDS has 0 incidents (1/01/11 - 12/14/11).
Rimsulfuron	9	9 cases reported to Aggregate IDS.
Sulfometuron-methyl	16	11 cases in Aggregate IDS (1/07 – 6/12). Main IDS (1/07 – 6/12) no incidents for single chemical, 5 cases involving more than one chemical
Sulfosulfuron	10	9 cases of minor, unknown, or no effects incidents. One incident of moderate severity in which an applicator experienced corneal burns when the product he was spraying drifted into his eyes.
Thifensulfuron-methyl	18	1 incident in Main IDS reported in current IDS analysis from 1/1/10 - 3/10/15 involving multiple chemicals and 5 incidents reported in Aggregate IDS. In an older incidents report published in 2010, no incidents occurred in the Main IDS however 12 incidents were reported in Aggregate IDS. All incidents were classified as low severity and did not appear to be a concern at the time.
Triasulfuron	2	1 case classified as moderate severity and 1 case classified as minor severity.
Tribenuron-methyl	22	8 incidents reported to Aggregate IDS (January 1, 2002 – May 26, 2010), no incidents reported to Main IDS. 6 cases reported to Aggregate IDS (January 1, 2010 – March 10, 2015) and no incidents reported to Main IDS. 8 cases reported to SENSOR-Pesticides (1998-2011) involving multiple active ingredients, including tribenuron-methyl – classified as low severity. Review of these incidents concluded that based on low frequency and severity of cases there is no concern or cause for further investigation.
Trifloxysulfuron-Na	3	3 incidents classified as minor severity in Aggregate IDS (January 1, 2007 - December 11, 2012)
Triflusulfuron-methyl	1	No single chemical incidents. In Main IDS, 1 incident was reported that involved more than one chemical.

Note: Incidents of minor severity, unknown severity, or no effect outcomes are reported into Aggregate IDS. Moderate, high and fatal severity cases are reported into Main IDS. Data for this appendix was extracted from SU chemical-specific human health risk assessments and human incident summary reports previously conducted by the Agency.

Appendix G. Terrestrial Plant Incidents for the Sulfonylureas Herbicides

Chemical (total number of reports across all databases)	Number or Reports, Year Range and States	Plant/Crop Impacted by Incident
Bensulfuron-methyl (2)	EIIS: 1 plant report IDS: 1 incident	Trees affected from rice treatment
Chlorimuron (41)	EIIS: 19 plant reports IDS: 22 incident reports, including 20 plant reports.	Agricultural crops
Chlorsulfuron (34+)	EIIS: 10 plant reports IDS: 24 incident reports, including 22 plant reports +(Aso, House Heaven Hills incidents-1980's)	Agricultural crops
Flazasulfuron (2)	EIIS: none IDS: 2 plant reports	
Foramsulfuron (103)	EIIS 70 plant reports: IDS: 33 plant reports	Agricultural crops
Halosulfuron methyl (3)	EIIS: 1 plant report IDS:2 plant reports	
Imazosulfuron	None reported	
Iodosulfuron-methyl-Na (30)	EIIS: 9 plant reports, 2003 - 2004 IDS: 21 plant reports	Corn
Mesosulfuron-methyl (81)	EIIS: 41 plant reports IDS: 40 plant reports	Agricultural areas, residential areas fence rows, rights of way
Metsulfuron (75)	EIIS: 29 plant reports IDS: 46 plant reports	Agricultural areas, turf, right of ways, fence rows, residential areas, ornamentals
Nicosulfuron (112)	EIIS: 42 plants reports IDS: 70 plant reports	Agricultural crops
Orthosulfamuron (0)	None reported	
Primisulfuron-methyl (137)	EIIS: 68 plant reports IDS: 69 plant reports	Agricultural areas
Prosulfuron (115)	EIIS: 78 plant reports IDS: 37 plant reports	Agricultural areas
Rimsulfuron (88)	EIIS: 43 plant reports IDS: 45 plant reports	
Sulfometuron-methyl (82)	EIIS: 41 plant reports IDS: 41 plant reports	Agricultural crops, including beets, forests, industrial sites, right of ways
Sulfosulfuron (0)	None reported	
Thifensulfuron (81)	EIIS: 26 plant reports IDS: 55 plant reports	
Triasulfuron (3)	EIIS: 1 plant report IDS: 2 plant reports	
Tribenuron-methyl (24)	EIIS: 9 plant reports IDS: 15 plant reports	Agricultural crops
Trifloxysulfuron-Na (3)	EIIS: 2 plant reports IDS: 1 plant report	Agricultural crops
Triflusulfuron (0)	None reported	

Appendix H: Information to Be Provided on All SU Product Labels

It is proposed that the following information **MUST** be provided on all SU product labels:

For Each Product:

- formulation type;
- pounds of active ingredient (ai) per gallon of product;
- ensure that the application rates expressed (*i.e.*, lbs ai/acre/year) present the maximum amount of ai for the subject product, or any other product with the subject ai;
- use sites and permitted applicators, include any prohibitions of a user type;
- application equipment;

For Each Target Use Site on the Product:

- maximum single application rate (lbs ai/acre);
- maximum annual application rate (lbs ai/acre/year);
- maximum number of applications per year;
- maximum application rate per crop cycle or season and year (if applicable); (If the target site is not grown in cycles or by seasons, then only express the maximum application rate as an annual maximum rate);
- maximum number of applications per crop cycle or season (if applicable);
- maximum number of times the crop cycle rate can be repeated per year (if applicable);
- application timing – pre-emergent vs. post-emergent;
- application target;
- application type;

If applicable, also include the following information:

- maximum finished spray concentration
- minimum re-treatment interval (expressed in days);
- pre-harvest interval;
- pre-bloom interval;
- pre-grazing interval;
- pre-slaughter interval;
- plant-back interval;
- minimum restricted entry interval (REI);
- minimum personal protective equipment (PPE);

Note the following:

- glove statements – the appropriate gloves must be listed out on the label, per the Label Review Manual (LRM) (Chapter 10). Registrants can no longer reference the category charts;
- Precautions should be separate from use restrictions (such as rotational crop restrictions, or restrictions for adjuvants and/or surfactants).