Dated: December 4, 2024.

César Zapata,

Acting Regional Administrator, Region 4.

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ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 180

[EPA–HQ–OPP–2024–0431; FRL–12415–01–OCSPP]

Chlorpyrifos; Tolerance Revocation

AGENCY: Environmental Protection Agency (EPA).

ACTION: Proposed rule.

SUMMARY: EPA is proposing to revoke all tolerances for residues of chlorpyrifos, except for those associated with the use of chlorpyrifos on the following crops: alfalfa, apple, asparagus, tart cherry, citrus, cotton, peach, soybean, strawberry, sugar beet, and spring and winter wheat. This proposal also addresses the request to revoke all chlorpyrifos tolerances contained in the September 12, 2007, petition submitted by the Natural Resources Defense Council (NRDC) and Pesticide Action Network North America (PANNA).

DATES: Comments must be received on or before February 10, 2025.

ADDRESSES: Submit your comments, identified by docket identification (ID) number EPA–HQ–OPP–2024–0431, through the Federal eRulemaking Portal at *https://www.regulations.gov.* Follow the online instructions for submitting comments. Do not submit electronically any information you consider to be Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. Additional instructions on commenting and visiting the docket, along with more information about dockets generally, is available at *https://www.epa.gov/dockets.*

FOR FURTHER INFORMATION CONTACT: Patricia Biggio, Pesticide Re-Evaluation Division (7508M), Office of Pesticide Programs, Environmental Protection Agency, 1200 Pennsylvania Ave. NW, Washington, DC 20460–0001; telephone number: 202–566–0700; email address: *OPPChlorpyrifosInquiries@epa.gov.*

SUPPLEMENTARY INFORMATION:

I. General Information

A. Does this action apply to me?

This action is directed to the public in general and may be of interest to a wide range of stakeholders including environmental, human health, and agricultural advocates; the chemical industry; pesticide users; and members of the public interested in the sale, distribution, or use of pesticides. Since others also may be interested, the Agency has not attempted to describe all the specific entities that may be affected by this action.

B. How can I get electronic access to other related information?

You may access a frequently updated electronic version of 40 CFR part 180 through the Office of the Federal Register's e-CFR site at *https://www.ecfr.gov/current/title-40.*

C. What action is the Agency proposing?

EPA is proposing to revoke all tolerances for residues of the insecticide chlorpyrifos as contained in 40 CFR 180.342, except for those tolerances associated with 11 uses that were proposed for retention in the Agency's December 2020 C*hlorpyrifos Proposed Interim Decision* (2020 PID). (Ref. 1) As a result of voluntary cancellations and label amendments, registrations of chlorpyrifos will be limited in terms of food uses to these crops within certain states, as proposed in the 2020 PID and EPA's *Updated Chlorpyrifos Refined Drinking Water Assessment for Registration Review* (September 2020) (''2020 DWA'') as described in Unit III below. (Ref. 2)

Therefore, the Agency is proposing to revoke all other tolerances that are not needed as a result of the cancellations, including uses in food handling establishments and food service establishments. This proposal will also address the request to revoke chlorpyrifos tolerances in the pending 2007 Petition from NRDC and PANNA.

D. What is EPA's authority for taking this action?

Pursuant to its authority under section 408 of the Federal Food, Drug, and Cosmetic Act (FFDCA), 21 U.S.C. 346a (*https://www.govinfo.gov/link/uscode/21/346a*), EPA may respond to a petition filed with the Agency under FFDCA section 408(d) by issuing a proposed and final rule under FFDCA section 408(e). The 2007 Petition requested that EPA revoke chlorpyrifos tolerances, as well as cancel chlorpyrifos registrations. EPA is proposing to revoke chlorpyrifos tolerances that will no longer be necessary due to the cancellation of domestic uses on those commodities. Under section 408(e) of the FFDCA, EPA may issue a rule revoking tolerances after providing notice of a proposed rulemaking and a period of not less than 60 days for public comment. 21 U.S.C. 346a(e).

E. What is the expected impact of this action?

The revocations of these tolerances are not expected to present extraordinary circumstances because the registrants have requested, pursuant to the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) section 6(f) (7 U.S.C. 136d(f)), to voluntarily cancel uses associated with these tolerances. EPA is in the process of approving those cancellation requests under FIFRA, which means that soon the tolerances will no longer be needed to cover residues of chlorpyrifos in or on those food commodities.

The revocations of tolerances could impact foreign producers who use chlorpyrifos to control insect pests and importers of those commodities. Shipments found to have residues could not be sold in the United States, which may represent a loss to importers or their trading partners. It is possible that these effects could have downstream effects, such as raising costs to U.S. consumers of these commodities. Regardless of the potential impacts of this action, tolerances can only be maintained if they are safe, which is a risk-only analysis under the FFDCA.

F. What can I do if I want the Agency to maintain, for import purposes, a tolerance that the Agency proposes to revoke?

This proposed rule provides a 60-day public comment period. All chlorpyrifos registrants have already voluntarily requested cancellation of all the uses of chlorpyrifos associated with the tolerances proposed for revocation in this notice. Once those cancellations are effective, those uses of chlorpyrifos on these commodities will no longer be registered in the United States, and once use terminates under the applicable existing stocks provisions, the tolerances will no longer be necessary to cover residues from use of the pesticide. Any food being moved through interstate commerce after tolerances are revoked would be covered by the FFDCA channels of trade provision, 21 U.S.C. 346a(l)(5), as described in Unit VII.A. The Agency's typical process, *e.g.,* during registration review, is to remove tolerances from the regulations that are no longer necessary. This avoids confusion among the regulated community by reflecting registered uses and label directions and helps with consistency in enforcement under the FFDCA and FIFRA.

The only reason to retain a tolerance in such circumstances is for import purposes. Any commenter seeking to retain tolerances for import purposes

must provide a comment to that effect and include information demonstrating the need for retaining a specific tolerance for specific imports, even if they have previously provided this information; a hypothetical need based on the potential for some commodities containing chlorpyrifos residues to one day be imported into the United States is insufficient.

If any data are necessary to retain the tolerances for import purposes, EPA will issue an order in the **Federal Register** under FFDCA section 408(f). The order would specify data needed and the timeframes for submission of the data and would require that within 90 days some person or persons notify EPA that they will submit the data. If the data are not submitted as required in the order, EPA will take appropriate action under FFDCA.

After considering comments that are received in response to this proposed rule, EPA will issue a final rule.

G. What should I consider as I prepare my comments for EPA?

1. *Submitting CBI.* Do not submit CBI information to EPA through *https://www.regulations.gov* or email. If you wish to include CBI in your comment, please follow the applicable instructions at *https://www.epa.gov/dockets/commenting-epa-dockets#rules* and clearly mark the part or all of the information that you claim to be CBI. In addition to one complete version of the comment that includes information claimed as CBI, a copy of the comment that does not contain the information claimed as CBI must be submitted for inclusion in the public docket. Information so marked will not be disclosed except in accordance with procedures set forth in 40 CFR part 2.

2. *Tips for preparing your comments.* When preparing and submitting your comments, see the commenting tips at *https://www.regulations.gov/faq.*

3. *Environmental justice.* EPA seeks to achieve environmental justice—the just treatment and meaningful involvement of all people, regardless of income, race, color, national origin, Tribal affiliation, or disability, in Agency decision-making and other Federal activities that affect human health and the environment so that people are fully protected from disproportionate and adverse human health and environmental effects (including risks). To help address potential environmental justice issues, the Agency seeks information on any groups or segments of the population who, as a result of their location, cultural practices, or other factors, may have atypical or disproportionate and adverse human health impacts or environmental effects from exposure to chlorpyrifos, compared to the general population.

H. What is contained in this proposed rule?

The following provides a brief roadmap of the Units in this proposed rule.

- Unit II contains an overview of the relevant statutory background under the FFDCA and FIFRA as well as the regulatory status of chlorpyrifos. This Unit also provides a summary of the various recent legal challenges to the chlorpyrifos tolerances.
- Unit III describes the Agency's proposal to revoke tolerances that will not be needed as a result of the approval of registrants' requests to cancel chlorpyrifos uses on certain food commodities.
- Unit IV contains a safety determination that supports the tolerances that are not proposed for revocation.
- Unit V contains the Agency's responses to specific claims raised in the 2007 Petition not otherwise addressed in the rest of the proposed rule.
- Units VI, VII, and VIII contain EPA's request for public comment, discuss EPA's intention for phasing out the tolerances, and consistency with other statutory requirements and executive orders.

II. Background

A. What is a tolerance?

A ''tolerance'' represents the maximum level for residues of pesticide chemicals legally allowed in or on food, which includes raw agricultural commodities, processed foods, and feed for animals. Under the FFDCA, residues of a pesticide chemical that are not covered by a tolerance or exemption from the requirement of a tolerance are considered unsafe. *See* 21 U.S.C. 346a(a)(1). Foods containing unsafe residues are deemed adulterated and may not be distributed in interstate commerce. *See* 21 U.S.C. 331(a), 342(a)(2)(B). This applies to both food treated domestically with a pesticide registered in the United States or treated in another country and imported into the United States. Thus, before registering any food-use pesticide (*i.e.,* a pesticide use that is likely to result in residues in or on food) under FIFRA, 7 U.S.C. 136 *et seq.,* EPA ensures that any necessary tolerances or exemptions are in place. 40 CFR 152.112(g). EPA also establishes tolerances or exemptions for pesticides not registered in the United States in order for commodities treated with those pesticides to be imported.

B. FFDCA/FIFRA Background

1. FFDCA

FFDCA section 408(b) authorizes EPA to establish a tolerance, if the Agency determines that a tolerance is safe. *See* 21 U.S.C. 346a(b). If EPA determines that a tolerance is not safe, EPA must modify or revoke that tolerance. The FFDCA defines ''safe'' to mean that ''there is a reasonable certainty that no harm will result from aggregate exposure to the pesticide chemical residue, including all anticipated dietary exposures and all other exposures for which there is reliable information.'' 21 U.S.C. 346a(b)(2)(A)(ii). This includes exposure through drinking water and in residential settings but does not include occupational exposure.

FFDCA section 408(b)(2)(C) requires EPA to give special consideration to the exposure of infants and children to the pesticide chemical residue in establishing a tolerance and to ''ensure that there is a reasonable certainty that no harm will result to infants and children from aggregate exposure to the pesticide chemical residue[s].'' 21 U.S.C. 346a(b)(2)(C). This provision also creates a presumption that EPA will use an additional safety factor for the protection of infants and children. Specifically, it directs that ''in the case of threshold effects, . . . an additional tenfold margin of safety for the pesticide chemical residue and other sources of exposure shall be applied for infants and children to take into account potential pre- and post-natal toxicity and completeness of the data with respect to exposure and toxicity to infants and children.'' (21 U.S.C. 346a(b)(2)(C)) EPA is permitted to ''use a different margin of safety for the pesticide chemical residue only if, on the basis of reliable data, such margin will be safe for infants and children.'' (*Id.*) Due to Congress's focus on both prenatal and post-natal toxicity, EPA has interpreted this additional safety factor as pertaining to risks to infants and children that arise due to prenatal exposure as well as to exposure during childhood years. This section providing for the special consideration of infants and children in section 408(b)(2)(C) was added to the FFDCA by the Food Quality Protection Act (FQPA) in 1996; therefore, this additional margin of safety is referred to throughout this proposed rule as the FQPA safety factor (SF).

Finally, FFDCA section 408(b)(2)(D) contains several factors that EPA considers when making determinations about establishing, modifying, or

revoking tolerances. 21 U.S.C. 346a(b)(2)(D).

Any person may file a petition requesting that EPA establish, modify, or revoke a tolerance. 21 U.S.C. 346a(d)(1). After publishing notice of receipt of that petition and after giving due consideration, EPA may issue a final or proposed rule establishing, modifying, or revoking the tolerances or issue an order denying the petition. 21 U.S.C. 346a(d)(4)(A).

2. FIFRA

Under FIFRA (7 U.S.C. 136 *et seq.*), EPA regulates the sale, distribution, and use of pesticides. While FFDCA authorizes the establishment of legal limits for pesticide residues in food, FIFRA generally requires the approval of pesticides prior to their sale and distribution (*id.* at section 136a(a)) and establishes a registration regime for regulating the use of pesticides. In order for a pesticide to be registered, EPA must determine that a pesticide ''will not generally cause unreasonable adverse effects on the environment,'' among other things. (*Id.* at section 136a(c)(5)) The term ''unreasonable adverse effects on the environment'' is defined to include ''a human dietary risk from residues that results from a use of a pesticide in or on any food inconsistent with the standard under section 346a of Title 21.'' (*Id.* at section 136(bb)) The FFDCA safety standard was integrated into the FIFRA registration standard through the FQPA, which also directed that EPA coordinate, to the extent practicable, revocations of tolerances with pesticide cancellations under FIFRA. (21 U.S.C. 346a(l)(1)).

Also under FIFRA, EPA is required to re-evaluate existing registered pesticides every 15 years in a process called ''registration review.'' (7 U.S.C. 136(a)(g)) The purpose of registration review is ''to ensure that each pesticide registration continues to satisfy the FIFRA standard for registration,'' (40 CFR 155.40(a)(1)) taking into account changes that have occurred since the last registration decision, including any new relevant scientific information and any changes in the law or regulations, policy, risk-assessment procedures or methods, and data requirements. (40 CFR 155.53(a)) To ensure that a pesticide continues to meet the standard for registration, EPA must determine, based on the available data, including any additional information that has become available since the pesticide was originally registered or previously re-evaluated, that the pesticide does not cause ''unreasonable adverse effects on the environment.'' (7 U.S.C. 136a(c)(1), (5); *see also* 40 CFR 152.50) As part of the registration review of a pesticide, EPA also evaluates whether existing tolerances are safe and whether any changes to existing tolerances are necessary or appropriate. Pesticide products that do not meet the FIFRA standard for registration may be cancelled pursuant to the procedures in FIFRA section 6, 7 U.S.C. 136d. That provision of FIFRA also provides a mechanism for registrants to request voluntary cancellation of registered products or to request termination of specific uses on any registered product, at any time for any reason. 7 U.S.C. 136d(f). If a registrant requests such cancellation or use termination, EPA publishes notice of that request and allows for a public comment period. 7 U.S.C. 136d(f)(1)(B) and (C). After the public comment period, EPA may approve or deny the request. 7 U.S.C. 136d(f)(1)(D).

C. Chlorpyrifos Background

Chlorpyrifos (0,0-diethyl-0-3,5,6-trichloro-2-pyridyl phosphorothioate) is a broad-spectrum, chlorinated organophosphate (OP) insecticide. Chlorpyrifos also forms the more toxic and potent acetylcholinesterase (AChE) inhibitor, chlorpyrifos oxon.

Chlorpyrifos has been registered for use in the United States since 1965. These uses have included a wide range of food crops (*e.g.,* soybean, wheat) and non-food use sites (*e.g.,* tobacco, ornamental flowering plants, turf), as well as public health uses (*e.g.,* aerial and ground-based fogger mosquito adulticide treatments) and residential uses (*e.g.,* roach bait products, and individual fire ant mound treatments). In 2000, chlorpyrifos registrants reached an agreement with EPA to voluntarily cancel all residential use products except those registered for ant and roach baits in child-resistant packaging and fire ant mound treatments. Most recently, as discussed later in this document, chlorpyrifos registrants have voluntarily requested to cancel all food uses except the 11 uses described in Unit III. Pursuant to those requests, EPA has already cancelled most of those registered food uses and expects to process the remaining cancellation requests by the end of this calendar year (2024). (Ref. 3–8).

EPA is currently working to complete the registration review of chlorpyrifos. As part of that process, EPA has completed multiple human health risk assessments (HHRAs) since 2011. As additional data became available for chlorpyrifos and its metabolite of concern, chlorpyrifos oxon, EPA completed revised draft human health risk assessments in 2014, 2016, and 2020. A refined drinking water assessment (DWA) was completed in 2016 (2016 DWA), and the Updated DWA was completed in 2020 (2020 DWA). In December 2020, EPA issued the *Chlorpyrifos Proposed Interim Decision* (2020 PID). (Ref. 1) At this time, EPA is working on responding to comments received on the 2020 PID and supporting risk assessments and on preparing an updated human health risk assessment and amended proposed interim registration review decision. EPA anticipates issuing an amended PID in 2026 followed by the Chlorpyrifos Interim Decision.

It should be noted that there has been an international effort to develop a battery of new approach methodologies (NAMs) to inform the developmental neurotoxicity (DNT) potential for individual chemicals. The assays in this battery are expected to provide a mechanistic understanding of the underlying biological processes that may be vulnerable to chemically-induced disruption. Since the integration of data from the DNT NAM battery for the chlorpyrifos risk assessment is in progress, it has not been incorporated into the risk assessment that supports this rulemaking. It is intended to be incorporated into the amended human health risk assessment anticipated for release in 2025 in support of registration review, and the Agency will provide any updates on the status of this effort through the ongoing registration review of chlorpyrifos.

D. 2007 Petition and Associated Litigation

In September 2007, PANNA and the NRDC jointly submitted to EPA a petition under FFDCA section 408(d), seeking revocation of all chlorpyrifos tolerances. The 2007 Petition also sought the cancellation of all chlorpyrifos pesticide product registrations under FIFRA section 6, 7 U.S.C. 136d. The 2007 Petition raised several claims, which are discussed in Unit V., regarding both EPA's 2006 FIFRA reregistration eligibility decision (RED) and active registrations of chlorpyrifos in support of the request for tolerance revocations and product cancellations.

In March 2009, EPA decided it would be appropriate to address these issues and the 2007 Petition claims in connection with the registration review of chlorpyrifos under FIFRA section 3(g) and decided to expedite that review, intending to finalize it several years in advance of the registration review deadline at that time, October 1, 2022.

On July 16, 2012, EPA denied the one FIFRA claim in a letter to the Petitioners and offered a partial response on several of the FFDCA claims; however, because the complexity of these scientific issues precluded EPA from finishing its review according to EPA's original timeline, the Petitioners brought legal action in the U.S. Court of Appeals for the Ninth Circuit to compel EPA to either issue an order denying the 2007 Petition or to grant the 2007 Petition by initiating the tolerance revocation process. On August 10, 2015, the Ninth Circuit ordered EPA to ''issue either a proposed or final revocation rule or a full and final response to the administrative [P]etition by October 31, 2015.'' *In re Pesticide Action Network N. Am.,* 798 F.3d 809, 815 (9th Cir. 2015).

In response to that 2015 order, EPA issued a proposed rule to revoke all tolerances for chlorpyrifos on October 28, 2015 (published in the **Federal Register** on November 6, 2015 (80 FR 69080)). Although EPA noted that further evaluation might enable more tailored risk mitigation, EPA was unable to conclude, based on the information before EPA at the time, that the tolerances were safe, since the aggregate exposure to chlorpyrifos, driven by drinking water exposures, exceeded safe levels. In November 2016, EPA issued a notice of data availability announcing the availability of a revised human health risk assessment. (81 FR 81049) (Nov. 17, 2016) (Ref. 9)

In the meantime, the Ninth Circuit ordered EPA to take final action on its proposed revocation rule and issue its final response to the Petition by December 30, 2016. *In re Pesticide Action Network N. Am.,* 808 F.3d 402 (9th Cir. 2015). EPA requested an extension of the deadline in order to be able to fully consider the July 2016 FIFRA Scientific Advisory Panel (SAP) report regarding chlorpyrifos toxicology, but the Ninth Circuit ordered EPA to complete its final action by March 31, 2017. *In re Pesticide Action Network of North America* v. *EPA,* 840 F.3d 1014 (9th Cir. 2016).

Accordingly, EPA issued a formal denial of the FFDCA claims in the 2007 Petition in an order issued in March 2017. (Ref. 10) In that 2017 Petition Denial, EPA concluded that it was not required to complete—and would not complete—any tolerance revocation of chlorpyrifos without resolution of those issues during the ongoing FIFRA registration review of chlorpyrifos. *Chlorpyrifos; Order Denying PANNA and NRDC's Petition to Revoke Tolerances,* 82 FR 16581 (April 5, 2017) (''2017 Petition Denial''). EPA also denied objections filed in response to the 2017 Petition Denial on July 24, 2019. *See Chlorpyrifos; Final Order Denying Objections to March 2017 Petition Denial Order,* 84 FR 35555 (July 24, 2019) (''2019 Objections Denial''). In the 2019 Objections Denial, EPA concluded that it was appropriate to deny the objections related to new issues raised after EPA's 2006 tolerance reassessment and reregistration of chlorpyrifos as these issues are being addressed according to the schedule for EPA's ongoing registration review of chlorpyrifos.

The 2019 Objections Denial was challenged by several farmworker advocacy groups and States, and in April 2021, the Ninth Circuit issued its decision, finding that EPA's denial was arbitrary and capricious based on the record before the court. *See League of United Latin Am. Citizens, et al.,* v. *Regan,* 996 F.3d 673 (9th Cir. 2021). The Ninth Circuit vacated EPA's petition response and ordered EPA to grant the 2007 Petition; to issue a final rule either revoking all chlorpyrifos tolerances or modifying the chlorpyrifos tolerances, provided EPA could make a determination that those modified tolerances met the safety standard mandated by the FFDCA; and to cancel registered chlorpyrifos products or uses associated with the revoked tolerances. The Ninth Circuit ordered EPA to issue that final rule within 60 days of the issuance of the mandate and to cancel the registered pesticides in a timely manner. Frustrated with the ''[then-] thirteen years of interminable delay,'' the Ninth Circuit concluded that ''further factfinding'' would not be reasonable and that ''immediate issuance of a final regulation is the only reasonable action,'' citing the FFDCA provision authorizing issuance of a final rule '' '*without further notice and without further period for public comment.*' '' *See id.* at 702, citing 21 U.S.C. 136a(d)(4)(A)(i) (emphasis in original).

On August 30, 2021, EPA complied with the Ninth Circuit's ruling by granting the 2007 Petition and issuing the Final Tolerance Rule for Chlorpyrifos, which revoked all tolerances for chlorpyrifos. *See* 86 FR 48315 (Aug. 30, 2021) (''2021 Final Rule''). EPA explained in the 2021 Final Rule that it was unable to determine that there was a reasonable certainty of no harm for aggregate exposure, including food, drinking water, and residential exposure, based on the available data and the anticipated exposures from all of the then-currently registered uses of chlorpyrifos. EPA's analysis indicated that risk from aggregate exposures from all of the then-registered uses would exceed the Agency's levels of concern. To satisfy international trade considerations, the 2021 Final Rule allowed the tolerances to remain in effect for six months until February 28, 2022, at which time the tolerances expired. Pursuant to FFDCA section 408(g), registrants and grower groups, among others, filed objections to the 2021 Final Rule, which EPA denied on February 28, 2022. *See Chlorpyrifos; Final Order Denying Objections, Requests for Hearings, and Requests for a Stay of the August 2021 Tolerance Final Rule.* 87 FR 11222 (Feb. 28, 2022) (''2022 Objections Denial'').

The 2021 Final Rule and 2022 Objections Denial were challenged by a chlorpyrifos registrant, Gharda Chemicals International, Inc. (Gharda), and 19 grower groups in the U.S. Court of Appeals for the Eighth Circuit. The grower groups included Red River Valley Sugarbeet Growers Association, U.S. Beet Sugar Association, American Sugarbeet Growers Associations, Southern Minnesota Better Sugar Cooperative, American Crystal Sugar Company, Minn-Dak Farmer Cooperative, American Farm Bureau Federation, American Soybean Association, Iowa Soybean Association, Minnesota Soybean Growers Association, Missouri Soybean Association, Nebraska Soybean Association, South Dakota Soybean Association, North Dakota Soybean Growers Association, National Association of Wheat Growers, Cherry Marketing Institute, Florida Fruit and Vegetable Association, Georgia Fruit and Vegetable Growers Association, and the National Cotton Council of America. These petitioners argued, among other things, that EPA should have modified tolerances by leaving tolerances in place consistent with the 11 uses proposed the 2020 PID, rather than revoking all tolerances.

On November 2, 2023, the Eighth Circuit issued its decision, vacating the 2021 Final Rule (and EPA's response to the 2007 Petition once again) and remanding the matter to EPA for further proceedings. *See Red River Valley Sugarbeet Growers Ass'n, et al.* v. *Regan,* 85 F.4th 881 (8th Cir. 2023). The Eighth Circuit's decision noted that the Agency had ''identified 11 specific candidates'' of food and feed crop uses in the 2020 PID as part of Registration Review. Although the 2021 Final Rule (and the 2022 Objections Denial) explained why EPA was not modifying the tolerances consistent with the 2020 PID, the Eighth Circuit concluded that the 2021 Final Rule ignored modification of tolerances as an option for addressing the Ninth Circuit's

mandate and thus was arbitrary and capricious. The Eighth Circuit's mandate issued on December 28, 2023, at which time all chlorpyrifos tolerances were automatically reinstated. EPA amended the Code of Federal Regulations on February 5, 2024, to reflect the Eighth Circuit's reinstatement of chlorpyrifos tolerances. *See Chlorpyrifos; Reinstatement of Tolerances,* 89 FR 7625 (Feb. 5, 2024).

III. Proposed Rule

In this document, EPA is proposing to revoke tolerances to reflect registrants' requests to voluntarily cancel food uses and submission of label amendments consistent with the 2020 PID and supporting documents. EPA anticipates approving all submitted cancellation requests by the end of 2024. After approval of the cancellation requests and label amendments, the only food uses that will remain on federally registered chlorpyrifos products are listed below and will be limited to the following States:

1. Alfalfa: Arizona, Colorado, Iowa, Idaho, Illinois, Kansas, Michigan, Minnesota, Missouri, Montana, North Dakota, Nebraska, New Mexico, Nevada, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, Wisconsin, and Wyoming.
2. Apple: Alabama, Delaware, Georgia, Idaho, Indiana, Kentucky, Maryland, Michigan, New Jersey, New York, Ohio, Oregon, Pennsylvania, Tennessee, Virginia, Vermont, Washington, West Virginia, and Washington, DC.
3. Asparagus: Michigan.
4. Tart cherry: Michigan.
5. Citrus: Alabama, Florida, Georgia, North Carolina, South Carolina, and Texas.
6. Cotton: Alabama, Florida, Georgia, North Carolina, South Carolina, and Virginia.
7. Peach: Alabama, Delaware, Florida, Georgia, Maryland, Michigan, North Carolina, New Jersey, New York, Ohio, Pennsylvania, South Carolina, Texas, Virginia, Vermont, West Virginia, and Washington, DC.
8. Soybean: Alabama, Colorado, Florida, Georgia, Iowa, Illinois, Indiana, Kansas, Kentucky, Minnesota, Missouri, Montana, North Carolina, North Dakota, Nebraska, New Mexico, Ohio, Oklahoma, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, Virginia, Wisconsin, West Virginia, and Wyoming.
9. Strawberry: Oregon
10. Sugar beet: Iowa, Idaho, Illinois, Michigan, Minnesota, North Dakota, Oregon, Washington, Wisconsin.
11. Wheat:

a. Spring wheat: Colorado, Kansas, Missouri, Montana, North Dakota, Nebraska, South Dakota, and Wyoming.

b. Winter wheat: Colorado, Iowa, Kansas, Minnesota, Missouri, Montana, North Dakota, Nebraska, Oklahoma, South Dakota, Texas, and Wyoming.

EPA notes that not all chlorpyrifos products are registered for these uses in all of the above listed States. If the use is not registered on a particular chlorpyrifos product, it must be added via the FIFRA section 3 registration process in order for that product to be used in a particular State. Moreover, EPA notes that since the issuance of the 2020 PID, several States have prohibited use of chlorpyrifos, including California, Hawaii, New York, Maryland, and Oregon. States may regulate the sale or use of federally registered pesticides within their State. Although these particular States have adopted additional restrictions, the voluntary cancellation requests for the federally registered uses only reflected EPA's proposal in the 2020 PID and did not incorporate any additional restrictions at the State level. As a result, EPA's proposed tolerance revocations reflect only the adjustments to the federal registrations, but the continued registration review of chlorpyrifos allows for further consideration of this issue.

In addition, the submitted label amendments are consistent with the reduced application frequency and rates for these uses that were used in the 2020 DWA and support the Estimated Drinking Water Concentration (EDWC) calculations. (Ref. 2) EPA expects to approve the last of these label amendments by the end of 2024. Consistent with the terms of the cancellation orders, use of these previously registered chlorpyrifos products on any crops beyond the 11 uses listed above and restricted as described herein will be prohibited after June 30, 2025.

To cover residues of chlorpyrifos in food from these remaining food uses, the following existing tolerances are not being revoked: alfalfa, forage; alfalfa, hay; apple, apple, wet pomace; beet, sugar, dried pulp; beet, sugar, molasses; beet, sugar, roots; beet, sugar, tops; cattle, fat; cattle, meat; cattle, meat byproducts; cherry, tart; citrus, dried pulp; citrus, oil; cotton, undelinted cotton seed; egg; fruit, citrus, group 10; goat, fat; goat, meat; goat, meat byproducts; hog, fat; hog, meat; hog, meat byproducts; horse, meat; horse, meat byproducts; milk, fat (reflecting 0.01 ppm in whole milk); peach; poultry, fat; poultry, meat; poultry, meat byproducts; sheep, fat; sheep, meat; sheep, meat byproducts; soybean, seed; strawberry; wheat, forage; wheat, grain; and wheat, straw in section 40 CFR 180.342(a) and asparagus in 180.342(c).

EPA is proposing to revoke all other tolerances for residues of chlorpyrifos on specific food commodities (40 CFR 180.342(a)(1)); on all food commodities treated in food handling and food service establishments in accordance with prescribed conditions (40 CFR 180.342(a)(2) and(a)(3)); and on grape when used under regional registrations (40 CFR 180.342(c)).

EPA is proposing these tolerance revocations because all the registrants have submitted voluntary cancellation requests for all food uses that trigger the need for those tolerances. Moreover, all registrants retaining any of the 11 food uses listed above have submitted label amendments that limit uses to the specific States listed above and restrict application rates and application frequency consistent with the assumptions supporting the 2020 DWA. As of the publication of this proposed rule, 41 products have been cancelled, and 12 products have had all food uses but the 11 uses identified above cancelled. EPA has approved amended labels for 15 products. EPA is currently working to process and expects to complete its issuance of cancellation orders by the end of 2024, at which time no food uses beyond the 11 identified above will remain registered.

Because of the cancellation of these uses, these tolerances will no longer be needed to cover residues from use of the pesticide within the United States. Removing unnecessary tolerances helps to avoid confusion among stakeholders about where the pesticide can be used and improves coordination under FIFRA and the FFDCA. EPA's typical practice when tolerances are no longer needed due to the cancellation of registered uses or products is to remove them from the Code of Federal Regulations, usually carried out after being discovered as not necessary in registration review. *See, e.g., Pesticide Tolerance; Exemptions, Petitions, Revocations, etc.: Implementing Registration Review Decisions for Certain Pesticides; Aluminum tris (O-ethylphosphonate), Carbon disulfide, et al.,* (88 FR 46077) (July 19, 2023). (Ref. 11) There is no requirement, however, to wait until the conclusion of registration review, and since EPA is aware of the lack of necessity of these tolerances now, EPA's current proposed rule facilitates a more-timely reflection of the actual use status within the tolerance regulation to provide greater clarity to stakeholders, including growers and States, to avoid confusion

about what is allowed under the FFDCA and FIFRA. Moreover, although the EPA's conclusions and rationale for the revocation of these tolerances differ from the claims outlined in the Petitioner's 2007 request to revoke all tolerances, the EPA is, in part, taking the action requested by the 2007 Petition.

In some cases, the registrants' requests to terminate these food uses or cancel registered chlorpyrifos products included requests to continue sale, distribution, and use of existing stocks for a certain period of time after cancellation. Existing stocks are those stocks of registered pesticide products that were in the United States and that were packaged, labeled, and released for shipment prior to the effective date of the cancellation action. Under those applicable cancellation orders, some existing stocks of previously registered chlorpyrifos products may be used on food until June 30, 2025. Therefore, EPA is proposing that the final rule revoking the unnecessary tolerances set an expiration date for those tolerances being revoked of July 1, 2025. This approach would align the permissible use period allowed under the cancellation orders with the coverage of the existing tolerance to allow for clearer coverage under section 408(l)(5) of the FFDCA. Under that provision, residues of a pesticide chemical in or on food will not render that food adulterated despite the revocation of a tolerance as long as the residue is present as a result of a lawful application of the pesticide and does not exceed the tolerance level that was authorized at the time of the application. *See* 21 U.S.C. 346a(l)(5). In addition, this approach would provide for a reasonable interval for exporting countries to adjust to the new tolerance restrictions consistent with the United States' obligations under the World Trade Organization Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement).

IV. Safety of the Remaining Tolerances

As noted in the previous Unit, in a typical revocation action following the cancellation of registered products or uses, EPA would propose to remove tolerances that are no longer necessary. Those actions typically do not require a rationale for justifying retention of the tolerances that are not affected by that action, as revocation does not impact the prior safety determinations made for the tolerances left in place.

Chlorpyrifos, however, presents an unusual situation due to the litigation history and the pending 2007 Petition. The last formal determination that EPA made concerning chlorpyrifos tolerances was in the 2021 Final Rule, in which EPA concluded that aggregate exposure to chlorpyrifos, based on all registered food uses on chlorpyrifos products at that time, was unsafe. That rule was issued in response to a Ninth Circuit order, which vacated EPA's 2017 Petition Denial and 2019 Objections Denial in full and ordered EPA to issue a final rule revoking all tolerances or modifying tolerances, as long as a safety determination supported those modified tolerances. Then the Eighth Circuit reinstated those tolerances through vacatur of the 2021 Final Rule, despite EPA's finding that those tolerances were unsafe based on uses that were registered at that time and noted that EPA should have considered the option of retaining tolerances for the 11 uses proposed in the 2020 PID in its 2021 Final Rule. In addition, the 2007 Petition asserted that all chlorpyrifos tolerances were unsafe and should be revoked. Because EPA's proposed rule does not revoke all chlorpyrifos tolerances, EPA is providing an updated determination of safety supporting the tolerances that are not being revoked. This approach and the related FIFRA cancellation actions satisfy the Eighth Circuit's remand for further proceedings and the Ninth Circuit's directive to ensure that any modified tolerances are safe, without further factfinding and delay.

As indicated in Unit III., all chlorpyrifos registrants have submitted requests to voluntarily cancel all but 11 food uses of chlorpyrifos and to amend labels that limit those food uses in several ways, *i.e.,* limiting uses to specific States and restricting application rates and application frequency. After cancellation of all uses but the 11 food uses listed in Unit III, amendment of those uses on labels as described, and the termination of existing stocks terms, which EPA expects no later than June 30, 2025, EPA anticipates that exposure to chlorpyrifos in food and drinking water will align with the calculations in the 2020 DWA, the 2020 human health risk assessment, and the proposed determinations in the 2020 PID. The cancellations and label amendments are reducing the amount of chlorpyrifos being used—and thus being applied to food and getting into drinking water.

The safety determination in this document is based on the anticipated aggregate exposures expected as a result of the cancellation of most of the registered food uses and, on the analysis conducted in the 2020 HH DRA and the 2020 DWA. As noted above, the registration review process is ongoing, and there is a possibility that additional information may alter the Agency's conclusions once that process has been completed. However, for purposes of this rule and in an effort not to further delay progress on this rulemaking or in responding to the FFDCA petition, EPA is relying on the currently available scientific documents to conclude that the tolerances not being revoked are safe, *i.e.,* that there is a reasonable certainty that no harm will result from the aggregate exposure to chlorpyrifos. As noted in this Unit, the aggregate exposures assessed reflect the anticipated exposures to chlorpyrifos residues in drinking water after the cancellation of most food uses of chlorpyrifos, rather than chlorpyrifos residues in drinking water based on the wider set of previously registered food uses as was done in the 2021 Final Rule.

EPA's full risk conclusions supporting this proposed response are set forth in *Chlorpyrifos: Third Revised Human Health Risk Assessment for Registration Review* (September 2020) (''2020 HH DRA'') and the 2020 DWA. (Ref. 12 and 2) EPA's assessment supports a conclusion that aggregate exposures (including residential exposures and food and drinking water exposures anticipated from the remaining registered chlorpyrifos uses after the cancellation orders are issued and amended labels are approved under FIFRA) are safe.

A. EPA's Hazard Assessment for Chlorpyrifos

1. General Approach to Hazard Identification, Dose-Response Assessment, and Extrapolation

Any risk assessment begins with an evaluation of a chemical's inherent properties, and whether those properties have the potential to cause adverse effects (*i.e.,* a hazard identification). In evaluating toxicity or hazard, EPA reviews toxicity data, typically from studies with laboratory animals, to identify any adverse effects on the test subjects. Where available and appropriate, EPA will also take into account studies involving humans, including human epidemiological studies. The animal toxicity database for a conventional, food use pesticide usually consists of studies investigating a broad range of endpoints including potential for carcinogenicity, mutagenicity, developmental and reproductive toxicity, and neurotoxicity. These studies include gross and microscopic effects on organs and tissues, functional effects on bodily organs and systems, effects on blood

parameters (such as red blood cell (RBC) count, hemoglobin concentration, hematocrit, and a measure of clotting potential), effects on the concentrations of normal blood chemicals (including glucose, total cholesterol, urea nitrogen, creatinine, total protein, total bilirubin, albumin, hormones, and enzymes such as alkaline phosphatase, alanine aminotransferase and cholinesterase), and behavioral or other gross effects identified through clinical observation and measurement. EPA examines whether adverse effects are caused by different durations of exposure ranging from short-term (acute) to long-term (chronic) pesticide exposure and different routes of exposure (oral, dermal, inhalation). Further, EPA evaluates potential adverse effects in different age groups (adults as well as fetuses and juveniles). (Ref. 13 at 8–10).

Once a pesticide's potential hazards are identified, EPA determines a toxicological level of concern for evaluating the risk posed by human exposure to the pesticide. In this step of the risk assessment process, EPA essentially evaluates the levels of exposure to the pesticide at which effects might occur. An important aspect of this determination is assessing the relationship between exposure (dose) and response (often referred to as the dose-response analysis). In evaluating a chemical's dietary risks, EPA uses a reference dose (RfD) approach, which typically involves a number of considerations including:

- *A ''point of departure'' (PoD):* Typically, the PoD is the value from a dose-response curve that is at the low end of the observable data in laboratory animals and that is the toxic dose that serves as the ''starting point'' in extrapolating a risk to the human population, although a PoD can also be derived from human data as well. PoDs are selected to be protective of the most sensitive adverse toxic effect for each exposure scenario and are chosen from toxicity studies that show clearly defined No Observed Adverse Effect Levels (NOAELs) or Lowest Observed Adverse Effect Levels (LOAELs), dose-response relationships, and relationships between the chemical exposure and effect. EPA will select separate PoDs, as needed, for each expected exposure duration (*e.g.,* acute, chronic, short-term, intermediate-term) and route of exposure (*e.g.,* oral, dermal, inhalation). For chlorpyrifos, as discussed later in this Unit, EPA derived PoDs based on 10% RBC AChE inhibition in the 2020 HH DRA.
- *Interspecies extrapolation:* Because most PoDs are derived from toxicology studies in laboratory animals, there is a need to extrapolate from animals to humans. In typical risk assessments, a default tenfold (10X) uncertainty factor is used to address the potential for a difference in toxic response between humans and animals used in toxicity tests. For chlorpyrifos, as described further below, EPA used a sophisticated model called a physiologically based pharmacokinetic-pharmacodynamic (PBPK–PD) model that accounts for differences in laboratory animals and humans, thereby obviating the need for the default interspecies factor.
- *Intraspecies extrapolation:* To address the potential for differences in sensitivity in the toxic response across the human population, EPA conducts intraspecies extrapolation. In typical risk assessments, a 10X default uncertainty factor is used. For chlorpyrifos, the PBPK–PD model used to derive PoDs also accounts for differences in metabolism and toxicity response across the human population for some age groups and some subpopulations, which allows the default factor of 10X to be refined in accordance with EPA's 2014 *Guidance for Applying Quantitative Data to Develop Data-Derived Extrapolation Factors for Interspecies and Intraspecies Extrapolation.*
- *Food Quality Protection Act safety factor (FQPA SF):* The FFDCA section 408(b)(2)(C) instructs EPA, in making its ''reasonable certainty of no harm'' finding, that in ''the case of threshold effects, an additional tenfold margin of safety for the pesticide chemical residue and other sources of exposure shall be applied for infants and children to take into account potential pre- and post-natal toxicity and completeness of data with respect to exposure and toxicity to infants and children.'' Section 408(b)(2)(C) further states that ''the Administrator may use a different margin of safety for the pesticide chemical residue only if, on the basis of reliable data, such margin will be safe for infants and children.'' For chlorpyrifos, EPA is retaining the default 10X FQPA SF as discussed later in this Unit.

In the human health risk assessment process, as indicated above, EPA uses the selected PoD to calculate a RfD for extrapolating risk. The RfD is calculated by dividing the selected PoD by any applicable interspecies and intraspecies factors and other relevant uncertainty factors such as LOAEL to NOAEL factor or database uncertainty factor.

After calculating the RfD, as indicated above, EPA retains an additional safety factor of 10X to protect infants and children (the FQPA SF), unless reliable data support selection of a different factor, as required under the FFDCA. As described in EPA's policy for determining the appropriate FQPA SF, this additional safety factor often overlaps with other traditional uncertainty factors (*e.g.,* LOAEL to NOAEL factor or database uncertainty factor), but it might also account for residual concerns related to pre- and post-natal toxicity or exposure. (Ref. 14 at 13–16) In implementing FFDCA section 408, EPA calculates a variant of the RfD referred to as a Population Adjusted Dose (PAD), by dividing the RfD by the FQPA SF. Risk estimates less than 100% of the PAD are safe.

2. Toxicological Effects of Chlorpyrifos

Consistent with FFDCA section 408(b)(2)(D), EPA has reviewed the available scientific data and other relevant information for chlorpyrifos in support of this action. For over two decades, EPA has evaluated the scientific evidence surrounding the different health effects associated with chlorpyrifos. The Agency has conducted extensive reviews of the scientific literature on health outcomes associated with chlorpyrifos and presented approaches for evaluating and using that information to the FIFRA Scientific Advisory Panel (SAP), on several occasions, as discussed in Unit V of the 2021 Final Rule. *See* 86 FR at 48320–21. (*Note:* The FIFRA SAP is a federal advisory committee created by FIFRA section 25(d), 7 U.S.C. 136w(d), and serves as EPA's primary source of external, independent, scientific peer review for significant regulatory and policy matters involving pesticides).

Chlorpyrifos has been tested in toxicological studies for the potential to cause numerous different adverse outcomes (*e.g.,* reproductive toxicity, developmental toxicity, cancer, genotoxicity, dermal toxicity, endocrine toxicity, inhalation toxicity, and immunotoxicity). Chlorpyrifos has an established neurotoxic mode of action, and neurotoxicity is the most sensitive effect in all species, routes, and lifestages. The hazard characterization for chlorpyrifos and its oxon is based on adverse health effects in animals and humans related to two different neurotoxic endpoints: AChE inhibition and potential for neurodevelopmental effects. AChE inhibition is being used to derive the PODs for risk assessment. These PODs are protective for neurotoxic effects related to AChE inhibition and potential downstream neurotoxic effects. A weight-of-the-evidence (WOE) analysis on the potential for neurodevelopmental effects following chlorpyrifos exposure considered (1) whether chlorpyrifos

causes long-term effects from prenatal and/or early lifestage exposure and (2) whether adverse effects can be attributed to doses lower than those which elicit 10% inhibition of RBC AChE. (Ref. 12 at 6) The FIFRA SAP reports have rendered numerous recommendations for additional study and sometimes conflicting advice for how EPA should consider (or not consider) the available data in conducting EPA's registration review human health risk assessment for chlorpyrifos.

The remainder of this Unit IV.A.2. discusses the Agency's assessment of the science relating to AChE inhibition and the potential for neurodevelopmental effects. Other adverse outcomes besides AChE inhibition and neurodevelopment are less sensitive and are thus not discussed in detail here. Further information concerning those effects can be found in the 2000 human health risk assessment which supported the RED and the 2011 preliminary human health risk assessment. (Ref. 15 and 16).

a. Acetylcholinesterase (AChE) Inhibition

Chlorpyrifos, like other organophosphate pesticides, affects the nervous system by inhibiting AChE, an enzyme necessary for the proper functioning of the nervous system and ultimately leading to signs of neurotoxicity. This mode of action, in which AChE inhibition leads to neurotoxicity, is well-established, and thus has been used as basis for the PoD for organophosphate human health risk assessments, including chlorpyrifos. This science policy is based on decades of work, which shows that AChE inhibition is the initial event in the pathway to cholinergic neurotoxicity.

The Agency has conducted a comprehensive review of the available data and public literature regarding this adverse effect from chlorpyrifos. (Ref. 17 at 24–25, Ref. 16 at 25–27) There are many chlorpyrifos studies evaluating RBC AChE inhibition or the brain in multiple lifestages (gestational, fetal, post-natal, and non-pregnant adult), multiple species (rat, mouse, rabbit, dog, human), methods of oral administration (oral gavage with corn oil, dietary, gavage via milk) and routes of exposure (oral, dermal, inhalation via vapor and via aerosol). In addition, chlorpyrifos is unique in the availability of AChE data from peripheral tissues in some studies (*e.g.,* heart, lung, liver). There are also literature studies comparing the *in vitro* AChE response to a variety of tissues which show similar sensitivity and intrinsic activity. Across the database, brain AChE tends to be less sensitive than RBC AChE or peripheral AChE. In oral studies, RBC AChE inhibition is generally similar in response to peripheral tissues. Thus, the *in vitro* data and oral studies combined support the continued use of RBC AChE inhibition as the critical effect for quantitative dose-response assessment.

For chlorpyrifos, there are data from multiple studies which provide robust RBC AChE data, including studies in pregnant, lactating, and non-pregnant female rats from oral exposure (*e.g.,* developmental neurotoxicity (DNT), reproductive, and subchronic data). In addition, studies are available in juvenile pups that show age-dependent differences, particularly following acute exposures, in sensitivity to chlorpyrifos and its oxon metabolite. This sensitivity is not derived from differences in the AChE enzyme itself but instead are derived largely from the immature metabolic clearance capacity in the juveniles.

b. Neurodevelopmental Toxicity

In addition to information on the effects of chlorpyrifos on AChE, there is an extensive body of information (in the form of laboratory animal studies, epidemiological studies, and mechanistic studies) studying the potential effects on neurodevelopment in infants and children following exposure to organophosphates, including chlorpyrifos.

There are numerous laboratory animal studies on chlorpyrifos in the literature that have evaluated the impact of chlorpyrifos exposure in pre- and post-natal dosing on the developing brain. These studies vary substantially in their study design, but all involve gestational and/or early post-natal dosing with behavioral evaluation from adolescence to adulthood. The data provide qualitative support for chlorpyrifos to potentially impact the developing mammalian brain with adverse outcomes in several neurological domains including cognitive, anxiety and emotion, social interactions, and neuromotor function. It is, however, important to note that there is little consistency in patterns of effects across studies. In addition, most of these studies use doses that far exceed EPA's 10% benchmark response level for RBC AChE inhibition. There are only a few studies with doses at or near the 10% brain or RBC AChE inhibition levels; among these only studies from Carr laboratory at Mississippi State University are considered by EPA to be high quality. In the 2020 HH DRA, EPA concluded that the laboratory animal studies on neurodevelopmental outcomes are not sufficient for quantitatively establishing a PoD. EPA further concluded that the laboratory animal studies do not support a conclusion that adverse neurodevelopmental outcomes are more sensitive than 10% RBC AChE inhibition. (Ref. 17 at 25–31, Ref. 12 at 88–89).

EPA evaluated numerous epidemiological studies on chlorpyrifos and other organophosphate pesticides in accordance with the ''Framework for Incorporating Human Epidemiologic & Incident Data in Health Risk Assessment.'' (Ref. 17, 18, and 19) The most robust epidemiologic research comes from three prospective birth cohort studies. These include: (1) The Mothers and Newborn Study of North Manhattan and South Bronx performed by the Columbia Children's Center for Environmental Health (CCCEH) at Columbia University; (2) the Mount Sinai Inner-City Toxicants, Child Growth and Development Study or the ''Mt. Sinai Child Growth and Development Study;'' and (3) the Center for Health Assessment of Mothers and Children of Salinas Valley (CHAMACOS) conducted by researchers at University of California Berkeley. (Ref. 17 at 32–43).

In the case of the CCCEH study, which specifically evaluated the possible connections between chlorpyrifos levels in cord blood and neurodevelopmental outcomes on a specific cohort, there are a number of notable associations. (Ref. 17 at 36–38) Regarding infant and toddler neurodevelopment, the CCCEH authors reported statistically significant deficits of 6.5 points on the Psychomotor Development Index at three years of age when comparing high to low exposure groups. Notably, these decrements persist even after adjustment for group and individual level socioeconomic variables. These investigators also observed increased odds of mental delay and psychomotor delay at age three when comparing high to low exposure groups. The CCCEH authors also report strong, consistent evidence of a positive association for attention disorders, attention deficit hyperactivity disorder (ADHD), and pervasive development disorder (PDD) when comparing high to low chlorpyrifos exposure groups. Moreover, it was reported that for children in the CCCEH cohort at age seven for each standard deviation increase in chlorpyrifos cord blood exposure, there is a 1.4% reduction in Full-Scale IQ and a 2.8% reduction in Working Memory. In addition, the CCCEH authors evaluated the relationship between pre-natal

chlorpyrifos exposure and motor development/movement and reported elevated risks of arm tremor in children around 11 years of age in the CCCEH cohort.

Notwithstanding the observed associations, EPA and the 2012 and 2016 FIFRA SAP reports identified multiple uncertainties in the CCCEH epidemiology studies. (Ref. 17 and 20) Some of these include the relatively modest sample sizes, which limited the statistical power; exposure at one point in pre-natal time with no additional information regarding post-natal exposures; representativeness of a single point exposure where time-varying exposures or the ability to define cumulative exposures would be preferable; lack of specificity of a critical window of effect and the potential for misclassification of individual exposure measures; and lack of availability of the raw data from the studies that would allow verification of study conclusions.

One of the notable uncertainties in the CCCEH epidemiology studies identified by EPA and the 2016 FIFRA SAP report is the lack of specific exposure information on the timing, frequency, and magnitude of chlorpyrifos application(s) in the apartments of the women in the study. Since 2012, despite extensive effort by EPA to obtain or infer this exposure information from various sources, the lack of specific exposure data remains a critical uncertainty. EPA made efforts in 2014 and 2016 to develop dose reconstruction of the exposures to these women. These dose reconstruction activities represent the best available information and tools but are highly uncertain. In addition, the pregnant women and children in the CCCEH studies were exposed to multiple chemicals, including multiple potent AChE-inhibiting organophosphates and *N*-methyl carbamates. Moreover, using EPA's dose reconstruction methods from 2014 suggest that the pregnant women likely did not exhibit RBC AChE inhibition above 10%. The 2012 and 2016 FIFRA SAP reports expressed concern that it is likely that the CCCEH findings occurred at exposure levels below those that result in 10% RBC AChE inhibition. (Ref. 17 and 20) However, given the limitations of the available CCCEH exposure information and the exposures to multiple potent AChE inhibiting pesticides, EPA has been unable to definitively conclude the level of AChE inhibition occurring in the CCCEH studies. Consistent with the 2016 SAP report, EPA remains unable to make a causal linkage between chlorpyrifos exposure and the outcomes reported by CCCEH investigators. (Ref. 12 and 17) Given the uncertainties, particularly in the exposure information available from CCCEH (single timepoints, lack of time varying exposure, lack of knowledge about application timing), uncertainties remain about the dose-response relationships from the epidemiology studies, which EPA noted in the 2020 HH DRA. (Ref. 12)

Finally, there are several lines of evidence for modes of action of chlorpyrifos distinct from the classical mode of action of AChE inhibition. This information has been generated from model systems representing different levels of biological organization and provide support for molecular initiating events (binding to the morphogenic site of AChE, muscarinic receptors, or tubulin), cellular responses (alterations in neuronal proliferation, differentiation, neurite growth, or intracellular signaling), and responses at the level of the intact nervous system (serotonergic tone, axonal transport). Among the many *in vitro* studies on endpoints relevant to the developing brain available for chlorpyrifos, only three have identified outcomes in picomole concentrations, including concentrations lower than those that elicit AChE inhibition *in vitro.* However, as is the case for many other developmental neurotoxicants, most of these studies have not been designed with the specific goal of construction or testing an adverse outcome pathway. Thus, as discussed in the 2020 HHRA, there are not sufficient data available to test rigorously the causal relationship between effects of chlorpyrifos at the different levels of biological organization in the nervous system. (Ref. 17 at 27–31), so until there are any updates to the state of the science for chlorpyrifos, the Agency is relying on the 2020 HHRA for this rule.

3. Hazard Identification: Using AChE as the Toxicological Endpoint for Deriving PADs

In its 2020 HH DRA assessment, based on its review of all available data, EPA determined that AChE inhibition has the most robust quantitative dose-response data and, thus, was chosen as the critical effect for the quantitative risk assessment. The Agency typically uses a 10% response level for AChE inhibition in human health risk assessments. This longstanding approach, *see* 2006 RED, is consistent with the advice of the FIFRA SAP from 2008 and 2012 and has been applied in the 2006 OP cumulative risk assessment and other single-chemical OP risk assessments. (Ref. 21 and 22).

During the ongoing registration review of chlorpyrifos and consideration of the 2007 Petition, the Agency has received comments concerning whether the use of the 10% AChE inhibition is sufficiently health protective. In one effort to take those comments into consideration, EPA conducted an additional hazard analysis and convened the 2016 FIFRA SAP to evaluate a proposal of using cord blood data from the CCCEH epidemiology studies as the source of data for PoDs. The 2016 FIFRA SAP report did not support the ''direct use'' of the cord blood and working memory data for deriving the regulatory endpoint, due to insufficient information about timing and magnitude of chlorpyrifos applications in relation to cord blood concentrations at the time of birth, uncertainties about the pre-natal window(s) of exposure linked to reported effects, and lack of a second laboratory to reproduce the analytical blood concentrations. (Ref. 17) Despite their critiques regarding uncertainties in the CCCEH studies, the 2016 FIFRA SAP report expressed concern that 10% RBC AChE inhibition may not be sufficiently protective of human health.

The 2016 FIFRA SAP report, however, did present an alternative approach for EPA to consider. This report was supportive of EPA's use of the PBPK–PD model as a tool for assessing internal dosimetry from typical pesticide exposure scenarios. Use of the PBPK–PD model coupled with typical exposure scenarios provides the strongest scientific foundation for chlorpyrifos human health risk assessment. Given that the window(s) of susceptibility are currently not known for the observed neurodevelopmental effects, and the uncertainties associated with quantitatively interpreting the CCCEH cord blood data, the 2016 FIFRA SAP report recommended that the Agency use a time weighted average (TWA) blood concentration of chlorpyrifos for the CCCEH study cohort as the PoD for risk assessment. Thus, in 2016, EPA attempted, using the PBPK–PD model, to determine the TWA blood level expected from post-application exposures from the chlorpyrifos indoor crack-and-crevice use scenario. Despite that effort, EPA concluded in the 2020 HH DRA that the shortcomings of the data with regard to the dose-response relationship and lack of exposure information discussed above, continue to raise issues that make quantitative use of the CCCEH data in risk assessment not scientifically sound. (Ref. 12)

Thus, taking into consideration the robustness of the available data at this

time, EPA has determined in the 2020 HH DRA that the most appropriate toxicological endpoint for deriving points of departure for assessing risks of chlorpyrifos is 10% RBC AChE inhibition. The Agency is not ignoring or dismissing the extensive data concerning the potential for adverse neurodevelopmental outcomes. As discussed later in this Unit, the Agency is addressing the uncertainties surrounding the potential for adverse neurodevelopmental outcomes by retaining the default 10X FQPA SF.

a. Durations of Exposure

As noted in Unit IV.A.1., EPA establishes PoDs for each expected exposure duration likely to result from pesticide exposure. For chlorpyrifos, exposure can occur from a single event or on a single day or from repeated days of exposure. With respect to AChE inhibition, effects can occur from a single exposure or from repeated exposures. For organophosphates, repeated exposures generally result in more AChE inhibition at a given administered dose compared to acute exposures. Moreover, AChE inhibition in repeated dosing guideline toxicology studies with most organophosphates show a consistent pattern of inhibition reaching a ''steady state'' of inhibition at or around 2 to 3 weeks of exposure in adult laboratory animals. (Ref. 23) This pattern observed with repeated dosing is a result of the amount of inhibition coming to equilibrium with production of new enzyme. As such, AChE studies of 2 to 3 weeks generally show the same degree of inhibition with those of longer duration (*i.e.,* up to two years of exposure). Thus, for most of the human health risk assessments for the organophosphates, the Agency is focusing on the critical durations ranging from a single day up to 21 days (*i.e.,* the approximate time to reach steady state for most organophosphates). As such, EPA has calculated PoDs for the acute and steady-state durations. As described below, these PoDs have been derived for various lifestages, routes, and exposure scenarios.

b. Deriving PoDs, Interspecies and Intraspecies Extrapolation: Use of the PBPK Model

The process for developing RfDs and PADs typically involves first deriving PoDs directly from laboratory animal studies, followed by dividing the PoD by the default uncertainty factors of 10X each for interspecies extrapolation and intraspecies extrapolation, and the FQPA safety factor. For chlorpyrifos, EPA has developed a sophisticated PBPK–PD model to derive PoDs. Numerous federal advisory committees and external review panels have encouraged the use of such a modeling approach to reduce inherent uncertainty in the risk assessment and facilitate more scientifically sound extrapolations across studies, species, routes, and dose levels. The PBPK–PD model for chlorpyrifos has undergone extensive peer review by various individual or groups, including the FIFRA SAPs. Significant improvements have been made to the model over the years in response to recommendations from the 2008, 2011, and 2012 FIFRA SAPs and comments from both internal and external peer reviewers. (Ref. 12 at 20) As a result, EPA has concluded that the current PBPK–PD model is sufficiently robust and is using it for deriving PoDs for chlorpyrifos.

i. Derivation of PoDs

As noted above, the PoDs for chlorpyrifos are based on the levels at which 10% RBC AChE inhibition is observed. The PBPK–PD model accounts for pharmacokinetic and pharmacodynamic characteristics to derive age, duration, and route-specific PoDs. Separate PoDs have been calculated for dietary (food, drinking water) and residential exposures by varying inputs on types of exposures and populations exposed. Specifically, the following characteristics have been evaluated: (1) Duration (24-hour (acute), 21-day (steady-state)); (2) route (dermal, oral, inhalation); (3) body weights which vary by lifestage; (4) exposure duration (hours per day, days per week); and (5) exposure frequency (events per day (eating, drinking)). For each exposure scenario, the appropriate body weight for each age group or sex was modeled as identified from the Exposure Factors Handbook for residential exposures and from the U.S. Department of Agriculture's (USDA) National Health and Nutrition Examination Survey (NHANES)/What We Eat in America (WWEIA) Survey for dietary exposures. (Ref. 24).

Using the PBPK–PD model, the Agency evaluated the following exposure scenarios: (1) drinking water exposures to oxon (chlorpyrifos metabolite)—acute and steady-state exposures for infants, children, youths, and female adults; (2) food exposures to chlorpyrifos—acute and steady-state exposures for infants, children, youths, and female adults; (3) residential dermal exposures to chlorpyrifos—steady-state exposures for children, youths, and female adults; (4) residential hand-to-mouth ingestion exposures—steady-state for children 1 to 2 years old; and (5) residential inhalation exposures—steady-state for children 1 to 2 years old and female adults. (Ref. 12 at 22–25).

Steady-state dietary exposure was estimated daily for 21 days. For drinking water exposure, infants and young children (infants <1 year old, children between 1 to 2 years old, and children between 6 to 12 years old) were assumed to consume water 6 times per day, with a total consumption volume of 0.69 L/day. For youths and female adults, they were assumed to consume water 4 times per day, with a total consumption volume of 1.71 L/day.

For all residential dermal exposures to chlorpyrifos, the dermal PoDs were estimated assuming 50% of the skin's surface was exposed. Exposure times for dermal exposure assessment were consistent with those recommended in the 2012 Residential Standard Operating Procedures (SOPs). (Ref. 22) For residential inhalation exposures following public health mosquitocide application, the exposure duration was set to 1 hour per day for 21 days. The incidental oral PoDs for children 1 to <2 years old for other turf activities were estimated assuming that there were six events, 15 minutes apart, per day.

The PBPK-modeled PoDs derived for the various lifestages, routes, and exposure scenarios discussed above, can be found in table 4.2.2.1.2 of the 2020 HH DRA. (Ref. 12).

ii. Interspecies Extrapolation

As indicated above, the PBPK–PD model directly predicts human PoDs based on human physiology and biochemistry; thus, there is no need for an interspecies uncertainty factor to extrapolate from animal PoDs.

iii. Intraspecies Extrapolation

The PBPK–PD model can account for variability of critical physiological, pharmacokinetic, and pharmacodynamic parameters in a population to estimate, using the Monte Carlo analysis, the distribution of doses that result in 10% RBC AChE inhibition. Therefore, Data-Derived Extrapolation Factors (DDEF) for intraspecies extrapolation have been estimated to replace the default intraspecies uncertainty factor for some groups. (Ref. 25).

According to EPA's DDEF guidance, when calculating a DDEF intraspecies extrapolation factor, administered doses leading to the response level of interest (in the case of chlorpyrifos, the 10% change in RBC AChE inhibition) are compared between a measure of average response and response at the tail of the distribution representing sensitive individuals. The tail of the distribution

may be selected at the 95th, 97.5th, and 99th percentile.

As for chlorpyrifos, the 99th percentile was used in risk assessment to provide the most conservative measure. (Ref. 26) In addition to estimating DDEF using the above approach for specific age groups, intraspecies DDEF were also calculated by comparing average responses between adults and 6-month-old infants. For the 2020 HHRA, the largest calculated DDEFs, 4X for chlorpyrifos and 5X for the oxon metabolite, were used for intraspecies extrapolation for all groups except women of childbearing age. There was a slightly higher variability between adults and infants when considering the distributions for the oxon metabolite, thus, the slightly higher intraspecies factor. For women of childbearing age, the Agency is applying the standard 10X intraspecies extrapolation factor due to limitations in the PBPK–PD model to account for physiological, anatomical, and biochemical changes associated with pregnancy. (Ref. 12 at 21–22).

iv. Summarizing the PoDs, Interspecies and Intraspecies Extrapolation Factors

In summary, for assessing the risks from exposure to chlorpyrifos, the human PBPK–PD model has been used to derive PoDs based on 10% RBC AChE inhibition for various populations, durations, and routes. The model, which calculates a human PoD directly, obviates the need for an interspecies extrapolation factor since animal data are not used. To account for variations in sensitivities, the Agency has determined that an intraspecies factor of 4X for chlorpyrifos and 5X for the oxon is appropriate for all groups except women of childbearing age. For women of childbearing age, the typical 10X intraspecies factor is being applied, due the lack of appropriate information and algorithms to characterize physiological changes during pregnancy.

c. FQPA Safety Factor

As noted above, the FFDCA requires EPA, in making its safety finding, that in ''the case of threshold effects, an additional tenfold margin of safety for the pesticide chemical residue and other sources of exposure shall be applied for infants and children to take into account potential pre- and post-natal toxicity and completeness of data with respect to exposure and toxicity to infants and children.'' 21 U.S.C. 346a(b)(2)(C). Section 408(b)(2)(C) further states that ''the Administrator may use a different margin of safety for the pesticide chemical residue only if, on the basis of reliable data, such margin will be safe for infants and children.'' *Id.*

In applying the FQPA SF provision, EPA has interpreted it as imposing a presumption in favor of retaining it as an additional 10X SF. (Ref. 27 at 4, 11) Thus, EPA generally refers to the 10X factor as a presumptive or default 10X factor. EPA has also made clear, however, that this presumption or default in favor of the 10X is only a presumption. The presumption can be overcome if reliable data demonstrate that a different factor is safe for children. (*Id.*). In determining whether a different factor is safe for children, EPA focuses on the three factors listed in FFDCA section 408(b)(2)(C)—the completeness of the toxicity database, the completeness of the exposure database, and potential pre- and post-natal toxicity. In examining these factors, EPA strives to make sure that its choice of a SF, based on a weight-of-the-evidence evaluation, does not understate the risk to children. (*Id.* at 24–25, 35).

In the 2020 HH DRA, the default 10X FQPA SF was retained, and the assessment did not adopt or offer support for reducing the factor to 1X. However, the 2020 HH DRA does present potential risks from exposures to chlorpyrifos with retention of the default 10X FQPA SF and with reduction of the FQPA SF to 1X. The purpose of presenting both values was to provide an indication of what the potential risk estimates would be under either scenario. To reduce the FQPA SF to 1X, the FFDCA requires that EPA determine that reliable data demonstrate that the 1X would be safe for infants and children. The 2020 HH DRA did not make that determination. For chlorpyrifos, of the three factors mentioned in the previous paragraph, the primary factor that undercuts a determination that a different SF would be safe for children is the uncertainty around the potential for pre- and post-natal toxicity for infants and children in the area of neurodevelopmental outcomes.

Based on the weight of the evidence concerning the potential for neurodevelopmental outcomes as discussed in this Unit above, there is ample qualitative evidence of a potential effect on the developing brain; however, there remains uncertainty around the levels at which these potential neurodevelopmental outcomes occur. Although the laboratory animal studies do not support a conclusion that neurodevelopmental outcomes are more sensitive than AChE inhibition, there remains some uncertainty in the dose-response relationship between chlorpyrifos and adverse neurodevelopmental outcomes based on the epidemiology data, and the mechanistic data are, at this time, incomplete in their characterization of dose-response. Because the data available at this time indicate remaining uncertainties concerning pre- and post-natal toxicity due to insufficient clarity on the levels at which these outcomes occur, the Agency is unable to conclude, at this time, that a different SF would be safe for infants and children. Thus, the Agency is retaining the default 10X FQPA SF at this time.

d. Total Uncertainty Factors and PADs

In conclusion, the Agency used a total uncertainty factor of 100X for determining the food and drinking water PADs for females of childbearing age (1X interspecies factor, 10X intraspecies factor, and 10X FQPA SF); 40X for determining the food PADs for remaining populations (1X interspecies factor, 4X intraspecies factor, and 10X FQPA SF); and 50X for determining the PADs for drinking water for remaining populations (1X interspecies factor, 5X intraspecies factor, and 10X FQPA SF).

Taking into consideration the PoDs, intraspecies extrapolation factors, and FQPA SF, the Agency calculated acute PADs (aPADs) and steady-state PADs (ssPADs) for infants (less than 1 year old), children (1 to 2 years old), children/youth (6 to 12 years old), and females (13 to 49 years old); these subpopulations will be protective of other subpopulations. While PADs were calculated for youths (13 to 19 years old), these PADs were not used in the dietary/aggregate assessments because females (13 to 49 years old) are considered protective of this sub-population. (Ref. 12 at 30–32) Risk estimates can be found in table 5.0.1 in the 2020 HH DRA.

B. EPA's Exposure Assessment for Chlorpyrifos

Risk is a function of both hazard and exposure. Thus, equally important to the risk assessment process as determining the hazards posed by a pesticide and the toxicological endpoints for those hazards is estimating human exposure. Under FFDCA section 408, EPA must evaluate the aggregate exposure to a pesticide chemical residue, which includes ''all anticipated dietary exposures and all other exposures for which there is reliable information.'' 21 U.S.C. 346a(b)(2)(A)(ii). This means that EPA is concerned not only with exposure to pesticide residues in food but also exposure resulting from pesticide contamination of drinking water

supplies and from use of pesticides in the home or other non-occupational settings. (See 21 U.S.C. 346a(b)(2)(D)(vi)).

Pursuant to FFDCA section 408(b), EPA has evaluated chlorpyrifos's risks based on ''aggregate exposure'' to chlorpyrifos. By ''aggregate exposure,'' EPA is referring to exposure to chlorpyrifos by multiple pathways of exposure, *i.e.,* food, drinking water, and residential. EPA uses available data and standard analytical methods, together with assumptions designed to be protective of public health, to produce separate estimates of exposure for a highly exposed subgroup of the general population, for each potential pathway and route of exposure.

The following analysis reflects a summary of the Agency's exposure assessment from the 2020 HH DRA unless otherwise specified. (Ref. 2).

1. Exposure From Food

a. General Approach for Estimating Food Exposures

There are two critical variables in estimating exposure in food: (1) the types and amount of food that is consumed; and (2) the residue level in that food. Consumption is estimated by EPA based on scientific surveys of individuals' food consumption in the United States conducted by the U.S. Department of Agriculture (USDA). (Ref. 28 at 12) Information on residue values can come from a range of sources including crop field trials; data on pesticide reduction (or concentration) due to processing, cooking, and other practices; information on the extent of usage of the pesticide; and monitoring of the food supply. (*Id.* at 17).

Data on the residues of chlorpyrifos in foods are available from both field trial data and monitoring data, primarily the USDA's Pesticide Data Program (PDP) monitoring data. Monitoring data generally provide a characterization of pesticide residues in or on foods consumed by the U.S. population that closely approximates real-world exposures because they are sampled closer to the point of consumption in the chain of commerce than field trial data, which are generated to establish the maximum level of legal residues that could result from maximum permissible use of the pesticide immediately after harvest.

EPA used a computer program known as the Dietary Exposure Evaluation Model and Calendex software with the Food Commodity Intake Database (DEEM–FCID version 3.16/Calendex) to estimate chlorpyrifos exposure by combining data on human consumption amounts with residue values in food commodities. This version of the model incorporated 2003–2008 consumption data from USDA's NHANES/WWEIA. The data are based on the reported consumption of more than 20,000 individuals over two non-consecutive survey days. Foods ''as consumed'' (*e.g.,* apple pie) are linked to EPA-defined food commodities (*e.g.,* apples, peeled fruit—cooked; fresh or N/S (Not Specified); baked; or wheat flour—cooked; fresh or N/S, baked) using publicly available recipe translation files developed jointly by USDA Agricultural Research Service (ARS) and EPA. For chronic exposure assessment (or in the case of chlorpyrifos, for steady-state exposure assessment), consumption data are averaged for the entire U.S. population and within population subgroups; however, for acute exposure assessment, consumption data are retained as individual consumption events. Using this consumption information and residue data, the exposure estimates are calculated for the general U.S. population and specific subgroups based on age, sex, ethnicity, and region.

For chlorpyrifos, EPA determined that acute and steady-state exposure durations were relevant for assessing risk from food consumption. EPA calculates potential risk by using probabilistic techniques to combine distributions of potential exposures in sentinel populations. The resulting probabilistic assessments present a range of dietary exposure/risk estimates.

Because probabilistic assessments generally present a realistic range of residue values to which the population may be exposed, EPA's starting point for estimating exposure and risk for such assessments is the 99.9th percentile of the population under evaluation. When using a probabilistic method of estimating acute dietary exposure, EPA typically assumes that, when the 99.9th percentile of acute exposure is equal to or less than the aPAD, the level of concern for acute risk has not been exceeded. By contrast, where the analysis indicates that estimated exposure at the 99.9th percentile exceeds the aPAD, EPA would generally conduct one or more sensitivity analyses to determine the extent to which the estimated exposures at the high-end percentiles may be affected by unusually high food consumption or residue values. (The same assumptions apply to estimates for steady-state dietary exposure and the ssPAD.) To the extent that one or a few values seem to ''drive'' the exposure estimates at the high-end of exposure, EPA would consider whether these values are reasonable and should be used as the primary basis for regulatory decision making. (Ref. 29).

b. Estimating Chlorpyrifos Exposures in Food

The residue of concern, for tolerance expression and risk assessment, in plants (food and feed) and livestock commodities is the parent compound chlorpyrifos. EPA has determined that the metabolite chlorpyrifos oxon is not a residue of concern in food or feed, based on available field trial data and metabolism studies that indicate that the oxon is not present in the edible portions of the crops. This conclusion is supported by USDA PDP monitoring data, which did not find residues of chlorpyrifos oxon on food samples. Furthermore, the oxon metabolite was not found in milk or livestock tissues. (Ref. 12 at 33).

Acute and steady-state dietary (food only) exposure analyses for chlorpyrifos were conducted using the DEEM–FCID version 3.16/Calendex software. (Ref. 30) These analyses were performed for the purpose of obtaining food exposure values for comparison to the chlorpyrifos doses predicted by the PBPK–PD model to cause 10% RBC AChE inhibition. The acute and steady-state dietary (food only) exposure analyses do not include drinking water exposures, which were assessed separately, as discussed in the next section.

The assessments include exposures to residues on all field crops and livestock use resulting from uses registered at the time of the dietary risk assessment as well as residues on imported commodities, but the assessments do not include potential exposure from food handling establishments as those were considered negligible. (Ref. 26) Both the acute and steady-state dietary (food only) exposure analyses are highly refined. The large majority of food residues used were based upon PDP monitoring data except in a few instances where no appropriate PDP data were available. In those cases, field trial data or tolerance-level residues were assumed. EPA also used food-processing factors from submitted studies as appropriate. In addition, EPA's acute and steady-state dietary (food only) exposure assessments used percent crop treated (PCT) information. (Ref. 30).

The chlorpyrifos acute dietary (food only) exposure analysis was conducted using the DEEM–FCID, version 3.16. The acute risk estimates were presented for the sentinel populations for infants (less than 1 year old); children (1–2 years old); youths (6–12 years old); and

adults (females 13–49 years old). The assessment of these index lifestages is protective of other population subgroups.

The chlorpyrifos steady-state dietary (food only) exposure analysis was conducted using the Calendex component of DEEM–FCID (with 2003–2008 survey consumption data from USDA's NHANES/WWEIA). Calendex provides a focus detailed profile of potential exposures to individuals across a calendar year. A calendar-based approach provides the ability to estimate daily exposures from multiple sources over time to an individual and is in keeping with two key tenets of aggregate risk assessment: (1) that exposures when aggregated are internally consistent and realistic; and (2) that appropriate temporal and geographic linkages or correlations/associations between exposure scenarios are maintained.

The chlorpyrifos steady-state dietary (food only) assessment considers the potential risk from a 21-day exposure duration using a 3-week rolling average (sliding by day) across the year. For this assessment, the same food residue values used in the acute assessment were used for the 21-day duration. In the Calendex software, one diary for each individual in the WWEIA is selected to be paired with a randomly selected set of residue values for each food consumed. The steady-state analysis calculated exposures for the sentinel populations for infants (less than 1 year old); children (1 to 2 years old); youths (6 to 12 years old); and adults (females 13 to 49 years old). The assessment of these index lifestages is protective of other population subgroups.

2. Exposure From Drinking Water

a. General Approach for Assessing Exposure From Drinking Water

i. Modeling and Monitoring Data

Monitoring and modeling are both important tools for estimating pesticide concentrations in water and can provide different types of information. Monitoring data can provide estimates of pesticide concentrations in water that are representative of the specific agricultural or residential pesticide practices in specific locations, under the environmental conditions associated with a sampling design (*i.e.,* the locations of sampling, the times of the year samples were taken, and the frequency by which samples were collected). Although monitoring data can provide a direct measure of the concentration of a pesticide in water, it does not always provide a reliable basis for estimating spatial and temporal variability in exposures because sampling may not occur in areas with any pesticide use, with the highest pesticide use, when the pesticides are being used, and/or at an appropriate sampling frequency to detect high concentrations of a pesticide that occur over the period of a day to several days.

Because of the limitations in most monitoring studies, EPA's standard approach is to use water exposure models as the primary means to estimate pesticide exposure levels in drinking water. Modeling is a useful tool for characterizing vulnerable sites and can be used to estimate upper-end pesticide water concentrations in surface water and groundwater. EPA's computer models use detailed information on soil properties, crop characteristics, and weather patterns to estimate water concentrations in vulnerable locations where the pesticide could be used according to its label. (Ref. 31 at 27–28) EPA's models calculate estimated water concentrations of pesticides using laboratory data that describe how fast the pesticide breaks down to other chemicals and how it moves in the environment at these vulnerable locations. Depending on the modeling algorithm (*e.g.,* surface water modeling scenarios), daily concentrations can be estimated continuously over long periods of time, and for places that are of most interest for any particular pesticide.

EPA relies on models it has developed for estimating pesticide concentrations in both surface water and ground water. The most common model used to conduct drinking water assessments is the Pesticide in Water Calculator (PWC). PWC couples the Pesticide Root Zone Model (PRZM) and Variable Volume Water Model (VVWM) together to simulate pesticide fate and transport from the field of application to an adjacent reservoir. (Ref. 31 at 27–28). The PWC estimates pesticide concentrations for an index reservoir that is modeled for site-specific scenarios (*i.e.,* weather and soil data) in different areas of the country. A detailed description of the models routinely used for exposure assessment is available from the EPA OPP Aquatic Models website. *See* EPA's aquatic models for estimating pesticide concentrations in food, water, non-target organisms, and residential and occupational environments. (Ref. 2).

In modeling potential surface water concentrations, EPA models areas of the country that are vulnerable to surface water contamination. Consequently, EPA models exposures occurring in small highly agricultural watersheds in different growing areas throughout the country, over a 30-year period. The scenarios are designed to capture residue levels in drinking water from reservoirs with small watersheds with a large percentage of land use in agricultural production. EPA believes these assessments are likely reflective of a small subset of watersheds across the country and represent a drinking water source generally considered to be the most vulnerable to frequent high concentrations of pesticides.

When monitoring data meet certain data quantity criteria, EPA has tools available to quantify the uncertainty in available monitoring data such that it can be used quantitively to estimate pesticide concentrations in drinking water. (Ref. 32) Furthermore, monitoring data can be used in a weight of evidence approach with model estimated concentrations to increase confidence in the conclusions of a drinking water assessment.

ii. Drinking Water Level of Comparison (DWLOC)

The drinking water level of comparison (DWLOC) is a benchmark that can be used to guide refinements of the DWA. For a drinking water assessment that utilizes a DWLOC, the calculated DWLOC is compared to the EDWC. When the EDWC is greater than the DWLOC, there may be a risk concern. Conversely, when the EDWC is less than the DWLOC, there are no risks of concern.

The DWLOC relates to the concept of the ''risk cup,'' which EPA developed to facilitate risk refinement when considering aggregate human health risk to a pesticide. (Ref. 33) The risk cup is the total exposure allowed for a pesticide considering its toxicity and required safety factors. The risk cup represents the maximum safe exposure for the duration and population being considered. Exposures exceeding the risk cup are of potential concern. There are risk cups for each pertinent duration of exposure (*e.g.,* acute, short-term, chronic). For chlorpyrifos, EPA is using exposure durations of acute (single day, 24 hours) and steady state (21-day). (Ref. 32).

In practice, EPA calculates the total exposure from food consumption and residential (or other non-occupational) exposures and subtracts this value from the maximum safe exposure level. The resulting value is the allowable remaining exposure that can come from drinking water without the potential for adverse health effects. Knowing this allowable remaining exposure and the water consumption for each population

subgroup (*e.g.,* infants), the Agency can calculate the DWLOC, which is the estimate of safe concentration of pesticides in drinking water. Using this process of DWLOC calculation allows EPA to determine a target maximum safe drinking water concentration, thereby identifying instances where drinking water estimates require refinement or estimates that may be indicative of risk. (Ref. 31 at 19–20).

iii. Scale of Drinking Water Assessment

Although food is distributed nationally and pesticide residue values on food are therefore not expected to vary substantially throughout the country, drinking water is locally derived and concentrations of pesticides in source water fluctuate over time and location for a variety of reasons. Pesticide residues in water fluctuate daily, seasonally, and yearly because of the timing of the pesticide application, the vulnerability of the water supply to pesticide loading through runoff, spray drift and/or leaching, and changes in the weather. Concentrations are also affected by the method of application, the location, and characteristics of the sites where a pesticide is used, the climate, and the type and degree of pest pressure, which influences the application timing, rate used, and number of treatments in a crop production cycle.

EPA may conduct a DWA for a national scale depending on the pesticide use under evaluation. A national scale DWA may use a single upper-end pesticide concentration as a starting point for assessing whether additional refinements are needed or estimated pesticide concentrations for certain site-specific scenarios that are associated with locations in the United States vulnerable to pesticide contamination based on pesticide use patterns. (Ref. 31 at 22).

EPA may also conduct a regional scale DWA to focus on areas where pesticide concentrations may be higher than the DWLOC. Under this assessment, EPA estimates pesticide concentrations across different regions in the United States that are subdivided into different areas called hydrologic units, identified by a two-digit hydrologic unit code (HUC 2) number. There are 21 HUC 2 regions in the United States, with 18 of them within the contiguous United States. These areas contain either the drainage area of a major river or a combined drainage of a series of rivers. *See* United States Geological Survey (USGS) Water Resources of the United States. (Ref. 34) Estimated pesticide concentrations under this approach would be associated with a vulnerable pesticide use area somewhere within the evaluated region. (Ref. 31 at 23).

iv. Drinking Water Refinements

EPA has defined four assessment tiers for drinking water assessments. Lower-tiered assessments are more conservative based on the defaults or upper bound assumptions and may compound conservatisms, while higher tiers integrate more available data and provide more realistic estimates of environmental pesticide concentrations.

These four tiers vary in the level of resources, the amount of data considered, the spatial scale, and the refinement in the estimated pesticide concentration. Tier 1 requires the least amount of resources and the least amount of data, whereas Tier 4 is resource intensive, considers a wide range of sources and types of data, and is spatially explicit, resulting in high confidence in the reported pesticide concentration. Each successive tier integrates more focused pesticide, spatial, temporal, agronomic, and crop-specific information. The order in which refinements are considered (*i.e.,* the order in which the assessment is refined) is pesticide-specific and depends on the nature and quality of the available data used to support the refinement. Additional information on the conduct of drinking water assessments can be found in the ''Framework for Conducting Pesticide Drinking Water Assessment for Surface Water'' (USEPA, 2020) (''DWA Framework document''). (Ref. 31).

As discussed in the DWA Framework document, EPA can incorporate several refinements in higher tiered modeling. Two such refinements are the percent cropped area (PCA) and the PCT. These are described in the document titled ''*Integrating a Distributional Approach to Using Percent Crop Area (PCA) and Percent Crop Treated (PCT) into Drinking Water Assessment.*'' (Ref. 35) The PCA refers to the amount of area in a particular community water system that is planted with the crop of interest (*e.g.,* the default assumption is that the entire watershed is planted with a crop of interest). The PCT refers to the amount of the cropped area that is treated with the pesticide of interest (*e.g.,* the default is that the entire cropped area is treated with the pesticide of interest). With additional use and usage data, EPA can refine assumptions about the application rate and PCT for use in modeling to generate EDWCs that are appropriate for human health risk assessment and more accurately account for the contribution from individual use patterns in the estimation of drinking water concentrations.

b. Drinking Water Assessment for Chlorpyrifos

For the chlorpyrifos drinking water assessment, the metabolite chlorpyrifos oxon—which forms during water treatment, *e.g.,* chlorination, of source water containing chlorpyrifos and is more toxic than chlorpyrifos—was selected as the residue of concern. (Ref. 36 and 37) The range of conversion from parent to oxon depends upon the type of water treatment and other conditions. Based on available information regarding the potential effects of certain water treatments (*e.g.,* chlorination appears to hasten transformation of chlorpyrifos-to-chlorpyrifos oxon), EPA assumed that all chlorpyrifos in source water is converted to chlorpyrifos oxon upon treatment.

The Agency used a DWLOC approach for assessing aggregate risk from chlorpyrifos. EPA calculated DWLOCs for different age groups for both the acute aggregate assessment and the steady-state aggregate assessment, taking into consideration the food and residential contributions to the risk cup. These numbers were provided as a benchmark for evaluating drinking water contributions from uses of chlorpyrifos across the United States, and whether such concentrations would result in aggregate exposures to chlorpyrifos that exceeded the Agency's levels of concern. The lowest acute DWLOC calculated was for exposure to chlorpyrifos oxon to infants (<1 year old) at 23 ppb; the lowest steady-state DWLOC calculated was also for exposure to chlorpyrifos oxon to infants (<1 year old) at 4.0 ppb. (Ref. 12 at 45) In other words, EDWCs for infants of chlorpyrifos oxon greater than 23 ppb from a single exposure or 4.0 ppb for a 21-day average would exceed EPA's DWLOC and present a risk that exceeds the Agency's level of concern.

In its 2014 DWA, EPA concluded that there were multiple uses of chlorpyrifos that could lead to exposures to chlorpyrifos oxon in drinking water that exceed the DWLOC. (Ref. 38) The 2014 DWA provided the basis for the Agency's proposal to revoke tolerances in 2015. (Ref. 39) In 2016, EPA conducted a refined DWA that estimated drinking water concentrations based on modeling of all registered uses, as well as all available surface water monitoring data. That 2016 DWA considered several refinement strategies in a two-step process to derive exposure estimates for chlorpyrifos and chlorpyrifos oxon across the country. The first step was an assessment of

potential exposure based on the current maximum label rates at a national level. This indicated that the EDWCs could be above the DWLOC.

Because estimated concentrations at the national level exceeded the DWLOC, the Agency conducted a more refined assessment of uses on a regional level. (Ref. 36 at 73–86) This more refined analysis derived EDWCs using the PWC modeling for maximum labeled rates and 1 pound per acre by region for each use. The analysis indicated that approved uses of chlorpyrifos in certain vulnerable watersheds in every region of the country would result in EDWCs that exceed the DWLOC. For example, table 25 of EPA's 2016 DWA, which provides the range of estimated concentrations of chlorpyrifos in drinking water from uses on golf courses and agricultural or production crops, shows EDWCs that exceed the DWLOC in vulnerable watersheds in every region in the country. While the lower end of some of the ranges provided in that table are below the DWLOC, those lower numbers reflect a single use (*i.e.,* single crop) and do not reflect potential exposure from other uses where applications occur at higher rates, more frequently, or in more locations made more vulnerable due to soil type, weather, or agronomic practices—all of which were permitted by labeling that was approved at that time. The relevant estimated concentration for risk assessment purposes was the highest concentration across all uses because it reflects concentrations that may occur in vulnerable sources of drinking water based on approved use instructions. (Ref. 36 at 73–74).

In addition, a robust quantitative analysis of the monitoring data was conducted resulting in concentrations consistent with model-estimated concentrations above the DWLOC. (Ref. 36 at 90–121) Considering both monitoring data and modeling estimates together supported the conclusion that drinking water concentrations in regions across the country exceeded the DWLOC. (Ref. 36 at 121–123).

After the EPA's 2016 DWA showed that the DWLOC exceedances are possible from several uses, EPA developed refinement strategies to examine those estimated regional/watershed drinking water concentrations to pinpoint community drinking water systems where exposure to chlorpyrifos oxon as a result of chlorpyrifos applications may pose an exposure concern. At that time, it was anticipated that a more refined drinking water assessment might allow EPA to better identify where at-risk watersheds are located throughout the country to support more targeted risk mitigation through the registration review process. The refinements better account for variability in the use area treated within a watershed that may contribute to a drinking water intake (referred to as PCA or percent use area when considering non-agricultural uses) and incorporate data on the amount of a pesticide that is actually applied within a watershed for agricultural and non-agricultural uses (referred to as PCT). These refinement approaches underwent external peer review and were issued for public comment in January 2020. (Ref. 39 and 40) In addition, EPA used average application rates, average numbers of annual applications for specific crops, and estimated typical application timing at the state-level based on pesticide usage data derived from a statistically reliable private market survey database, publicly available survey data collected by the USDA, and state-specific scientific literature from crop extension experts. (Ref. 1)

The refinements were integrated in the 2020 DWA. The updated assessment applied the new methods for considering the entire distribution of community water systems, PCA adjustment factors, integrated state level PCT data, incorporated refined usage and application data, and included quantitative use of surface water monitoring data in addition to considering state level usage rate and data information. In addition, given the 2016 DWA calculation of EDWCs exceeding the DWLOC of 4.0 ppb, the Agency decided to focus its refinements for the 2020 DWA on a subset of uses in specific regions of the United States. The purpose of the focus on this subset of uses was to determine if limiting use of chlorpyrifos to only certain food uses and regions would yield EDWCs below the DWLOC. The subset of uses assessed were selected because they were identified as critical uses by the registrant and/or high benefit uses to growers. That subset of registered uses included the 11 identified crops in the specific geographical areas listed in Unit III, and the assessment of those uses assumed application rate and timing/frequency restrictions based on available usage data as described in the previous paragraph. The results of this analysis indicated that the EDWCs from this limited subset of uses are below both the acute and chronic DWLOCs. (Ref. 2 at 16–17) The 2020 DWA refined estimates did not include chlorpyrifos exposures from uses beyond that subset and expressly noted that a separate assessment would be needed in order to evaluate whether other uses could be added to or substituted for the crops and areas already identified and still maintain concentrations below the DWLOC.

3. Residential Exposure to Pesticides

a. General Approach to Assessing Residential Exposures

Residential assessments examine exposure to pesticides in non-occupational or residential settings (*e.g.,* homes, parks, schools, athletic fields or any other areas frequented by the general public), based on registered uses of the pesticide. Exposures to pesticides may occur to persons who apply pesticides (which is referred to as residential handler exposure) or to persons who enter areas previously treated with pesticides (which is referred to as post-application exposure). Such exposures may occur through oral, inhalation, or dermal routes and may occur over different exposure durations (*e.g.,* short-term, intermediate-term, long-term), depending on the type of pesticide and particular use pattern.

Residential assessments are conducted through examination of significant exposure scenarios (*e.g.,* children playing on treated lawns or homeowners spraying their gardens) using a combination of generic and pesticide-specific data. EPA has prepared SOPs for conducting residential assessments on a wide array of scenarios that are intended to address the most common uses by which individuals could be exposed to pesticides in a non-occupational environment. (Ref. 22) The SOPs identify relevant generic data and construct algorithms for calculating exposure amounts using these generic data in combination with pesticide-specific information. The generic data generally involve survey data on behavior patterns (*e.g.,* activities conducted on turf and time spent on these activities) and transfer coefficient data. Transfer coefficient data measure the amount of pesticide that transfers from the environment to humans from a defined activity (*e.g.,* hand contact with a treated surface or plant). Specific information on pesticides can include information on residue levels as well as information on environmental fate such as degradation data.

Typically, once EPA assesses potential exposures from all applicable exposure scenarios, EPA selects the highest exposure scenario for each exposed lifestage to calculate representative risk estimates for use in the aggregate exposure assessment.

Those specific exposure values are then combined with the lifestage appropriate exposure values provided for food and drinking water to determine whether a safety finding can be made. As described above, since EPA used a DWLOC approach for assessing risks for chlorpyrifos, EPA combined food exposures covered by all chlorpyrifos tolerances with residential exposures to identify the DWLOC and compared the DWLOC to EDWCs to determine whether a safety finding could be made. The end result is the same since both methods aggregate food, drinking water, and residential exposure estimates to determine whether a safety finding can be made.

b. Residential Exposure Assessment for Chlorpyrifos

Most chlorpyrifos products registered for residential treatment were voluntarily cancelled or phased out by the registrants between 1997 and 2001; however, some uses of chlorpyrifos remain that may result in non-occupational, non-dietary (*i.e.,* residential) exposures, specifically roach bait products, fire ant mound treatments, and uses on golf courses. The roach bait product is designed such that the active ingredient is contained within a bait station, which eliminates the potential for contact with the chlorpyrifos containing bait material; therefore, residential exposures from the roach bait product were determined to be negligible. Since the ant mound treatments can only be applied professionally and direct exposure with treated mounds is not anticipated, residential exposures from the ant mound use were also determined to be negligible. (Ref. 12 at 36–44).

For the golf course use, the Agency does not anticipate residential handler exposures, although there is a potential for residential post-application exposures that would aggregate with dietary exposures from the registered use on golf courses. Based on the anticipated use patterns reviewed under the SOP, EPA assessed these exposures as steady-state residential post-application exposures, which would be protective of shorter durations of exposure. There is a potential for dermal post-application exposures from the golf course uses for adults (females 13 to 49 years old); youths (11 to less than 16 years old); and children (6 to less than 11 years old). Although EPA did not identify any post-application risks of concern from use on golf courses, EPA used the post-application exposures and risk estimates resulting from the golfing scenarios in EPA's aggregate exposure and risk assessment.

4. Cumulative Risk

FFDCA section 408(b)(2)(D)(v), 21 U.S.C. 346a(b)(2)(D)(v), requires EPA to consider ''available information concerning the cumulative effects of [pesticide chemical] residues and other substances that have a common mechanism of toxicity.''

Chlorpyrifos belongs to a class of pesticides called organophosphates (OPs), which share the ability to inhibit AChE through phosphorylation of the serine residue on the enzyme leading to accumulation of acetylcholine and ultimately cholinergic neurotoxicity. This shared mode of action/adverse outcome pathway (MOA/AOP) is the basis for the OP common mechanism grouping per OPP's *Guidance for Identifying Pesticide Chemicals and Other Substances that have a Common Mechanism of Toxicity* (USEPA, 1999). The 2006 cumulative risk assessment for organophosphates (2006 OP CRA) used brain AChE inhibition in female rats as the source of dose response data for the relative potency factors and PODs for each OP, including chlorpyrifos. After considering the potential for cumulative risks of concern from the OPs, EPA concluded that the tolerances were safe. (Ref. 21).

After completion of the single-chemical OP assessments for this round of registration review, but prior to the issuance of a final registration review decision for chlorpyrifos (and the other OPs), EPA will determine whether any updates to the 2006 OP CRA on AChE inhibition are necessary. In the meantime, no additional uses have been approved since that document was completed (*i.e.,* no additional exposures), and many uses have been (or are in the process of being) cancelled or reduced (*e.g.,* the current reduction of chlorpyrifos uses). As such, EPA expects the potential for cumulative risks and any cumulative risk estimates will likely be lower than assessed in 2006, when EPA concluded that the results of the cumulative assessment support a reasonable certainty of no harm finding as required by FQPA.

C. Aggregate Risk Assessment and Determination of Safety for Chlorpyrifos

The final step in the risk assessment is the aggregate exposure assessment and risk characterization. In this step, EPA combines information from the first three steps (hazard identification, level of concern (LOC)/dose-response analysis, and human exposure assessment) to quantitatively estimate the risks posed by a pesticide. The aggregated exposure assessment process considers exposure through multiple pathways or routes of exposure (*e.g.,* food, water, and residential) for different sub-populations (*e.g.,* infants, children ages 1–2) and exposure duration or types of effects (*e.g.,* acute (single dose) noncancer effects, chronic noncancer effects, and cancer). The aggregated exposure assessments can be deterministic (levels of exposure for each pathway are point estimates), probabilistic (levels of exposure are a distribution for a given population), or a combination of the two and are dependent on the level of refinement or assessment tier.

As noted above, EPA evaluates aggregate exposure by comparing combined exposure from all relevant sources to the safe level. Where exposures exceed the safe level (*i.e.,* the risk cup), they present potential risks of concern. There are risk cups for each pertinent duration of exposure for a pesticide because the amount of exposure that can be incurred without adverse health effects will vary by duration (*e.g.,* acute, short-term, chronic).

Whether risks will exceed the risk cup (*i.e.,* whether exposures are expected to exceed safe levels) is expressed differently, depending on the type of level of concern the Agency has identified. For dietary assessments, the risk is expressed as a percentage of the acceptable dose (*i.e.,* the dose which EPA has concluded will be ''safe''). Dietary exposures greater than 100% of the acceptable dose are generally cause for concern and would be considered ''unsafe'' within the meaning of FFDCA section 408(b)(2)(B). For non-dietary (and combined dietary and non-dietary) risk assessments of threshold effects, the toxicological level of concern is typically not expressed as an RfD/PAD, but rather in terms of an acceptable (or target) Margin of Exposure (MOE) between human exposure and the PoD. The ''margin'' that is being referred to in the term MOE is the ratio between the PoD and human exposure, which is calculated by dividing human exposure into the PoD. An acceptable MOE is generally considered to be a margin at least as high as the product of all applicable safety factors for a pesticide. For example, when the Agency retains the default uncertainty factors for dietary or aggregate risk (a 10X interspecies uncertainty factor, a 10X intraspecies uncertainty factor, and a 10X FQPA safety factor), the total uncertainty factor (or level of concern) is 1,000, and any MOE above 1,000 represents exposures that are not of concern. Like RfD/PADs, specific target MOEs are selected for exposures of different durations and routes. For non-

dietary exposures, EPA typically examines short-term, intermediate-term, and long-term exposures. Additionally, target MOEs may be selected based on both the duration of exposure and the various routes of non-dietary exposure—dermal, inhalation, and oral. Target MOEs for a given pesticide can vary depending on the characteristics of the studies relied upon in choosing the PoD for the various duration and route scenarios.

In addition, in a DWLOC aggregate risk assessment, the calculated DWLOC is compared to the EDWC. Where EPA has calculated a DWLOC, it can determine whether drinking water exposures will result in aggregate risks of concern by comparing estimated pesticide concentrations in drinking water to the DWLOC. As noted above, an aggregate DWLOC represents the amount of allowable safe residues of pesticide in drinking water because it represents the room remaining in the risk cup after accounting for the food and residential exposures. The DWLOC provides an estimate of the allowable safe concentrations of pesticides in drinking water for comparison to EDWCs. When the EDWC is less than the DWLOC, there are no risk concerns for aggregate exposures because the Agency can conclude that the contribution from drinking water when aggregated with food and residential/non-occupational exposures will not exceed save levels of exposure. Conversely, an EDWC at or exceeding the DWLOC would indicate a risk of concern, as those exposures to chlorpyrifos in drinking water, when aggregated with exposures from food and residential exposures, would exceed safe levels of exposure. (Ref. 41).

1. Dietary Risks From Food Exposures

As noted above, EPA's acute and steady-state dietary (food only) exposure assessments for chlorpyrifos were highly refined and incorporated monitoring data for almost all foods. The Agency assessed food exposures based on all food uses of chlorpyrifos for which tolerances have been established, including all uses registered at the time of the 2020 HH DRA. It did not include potential exposure from food handling establishment uses since the Agency did not identify any actual usage under the registered food handling establishment uses. Previous assessments of the food handling establishment uses had indicated negligible residues. (Ref. 12 at 33–36 and 31 at 3).

Considering food exposures alone, the Agency did not identify risks of concern for either acute or steady-state exposures. (Ref. 12 at 34–36) Acute dietary (food only) risk estimates, which are based on risk from a single exposure event in the 2020 HH DRA, were all below 100% of the acute population adjusted dose for food ($aPAD_{food}$) at the 99.9th percentile of exposure and are not of concern. The population with the highest risk estimate was females (13 to 49 years old) at 3.2% $aPAD_{food}$. Steady-state dietary (food only) risk estimates, which are based on the potential risk from a 21-day exposure duration using a 3-week rolling average (sliding by day) across the year, were also all below 100% of the steady-state PAD for food ($ssPAD_{food}$) at the 99.9th percentile of exposure and are not of concern. The population with the highest risk estimate was children (1 to 2 years old) at 9.7% $ssPAD_{food}$. Note: Because the Agency has retained the 10X FQPA SF, as indicated in Unit VI.C.3., the relevant risk estimates are those associated with the retention of the 10X FQPA SF. The risk estimates associated with a 1X FQPA SF were provided solely to identify a range of risk estimates to characterize the risk in the event that EPA identified reliable data to support another FQPA SF that would be safe for infants and children, but no such data has been identified.

Following the approval of the product and use cancellation requests, the Agency has not conducted a separate quantitative assessment of the anticipated risk from food exposures from the 11 food uses remaining. Given that the cancellation actions will reduce exposure from residues in food and the current assessment with all currently registered food uses indicates there is no risk of concern from exposure to residues on all food for which there are tolerances, the Agency concludes that there will still be no risks of concern from exposure to residues of chlorpyrifos on food after most of the food uses are cancelled.

2. Non-Occupational, Non-Dietary (Residential) Risks

Because there are some uses of chlorpyrifos that may result in residential exposures, EPA assessed risk from those uses. All residential post-application risk estimates for the registered uses of chlorpyrifos were below the Agency's level of concern. (Ref. 12 at 38) The residential post-application LOC for children is 40, and the lowest risk estimate for children (11 to less than 16 years old) was 1,200. The residential post-application LOC for adults is 100, and the lowest risk estimate is 1,000. Because the calculated MOEs are above the Agency's level of concern, there are no risks of concern from residential exposures.

3. Risks From Drinking Water

As noted above, the Agency aggregated exposures to chlorpyrifos from food and residential exposures and calculated the DWLOC, *i.e.,* the amount of drinking water exposures that would be considered safe, based on how much room was left in the risk cup after accounting for food and residential/non-occupational exposures. The Agency calculated acute and steady-state DWLOCs for infants (less than 1 year old); children (1 to 2 years old); youths (6 to 12 years old), and adults (females 13 to 49 years old), which would be protective of other subpopulations. The most sensitive acute DWLOC was 23 ppb chlorpyrifos oxon, and the most sensitive steady-state DWLOC was 4.0 ppb chlorpyrifos oxon.

As indicated above in Unit IV.B.2., the Agency estimated drinking water contributions from the 11 food uses identified in Unit III. above in its 2020 DWA for both acute and steady-state exposure durations. Those estimates were based on limiting those uses to specific states and were modeled based on usage data concerning application frequency and application rates. These application rate and maximum number of application-per-year restrictions vary by use site, as specified in the 2020 DWA. (Ref. 2) That document indicated that EDWCs for those food uses with those specific limitations would be below the acute DWLOC of 23 ppb and the steady-state DWLOC of 4.0 ppb. The underlying assumption of the 2020 DWA was that there would be no other food uses contributing to drinking water exposures. As indicated in Unit III., all chlorpyrifos registrants have submitted requests to cancel all other food uses and to amend products for use on food consistent with the restrictions identified in Unit III; EPA has completed approval of the label amendments and expects to finalize the cancellations by the end of 2024, prior to the time this rule is finalized. Under the terms of those cancellation orders, use of chlorpyrifos will not be permitted on food except on the 11 remaining uses in accordance with the new label restrictions after June 30, 2025. As a result, EPA anticipates that use of chlorpyrifos products with the more restrictive labeling will result in drinking water exposures below the DWLOC.

4. Aggregate Exposure and Determination Concerning Safety

As noted above, in accordance with FFDCA section 408(b)(2), EPA must,

when establishing or leaving in effect tolerances for residues of a pesticide chemical, determine that the tolerances are safe. That is, EPA must determine that ''there is a reasonable certainty that no harm will result from aggregate exposure to the pesticide chemical residue, including all anticipated dietary exposures and all other exposures for which there is reliable information.'' (21 U.S.C. 346a(b)(2)).

As discussed earlier in this Unit, exposures from food and residential/non-occupational exposures, taken separately or together, do not exceed EPA's levels of concern. The Agency determined that risks from exposures to chlorpyrifos residues in food (from all food uses registered at the time of the 2020 HHRA) comprised 3.2% of the aPAD for females (13 to 49 years old) and 9.7% of the ssPAD for children (1 to 2 years old), the highest exposed subpopulations. Combining those exposures with relevant residential exposures, which did not exceed the Agency's levels of concern, the Agency calculated the levels of drinking water concentrations that would be safe, *i.e.,* the DWLOCs. The lowest DWLOC for acute exposures (for infants) is 23 ppb, and the lowest DWLOC for steady-state exposures (for infants) is 4.0 ppb; therefore, any EDWCs of chlorpyrifos oxon exceeding 23 ppb in an acute scenario or 4.0 ppb in a steady-state exposure scenario indicate that aggregate exposures of chlorpyrifos would be unsafe.

The Agency's 2020 DWA demonstrates that the DWLOCs will not be exceeded for the 11 uses as assessed in that document, *i.e.,* where those uses are limited to specific geographic areas and with restrictions on application rates and frequency. Those restrictions are described in Unit III. Because the registrants have, under FIFRA, requested cancellation of all other food uses and have submitted label amendments that reflect the necessary restrictions on the remaining food uses for consistency with the assumptions in the 2020 DWA, EPA considers the more limited exposure to be reasonably anticipated at this time, unlike at the time of the 2021 Final Rule when no such requests had been submitted. Use consistent with the amended labels will result in drinking water exposures that are below the DWLOC, and consequently, there is a reasonable certainty that no harm will result from aggregate exposure (including food, drinking water, and residential/non-occupational exposures) to chlorpyrifos. Therefore, EPA concludes that the tolerances remaining in place will be safe.

V. Petition Response

As noted in Unit II.D., PANNA and NRDC submitted a petition to EPA in September 2007, seeking revocation of all chlorpyrifos tolerances and cancellation of all chlorpyrifos registrations (''2007 Petition''). The 2007 Petition raised the following claims in support of that request:

1. EPA has ignored genetic evidence of vulnerable populations.
2. EPA has needlessly delayed a decision regarding endocrine disrupting effects.
3. EPA has ignored data regarding cancer risks.
4. EPA's 2006 OP CRA misrepresented risks and failed to apply the 10X FQPA Safety Factor.
5. EPA has over-relied on registrant data.
6. EPA has failed to properly address the exporting hazard in foreign countries from chlorpyrifos.
7. EPA has failed to quantitatively incorporate data demonstrating long-lasting effects from early life exposure to chlorpyrifos in children.
8. EPA has disregarded data demonstrating that there is no evidence of a safe level of exposure during pre-birth and early life stages.
9. EPA has failed to cite or quantitatively incorporate studies and clinical reports suggesting potential adverse effects below 10% cholinesterase inhibition.
10. EPA has failed to incorporate inhalation routes of exposure.

In a response dated July 16, 2012, EPA explained that all but one of the issues raised in the 2007 Petition relate to EPA's establishment of the chlorpyrifos tolerances under the FFDCA that would be addressed in either a rule or an order issued under the FFDCA. (Ref. 42) The one issue that was not related to the safety of the tolerances was claim 6, which EPA denied in that July 16, 2012, response. EPA expressly noted that its denial of claim 6 was a final agency action subject to judicial review under section 16 of FIFRA; that denial was never challenged.

The only claims remaining in the 2007 Petition, therefore, are claims related to the safety of the chlorpyrifos tolerances that must be addressed under the FFDCA. Because of the integration of the safety standard into the FIFRA registration standard, if EPA were to determine that the tolerances were unsafe, then the corresponding food uses would not meet the FIFRA standard for registration and must be cancelled. If, however, EPA were to determine that the 2007 Petition does not provide a basis for determining that the tolerances associated with the 11 remaining food uses are unsafe, as EPA is proposing to do in this document, there would be no separate basis in the 2007 Petition for a cancellation action under FIFRA. Section 408(h)(5) prohibits the review of issues under other statutes, for which review is obtainable under the FFDCA. 21 U.S.C. 346a(h)(5). Accordingly, EPA intended, as indicated in its July 2012 response, and intends currently to treat the final rule of this rulemaking as its final response to the remaining claims in the 2007 Petition.

Regarding the remaining claims, which must be reviewed under the FFDCA, EPA denied the rest of the claims in the 2017 Denial Order and denied the objections to that order in the 2019 Denial Order. (Ref. 10 and 43) After the 2017 and 2019 Denial Orders were vacated by the Ninth Circuit in 2021, EPA granted the 2007 Petition as part of the 2021 Final Rule, as directed by the Ninth Circuit, but that 2021 Final Rule (and petition response) was subsequently vacated by the Eighth Circuit in 2023.

As noted above, however, EPA is taking action in this rulemaking to revoke most tolerances, which is consistent, in part, with the 2007 Petition's request. Based on the available data, use of chlorpyrifos has been decreasing (also noted in section IV.B.4 of this rule). Cancelling all food uses but the 11 mentioned in Unit III. above—along with geographic limitations and additional application restrictions—will contribute to the decrease of chlorpyrifos applied in the United States compared to historical usage. In addition, to address concerns about whether the rest of the tolerances should be revoked as requested by the 2007 Petition, EPA has provided a safety determination in Unit IV. above. To the extent the Petition's request to revoke tolerances is not fully addressed above, EPA is clarifying its responses to the specific claims in this Unit.

EPA provided responses to the specific claims 1–5 and 10 in the 2017 Denial Order. EPA's position on those issues has not changed, and thus EPA is incorporating those responses into this document by reference. Those responses can be found in Unit V.1–5 and 10 of the 2017 Petition Denial. *See* 82 FR at 16585–91.

EPA has grouped claims 7–9 together because they fundamentally all raise the same issue: Whether the potential exists for chlorpyrifos to cause neurodevelopmental effects in infants and children from exposures (either to mothers during pregnancy or directly to

infants and children) that are lower than those resulting in 10% cholinesterase inhibition—the basis for EPA's long-standing point of departure in regulating chlorpyrifos and other OPs.

The petitioners assert that human epidemiology and rodent developmental neurotoxicity data suggest that pre-natal and early life exposure to chlorpyrifos can result in long-lasting, possibly permanent damage to the nervous system and that these effects are likely occurring at exposure levels below 10% cholinesterase inhibition, EPA's existing regulatory standard for chlorpyrifos and other OPs. They assert that EPA has therefore used the wrong endpoint as a basis for regulation and that, taking into account the full spectrum of toxicity, chlorpyrifos does not meet the FFDCA safety standard (and thus does not meet the FIFRA standard for registration, which integrates the FFDCA safety standard).

EPA initiated a science evaluation of the potential effects on neurodevelopment in 2007 following the receipt of the 2007 Petition. EPA has three times presented approaches and proposals to the FIFRA SAP for evaluating epidemiologic, laboratory animal, and mechanistic data exploring the possible connection between *in utero* and early childhood exposure to chlorpyrifos and adverse neurodevelopmental effects. The FIFRA SAP reports have rendered numerous recommendations for additional study and sometimes conflicting advice for how EPA should consider (or not consider) the epidemiology data in conducting EPA's registration review human health risk assessment for chlorpyrifos. For over two decades, EPA has evaluated the scientific evidence surrounding the different health effects associated with chlorpyrifos. The Agency's position on the strengths and weaknesses of the available epidemiological, laboratory animal, and mechanistic data as laid out in the 2020 HH DRA is discussed in Unit IV.A.2.b above.

As noted in that section and in Unit IV.A.3., EPA concludes that the available epidemiological data does not provide a sufficient basis for calculating a PoD nor does it support a conclusion that PoDs based on the 10% AChE inhibition are not protective. Nevertheless, as discussed in Unit IV.A.3.c., EPA has retained the 10X FQPA SF to account for the uncertainties around the dose-response level for neurodevelopmental effects for the purpose of this rule.

Through this proposal, EPA is proposing to take action to revoke most chlorpyrifos tolerances as requested in the 2007 Petition but is not proposing to revoke tolerances associated with the remaining registered uses because the Agency's analysis in the 2020 HH DRA and the 2020 DWA support a conclusion that those tolerances are safe. The voluntary cancellations will effectuate a reduction in exposures, and because exposures will be reduced, the underlying assessment, even with the retention of the default 10X FQPA SF, supports the retention of the remaining tolerances.

EPA is proposing that the claims in the 2007 Petition do not provide a basis for concluding that the tolerances not being revoked are unsafe.

VI. Request for Public Comment

The Agency is requesting comments on this proposal.

During the lengthy pendency of the 2007 Petition to revoke tolerances and the registration review process for chlorpyrifos, the public has had numerous opportunities to comment on EPA's scientific conclusions, risk assessments, regulatory proposals, and rules. Hundreds of thousands of comments have been submitted, and those comments have informed EPA's subsequent assessments and regulatory decision making.

As this is a proposed rule, EPA is providing an opportunity to comment on issues related to this proposal, and EPA will consider significant comments in the final rule. Comments on this particular proposal must be submitted at this time, even if that person has submitted comments at other times during the history of chlorpyrifos regulatory actions.

VII. Other Administrative Considerations

A. Tolerance Expiration Date

EPA is proposing to set an expiration date for the chlorpyrifos tolerances being revoked so that those tolerances will expire on July 1, 2025. This date would align with the existing stocks provisions for the related cancellation actions, which allow use of existing stocks of some cancelled chlorpyrifos products on food until June 30, 2025. This approach is also intended to satisfy the U.S. commitments under the SPS Agreement, requiring Members to provide a ''reasonable interval'' between the publication of a regulation subject to the Agreement and its entry into force to allow time for producers in exporting Member countries to adapt to the new requirement.

Any commodities treated with chlorpyrifos that are in the channels of trade and impacted by the tolerance revocations shall be subject to FFDCA section 408(1)(5). That section provides that any residues of the subject pesticide in or on such food shall not render the food adulterated so long as it is shown to the satisfaction of the Food and Drug Administration that:

1. The residue is present as the result of an application or use of the pesticide at a time and in a manner that was lawful under FIFRA, and

2. The residue does not exceed the level that was authorized at the time of the application or use to be present on the food under a tolerance or exemption from tolerance. Evidence to show that food was lawfully treated may include records that verify the dates when the pesticide was applied to such food.

The tolerance revocations in this proposed rule are not discriminatory and are designed to ensure that both domestically produced and imported foods meet the food safety standard established by the FFDCA. The same food safety standards apply to domestically produced and imported foods.

B. Severability

This proposed rule includes two distinct actions concerning chlorpyrifos tolerances. Specifically, the Agency is proposing: (1) to revoke all tolerances associated with use cancellations as those tolerances are no longer needed and (2) that the tolerances not being revoked are safe. The Agency intends that these two actions be severable from each other, although for purposes of expediency and to fully address the pending 2007 Petition, EPA is proposing to include all parts in one rulemaking. (21 U.S.C. 346a(l)(1)). However, EPA retains the discretion to take each of these actions separately, with each implementing a portion or portions of this proposed rule.

The revocation of tolerances that are no longer needed is an almost entirely ministerial action. Because those uses of chlorpyrifos on these commodities will no longer be registered in the United States, the corresponding tolerances are considered unnecessary. The Agency's typical process is to automatically remove tolerances from the regulations that are no longer necessary. The only element of agency discretion involved in revocation of most tolerances would arise from a hypothetical request that EPA retain certain tolerances for purposes of importing food treated with chlorpyrifos. The proposal to revoke all tolerances except for those on the 11 specified crops depends neither on the Agency making a safety finding for the remaining tolerances nor on the Agency's response to the 2007 Petition.

Even if safety of the tolerances not being revoked is challenged, the revocation of unnecessary tolerances would not be affected and would stand on its own right; EPA could re-evaluate the safety of the remaining tolerances and either provide additional justification for its safety determination or take other action—if needed—to address the safety of chlorpyrifos tolerances. The tolerances proposed for revocation in this document would remain revoked in such circumstances.

This discussion of separate actions proposed in this document is not intended to be exhaustive and should not be viewed as an intention by EPA to consider other actions or determinations proposed herein as non-severable from other parts of the proposed rule.

VIII. Statutory and Executive Order Reviews

In this proposed rule, EPA is proposing to revoke specific tolerances established under FFDCA section 408. The Office of Management and Budget (OMB) has exempted this type of action (*e.g.,* tolerance revocation for which extraordinary circumstances do not exist) from review under Executive Order 12866, entitled ''Regulatory Planning and Review'' (58 FR 51735, October 4, 1993). These revocations are not expected to present extraordinary circumstances because the registrants have requested to voluntarily cancel uses associated with these tolerances, which means that the tolerances will no longer be needed to cover residues of chlorpyrifos in or on those food commodities. Because this proposed rule has been exempted from review under Executive Order 12866, this proposed rule is not subject to Executive Order 13211, entitled ''Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use'' (66 FR 28355, May 22, 2001).

This proposed rule does not contain any information collections subject to OMB approval under the Paperwork Reduction Act (PRA) (44 U.S.C. 3501 *et seq.*) or impose any enforceable duty or contain any unfunded mandate as described under Title II of the Unfunded Mandates Reform Act (UMRA) (2 U.S.C. 1501 *et seq.*). Nor does it require any special considerations as required by Executive Order 12898, entitled ''Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations'' (59 FR 7629, February 16, 1994); or OMB review or any other Agency action under Executive Order 13045, entitled ''Protection of Children from Environmental Health Risks and Safety Risks'' (62 FR 19885, April 23, 1997). However, EPA considered the best available science in order to protect children against environmental health risks and this proposed rule is consistent with EPA's 2021 Policy on Children's Health (Oct. 5, 2021). (Ref. 43).

This proposed rule does not involve any technical standards that would require Agency consideration of voluntary consensus standards pursuant to section 12(d) of the National Technology Transfer and Advancement Act (NTTAA) (15 U.S.C. 272 note). In addition, the Agency has determined that this proposed rule will not have a substantial direct effect on States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132, entitled ''Federalism'' (64 FR 43255, August 10, 1999). This proposed rule directly regulates growers, food processors, food handlers, and food retailers, not states, including a state's ability to register pesticide products. This proposed rule does not alter the relationships or distribution of power and responsibilities established by Congress in the preemption provisions of FFDCA section 408(n)(4). For these same reasons, the Agency has determined that this proposed rule does not have any ''tribal implications'' as described in Executive Order 13175, entitled ''Consultation and Coordination with Indian Tribal Governments'' (65 FR 67249, November 9, 2000).

In addition, pursuant to section 605(b) of the Regulatory Flexibility Act (RFA) (5 U.S.C. 601 *et seq.*), the Agency hereby certifies that the revocation of these tolerances in response to the cancellation of associated food uses will not have a significant impact on a substantial number of small entities. The certification presented above is based on the following rationale. In the case of domestically grown food, the tolerance revocations contained in this notice, as is generally the case, will have no economic impact. The associated pesticide registered uses are in the process of being canceled at this time, as requested by the registrants. By the time this rule is finalized, EPA intends to have approved all requested cancellations, and use will only be permitted on food consistent with the existing stocks provisions of those orders. Pursuant to the cancellation orders, U.S. growers will be prohibited from using chlorpyrifos on the foods for which this rule proposes revoking tolerances after June 30, 2025. Accordingly, revoking the tolerances themselves will have no effect on food grown in the United States. As for food grown in the United States, it will not be considered adulterated if it was treated in a way that complied with the tolerance in effect at the time of treatment and the use is consistent with the applicable cancellation order. The revocation of a pesticide tolerance generally has a greater potential to affect foreign-grown food, since the uses of the pesticide prohibited in the United States may still be lawful in other countries. If foreign growers use the pesticide after the tolerances are revoked, the food they grow will be considered adulterated and cannot be imported.

IX. References

EPA has established an official record for this rulemaking. The official record includes all information considered by EPA in developing this proposed rule. This official record includes all information physically located in docket ID number EPA–HQ–OPP–2024–0431, any documents identified in this proposal, and documents referenced in documents in the docket. The public version of the official record does not include any information claimed as CBI.

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List of Subjects in 40 CFR Part 180

Environmental protection, Administrative practice and procedure, Agricultural commodities, Pesticides and pests, Reporting and recordkeeping requirements.

Dated: November 27, 2024.

Edward Messina,

Director, Office of Pesticide Programs.

Therefore, for the reasons stated in the preamble the Environmental Protection Agency proposes to amend 40 CFR part 180 as follows:

PART 180—TOLERANCES AND EXEMPTIONS FOR PESTICIDE CHEMICAL RESIDUES IN FOOD

■ 1. The authority citation for part 180 continues to read as follows:

Authority: 21 U.S.C. 321(q), 346a and 371.

■ 2. Revise § 180.342 to read as follows:

§ 180.342 Chlorpyrifos; tolerances for residues.

(a) *General.* (1) Tolerances are established for residues of the pesticide chlorpyrifos *per se* (*O,*O-diethyl-*O*-(3,5,6-trichloro-2-pyridyl) phosphorothioate) in or on the following food commodities:

TABLE 1 TO PARAGRAPH (a)(1)

Commodity	Parts per million	Tolerance expiration date
Alfalfa, forage	3.0	None
Alfalfa, hay	13	None
Almond	0.2	7/1/2025
Almond, hulls	12	7/1/2025
Apple	0.01	None
Apple, wet pomace	0.02	None
Banana	0.1	7/1/2025
Beet, sugar, dried pulp	5.0	None
Beet, sugar, molasses	15	None
Beet, sugar, roots	1.0	None
Beet, sugar, tops	8.0	None
Cattle, fat	0.3	None
Cattle, meat	0.05	None
Cattle, meat byproducts	0.05	None
Cherry, sweet	1.0	7/1/2025
Cherry, tart	1.0	None
Citrus, dried pulp	5.0	None
Citrus, oil	20	None
Corn, field, forage	8.0	7/1/2025
Corn, field, grain	0.05	7/1/2025
Corn, field, refined oil	0.25	7/1/2025
Corn, field, stover	8.0	7/1/2025
Corn, sweet, forage	8.0	7/1/2025
Corn, sweet, kernel plus cob with husk removed	0.05	7/1/2025
Corn, sweet, stover	8.0	7/1/2025
Cotton, undelinted seed	0.2	None
Cranberry	1.0	7/1/2025
Cucumber	0.05	7/1/2025
Egg	0.01	7/1/2025
Fig	0.01	7/1/2025
Fruit, citrus, group 10	1.0	None
Food commodities (other than those already covered by a higher tolerance as a result of use on growing crops) in food service establishments where food and food products are prepared and served, as a result of the application of chlorpyrifos in microencapsulated form	0.1	7/1/2025
Goat, fat	0.2	None
Goat, meat	0.05	None
Goat, meat byproducts	0.05	None
Hazelnut	0.2	7/1/2025
Hog, fat	0.2	None
Hog, meat	0.05	None
Hog, meat byproducts	0.05	None
Horse, fat	0.25	None
Horse, meat	0.25	None
Horse, meat byproducts	0.25	None
Kiwifruit	2.0	7/1/2025
Milk, fat (Reflecting 0.01 ppm in whole milk)	0.25	None
Nectarine	0.05	7/1/2025
Onion, bulb	0.5	7/1/2025
Peach	0.05	None
Peanut	0.2	7/1/2025
Peanut, refined oil	0.2	7/1/2025
Pear	0.05	7/1/2025
Pecan	0.2	7/1/2025
Pepper	1.0	7/1/2025
Peppermint, tops	0.8	7/1/2025
Peppermint, oil	8.0	7/1/2025

TABLE 1 TO PARAGRAPH (a)(1)—Continued

Commodity	Parts per million	Tolerance expiration date
Plum, prune, fresh	0.05	7/1/2025
Poultry, fat	0.1	None
Poultry, meat	0.1	None
Poultry, meat by products	0.1	None
Pumpkin	0.05	7/1/2025
Radish	2.0	7/1/2025
Rutabaga	0.5	7/1/2025
Sheep, fat	0.2	None
Sheep, meat	0.05	None
Sheep, meat byproducts	0.05	None
Spearmint, tops	0.8	7/1/2025
Spearmint, oil	8.0	7/1/2025
Sorghum, grain, forage	0.5	7/1/2025
Sorghum, grain, grain	0.5	7/1/2025
Sorghum, grain, stover	2.0	7/1/2025
Soybean, seed	0.3	None
Strawberry	0.2	None
Sunflower, seed	0.1	7/1/2025
Sweet potato, roots	0.05	7/1/2025
Turnip, roots	1.0	7/1/2025
Turnip, tops	0.3	7/1/2025
Vegetable, brassica, leafy, group 5	1.0	7/1/2025
Vegetable, legume, group 6, except soybean	0.05	7/1/2025
Walnut	0.2	7/1/2025
Wheat, forage	3.0	None
Wheat, grain	0.5	None
Wheat, straw	6.0	None

(2) Chlorpyrifos [O,O-diethyl O-(3,5,6-trichloro-2-pyridyl) phosphorothioate] may be safely used up until and including June 30, 2025 in accordance with the following prescribed conditions. On and after July 1, 2025, chlorpyrifos may not be used as described below:

(i) Application shall be limited solely to spot and/or crack and crevice treatment in food handling establishments where food and food products are held, processed, prepared or served. Contamination of food or food contact surfaces shall be avoided. Food must be removed or covered during treatment.

(ii) Spray concentration for spot treatment shall be limited to a maximum of 0.5 percent of the active ingredient by weight. A course, low-pressure spray shall be used to avoid atomization or splashing of the spray.

(iii) Paint-on application for spot treatment shall be limited to a maximum of 2 percent of the active ingredient by weight.

(iv) Crack and crevice treatment shall be limited to a maximum of 2 percent of the active ingredient by weight. Equipment capable of delivering a pin-stream of insecticide shall be used.

(v) Application via adhesive strips shall contain a maximum of 10% by weight of the controlled-release product in food-handling establishments where food and food products are held, processed, prepared, or served. A maximum of 36 strips (or 5.15 grams of chlorpyrifos) is to be used per 100 square feet of floor space. The strips are not to be placed in exposed areas where direct contact with food, utensils, and food-contact surfaces would be likely to occur.

(vi) To assure safe use of the insecticide, its label and labeling shall conform to that registered by the U.S. Environmental Protection Agency, and it shall be used in accordance with such label and labeling.

(3) A tolerance of 0.1 part per million is established for residues of chlorpyrifos, *per se,* in or on food commodities (other than those already covered by a higher tolerance as a result of use on growing crops) in food service establishments where food and food products are prepared and served, as a result of the application of chlorpyrifos in microencapsulated form. This tolerance expires on July 1, 2025.

(i) Application of a microencapsulated product shall be limited solely to spot and/or crack and crevice treatment in food handling establishments where food and food products are prepared and served. All treatments shall be applied in such a manner as to avoid contamination of food or food contact surfaces.

(ii) Spray concentrations shall be limited to a maximum of 0.5 percent of the active ingredient by weight.

(iii) For crack and crevice treatment, equipment capable of delivering a pin stream of spray directly into cracks and crevices or capable of applying small amounts of insecticide into cracks and crevices shall be used.

(iv) For spot treatment, an individual spot shall not exceed 2 square feet.

(v) To assure safe use of the insecticide, its label and labeling shall conform to that registered by the U.S. Environmental Protection Agency, and it shall be used in accordance with such label and labeling.

(b) [Reserved]

(c) *Tolerances with regional registrations.* Tolerances with regional registration, as defined in 180.1(l), are established for residues of the pesticide chlorpyrifos *per se* (O,O-diethyl- O-(3,5,6-trichloro-2-pyridyl) phosphorothioate) in or on the following food commodities:

TABLE 2 TO PARAGRAPH (c)

Commodity	Parts per million	Tolerance expiration date
Asparagus	5.0	None
Grape	0.01	7/1/2025

(d) [Reserved]

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DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS–R2–ES–2024–0193; FXES1111090FEDR–256–FF09E21000]

Endangered and Threatened Wildlife and Plants; 12-Month Not-Warranted Finding for the Rio Grande Cutthroat Trout

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Notification of finding.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), announce a 12-month finding on a petition to list the Rio Grande cutthroat trout (*Oncorhynchus clarkii virginalis*) as an endangered or threatened species under the Endangered Species Act of 1973, as amended (Act). Rio Grande cutthroat trout, a subspecies of cutthroat trout (*Oncorhynchus clarkii*), inhabit high-elevation streams in New Mexico and southern Colorado. After a thorough review of the best available scientific and commercial information, we find that listing the Rio Grande cutthroat trout as an endangered or threatened species is not warranted at this time. However, we ask the public to submit to us at any time any new information relevant to the status of the Rio Grande cutthroat trout or its habitat.

DATES: The finding in this document was made on December 10, 2024.

ADDRESSES: A detailed description of the basis for this finding is available on the internet at *https://www.regulations.gov* under Docket No. FWS–R2–ES–2024–0193. Supporting information used to prepare this finding is also available for public inspection, by appointment, during normal business hours at the New Mexico Ecological Services Office. Please submit any new information, materials, comments, or questions concerning this finding to the person listed under **FOR FURTHER INFORMATION CONTACT**.

FOR FURTHER INFORMATION CONTACT: Shawn Sartorius, Field Supervisor, New Mexico Ecological Services Office, 505–346–2525, *shawn_sartorius@fws.gov.* Individuals in the United States who are deaf, deafblind, hard of hearing, or have a speech disability may dial 711 (TTY, TDD, or TeleBraille) to access telecommunications relay services. Individuals outside the United States should use the relay services offered within their country to make international calls to the point-of-contact in the United States.

SUPPLEMENTARY INFORMATION:

Background

Under section 4(b)(3)(B) of the Act (16 U.S.C. 1531 *et seq.*), we are required to make a finding on whether or not a petitioned action is warranted within 12 months after receiving any petition that we have determined contains substantial scientific or commercial information indicating that the petitioned action may be warranted (''12-month finding''). We must make a finding that the petitioned action is: (1) Not warranted; (2) warranted; or (3) warranted, but precluded by other listing activity. We must publish a notification of the 12-month finding in the **Federal Register**.

Summary of Information Pertaining to the Five Factors

Section 4 of the Act (16 U.S.C. 1533) and the implementing regulations at part 424 of title 50 of the Code of Federal Regulations (50 CFR part 424) set forth procedures for adding species to, removing species from, or reclassifying species on the Lists of Endangered and Threatened Wildlife and Plants (Lists). The Act defines ''species'' as including any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature. The Act defines an ''endangered species'' as a species that is in danger of extinction throughout all or a significant portion of its range and a ''threatened species'' as a species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. The Act requires that we determine whether any species is an endangered species or a threatened species because of any of the following factors:

(A) The present or threatened destruction, modification, or curtailment of its habitat or range;

(B) Overutilization for commercial, recreational, scientific, or educational purposes;

(C) Disease or predation;

(D) The inadequacy of existing regulatory mechanisms; or

(E) Other natural or manmade factors affecting its continued existence.

These factors represent broad categories of natural or human-caused actions or conditions that could have an effect on a species' continued existence. In evaluating these actions and conditions, we look for those that may have a negative effect on individuals of the species, as well as other actions or conditions that may ameliorate any negative effects or may have positive effects.

We use the term ''threat'' to refer in general to actions or conditions that are known to or are reasonably likely to negatively affect individuals of a species. The term ''threat'' includes actions or conditions that have a direct impact on individuals (direct impacts), as well as those that affect individuals through alteration of their habitat or required resources (stressors). The term ''threat'' may encompass—either together or separately—the source of the action or condition or the action or condition itself.

However, the mere identification of any threat(s) does not necessarily mean that the species meets the statutory definition of an ''endangered species'' or a ''threatened species.'' In determining whether a species meets either definition, we must evaluate all identified threats by considering the species' expected response and the effects of the threats—in light of those actions and conditions that will ameliorate the threats—on an individual, population, and species level. We evaluate each threat and its expected effects on the species, then analyze the cumulative effect of all of the threats on the species as a whole. We also consider the cumulative effect of the threats in light of those actions and conditions that will have positive