Simazine

Interim Registration Review Decision
Case Number 0070

September 2020

Approved by: _____

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I. INTRODUCTION

This document is the Environmental Protection Agency's (EPA or the Agency) Interim Registration Review Decision (ID) for simazine (PC Code 080807, case 0070), and is being issued pursuant to 40 CFR §§ 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 determine that new risk mitigation measures are necessary, 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 simazine, can be found in EPA's public docket (EPA-HQ-OPP-2013-0251) 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 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://www.epa.gov/pesticide-reevaluation. In 2006, the agency implemented the registration review program pursuant to FIFRA § 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 ID for simazine so that it can (1) move forward with aspects of the registration review that are complete and (2) implement interim risk mitigation (see Appendices A and B). The Agency is currently working with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service (collectively referred to as, "the Services") improve the consultation process for threatened and endangered (listed) species for pesticides in accordance with the Endangered Species Act (ESA) § 7. The Agency will complete its listed species assessment and any necessary consultation with the Services for simazine prior to completing the simazine registration review.

Simazine is an herbicide with products registered for use to control broadleaf and grassy weeds. Simazine is a member of the triazine chemical class (Class 5), which includes atrazine and propazine and the three major chloro metabolites: desethyl-s-atrazine (DEA), desisopropyl-s-atrazine (DIA), and diaminochlorotriazine (DACT). EPA has determined that the triazines and their three chlorinated metabolites share a common mechanism of toxicity, and as such, human health risks were assessed together through a triazine cumulative risk assessment. Pesticide products containing simazine are registered for use on several agricultural crops, most common of which are corn and citrus. Simazine products are also registered for several non-agricultural use sites, including residential and recreational settings. Common non-agricultural uses include

turf, nurseries, greenhouse and ornamentals. The first product containing simazine was registered in 1958, and therefore simazine was subject to reregistration under FIFRA section 4. There are three technical product registrants for simazine: Drexel Chemical Company, Oxon Italia, and Syngenta Crop Protection, LLC.

This document is organized in 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 simazine 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 necessary to address risks of concern and the regulatory rationale for EPA's ID; and, lastly, the *Next Steps and Timeline* for completion of this registration review.

A. Updates Since the Proposed Interim Registration Review Decision was Issued

Residential Turf Mitigation

In January 2020, the Agency published the PID for simazine and took public comment for 60 days. The Agency received comments from the USDA, Sipcam Argo USA, Inc and Syngenta regarding EPA's proposal in the simazine PID to cancel simazine residential turf uses (to mitigate potential post-application residential risks of concern). Each of the commenters articulated the benefits of preserving the registered residential turf use. In addition, the registrants submitted data during the comment period that demonstrated residue decline on turf after irrigation and proposed an alterative mitigation measure of requiring that 0.5 inches of water be applied immediately upon simazine's application to residential turf. The Agency has reviewed the proposal and supporting data and has determined there are no post-application residential risks of concern for residential turf use if the maximum turf application rate is reduced from 2 lb ai/A to 1.6 lb ai/A with the added irrigation (i.e., watering-in with 0.5 inches of water immediately after application) (dermal MOE = 64 , LOC = 30). If registrants choose to not adopt the label requirements for watering in simazine with 0.5 inches of water immediately after application to residential turf at a maximum rate of 1.6 lb ai/A, then the maximum application rate must be reduced further to 0.65 lb ai/A to address the potential residential post-application turf risks of concern (dermal MOE = 67, LOC = 30). There are no residential post-application risks of concern at either of the rate and application parameters specified above. A more detailed response to this comment/proposal can be found in the document, *Atrazine, Simazine, Propazine: Response to Public Comments on Proposed Interim Decision*, which addresses technical comments received on the draft human health risk assessment and is available in the public docket.

Endangered Species Assessment

Simazine is one of the chemicals mentioned in a stipulated partial settlement agreement in the case of Center for Biological Diversity et. al., v. United States Environmental Protection Agency et al., No. 3:11 cv 0293 (N.D. Cal.). Among other provisions, this agreement sets a September 28, 2021 deadline for EPA to complete nationwide ESA section 7(a)(2) effects determination for atrazine and simazine and, as appropriate, request initiation of any ESA section 7(a)(2)

consultations with the Services that EPA may determine to be necessary as a result of those effects determinations. EPA also stated in this settlement that the Agency would also include propazine in this group of effects determinations. Prior to completing the effects determination, the Agency plans to issue a draft biological evaluation for atrazine, simazine, and propazine for a 60-day public comment period by the end of November 2020.

In an effort to streamline and improve the biological evaluation and any subsequent consultations with the Services, as appropriate, the simazine technical registrants Drexel Chemical Company, Sipcam Argo USA, Inc, and Syngenta Crop Protection, LLC voluntarily committed to making several modifications to simazine product labels and registrations.[1] In addition to removing several use patterns, simazine technical registrants have committed to implementing certain geographic restrictions and buffers from listed species' locations and/or critical habitats. These label changes are expected to reduce the extent of exposure and risk to both listed and non-listed species whose range and/or habitat co-occur with the use of simazine. EPA will work with registrants to implement these voluntary label changes on the same timeframe as the necessary mitigation measures described in Section IV of this ID. In addition, for label modifications that are subject to the use deletion process under FIFRA 6(f), EPA will announce these modifications in the Federal Register and open a public comment period for a minimum of 30 days.

Simazine technical registrants have committed to the following voluntary label modifications:

- Prohibit all uses of simazine in Hawaii, Alaska, and the U.S. territories (Puerto Rico, Guam, American Samoa, the U.S. Virgin Islands, and the North Mariana Islands), thereby restricting registered uses to the contiguous United States.
- Remove "Shelterbelt" use
- Restrict forestry uses to "Christmas trees only"
- Restrict use on turf to "warm season turf" only
- Require an in-field downwind buffer of 15 feet (4.6 meters) for ground applications and 150 feet (46 meters) for aerial applications:
    - from the edge of all streams and rivers as well as the high-tide line for all estuarine/marine environments, and
    - from threatened and endangered species critical habitat and/or species locations.

B. Summary of Simazine Registration Review

Pursuant to 40 CFR § 155.50, EPA formally initiated registration review for simazine 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 simazine.

- June 2013- The following documents were posted to the docket for a 60-day public comment period:
    - *Simazine Preliminary Work Plan* (PWP)

[1] See registrant commitment letters located in the simazine docket at EPA-HQ-OPP-2013-0251

  - Registration Review – *Preliminary Problem Formulation for the Ecological Risk Assessment for Atrazine, Propazine, and Simazine*
  - *Human Health Risk Scoping Document in Support of Registration Review*
  - Atrazine, Propazine, and Simazine: Review of Human Incidents
  - *BEAD Chemical Profile for Registration Review: Simazine (080807) Screening Level Usage Analysis (SLUA)*
  - *PRD Label Data Report: Food/Feed & Non-Food/Non-Feed Uses Considered in Registration Review Work Planning*

- January 2014 - The *Final Work Plan* (FWP) for simazine was issued. The Agency received 14 sets of public comments concerning the PWP. The comments did not change the schedule, risk assessment needs, or anticipated data requirements in the FWP.

- May 2014 - A Generic Data Call-In (GDCI) for simazine was issued for data needed to conduct the registration review risk assessments (GDCI-080807-1384). All data have been submitted and accepted.

- June 2016 - The Agency announced the availability of the *Preliminary Ecological Risk Assessment for Simazine* and took public comment for 120-days. 119 comments were received as well as another 88 that were posted on the shared triazine docket. These comments and the Agency's responses are summarized below. The comments resulted in the correction of some minor errors, which are discussed in the *Simazine—Environmental Fate and Effects Division's Response to Public Comments* document but did not impact the overall conclusions of the risk assessment.

- July 2018 – The Agency announced the availability of the *Simazine Human Health Risk Assessment for Registration Review to Support the Registration of Proposed Uses on Citrus Fruit (Crop Group 10-10), Pome Fruit (Crop Group 11-10), Stone Fruit (Crop Group 12/12), Tree Nuts (Crop Group 14-12), and tolerance Amendment for Almond Hulls* and the *Chlorotriazines: Cumulative Risk Assessment - Atrazine, Propazine, and Simazine* along with the supporting documents listed below, and took public comment for 120-days. . During that time 16public comments were received related to simazine.
  - *Cumulative Triazine (Atrazine, Simazine, Propazine) Drinking Water Assessment*
  - *Chlorotriazines. Toxicology Systematic Literature Review- Atrazine, Simazine and Propazine*
  - *Simazine Occupational and Residential Exposure and Risk Assessment for Registration Review and to Support the Registration of Proposed Uses Citrus Fruit (Crop Group 10-10), Pome Fruit (Crop Group 11-10), Stone Fruit (Crop Group 12-12), Tree Nuts (Crop Group 14-12), and Tolerance Amendment for Almond Hulls*
  - *Simazine. Acute 4-Day, Background, and Chronic Dietary (Food Only) Exposure and Risk Assessments for Registration Review*

- December 2018 - A Generic Data Call-In (GDCI) for simazine was issued for multiresidue data that was identified as a deficiency in the human health risk assessments. The required data are currently under development and due to be submitted to EPA by

December 20, 2020. These data are not expected to impact the Agency's ability to make a risk managment finding.

- January 2020 – The Agency announced the availability of the Proposed Interim Decision (PID) for simazine and took public comment for 60-days. In addition to the PID, the Agency published the following supporting documents.
    - *Simazine—Environmental Fate and Effects Division's Response to Public Comments*. November 25, 2019.
    - *Atrazine, Simazine, Propazine: Response to Public Comments on Registration Review Human Health Risk Assessments*. November 25, 2019.
    - *Atrazine and Simazine Use on Sweet Corn: Response to Comments, Usage, Benefits, and Impacts of Potential Mitigation; PC Codes (080803 and 080807)*. November 25, 2019.
    - *Atrazine and Simazine Use on Field Corn: Response to Comments, Usage, Benefits, and Impacts of Potential Mitigation; PC Codes (080803 and 080807)*. November 25, 2019.
    - *Atrazine and Simazine Use in Forestry, Rights of Way, Turfgrass, and Nursery: Response to Comments, Usage, and Benefits*. November 25, 2019.
    - *Simazine Response to Comments, Usage, Benefits, and Impacts of Potential Mitigation on Orchards, Vineyards, Caneberries, Strawberries, and Christmas Trees.* November 25, 2019
- September 2020 - The Agency has completed the Interim Decision (ID) for simazine. Soon EPA will announce the availability of the ID in the simazine docket. Along with the ID, the following documents are also posted to the simazine docket: https://www.regulations.gov/docket?D=EPA-HQ-OPP-2013-0251
    - *Atrazine, Simazine, and Propazine —Environmental Fate and Effects Division's Response to Public Comments on Preliminary Interim Decision (PID),* 8/24/2020.
    - *Atrazine, Simazine, Propazine: Human Health Response to Public Comments on Proposed Interim Decision),* 9/9/2020.
    - *Biological and Economic Analysis Division's (BEAD) Response to Comments on the Benefit Assessments for Triazine Use on Field Corn, Sorghum, Fallow, Sweet Corn, Sugarcane, Orchards, Vineyards, Caneberries, Strawberries, Christmas Trees, Forestry, Rights-of-Way, Turfgrass, and Nurseries,* 9/10/2020.

C. Summary of Public Comments on the Proposed Interim Decision and Agency Responses

During the 60-day public comment period for the PID, which opened on January 2, 2020, and closed on March 2, 2020, the Agency received 21 unique comments specific to simazine. In addition, EPA received comments via mass mailers with a combined count of approximately 46,791 comments either supporting or opposing the continued registration of all three triazines, atrazine, propazine, and simazine. The unique comments specific to simazine discussed the impacts of proposed mitigation measures and/or provided information about the use and benefits of simazine to growers. Comments were submitted by individual citizens, the simazine technical registrants (Drexel Chemical Company, Sipcam Argo USA, Inc., Syngenta), various trade

organizations (e.g., agricultural growers and industry groups), and other non-governmental organizations.

Comments of a technical nature concerning the simazine PID are summarized and addressed in the *Atrazine, Simazine, and Propazine —Environmental Fate and Effects Division's Response to Public Comments on Preliminary Interim Decision (PID)* (8/24/2020.), the *Atrazine, Simazine, Propazine: Human Health Response to Public Comments on Proposed Interim Decision* (9/9/2020), and the *Biological and Economic Analysis Division's (BEAD) Response to Comments on the Benefit Assessments for Triazine Use on Field Corn, Sorghum, Fallow, Sweet Corn, Sugarcane, Orchards, Vineyards, Caneberries, Strawberries, Christmas Trees, Forestry, Rights-of-Way, Turfgrass, and Nurseries* (9/10/2020). For additional details please refer to these documents which will be posted on the simazine registration review docket (EPA-HQ-OPP-2013-0251 on www.regulations.gov). Substantive comments, comments of a broader regulatory nature, and the Agency's responses to those comments are summarized below. The Agency thanks all commenters for their comments and has considered them in developing this ID.

Comments Submitted by Sipcam Argo USA, Inc, Syngenta and USDA (Docket ID: EPA-HQ-OPP-2013-0251-153, EPA-HQ-OPP-2013-0251-0163, EPA-HQ-OPP-2013-0251-0166)

Comment: Sipcam Argo USA, Inc, Syngenta and the USDA commented on the Agency's proposed prohibition of simazine on residential turf. They suggested alternative mitigation of requiring irrigation after application (i.e., mandatory watering in of 0.5 inches of water immediately after application). The registrants provided data in support of their proposal, which shows residue decline on turf after irrigation.

EPA Response: The Agency reviewed the registrants' proposal and supporting data and has determined there are no post-application residential risks of concern for residential turf if the maximum application rate is reduced from 2 lbs ai/A to 1.6 lb ai/A with required irrigation (watering-in) of 0.5 inches of water immediately after application (Dermal MOE = 64, LOC =30). An alternative to the rate reduction to 1.6 lbs ai/A combined with the irrigation requirement that also mitigates the potential residential post-application turf risks of concern is a reduction of the maximum application rate to 0.65 lb ai/A (Dermal MOE = 67, LOC = 30). There are no residential post-application risks of concern at either of the rate and application parameters specified above. Having both options provides users flexibility to either use simazine at 1.6 lb ai/A and then irrigate or use simazine as part of a tank-mix or pre-mix at a reduced rate of 0.65 lbs a/A without irrigation. For more detail, see *Atrazine, Simazine, Propazine: Human Health Response to Public Comments on Proposed Interim Decision.*

Comments submitted by the National Agricultural Aviation Association (Docket ID: EPA-HQ-OPP-2013-0251-0161)

Comment: NAAA does not agree that registered uses for simazine do not allow aerial applications while other triazines (atrazine and propazine) do have aerial applications.

EPA Response: The aerial uses were prohibited as part of the *Reregistration Eligibility Decision for Simazine* in 2006 to mitigate potential drinking water and occupational handler risks of

concern that were identified at that time. Therefore, aerial was not assessed as part of the human health draft risk assessment for registration review. Further, if aerial uses were to be considered at the same application rates as allowed prior to the 2006 RED there likely would still be occupational risks of concern that would prohibit registration of that use.

II. USE AND USAGE

Simazine is a selective herbicide that prevents grass and broadleaf weeds from emerging. Simazine products are registered for agricultural use sites such as caneberries, grapes, strawberries, citrus fruits, nut crops, pome fruits, stone fruits, artichokes, corn, asparagus, uncultivated agricultural areas, kale, cabbage, kohlrabi, Brussel sprouts, blueberries, alfalfa, avocado, and olives. Products containing simazine are also registered for use on non-agricultural sites such as forest trees, ornamental herbaceous plants, ornamental lawns and turf, ornamental woody shrubs and vines, ornamental trees, Christmas tree farms, nursery stock, farm buildings, golf course turf, and shelterbelt plantings. Simazine is registered in liquid, dry flowable (DF), and water dispersible granule (WDG) formulations. Simazine can be applied via ground, chemigation, and handheld application equipment; aerial application is prohibited.

An average of 3 million pounds of simazine are applied to 2.6 million acres of agricultural cropland per year. Although simazine is not used extensively on major row crops (e.g., corn), these type of use sites do account for the majority of agricultural usage in terms of pounds applied and acres treated. Approximately 3% of corn acres in the U.S. are treated with simazine each year and this accounts for 76% of simazine use. Less than 1% of sweet corn acres are treated with simazine, or about 3,600 acres annually.

Simazine is used extensively in orchard, vineyard, and berry crop sites. On average, over 650,000 pounds, or approximately 20%, of simazine is applied in agricultural settings to these sites. The crops with the highest percent crop treated (PCT) with simazine are caneberries (32%), blueberries (20%), raisin grapes (17%), hazelnuts (16%), oranges (12%), and peaches (10%). All the orchard, vineyard, and berry crops surveyed typically received one to two applications of simazine per year on average. Citrus fruit (i.e. oranges, lemons, and grapefruit) typically have the highest reported average simazine application rates, around 2.2 lbs a.i./acre or higher.

In the most recent year with data available (2013-2016), thousands of pounds of simazine were applied to various non-agricultural use sites: nursery/ornamental (400,000 lbs), turf-sod farms (26,000 lbs), non-residential turfgrass [e.g., golf courses] (237,000 lbs) and forestry (less than 5,000 lbs).

III. SCIENTIFIC ASSESSMENTS

A. Human Health Risks

A summary of the Agency's human health risk assessments 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 simazine. In addition, EPA has made a

determination of a common mechanism of toxicity for atrazine, simazine, propazine, and their chlorinated metabolites. Therefore, in addition to assessing potential risk from simazine, EPA evaluated the potential cumulative risk from combined exposure to the triazines and their three major chlorinated metabolites, desethyl-s-atrazine (DEA), desisopropyl-s-atrazine (DIA), and diaminochlorotriazine (DACT). For additional details on the human health assessments, see the *Simazine. Human Health Risk Assessment for Registration Review and to Support Registration of Proposed Uses on Citrus Fruit, Pome Fruit, Stone Fruit, Tree Nuts, and Tolerance Amendment for Almond Hulls*, the *Chlorotriazines: Cumulative Human Health Risk Assessment - Atrazine, Propazine, and Simazine*, and *Cumulative Triazine (Atrazine, Simazine, Propazine) Drinking Water Assessment*, which are available in the public docket.

For registration review, the predominant adverse health effect of concern for triazines is suppression of the luteinizing hormone (LH) surge leading to neuroendocrine effects. This effect was observed in rat studies after four days of exposure, therefore potential risk was assessed using a 4-day duration of exposure rather than EPA's typical short- or intermediate-term duration of exposure. Disruptive hormonal effects related to the LH surge are different for different age groups and sexes, and the downstream adverse effects vary considerably. Exposures during early life may lead to effects later in life including delays in sexual maturation, inflammation of the prostate, effects related to development of the genitalia, and/or irregular menstrual cycles. Therefore, this endpoint is relevant for males and females, and all life-stages.

For the acute assessment for simazine and its chlorinated metabolites, the toxicological endpoint is increased incidence of unossified teeth, head, centra vertebrae, and sternebrae, and also rudimentary ribs, which is only applicable to females 13-49 years old. For the 4-day assessment for simazine and its chlorinated metabolites, the toxicological endpoint is attenuation of LH surge, which is applicable to all life-stages. The hydroxy metabolites of simazine are major metabolites in plants but not in livestock. Dermal and inhalation exposures are not expected for the hydroxy metabolites of simazine; however, chronic dietary exposures are expected. The chronic endpoint (kidney effects) is applicable to all life-stages.

1. Risk Summary and Characterization

Dietary (Food + Water) Risks

EPA's dietary risk assessments did not identify any potential acute, 4-day, chronic, or cancer risks of concern associated with dietary exposure to simazine and its chlorinated metabolites or to the hydroxy metabolites of simazine. Simazine has been classified as "Not likely to be carcinogenic to humans"; therefore, a quantitative cancer dietary risk assessment was not conducted.

Residential Handler Risks

Simazine products are registered for use in residential areas (e.g., residential lawns and playgrounds). Although all simazine labels require that handlers wear specific clothing (e.g., long sleeved shirt, long pants) and/or use personal protective equipment (PPE), one label is

specifically labeled "for residential use" of simazine on residential turf. Therefore, a residential handler assessment was conducted for simazine application to residential turf. There were no residential handler combined (dermal + inhalation) risks of concern; combined (dermal + inhalation) Margins of Exposure (MOEs) ranged from 44 to 180 (Level of Concern (LOC)=30).

Residential Post-Application Risks

Residential post-application exposure is expected via the dermal route for adults, children 11 to 16 years old, children 6 to 11 years old, and children 1 to < 2 years old; and via incidental oral exposure (i.e., hand-to-mouth or object to mouth) for children 1 to < 2 years old as a result of being in an environment that was previously treated with simazine (e.g., lawns, golf courses, playgrounds, recreational areas, etc).

Since dermal and incidental oral exposure routes share a common toxicological endpoint, risk estimates have been combined for those routes for children 1 to < 2 years old. Chemical-specific predicted day zero turf transferrable residues were adjusted in the post-application assessment for any differences between the study application rate and the registered application rates for simazine. Then, a 4-day average residue was used to estimate risk from contact with treated turf because the point of departure (POD) is based on decreased LH surge and available toxicity data indicate that the decrease occurs after a 4-day exposure. EPA's assessment of these exposure pathways demonstrated potential post-application risks of concern (i.e., Margins of Exposure (MOEs) < the level of concern (LOC) of 30) from the currently labeled maximum application rates for spray applications for adults from dermal exposure and for children 1 to < 2 years old from combined dermal and incidental oral exposure to residential turf.

For adults, the dermal MOE resulting from contacting treated turf is 26 at the currently labeled maximum application rate of 2.0 lb ai/A. For children 1 to < 2 years old, the combined dermal and incidental oral MOE resulting from contacting treated turf is 17 at the currently labeled maximum application rate of 2.0 lb ai/A. If the maximum rate is reduced to 1.0 lb ai/A, there are no risk estimates of concern for adults or children 1 to < 2 years old (adult dermal MOE = 52 and combined dermal + incidental oral MOE for children 1 to < 2 years old = 33) from simazine alone. However, in the cumulative assessment (results summarized below), cumulative risks of concern were identified from the use of simazine on residential turf even at 1.0 lb ai/A. Cumulative risks of concern are present unless the rate for simazine use on turf is reduced to 0.65 lb ai/A or lower.

Non-Occupational Bystander Risks

In addition to potential exposure from application directly to residential turf treated with simazine, EPA assessed potential human exposure from off-target movement and deposition (i.e., spray drift) of simazine. Applications to grapefruit and oranges at the maximum application rate of 8.0 pounds per acre (lb/A) resulted in combined dermal + incidental oral risks of concern for children 1 to < 2 years old at the field edge. However, with existing spray drift mitigation on labels, along with the fact that applications to citrus orchards are made at least 10 feet from the edge of the field, there are no bystander risks of concern.

In addition, a non-occupational bystander exposure and risk assessment was conducted using the available application site and ambient volatilization monitoring data available for simazine. There are no risk estimates of concern for adults and children (MOEs $\geq$ 30) using either the maximum air concentration data from application site monitoring or using the average air concentration from all ambient air monitoring.

Aggregate Risks

There is the potential for aggregate risks of concern following exposure to simazine and its chlorinated metabolites (DEA, DIA, and DACT). EPA evaluated acute and 4-day aggregate exposure to simazine (dietary and residential), and chronic aggregate exposure to the hydroxy metabolites of simazine. The acute and chronic aggregate assessments include dietary (food-only) and drinking water. The 4-day aggregate assessment includes dietary (food-only), drinking water, and residential exposures.

EPA used a drinking water level of comparison (DWLOC) approach to evaluate aggregate risk. This approach determines acceptable levels of exposure in the total "risk cup" for drinking water, after accounting for exposures from food/residential uses. DWLOCs are then compared to estimated drinking water concentrations (EDWC) to determine whether there are aggregate risk concerns once exposure from drinking water is added in. The DWLOC approach is useful when there are multiple EDWCs, as is the case for simazine or when there are potential aggregate risk estimates of concern.

There were no acute risks of concern for simazine and its chlorinated metabolites, and no chronic aggregate risks of concern for the hydroxy metabolites of simazine. For the 4-day aggregate assessment, the maximum application rate on residential turf (2.0 lb ai/A) would need to be reduced to 0.65 lb ai/A to be not of concern for all subpopulations.

Cumulative Risks

EPA has determined that simazine shares a common mechanism of toxicity (neuroendocrine effects in rats that can cause developmental and reproductive toxicity) with the other triazine herbicides, atrazine and propazine, and their chlorinated metabolites. EPA assessed cumulative risk from the triazines and their chlorinated metabolites in the July 10, 2018 *Chlorotriazines: Cumulative Risk Assessment - Atrazine, Propazine, and Simazine*, which is available in the public docket.
There were no risks of concern identified for the chlorotriazine 4-day cumulative dietary (food only) exposure and risk assessment, or for the 4-day dietary cumulative aggregate (food + drinking water) exposure and risk assessment. There were also no cumulative risks of concern for the chronic dietary (food only) or screening-level aggregate (food + drinking water) assessment for the hydroxytriazines.

However, there were some 4-day cumulative aggregate (food + drinking water + residential) exposures that resulted in risks of concern at the maximum labeled rates for simazine spray application to residential turf at the maximum application rate (2.0 lb ai/A). However, if the

application rate is reduced to 0.65 lb ai/A for turf, there are no cumulative aggregate risks of concern.

Occupational Handler Risks

There is potential for occupational handler risk from combined dermal and inhalation exposure to simazine, with dermal exposure driving the risk estimates. EPA calculated risk estimates based on combined dermal and inhalation exposure for various levels of PPE; label-specified PPE (i.e., long sleeves, pants and socks and chemical resistant gloves), and any additional PPE or engineering controls required to result in risk estimates that are not of concern. The occupational handler scenarios evaluated resulted in potential risks of concern with MOEs ranging from 2.7 to 1,400 (LOC = 30) assuming label-specified PPE. Uses with potential occupational risks of concern are:

- Mixing/loading/applying dry flowable/water dispersible granule (DF/WDG) and liquid formulations for backpack application to grapefruit, oranges and landscape turf.
- Mixing/loading/applying DF/WDG and liquid for mechanically pressurized handgun application to:
    - Citrus (Grapefruit, Oranges, Lemons)
    - Pome Fruits (Apples, Pears)
    - Stone Fruits (Cherries [sweet and tart], peaches, Plums, Nectarines)
    - Tree Nuts (Pecans, Walnuts, Filberts, Almonds, Macadamia Nuts
    - Berry and Small Fruit (Blueberries, Blackberries, Loganberries, Raspberries, Grapes, Lowbush Blueberries, Cranberries)
    - Tropical and Sub-tropical Fruits (Avocado, Olive)
    - Nursery/Ornamentals
    - Sweet corn
    - Strawberries

Based on EPA's risk assessment, a requirement of additional PPE could eliminate potential risk for some but not all scenarios.

The scenarios for which potential occupational risks of concern remain (*i.e.,* MOEs remain below the LOC of 30) assuming the highest possible level of PPE and/or engineering controls include:

- Mixing/loading/applying DF/WDG and liquid formulations for broadcast backpack sprayer applications to landscape turf (MOE assuming a double layer of clothing, gloves, and a particulate filtering facepiece or elastomeric particulate respirator = 27).
- Mixing/loading/applying DF/WDG and liquid formulations for mechanically pressurized handgun applications to:
    - grapefruit and oranges (MOE assuming a double layer of clothing, gloves, and a particulate filtering facepiece or elastomeric particulate respirator = 4.4);
    - lemons, apples, pears, tart cherries, avocadoes, filberts, grapes, olives, peaches, plums, sweet cherries, pecans, walnuts (MOE assuming a double layer of clothing, gloves, and a particulate filtering facepiece or elastomeric particulate respirator = 8.7);
    - almonds, peaches, nectarines, macadamia nuts, blueberries, blackberries,

loganberries, raspberries (MOE assuming a double layer of clothing, gloves, and a particulate filtering facepiece or elastomeric particulate respirator = 18);
- nursery ornamentals (MOE assuming a double layer of clothing, gloves, and a particulate filtering facepiece or elastomeric particulate respirator = 12);
- lowbush blueberries (MOE assuming a double layer of clothing, gloves, and a particulate filtering facepiece or elastomeric particulate respirator = 18);
- cranberries (MOE assuming a double layer of clothing, gloves, and a PF 10 respirator = 8.7); and,
- sweet corn (MOE assuming a double layer of clothing, gloves, and a particulate filtering facepiece or elastomeric particulate respirator = 14).

The occupational handler exposure assessment relied on maximum registered application rates, generic handler data in absence of chemical-specific unit exposure data, standard area/amount treated assumptions. Registered simazine labels vary with respect to required attire and PPE. The DF/WDG labels require mixer/loaders for groundboom applications; and/or mixer/loaders, cleaners of equipment or spills, or other handlers otherwise exposed to the concentrate to wear baseline attire (long sleeved shirts, long pants, shoes, and socks), chemical resistant gloves, and a dust/mist respirator. Some labels also require mixer/loaders to wear a double layer of clothing or coveralls. All other handlers of DF/WDG products must wear baseline attire and chemical resistant gloves. All of the registered liquid labels require handlers to wear baseline attire and waterproof or chemical resistant gloves. Therefore, results were presented for "baseline attire," (long sleeved shirt, long pants, shoes plus socks), protective gloves, and no respirator; as well as baseline, gloves, and various levels of PPE as necessary (e.g., double layer of clothing, respirator, etc.).

Occupational Post-Application Risks

Using atrazine dislodgeable foliar residue (DFR) and simazine turf transferrable residue (TTR) data, there are no occupational post-application MOEs of concern for the registered and proposed uses of simazine on the day of application, except for hand-set irrigation for highbush and lowbush blueberries (MOE = 24; LOC=30). One day after application there are no risks of concern (MOE = 43). The Agency does not consider this a risk of concern because there is an existing restricted entry interval (REI) of 12 hours and the risk calculated at the maximum label rate of 4 lb ai/A is much lower than the typical use rate of 1.6 lb ai/A. All other registered uses had MOEs above the LOC.

2. Human Incidents and Epidemiology

Four minor severity incidents were reported in the OPP Incident Data System (IDS) between January 1, 2012 and January 12, 2017 involving simazine. A National Pesticide Information Center (NPIC) query from 2012 to 2017 found one minor severity incident involving simazine. A query of California Pesticide Illness Surveillance Program incidents from 2010 to 2014 found one incident involving simazine. Lastly, a query of Sentinel Event Notification System for Occupational Risk-Pesticides from 2010 to 2013 identified three cases involving simazine. Two cases were moderate in severity and one case was low in severity. All three cases were

occupational exposures. The Agency will continue to monitor the incident information. Additional analyses will be conducted if ongoing human incident monitoring indicates a concern.

The Agency recently conducted an updated epidemiology systematic literature review to investigate evidence about the human health effects potentially associated with exposure to atrazine, simazine, and/or propazine. Ninety-three publications from 1990 to 2017 were identified for inclusion in the epidemiology literature review. These publications investigated carcinogenic and noncarcinogenic effects (43% and 58%, respectively; not mutually exclusive). Most (88%) reported an effect estimate for atrazine, 14% reported an effect estimate for simazine (not mutually exclusive: some articles reported estimates for both chemicals, while other articles reported estimates for only one). No publications reported an effect estimate for propazine. Additional details can be found in *Chlorotriazines. Toxicology Systematic Literature Review-Atrazine, Simazine and Propazine.*

3. Tolerances

Tolerances are established under 40 CFR §180.213 for the combined residues of simazine and its two chlorinated metabolites in/on a variety of crops and livestock commodities. In a separate action, EPA will use its Federal Food, Drug, and Cosmetic Act (FFDCA) rulemaking authority to require tolerance changes which will have a public comment period. The Agency intends to establish, remove (delete), and/or update tolerances for the commodities listed in Table 1. Tolerances need to be updated in accordance with the Organisation for Economic Co-operation and Development (OECD) Rounding Class Practice. The tolerance's for almond, hulls and strawberry need to be revised based on individual field trial data. The Agency also needs to delete and/or establish several new tolerances in accordance with new crop groupings. The Agency also intends to require that the residue definition for the tolerance expression for simazine be modified in accordance with current policy on tolerance definitions, to read:

> *"Tolerances are established for residues of the herbicide simazine, 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 the sum of simazine, 6-chloro-N,N'-diethyl-1,3,5-triazine-2,4-diamine, its desethyl metabolite 2-amino-4-chloro-6-ethylamino-s-triazine (G-28279) (DIA), and its diamino metabolite 2,4-diamino-6-chloro-s-triazine (G-28273) (DACT), calculated as the stoichiometric equivalent of simazine, in or on the commodity.*

A summary of the tolerance revisions and changes (e.g., to remove and/or establish new tolerances in accordance with new crop groups) that the Agency intends to require for simazine are listed in Table 1, below.

Table 1: Summary of Anticipated Tolerance Revisions for Simazine (40 CFR §180.213)

Commodity/ Correct Commodity Definition	Established Tolerance (ppm)	Required Tolerance (ppm)	Comments
Almond, hulls	0.25	3	Based on field trial data (D409212, W. Donovan, 26-JUN-2013)

Table 1: Summary of Anticipated Tolerance Revisions for Simazine (40 CFR §180.213)			
Commodity/ Correct Commodity Definition	**Established Tolerance (ppm)**	**Required Tolerance (ppm)**	**Comments**
Avocado	0.20	0.2	OECD rounding class consistency
Blackberry	0.20	0.2	
Blueberry	0.20	0.2	
Cattle, meat	0.03	Remove	Separate tolerances are not needed as these commodities fall under residue in livestock matrices 40 CFR §180.6(a)(3) 40 CFR §180.6(a)(3) D442822, W. Donovan, 12-JUN-2018
Cattle, meat byproducts	0.03	Remove	
Corn, field, forage	0.20	0.2	OECD rounding class consistency
Corn, field, grain	0.20	0.2	
Corn, pop, grain	0.20	0.2	
Corn, sweet, forage	0.20	0.2	
Corn, sweet, kernel plus cob with husks removed	0.25	0.2	D442825, W. Donovan, 10-JUL-2018 OECD rounding class consistency
Egg	0.03	Remove	Separate tolerances are not needed as these commodities fall under residue in livestock matrices 40 CFR §180.6(a)(3) 40 CFR §180.6(a)(3) D442822, W. Donovan, 12-JUN-2018
Goat, meat	0.03	Remove	
Goat, meat byproducts	0.03	Remove	
Fruit, citrus, group 10-10	-	0.04	Establishment of crop group tolerance
Grapefruit	0.25	Remove	
Lemon	0.25	Remove	
Orange	0.25	Remove	
Fruit, pome, group 11-10	-	0.03	Establishment of crop group tolerance
Apple	0.20	Remove	
Pear	0.25	Remove	
Fruit, stone, group 12-12	-	0.1	Establishment of crop group tolerance
Cherry	0.25	Remove	
Peach	0.20	Remove	
Plum	0.25	Remove	
Grape	0.20	0.2	OECD rounding class consistency
Horse, meat	0.03	Remove	Separate tolerances are not needed as these commodities fall under residue in livestock matrices 40 CFR §180.6(a)(3) 40 CFR §180.6(a)(3) D442822, W. Donovan, 12-JUN-2018
Horse, meat byproducts	0.03	Remove	
Loganberry	0.20	0.2	OECD rounding class consistency
Milk	0.03	Remove	Separate tolerances are not needed as these commodities fall under residue in livestock matrices 40 CFR §180.6(a)(3) 40 CFR §180.6(a)(3) D442822, W. Donovan, 12-JUN-2018
Nut, tree, group 14-12	-	0.05	Establishment of crop group tolerance
Almond	0.25	Remove	
Hazelnut	0.20	Remove	
Nut, macadamia	0.20	Remove	
Pecan	0.20	Remove	

Table 1: Summary of Anticipated Tolerance Revisions for Simazine (40 CFR §180.213)			
Commodity/ Correct Commodity Definition	**Established Tolerance (ppm)**	**Required Tolerance (ppm)**	**Comments**
Walnut	0.2	Remove	
Olive	0.20	0.2	OECD rounding class consistency
Raspberry	0.20	0.2	
Sheep, meat	0.03	Remove	Separate tolerances are not needed as these commodities fall under residue in livestock matrices 40 CFR §180.6(a)(3) 40 CFR §180.6(a)(3) D442822, W. Donovan, 12-JUN-2018
Sheep, meat byproducts	0.03	Remove	
Strawberry	0.25	0.03	Based on field trial data (D442825, W. Donovan, 10-JUL-2018)

4. Human Health Data Needs

The human health risk assessment identified multiresidue method testing results (OCSPP 860.1360) for the chlorinated metabolites of atrazine, propazine, and simazine (desethylatrazine (DEA), desisopropylatrazine (DIA), and diaminochlorotriazine (DACT)) as a data deficiency. These data are needed to determine the suitability of multiresidue methodology for quantification of simazine and its regulated metabolites. The Agency issued a GDCI to require these data on December 12, 2018. These data are under development and due to be submitted to the Agency by December 20, 2020. Pending review and acceptability of this study, the Agency does not anticipate any further human health data needs for the simazine registration review.

The Agency is moving forward with its registration review decision because this required multiresidue study is needed for greater efficiency of tolerance enforcement and does not impact the safety finding for simazine.

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 simazine. For additional details on the ecological assessment for simazine, see the *Preliminary Ecological Risk Assessment for Simazine*, which is 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 simazine. See Appendix C for more details. As such, potential risks for non-listed species only are described below.

1. Risk Summary and Characterization

EPA estimated risks associated with simazine use to non-target birds, mammals, reptiles, freshwater fish, amphibians, and aquatic invertebrates; terrestrial invertebrates, including honeybees and other insect pollinators; and plants. Risk estimates (risk quotients, or RQs) were compared with EPA's LOCs. For ecological risk, RQs below the LOC are not of concern to the Agency. For all taxa in the terrestrial assessment, except for plants, the LOC for acute exposure is 0.5 and the LOC for chronic exposure is 1.0. The LOC for plants is 1.0. In the draft risk assessment, the Agency identified potential chronic risk concerns for mammals, birds, freshwater fish, amphibians, reptiles, and aquatic invertebrates. In addition, available information suggests potential risk to terrestrial invertebrates. The draft risk assessment assessed the maximum-labelled and typical application rates.

Terrestrial Risks

Mammals

The ecological risk assessment did not identify acute risks of concern for mammals; however, chronic risk estimates exceed the Agency's LOC of 1 for all uses. At maximum application rates, chronic risk quotients (RQs) range from 1 - 869. The toxicity endpoint is based on decreased body weight and body weight gains. In addition, chronic LOCs for mammals are exceeded up to distances of 1,000 feet off field depending on the method of application and application rate.

Birds, Reptiles, and Terrestrial-Phase Amphibians

The ecological risk assessment did not identify acute risks of concern for birds; however, chronic levels of concern (LOC = 1) are exceeded for birds for all simazine uses. Birds serve as surrogates for reptiles and terrestrial-phase amphibians in the absence of taxa-specific data. Chronic RQs range from 0.2 to 11.2. The chronic endpoint is based on reproduction impacts observed in the most sensitive species, bobwhite quail.

Terrestrial Invertebrates (honeybees)

Available toxicity data indicate that simazine is practically non-toxic to bees on an acute oral exposure basis. Based on these data, the Agency calculated an RQ of 0.11, which is below the Agency's LOC of 0.4 for acute exposure. However, there is uncertainty about potential risks to terrestrial invertebrates because a full Tier 1 suite of terrestrial invertebrate toxicity studies is not available at this time.

Although the EPA identified the need for certain data to evaluate potential ecological effects to non-target organisms when initially scoping the registration review for propazine, the ecological effects problem formulation and the May 2014 registration review DCI were both issued prior to the EPA's issuance of the June 2014 *Guidance for Assessing Pesticide Risks to Bees*[2]. EPA is

[2] Available at https://www.epa.gov/sites/production/files/2014-06/documents/pollinator_risk_assessment_guidance_06_19_14.pdf

currently determining whether additional pollinator data are needed for simazine. If the Agency determines that additional pollinator exposure and effects data are necessary to help make a final registration review decision for simazine, then EPA will issue a DCI to obtain these data. The pollinator studies that could be required are listed in Table 1 below and based on EPA's June 2014 *Guidance for Assessing Pesticide Risks to Bees*[3].

Table 1: Potential Pollinator Data Requirements	
Guideline #	**Study**
Tier 1	
850.3020	Acute contact toxicity study with adult honey bees
850.3030	Honey bee toxicity of residues on foliage
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
Tier 2†	
Non-Guideline	Field trial of residues in pollen and nectar
Non-Guideline (OECD 75)	Semi-field testing for pollinators
Tier 3†	
850.3040	Full-Field testing for pollinators

† 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

Consistent with its herbicidal mode of action, simazine is highly toxic to monocot and dicot terrestrial plant species. As such, non-target terrestrial plant species in areas adjacent to treated fields are likely to be impacted by exposure to simazine. At the maximum single application rate, RQs associated with exposure via spray drift, as well as the combination of runoff and spray drift exposure to dry areas and semi-aquatic habitats exceed the LOC of 1. RQs for spray drift-only exposure range from 0.5 to 8.9, RQs for runoff and spray drift deposition to dry areas range from 1.0 to 10.7, and RQs for runoff and spray drift deposition to semi-aquatic areas range from 5.5 to 48.9. The adverse effect endpoint is based on impacts to seedling emergence.

For characterization, EPA evaluated potential risks to terrestrial plants at reduced application rates and developed species vegetative vigor and seedling emergence sensitivity distributions (SSDs); however, risks to terrestrial plants remain of concern.

Aquatic Risks

Freshwater Fish and Aquatic-Phase Amphibians

EPA's chronic LOC of 1 is exceeded for freshwater fish and aquatic-phase amphibians through runoff and spray drift deposition into waterways following labeled applications for many simazine uses (including corn, orchard, and berries), with RQs ranging from 0.1 to 5.7. The

[3] Available at https://www.epa.gov/sites/production/files/2014-06/documents/pollinator_risk_assessment_guidance_06_19_14.pdf

chronic fish endpoint is based on decreased egg production in the freshwater Japanese medaka fish; this endpoint is from a study conducted with atrazine, as no such study is available for simazine. With aquatic-phase amphibian data unavailable, freshwater fish data is considered as surrogate data for aquatic phase amphibians, and therefore chronic risks to aquatic-phase amphibians are the same as freshwater fish. While there are amphibian-specific data for atrazine which indicate potential sublethal effects at low exposure concentrations, it is unclear to what degree those data represent simazine.

Estuarine/Marine Fish
Acute and chronic RQs did not exceed the LOC for estuarine/marine fish.

Freshwater Invertebrates
The ecological risk assessment did not identify acute risks of concern for freshwater invertebrates; however, chronic risk estimates exceed the Agency's LOC of 1, with RQs ranging from 0.2 to 9.

Estuarine/Marine Invertebrates
The ecological risk assessment did not identify acute risks of concern for estuarine/marine invertebrates; however, chronic risk estimates exceed the Agency's LOC of 1 for estuarine/marine invertebrates, with RQs ranging from 0.1 to 5.7.

Aquatic Vascular and Non-Vascular Plants
Risk estimates exceed the Agency's LOC for aquatic vascular and non-vascular plants for nearly all uses. RQs range from 0.8 – 46.4 for vascular plants, and 0.1 – 5.5 for non-vascular plants.

Aquatic Plant Communities
Simazine does not have an extensive body of research on micro and mesocosms like atrazine does. However, because atrazine and simazine share a common mechanism of action and similar potency in plants and coupled with their propensity to move into aquatic ecosystems and their persistence in water, these chemicals both pose a potential risk to aquatic plant communities. Based on the toxicity data, there are risks to non-vascular plants for all simazine uses and risks to vascular plants for many uses.

2. Ecological Incidents

A review of the Ecological Incident Information Systems (EIIS) database for ecological incidents involving simazine was completed on August 2020. The Avian Monitoring System (AIMS) is a database administered by the American Bird Conservancy and are included in the EIIS summary. The EIIS search resulted in three incidents involving terrestrial animals, four for plants, and ten freshwater incidents involving fish kills.

The Aggregate Incident Summary report in the IDS shows six simazine related incidents, including two involving plant damage and the others were single reports involving moderate property damage, minor to moderate effects on domestic animals, fatal domestic animal event and one unspecified human event.

The Agency will continue to monitor ecological incident information as it is reported to the Agency. Detailed analyses of these incidents are conducted if reported information indicates concerns for risk to non-target organisms.

C. Benefits Assessment

Simazine is a chlorinated triazine herbicide and is classified as a Weed Science Society of America (WSSA) Group 5 herbicide. Simazine is applied before the weed emerges to control broadleaf and grass weeds, and it can be applied in the fall for winter weed control. Simazine is a commonly used preemergence, soil residual herbicide in orchards, vineyard, berry crops, nurseries/ornamentals, and Christmas tree farms. There is also usage of simazine in non-agricultural sites, including turfgrass and forestry sites. It is an important herbicide for these use sites because it is economical, has a flexible use pattern, has a long residual period, has good crop safety, and is highly effective against a broad spectrum of weeds.

Field Corn

In field corn, simazine provides residual control and offers control of a broad-spectrum of broadleaf weeds and grasses. It has a flexible use pattern in that it can be applied before planting, before crop emergence, or as a fall application after harvest. The Corn Belt states (Illinois, Indiana, Iowa, Missouri, Ohio) account for approximately 76% of simazine's total acre treatments, followed by the Southern/Seaboard states (Kentucky, Maryland, North Carolina, Virginia) with about 18% of total area treatments and Northeast/Lakes states (Delaware, Michigan, Pennsylvania, Wisconsin) with about 7% of total acre treatments. Application timing varies by region, but nationally about 48% of simazine is applied during the previous fall (after the harvest primarily in the Corn Belt for winter weed control), and the remaining 52% is applied before corn emerges. In the absence of simazine, in the Corn Belt and Northeast/Lakes states, EPA estimates a loss of approximately 4% in net revenue ($7 per acre) for applications made prior to crop emergence using the next best alternative herbicide. For the Southern/Seaboard states, EPA estimates that growers may choose to use atrazine in the absence of simazine, which is slightly cheaper than simazine per acre, so no net revenue losses are expected.

For more information refer to *Atrazine and Simazine Use on Field Corn: Response to comments, Usage, Benefits, and Impacts of Potential Mitigation; PC Codes (080803 and 080807)* in the docket.

Orchards, Vineyards, Berries and Christmas Trees

In perennial crop settings such as orchards, vineyards, and berries, simazine is used for residual control of grasses and broadleaf weeds that occur in row middles and around the base of crops or trees. Simazine is typically applied in the late fall or early spring months to provide weed control in perennial cropping systems. It is the top pre-emergent option used in caneberry production. In strawberries, simazine may be important for operations that do not use fumigation or for residual control after harvest, especially in the Pacific Northwest strawberry production areas. In

Christmas tree production, simazine is a preemergence herbicide that can provide residual control with winter applications.

For more information refer to *Simazine Response to Comments, Usage, Benefits, and Impacts of Potential Mitigation on Orchards, Vineyards, Caneberries, Strawberries, and Christmas Trees; PC Code (080807)* in the docket.

Sweet Corn

Simazine provides residual control and offers control of a broad-spectrum of broadleaf weeds and grasses in sweet corn. It has a flexible use pattern in that it can be applied before planting, at plant, before crop emergence or as a fall application after harvest. Growers in the North Central / Northeastern (Indiana, Illinois, Michigan, Minnesota, New Jersey, New York, Ohio, Pennsylvania, Wisconsin) region account for nearly all of the simazine usage in sweet corn, even though simazine is recommended by university extension in other regions. Without simazine, the Agency estimates an increase in production costs of $11 per acre in the North Central / Northeastern region using the next best alternative herbicide. Simazine is more expensive than atrazine and used less frequently; however, it is still less expensive than many other herbicides that can be used to target the similar suite of broadleaf weeds and grasses.
For more information refer to *Atrazine and Simazine Use on Sweet Corn: Response to Comments, Usage, Benefits, and Impacts of Potential Mitigation; PC Codes (080803 and 080807)* in the docket.

Turfgrass and Nursery/Ornamental

Simazine is a top preemergence herbicide for a few non-agricultural use sites (i.e., certain types of turfgrass and nursery/ornamental sites). Herbicides are applied to turfgrass at golf courses, homes, parks, and professionally maintained turfgrass sites to control annual broadleaf and grass weeds which may impact yield and/or seed/turf quality, playability, or it may be primarily driven by aesthetics. According to the most recent data (2013) available to the Agency, simazine was the third most used preemergence herbicide on turf-sod farms, and the second most used preemergence herbicide on golf courses in terms of pounds applied. Simazine can be used on many ornamental species without causing damage to the species. Simazine was the second-most used herbicide overall in nursery/ornamental sites in 2013.

For more information refer to *Atrazine and Simazine Use in Forestry, Rights of Way, Turfgrass, and Nursery: Response to Comments, Usage, and Benefits; PC Codes (080803 and 080807)* in the docket.

IV. INTERIM REGISTRATION REVIEW DECISION

A. Risk Mitigation and Regulatory Rationale

The currently registered uses of simazine pose potential human health risks of concern, including residential post-application, aggregate, and cumulative risk associated with simazine use on residential turf and potential occupational risk to handlers from mixing, loading, and applying

simazine. In addition, simazine use poses potential ecological risks to mammals, birds, reptiles, amphibians, fish, aquatic invertebrates, terrestrial plants and aquatic plant communities.

The Agency has reviewed the risks, benefits, and uses of simazine and has determined that risk mitigation is necessary. For information about the potential impacts of the necessary mitigation, please refer to Section IV. C. *Expected Impacts of Necessary Mitigation*.

EPA is describing the mitigation measures that are necessary to address the identified potential risks of concern and subsequently discusses the expected impacts by use site (unless otherwise noted). By describing the mitigation in this way, the Agency seeks to clarify the specific mitigation that may impact each specific simazine user group.

To address the potential residential post-application, aggregate, and cumulative risk concerns for simazine use on residential turf, EPA determined that it is necessary to reduce the maximum application rate to either 0.65 lb ai/A or a maximum application rate of 1.6 lb ai/A with required irrigation of 0.5 inches of water immediately following application to turf. (The application rate is being reduced from 2.0 lbs ai/A.) This provides users flexibility to either irrigate and use simazine at 1.6 lb ai/A or use simazine as part of a tank- or pre-mix at a reduced rate (0.65 lbs ai/A) without irrigation. In addition, EPA determined that additional PPE or engineering controls are necessary to address potential occupational handler risk concerns associated with various simazine uses, as discussed in more detail below. EPA also determined that updates to the spray drift reduction language are necessary for all labels. Additionally, updates to herbicide resistance management language and some additional label updates for consistency with generic labeling requirements are necessary.

In evaluating potential risk mitigation for simazine, EPA considered the risks, the benefits, and the use pattern. Although there are potential risks of concern associated with the use of simazine, with the adoption of the mitigation measures discussed in this section, EPA determined that any remaining potential worker and/or ecological risks are outweighed by the benefits associated with use of simazine (i.e., important herbicide for warm-season grass crops including corn, sorghum, and sugarcane; it is economical; has a flexible use pattern; has a long residual period; good crop safety; and is highly effective against a broad spectrum of weeds. There are also similar benefits of simazine in non-agricultural sites such as, turfgrass and nurseries/ornamentals).

1. Requiring Reduced Application Rate and Irrigation for Residential Turf

As discussed in *Section I A. Updates Since the Proposed Interim Registration Review Decision was Issued*, the human health risk assessment indicates potential post-application, aggregate, and cumulative triazine risks of concern for adults from dermal exposures to treated residential turf and children 1 to <2 years old from combined dermal and incidental oral exposures to treated residential turf. In the PID, the Agency proposed to cancel the resident turf use. Based on comments received on the PID from the registrants, the Agency is now allowing two alternative mitigation options to address this risk. The Agency determined that reducing the application rate to 1.6 lb ai/A coupled with a requirement for irrigation with 0.5 inches of water immediately following application to turf, or a lower maximum application rate of 0.65 lb ai/A without the

requirement for irrigation, will address these risks of concern (i.e., with the mitigation, the resultant MOEs are above the level of concern of 30). EPA determined that all labels with residential and recreational turf use, including turf around homes, daycare facilities, schools, playgrounds, parks, recreational areas, or sports fields, need to include one or both of these label restrictions to address the risk of concern. EPA expects these measures to be updated on labeling in a timely manner. Use on golf courses and sod-production fields does not require this mitigation; simazine use on golf courses and sod-production fields may continue to be labeled up to the current maximum application rate of 2 lb ai/A.

For information about the impacts of the necessary mitigation, please refer to Section IV.C*, Impacts of Mitigation* of the simazine ID.

2. Risk Mitigation for Occupational Handlers

The human health risk assessment identifies several scenarios that result in potential risks of concern to occupational handlers who mix, load, and apply simazine. EPA determined that additional PPE is necessary to address these potential risks, including a respirator in some cases and, for pesticides covered by the Worker Protection Standard[4] (WPS), the associated fit test, training, and medical evaluation:

- To address potential risks of concern to occupational handlers, EPA determined coveralls over long sleeve shirts and long pants are necessary for the uses listed below.
    - Dry flowable and Water Dispersible Granule (DF/WDG) – backpack application – grapefruit, oranges
    - Liquid – backpack application – grapefruit, oranges
- To address potential risks of concern to occupational handlers, EPA determined that either additional PPE of coveralls over long sleeve shirts and long pants is needed or labels need to be amended to restrict application to spot treatment only for the uses listed below. Either mitigation measure will bring the MOEs to above the LOC and remove any potential risks of concern.
    - DF/WDG – mechanically pressurized handgun – strawberries
    - Liquid – mechanically pressurized handgun – strawberries
- To address potential risks of concern to occupational handlers, EPA determined that labels need to be amended to restrict mechanically pressurized handgun applications of DF, WDG, and liquid formulations of simazine to <u>spot treatment only</u> for the following uses.
    - Citrus (Grapefruit, Oranges, Lemons)
    - Pome Fruits (Apples, Pears)
    - Stone Fruits (Cherries [sweet and tart], peaches, Plums, Nectarines)
    - Tree Nuts (Pecans, Walnuts, Filberts, Almonds, Macadamia Nuts
    - Berry and Small Fruit (Blueberries, Blackberries, Loganberries, Raspberries, Grapes, Lowbush Blueberries, Cranberries)
    - Tropical and Sub-tropical Fruits (Avocado, Olive)
    - Nursery/Ornamentals
    - Sweet corn

[4] 40 CFR 170

For information about the impacts of the necessary mitigation, please refer to Section IV.C, *Expected Impacts of the Necessary Mitigation*.

3. Spray Drift Reduction Language

In the 2006 Reregistration Eligibility Decision for Simazine (RED), mandatory and advisory spray drift language was specified. EPA determined that updates to existing spray drift mitigation label language on all simazine products labeled for liquid spray application are necessary. These additional restrictions include mandatory, enforceable statements that will supersede any existing language already on product labels (either advisory or mandatory) covering the same topics. When requesting labeling amendments to add these new statements, registrants must ensure that any advisory language left on labels does not contradict or modify the new mandatory spray drift statements required in this ID, once effective.

- Applicators must not spray during temperature inversions.
- For ground boom applications, apply with the release height no more than 4 feet above the ground or crop canopy.
- For ground applications, do not apply when wind speeds exceed 10 mph at the application site.
- For ground applications, select nozzle and pressure that deliver coarse or coarser droplets as indicated in nozzle manufacturers' catalogues and in accordance with American Society of Agricultural & Biological Engineers Standard 572.1 (ASABE S572).

In addition to including the spray drift restrictions on simazine labels, all references to volumetric mean diameter (VMD) information for spray droplets need to be removed from all simazine labels where such information currently appears. The required new language above, which cites ASABE S572, eliminates the need for VMD information.

4. Non-target Organism Advisory Statement

EPA determined that a non-target organism advisory is necessary label language for simazine. The protection of pollinating organisms is a priority for the Agency. Simazine may negatively impact forage and habitat of pollinators and other non-target organisms. It is the Agency's goal to reduce spray drift whenever possible and to educate growers on the potential for indirect effects on the forage and habitat of pollinators and other non-target organisms. Therefore, EPA determined that a non-target organism advisory language is necessary on simazine labels to address this potential concern.

For information about the impacts of the necessary mitigation, please refer to Section IV.C, *Expected Impacts of the Necessary Mitigation*.

5. Herbicide Resistance Management

On August 24, 2017, EPA finalized a Pesticide Registration Notice (PRN) on herbicide resistance management.[5] Consistent with the Notice, EPA has determined that the implementation of herbicide resistance measures for existing chemicals during registration review is necessary. In registration review, herbicide resistance elements will be considered and addressed in every herbicide PID.

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 mitigating established herbicide resistant weeds and in slowing or preventing the development of new herbicide 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.

EPA determined that labeling statements are necessary 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.

6. Additional Label Changes

In addition to the above-mentioned mitigation measures, EPA has also determined that the following label changes are necessary to address generic labeling requirements for all simazine products and uses:

- *Updated Glove and Respirator Label Language*: The Agency has determined that an update to the glove and respirator statements currently on labels is necessary to be consistent with the Label Review Manual[6]. The new glove and respirator language do not fundamentally change the personal protective equipment that workers need to use, and therefore should impose no impacts on users. For gloves, all statements that refer to the chemical resistance category selection chart must be removed from simazine labels as they might cause confusion for users. These statements must be replaced with specific chemical-resistant glove types, as appropriate. See Appendix B.
- *Directions for Mixing/Loading Water Soluble Packages (WPS) Label Language*: see Appendix B.

[5] PRN 2017-2, "Guidance for Herbicide Resistance Management Labeling, Education, Training, and Stewardship". Available at https://www.epa.gov/pesticide-registration/pesticide-registration-notices-year
[6] https://www.epa.gov/pesticide-registration/label-review-manual

B. Status of Simazine Water Monitoring Program and Future Changes

A drinking water monitoring program was required through a 2008 simazine Generic Data Call-In (GDCI-080807-26466) (2008) and identified as being needed in the Simazine RED (2006). The simazine drinking water monitoring program, which is conducted in conjunction with a similar monitoring program for atrazine, monitors community drinking water systems, primarily in the midwest United States in areas of high simazine use, to assesses simazine levels in drinking water sources.

EPA recognizes that the totality of available triazine monitoring data, including data collected through the simazine drinking water monitoring program, is robust and comprehensive. The availability of robust triazine monitoring data enabled EPA to refine and characterize its draft human health risk assessments. While having monitoring data specific to community water systems is useful, given the conclusions of the 2018 draft triazine human health risk assessments, EPA is discontinuing the requirement for simazine drinking water monitoring. Model-estimated triazine concentrations, as well as measured concentrations for community water systems are well below the drinking water level of concern (DWLOC). The vast majority of samples from the simazine monitoring program were below 1 ppb, while the highest triazine concentration ever measured was 227 ppb, which is well below the triazine DWLOC of 580 ppb. Therefore, the Agency does not see value in continuation of the simazine drinking water monitoring program. For these reasons, EPA suspended the requirement for the simazine drinking water monitoring program for calendar year 2020 during which time the Agency solicited comments (during the 60-day comment period for the PID) about the proposal to end the requirement for the simazine drinking water program. The Agency did not receive significant comments that illustrated a continued need for monitoring through this program and therefore the Agency will no longer require the simazine drinking water monitoring program.

C. Expected Impacts of the Necessary Mitigation

The expected impacts of the necessary mitigation are presented below by use site unless otherwise noted. The intent is to help clarify to which situations specific mitigation applies and for each user group to determine how they will be impacted by all necessary mitigation. For more information, see the following documents which are located in the docket: *Atrazine and Simazine Use on Field Corn: Response to comments, Usage, Benefits, and Impacts of Potential Mitigation; PC Codes (080803 and 080807), Simazine Response to Comments, Usage, Benefits, and Impacts of Potential Mitigation on Orchards, Vineyards, Caneberries, Strawberries, and Christmas Trees; PC Code (080807),* and *Atrazine and Simazine Use in Forestry, Rights of Way, Turfgrass, and Nursery: Response to Comments, Usage, and Benefits; PC Codes (080803 and 080807)*.

<u>Impact of Spray Drift Reduction Language Update</u>
The Agency recognizes that the 2006 Reregistration Eligibility Decision for Simazine (RED) specified mandatory spray drift language; however, not all components of that language were incorporated on all product labels, including frequently used products. Therefore, the Agency is evaluating the impacts of each component of the spray drift language update.

Impacts of Inversion Restriction
This requirement could reduce the amount of time users have to apply triazines. Users may switch to other products that only have advisory language for this restriction if they encounter temperature inversions when needing to treat a field.

Impacts of Mandatory Maximum Spray Release Height Requirement for Ground Applications
For ground boom applications, apply with the release height no more than 4 feet above the ground or crop canopy. This currently exists as mandatory label language; therefore, there will be no impact.

Impacts of Windspeed Restrictions for Ground Applications
The Agency is aware that low wind speeds reduce the number of available hours a grower would have to make an application. However, a restriction of 10 miles per hour for ground applications currently exists as mandatory label language; therefore, there will be no impact.

Impacts of Droplet Size
The Agency is ensuring that a restriction on droplet size is specified as mandatory label language because coarser or coarser droplets have been demonstrated to decrease spray drift, and therefore, reduce potential risks to non-target species. The current droplet size language specified in the simazine RED is advisory; through registration review, the Agency has determined that adjusting the language to clarify droplet size restrictions are mandatory is necessary.

Because chemical-specific data for the performance of droplet sizes is limited, EPA is not able to evaluate the effects of medium or coarser droplet sizes (as defined by ASABE S572.1) specifically for simazine. Therefore, EPA does not know the effect this mitigation measure will have on the performance of simazine across various use patterns, especially regarding tank mix partners that require a finer droplet size. In general, potential negative impacts to growers from requiring larger droplets could include: reductions in efficacy, increased selection pressure for the evolution of herbicide resistance due to a decrease in lethal dose delivered to target weeds, increased application rates used by growers, increased costs associated with reduced yield, additional herbicide applications, purchase of alternative products, or an inability to use tank mix or premix products.

Impacts of Interaction of Individual Components of Spray Drift Mitigation
The Agency acknowledges the impacts of multiple mitigation measures could be compounded and further reduce the time in which applicators could apply herbicides. For instance, applicators may deal with wind restrictions by spraying early in the morning/late evenings when winds are calmer; however, temperature inversions are more likely to occur several hours before sunset and can persist until 1-2 hours after sunrise. As the window of application gets smaller, growers may be forced to switch to products without these restriction on short notice. Therefore, the alternative may be based on availability and not cost and/or performance, which could be costly and reduce weed control. Additionally, growers may have situations where a tank is loaded and ready to spray, but they are not able to spray due to prolonged weather conditions that prevent application due mandatory multi-layered restrictions. In rare situations, there could be scenarios

where applicators cannot spray what is mixed in the tank for a long period of time and would need to dispose of a large quantity of mixed herbicides in order to switch to an alternative mixture. There may be additional concerns (e.g., tank clean-out when products settle out) when a loaded tank sits hours, and possibly days.

Impacts of Mitigation by Use Site

Turfgrass
Post Application Irrigation plus reduced rate for Residential and Recreational Turfgrass, or Lower Reduced Rate for Residential and Recreational Turfgrass
The Agency considered the impacts of reducing the residential/recreational turfgrass maximum single application rate from the currently registered 2.0lbs ai/acre to 1.6 lbs ai/acre followed by mandatory irrigation (watering-in) of 0.5 inches of water (when rates are higher than 0.65 lbs. ai/acre); or allowing applications to occur without watering-in simazine, if rates are equal to or less than 0.65 lbs ai/acre (i.e., reduce the maximum application from 2.0lbs ai/acre to 0.65 lbs ai/acre without the irrigation requirement). The Agency concluded a lower application rate (0.65 lbs ai/acre) without the irrigation requirement allows flexibility for tank mix and premix options for weed control. The Agency also considers watering-in at an application rate higher than 0.65 lbs. ai/acre (but not to exceed 1.6 lbs ai/acre) feasible for many use sites.

Either watering-in at the higher rates (not to exceed 1.6 lbs ai/acre) or using the lower rate (of 0.65 lbs ai/A) with another herbicide(s) could add to the cost of weed control. The mitigation measures could impact some users with heavy weed pressure, and they would need to add an additional herbicide to the mixture or choose another herbicide to control their weeds; however, these impacts would be much less than cancellation of simazine use in turf which was initially proposed in the simazine PID.

Impacts of Inversion Restriction
This component does not appear on all labels. However, the Agency assumes that applications to golf course would be made during normal work hours when temperature inversions are unlikely. Therefore, the Agency assumes that requiring that applications be made when temperature inversions were not likely to occur would not impact golf course and recreational uses. For sod-production fields, there could be a reduction in hours when applications could be made (impacts of the spray drift mitigation, see above).

For more information refer to *Atrazine and Simazine Use in Forestry, Rights of Way, Turfgrass, and Nursery: Response to Comments, Usage, and Benefits* in the docket.

Field Corn
Spray Drift Management
For impacts of the spray drift mitigation, see above.

For more information refer to *Atrazine and Simazine Use on Field Corn: Response to comments, Usage, Benefits, and Impacts of Potential Mitigation; PC Codes (080803 and 080807)* in the docket.

Sweet Corn

Restrict Mechanically Pressurized Handgun Applications of DF/WDG/L Formulations to Spot Treatments Only

The Agency anticipates that mechanically pressurized handguns would be used for spot treatments to small areas, not for broadcast treatments over large acreages in sweet corn. In some instances, applicators may use a mechanically pressurized handgun attached to small ground boom sprayers to treat around an obstruction (e.g., telephone pole) or the perimeter of a field (e.g., fencerows). Therefore, the impact of limiting mechanically pressurized applications to spot treatments is likely to be low in terms of acres impacted. However, if there are growers who use mechanically pressurized handguns for broadcast applications of simazine, they would have to make an application using a different herbicide, which may be more expensive and possibly less effective.

Spray Drift Management

For impacts of the spray drift mitigation measure, see above.

For more information refer to *Atrazine and Simazine Use on Sweet Corn: Response to Comments, Usage, Benefits, and Impacts of Potential Mitigation; PC Codes (080803 and 080807)* in the docket.

Citrus (Grapefruit, Oranges, Lemons)

Double-layers and Gloves for Grapefruit and Oranges for DF/WDG/L Formulations Applied via Backpack Sprayers

Requiring double-layer coveralls and gloves for users applying via backpack will not likely impact the overall use of simazine since it is likely that applications via backpack sprayers are infrequent. However, users who apply with backpack equipment may incur some additional costs or burdens. For example, the use of PPE (e.g., wearing double layers when applying pesticides) can reduce productivity of workers because of the physiological stress when working in high temperatures and/or humid conditions. Workers may need to take more frequent breaks in certain situations than if extra PPE were not required. Individuals will respond differently depending on many factors, such as fitness level, hydration, acclimatization, etc. The requirement of additional PPE when individuals are applying simazine with a backpack applicator could decrease productivity, which will increase the time required for an application to be made, and likely increase costs. Alternatively, applicators may choose to use a different herbicide, which could be more expensive and potentially less effective than simazine.

Restrict Mechanically Pressurized Handgun Applications of DF/WDG/L Formulations to Spot Treatments Only (Grapefruit, Oranges, Lemons)

The Agency assumes that mechanically pressurized handguns would be used for spot treatments to small areas, not for broadcast treatments over large acreages in citrus groves. In some instances, applicators may use a mechanically pressurized handgun attached to small ground boom sprayers to treat around an obstruction (e.g., telephone pole) or the perimeter of a field (e.g., fencerows). Therefore, limiting mechanically pressurized applications to spot treatments is likely to be low in terms of acres impacted. However, if there are growers who use mechanically pressurized handguns for broadcast applications of simazine, they would have to make an application using a different herbicide, which may be more expensive and possibly less effective.

Spray Drift Management
For impacts of the spray drift mitigation measures to Grapefruit, Oranges, and Lemons, see above.

Pome Fruits (Apples, Pears)
Restrict Mechanically Pressurized Handgun Applications of DF/WDG/L Formulations to Spot Treatments Only
The Agency assumes that mechanically pressurized handguns would be used for spot treatments to small areas, not for broadcast treatments over large acreages in in orchards. In some instances, applicators may use a mechanically pressurized handgun attached to small ground boom sprayers to treat around an obstruction (e.g., telephone pole) or the perimeter of a field (e.g., fencerows). Therefore, limiting mechanically pressurized applications to spot treatments is likely to be low in terms of acres impacted. However, if there are growers who use mechanically pressurized handguns for broadcast applications of simazine, they would have to make an application using a different herbicide, which may be more expensive and possibly less effective.
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Spray Drift Management
For impacts of the spray drift mitigation measures for Pome fruit, see above.

Stone Fruits (Cherries [sweet and tart], Peaches, Plums, Nectarines)
Restrict Mechanically Pressurized Handgun Applications of DF/WDG/L Formulations to Spot Treatments Only
The Agency assumes that mechanically pressurized handguns would be used for spot treatments to small areas, not for broadcast treatments over large acreages in orchards. In some instances, applicators may use a mechanically pressurized handgun attached to small ground boom sprayers to treat around an obstruction (e.g., telephone pole) or the perimeter of a field (e.g., fencerows). Therefore, limiting mechanically pressurized applications to spot treatments is likely to be low in terms of acres impacted. However, if there are growers who use mechanically pressurized handguns for broadcast applications of simazine, they would have to make an application using a different herbicide, which may be more expensive and possibly less effective.
Spray Drift Management
For impacts of the spray drift mitigation measures to Stone Fruit, see above.

Tree Nuts (Pecans, Walnuts, Filberts, Almonds, Macadamia Nuts)
Restrict Mechanically Pressurized Handgun Applications of DF/WDG/L Formulations to Spot Treatments Only
The Agency assumes that mechanically pressurized handguns would be used for spot treatments to small areas, not for broadcast treatments over large acreages in orchards. In some instances, applicators may use a mechanically pressurized handgun attached to small ground boom sprayers to treat around an obstruction (e.g., telephone pole) or the perimeter of a field (e.g., fencerows). Therefore, limiting mechanically pressurized applications to spot treatments is likely to be low in terms of acres impacted. However, if there are growers who use mechanically pressurized handguns for broadcast applications of simazine, they would have to make an application using a different herbicide, which may be more expensive and possibly less effective.

Spray Drift Management
For impacts of the spray drift mitigation measures to Tree Nuts, see above.

Berry and Small Fruit (Blueberries, Blackberries, Loganberries, Raspberries, Grapes, Lowbush Blueberries, Strawberries, Cranberries)
Double-layers and Gloves for DF/WDG/L Formulations Applied Via Mechanically Pressurized Handguns (Strawberries)
Requiring double-layer coveralls and gloves for users applying via mechanically pressurized handguns will not likely impact the overall use of since it is likely that applications via mechanically pressurized handguns are infrequent. However, users who apply with mechanically pressurized handguns, may incur some additional costs or burdens. For example, the use of a PPE (e.g., wearing double layers when applying pesticides) can reduce productivity of workers because of the physiological stress when working in high temperatures and/or humid conditions. Workers may need to take more frequent breaks in certain situations than if extra PPE were not required. Individuals will respond differently depending on many factors, such as fitness level, hydration, acclimatization, etc. Alternatively, applicators may choose to use a different herbicide, which could be more expensive and potentially less effective than simazine.

Restrict Mechanically Pressurized Handgun Applications of DF/WDG/L Formulations to Spot Treatments Only (Blueberries, Blackberries, Loganberries, Raspberries, Grapes, Lowbush Blueberries, Cranberries)
The Agency assumes that mechanically pressurized handguns would be used for spot treatments to small areas, not for broadcast treatments over large acreages in orchards. In some instances, applicators may use a mechanically pressurized handgun attached to small ground boom sprayers to treat around an obstruction (e.g., telephone pole) or the perimeter of a field (e.g., fencerows). Therefore, limiting mechanically pressurized applications to spot treatments is likely to be low in terms of acres impacted. However, if there are growers who use mechanically pressurized handguns for broadcast applications of simazine, they would have to make an application using a different herbicide, which may be more expensive and possibly less effective.

Spray Drift Management
For impacts of the spray drift mitigation measures to Berries and Small Fruit, see above.

Tropical and Sub-tropical Fruits (Avocado, Olive)
Restrict Mechanically Pressurized Handgun Applications of DF/WDG/L Formulations to Spot Treatments Only
The Agency assumes that mechanically pressurized handguns would be used for spot treatments to small areas, not for broadcast treatments over large acreages in orchards. In some instances, applicators may use a mechanically pressurized handgun attached to small ground boom sprayers to treat around an obstruction (e.g., telephone pole) or the perimeter of a field (e.g., fencerows). Therefore, limiting mechanically pressurized applications to spot treatments is likely to be low in terms of acres impacted. However, if there are growers who use mechanically pressurized handguns for broadcast applications of simazine, they would have to make an application using a different herbicide, which may be more expensive and possibly less effective.

Spray Drift Management
For impacts of the spray drift mitigation measures to Avocado and Olives, see above.

For more information refer to *Simazine Response to Comments, Usage, Benefits, and Impacts of Potential Mitigation on Orchards, Vineyards, Caneberries, Strawberries, and Christmas Trees* in the docket.

Nursery and Ornamentals
Restrict Mechanically Pressurized Handgun Applications of DF/WDG/L Formulations to Spot Treatments Only
The Agency assumes that mechanically pressurized handguns would be used for spot treatments to small areas, not for broadcast treatments over large acreages in nursery and ornamental operations. In some instances, applicators may use a mechanically pressurized handgun attached to small ground boom sprayers to treat around an obstruction (e.g., telephone pole), the perimeter of a field (e.g., fencerows), or for small groups of nursery or ornamental crops in small acreage sites. Therefore, limiting mechanically pressurized applications to spot treatments is likely to be low in terms of acres impacted. However, if there are growers who use mechanically pressurized handguns for broadcast applications of simazine, they would have to make an application using a different herbicide, which may be more expensive and possibly less effective.
Spray Drift Management
Nursery and ornamental users generally have mixtures of many plant species and are therefore careful about off-site movement. Therefore, impacts of the spray drift mitigation measures relevant to maximum droplet size, boom height, and maximum windspeed should be minimal, see above.

For more information refer to *Atrazine and Simazine Use in Forestry, Rights of Way, Turfgrass, and Nursery: Response to Comments, Usage, and Benefits.* in the docket.

D. Tolerance Actions

EPA is requiring the establishment and revocation, as well as amendment of tolerances for several commodities. Refer to Section III.A.3 for details. The Agency will use its FFDCA rulemaking authority to make the needed changes to the tolerances.

E. Interim Registration Review Decision

In accordance with 40 CFR §§ 155.56 and 155.58, the Agency is issuing this ID. Except for the Endocrine Disruptor Screening Program (EDSP), and the Endangered Species Act (ESA) components of this case, the Agency has made the following ID: (1) with the exception of the outstanding GDCI data requirements, no additional data are required at this time; and (2) changes to the affected registrations and their labeling are needed at this time, as described in Section IV.A and Appendices A and B.

In this ID, the Agency is making no human health or environmental safety findings associated with the EDSP screening of simazine, nor is it making a final endangered species finding. Although the Agency is not making a final endangered species finding at this time, the required

mitigation described in this document, when implemented on labels, 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 simazine. The Agency's final registration review decision for simazine will be dependent upon the result of the Agency's ESA assessment and any needed § 7 consultation with the Services, and an EDSP FFDCA § 408(p) determination.

F. Data Requirements

EPA issued a GDCI requiring multiresidue method testing results (OCSPP 860.1360) for simazine and its chlorinated metabolites, desisopropylatrazine (DIA), and diaminochlorotriazine (DACT) on December 12, 2018. These data are needed to determine the suitability of multiresidue methodology for quantification of simazine and its regulated metabolites. resulting in more efficient residue testing for tolerance enforcement. However, they are not needed to make a safety finding and will not impact the interim decision. These data are under development and are required to be submitted to the Agency by December 20, 2020.

No additional data are anticipated to be needed to be called-in for this registration review at this time. The EPA will consider requiring submission of pollinator data as a separate action.

The analytical reference standard for desisopropylatrazine (DIA), and diaminochlorotriazine (DACT) have expired and must be submitted to EPA's National Pesticide Standards Repository (see https://www.epa.gov/pesticide-analytical-methods/national-pesticide-standard-repository).

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 simazine. A final decision on the simazine registration review case will occur after: (1) an EDSP FFDCA § 408(p) determination, and (2) an endangered species determination under the ESA and any needed § 7 consultation with the Services.

B. Implementation of Mitigation Measures

Once the Interim Registration Review Decision is issued, the simazine registrants must submit amended labels that include the label changes described in Appendices A and B. The revised labels and requests for amendment of registrations must be submitted to the Agency for review within 60 days following issuance of the Interim Registration Review Decision in the docket.

Registrants must submit a cover letter, a completed Application for Registration (EPA form 8570-1) and electronic copies of the amended product labels. Two copies for each label must be submitted, a clean copy and an annotated copy with changes. In order for the application to be processed, registrants must include the following statement on the Application for Registration (EPA form 8570-1):

"I certify that this amendment satisfies the requirements of the Propazine Interim Registration Review Decision and EPA regulations at 40 CFR Section 152.44, and no other changes have been made to the labeling of this product. I understand that it is a violation of 18 U.S.C. Section 1001 to willfully make any false statement to EPA. I further understand that if this amendment is found not to satisfy the requirements of the Propazine Interim Registration Review Decision and 40 CFR Section 152.44, this product may be in violation of FIFRA and may be subject to regulatory and/or enforcement action and penalties under FIFRA."

Within the required timeframe, registrants must submit the required documents to the Re-evaluation section of EPA's Pesticide Submission Portal (PSP), which can be accessed through EPA's Central Data Exchange (CDX) using the following link: https://cdx.epa.gov/. Registrants may instead send paper copies of their amended product labels, with an application for a fast-track, Agency-initiated non-PRIA label amendment to Christian Bongard at one of the following addresses, so long as the labels and application are submitted within the required timeframe:

VIA US Mail
USEPA Office of Pesticide Programs
Pesticide Re-evaluation Division
Mail Code 7508P
1200 Pennsylvania Ave NW
Washington, DC 20460-0001

VIA Courier
Pesticide Re-evaluation Division
c/o Front End Processing
Room S-4910, One Potomac Yard
2777 South Crystal Drive
Arlington, VA 22202-4501

Appendix A: Summary of Required Actions for Simazine

Registration Review Case#: 0070
PC Code: 080807
Chemical Type: Herbicide
Chemical Family: Triazine
Mechanism of Action: 5

Affected Population(s)	Source of Exposure	Route of Exposure	Duration of Exposure	Potential Risk(s) of Concern	Required Actions	Comment (use to briefly clarify or elaborate on risk or mitigation)
Occupational handler (applicator of simazine via mechanically-pressurized handgun on numerous uses)	• Air (e.g., respirable particles at/on site while mixing/loading) • Residues (e.g., at /on site while mixing/loading)	Combined dermal and inhalation	4-day and longer	LH surge suppression	Limit application to spot treatment only	
Occupational handler (applicator of simazine via backpack sprayer on oranges and grapefruit)	• Air (e.g., respirable particles at/on site while mixing/loading) • Residues (e.g., at /on site while mixing/loading)	Combined dermal and inhalation	4-day and longer	LH surge suppression	Require additional PPE (coveralls over long sleeve shirts and long pants)	
Post-Application Residential and Recreational	• Chlorotriazine cumulative aggregate exposure (food +water + residential post-application exposure to treated residential turf)	• Dietary (food) • Combined dermal and incidental oral (residential post-application to treated residential turf)	4-day and longer	LH surge suppression	Either Reduce Application Rate to 0.65 lb ai/A or Require Post-Application Irrigation plus a Reduced Application Rate of 1.6 lb ai/A	
Avian	Dietary and spray drift	Ingestion	Chronic	Growth	Enforceable spray drift management measures	Label clarification
Mammals	Dietary and spray drift	Ingestion	Chronic	Reproductive and Growth	Enforceable spray drift management measures	Label clarification
Terrestrial Plants	Spray drift	Direct contact	Acute Chronic	Growth	Enforceable spray drift management measures	Label clarification
Aquatic plants (nonvascular)	Spray drift and runoff	Direct contact	Acute Chronic	Growth	Enforceable spray drift management measures	Label clarification

Appendix B: Required Labeling Changes for Simazine Products

Description	Required Label Language for Simazine Products	Placement on Label
PPE Requirement For backpack application of DF, WDG, and liquid formulations on Grapefruit and Oranges	Mixer/loader/applicators for backpack application to grapefruit and oranges are required to wear coveralls over long-sleeve shirts and long pants clothing	
Use Restrictions for mechanically pressurized handguns of DF, WDG, and liquid formulations	• Applications made by mechanically pressurized handguns are restricted to spot treatment only for the following uses o Citrus (Grapefruit, Oranges, Lemons) o Pome Fruits (Apples, Pears) o Stone Fruits (Cherries [sweet and tart], peaches, Plums, Nectarines) o Tree Nuts (Pecans, Walnuts, Filberts, Almonds, Macadamia Nuts o Berry and Small Fruit (Blueberries, Blackberries, Loganberries, Raspberries, Grapes, Lowbush Blueberries, Cranberries) o Tropical and Sub-tropical Fruits (Avocado, Olive) o Nursery/Ornamentals o Sweet Corn • Applications made by mechanically pressurized handguns to strawberries are restricted to either spot treatment only or mixer/loader/applicators are required to wear coveralls over long sleeve shirts and long pants of clothing.	
	End Use Products	
Mechanism of Action Group Number	**Note to registrant:** • Include the name of the **ACTIVE INGREDIENT** in the first column • Include the word "**GROUP**" in the second column • Include the **MODE/MECHANISM OF ACTION CODE** in the third column (for herbicides this is the Mechanism of Action, for fungicides this is the FRAC Code, and for insecticides this is the Primary Site of Action) • Include the type of pesticide (*i.e.*, **HERBICIDE** or **FUNGICIDE** or **INSECTICIDE)** in the fourth column.	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

Description	Required Label Language for Simazine Products	Placement on Label
	Simazine **GROUP** **5** **Herbicide**	be surrounded by a black rectangle.
For products registered for use on turf	For residential turf on lawns, institutional turf, parks or recreational fields, the maximum application rate may either be: • 1.6 lb ai/A paired with the requirement of 0.5 inches of irrigation; or • 0.65 lb ai/A without irrigation. NOTE: No change for golf course turf and sod farms uses.	Directions for Use
Updated Gloves Statement	Update the glove statements to be consistent with Chapter 10 of the Label Review Manual	In the Personal Protective Equipment (PPE) within the Precautionary Statements and Agricultural Use Requirements, if applicable
Updated Respirator Language	[**Note to registrant**: If your end-use product only requires protection from particulates only (low volatility), use the following language:] "Wear a minimum of a NIOSH-approved particulate filtering facepiece respirator with any N*, R or P filter; OR a NIOSH-approved elastomeric particulate respirator with any N*, R or P filter; OR a NIOSH-approved powered air purifying respirator with HE filters." *Drop the "N" option if there is oil in the product's formulation and/or the product is labeled for mixing with oil-containing products. [**Note to registrant:** For respiratory protection from organic vapor **and** particulates (or aerosols), use the following language:] "Wear a minimum of a NIOSH-approved elastomeric half mask respirator with organic vapor (OV) cartridges and combination N*, R, or P filters; OR a NIOSH-approved gas mask with OV canisters; OR a NIOSH-approved powered air purifying respirator with OV cartridges and combination HE filters." [**Note to registrant:** For products requiring protection for organic vapor only, use the following language:]	In the Personal Protective Equipment (PPE) within the Precautionary Statements

Description	Required Label Language for Simazine Products	Placement on Label
	"Wear a minimum of a NIOSH-approved elastomeric half mask respirator with organic vapor (OV) cartridges; OR a NIOSH-approved full face respirator with OV cartridges; OR a gas mask with OV canisters; OR a powered air purifying respirator with OV cartridges." *Drop the "N" option if there is oil in the product's formulation and/or the product is labeled for mixing with oil-containing products.	
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
HERBICIDE RESISTANCE MANAGEMENT: Weed Resistance Management	Include resistance management label 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"
Additional Required Labelling Action **Applies to all products delivered via liquid spray applications**	Remove information about volumetric mean diameter from all labels where such information currently appears.	Directions for Use
Directions for mixing/loading products packaged in water soluble bags	Instructions for Introducing Water Soluble Packages Directly into Spray tanks: "Soluble Packages (WSPs) are designed to dissolve in water. Agitation may be used, if necessary, to help dissolve the WSP. Failure to follow handling and mixing instructions can increase your exposure to the pesticide products in WSPs. WSPs, when used properly, qualify as a closed mixing/loading system under the Agricultural Worker Protection Standard [40 CFR 170.607(d)]. Handling Instructions Follow these steps when handling pesticide products in WSPs. 1.Mix in spray tank only. 2.Handle the WSP in a manner that protects package from breakage and/or unintended release of contents. If package is broken, put on PPE required for clean-up and then continue with mixing instructions.	

Description	Required Label Language for Simazine Products	Placement on Label
	3.Keep the WSP in outer packaging until just before use. 4.Keep the WSP dry prior to adding to the spray tank. 5.Handle with dry gloves and according to the label instructions for PPE. 6.Keep the WSP intact. Do not cut or puncture the WSP. 7.Reseal the WSP outer packaging to protect any unused WSP(s). Mixing Instructions Follow the steps below when mixing this product, including if it is tank-mixed with other pesticide products. If being tank-mixed, the mixing directions 1 through 9 below take precedence over the mixing directions of the other tank mix products. WSPs may, in some cases, be mixed with other pesticide products so long as the directions for use of all the pesticide product components do not conflict. Do not tank-mix this product with products that prohibit tank-mixing or have conflicting mixing directions. 1.If a basket or strainer is present in the tank hatch, remove prior to adding the WSP to the tank. 2.Fill tank with water to approximately one-third to one-half of the desired final volume of spray. 3.Stop adding water and stop any agitation. 4.Place intact/unopened WSP into the tank. 5.Do not spray water from a hose or fill pipe to break or dissolve the WSP. 6.Start mechanical and recirculation agitation from the bottom of tank without using any overhead recirculation, if possible. If overhead recirculation cannot be turned off, close the hatch before starting agitation. 7.Dissolving the WSP may take up to 5 minutes or longer, depending on water temperature, water hardness and intensity of agitation. 8.Stop agitation before tank lid is opened. 9.Open the lid to the tank, exercising caution to avoid contact with dusts or spray mix, to verify that the WSP has fully dissolved and the contents have been thoroughly mixed into the solution. 10.Do not add other allowed products or complete filling the tank until the bags have fully dissolved and pesticide is thoroughly mixed. 11.Once the WSP has fully dissolved and any other products have been added to the tank, resume filling the tank with water to the desired level, close the tank lid, and resume agitation. 12.Use the spray solution when mixing is complete. 13.Maintain agitation of the diluted pesticide mix during transport and application. 14.It is unlawful to use any registered pesticide, including WSPs, in a manner inconsistent with its label. ENGINEERING CONTROLS Water soluble packets, when used correctly, qualify as a closed mixing/loading system under the Worker Protection Standard [40 CFR 170.607(d)]. Mixers and loaders handling this product while it is enclosed in intact water-soluble packets may elect to wear reduced PPE of long-sleeved shirt, long pants, shoes, socks, a chemical-resistant apron, and chemical-resistant gloves. When reduced PPE is worn because a closed system is being used, handlers must be	

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	provided all PPE specified above for "applicators and other handlers" and have such PPE immediately available for use in an emergency, such as in case of a spill or equipment break-down."	
Spray Drift Management Application Restrictions for products that are applied as liquids and allow ground boom applications	**"SPRAY DRIFT** **Ground Boom Applications:** • User must only apply with the release height recommended by the manufacturer, but no more than 4 feet above the ground or crop canopy. • Applicators are required to use a coarse or coarser droplet size (ASABE S572). • Do not apply when wind speeds exceed 10 miles per hour at the application site. • Do not apply during temperature inversions."	Directions for Use, in a box titled "Spray Drift" under the heading "Ground Boom Applications"
Advisory Spray Drift Management Language for all products delivered via liquid spray application	**"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. **BOOM HEIGHT – Ground Boom** ***(note to registrants:*** *remove if ground boom is prohibited on product labels)* For ground equipment, the boom should remain level with the crop and have minimal bounce. **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.	Directions for Use, just below the Spray Drift box, under the heading "Spray Drift Advisories"

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	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."	
Advisory Spray Drift Management Language for all products that allow liquid applications with handheld technologies	**"SPRAY DRIFT ADVISORIES** **Handheld Technology Applications:** • Take precautions to minimize spray drift."	Directions for Use, just below the Spray Drift box, under the heading "Spray Drift Advisories"