





OFFICE OF CHEMICAL SAFETY AND POLLUTION PREVENTION
WASHINGTON, D.C. 20460


MEMORANDUM


DATE: 11/20/2024

SUBJECT: Updated Mitigation Proposal for the Atrazine Interim Registration Review Decision, Case Number 0062

FROM: Alex Hazlehurst, Chemical Review Manager
Risk Management Implementation Branch III
Pesticide Re-evaluation Division (7508M) 

THRU: Jaclyn Pyne, Team Leader
Risk Management Implementation Branch III
Pesticide Re-evaluation Division (7508M) 

Kelly Sherman, Chief
Risk Management Implementation Branch III
Pesticide Re-evaluation Division (7508M) 

TO: Jean Overstreet, Director
Pesticide Re-evaluation Division (7508M) 

I. Overview

On September 14, 2020, the Environmental Protection Agency (EPA or the Agency) signed the [Atrazine Interim Registration Review Decision](#), which can be found in docket EPA-HQ-OPP-2013-0266 at www.regulations.gov. Atrazine is a chlorinated triazine systemic herbicide that is used to selectively control annual grasses and broadleaf weeds before they emerge. Pesticide products containing atrazine are registered for use on several agricultural crops, with the highest use on field corn, sweet corn, sorghum, and sugarcane. Additionally, atrazine products are registered for use on macadamia nuts and guava, as well as non-agricultural uses such as nursery/ornamental and turf.

For the 2020 Interim Registration Review Decision (ID), EPA conducted a comprehensive ecological risk assessment for the registered uses of atrazine. In the ecological assessment, EPA identified a potential risk concern to non-target mammals, birds, reptiles, amphibians, freshwater and estuarine/marine fish, aquatic invertebrates, terrestrial and aquatic plants, and aquatic plant communities associated with the use of atrazine. In addition to reviewing the aquatic plant toxicity data for individual species in the ecological assessment, the toxicity of atrazine to aquatic plant communities was evaluated, and a Concentration Equivalent Level of Concern (CE-LOC) of 3.4 micrograms per liter ($\mu\text{g}/\text{L}$) was identified. The ecological assessment evaluated whether there were risks of concern based on the maximum labeled, reduced, and typical application rates.¹

On October 30, 2020, a lawsuit was filed in the Ninth Circuit Court of Appeals challenging the issuance of the atrazine ID.² The Petition alleges that EPA violated its duties under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) by approving the atrazine ID based on a lack of substantial supporting evidence. In response to the Petition, EPA sought a voluntary partial remand that was granted by the court on December 14, 2021. Specifically, the voluntary partial remand was focused on re-evaluating the determination in the ID that the concentration of 15 $\mu\text{g}/\text{L}$ triggers required monitoring and/or mitigation³ to protect aquatic plant communities.⁴

During the partial remand, EPA reevaluated the policy decision to use 15 $\mu\text{g}/\text{L}$ as the level of regulation for aquatic plant communities in the ID rather than the scientifically derived CE-LOC of 3.4 $\mu\text{g}/\text{L}$. The reevaluation concluded that this portion of the previous decision was not adequately supported by science and on June 20, 2022, EPA released the [Proposed Revisions to the Atrazine Interim Registration Review Decision](#) (2022 proposed revisions) and supporting documents for public comment. That 2022 proposal reconfirmed the 3.4 $\mu\text{g}/\text{L}$ atrazine concentration (60-day average) equivalent level of concern (CE-LOC) to protect aquatic plant communities and proposed additional mitigations to protect aquatic plant communities in aquatic ecosystems where atrazine concentrations were predicted to be above the CE-LOC.

During the 60-day public comment period on the 2022 proposed revisions and associated supporting documents, the Agency received around 500 comments from a variety of groups, including states, other federal agencies, the pesticide industry (e.g., pesticide companies, applicators), grower groups, environmental groups, academics, and individuals. All comment summaries and EPA's corresponding responses can be found in Appendix C of this document – EPA's Updated Mitigation Proposal for the Atrazine Interim Registration Review Decision (updated mitigation proposal). The Agency thanks all commenters for participating and has considered the comments received in 2022 in developing this updated mitigation proposal.

¹ The ID also considered human health risks, as well as consideration of benefits of the use of atrazine.

² *Rural Coalition, et al. v. EPA, et al.*, (No. 20-73220) (9th Cir.).

³ The requirements for registrants to revise atrazine labels to mitigate risk from the use of products containing atrazine were accepted on all atrazine product registrations and updated labels were stamped by the Agency on November 12, 2021.

⁴ The Agency did not seek a remand on any of the other determinations identified in the ID.

Among the comments received on the 2022 proposed revisions were numerous requests for EPA to convene a FIFRA Scientific Advisory Panel (SAP) to reconsider a subset of the microcosm and mesocosm (cosm) studies used in the calculation of the 3.4 µg/L CE-LOC. The [SAP](#) is a forum that provides independent scientific advice and recommendations on scientific issues related to pesticides. In August 2023, EPA held a FIFRA SAP meeting to present and receive feedback on its reevaluation of 11 cosm studies identified by the 2012 SAP as warranting further review because of concerns about study design or performance flaws, as well as EPA's interpretation of the results. EPA divided the 11 cosm studies into seven study groups and presented its reevaluation in a [White Paper](#) prior to the for the 2023 SAP. The 2023 SAP's [final report](#) and EPA's [response](#) to the report, which indicated concurrence with the SAP's overall recommendations and final conclusions, have since been made public and can be found in docket EPA-HQ-OPP-2023-0154 at [www.regulations.gov](#).

On July 8, 2024, EPA released the [Update to "EFED's Support Documentation for the Proposed Revisions to the Atrazine Interim Registration Review Decision Regarding Risks to Aquatic Plant Communities"](#). That document included EPA's recalculation of the CE-LOC (increased from 3.4 µg/L to 9.7 µg/L), which reflects the results of EPA's reevaluation of the cosm studies that were the focus of the 2023 SAP meeting as well as two additional relevant studies. It also included updates EPA made in the Watershed Regressions for Pesticides for Multiple Pesticides (WARP-MP) modeling analysis to correct errors, as well as [maps](#) that show where the CE-LOC was exceeded based on the revisions to the CE-LOC and WARP-MP modeling error corrections. See Section II below for additional information and the memorandum in EPA's July 2024 update. Collectively, these updates resulted in the removal of millions of acres of land from the map of watersheds that were expected to exceed the revised CE-LOC in the 2022 proposed revisions document and added a smaller number of acres in other areas of the country not previously identified due to a mapping error.

This updated mitigation proposal incorporates the revised atrazine level of concern for aquatic plant communities, an expanded use of robust surface water monitoring data, and the [mitigation menu](#) and point system from the final Herbicide Strategy to provide growers more options to achieve mitigation points and reduce runoff. This document is organized into three sections and three appendices.

- **Section II (*Impacted Watersheds and Review of Scientific Assessments*)** - includes a summary of EPA's updated method for identifying predicted atrazine concentrations in watersheds, and EPA's review of the most current atrazine usage data available for field corn, sweet corn, sorghum, and sugarcane to assess any changes in the benefits of atrazine.
- **Section III (*Updated Proposed Mitigations for Atrazine and Consistency with EPA's Herbicide Strategy*)** - includes an overview of the updated proposed additional mitigation along with the regulatory rationale for consistency with EPA's [Herbicide Strategy](#) (HS), which was published to the public docket on August 20, 2024. This section also describes the potential impacts of the proposed additional mitigation on atrazine users.

- **Section IV (*Next Steps and Timeline*)** - provides information on the upcoming actions EPA will be taking after publication of this updated proposal.
- **Appendix A (Update of Proposed Mitigation Labeling Changes for Atrazine Products)** - provides an update to the 2022 proposed mitigations.
- **Appendix B (List of Mitigation Measures and the Associated Point Values for Ecological Runoff/Erosion Mitigation Measures)**
- **Appendix C (Office of Pesticide Programs Response to Comments on the 2022 Proposed Revisions to the Atrazine Interim Registration Review Decision)** - provides EPA's responses to public comments on the Updated Mitigation Proposal for the Atrazine Registration Review Interim Decision (Mitigation Proposal) and supporting documents, received as part of the registration review process.

II. Impacted Watersheds and Review of Scientific Assessments

A. Risk Summary for Aquatic Plant Communities

The CE-LOC provides a level of concern for use in EPA's analyses for atrazine. Where the CE-LOC is exceeded, EPA may determine mitigations are necessary to avoid atrazine concentrations in watersheds that could cause detrimental changes in aquatic plant community structure, function, and productivity. While the CE-LOC is based on effects to aquatic plant communities, by ensuring protection of primary producers, it is intended to also provide protection for the entire aquatic ecosystem, including fish, invertebrates, and amphibians. The focus on toxicity to aquatic plant communities is necessary to ensure that the atrazine concentrations in watersheds do not cause significant changes in plant community structure, function and productivity and thus put at risk the food chain (*e.g.*, reducing food for fish, invertebrates, and birds) and ecosystem integrity (*e.g.*, erosion control and animal habitat). Therefore, exceedances of the CE-LOC are considered far more meaningful than exceedances for any single aquatic plant species. Impacts on smaller scale communities such as headwater streams, ponds, and wetlands could carry over to larger rivers, lakes, and reservoirs which contain organisms that depend on the headwaters and microhabitats the CE-LOC is intended to protect for refuge (*e.g.*, during high flow events, thermal events, predation, and competition) and rich feeding sites for spawning and nursery habitats.

B. Impacted Watersheds

During the re-evaluation process related to the partial remand of the atrazine ID, the Agency employed the Watershed Regression for Pesticides for Multiple Pesticides (WARP-MP) model in conjunction with incorporation of the most recent water monitoring data from the Atrazine Ecological Exposure Monitoring Program (AEEMP), USGS, and the National Center for Water

Quality Research (NCWQR) to conduct an analysis of predicted atrazine concentrations on the sub-watershed scale (hydrologic unit code [HUC]⁵ 12 or 12-Digit HUCs), with a goal to target mitigation to watersheds vulnerable to exceeding the CE-LOC. To identify which HUC 12 watersheds may need mitigation to avoid exceeding the CE-LOC, EPA first compared 60-day average monitored or WARP-MP modeled concentrations to the updated CE-LOC. Watersheds with a predicted concentration above the CE-LOC were proposed to require mitigation, with additional mitigation proposed for watersheds above the 90th percentile national WARP-MP predicted atrazine concentration (i.e., the most vulnerable watersheds based on watershed properties and atrazine use intensity). In the June 2022 proposal, EPA used the higher atrazine concentration of monitoring data or WARP-MP predictions to determine the level of mitigation for a watershed.

For this updated mitigation proposal, and consistent with the 2022 proposed revisions, EPA developed two bins for mitigation. Based on the information EPA had in 2022, comments on the 2022 proposed revisions specific to using the 95th percentile instead of 90th, and the updates from the SAP, the two bins for mitigation now include:

- One bin for watersheds that were above the CE-LOC of 9.7 µg/L but below the 95th percentile of watersheds, which was determined to have a WARP-MP-predicted atrazine concentration of 45.4 µg/L.
- A second bin for watersheds that exceed the 95th percentile of predicted atrazine concentrations (>45.4 µg/L).

Additionally, in the 2022 proposed revisions, monitoring data were used as a replacement for predicted modeling values only when the monitoring results exceeded the modeled value. In this updated proposal, the Agency utilized data from certain monitoring sites that the Agency considered robust enough to be used quantitatively as representative of the HUC-12 watersheds in which those monitoring sites are located. Therefore, in this updated mitigation proposal, if surface water monitoring data met the Agency's high monitoring quality data standard, that data was used as the estimated concentration for that watershed, regardless of whether or not the concentration exceeds the modeled value.

To derive watershed estimates from monitoring data, EPA uses a high monitoring data quantity standard due to the transience of pesticides in flowing waterbodies and the likelihood that infrequent sampling will underestimate 60-day average concentrations. This topic of [quantitative use of surface water monitoring data](#) was brought to a FIFRA Scientific Advisory Panel in 2019 (EPA-HQ-OPP-2019-0417). In the 2022 proposed revisions, AEEMP and NCWQR data were used as direct measurements of atrazine concentrations as these programs sample frequently. Additional monitoring data were included if they met the requirements to be imputed by the model SEAWAVE-QEX (i.e., SEAsonal WAVE with streamflow adjustment and

⁵ For more information on Hydrologic Unit Codes refer to:
https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1042207.pdf

Extended capability), which requires a minimum of 3 years of sampling, at least 12 samples per year, 25% of samples having atrazine detections, and accompanying streamflow data. In the current proposal, in addition to the monitoring data used in the 2022 proposed revisions, 21 additional monitoring sites meeting SEAWAVE-QEX criteria from the Minnesota Department of Agriculture were able to be imputed using SEAWAVE-QEX, once accompanying streamflow data was identified. These SEAWAVE-QEX results were then used as measurements of atrazine in those watersheds.

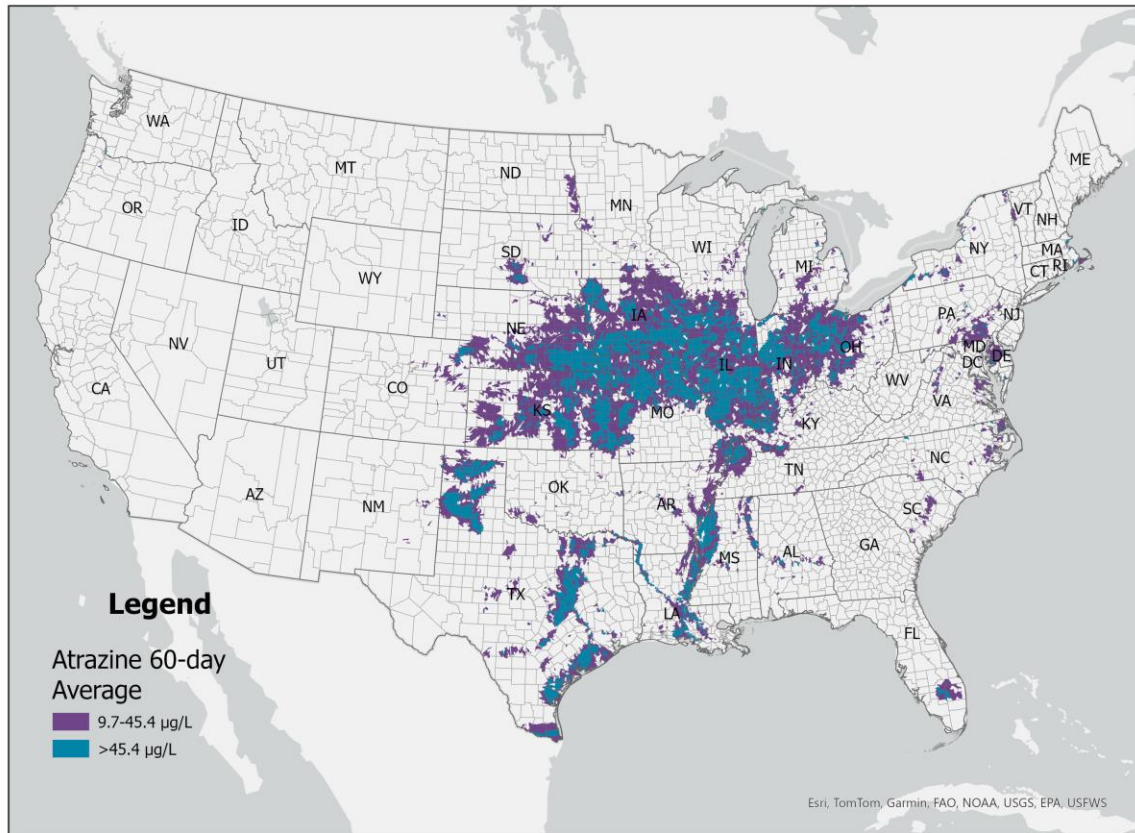
Additionally, atrazine-specific sampling bias factors were utilized in this updated mitigation proposal to make the most use of the available monitoring data while accounting for the uncertainty in non-daily sampling programs. The use of sampling bias factors quantitatively in risk assessment was also vetted through the FIFRA Scientific Advisory Panel in 2019 ([EPA-HQ-OPP-2019-0417-0019](#)). Sampling bias factors (SBFs) are numbers that can be multiplied by a measured concentration, and the resulting value is expected to encompass the maximum concentration that could be observed at that site 95% of the time. These are not interpreted as actual concentrations expected at the sampling site, but measures of the uncertainty around the monitoring data. The value of the sampling bias factors used to adjust monitoring data at a site differs based on the sampling frequency of the program (i.e., higher frequency sampling has less uncertainty and requires less adjustment). These values are listed in Table 1. The use of sampling bias factors allowed for the quantitative use of monitoring data in 300 additional watersheds.

Table 1. Atrazine-Specific Sampling Bias Factors

Sampling Frequency (Samples/Year)	60-day Sampling Bias Factor
≥ 52	3.4
26-51	6.4
17-25	9.4
13-16	13

For this updated mitigation proposal, the analysis of all 12-digit HUCs (watersheds) in the continental U.S. (82,920 total) found predicted atrazine concentrations between 9.7-45.4 µg/L in 7,151 watersheds and predicted concentrations greater than 45.4 µg/L in 4,097 watersheds. Monitoring data was used directly or following imputation with SEAWAVE-QEX for 185 watersheds, sampling bias factor-adjusted monitoring concentrations were used for an additional 300 watersheds, and WARP-MP was used to estimate atrazine concentrations for the remaining 82,435 watersheds (see Figure 1 below).

Figure 1. Predicted Atrazine Concentrations in All 12-digit HUCs in the Continental U.S.⁶



C. Usage, Benefits, and Impacts

As part of the Agency’s re-evaluation process while developing the 2022 proposed revisions document, the EPA reviewed atrazine usage data available for field corn, sweet corn, sorghum, and sugarcane utilizing a combination of market research data, extension literature and stakeholder outreach to assess any changes in the benefits of atrazine, as well as the impacts of any proposed additional mitigation options. BEAD’s *Assessment of the Benefits of Atrazine and the Impacts of Potential Mitigation for Field Corn, Sweet Corn, Sorghum, and Sugarcane* (June 2022) provides both a summary of previous assessments used in the ID as well as updated 2015-2019 use and usage data, benefits, and impacts of proposed additional mitigation for field corn, sweet corn, sorghum, and sugarcane. This analysis supplements the findings specific to field corn, sweet corn, sorghum, and sugarcane in Section II., Section III.C., and Section IV.C. of the atrazine ID.

Per the Agency’s 2022 assessment of the usage and benefits of the use of atrazine, atrazine is

⁶ A high-resolution version of this map can be accessed in docket [EPA-HQ-OPP-2013-0266](https://www.regulations.gov/docket/EPA-HQ-OPP-2013-0266)

widely used in field corn, sweet corn, sorghum, and sugarcane – over half of the acres planted with each of these crops in the United States are treated with atrazine each year. Atrazine is an important herbicide in these crops because it is economical, has a flexible use pattern, long residual herbicidal activity, is effective against a broad spectrum of weeds, and is an important tool in management of herbicide-resistant weeds. The benefits of atrazine are high in these four crops, increasing grower net operating revenue by up to \$30 per acre in field corn, up to \$52 per acre in sweet corn, up to \$16 per acre in sorghum, and up to \$13 per acre in sugarcane compared to the next best alternative weed control options. These benefits are estimated as the impact on growers if atrazine were not available – without atrazine, growers could hypothetically face up to a 61% decrease in net operating revenue in field corn, up to complete net revenue loss in sweet corn, up to a 67% decrease in net operating revenue in sorghum, and up to a 17% decrease in net operating revenue in sugarcane.

III. Updated Proposed Mitigations for Atrazine and Consistency with EPA’s Herbicide Strategy

In this updated mitigation proposal, some of the mitigations for atrazine from the 2022 proposed revisions have been adjusted to provide the same spray drift and run-off mitigation menus for consistency with the Herbicide Strategy (HS) that was finalized on August 20, 2024. This section explains how the Agency updated the earlier proposed mitigations for atrazine in vulnerable watersheds where the CE-LOC is exceeded to provide protections for aquatic plant community structure, function, and productivity. These updates were informed by the final Herbicide Strategy.

A. Herbicide Strategy (HS) Background

The Environmental Protection Agency (EPA) released the [draft Herbicide Strategy](#) for public comment in July 2023 and the [final Herbicide Strategy](#) on August 20, 2024. The Herbicide Strategy is part of EPA’s larger plan to further meeting its Endangered Species Act (ESA) obligations, by identifying protections for hundreds of federally threatened and endangered (listed) species from herbicide exposure. The goal is to identify mitigations even before EPA makes ESA effects determinations or, if necessary, completes an ESA consultation. The Herbicide Strategy describes whether, how much, and where mitigations may be needed to protect species listed by the U.S. Fish and Wildlife Service (FWS)⁷ from agricultural uses of conventional herbicides. To address the potential for population-level impacts from pesticide exposure via runoff/erosion, EPA would identify mitigation points: up to 9 depending on the potential for these impacts. To minimize population-level impacts while also minimizing the impacts on herbicide users, EPA developed a menu of runoff/erosion ecological mitigations

⁷ For species listed by the National Marine Fisheries Service, EPA is addressing pesticide impacts through a separate initiative with that agency.

from practices that EPA has deemed effective at reducing runoff into these habitats, and that can be implemented by growers and other applicators in different parts of the country.

EPA completed a [final Biological Evaluation](#) and is currently in formal consultation with FWS and the National Marine Fisheries Service (Services) for atrazine. For the updated mitigation proposal, EPA used aspects of the Herbicide Strategy to inform this proposal. EPA coordinated with FWS on the development of the Herbicide Strategy and the two agencies are in the process of formalizing their collective understanding of how this strategy can inform consultations, including the ongoing one for atrazine. Since EPA expects FWS would utilize the same mitigation menus in the Herbicide Strategy when it identifies mitigations for listed species during consultation, EPA is similarly using the mitigation menus for this action as described in more detail below.

B. Utilization of the EPA’s Mitigation Menu Website to Expand the 2022 Proposed “Picklist”

In the 2022 Proposed Revisions to the Atrazine Interim Registration Review Decision, the Agency proposed a “picklist” for labels from which a grower would be required to select a combination of application rate reductions and/or runoff mitigation measures if the field is in a watershed with predicted atrazine concentrations that exceeded the CE-LOC to further mitigate potential risks to aquatic plant communities. In response to numerous comments on the infeasibility of the 2022 proposed picklist and the development and release of the final Herbicide Strategy, the Agency is proposing the use of the mitigations and point system identified in the strategy and on EPA’s [mitigation menu](#) website, which will expand the options of mitigation measures growers could implement to achieve a certain amount of points in areas where predicted atrazine concentrations are above the updated CE-LOC of 9.7 µg/L to reduce runoff.

With the flexibility of the run-off/erosion mitigation menu, there are now approximately 40 options for growers to choose from and implement after considering variations in field topography, growing conditions and regional weed pressure. This is a substantial increase in options and flexibility from the 2022 proposal, which proposed 12 mitigation options for field corn, sweet corn, and sorghum, and only one option for sugarcane. This proposal includes a direction for the user to access EPA’s mitigation menu website that is expected to evolve over time and be updated⁸ with additional measures or refinements to those identified to date as new information becomes available.

⁸ <http://www.epa.gov/pesticides/mitigation-menu>

C. Overview of Proposed Mitigation to Reduce Atrazine Runoff and Risks to Aquatic Plant Communities

Through analysis of modeling data in combination with available water monitoring data, EPA has identified watersheds that exceed the CE-LOC of 9.7 µg/L and determined the level of mitigation needed to address this concern. EPA's approach is targeted to provide maximum level of flexibility (recognizing atrazine's high benefits) while addressing the need for mitigation. EPA expects the mitigations will reduce atrazine runoff and thus decrease environmental concentrations in those watersheds with predicted exceedances, while also providing flexibility to growers and allowing for the continued use of atrazine.

The mitigation options being proposed focus on reducing potential exposure and risk to aquatic plant communities from atrazine via runoff from agricultural uses. The four major agricultural use sites for atrazine are field corn, sweet corn, sorghum, and sugarcane, with 2015-2019 market research data suggesting that over half of all acres grown are being treated with atrazine annually⁹. EPA has reviewed the risks to aquatic plant communities, the benefits of atrazine use, and feasibility of mitigation measures in developing its updated proposal.

To address potential risks of concern to aquatic plant communities from runoff as the major route of exposure, EPA has determined that the following proposed nationwide runoff reduction measures are necessary for all atrazine labels:

- prohibit application during rain or when soils are saturated or above field capacity
- restrict annual application rates to 2.0 lbs ai/A/year or less for applications to sorghum, field corn, and sweet corn

In addition to the proposing nationwide mitigation on the labels, EPA is proposing to include a level of mitigation (represented by points) on the label that pesticide applicators would need to achieve (see Table A below) to apply atrazine pesticide products to fields located in watersheds with predicted atrazine concentrations in the two bins that were described earlier in Section II of this document.

This updated mitigation proposal for atrazine considered relevant parts of the Herbicide Strategy's mitigation support document that assigns lower or higher point values to mitigation practices that were determined to be less or more effective, respectively, in reducing runoff/erosion. In the Herbicide Strategy, EPA assigned efficacy points to each of the measures on the runoff/erosion mitigation menu based on the efficacy of reducing exposure of the mitigation measure. Following the same approach, in this updated proposal, generally, high efficacy mitigation measures are worth 3 points, medium efficacy measures are worth 2 points,

⁹ Kynetec USA, Inc. 2020b. "The AgroTrak® Study from Kynetec USA, Inc." Microsoft Access Database. Database Subset: 2015-2019. [Accessed January 2022].

and low efficacy measures are worth 1 point and can be found on the [mitigation menu website](#) with the Ecological Runoff/Erosion Mitigation Measures. EPA determined that mitigation measures are not needed for fields located more than 1,000 feet from non-managed areas or aquatic habitats or for fields that slope away from non-managed areas or aquatic habitats and are implemented to reduce runoff on the downslope side of the field.

In the Herbicide Strategy, EPA assigned relief points to all counties with medium (2 points), low (3 points), or very low (6 points) pesticide runoff vulnerability. This county-level relief reduces the amount of additional mitigation that would be identified in areas that do not have high pesticide runoff vulnerability. The same relief points were identified for this updated mitigation proposal for atrazine. The EPA document listing the [Pesticide Runoff Vulnerability Mitigation Relief Points](#) is available in the Herbicide Strategy docket (EPA-HQ-OPP-2023-0365) and also on the mitigation menu website under "[County list.](#)"

Additionally, the mitigation menu includes one (1) point for those who track the mitigation measures that they adopt. The same has been identified as appropriate for this updated mitigation proposal. More information on mitigation tracking may be found in Section 3.2.2.6.3 of the final Herbicide Strategy.

The bins in Table A reflect watersheds that have predicted concentrations above the CE-LOC of 9.7 µg/L but below the 95th percentile predicted concentration of 45.4 µg/L and watersheds exceeding the 95th percentile (>45.4 µg/L). For bin one, EPA is proposing to assign 3 mitigation points as being necessary to reduce runoff/erosion but still feasible for growers to achieve. The mitigation menu contains the points assigned to mitigations as well as descriptions on how to achieve the mitigation. For bin two, the Agency is proposing to assign 6 mitigation points necessary to reduce runoff/erosion that would be feasible to achieve for fields located in watersheds with the highest vulnerability to atrazine runoff. Apart from the proposed nationwide mitigation noted above, no additional mitigation measures (or points) are needed to mitigate runoff from fields located in watersheds with predicted atrazine concentrations below 9.7 µg/L.

Table A: Proposed Mitigation Point Assignments for Specific Watersheds with Predicted Atrazine Concentrations

Watershed Bin	Predicted Atrazine Concentration (µg/L)	Proposed Mitigation Points Assigned
-	Below 9.7 µg/L	No additional mitigation
1	9.7 - 45.4 µg/L	3 points
2	Above 45.4 µg/L	6 points

To summarize, for the proposed watershed-specific mitigation identified as being necessary, an atrazine user would follow the directions for use on the label, including steps to determine the total number of runoff mitigation points needed to achieve prior to applying an atrazine product as follows:

- Identify the watershed where the application site(s) are located (bin 1, 2 or not applicable).¹⁰
- For a particular use, start with the number of runoff mitigation points (0, 3, or 6 depending on the watershed the application site(s) are located) needed, if any, as indicated on the atrazine label.
- Subtract the number of mitigation relief points¹¹, if any, in geographic areas determined to have limited runoff potential, or other reasons specified.
- Subtract the number of mitigation points, if any, for working with an expert, participating in a conservation program, and/or tracking mitigation measures.
- Subtract the number of mitigation points, if any, for mitigation measures from EPA's menu that the user has already implemented.
- The result is the total number of points that would need to be achieved to apply the atrazine product. After these subtractions, if mitigation points are still greater than or equal to 1, additional measures from the mitigation menu would need to be employed to achieve the remaining mitigation points.

Collectively, these proposed mitigation measures and fulfillment of point assignments are expected to reduce overall atrazine exposure to aquatic plant communities and potential risk to other non-target species, including listed species. Providing multiple options to fulfill the point assignment minimizes the impacts on atrazine users by allowing them to implement the most practical measures for their specific field conditions.

D. Impacts of Proposed Mitigation

EPA is proposing mitigation measures to reduce runoff risks to aquatic plant communities from the use of atrazine, including limiting when and how atrazine can be applied, reducing maximum use rates, and the adoption of other mitigation measures to reduce atrazine runoff.

EPA is proposing the following nationwide use restrictions for all atrazine labels (discussed above):

- Restrict maximum annual application rates for:
 - sorghum, field corn, and sweet corn to 2.0 lbs ai/A/year or less for applications
 - sugarcane to 8.0 lbs a.i./acre in Florida and 4.0 lbs a.i./acre in Louisiana and Texas
- Prohibit application during rain.
- Prohibit when soils are saturated or above field capacity.

¹⁰ During the registration review of atrazine, EPA identifies whether labeling changes may be necessary. This updated mitigation proposal identified the need for a website link so that an atrazine user can identify which watershed bin the application site is located within, as well as determine any corresponding mitigation point assignments or relief points that have been assigned to that particular watershed.

¹¹ Pesticide Runoff Vulnerability Mitigation Relief Points are found at <https://www.regulations.gov/document/EPA-HQ-OPP-2023-0365-1135> or at <https://www.epa.gov/system/files/documents/2024-10/county-mitigation-relief-points-runoff-vulnerability.pdf>

EPA is also proposing the following geographic-specific restrictions for all atrazine labels (discussed above):

- Users must visit a website to determine if their field falls within a Bin that requires runoff mitigation:
 - If in Bin 1, applicators must have achieved 3 points prior to making an application.
 - If in Bin 2, applicators must have achieved 6 points prior to making an application.
 - If in neither, additional mitigation is not needed.

Impacts of an Application Rate Reduction

The potential impact on growers from restricting the maximum application rate will likely affect relatively few acres of field corn. EPA found that, from 2015-2019, 10% of treated field corn acres were treated with an atrazine application rate of 2.0 lbs/A/year or greater nationally. However, in the southern U.S., 20% of treated field corn acres were treated with an atrazine application of 2.0 lbs/A/year or greater.

Distributions of annual application rates are not available for sweet corn, sorghum, or sugarcane. However, average rates are also higher for Southern sweet corn growers compared to sweet corn growers in other regions, so rate reductions could be more restrictive for Southern sweet corn growers relative to growers in other regions. The Agency expects the same pattern will likely hold in sorghum production as well. Based on available data, EPA does not anticipate that sugarcane growers will be impacted by the proposed rate reductions given the proposed reductions account for rates based on soil type. Sugarcane growers in Florida have organic soils that tightly absorb atrazine and, therefore, requires higher rates for effective weed control compared to growers in Louisiana.

Reducing the rate of atrazine below current practice could complicate herbicide resistance management by potentially increasing selection pressure for atrazine-resistant weeds and making atrazine less effective as a tool to control weeds that are resistant to other herbicides. However, EPA also found that some growers using more than 2.0 lbs/A/year may be able to achieve effective control by making banded applications and/or co-applying another herbicide. If rate reductions would result in reduced weed control, growers would likely use alternatives to atrazine, resulting in increased weed control costs and reduced net operating revenue as described above in section II.C. The per-acre impacts of annual rate reductions vary both between crops and between regions within crops. Impacts are likely to be higher for growers of field corn, sweet corn, and sorghum in the Southern U.S. than in other regions due to high weed pressures and frequency of herbicide resistance in target weeds in these areas. Those who are not currently using atrazine at rates higher than 2.0 lbs/A/year would not be impacted by the proposed rate reduction.

Impacts of Prohibiting Applications to Saturated Soils

The proposed updated nationwide mitigation prohibiting atrazine applications when soils are saturated aligns with best management practices that are generally already implemented by

atrazine users when applying with ground equipment. However, prohibiting applications of atrazine when soil is saturated could limit the ability of some growers to use atrazine in the period between rainfall that results in saturated soil until the ground is no longer saturated, as often happens in early spring. As a result, growers often opt to make an aerial application to ensure timely application to avoid waiting to apply until the field is dry enough for ground equipment. Therefore, prohibiting applications to saturated soil would prevent timely application for those who would make aerial applications when ground equipment cannot be used, but this is likely to be a rare situation. According to the most recent available market research data, 99% of atrazine applied to field corn, 95% of atrazine applied to sweet corn, and 99% of atrazine applied to sorghum are applied via ground equipment; the remainder is applied aerially¹². While recent market research data are not available for sugarcane, in the most recent available market research data from 2012-2016, no aerial application of atrazine was reported in sugarcane¹³. If growers cannot apply atrazine, they would need to apply alternatives to atrazine, facing impacts as described above in section II.C.

Impacts of Prohibiting Applications During Rain

The proposed updated nationwide mitigation prohibiting atrazine applications during periods of active rainfall aligns with best management practices that are generally already implemented by atrazine users. Growers typically do not apply herbicides during rain, as this is not conducive to herbicides staying in place, resulting in poor weed control. Therefore, restricting applications of atrazine during rainfall is not expected to have a significant impact on growers.

Impacts of Adopting Runoff Mitigations When Located in Bin 1 or 2

The revised runoff mitigation requirements will use a point system. As with the 2022 proposal, growers who are not already practicing a sufficient combination of runoff mitigation measures will face managerial complexity issues initially as they determine the most cost-effective measures to adopt. However, EPA expects the complexity to be less burdensome than the 2022 proposal because it aligns with the point system that will be implemented under the Herbicide Strategy. Thus, points achieved when implementing mitigation measures for use of other herbicides could be applicable to the points to be achieved for atrazine and points for mitigation measures implemented for atrazine could be applicable to the points to be achieved for other herbicides. Using the mitigation menu that aligns with the Herbicide Strategy also gives growers more flexibility than the 2022 proposed picklist, allowing growers to select from a greater number of runoff mitigation measures than the 2022 proposal.

¹² The AgroTrak® Study from Kynetec USA, Inc.” iMap Software. Database Subset: 2012-2019. [Accessed January 2022].

¹³ McFarley, H. and A. Lee. 2019. Atrazine in Sugarcane: Usage, Benefits, Impacts of Potential Mitigation, and Response to Comments; PC Code (080803). Available at: <https://www.regulations.gov/document?D=EPA-HQ-OPP-2013-0266-1272>.

The revised proposal also identifies that fields beyond 1,000 feet or more from non-managed areas or aquatic habitats or that slope away from non-managed areas or aquatic habitats would not need additional mitigation. The 1,000 feet may include managed and/or developed lands and landscapes in areas adjacent to a pesticide application¹⁴. As a result, fewer fields will likely be affected than the 2022 proposal.

Additionally, this new proposal is based upon a higher CE-LOC compared to the 2022 proposal, which will reduce the area subject to runoff mitigation requirements and sets Bin 2 at the 95th percentile, compared to the 90th percentile in the 2022 proposal. Using the 95th percentile means fewer areas will be required to achieve 6 points of mitigation.

As for point requirements for watersheds in Bin 1 and 2, many growers will receive some points for existing practices or conditions. According to the USDA, some form of runoff/erosion mitigation was practiced on about 50% of agricultural lands in 2022 and more than one measure was in place on another 30% of land¹⁵. In addition, growers in some regions (e.g., many counties in Kansas and Oklahoma, North Central and Midwest¹⁶) are located in areas that receive two or three Geographic Mitigation Relief Points because of their reduced runoff vulnerability.

However, some growers may still face a range of economic and managerial complexities. In particular, atrazine users in many counties in the Lower Mississippi and Texas Gulf¹⁷ region that

¹⁴ The following managed areas can be included in the buffer if they are immediately adjacent/contiguous to the treated field.

- a. Agricultural fields, including untreated portions of the treated field;
- b. Roads, paved or gravel surfaces, mowed grassy areas adjacent to field, and areas of bare ground from recent plowing or grading that are contiguous with the treated area;
- c. Buildings and their perimeters, silos, or other man-made structures with walls and/or roof;
- d. Areas maintained as a mitigation measure for runoff/erosion or drift control, such as vegetative filter strips (VFS), field borders, hedgerows, Conservation Reserve Program lands (CRP)¹, and other mitigation measures identified by EPA on the mitigation menu. (Growers may need to ensure that pesticide use does not cause degradation of the CRP habitat);
- e. Managed wetlands including constructed wetlands on the farm; and
- f. On-farm contained irrigation water resources that are not connected to adjacent water bodies, including on-farm irrigation canals and ditches, water conveyances, managed irrigation/runoff retention basins, and tailwater collection ponds.

¹⁵ [Conservation Effects Assessment Project \(CEAP\): 2022 Conservation Practices on Cultivated Cropland: A Comparison of CEAP I and CEAP II Survey Data and Modeling](#)

¹⁶ Regions are those described in the [Conservation Effects Assessment Project \(CEAP\): 2022 Conservation Practices on Cultivated Cropland: A Comparison of CEAP I and CEAP II Survey Data and Modeling](#). The East Central Region includes parts of PA, OH, MD, VA, NC, SC, GA, AL, TN, KY, IN, WV. The North Central and Midwest Region includes parts of OH, IN, IL, MI, MO, KS, NE, SD, MN, IA, WI.

¹⁷ Regions are those described in the [Conservation Effects Assessment Project \(CEAP\): 2022 Conservation Practices on Cultivated Cropland: A Comparison of CEAP I and CEAP II Survey Data and Modeling](#). The Lower Mississippi and Texas Gulf Region includes parts of TX, LA, MS, AR, TN, MO, and IL.

are in areas of high run-off vulnerability and are not assigned Geographic Mitigation Relief Points, may need to adopt multiple mitigation measures to achieve required points. EPA expects that the impacts of implementing an individual mitigation measure for atrazine will be similar to the expected impacts of implementing the same measure under the Herbicide Strategy (see *Appendix D: Impacts of Mitigation Measures* of the EPA's Scenarios document, available in the Herbicide Strategy docket [EPA-HQ-OPP-2023-0365]). This proposal would only require 3 or 6 points; therefore, growers would not have to implement as many practices as described in the Scenario document where EPA evaluated situations where growers would have to reach 9 points.

EPA designed the mitigation menu to provide growers and/or applicators enough flexibility to choose what is technologically and economically feasible for their specific circumstances. Growers can choose between changing agronomic practices or structural mitigation to achieve the necessary points. Agronomic practices include adopting cover crops or reduced tillage practices. Structural mitigation strategies include vegetative filter strips, field borders, windbreaks, grassed waterways or vegetated ditches. In general, structural mitigations can incur high initial costs that can be disproportionately difficult for small producers without financial resources and may be costly in terms of lost area of production, particularly on small fields. EPA acknowledges that the proposed mitigation system is more complex for applicators than a traditional labeling approach where applicators have few or no options to reduce the extent of mitigations they need to implement. During EPA's outreach efforts between the release of the Draft Herbicide Strategy and the Final Herbicide Strategy, agricultural stakeholders have indicated that they prefer the flexibility of EPA's current approach of a mitigation menu, despite the complexity. To minimize the managerial burden, EPA is developing educational materials, like EPA's Scenarios document, available in the Herbicide Strategy docket [EPA-HQ-OPP-2023-0365], to provide additional information to help growers and pesticide applicators better understand EPA's mitigation menu, and to better inform decisions they may need to make in the future. While these materials were developed for the Herbicide Strategy, because the atrazine mitigation menu will be the same as the mitigation menu developed for the Herbicide Strategy, these materials will also help atrazine users understand the mitigation and how to apply runoff mitigation to their fields.

E. Rationale for Updated Mitigation Proposal

In evaluating the proposed updated mitigation for atrazine to address potential risks to aquatic plant communities, EPA considered the risks, benefits, and use patterns of atrazine, as well as the potential impacts of the updated proposed mitigation. The benefits of continued atrazine use are high because it is economical, has a flexible use pattern, long residual herbicidal activity and is effective against a broad spectrum of weeds. However, EPA identified the updated proposed mitigation as being necessary to address the identified potential risks of concern to aquatic plant communities. The mitigation is focused on toxicity to aquatic plant communities to ensure that atrazine concentrations in watersheds do not cause significant changes in plant

community structure, function and productivity and thus put the food chain at risk with potential risks on the entire aquatic ecosystem. Additionally, EPA considered the impacts on the benefits of atrazine when identifying flexible mitigation options.

The proposed updated nationwide mitigation prohibiting atrazine applications during periods of active rainfall or when soils are saturated or above field capacity aligns with best management practices that are generally already implemented by atrazine users and is expected to reduce potential risks of concern to aquatic plant communities from runoff as the major route of exposure.

Limiting maximum application rates of atrazine for field corn, sweet corn, sorghum, and sugarcane would reduce the amount of atrazine entering the environment by limiting the total potential amount of atrazine that may be applied. Reduced atrazine application rates are being proposed with two options: lower maximum rates prior to crop emergence, and/or lower maximum annual rates.

Currently, the maximum annual rate is 2.5 lbs of atrazine per acre for field corn, sweet corn and sorghum, and the Agency is proposing lowering maximum annual rates to 2.0 lbs a.i./acre, while the current maximum annual rate is 10 lbs of atrazine per acre for sugarcane and EPA is proposing lowering maximum annual rates to 8.0 lbs a.i./acre in Florida and 4.0 lbs a.i./acre in Louisiana and Texas. EPA is proposing less of a reduction in maximum annual rates in Florida than in Texas and Louisiana due to the organic soils in Florida that sugarcane is typically grown in. The organic soil tightly absorbs atrazine and therefore requires higher rates for effective weed control. Lowering the maximum application rate below 8.0 lbs a.i./acre/year in Florida would have substantial impacts on users in terms of yield loss resulting from poor weed control. The proposed lowered maximum annual application rates for field corn, sweet corn, sorghum and sugarcane represents a potential 20% reduction in annual rates.

Based on predicted atrazine concentrations in watershed bins 1 or 2, growers would be required to adopt runoff mitigation measures to achieve 3 or 6 points, respectively, by choosing from the mitigation menu. Defining the 95th percentile (45.4 µg/L) as the division between bins 1 and 2 provides a higher level of identified mitigations as necessary in watersheds with the highest vulnerability to atrazine runoff. EPA considered using the 90th percentile (18.4 µg/L) identified in the 2022 proposal, but determined for this updated proposal, using the 95th percentile as delineation between the two bins of mitigation requirements would help to address the larger impacts identified for sorghum and sugarcane growers for whom the 2022 proposed picklist was less feasible because the 2022 proposed revisions offered few options for sorghum and sugarcane growers specifically.

After considering stakeholder feedback, the expanded use of robust surface water monitoring data is now used in watersheds where the data meet certain requirements as opposed to originally only using WARP-MP modeling output concentrations to inform the binning of those

watersheds. When EPA consulted the external FIFRA Scientific Advisory Panel (SAP) in 2019 on the use of surface water monitoring data, EPA received support in the [SAP's final report](#) to utilize data that met specified criteria for risk assessment purposes. The SAP further agreed that EPA could use infrequent monitoring data by inputting it into the SEAWAVE-QEX model or multiply the monitoring data by atrazine-specific sampling bias factors to bolster confidence that exposure is not underestimated. Therefore, a subset of monitoring data (0.6% of 82,920 watersheds) were used directly (i.e., high frequency monitoring), in the SEAWAVE-QEX model, or following adjustment with sampling bias factors.

As described in *Section III D.*, the mitigation menu developed for ESA strategies gives growers more flexibility than the 2022 proposed picklist, with the goal of providing atrazine users additional options so that if mitigation is required, a grower can select the least burdensome runoff mitigation to implement on an individual farm basis. The updated proposed mitigation is expected to reduce potential risks of concern to aquatic plant communities in vulnerable watersheds via atrazine runoff, while minimizing the impacts to atrazine users.

IV. Next Steps and Timeline

EPA is issuing this updated mitigation proposal for revisions to the atrazine ID to: (1) provide the recalculated atrazine concentration of 9.7 micrograms per liter ($\mu\text{g/L}$), which was derived following an August 2023 SAP, and was used to develop an updated mitigation proposal to address risks of concern to aquatic communities, including plants, fish, invertebrates, and amphibians; (2) utilize monitoring data quantitatively to determine where mitigation is identified as necessary; and (3) provide the points system EPA would use to identify the level of runoff/erosion mitigation to address potential risks of concern to aquatic plant communities identified through this re-evaluation. A user would achieve the number of points of mitigation using the mitigation menu website that was developed for the Final Herbicide Strategy (and expected to be used in other situations), including some additional mitigation options that were not originally included in the 2022 proposed revisions. EPA also considered the high benefits of atrazine and potential impacts to growers in developing this updated mitigation proposal for atrazine.

A Federal Register Notice will announce the availability of this updated mitigation proposal for the atrazine Interim Decision and will open a 30-day comment period. EPA is only soliciting comment on this mitigation proposal and is not reopening the Interim Decision issued in 2020. Appendix A below provides how EPA expects labeling would change in light of this updated proposal.

Appendix A: Updated Mitigation Proposal for Labeling on Atrazine Products

Table 1. Proposed Updated Mitigation Labeling for All Atrazine Technical Products		
Description	Proposed Labeling for All Atrazine Technical Labels	Placement on Label
Soil Saturation Restriction	For all formulations, add the following restriction: “Do not apply atrazine products when soils are saturated or above field capacity.”	Directions for Use
Precipitation Restriction	For all formulations, add the following restrictions: <ul style="list-style-type: none"> • “Do not apply atrazine containing products during rain.” 	Directions for Use
Use Restrictions for Sorghum; Field Corn; Sweet Corn	For all formulations, add the following restriction: “Do not apply more than 2.0 lbs ai/A/year”	Directions for Use

Table 2. Proposed Updated Mitigation Labeling for All Atrazine End-Use Products										
Applications to Field Corn, Sweet Corn, Sorghum and Sugarcane										
Description	Proposed Labeling for All Atrazine End-Use Labels	Placement on Label								
Runoff/Erosion Mitigation	<p>“MANDATORY RUNOFF MITIGATION</p> <p>Before using this product, access [website] and determine if the application site is located in Atrazine Watershed Bin 1 or 2.¹⁸ If your application site is in Atrazine Watershed Bin 1 or 2, runoff mitigation is required for this product unless certain field/application parameters are present at the time of application (i.e., subsurface or tile drains with controlled outlet, perimeter berm systems, irrigation tailwater return systems, spot treatment, etc). Access EPA’s Mitigation Menu Website at www.epa.gov/pesticides/mitigation-menu for a full list of field/application parameters to evaluate whether your field is subject to runoff mitigation. If the application does not meet the specified field/application parameters, you must achieve, at a minimum, the points specified in the table below for Atrazine Watershed Bins 1 and 2 for the crop uses listed on this label:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2">Minimum Mitigation Points to Achieve for Labeled Crop Uses</th> </tr> <tr> <th>Atrazine Watershed Bin</th> <th>Minimum Points to Achieve</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">3 points</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">6 points</td> </tr> </tbody> </table> <p>The applicator must choose among the mitigation and/or mitigation relief measures on EPA’s Mitigation Menu</p>	Minimum Mitigation Points to Achieve for Labeled Crop Uses		Atrazine Watershed Bin	Minimum Points to Achieve	1	3 points	2	6 points	Directions for Use
Minimum Mitigation Points to Achieve for Labeled Crop Uses										
Atrazine Watershed Bin	Minimum Points to Achieve									
1	3 points									
2	6 points									

¹⁸ During the registration review of atrazine, EPA identifies whether labeling changes may be necessary. This updated mitigation proposal identified the need for a website link so that an atrazine user can identify which watershed bin the application site is located within, as well as determine any corresponding mitigation point assignments or relief points that have been assigned to that particular watershed.

	<p>Website to meet or exceed these points before applying this product. The website includes the full menu of runoff mitigation and mitigation relief measures. The following are examples:</p> <ul style="list-style-type: none"> ○ Location in a very low, low, or medium runoff vulnerability county ○ Field slope ○ Soil incorporation ○ Conservation tillage ○ Vegetative strips ○ Cover crop or continuous ground cover ○ Irrigation water management ○ Mulching ○ Grassed waterway ○ Vegetated ditch ○ Constructed and natural wetlands ○ Water retention systems ○ Following recommendations from a runoff/erosion specialist or participating in a qualifying conservation program (see https://www.epa.gov/pesticides/mitigation-menu for minimum elements). <p>To achieve mitigation points for the application, the mitigation and mitigation relief measures must be:</p> <ul style="list-style-type: none"> • Employed in accordance with the instructions and descriptions on EPA’s Mitigation Menu Website. • In place during the application unless a different timing (such as before or after application) is specifically provided in the measure’s description on EPA’s Mitigation Menu Website. <p>EPA may periodically update the Mitigation Menu Website, for example, by adding new mitigation measures or updating a mitigation measure description.</p> <p>When tank mixing, the most restrictive of the products’ labeling requirements must be followed (e.g., use prohibition, timing restriction, application method restriction, sandy soil application restriction). Check Bulletins Live Two! for additional restrictions that may be applicable for your application site. If bulletins are applicable, follow the strictest requirements between the labels and bulletins.”</p>	
Description	Proposed Labeling for All Atrazine Field Corn, Sweet Corn, and Sorghum End-Use Labels	Placement on Label
All States	<ul style="list-style-type: none"> • Do not apply more than 2.0 lbs ai/A/year. 	Directions for Use
Description	Proposed Labeling for All Atrazine Sugarcane End-Use Labels	Placement on Label
Florida	<ul style="list-style-type: none"> • Do not apply more than 8 lbs ai/A/year 	Directions for Use
Texas and Louisiana	<ul style="list-style-type: none"> • Do not apply more than 4 lbs ai/A/year 	Directions for Use

Appendix B. List of Mitigation Measures and Associated Point Values for Ecological Runoff/Erosion Mitigation Measures.

Table B.0-1. EPA Runoff/Erosion Mitigation Measures

EPA Mitigation Measure Title¹	Conditions that Qualify^{1,2}	Points for Mitigation Measure on Mitigation Menu
Application Parameters		
Annual Application Rate Reduction	Any application 10% to <30% less than the maximum labeled annual application rate	1
	Any application 30% to <60% less than the maximum labeled annual application rate	2
	Any application ≥60% less than the maximum labeled annual application rate	3
Reduction in Proportion of Field Treated	10 to <30% of Field Area treated (Banded application, partial treatment, precision sprayers)	2
	30 to <60% of Field Area treated (Banded application, partial treatment, precision sprayers)	3
	≥60% of Field Area treated (Banded application, partial treatment, precision sprayers)	4
Soil Incorporation	Watering-in or mechanical incorporation before runoff producing rain event	1
Field Characteristics³		
Field with slope ≤ 3%	Naturally low slope or flat fields; flat laser leveled fields	2
Predominantly Sandy Soils ⁴	Fields with sand, loamy sand, or sandy loam soil without a restrictive layer that impedes the movement of water through the soil	2
In-Field Mitigation Measures³		
Reduced Tillage Management	Reduced tillage, mulch tillage, strip till, ridge tillage	2
	No-till	3
Reservoir Tillage	Reservoir tillage, furrow diking, basin tillage	3
Contour Farming	Contour farming, contour tillage, contour orchard and perennial crops	2
In-field Vegetative Strips	Inter-row vegetated strips, strip cropping, alley cropping, prairie strips, contour buffer strips, contour strip cropping, prairie strip, alley cropping, vegetative barrier (occurring in a contoured field)	2
Terrace Farming	Terrace farming, terracing, field terracing	2
Cover Crop/Continuous Ground Cover	Cover crop, double cropping, relay cropping	1 (tillage used)
		2 (no tillage, short term)
		3 (no tillage, long term)

EPA Mitigation Measure Title¹	Conditions that Qualify^{1,2}	Points for Mitigation Measure on Mitigation Menu
Irrigation Water Management	Use of soil moisture sensors/evapotranspiration meters with center pivots & sprinklers; above ground drip tape, drip emitters; micro-sprinklers	2 (general irrigation management)
	Below tarp irrigation, below ground drip tape; dry farming, non-irrigated lands	3 (subsurface irrigation; no Irrigation)
Mulching with Natural and Artificial Materials	Mulching with artificial materials (i.e., landscape fabrics, synthetic mulches)	1
	Mulching with natural materials	3
Erosion Barriers	Wattles, Silt Fences	2
Adjacent to Field Mitigation Measures⁵		
Grassed Waterway	Grassed waterway	2
Vegetative Filter Strips - Adjacent to the Field	20 to <30 ft Vegetative filter strip (VFS), field border	1
	30 to <60 ft Vegetative filter strip (VFS), field border	2
	≥60 ft Vegetative filter strip (VFS), field border	3
Vegetated Ditch	Vegetated ditch	1
Riparian Area	20 to <30 ft Riparian forest buffer, riparian herbaceous cover Riparian forest buffer, riparian herbaceous cover	1
	30 to <60 ft Riparian forest buffer, riparian herbaceous cover	2
	≥60 ft Riparian forest buffer, riparian herbaceous cover	3
Constructed and Natural Wetlands	Constructed wetlands, Wetland and Riparian Landscape/Habitat Improvement	3
Terrestrial Habitat Landscape Improvement	20 to <30 ft Terrestrial Landscape/habitat improvement	1
	30 to <60 ft Terrestrial Landscape/ habitat improvement	2
	≥60 ft Terrestrial Landscape/ habitat improvement	3
Filtering Devices with Activated Carbon or Compost Amendments	Filters, sleeves, socks, or filtration units containing activated carbon	3
	Filters, sleeves, socks, or filtration units containing compost	1
Systems that Capture Runoff and Discharge		
Water Retention Systems	Retention pond, sediment basins, catch basins, sediment traps	2
Subsurface Drainages and Tile Drainage Installed <i>without</i> Controlled Drainage Structure	Subsurface tile drains, tile drains	1

EPA Mitigation Measure Title ¹	Conditions that Qualify ^{1,2}	Points for Mitigation Measure on Mitigation Menu
Other Mitigation Measures		
Mitigation measures from multiple categories (<i>i.e.</i> , in-field, adjacent to the field, or water retention systems) are utilized. ⁶	See measures in categories above.	1

¹ <https://www.epa.gov/pesticides/mitigation-menu> Not all measures are applicable to all fields and crops.

² Only one of the practices that qualify from a ‘mitigation measure’ can be used. For example, a user could get credit for cover cropping or double cropping but not both.

³ Multiple field characteristics may apply to an individual field.

⁴ Soil texture is as defined by USDA’s soil classification system. See USDA’s Web Soil Survey tool to determine soil texture: <https://websoilsurvey.nrcs.usda.gov/app/>.

⁵ Adjacent to the field mitigations should be located downgradient from a treated field to effectively reduce pesticide exposure in runoff and erosion.

⁶ For example, if a cover cropping and adjacent to the field VFS are both utilized, the efficacy of the mitigation measures in combination may be increased.

Table B.0-2. Crosswalk Between EPA’ Other Mitigation Considerations for Ecological Runoff/Erosion and Examples of Existing Conservation Practices that Meet EPA’s Minimum Requirements

Other Mitigation Considerations ¹	General Description of Qualifying Practices	Points for Mitigation Measure on Mitigation Menu
Additional considerations associated with the extent of mitigation associated with any particular field/area		
Pesticide Runoff Vulnerability	County based mitigation relief, see description below	2 to 6 relief points based on location ²
Participate in a Qualifying Conservation Program	Enrolled and participating in a qualifying conservation program	2
Follow Recommendations from a Runoff/Erosion Specialist	Working with a runoff/erosion technical specialist	1
Mitigation Tracking	Mitigation measure tracking	1
Areas 1000 ft Down-Gradient from Application Areas ³	Areas where there is not a potential for population-level impacts from off-site exposure to runoff/erosion from pesticide applications	No additional mitigation needed

¹ <https://www.epa.gov/pesticides/mitigation-menu> Not all measures are applicable to all fields and crops.

² <https://www.epa.gov/system/files/documents/2024-10/county-mitigation-relief-points-runoff-vulnerability.pdf>
See Appendix B of the Herbicide Strategy for a list of mitigation relief points by State and County, available in the Herbicide Strategy docket (EPA-HQ-OPP-2023-0365) on www.regulations.gov.

³ Downslope managed areas within 1000 feet downslope of treated area where runoff/erosion mitigations were not identified: a. Agricultural fields, including untreated portions of the treated field; b. Roads, paved or gravel surfaces, mowed grassy areas adjacent to field, and areas of bare ground from recent plowing or grading that are contiguous with the treated area; c. Buildings and their perimeters, silos, or other man-made structures with walls and/or roof; d. Areas maintained as a mitigation measure for runoff/erosion or spray drift control, such as vegetative filter strips (VFS), field borders, hedgerows, Conservation Reserve Program lands (CRP) , and other mitigation measures identified by EPA on the mitigation menu. Managed wetlands including constructed wetlands on the farm; and f. On-farm contained irrigation water resources that are not connected to adjacent water bodies, including on-farm irrigation canals and ditches, water conveyances, managed irrigation/runoff retention basins, and tailwater collection ponds.

Appendix C. Office of Pesticide Programs Response to Comments on the 2022 Proposed Revisions to the Atrazine Interim Registration Review Decision

This appendix provides EPA's responses to public comments on the 2022 Proposed Revisions to the Atrazine Interim Registration Review Decision (Mitigation Proposal) and supporting documents, received as part of the registration review process. The comments below were reviewed and addressed by EPA's Office of Pesticide Programs (OPP) Environmental Fate and Effects Division (EFED), Biological and Economic Analysis Division (BEAD), and Pesticide Re-Evaluation Division (PRD).

Many of the comments received shared the same topic; therefore, EPA addressed these comments collectively by theme.

There were numerous comments on the Concentration Equivalent Level of Concern (CE-LOC) of 3.4 µg/L. EPA appreciates those comments and has since made revisions after considering those comments. Please refer to the [Update to "EFED's Support Documentation for the Proposed Revisions to the Atrazine Interim Registration Review Decision Regarding Risks to Aquatic Plant Communities"](#).

Each comment is denoted by the docket number and a four-digit number that was assigned to the individual submission. For instance, the comment denoted EPA-HQ-OPP-2013-0266-0010 is located in the atrazine docket number (EPA-HQ-OPP-2013-0266) and was assigned the identification number 0010. All comments can be found by searching regulations.gov for the complete string. The comments are organized by the following major themes and subdivided into specific topics related to that theme:

1. Concentration Equivalent Level of Concern (CE-LOC) and Effects to Aquatic Plant Communities
2. Exposure Predictions in the Aquatic Environment (Including Modeling Assumptions and Monitoring Data)
3. Development and Implementation of the Updated Mitigation Proposal

Summary and Responses to Comments by Subject Category

Concentration Equivalent Level of Concern (CE-LOC) and Effects to Aquatic Plant Communities

Atrazine Metabolites: Comments submitted by Beyond Pesticides (EPA-HQ-OPP-2013-0266-1703)

Comment: Beyond Pesticides stated that, "The CE-LOC used also does not incorporate toxic metabolites of atrazine including desethyl-s-atrazine (DEA), desisopropyl-s-atrazine (DIA), and diaminochlorotriazine (DACT) that also pose serious risk concerns to aquatic plant communities."

EPA Response: Based on available single-organism toxicity data for aquatic organisms, including fish, aquatic invertebrates, aquatic phase amphibians, and aquatic plants, the primary degradates of atrazine (e.g., DEA, DIA, DACT) are less toxic than the parent compound. For these reasons, aquatic exposure modeling was based on atrazine only. For aquatic plant communities, many of the atrazine cosm studies, showed that measured concentrations of atrazine decreased over time and since many of the cosm

studies were closed systems, effects (or lack thereof) in some studies would have been the result of exposure to atrazine and its degradates, collectively.

Necessary CE-LOC Information: Comment submitted by Syngenta Crop Protection (EPA-HQ-OPP-2013-0266-1755)

Comment: Syngenta noted that EPA failed to provide information necessary to understand and reconstruct CE-LOC determinations.

EPA Response: EPA's [2024 Update](#) (EPA-HQ-OPP-2013-0266-2128) included a CE-LOC protocol (Appendix III) and the necessary files (Appendix IV) to recreate the 2016 CE-LOC of 3.4 µg/L and the 2024 CE-LOC of 9.7 µg/L. Other necessary components are now publicly available, including the updated cosm database (see Appendix II) and EPA's reevaluations (see Appendix I, the [2023 SAP White Paper](#), [2023 SAP meeting minutes](#), and [EPA's response to the 2023 SAP](#); 2023 SAP docket: EPA-HQ-OPP-2023-0154).

Cosm studies mentioned in comments: Comments submitted by Syngenta Crop Protection (EPA-HQ-OPP-2013-0266-1755) and the Triazine Network (EPA-HQ-OPP-2013-0266-1655)

Comment: Syngenta and the Triazine Network identified specific cosm studies in EPA's cosm database where they disagreed on the study's inclusion due to quality concerns, EPA's effect/no-effect conclusions, or the number of endpoints associated with the study (i.e., splitting of endpoints for various reasons).

EPA Response: For the 2023 FIFRA Scientific Advisory Panel meeting, EPA reevaluated the majority of the cosm studies identified in public comments. The [2023 SAP White Paper](#), [the 2023 SAP's final report](#), and [EPA's response to the 2023 SAP](#), which indicated concurrence with the 2023 SAP's overall recommendations and presented final conclusions, have been made public (2023 SAP docket: EPA-HQ-OPP-2023-0154).

For the remaining studies mentioned in the public comments, EPA did not reevaluate those that were in the cosm database at the time of the 2012 SAP meeting as the 2012 SAP did not identify them as needing reevaluation. The 2012 SAP stated that other cosm studies beyond the 11 did not need to be reassessed because there was agreement among the panel on including the studies and on EPA's effect/no-effect conclusions for the endpoints within the studies.

There are three studies mentioned in the public comments that were not in the database at the time of the 2012 SAP – Pannard *et al.* (2009), Baxter *et al.* (2011), and King *et al.* (2016) – that were not evaluated by either the 2012 or 2023 SAP. EPA received comments indicating disagreement on the former two. In EPA's [2024 Update](#) (EPA-HQ-OPP-2013-0266-2128), EPA reevaluated Pannard *et al.* (2009) and Baxter *et al.* (2011) following the same approach used in the 2023 SAP White Paper and presented final conclusions (see Appendix I of EPA's 2024 Update for the reevaluations).

The 2024 Update explains EPA's position on the reevaluated studies and contains the updated cosm database (Appendix II) that reflects the removal of a subset of cosm studies following the 2023 SAP

meeting and EPA's effect/no-effect conclusions on the remaining studies that were used to calculate the CE-LOC of 9.7 µg/L.

King et al. (2016): Comment submitted by the Triazine Network (EPA-HQ-OPP-2013-0266-1655)

Comment: The Triazine Network's 2022 public comment states that "The results of King *et al.* (2016) [cosm study] support a 60-day LOC¹⁹ for atrazine of 20-30 µg a.i./L." The Triazine Network supports this claim by saying that, "Only transient effects were observed in functional endpoints at the highest 60-day rolling average concentration of 30 µg a.i./L."

EPA Response: The King *et al.* (2016) study is often regarded as the "gold standard" study for validating the CE-LOC estimate by Syngenta Crop Protection, Triazine Network, etc. However, the atrazine cosm database is not intended to represent toxicity to a specific organism or community under specific conditions. Rather, the cosm database is intended to capture as much environmental variability as possible given the intent to protect aquatic plant communities at a national level. The King *et al.* (2016) study represents one community under one set of conditions and was therefore used as part of the weight of evidence.

Additionally, contrary to the Triazine Network's comment on the study's observed effects, both EPA and Syngenta (see Attachment 1, MRID 51885101, of their 2022 comment) assigned an effect at test concentrations of approximately 10, 20, and 30 µg/L (initial and 60-day average). Therefore, the King *et al.* (2016) study would technically support a 60-day CE-LOC for atrazine of 10 µg/L, which is approximately the CE-LOC that EPA presented in the [2024 Update](#) (9.7 µg/L; EPA-HQ-OPP-2013-0266-2128).

Additional discussions of the King *et al.* (2016) study can be found in the [2016 Refined Ecological Risk Assessment](#) (EPA-HQ-OPP-2013-0266-0315) and [2019 Response to Public Comments on the Refined Ecological Risk Assessment for Atrazine](#) (page 3 of EPA-HQ-OPP-2013-0266-1267).

Cosm criteria and weighting studies: Comments submitted by Syngenta Crop Protection (EPA-HQ-OPP-2013-0266-1755) and the Triazine Network (EPA-HQ-OPP-2013-0266-1655)

Comment: Public comments criticized EPA's evaluation and use of the cosm studies. For example, the Triazine Network stated that "Key Studies Did Not Meet [EPA's] Basic Requirements of Toxicity Testing" and cited USEPA (2016), which is the ["Ecological Effects Test Guidelines: OCSPP 850.1000 Background and Special Considerations-Tests with Aquatic and Sediment-Dwelling Fauna and Aquatic Microcosms."](#) Syngenta commented "EFED's evaluation criteria were not scored systematically or numerically" and that "All studies that were not rejected were given equal weight in EFED's LOC analysis." The comment also states that EPA has not documented criteria for scoring effects.

¹⁹ EPA's aquatic plant community level of concern is called the CE-LOC, or concentration equivalent level of concern. Some public comments from 2022 referred to this value as a LOC, or level of concern, and in some cases, this might have been due to the different calculation method used to derive the value. In this document, "CE-LOC" is used unless "LOC" is part of a direct quote.

As an alternative, Syngenta presented a new reanalysis that included assigning “Quality Scores” to each cosm study based on ten criteria (each scored 0-2) divided into either a relevance or a reliability category (see Table 5 in Attachment 1, MRID 51885101, of Syngenta’s comment). After the studies were scored in the reanalysis, studies that received a score below 0.5 (total score/total possible of 20) were removed from the reanalysis.

EPA Response: EPA did not use OCSPP toxicity guidelines (e.g., 850 series) when evaluating the cosm studies because those guidelines are primarily intended for registrant submitted studies, not open literature studies like those in the cosm database. Instead, EPA completed thorough and transparent open literature data evaluation records (DERs) that first considered the prescreening and quality criteria (EPA-HQ-OPP-2013-0266-0332) to determine whether a study would be included or excluded in the cosm database. In the DERs, scientists then used a weight of evidence approach to determine if the studies included in the cosm database showed an effect or no effect at the tested concentration(s). This involved considering characteristics that are included in Syngenta’s Quality Score criteria, like the consistency of the response and confounding factors that might have impacted the results. In addition to the detailed DERs, most of the studies have been evaluated by multiple SAPs for their inclusion in the database and their effect/no-effect conclusions, EPA has utilized public comments to guide adjustments to the cosm database, and some studies have had multiple reevaluations by different staff. Thus, EPA believes the cosm database contains quality cosm data and the current effect/no-effect conclusions are accurate.

Using the alternative Quality Score approach proposed by Syngenta would fault a study for common, acceptable features of cosm studies that highlights the variation in these studies that EPA wants to capture (e.g., realism, size, complexity). Other criteria of Syngenta’s approach would either go against EPA’s quality criteria (e.g., replication, atrazine analysis) or were already considered (e.g., consistency of response, confounding factors), along with other characteristics of the studies, when EPA completed the DERs. Overall, the goal of EPA’s cosm database is to include studies that test multiple plant species (i.e., not single organisms) to better understand the effects of atrazine on plant communities, not necessarily to include highly complex, ultra-realistic studies that the Quality Score approach would identify.

Finally, EPA posits that the Quality Score approach could be subject to bias, even if it does have a seemingly “systematic” approach that results in a number (e.g., the criteria chosen, the separation of each criterion, the scores given to each study, the cutoff for removal). Some of this bias could result from a difference in scientific opinion, which can be seen by comparing the scores given in Syngenta’s reanalysis versus the 2023 FIFRA SAP recommendations (e.g., the Seguin groups scored below the University of Kansas groups, but the SAP only recommended retaining the former). Additionally, the removal of studies from the reanalysis based on an arbitrary cutoff is a matter of filtering the data, not truly weighting each study.

Removal of studies with durations <30 days: Comment submitted by Syngenta Crop Protection (EPA-HQ-OPP-2013-0266-1755)

Comment: Syngenta presented multiple CE-LOCs from their reanalysis for EPA to consider, including some that excluded endpoints from cosm studies with durations <30 days. The following was stated,

“The uncertainty associated with extrapolating from short observations periods [in the cosm studies] to long-term averages [in the LOC calculation] could have a significant influence on the LOC... one way to reduce the effect of this uncertainty is to limit the LOC analysis to data from cosm studies with a duration equal to or greater than the analysis period [of 30 or 60 days].”

EPA Response: As noted in Attachment 1 (MRID 51885101) of Syngenta’s comment, “duration appeared to have little influence on the concentrations at which effects were observed... suggesting that effects were primarily a function of the initial (maximum) concentrations regardless of exposure duration.” So, removing all studies with a duration of less than a certain number of days used in the analysis unnecessarily reduces the dataset used to calculate the CE-LOC. Therefore, when recalculating the CE-LOC presented in the [2024 Update](#) (EPA-HQ-OPP-2013-0266-2128), EPA did not remove studies from the cosm database solely because they had durations less than 30 days

Recommendation of a 30-day CE-LOC: Comment submitted by Syngenta Crop Protection (EPA-HQ-OPP-2013-0266-1755)

Comment: Syngenta stated that, “The updated analysis recommends the 30-day CE-LOC of 29.8 µg/L as the most scientifically reliable CE-LOC”, which uses “higher-quality data points” and “remove[s] studies with less than 30-day observation periods to avoid the uncertainty of extracting the outcomes to longer time frames.”

EPA Response: As addressed in Response 1.5 and 1.6, EPA believes the cosm database contains quality cosm data and did not remove studies beyond those removed following the 2023 SAP recommendations.

EPA also did not move away from the 60-day CE-LOC calculation. Starting on page 193, the [2016 Refined Ecological Risk Assessment](#) (EPA-HQ-OPP-2013-0266-0315) discusses EPA’s rationale for using a 60-day assessment period. In short, the 60-day assessment period was chosen because it would include all or almost all periods of significant exposure in the Atrazine Ecological Exposure Monitoring Program (AEEMP) monitoring data and would also encompass the duration of all but a few of the cosm studies.

Over the years, there have been many calculations of an aquatic plant community CE-LOC for atrazine and EPA acknowledges the variability based on differing methods and interpretations. However, EPA believes the revised 60-day CE-LOC of 9.7 µg/L that EPA detailed in its [2024 Update](#) (EPA-HQ-OPP-2013-0266-2128) is supported by the best available science and takes into account stakeholder input and concerns, the recommendations of the 2023 SAP on the studies it reviewed (EPA-HQ-OPP-2023-0154-0050), additional study reevaluations, and consideration of public comments received in 2022.

Reproductive Effects: Comments submitted by Center for Food Safety (EPA-HQ-OPP-2013-0266-1782)

Comment: Center for Food Safety suggested that even if the proposed CE-LOC of 3.4 µg/L does protect aquatic plant communities, it is still too high to protect sensitive aquatic life from reproductive harm. They noted that atrazine-induced reductions in fish egg production and reproductive dysfunction in amphibians could pose long-term threats to the viability of sensitive fish populations.

EPA Response: As noted in the 2019 response to comments on the Probabilistic Risk Assessment (PRA), a review of the amphibian toxicity dataset was included in the 2012 problem formulation and presented at the 2012 Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Scientific Advisory Panel (SAP). In response to the SAP, the Agency considered the breadth of aquatic toxicity data in a weight of evidence analysis of sublethal effects to amphibians in the 2016 PRA. The 2016 PRA specified that 3.4 µg a.i./L was considered protective of sublethal effects to amphibians based on the weight of evidence, including potential impacts to reproduction. Considering the toxicity data for reproductive effects that is presented in the PRA, 3.4 µg a.i./L was considered protective of effects to fish as well.

Environmental Impacts of Atrazine Runoff: Comments submitted by Agribusiness Association of Iowa, (EPA-HQ-OPP-2013-0266-1715); Beyond Pesticides (EPA-HQ-OPP-2013-0266-1703); Center for Food Safety (EPA-HQ-OPP-2013-0266-1782); Colorado Farm Bureau (EPA-HQ-OPP-2-13-266-1727); Illinois Farm Bureau (EPA-HQ-OPP-2013-0266-1734); Kansas Agribusiness Retailers Association (EPA-HQ-OPP-2013-0266-1725); National Corn Growers Association (EPA-HQ-OPP-2013-0266-1741); Pennsylvania Farm Bureau (EPA-HQ-2013-0266-1733); Weed Science Society of America (EPA-HQ-OPP-2013-0266-1764) and Wisconsin Department of Agriculture, Trade and Consumer Protection (EPA-HQ-2013-0266-1732)

Comment: Weed Science Society of America (WSSA) noted that the Mitigation Proposal describes the environmental impacts of atrazine runoff as “reduced biological diversity, reduced food items, reduction in habitat, increased erodibility, and reduction in water quality.” WSSA requested that the Agency provide a more detailed list of specific, documented environmental impacts that are being weighed against the clearly described benefits. Other commenters provided similar comments pertaining to this.

EPA Response: The Agency balances the conclusions of risk assessments with conclusions of the benefit assessments, when making risk management decisions. Environmental risk assessments leverage laboratory and field data, mathematical modeling, and real-world incidents to describe expected and documented effects to the environment from pesticide use. Documented environmental impacts are not likely to account for the total environmental effects of pesticide use, as it is unlikely that every effect will be observed, reported, investigated, and submitted to the Agency. Therefore, although incident data are valuable in risk assessment, documented incidents of every listed measure of environmental health are not required to make risk conclusions to be balanced with the benefits.

Ecological risks from atrazine runoff are described in the [2016 Refined Ecological Risk Assessment](#), which includes discussion of documented ecological incidents attributed to atrazine (Section 13; see Appendix K for the full incident list). A total of 667 incidents had a certainty rating of “probable” or higher, of which the majority (91%) report damage to plants from registered uses of atrazine. An additional 48 incidents involved aquatic animals and 18 involved terrestrial animals. Incidents involving animals generally report mortality, while sublethal effects (*e.g.*, population decline through reduced reproduction) would not be reported as an incident. However, the PRA shows that atrazine exposure has documented effects on certain non-target taxa, and it is reasonable to conclude that where those effects are likely, effects on one taxon would reduce the availability of that taxon as dietary items/prey

to their predators, that dead or stunted plants would no longer reduce erosion or protect water quality as effectively, etc.

Comment Submitted by Beyond Pesticides (EPA-HQ-OPP-2013-0266-1703)

Comment: The Agency's benefits assessment did not adequately consider loss of aquatic species and ecosystem services from impaired habitats and sensitive aquatic plant communities. They noted that the benefits of atrazine use are diminished by availability of alternative pest management practices that include cultural practices and/or less toxic pest management products, including numerous other registered pesticides.

EPA Response: The Agency considers both the costs and the benefits of the use of a pesticide but assesses them separately and does not estimate a 'net' cost or 'net' benefit. Instead, the Agency has long described the decision as a risk-benefit balancing recognizing that factors are frequently measured in different ways and/or can be difficult to quantify. As part of its ecological risk assessments, EPA considers adverse environmental effects from use of the pesticide, including effects on non-target organisms on or off treated areas. EPA has generally referred to these effects as the 'risks' rather than 'costs' from use of the pesticide. EPA considers the risks to ecosystem services from the use of atrazine. EPA considers whether there are adverse effects to non-target organisms (e.g., aquatic species) and documents them in Agency risk assessments. OPP does not place a dollar value on adverse effects and OPP does not think it is necessary or particularly informative to monetize identified negative effects of the use of atrazine on aquatic environments. EPA identified mitigation measures to address the risks of use of atrazine aquatic communities binned based on the CE-LOC.

EPA also identifies the benefits of the use of atrazine in terms of impact to growers in the absence of atrazine. EPA identified alternative herbicides that likely would be used as replacements in the absence of atrazine and considers the benefits of atrazine in comparison to the next best method of weed control. Regardless of the availability of alternatives, OPP identified high benefits to users of atrazine.

Exposure Predictions in the Aquatic Environment (Modeling Assumptions and Monitoring Data)

WARP-MP Model Input and Mapping Errors: Comments submitted by Agricultural Retailers Association (EPA-HQ-OPP-2013-0266-1744); Minnesota Department of Agriculture (EPA-HQ-OPP-2013-0266-1705); Mississippi Farm Bureau Federation (EPA-HQ-OPP-2013-0266-1737); Missouri Association of Soil and Water Conservation Districts (EPA-HQ-OPP-2013-0266-1714); Missouri Corn Growers Association (EPA-HQ-OPP-2013-0266-1731); National Agricultural Aviation Association (EPA-HQ-OPP-2013-0266-1720); Southern Illinois University Carbondale (EPA-HQ-OPP-2013-0266-1736); and Syngenta Crop Protection (EPA-HQ-OPP-2013-0266-1755; MRIDs [51885102](#) and [51885103](#))

Comment: Syngenta and many others commented that there were errors in modeling and mapping in the 2022 Proposed Revisions to Atrazine Interim Registration Review Decision (2022 proposed revisions) First, they noted that instead of inputting total rainfall figures for May and June combined, as the WARP-MP model directs, EPA used average rainfall figures in the 2016 WARP-MP model runs, which are half the appropriate rainfall value. Second, they noted that the EPA used explanatory variables in WARP-MP from 2006-2009, suggesting more specifically that the factor representing the percentage of a

watershed with a soil-restrictive layer within the top 25 cm of the soil surface (SRL25) be recalculated with newer data that corrects an error (i.e., missing data) in the original database.

Regarding the Atrazine Ecological Exposure Monitoring Program (AEEMP) data used in the 2022 proposed revisions, Syngenta also suggested that EPA used erroneous geographic coordinate data for five of the AEEMP monitoring sites, that AEEMP watershed boundaries do not always align with HUC-12 boundaries, and that some AEEMP data may be missing from EPA's dataset. They also noted that that graphs of AEEMP data from the 2022 proposed revisions include incorrect data.

Lastly, Syngenta noted that the map showing areas proposed for mitigation in the 2022 proposed revisions did not properly display the location of watersheds requiring mitigation.

EPA Response: Regarding the WARP-MP precipitation input parameter, EPA agrees that this was an error in that the WARP-MP modeling from 2016 included averaged rainfall instead of total rainfall in May and June. EPA has updated the WARP-MP modeling to correct this error so that the model is parameterized correctly. EPA is however not updating model inputs to incorporate more recent AEEMP data since the publication of the model. EPA has confidence in the ability of the model to predict vulnerability to atrazine runoff as currently parameterized.

EPA acknowledges that the graphs of AEEMP data in the 2022 proposed revisions have erroneous watershed boundaries. However, correcting this plot does not change the outcome of the analysis and EPA's decision to rely on the 95th prediction interval from WARP-MP. EPA has also verified that the values used to generate the maps are correct and match the commenter's values.

EPA was unaware that additional AEEMP data was available in the atrazine ecological monitoring database (AEMD) submitted to EPA by Syngenta in 2017. This additional AEEMP data has been included in the current 2024 updated proposal as well as the associated geographic coordinate data in the AEMD. However, EPA is continuing to use the AEEMP coordinates to identify a representative HUC-12 region to compare modeling with monitoring, rather than using the AEEMP watershed boundaries as EPA is mitigating on a HUC-12 scale. EPA has assumed that all monitoring sites within a HUC-12 watershed with sufficient monitoring data to use quantitatively can be considered representative of the entire HUC-12 and therefore used in place of modeling. The updated geographic coordinates for the AEEMP sites did not change the assigned HUC-12 watershed for any site and the additional AEEMP data did not change the assigned mitigation bin for any watershed. The mapping has also been updated to correctly display watershed locations based on the HUC-12 shapefile used by WARP-MP (refer to EPA-HQ-OPP-2013-0266-2128 for more information on the error correction).

Rounding Percentile Values: Comments submitted by Missouri Association of Soil and Water Conservation Districts (EPA-HQ-OPP-2013-0266-1714) and Syngenta Crop Protection (EPA-HQ-OPP-2013-0266-1755)

Comment: Syngenta and a few other commenters noted that EPA rounded the WARP-MP computed percentile for the second bin of mitigation to the nearest integer such that the 9.8 µg/L value represents the 89.5th percentile, not the 90th percentile, which would be 10.8 µg/L.

EPA Response: Following EPA's updates to the CE-LOC, modeling/monitoring, and change of the second mitigation bin to the 95th percentile, the second bin of mitigation is not rounded and now begins at a concentration of 45.4 µg/L.

WARP-MP Overpredicts Monitoring Data: Comments submitted by Agribusiness Association of Iowa (EPA-HQ-OPP-2013-0266-1715); Agricultural Retailers Association (EPA-HQ-OPP-2013-0266-1744); CropLife America (EPA-HQ-OPP-2013-0266-1632); Illinois Farm Bureau (EPA-HQ-OPP-2013-0266-1734); Minnesota Department of Agriculture (EPA-HQ-OPP-2013-0266-1705); Missouri Association of Soil and Water Conservation Districts (EPA-HQ-OPP-2013-0266-1714); Missouri Corn Growers Association (EPA-HQ-OPP-2013-0266-1731); Southern Illinois University Carbondale (EPA-HQ-OPP-2013-0266-1736); and Syngenta Crop Protection (EPA-HQ-OPP-2013-0266-1755)

Comment: Several commenters suggested that the Watershed Regressions for Pesticides for multiple pesticides (WARP-MP) model has overpredicted atrazine concentrations in surface water monitoring data. The Minnesota Department of Agriculture (MDA) (EPA-HQ-OPP-2013-0266-1705) and Washington State Department of Agriculture (WSDA) (EPA-HQ-OPP-2013-0266-1756) submitted analyses of state-collected surface water monitoring data in support of this assertion. Based on 8,171 atrazine results collected from 400 surface water monitoring sites between 2010 and 2021, the MDA does not believe any river or stream in Minnesota is approaching a 60-day average atrazine concentration ≥ 3.4 µg/L (the previously defined CE-LOC). They suggest that the predicted concentrations from EPA's WARP-MP modeling efforts are overly conservative and do not account for atrazine stewardship strategies implemented in Minnesota. WSDA expressed similar concerns, sharing that no sample ever exceeded an atrazine concentration of 3.1 µg/L out of over 5000 samples from 24 unique streams or rivers between 2003 and 2020.

Syngenta Crop Protection submitted (EPA-HQ-OPP-2013-0266-1755) an analysis of monitoring data from state agencies in four states (Iowa Department of Natural Resources, Kansas Department of Health and Environment, Minnesota Department of Agriculture, Minnesota Pollution Control Agency, and Nebraska Department of Environmental Quality) as well as discussion of AEEMP data to support a similar conclusion regarding overprediction of monitoring data when using the WARP-MP upper 95% prediction interval.

Similarly, CropLife America recommends that EPA use the predicted value ("median") from WARP-MP rather than the 95% prediction interval, suggesting that most watersheds are overpredicted by a factor of 8X while capturing high-end AEEMP concentrations.

EPA Response: EPA acknowledges the importance of state-level water monitoring and outreach efforts to reduce the loading of atrazine to aquatic environments.

In developing the current atrazine mitigation proposal, EPA targeted mitigation to watersheds with the potential to exceed the CE-LOC (i.e., watersheds vulnerable to atrazine runoff). This included estimating the potential to exceed the CE-LOC in each watershed. EPA evaluated all available atrazine monitoring data using data quantity standards discussed in the 2019 SAP (EPA-HQ-OPP-2019-0417) for quantitative use of monitoring data in assessments. These standards are used because of the transience of pesticides

in flowing waterbodies and the likelihood that infrequent sampling will miss peak concentrations, which would underestimate the 60-day average exposure. EPA found that 485 of the HUC-12 watersheds nationwide have monitoring sites with atrazine monitoring data meeting those data quantity standards including SEAWAVE-QEX and sampling bias factors (SBF); 185 watersheds relying on the highest frequency monitoring and 300 watersheds relying on sampling bias factor-adjusted concentrations. In the current proposal, EPA is using the results of the monitoring analysis as direct estimates of exposure in those watersheds rather than the modeling results.

While 485 watersheds represent significant high-frequency monitoring efforts, EPA currently lacks a method for spatially extrapolating monitoring data to the rest of the HUC-12 watersheds (nearly 83,000), as differences in the landscape between watersheds will change the amount of atrazine runoff and the vulnerability of a waterbody to that atrazine runoff. For the rest of the HUC-12 watersheds, EPA relied on WARP-MP predictions, which is based on watershed properties, atrazine use intensity, and is calibrated with atrazine monitoring data.

To derive a watershed concentration from WARP-MP, EPA has two choices based on the WARP-MP results. WARP-MP provides an estimate of atrazine concentrations (referred to as the “median”) as well as a 95-percent prediction interval, which incorporates model error and is the range in which the actual concentration is expected to occur 95% of the time. EPA is relying on the upper 95% prediction interval from WARP-MP as a measure of a watershed’s vulnerability to atrazine runoff. This does not mean that EPA expects the WARP-MP predicted concentration to occur each year, but that the watershed is vulnerable to atrazine runoff and may exceed the CE-LOC without runoff mitigations.

Based on the available monitoring data, EPA is confident that the upper 95% prediction interval from WARP-MP will be protective of real exposures. However, EPA expects that the median value from WARP-MP would underpredict monitoring data in some watersheds, meaning that mitigations would not be in place where needed. In the high frequency monitoring dataset EPA compiled, excluding the watersheds with sampling bias factor-adjusted concentrations, 27 watersheds (15% of watersheds with monitoring) exceed the current CE-LOC of 9.7 µg/L and <2% exceed the 95th percentile threshold of 45.4 µg/L based on measured concentrations. In all the watersheds with monitoring data showing exceedance of the CE-LOC, the upper 95% prediction interval from WARP-MP also predicts concentrations greater than 9.7 µg/L. However, the median prediction from WARP-MP would mis-categorize 41% of those watersheds as not exceeding the CE-LOC. This means that if EPA relied on the median to predict vulnerability for watershed-specific mitigation across the country, a number of watersheds is expected to be under-mitigated.

Regarding the specific concerns from MDA and WSDA about WARP-MP predictions compared to their state monitoring data, EPA notes that the updates to the CE-LOC, WARP-MP modeling, and mapping removed many watersheds in Minnesota from proposed mitigation, and only one watershed in Washington is currently proposed for mitigation. Additionally, EPA was able to impute monitoring data from sites in 21 watersheds in Minnesota and use these atrazine concentrations directly; all 21 watersheds had SEAWAVE-QEX-imputed maximum 60-day averages below the CE-LOC. EPA notes that the limitation with using SEAWAVE-QEX on non-USGS, highly sampled monitoring data is often the ability to pair streamflow data with pesticide monitoring data at each site. For the remaining

watersheds, EPA also acknowledges that mitigation practices currently in place may not be reflected in the WARP-MP estimate and would be expected to result in lower observed atrazine concentrations in waterbodies, as suggested by MDA. EPA notes that those mitigations currently in place may potentially be used to satisfy the proposed mitigation requirements.

Second Bin of Mitigation Based on WARP-MP: Comment submitted by Syngenta Crop Protection (EPA-HQ-OPP-2013-0266-1755)

Comment: Syngenta expressed concerns that the second tier of mitigation, which is proposed for watersheds above the 90th percentile national WARP-MP predicted atrazine concentration, is not tied to a scientific reasoning related to aquatic plant communities but require significant additional mitigation.

EPA Response: EPA's updated mitigation proposal includes two bins of mitigation to account for the increased likelihood of and confidence in the CE-LOC being exceeded more frequently in watersheds with the highest vulnerability to atrazine runoff. Defining the 95% percentile (45.4 µg/L) as the division between bins 1 and 2 will still provide protection for watersheds with the highest vulnerability to atrazine runoff and give growers more flexibility than the 2022 proposed picklist, with the goal of providing atrazine users additional options so that if mitigation is required, a grower can select the least burdensome runoff mitigations on an individual farm basis. The updated proposed mitigation is expected to reduce potential risks of concern to aquatic plant communities via atrazine runoff, while minimizing the costs to atrazine users.

Expand Atrazine Monitoring: Comment submitted by Center for Biological Diversity (CBD) (EPA-HQ-OPP-2013-0266-1750)

Comment: CBD suggested that EPA should expand the AEEMP to monitor atrazine levels in all vulnerable waterways and that monitoring should be designed to detect peak flow during periods when atrazine is most likely being used and running off into waterways at levels greater than 3.4 ppb. CBD also requested that additional mitigation measures be imposed in the future beyond the requirements proposed in the 2022 Proposal if atrazine water concentrations are evidenced to not decrease below the CE-LOC over time.

EPA Response: EPA appreciates the comment and will take it into consideration in how monitoring may be used to evaluate the effectiveness of the mitigation measures being proposed to reduce atrazine water concentrations in vulnerable watersheds.

Development and Implementation of the Proposed Mitigation Menu Requirements

Rain Statement: Comments submitted by Agribusiness Association of Iowa, (EPA-HQ-OPP-2013-0266-1715); Illinois Farm Bureau, (EPA-HQ-OPP-2013-0266-1734); Michigan Farm Bureau, (EPA-HQ-OPP-2013-0266-1751); Minnesota Corn Growers Association, (EPA-HQ-OPP-2013-0266-1735); Mississippi Department of Agriculture and Commerce, (EPA-HQ-OPP-2013-0266-1752); Missouri Department of Agriculture, (EPA-HQ-OPP-2013-0266-1663); Missouri Farm Bureau, (EPA-HQ-OPP-2013-0266-1760); National Agricultural Aviation Association, (EPA-HQ-OPP-2013-0266-1720); National Corn Growers Association, (EPA-HQ-OPP-2013-0266-1741); South Dakota Department of Agriculture and Natural Resources, (EPA-HQ-OPP-2013-0266-1716); Syngenta Crop Protection (EPA-HQ-OPP-2013-0266-1755); United States Department of Agriculture, (EPA-HQ-OPP-2013-0266-1761); and Wisconsin Department Of Agriculture, Trade and Consumer Protection, (EPA-HQ-OPP-2013-0266-1732)

Comment: Numerous commenters suggested the removal of “Do not apply atrazine containing products when a storm event likely to produce runoff from the treated area is forecasted (by National Oceanic Atmospheric Administration/National Weather Service, or other similar forecasting service) to occur within 48 hours following application” as a mitigation requirement.

EPA Response: EPA did not include this statement in the updated mitigation proposal for atrazine because this mitigation is most effective for pesticides that are mobile and non-persistent, as described in EPA’s “Ecological Mitigation Support Document to Support Endangered Species Strategies” available in the Herbicide Strategy docket (EPA-HQ-OPP-2023-0365). Atrazine is highly mobile but is persistent, and so a 48-hour rain restriction would not be effective in reducing runoff for atrazine. However, a rain restriction is still being proposed that would prohibit application during rain or when soils are saturated or above field capacity because this mitigation aligns with best management practices that are generally already implemented by atrazine users and is expected to reduce potential risks of concern to aquatic plant communities from runoff as the major route of exposure.

Aerial Applications: Comments submitted by Agribusiness Association of Iowa, (EPA-HQ-OPP-2013-0266-1715); National Agricultural Aviation Association, (EPA-HQ-OPP-2013-0266-1720); and National Corn Growers Association, (EPA-HQ-OPP-2013-0266-1741)

Comment: Several commenters suggested the removal of “Aerial application is prohibited” as a mitigation requirement.

EPA Response: EPA did not include this statement in the updated mitigation proposal. EPA is not proposing to prohibit aerial applications of liquid formulations because additional modeling with the Pesticide Water Calculator indicates that aerial applications, given drift buffers already required on atrazine labels, do not lead to higher aquatic exposure relative to ground applications.

Mulching: Comments submitted by United States Department of Agriculture, (EPA-HQ-OPP-2013-0266-1761) and Weed Science Society of America, (EPA-HQ-OPP-2013-0266-1764)

Comment: Commenters suggested the addition of mulching as a picklist option for all crops.

EPA Response: In the updated mitigation proposal, EPA includes the mitigation menu developed for the Herbicide Strategy which includes an expanded menu of mitigation options relative to the 2022 proposed ID. Mulching with natural or artificial materials is included in the mitigation menu. The mitigation menu, including descriptions of mitigation menu options, can be found on the pesticide mitigation menu website: www.epa.gov/pesticides/mitigation-menu.

Consolidation of Picklist Options: Comments submitted by Agribusiness Association of Iowa, (EPA-HQ-OPP-2013-0266-1715); Center for Biological Diversity (EPA-HQ-OPP-2013-0266-1750); Illinois Farm Bureau, (EPA-HQ-OPP-2013-0266-1734); Illinois Fertilizer & Chemical Association, (EPA-HQ-OPP-2013-0266-1862); Iowa Department of Agriculture and Land Stewardship, (EPA-HQ-OPP-2013-0266-1701); Michigan Corn Growers Association, (EPA-HQ-OPP-2013-0266-1746); Minnesota Corn Growers Association, (EPA-HQ-OPP-2013-0266-1735); Minnesota Department of Agriculture, (EPA-HQ-OPP-2013-0266-1705); Mississippi Farm Bureau Federation, (EPA-HQ-OPP-2013-0266-1737); Missouri Association of Soil and Water Conservation Districts, (EPA-HQ-OPP-2013-0266-1714); Missouri Corn Growers Association, (EPA-HQ-OPP-2013-0266-1731); National Agricultural Aviation Association, (EPA-HQ-OPP-2013-0266-1720); National Corn Growers Association, (EPA-HQ-OPP-2013-0266-1741); Nebraska Corn Growers Association and Nebraska Corn Board, (EPA-HQ-OPP-2013-0266-1713); Nebraska Department of Agriculture, (EPA-HQ-OPP-2013-0266-1677); Pennsylvania Farm Bureau, (EPA-HQ-OPP-2013-0266-1733); South Dakota Department of Agriculture and Natural Resources, (EPA-HQ-OPP-2013-0266-1716); Weed Science Society of America, (EPA-HQ-OPP-2013-0266-1764); Wisconsin Department Of Agriculture, Trade and Consumer Protection (DATCP) ,(EPA-HQ-OPP-2013-0266-1732) and Syngenta Crop Protection (EPA-HQ-OPP-2013-0266-1755)

Comment: Many commenters submitted suggestions to consolidate or simplify the picklist options. The Center for Biological Diversity (CBD) (EPA-HQ-OPP-2013-0266-1750) specifically suggested consolidating contour farming, contour strip cropping, and contour buffer strips mitigations into one mitigation (“contour farming”) with specific requirements based on slope, rainfall, and erosion potential. Additionally, CBD proposed removing irrigation water management as a picklist option.

EPA Response: EPA has revised the mitigation menu for atrazine including consolidating similar mitigation measures as described above. Irrigation water management has been retained on the mitigation menu because the available data indicates this mitigation is effective for reducing pesticide runoff, but the description has been revised following further review. For more information on how the mitigation measures for contour farming and irrigation water management have been revised, see EPA’s pesticide mitigation menu website: www.epa.gov/pesticides/mitigation-menu.

Pre-mix or Tank Mixtures: Comments submitted by United States Department of Agriculture, (EPA-HQ-OPP-2013-0266-1761)

Comment: Commenters suggested the addition of pre-mix or tank mixtures as a picklist option. (OPMP)

EPA Response: Pre-mixes and tank mixes were considered but not added as a standalone mitigation menu option because tank mixes and pre-mixes are not, by themselves, expected to reduce pesticide

runoff. However, using a pre-mix or tank mix of atrazine with another herbicide may allow applicators to apply atrazine at a lower rate without reducing efficacy against target weeds. That application could then be used to achieve points for a reduction in the annual application rate.

Split Pre- and Post-Emergence Applications: Comments submitted by United States Department of Agriculture, (EPA-HQ-OPP-2013-0266-1761); Weed Science Society of America, (EPA-HQ-OPP-2013-0266-1764)

Comment: Commenters suggested the addition of split pre- and post-emergence applications as a picklist option stating that the practice arguably has a similar overall atrazine loading benefit as not making any pre-emergence applications, but it is a better fit with the agronomic practices that many field corn, sorghum and sweet corn growers already implement.

EPA Response: Split pre- and post- emergence applications are not predicted to be an effective measure to reduce the mass of atrazine in runoff and the commenters did not provide any data that demonstrates otherwise. At the time of pre-emergent (to the crop) applications, fields typically have lower vegetation than after crop emergence, which makes them more prone to runoff than after the crop has emerged. Additionally, splitting pre-emergence and post-emergence applications would reduce the single application rate of atrazine, but likely not the annual application rate. Annual application rate reductions are an option on the mitigation menu.

Overhead Irrigation: Comments submitted by Agribusiness Association of Iowa, (EPA-HQ-OPP-2013-0266-1715), Mississippi Farm Bureau Federation, (EPA-HQ-OPP-2013-0266-1737) and Weed Science Society of America (EPA-HQ-OPP-2013-0266-1764)

Comment: Several commenters suggested the addition of overhead irrigation as a picklist option.

EPA Response: EPA's updated mitigation proposal includes the use of the mitigation menu originally developed for the Herbicide Strategy. Center pivot and overhead sprinkler irrigation with runoff controls are included under irrigation water management. To qualify under this mitigation measure, sprinkler irrigation systems must include soil moisture sensors or evapotranspiration meters to reduce irrigation-induced runoff from fields. For more information on how the mitigation measures irrigation water management has been revised, see EPA's pesticide mitigation menu [website](#).

Using "Smart" Sprayers or Other Targeted Technologies: Comments submitted by Illinois Farm Bureau, (EPA-HQ-OPP-2013-0266-1734); Mississippi Farm Bureau Federation, (EPA-HQ-OPP-2013-0266-1737); Missouri Department of Agriculture, (EPA-HQ-OPP-2013-0266-1663); National Agricultural Aviation Association, (EPA-HQ-OPP-2013-0266-1720); and United States Department of Agriculture, (EPA-HQ-OPP-2013-0266-1761)

Comment: Numerous commenters suggested the addition of using "smart" sprayers or other targeted technologies as a picklist option (OPMP).

EPA Response: Reductions in run-off mass associated with smart sprayers and precision sprayers are included in the mitigation menu under the mitigation measure 'Reduction in Proportion of Field

Treated'. Several types of smart or precision spray technologies are available, and some can reduce the area treated by targeting pesticide applications to specific areas of the field. This could allow users to reduce the area treated without reducing effectiveness of weed control. For more information on mitigation measures, see EPA's pesticide mitigation menu website: www.epa.gov/pesticides/mitigation-menu.

Overly Complex and Burdensome Mitigations: Comments submitted by National Sorghum Producers, (EPA-HQ-OPP-2013-0266-1657); Syngenta Crop Protection LLC, (EPA-HQ-OPP-2013-0266-1755); and Washington Friends of Farms and Forests, (EPA-HQ-OPP-2013-0266-1754)

Comment: Numerous commenters stated that the proposed additional mitigation requirements will require an extremely complex and burdensome implementation process.

Commenters also state that due to the unavailability, impracticality, or cost of the mitigation measures, atrazine users in many cases will have to choose to reduce atrazine rates to avoid additional mitigation requirements they do not wish to or cannot implement. They suggest that this will result in use below current and recommended rates in many cases and will lead to a lack of adequate weed control, which in turn will reduce yields and increase herbicide resistance issues.

EPA Response: Since the issuance of the 2022 proposed revisions, EPA has updated the menu of mitigations available. The updated mitigation proposal includes the use of the mitigation menu that provides more flexibilities than the 2022 proposal. EPA recognizes that use of the mitigation menu (originally developed for the Herbicide Strategy) will be new and achieving the level of mitigation identified to be necessary may create additional management burden for growers and applicators. EPA also acknowledges that not all mitigation measures provided on the menu will be feasible for every crop, region, or individual field. The use of mitigation menu provides growers and/or applicators enough flexibility to choose what is technologically and economically feasible for their specific circumstances. Additionally, through EPA's outreach efforts related to the Herbicide Strategy (e.g., mitigation workshop, various stakeholder meetings), many agricultural stakeholders indicated that they prefer the flexibility of EPA's current thinking, despite the complexity, to a simple but rigid set of specific requirements.

To increase flexibility and reduce managerial burden on atrazine users, EPA's updated mitigation proposal uses EPA's mitigation measures menu and website located at: www.epa.gov/pesticides/mitigation-menu. EPA has and will continue to develop educational materials²⁰ to provide additional information to help pesticide applicators better understand the mitigation menu to better inform decisions they may need to make in the future. These educational materials could also help to inform users of atrazine under EPA's updated mitigation proposal. Further, the expanded mitigation menu in the updated mitigation proposal contains a larger number

²⁰ Application of EPA's Runoff and Erosion and Spray Drift Mitigations Through Scenarios that Represent Crop Production Systems in Support of Endangered Species Strategies: <https://www.regulations.gov/document/EPA-HQ-OPP-2023-0365-1139>; Crosswalk of EPA's Ecological Mitigation Measures with USDA NRCS Conservation Practices in Support of EPA's Endangered Species Strategies: <https://www.regulations.gov/document/EPA-HQ-OPP-2023-0365-1136>

of mitigation measures to select from than was originally proposed for atrazine. In addition, the mitigation menu contains mitigation relief for areas that are naturally less prone to pesticide runoff and points for field characteristics that make an individual field less prone to pesticide runoff. Some growers may achieve enough runoff points to meet labeling requirements for using atrazine from mitigation or mitigation relief measures already in place. Some growers may need to implement new mitigation measures or users may need to alter application parameters to achieve enough points to use atrazine. EPA's Scenarios document supporting the final Herbicide Strategy (EPA-HQ-OPP-2023-0365) provides information about how runoff/erosion mitigations may be achieved in several situations that could help those applying atrazine understand what may need to be achieved in the future.

The commenter notes that growers are likely to use ineffective rates to be able to achieve a given level of mitigation. However, by adopting the suite of mitigation available in the mitigation menu, growers would have many more mitigation options than proposed in 2022. Annual rate reduction remains an option for growers to select from; however, growers are less likely to need to use rate reductions as their main option to achieve a given number of points given the additional options available. If a grower were to use a reduced annual application rate to achieve points, impacts of rate reductions for atrazine are discussed in more detail in EPA's 2022 benefits assessment for atrazine. Due to concerns over complexity and growers using rates that could lead to resistance, EPA will work with the atrazine registrants to address these issues to the extent possible. For example, providing a table on the pesticide product laying out use sites, rates and required mitigation in a concise table for all uses subject to runoff/erosion mitigation could reduce some of these complexities.

Difficulty in implementing the proposed mitigations: Comment Submitted by National Sorghum Producers (EPA-HQ-OPP-2013-0266-1627)

Comment: National Sorghum Producers stated that only three of the twelve proposed additional mitigation options are available to atrazine users producing a non-irrigated crop on flat land. However, two of those mitigations function in conflict. The "soil incorporation" mitigation option requires tilling and the no- or reduced tillage mitigation requires atrazine for sorghum growers to accomplish. For the 90 percent of sorghum acres, which are non-irrigated, the Agency's picklist fails to offer options. The bulk of sorghum production is in the High Plains regions of Texas and Kansas, which are arid and largely flat. These areas are low risk for runoff and therefore low risk for off-field movement of atrazine, yet they will likely lose access to atrazine due to the CE-LOC values and highly erodible land (HEL) designations, which trigger mitigations requirements producers are unable to meet if the proposed mitigation requirements stand.

EPA Response: The Agency's updated atrazine mitigation proposal includes the use of the same menu of mitigations developed for the [Herbicide Strategy](#). The mitigation menu available on EPA's website at www.epa.gov/pesticides/mitigation-menu includes expanded mitigation measure options, mitigation relief for areas with low runoff vulnerability, and points for field characteristics that result in lower potential for runoff. Non-irrigated flat lands alone achieve five mitigation points. In addition, fields that are in counties with low run-off vulnerability receive three mitigation relief points. Therefore, non-irrigated flat lands in low run-off vulnerability counties can achieve eight mitigation points, irrespective

of the other mitigation measures on the field. Since the highest mitigation points EPA is proposing is six points, these fields would not require additional mitigation. Fields that are irrigated, sloped, or are not located in a county that receives relief points for low pesticide runoff vulnerability may need to adopt additional mitigation measures to use atrazine, but as the commenter points out most sorghum fields in the High Plains region are non-irrigated, largely flat, and arid and would qualify for at least some of these points.

Record-Keeping Requirements: Comments submitted by Iowa Department of Agriculture and Land Stewardship, (EPA-HQ-OPP-2013-0266-1701); Mississippi Farm Bureau Federation, (EPA-HQ-OPP-2013-0266-1737); Missouri Department of Agriculture, (EPA-HQ-OPP-2013-0266-1693); United States Department of Agriculture (USDA) ,(EPA-HQ-OPP-2013-0266-1761); Washington Friends of Farms and Forests, (EPA-HQ-OPP-2013-0266-1754)

Comment: Commenters stated that the proposed record-keeping requirements identified in the 2022 Proposed Revisions to Atrazine Interim Registration Review Decision extend beyond those specifically required by state pesticide certification programs and do not consider of the cost of applicator training resources, practices for effective implementation of the record-keeping requirements (coordinated by the grower, landowner, applicator, etc.), and the assessment of an applicator's overall ability to meet the proposed compliance standards.

EPA Response: The Agency's updated mitigation proposal includes the use of the mitigation menu developed for the Herbicide Strategy, which includes more mitigation measure options than the 2022 proposed revisions. The menu of mitigations includes mitigation tracking that provides a mitigation relief point when the mitigation measures employed are tracked. Record keeping is no longer a proposed requirement, but mitigation tracking is an option to achieve one point. For the current mitigation menu, see EPA's mitigation menu website: www.epa.gov/pesticides/mitigation-menu.

Atrazine Usage on Sugarcane; Comment Submitted by Center for Biological Diversity (EPA-HQ-OPP-2013-0266-1750)

Comment: The Agency estimated the benefits from the use on sugarcane to be lower than other crops. The comment suggested that sugarcane will be more likely to be responsible for regional atrazine pollution pressure because the 2022 mitigation proposal allows higher rates on sugarcane than other crops and weaker mitigation requirements. CBD questioned EPA's justification for retaining atrazine use on sugarcane.

EPA Response: As discussed in the Agency's 2022 benefits assessment, EPA identified high benefits of atrazine use in sugarcane because it is economical, has a flexible use pattern, a long residual period, and good crop safety.

EPA's updated mitigation proposal includes the mitigation menu developed for the Herbicide Strategy that includes expanded mitigation measure options, mitigation relief points for areas with low runoff vulnerability, and for field characteristics that result in lower potential for runoff. The updated

mitigation proposal contains options that are feasible in sugarcane, such as vegetated ditches, low slope fields, elevated berm systems in some sugarcane-producing areas, moderate pesticide runoff vulnerability in some areas, and dryland farming (under the mitigation measure ‘irrigation water management’) in some areas. Because of this, the mitigation menu requirements will be applied to sugarcane consistent with other crops. For the current mitigation menu, see EPA’s mitigation menu website: www.epa.gov/pesticides/mitigation-menu.

Cover Crops: Comments submitted by Agriculture Nutrients Policy Council, (EPA-HQ-OPP-2013-0266-1753); CropLife America, (EPA-HQ-OPP-2013-0266-1775); Illinois Farm Bureau, (EPA-HQ-OPP-2013-0266-1734); and National Corn Growers Association (NCGA), (EPA-HQ-OPP-2013-0266-1741)

Comment: CropLife America commented that the proposed revisions state that the cover crop “...must be planted after harvest of the previous season’s crop.” This definition does not consider various agronomic practices adopted by American farmers like seeds that are planted while the previous season’s crop is still standing to ensure that the cover crop has germinated by harvest time. Another option on the pick list is “no pre-emergence applications,” which is inconsistent with conservation tillage and cover cropping practices. Atrazine is applied pre-emergence to help with weed control.

EPA Response: EPA acknowledges that the 2022 proposed description of cover crop was too narrow. EPA’s updated mitigation proposal includes the mitigation menu developed for the Herbicide Strategy, including expanding the description and associated mitigation points for cover crops to include more timing options. For more information on how the mitigation measure for cover crops has been revised, see EPA’s pesticide mitigation menu website: www.epa.gov/pesticides/mitigation-menu.

Best Management Practices; Comment Submitted by Syngenta (MRID 51885104)

Comment: Syngenta submitted a document outlining best management practices (BMPs) for reducing atrazine runoff published by USDA, state agencies, and universities (MRID 51885104). The document includes recommendations for several potential items to add to the picklist, including a comparison of recommendations between sources, suggested descriptions for new picklist items, and efficacy information. The document also included differences in the requirements between EPA’s picklist items and BMPs available from other sources.

EPA Response: EPA’s updated mitigation proposal includes the mitigation menu developed for the Herbicide Strategy. Some of the BMPs recommended by the commenter are included in the current mitigation menu, including banded applications (included under the mitigation measure ‘Reduction in Proportion of Field Treated’) and subsurface drainage with or without a controlled outlet. Several other mitigation measure descriptions have been revised. Some of these were discussed earlier in this document. For more information on the mitigation measures included in the mitigation menu, see EPA’s pesticide mitigation menu website: www.epa.gov/pesticides/mitigation-menu. For a discussion of efficacy of mitigation measures, see EPA’s “Ecological Mitigation Support Document to Support Endangered Species Strategies” available in the Herbicide Strategy docket (EPA-HQ-OPP-2023-0365).