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Fomesafen

Interim Registration Review Decision
Case Number 7211

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Approved by: _____
Yu-Ting Guilaran, P.E.
Director
Pesticide Re-evaluation Division

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I. INTRODUCTION

This document is the Environmental Protection Agency's (EPA or the Agency) *Interim Registration Review Decision* for fomesafen (PC Code 123802, case 7211), 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 continues to meet, 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 require new risk mitigation measures, impose interim risk mitigation measures, identify data or information required to complete the review, and include schedules for submitting the required data, conducting the new risk assessment and completing the registration review. Additional information on fomesafen, can be found in EPA's public docket (EPA-HQ-OPP-2006-0239 at www.regulations.gov.

FIFRA, as amended by the Food Quality Protection Act (FQPA) of 1996, mandates the continuous review of existing pesticides. All pesticides distributed or sold in the United States 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 as 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.

EPA is issuing an interim registration review decision for fomesafen so that it can (1) move forward with aspects of the registration review that are completed and (2) implement interim risk mitigation. The Agency is currently working with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service (together, the Services) to develop methodologies for conducting national threatened and endangered (listed) species assessments for pesticides. Therefore, although EPA has not yet fully evaluated risks to listed species, the Agency will complete its listed species assessment and any necessary consultation with the Services for fomesafen prior to completing the fomesafen registration review. Likewise, the Agency will complete endocrine screening for fomesafen, pursuant to the Federal Food, Drug, and Cosmetic Act (FFDCA) section 408(p), before completing registration review. Last, EPA will determine whether pollinator exposure and effects data are necessary to make a final registration review decision for fomesafen and issue a data call-in (DCI) to obtain any such data prior to completing the fomesafen registration review. See Appendices B and C respectively, for additional information on the endangered species assessment and the endocrine screening for the fomesafen Registration Review.

Fomesafen is a light dependent peroxidizing herbicide (LDPH) and is applied pre-plant, pre-emergence, and post-emergence. Products containing fomesafen are registered for use on soybeans, cotton, beans, and a variety of fruits and vegetables for control of broadleaf weeds, grasses, and sedges. The mode of action is cellular membrane disruption. Fomesafen can be applied via ground and aerial sprays. There are currently 48 FIFRA Section 3 registrations and 32 special local need (SLN) registrations. There are no residential uses of fomesafen. The first product containing fomesafen was registered in the United States in the 1980s for use on soybeans, and a tolerance reassessment eligibility decision (TRED) was completed in 2006.

This document is organized into five sections: the *Introduction*, which includes this summary and a summary of public comments and EPA's responses; *Use and Usage*, which describes how and why fomesafen is used and summarizes data on its use; *Scientific Assessments*, which summarizes EPA's risk and benefits assessments, updates or revisions to previous risk assessments, and provides broader context with a discussion of risk characterization; the *Interim Registration Review Decision*, which describes the mitigation measures required to address risks of concern and the regulatory rationale for EPA's registration review decision; and, last, the *Next Steps and Timeline* for completion of this registration review.

Updates Since the Proposed Interim Decision (PID)

The Agency has been developing new enforceable spray drift language that would allow more flexibility to applicators. The proposed interim decision required that no applications be made when wind speeds were above 10 mph. Since publication of the PID, the Agency received numerous public comments asking for a reassessment of these requirements, and has decided to allow applications at up to 15 mph in some scenarios. These changes are further discussed in Section IV of this document and in Appendix A.

A. Summary of Fomesafen Registration Review

Pursuant to 40 CFR section 155.50, EPA formally initiated registration review for fomesafen with the opening of the registration review docket for the case. The following summary highlights the docket opening and other significant milestones that have occurred thus far during the registration review of fomesafen.

- February 2006 – The *Fomesafen Sodium: Human Health Risk Assessment for a Proposal to Amend Use on Soybeans, and Proposals to Add Uses on Cotton, Dry Bean, and Snap Bean* published.

- March 2007 - The *Fomesafen Summary Work Plan (PWP)*, Human Health Registration Review Problem Formulation, and Environmental Fate and Effects Problem Formulation were posted to the docket for a 60-day public comment period.

- August 2007 - The *Final Work Plan (FWP)* for fomesafen was completed. Three comments were received concerning the PWP from Syngenta, the FIFRA Endangered Species Task Force, and the New York State Department of Environmental Conservation. See the FWP for a comprehensive summary of the comments and the agency's responses.

The FWP noted that no additional data were anticipated to be needed for the fomesafen registration review. The 2007 FWP also noted that no new human health risk assessment was needed at the time. However, an assessment was eventually completed for a new use proposal in 2017 which was published along with the *Proposed Interim Registration Review Decision* in December 2017.

- No Generic Data Call-In (GDCI) for fomesafen was issued. At the time of the Final Work Plan, the Agency did not require any additional ecological effects, environmental fate, or human health data to complete the risk assessments.

- April 2009 – The Agency posted the *Environmental Fate, Ecological Risk and Endangered Species Assessment in Support of the Registration Review of Fomesafen Sodium* for a 60-day public comment period. 134 comments were received and are addressed in the *Response to Public Comments on the Preliminary Fomesafen Registration Review Ecological Risk Assessment* which was posted in the docket in August 2012.

- December 2017 - The Agency announced the availability of the *Proposed Interim Registration Review Decision (PID)* in the docket for fomesafen, for a 60-day public comment period. Since the 2007 FWP, which indicated no new human health risk assessment was needed, a new use request from the Registration Division resulted in a new human health risk assessment being completed. Therefore, along with the PID, the supporting documents *Fomesafen: Draft Human Health Risk Assessment for Registration Review and for the Section 3 Registration Action on Tuberous and Corm Vegetables (Crop Group 1C), Legume Vegetable (Crop Group 6) and Low Growing Berry (Except Cranberry) (Crop Group 13-07G)* and the *Ecological Risk Assessment for the Proposed IR-4 New Uses on Tuberous and Corm Vegetables Crop Subgroup 1C, Legume Vegetable Crop Group 6, and Low Growing Berry Crop Subgroup 13-07G (Except Cranberry)* were also published for comment. The Agency received three comments. These comments and the Agency's responses are summarized below. Based on these public comments, the Agency has decided to change several requirements for enforceable spray drift management described further in Section IV of this document.

- March 2017- The Agency is now announcing the availability of the *Interim Registration Review Decision (ID)* in the docket for fomesafen. Along with this ID, the Agency is also publishing an updated human health risk assessment revision, *Fomesafen Sodium. Revised Occupational and Residential Exposure Assessment for Proposed Uses on Tuberous and Corm Vegetables (Crop Group 1C), Legume vegetable (Crop Group 6) and Low Growing Berry (Except Cranberry) (Crop Group 13-07G) and for Registration Review.*

B. Summary of Public Comments on the Proposed Interim Registration Review Decision

During the 60-day public comment period on the proposed interim registration review decision the Agency received comments from the United States Department of Agriculture (USDA),

National Agricultural Aviation Association (NAAA), Syngenta (the registrant), and two unrelated comments from the general public. The comment from Syngenta was considered substantial, and the Agency is providing a response to comments document that will be published along with the ID for fomesafen, available in the public docket. The comments from USDA and NAAA are summarized and the Agency response is included below:

Comments from USDA (EPA-HQ-OPP-2006-0239-0191) and NAAA (EPA-HQ-OPP-2006-0239-0192)

Comment: Both USDA and NAAA provided comments on the enforceable spray drift management language that states "Do not apply when wind speeds exceed 10 MPH at the application site". There were concerns that in some regions or seasons, wind speed regularly fluctuates and may exceed 10 mph during periods when fomesafen must be applied to achieve effective weed control, or during an application which could put the use in violation of the label. NAAA provided additional options for EPA to consider.

EPA Response: The Agency thanks USDA and NAAA for their comments on spray drift. The Agency has decided to increase the maximum wind speed application allowance to 15 mph for ground applications, and up to 15 mph for some aerial applications described in the label table of this ID (Appendix A).

Comment: Label language that mandates the same droplet size restriction for all pesticides may preclude farmers from using a pesticide necessary to manage pest populations in a timely and efficient manner. In addition, while this mandate may result in reduced drift from the individual application, this approach may not produce the desired reduction in potential exposure due to the need for repeated treatments or increased doses required to achieve pest control.

EPA Response: The Agency thanks USDA for their comments. For clarification, EPA is not implementing a one-size-fits all approach with respect to droplet size. EPA reviews the chemical specific properties, risks, and other information in determining what mitigation measures are appropriate to propose for chemicals being evaluated in registration review. EPA appreciates USDA's input as we work to determine which chemicals and risks may need additional droplet size restrictions in order to allow the continued use of the pesticide.

Comment from Syngenta (EPA-HQ-OPP-2006-0239-0193):

Comment: The conclusion that "chronic risk is indicated for freshwater and estuarine/marine fish in clear, well-lit, shallow bodies of water due to UV light-enhanced toxicity" in the PID for fomesafen, is overstated and unrealistic. Using the value calculated in the submitted comments (105 µg/L) in conjunction with the highest aquatic EEC for fomesafen (14.49 µg/L), the calculated risk quotient does not exceed the level of concern (LOC) of 1. Consequently, the proposed fish advisory statement to address chronic risks to freshwater and estuarine/marine fish in shallow well-lit aquatic environments is unnecessary for this compound.

EPA Response: A full response to this comment is provided in the EFED Response to Comments document. To summarize the EFED response, the registrant will need to provide a fish early life stage study under enhanced lighting conditions using the technical active ingredient in order for the agency to reconsider the fish advisory statement.

II. USE AND USAGE

Fomesafen is a selective, pre- and post-emergence contact herbicide with products registered for use to control annual broadleaf weeds and some grasses in soybeans, cotton, bean (dry and succulent), cantaloupe, cucumber, peas, peppers, pine seedling nurseries, potato, pumpkin, squash, tomato, watermelon, nonagricultural/uncultivated areas, and agricultural fallow/idle land. Fomesafen is a member of the diphenyl ether group of herbicides and it belongs to a class of compounds, light dependent peroxidizing herbicides (LDPH), known to have a phototropic mode of action in plants. LDPHs act in plants through inhibition of the enzyme protoporphyrinogen oxidase, leading to cell membrane disruption and plant death through reactive oxygen species in the presence of light.

Approximately 1,930,000 pounds of fomesafen are applied annually in the United States. The crops that are most dependent on fomesafen in terms of average percent crop treated (PCT) include green beans (15%), cotton (10%), and dry beans/peas (10%). For soybeans, about 5% of the crop is treated on average. See *Usage Report in Support of Registration Review Draft Risk Assessment Purposes for Fomesafen*, dated Jan 20, 2016 for additional details on fomesafen use and usage. There are no residential uses of fomesafen. The maximum label rate is 0.5 pounds of active ingredient per acre (lbs ai/A), which is for pine seedling uses.

III. SCIENTIFIC ASSESSMENTS

A. Human Health Risks

A summary of the Agency's human health risk assessment is presented below. The Agency used the most current science policies and risk assessment methodologies to prepare a risk assessment in support of the registration review of fomesafen. For additional details on the human health assessment for fomesafen, see the *Fomesafen: Draft Human Health Risk Assessment for Registration Review and for the Section 3 Registration Action on Tuberous and Corm Vegetables (Crop Group 1C), Legume Vegetable (Crop Group 6) and Low Growing Berry (Except Cranberry) (Crop Group 13-07G)*, which is available in the public docket.

1. Risk Summary and Characterization

Dietary (Food + Water) Risks

All acute dietary (food and drinking water combined) risk estimates do not exceed the level of concern (100% of the acute population adjusted dose (aPAD)) for the general U.S. population and all population subgroups at the 95th percentile of exposure. The highest exposed subgroup is infants at 2.9% of the aPAD when using the estimated drinking water concentration (EDWC) with unextracted residues and at 2.3% of the aPAD when using the EDWC without unextracted residues.

All chronic dietary (food and drinking water combined) risk estimates do not exceed the level of concern (100% of the chronic population adjusted dose (cPAD)) for the general U.S. population and all population subgroups. The highest exposed subgroup is infants at 70% of the cPAD when using the EDWC with unextracted residues and at 56% of the cPAD when using the EDWC without unextracted residues.

Carcinogenicity was not observed in the rat chronic toxicity/carcinogenicity study. Liver tumors were produced in the mouse carcinogenicity study; however, HED's Cancer Assessment Review Committee (CARC) determined that fomesafen should be classified as "Not Likely to be Carcinogenic to Humans." Fomesafen was not considered to be mutagenic.

The fomesafen risk assessments were based on the most sensitive endpoints in the toxicity database, and the no observed adverse effect levels (NOAELs) selected for risk assessment are considered protective of potential developmental, neurotoxic, and immunotoxic effects for infants and children. There is no evidence of increased susceptibility in developing and young animals, and there are no residual uncertainties concerning pre- or post-natal toxicity or exposure. The Agency therefore reduced the 10x Food Quality Protection Act (FQPA) safety factor to 1x.

Residential and Bystander Risks

Residential exposures and risk are not assessed in this document because there are no residential uses for fomesafen. However, there is the potential for exposure (adult dermal and child dermal and incidental oral) resulting from drift from agricultural applications onto non-occupational sites. Risk estimates are not of concern (margins of exposures (MOEs) were above the level of concern (LOC) of 100) for adults and children at the edge of the treated field.

Aggregate Risks

The acute and chronic aggregate risk assessments include food and drinking water only. There are no acute or chronic aggregate risk of concern for fomesafen. A short/intermediate-term aggregate assessment was not conducted as there are no residential uses.

Cumulative Risks

EPA has not made a common mechanism of toxicity to humans finding for fomesafen and any other substances and fomesafen does not appear to produce a toxic metabolite produced by other substances. Therefore, EPA has not assumed that fomesafen has a common mechanism of toxicity with other substances for this assessment.

Occupational Handler Risks

Occupational dermal and inhalation risk estimates were assessed for the proposed and registered uses. For occupational handlers, the dermal and inhalation MOEs are above the LOC of 100 and are not of concern. All occupational exposure risk estimates for short- and intermediate-term exposures for handlers are not of concern with a single layer of clothing (includes long-sleeve shirt and long pants) or with engineering controls for aerial applicators (enclosed cab for a fixed wing aircraft). Dermal MOEs ranged from 170 to 610,000 and inhalation MOEs ranged from 250 to 540,000. The inhalation and dermal exposures are not combined since the toxicological effects/endpoints are different for these routes of exposure.

Occupational Post-Application Risks

Based on the Agency's current practices, a quantitative non-cancer occupational post-application inhalation exposure assessment was not performed for fomesafen at this time. If new policies or procedures are put into place, the Agency may revisit the need for a quantitative occupational post-application inhalation exposure assessment for fomesafen.

Post-emergent applications are allowed for several registered crops, including beans, cotton, pine seedling nurseries, soybeans, and watermelon. Occupational post-application dermal assessments were conducted for these registered crops. All occupational post-application short- and intermediate-term exposure and risk estimates for workers are not of concern (i.e., dermal MOEs are greater than the LOC of 100) on the day of application. Dermal post-application MOEs are $\geq$ 2,400 for post-application workers. The current restricted entry interval (REI) of 24 hours on labels is adequate to protect agricultural workers from post-application exposures to fomesafen.

2. Human Incidents

The Agency completed a review of fomesafen incidents in the OPP Incident Data Systems (IDS), for the period covering 1992 through 2006, 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 for the period covering 1998 through 2003. The Agency also acquired data from the California Department of Pesticide Regulation covering 1982-2006, and Poison Control Center data covering the years 1993-2003. Based on the low frequency and severity of incident cases reported for fomesafen in both IDS and NIOSH SENSOR-Pesticides, 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 detail, see *Review of Fomesafen Incident Reports* available in the public docket EPA-HQ-OPP-2006-0239.

3. Tolerances

Tolerances for plant commodities for fomesafen are defined in 40 CFR 180.433. Based on a recent IR-4 petition, the Agency is currently updating tolerances for crop group conversions.

4. Human Health Data Needs

The human health database for fomesafen is complete and no additional data are needed at this time.

B. Ecological Risks

A summary of the Agency's ecological risk assessment is presented below. The Agency used the most current science policies and risk assessment methodologies to prepare a risk assessment in support of the registration review of fomesafen. For additional details on the ecological assessment for fomesafen, see the *Environmental Fate, Ecological Risk, and Endangered Species Assessment in Support of the Registration Review of Fomesafen Sodium,* dated December 2008, and the *Ecological Risk Assessment for the Proposed IR-4 New Uses on Tuberous and Corm Vegetables Crop Subgroup 1C, Legume Vegetable Crop Group 6, and Low Growing Berry Crop Subgroup 13-07G (Except Cranberry)* which are available in the public docket.

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 fomesafen. See Appendix B for more details. As such, only the potential risks for non-listed species are described below.

1. Risk Summary and Characterization

Terrestrial Risks

Mammals

For mammals, no acute LOCs were exceeded at any application rate. There were no reproductive effects observed in the chronic mammal study; therefore, there is a low probability of a chronic risk of concern for mammals.

Birds, Reptiles, and Terrestrial-Phase Amphibians

For birds, no acute LOCs were exceeded at any application rates.

For chronic risks to birds, there were no effects observed at the highest concentration tested in the chronic study (46 mg/kg). At the lowest label application rate (0.17 lb ai/A), there is no avian chronic risk concern since the highest predicted Kenaga upper bound EECs (41 mg/Kg) were *lower* than the highest concentration tested in the chronic study. However, for the higher label application rates, the highest predicted Kenaga upper bound EECs were *higher* than the highest

concentration tested in the chronic study. Therefore, there is an uncertainty regarding the possibility of chronic risks to birds at all label application rates greater than 0.17 lb ai/A.

Invertebrates (honeybees)

EPA believes that additional data may be necessary to fully evaluate risks to non-target terrestrial invertebrates, especially pollinators. Although EPA identified the need for certain data to evaluate potential effects on pollinators when initially scoping the registration review for fomesafen, the problem formulation and registration review DCI for fomesafen were both issued prior to EPA's issuance of the June 2014 *Guidance for Assessing Pesticide Risks to Bees*[1]. This 2014 guidance lists additional pollinator studies that were not included in the fomesafen registration review DCI. Therefore, EPA is currently determining whether additional pollinator data are needed for fomesafen. If the Agency determines that additional pollinator exposure and effects data are necessary to help make a final registration review decision for fomesafen, then EPA will issue a DCI to obtain these data. The pollinator studies that could be required for fomesafen are listed in Table 1 below.

Table 1. Potential Pollinator Data Requirements for Fomesafen

Guideline #	Study
850.3030	Honey bee toxicity of residues on foliage (Tier 1)
Non-Guideline (OECD 213)	Honey bee adult acute oral toxicity (Tier 1)
Non-Guideline (OECD 237)	Honey bee larvae acute oral toxicity (Tier 1)
Non-Guideline	Honey bee adult chronic oral toxicity (Tier 1)
Non-Guideline	Honey bee larvae chronic oral toxicity (Tier 1)
Non-Guideline†	Field trial of residues in pollen and nectar (Tier 2)
Non-Guideline (OECD 75)†	Semi-field testing for pollinators (Tier 2)
850.3040†	Full-Field testing for pollinators (Tier 3)

† The need for higher tier tests for pollinators will be determined based upon the results of lower tiered tests and/or other lines of evidence and the need for a refined pollinator risk assessment.

Terrestrial Plants

For monocots, LOCs were exceeded for plants growing in semi-aquatic areas for both aerial and ground applications. RQs range from 1.0 to 3.3 (LOC = 1).

For dicots, RQs exceed the LOC for all modeled scenarios except plants grown in Region 5 (see Regional Use Maps on Fomesafen Labels) when fomesafen is applied at 0.17 lb ai/A via ground methods. RQs range from 0.85 to 60 (LOC = 1).

Aquatic Risks

Estuarine/Marine Fish, Freshwater Fish and Aquatic-Phase Amphibians

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

Previous assessments did not identify risks of concern for any aquatic taxa even at the highest application rate of 0.5 lb ai/A. However, based on the new *Guidance on Light-Dependent Peroxidizing Herbicides* (LDPH), potential chronic risk may occur for freshwater and estuarine/marine fish in clear, well-lit, shallow bodies of water due to UV light-enhanced toxicity. Based on the LDPH guidance, fomesafen's enhanced UV molar threshold NOAEC is 0.88 µg/L. The highest aquatic EEC for fomesafen is 14.5 µg/L, which produces an RQ of 16.5 for fish in shallow, well-lit bodies of water.

Aquatic Non-Vascular Plants

There are no risks of concern to either aquatic vascular or non-vascular plants.

Estuarine/Marine and Freshwater Invertebrates

There are no risks of concern to estuarine/marine or freshwater invertebrates.

2. Ecological Incidents

Reviews were conducted of the Ecological Incident Information System (EIIS, version 2.1.1), the Agency's Aggregated Incidents Reports database, and the Avian Incident Monitoring System (AIMS) on 6/2/2016 covering the time since the first registration. Incidents associated with fomesafen were reported in two of the three databases (no fomesafen incidents in AIMS).

Of the 78 fomesafen incidents in EIIS (this number includes all incidents including those previously summarized in the PRA), 77 are for terrestrial plants. Of the 77 terrestrial plant incidents, the legality of those applications were classified as misuse or misuse (accidental) for 7 incidents, 24 were classified as registered use, and for the remaining 47, the legality of the use was classified as undetermined. Given that fomesafen is an herbicide, it is not surprising that the vast majority of reported incidents were to plants (mostly corn, soybean, or not reported in terms of the use site). The only non-plant incident was an aquatic incident involving a fish kill of 200 fish in 1998. However, this aquatic incident was classified as unlikely to be related to the fomesafen application because fomesafen is not acutely toxic to fish.

There are 344 minor incidents reported in the Aggregated Incidents Reports database; one was classified as a minor fish and wildlife incident, 339 were minor plant incidents, and 4 other non-target incidents. Again, it is not surprising that the vast majority of reported incidents were to plants since fomesafen is an herbicide.

The total number of actual incidents associated with the use of fomesafen may be higher than what is reported to the Agency. Incidents may go unreported for a variety of reasons such as affected organisms were not found and effects were not immediately apparent or readily attributed to the use of a chemical. As such, the absence of incident reports cannot be construed as the absence of incidents and likewise, the number of incident reports cannot be assumed to fully account for the actual number of incidents.

3. Ecological and Environmental Fate Data Needs

Except for the potential pollinator data requirements described previously, the ecological and environmental fate database is complete. Submission of a fish early life stage study under enhanced lighting conditions using the technical active ingredient as discussed in Section 1 (i.e., in order for the agency to reconsider the fish advisory statement label requirement) is at the registrant's discretion.

C. Benefits Assessment

Fomesafen is a selective herbicide used to control troublesome weeds in cotton, dry beans/peas and soybeans. It may be applied both pre- and post-crop emergence, providing growers with flexibility in application timing. Fomesafen, which is absorbed through the foliage or roots, controls over 50 broadleaf weeds including weeds that have become resistant to herbicides such as glyphosate, triazines, and ALS-inhibitors. Fomesafen is an important resistance management tool, as it controls glyphosate-resistant pigweed and waterhemp and ALS-resistant pigweed and waterhemp. Fomesafen can be tank mixed with other modes of action for effective resistance management. Additional uses for fomesafen include use in pine seedling nurseries for the control or suppression of yellow nutsedge.

IV. INTERIM REGISTRATION REVIEW DECISION

A. Risk Mitigation and Regulatory Rationale

As discussed in Section III of this document, fomesafen does not pose human health risk concerns. However, since fomesafen is an herbicide, it does pose potential ecological risk to terrestrial plants, as well as potential risks to fish. In evaluating potential risk mitigation for fomesafen, EPA considered and weighed the risks, the benefits, and the use pattern of this chemical. For ecological risks, the Agency is requiring drift language for label consistency that will also reduce the potential risks identified in the registration review assessment. The Agency is also requiring a fish advisory statement to address potential chronic risks to freshwater and estuarine/marine fish in shallow well-lit aquatic environments, since this chemical has certain properties that enhance the toxicity to these organisms in those environments. The benefits of fomesafen outweigh the risks that may be incurred on non-target taxa.

1. Fish Advisory Language

Fomesafen may pose a potential chronic risk concern to fish inhabiting clear, shallow water that are simultaneously exposed to the product and ultraviolet light, in which case enhanced toxicity is expected. EPA does not expect widespread risk to fish based on the specific co-occurrence of factors anticipated to be needed to cause chronic effects. However, given the increase in estimated risk using the new LDPH methodology, EPA is requiring the following advisory language be added to all fomesafen product labels:

"Drift and runoff may be hazardous to aquatic organisms in water adjacent to treated areas."

2. Spray Drift Reduction

EPA is requiring label changes to reduce off-target spray drift and establish a baseline level of protection against spray drift that is consistent across all fomesafen products. Reducing spray drift will reduce the extent of environmental exposure and risk to non-target plants and animals. Although the Agency is not making a complete endangered species finding at this time, these label changes are expected to reduce the extent of exposure and may reduce risk to listed species whose range and/or critical habitat co-occur with the use of fomesafen.

The Agency is requiring the following spray drift mitigation language to be included on all fomesafen product labels. The required spray drift language is intended to be mandatory, enforceable statements and supersedes any existing language already on product labels (either advisory or mandatory) covering the same topics. The Agency is providing recommendations which allow fomesafen registrants to standardize all advisory language on fomesafen product labels. Registrants must ensure that any existing advisory language left on labels does not contradict or modify the new mandatory spray drift statements required in this interim decision.

In addition to including the following spray drift restrictions on fomesafen labels, all references to volumetric mean diameter (VMD) information for spray droplets are required to be removed from all fomesafen labels where such information currently appears. The required new language below, which cites American Society of Agricultural & Biological Engineers (ASABE) S572.1, eliminates the need for VMD information.

- For aerial applications, do not release spray at a height greater than 10 ft above the vegetative canopy, unless a greater application height is necessary for pilot safety.
- For ground applications, apply with the nozzle height recommended by the manufacturer, but no more than 3 feet above the ground or crop canopy unless making a turf, pasture, or rangeland application, in which case applicators may apply with a nozzle height no more than 4 feet above the ground.
- For applications prior to the emergence of crops and target weeds, applicators are required to use a Coarse or coarser droplet size (ASABE S572.1).
- For all other applications, applicators are required to use a Medium or coarser droplet size (ASABE S572.1).
- For aerial applications: Do not apply when wind speeds exceed 15 mph at the application site. If the wind speed is greater than 10 mph, the boom length must be 65% or less of the wingspan for fixed wing aircraft and 75% or less of the rotor diameter for helicopters. Otherwise, the boom length must be 75% or less of the wingspan for fixed-wing aircraft and 90% or less of the rotor diameter for helicopters. For ground applications: Do not apply when wind speeds exceed 15 miles per hour at the application site.
- 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 during temperature inversions.

3. Herbicide Resistance Management

EPA is requiring implementation of herbicide resistance measures for existing chemicals during registration review, and for new chemicals and new uses at the time of registration. In

registration review, herbicide resistance elements will be included in every herbicide interim decision.

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 over 250 weed species worldwide with confirmed herbicide resistance. In the United States there are over 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.

The EPA is requiring 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.

Fomesafen-Specific Herbicide Resistance Measures

Fomesafen is as a protoporphyrinogen oxidase inhibitor, which is classified by the Weed Science Society of America as mode of action group (MOA) Group 14. There are five confirmed herbicide resistant weed species associated with this MOA in North America. There are three confirmed herbicide resistant weed species to fomesafen in the United States. Herbicide resistance management elements for fomesafen include:

Required Elements for Label

1. Place the MOA using the WSSA Groupings (as described in PRN 2017-1)[2] on the label. This provides critical information to growers and crop advisors when developing herbicide programs and following best management practices for weed resistance. It allows the user to rotate between effective MOA's to reduce the buildup of resistant weeds.

2. Clearly express all currently required application parameters and product information on the label, including: maximum dose per application, maximum dose per crop cycle or per year, maximum number of applications per crop cycle or per year. This information is critical to allow the user to know how many applications and the amounts that can be applied in order to develop an effective Integrated Pest Management (IPM) plan for the season and the entire year.

[2] PRN 2017-1 entitled "Guidance for Pesticide Registrants on Pesticide Resistance Management Labeling."

Example Label Statements:

- *Apply [X] oz. of product per acre ([X] pounds active ingredient per acre).*
- *Do not apply more than [X] oz. of product per acre per season ([X] pound active ingredient per acre per season).*
- *Do not apply more than [X] pounds active ingredient per acre per year.*
- *Do not make applications less than [X] days apart.*

3. Recommendations (not requirement) that the field should be scouted both before and after a pesticide application (as described in PRN 2017-1). This recommendation reminds the user to scout to help insure that the proper herbicide is applied based on the weed species and growth stage. This recommendation also helps the user determine if the herbicide applied has provided effective control.

Example Label Statement:

- *Fields should be scouted prior to application to identify the weed species present and their growth stage to determine if the intended application will be effective. Fields should be scouted after application to verify that the treatment was effective.*

4. Label statement defining suspected resistance. This element provides critical information for the user, and the registrant or their representative, to identify suspected resistant weeds.

Example Label Statement:

Suspected herbicide-resistant weeds may be identified by these indicators:
** Failure to control a weed species normally controlled by the herbicide at the dose applied, especially if control is achieved on adjacent weeds;*
** A spreading patch of non-controlled plants of a particular weed species; and*
** Surviving plants mixed with controlled individuals of the same species.*

5. Label statement that the user should report lack of performance to the registrant or their representative and proactively take action before escaped weeds become widespread in their fields. EPA expects that the registrant or their representative will investigate to determine if the situation meets the criteria of suspected resistance. By reporting and investigating these incidents, cases resulting from suspected resistant weeds may be distinguished from lack of performance from other causes (e.g., equipment malfunction, weather events). This allows early action to be taken to control these weeds before resistance becomes widespread in their fields. The prevention of the development of herbicide-resistant weeds should be the first priority of a weed resistance plan. However, when suspected resistant weeds are identified, the highest priority is to achieve control of these weeds over any sampling to confirm herbicide resistance.

Example Label Statement:

- *Report any incidence of non-performance of this product against a particular weed species to your [registrant]retailer, representative or call XXX-XXX-XXXX. If resistance is suspected, treat weed escapes with an herbicide having a different mechanism of action and/or use non-chemical means to remove escapes, as practical, with the goal of preventing further seed production.*

6. Label statements describing best management practices for resistance management based on PRN 2017-1. Best Management Practices from WSSA, and the Herbicide Resistance Action Committee (HRAC) proposed guidance.

Example Label Statements:

- *Plant into weed-free fields and keep fields as weed-free as possible.*
- *Use a diversified approach toward weed management. Whenever possible incorporate multiple weed-control practices such as mechanical cultivation, biological management practices, and crop rotation.*
- *Fields with difficult to control weeds should be rotated to crops that allow the use of herbicides with alternative mechanisms of action or different management practices.*
- *Do not allow weed escapes to produce seeds, roots or tubers. Manage weed seeds at harvest and post-harvest to prevent a buildup of the weed seed-bank.*
- *Prevent field-to-field and within-field movement of weed seed or vegetative propagules. Thoroughly clean plant residues from equipment before leaving fields.*
- *Prevent an influx of weeds into the field by managing field borders.*
- *Identify weeds present in the field through scouting and field history and understand their biology. The weed-control program should consider all of the weeds present.*
- *Difficult to control weeds may require sequential applications of herbicides with differing mechanisms of action.*
- *Apply this herbicide at the correct timing and rate needed to control the most difficult weed in the field.*
- *Use a broad spectrum soil-applied herbicide with a mechanism of action that differs from this product as a foundation in a weed-control program. Do not use more than two applications of this or any other herbicide with the same mechanism of action within a single growing season unless mixed with an herbicide with another mechanism of action with an overlapping spectrum for the difficult-to-control weeds.*
- *If resistance is suspected, treat weed escapes with an herbicide with a different MOA or use non-chemical methods to remove escapes.*

7. Label statements on local resistant weeds. In general, the purpose of using multiple herbicides in a single product is to increase the spectrum of weeds controlled and not for herbicide-resistance management. Some products may contain one or more active ingredients at less than the optimal rate for control on a given weed species. Without clarification, the user may use a product with multiple herbicides and assume that multiple MOAs are being used for a specific herbicide-resistant weed species. This element will allow the user to make informed decisions about the need for additional control measures.

Example Label Statement:

- *[For products formulated as a single active ingredient.] Contact your local sales representative, crop advisor, or extension agent to find out if suspected resistant weeds to this MOA have been found in your region. If resistant biotypes of target weeds have been reported, use the application rates of this product specified for your local conditions. Tank mix products so that there are multiple effective mechanisms of actions for each target weed.*

- *[For products that are mixtures of herbicides] Contact your local sales representative, crop advisor, or extension agent to find out if suspected resistant weeds to these MOAs have been found in your region. Do not assume that each listed weed is being controlled by multiple mechanisms of action. Co-formulated active ingredients are intended to broaden the spectrum of weeds that are controlled. Some weeds may be controlled by only one of the active ingredient in this product.*

Elements and Terms of Registration (Registrant Responsibilities)

In addition to the required label statements, the Agency is recommending that registrants also consider additional actions to help provide users with additional information to help reduce the evolution and spread of resistance.

8. Registrant(s) report new cases of suspected and confirmed resistance to EPA and users. This will allow all stakeholder access to information about suspected and confirmed resistance in a timely manner so they are aware of and can proactively address the problem. The Agency expects reporting of suspected and confirmed resistance to be in compliance with 6(a)(2).

9. Unique terms and conditions of registration. In some cases, it may be appropriate to place other conditions on the registration (e.g., apply only with another MOA, apply every other year, statements about pollen flow for herbicide resistant crops with weedy relatives, concern about non-target site resistance). For fomesafen, EPA is not requiring any unique changes to the labeling or terms and conditions of registration.

Elements for Education, Training, and Stewardship (Developed by Various Stakeholders)

10. Provide educational and training materials for growers and users. It is critical that multiple stakeholders participate in this effort. The most successful strategies for herbicide resistance management will be tailored for local conditions. Moreover, crop advisers, extension agents, commodity groups and registrants need to work collaboratively to design effective educational and training materials.

Educational materials should include a resistance-management plan that includes best management practices and other proactive measures to reduce the likelihood of resistance. Another aspect of the educational outreach should involve a remedial-action plan which is instrumental in the early identification and remediation of the first signs of suspected resistance. Stakeholders may also choose to develop collaboratively other educational and training materials on herbicide resistance and its management. These materials should be applicable to local conditions and adaptable to changes in the scope of the weed problem. The Agency recommends that these materials be developed with input from the following groups: registrants, agricultural extension, crop consultants, individual crop associations, the Herbicide Resistance Action Committee, or the U.S. Department of Agriculture. The materials could be developed by a single stakeholder or collaboratively with other stakeholders. The Agency is available to consult and discuss the development of these educational materials. However, EPA does not intend to

review or approve these materials because that would make them more difficult to modify or adapt to meet local and changing conditions.

B. Tolerance Actions

The Agency is currently updating tolerances for crop group conversions. See also Section III.A.3 of this document.

C. Interim Registration Review Decision

In accordance with 40 CFR Sections 155.56 and 155.58, the Agency is issuing this Interim Registration Review Decision. Except for the EDSP, ESA and pollinator components of this case, the Agency has made the following Interim Registration Review Decision: (1) no additional data are required at this time; and (2) changes to the affected registrations or their labeling are needed at this time, as described in Sections IV.A and Appendix A.

In this interim registration review decision, EPA is making no human health or environmental safety findings associated with the EDSP screening of fomesafen, nor is it making a complete endangered species finding or a complete assessment of effects to pollinators. Although the Agency is not making a complete endangered species finding at this time, the required mitigation described in this document is expected to reduce the extent of environmental exposure and may reduce risk to listed species whose range and/or critical habitat co-occur with the use of fomesafen. The Agency's final registration review decision for fomesafen will be dependent upon the result of the Agency's ESA assessment and any needed Section 7 consultation with the Services, an EDSP FFDCA section 408(p) determination, and an assessment of non-target exposure to pollinators (bees).

D. Data Requirements

No additional data are required as part of this interim registration review decision. The EPA will consider requiring the fomesafen registrant to submit pollinator data as a separate action.

V. NEXT STEPS AND TIMELINE

A. Interim Registration Review Decision

A Federal Register Notice will announce the availability of this interim registration review decision for fomesafen. A final decision on the fomesafen registration review case will occur after: 1) an EDSP FFDCA section 408(p) determination, 2) an endangered species determination under the ESA and any needed Section 7 consultation with the Services, and 3) an assessment of non-target exposure to pollinators.

B. Implementation of Mitigation Measures

Once the Interim Registration Review Decision is issued the fomesafen registrants must submit amended labels that include the label changes described in Appendix A. The revised labels must be submitted to the Agency for review within 60 days following issuance of the Interim Registration Review Decision.

Appendix A: Labeling Changes for Fomesafen Products

<table>
<tr><th>Description</th><th>Required Amended Label Language for Fomesafen Products</th><th>Placement on Label</th></tr>
<tr><td></td><td>End Use Products</td><td></td></tr>
<tr><td>Mode/Mechanism of Action Group Number</td><td>• Include the name of the ACTIVE INGREDIENT in the first column
• Include the word “GROUP” in the second column
• Include the MODE OF ACTION CODE in the third column
• Include the type of pesticide (i.e., HERBICIDE or FUNGICIDE or INSECTICIDE) in the fourth column

Example:
<table><tr><td>FOMESAFEN</td><td>GROUP</td><td>14</td><td>HERBICIDE</td></tr></table></td><td>Front Panel, upper right quadrant.
All text should be black, bold face and all caps on a white background, except the mode of action code, which should be white, bold face and all caps on a black background; all text and columns should be surrounded by a black rectangle.</td></tr>
<tr><td></td><td>Mandatory Spray Drift</td><td></td></tr>
<tr><td>Enforceable Spray Drift Management Language for products that allow aerial applications</td><td>“SPRAY DRIFT
<u>Aerial Applications</u>:
• Do not release spray at a height greater than 10 ft above the vegetative canopy, unless a greater application height is necessary for pilot safety.
• For applications prior to the emergence of crops and target weeds, applicators are required to use a Coarse or coarser droplet size (ASABE S572.1).
• For all other applications, applicators are required to use a Medium or coarser droplet size (ASABE S572.1).
• For aerial applications: Do not apply when wind speeds exceed 15 mph at the application site. If the wind speed is greater than 10 mph, the boom length must be 65% or less of the wingspan for fixed wing aircraft and 75% or less of the rotor diameter for helicopters. Otherwise, the boom length must be 75% or less of the wingspan for fixed-wing aircraft and 90% or less of the rotor diameter for helicopters. 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 15 miles per hour at the application site.</td><td>Directions for Use, in a box titled “Spray Drift” under the headings “Aerial Applications”</td></tr>
</table>

Description	Required Amended Label Language for Fomesafen Products	Placement on Label
	• 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	**"SPRAY DRIFT** **Ground Boom Applications:** • User must only apply with the nozzle height recommended by the manufacturer, but no more than 3 feet above the ground or crop canopy unless making a turf, pasture, or rangeland application, in which case applicators may apply with a nozzle height no more than 4 feet above the ground. • For applications prior to the emergence of crops and target weeds, applicators are required to use a Coarse or coarser droplet size (ASABE S572.1). • For all other applications, applicators are required to use a Medium or coarser droplet size (ASABE S572.1). • Do not apply when wind speeds exceed 15 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	**"SPRAY DRIFT ADVISORIES** THE APPLICATOR IS RESPONSIBLE FOR AVOIDING OFF-SITE SPRAY DRIFT. BE AWARE OF NEARBY NON-TARGET SITES AND ENVIRONMENTAL CONDITIONS. **IMPORTANCE OF DROPLET SIZE** An effective way to reduce spray drift is to apply large droplets. Use the largest droplets that provide target pest control. While applying larger droplets will reduce spray drift, the potential for drift will be greater if applications are made improperly or under unfavorable environmental conditions. **Controlling Droplet Size – Ground Boom** ***(note to registrants:*** *remove if ground boom is prohibited on product labels)* • Volume - Increasing the spray volume so that larger droplets are produced will reduce spray drift. Use the highest practical spray volume for the application. If a greater spray volume is needed, consider using a nozzle with a higher flow rate. • Pressure - Use the lowest spray pressure recommended for the nozzle to produce the target spray volume and droplet size. • Spray Nozzle - Use a spray nozzle that is designed for the intended application. Consider using nozzles designed to reduce drift.	Directions for Use, just below the Spray Drift box, under the heading "Spray Drift Advisories"

Description	Required Amended Label Language for Fomesafen Products	Placement on Label
	Controlling Droplet Size – Aircraft ***(note to registrants:*** *remove if aerial application is prohibited on product labels)* • Adjust Nozzles - Follow nozzle manufacturers recommendations for setting up nozzles. Generally, to reduce fine droplets, nozzles should be oriented parallel with the airflow in flight. **BOOM HEIGHT – Ground Boom** ***(note to registrants:*** *remove if ground boom is prohibited on product labels)* Use the lowest boom height that is compatible with the spray nozzles that will provide uniform coverage. For ground equipment, the boom should remain level with the crop and have minimal bounce. **RELEASE HEIGHT - Aircraft** ***(note to registrants:*** *remove if aerial application is prohibited on product labels)* Higher release heights increase the potential for spray drift. **SHIELDED SPRAYERS** Shielding the boom or individual nozzles can reduce spray drift. Consider using shielded sprayers. Verify that the shields are not interfering with the uniform deposition of the spray on the target area. **TEMPERATURE AND HUMIDITY** When making applications in hot and dry conditions, use larger droplets to reduce effects of evaporation. **TEMPERATURE INVERSIONS** Drift potential is high during a temperature inversion. Temperature inversions are characterized by increasing temperature with altitude and are common on nights with limited cloud cover and light to no wind. The presence of an inversion can be indicated by ground fog or 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. Avoid applications during temperature inversions. **WIND** Drift potential generally increases with wind speed. AVOID APPLICATIONS DURING GUSTY WIND CONDITIONS. Applicators need to be familiar with local wind patterns and terrain that could affect spray drift."	
	Herbicide Resistance Management	
Weed Resistance Management (for Products Labeled for Agriculture Use)	• Include resistance management language for herbicides from PRN 2017-1 and PRN 2017-2 (https://www.epa.gov/pesticide-registration/pesticide-registration-notices-year)	Directions for Use, prior to directions for specific crops under the heading "WEED RESISTANCE MANAGEMENT"

Description	Required Amended Label Language for Fomesafen Products	Placement on Label
Non-target Organism Advisory Statement	• "Non-target Organism Advisory Statement: This product is toxic to plants and may adversely impact the forage and habitat of non-target organisms, including pollinators, in areas adjacent to the treated site. Protect the forage and habitat of non-target organisms by following label directions intended to minimize spray drift."	Environmental Hazards
Surface Water Advisory – To protect aquatic organisms in shallow standing waters. This is already on some labels.	**"Environmental Hazards** For Terrestrial Uses: Do not apply directly to water, or to areas where surface water is present, or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment washwater or rinsate. Do not apply when weather conditions favor drift from target area. Surface Water Advisory This product may impact surface water quality due to spray drift and 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 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 fomesafen from runoff water and sediment. Runoff of this product will be reduced by avoiding applications when rainfall is forecasted to occur within 48 hours. See the manual for "Conservation Buffers to Reduce Pesticide Losses" at the following internet address: http://www.wsi.nrcs.usda.gov/products/W2Q/pest/core4.html."	Environmental Hazards
Outdoor, Terrestrial Products Requiring Fish or Aquatic Invertebrate Statements	"Drift and runoff may be hazardous to aquatic organisms in water adjacent to treated areas."	Environmental Hazards

Appendix B: 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 (listed) 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[3] 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 ESA and 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, in April 2015, and in June 2016 — allowing additional 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 upcoming Registration Review decisions. 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*[4], dated November 1, 2013.

Given that the agencies are continuing to develop and work toward implementation of the Interim Approaches to assess the potential risks of pesticides to listed species and their designated critical habitat, the ecological risk assessment supporting this Interim Decision for fomesafen does not contain a complete ESA analysis that includes effects determinations for specific listed species or designated critical habitat. Although EPA has not yet completed effects determinations for specific species or habitats, for this interim decision EPA's evaluation assumed, for all taxa of non-target wildlife and plants, that listed species and designated critical habitats may be present in the vicinity of the application of fomesafen. This assessment will allow EPA to focus its future evaluations on the types of species where the potential for effects exists once the scientific methods being developed by the agencies have been fully vetted. Once the agencies have fully developed and implemented the scientific methodology for evaluating risks for listed species and their designated critical habitats, these methods will be applied to subsequent analyses for fomesafen as part of completing this registration review.

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[3] *Assessing Risks to Endangered and Threatened Species from Pesticides.* Available at http://www.nap.edu/catalog.php?record_id=18344

[4] Available at http://www2.epa.gov/endangered-species/assessing-pesticides-under-endangered-species-act#report

Appendix C: 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, sub-chronic 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 decision for fomesafen, 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), fomesafen is 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. The Agency has reviewed all of the assay data received for the List 1 chemicals and the conclusions of those reviews are available in the chemical-specific public dockets. A second list of chemicals identified for EDSP screening was published on June 14, 2013[5] and includes some pesticides scheduled for Registration Review and chemicals found in water. Fomesafen is on the second list of chemicals identified for EDSP screening. The second list represents the next set of chemicals for which EPA intends to issue test orders/DCIs in the near future. Neither of these lists should be construed as a list of known or likely endocrine disruptors. 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.[6]

In this interim decision, EPA is making no human health or environmental safety findings associated with the EDSP screening of fomesafen. Before completing this registration review, the Agency will make an EDSP FFDCA section 408(p) determination."

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

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