




**Captan
Amended Proposed Interim
Registration Review Decision
Case Number 0120**

March 2024

Approved by: 
Timothy Kiely
Acting Director
Pesticide Re-evaluation Division

Date: March 28, 2024

Contents

I.	INTRODUCTION	4
A.	Updates to the 2022 Proposed Interim Decision	6
B.	Summary of Captan Registration Review	8
C.	Summary of Public Comments on the 2022 PID and EPA Responses	11
II.	USE AND USAGE	20
III.	SCIENTIFIC ASSESSMENTS	21
A.	Human Health Risks	21
1.	Risk Summary and Characterization	22
2.	Human Incidents and Epidemiology	31
3.	Tolerances	32
B.	Ecological Risks	32
1.	Risk Summary and Characterization	33
2.	Ecological Incidents	36
3.	Ecological and Environmental Fate Data Needs	36
C.	Benefits Assessment	37
1.	Orchard Crops	38
2.	Berries and Grapes	40
3.	Ginseng and Ornamentals	42
4.	Seed Treatment	42
IV.	AMENDED PROPOSED INTERIM REGISTRATION REVIEW DECISION	43
A.	Proposed Risk Mitigation and Regulatory Rationale	44
1.	Limitation on Percent Active Ingredient in Consumer Products	45
2.	Termination of Uses and Application Methods	46
3.	Personal Protective Equipment (PPE) and Engineering Controls	48
4.	Label Updates	51
5.	Reduced Application Rates	53
6.	Changes to Restricted-entry Intervals (REIs)	54
6.	Endangered Species: Implementation of the 2011 Salmonid BiOp	55
7.	Nontarget Organism Spray Drift Advisory	56
8.	Spray Drift Management	57
10.	Resistance Management	58
B.	FIFRA Interim Ecological Mitigation (IEM)	59

1.	Surface Water Protection Statement (Rain Restriction).....	60
2.	Spray Drift Reduction Measures	61
3.	Treated Seed Labeling.....	62
4.	Proposed Mandatory and Advisory Pollinator Stewardship Language.....	65
5.	Ecological Incident Reporting Label Language	67
6.	<i>Bulletins Live! Two</i> Labeling.....	68
C.	Summary of Mitigation for Specific Crops and Use Sites.....	69
1.	Proposed Mitigation for Orchard Crops	69
2.	Proposed Mitigation for Berries and Grapes	70
3.	Proposed Mitigation for Ginseng and Ornamentals	72
4.	Proposed Mitigation for Seed Treatment.....	72
D.	Environmental Justice	75
E.	Tolerance Actions	75
1.	Tolerance Expression	75
2.	Changes to Commodity Definitions and Tolerance Levels.....	76
3.	International Harmonization.....	77
F.	Proposed Data Requirements	78
V.	Proposed Interim Registration Review Decision for Captan.....	78
VI.	NEXT STEPS AND TIMELINE.....	80
	Appendix A: Summary of Proposed Actions for Captan.....	81
	Appendix B: Proposed Labeling Changes for Captan Products	82
	Appendix C: Listed-Species Assessment.....	98
	Appendix D: Endocrine Disruptor Screening Program (EDSP).....	101
	Appendix E: Tolerance Harmonization	104
	Appendix F: Summary of Captan Worker Risk Estimates After Mitigation.....	106
	Appendix G: Seed Treatment Questions.....	114

I. INTRODUCTION

This document is an amendment to the Environmental Protection Agency's (EPA's) Proposed Interim Registration Review Decision (PID) for captan (PC Code 081301, case 0120), which supersedes the 2022 PID. The Federal Insecticide, Fungicide, Rodenticide Act (FIFRA)¹ mandates a periodic review of existing pesticide registrations every 15 years, referred to as registration review.² During registration review, the Agency ultimately determines whether a currently registered pesticide continues to meet FIFRA's registration standard.³ Where appropriate, the Agency may issue an Interim Registration Review Decision (ID) before completing a final registration review decision.⁴ However, issuance of an ID is not a decision on whether a pesticide's registrations continue to satisfy the FIFRA standard for registration.⁵ Rather, the ID may include mitigation measures and changes to labeling that EPA has determined would address risks of concern, identify data or information needed to complete registration review, and include schedules for submitting such data, conducting the new risk assessment, and completing the registration review.⁶ The Agency is issuing this amended PID for captan to identify risk mitigations that EPA has determined would address risks of concern for captan, as presented in Section IV and Appendices A and B. For more information on captan, see EPA's public docket (EPA-HQ-OPP-2013-0296) at www.regulations.gov.

The Agency has made the following changes since the 2022 PID, which are reflected in this amended PID, including (1) incorporating new information submitted by stakeholders during the public comment period on the 2022 PID, (2) implementing various EPA policy changes, including evaluation of seed treatment uses and incorporation of interim ecological mitigation, and (3) voluntary cancellation of some captan end-use products. This amendment revises the risk mitigation proposed in 2022, most notably for seed treatment, orchard crops, grapes, and berries; and updates the ecological risk mitigation in the captan PID to align it with the November 2022 Interim Ecological Mitigation strategy issued as part of the update to the Endangered Species Workplan.¹ Label language implementing the Interim Ecological Mitigation strategy was finalized in October 2023.

Captan was first registered as a fungicide in 1951. The Reregistration Eligibility Decision (RED) for Captan was completed in 1999 and amended in 2004. There are currently six technical registrants: ADAMA and UPL (jointly the Captan Task Force, which is responsible for data development), Albaugh, Drexel Chemical, Loveland, and RedEagle. ADAMA is also the technical registrant for folpet, another fungicide that is a structural analogue to captan that shares a common degradate with captan.

Captan is a broad-spectrum fungicide registered for use on fruit and nut trees, grapes, berries, ginseng, and ornamentals. It suppresses fungal growth by direct contact with fungal spores on foliage or fruit. It is a "multi-site" fungicide, acting on multiple biochemical sites on a pathogen, in contrast to many other fungicides which act on a single biochemical site. In addition, captan is registered for use as a seed treatment for vegetables, corn, soybeans, cereal grains, and forage crops; as a seed piece treatment for ornamental tubers and bulbs; as a pre-plant root dip for peach trees and strawberry plants; and as a post-harvest fruit dip for apples, cherries, and pears.

¹ <https://www.epa.gov/system/files/documents/2022-11/esa-workplan-update.pdf>

Although captan was also registered for use as a home and garden fungicide, the last residential product was canceled in December 2023. There are no antimicrobial uses² of captan; however, a few captan products are still labeled for turf or turf-like use.

The Agency is issuing an amended PID for captan so that it can (1) move forward with aspects of the registration review that are complete and (2) take comment on additional interim risk mitigation beyond EPA's proposal in the 2022 PID. EPA is amending the 2022 PID to propose FIFRA Interim Ecological Mitigation (IEM), to make changes to the mitigation proposed in 2022 based on a recent policy update that resulted in an updated seed treatment risk assessment, as well as to incorporate input from the public on the risk, benefits, and use of captan. For more details on how public comments influenced these changes, see Section I.C., which summarizes EPA's response to public comments on the 2022 PID, and EPA's separate response to comments documents, available in the captan docket (EPA-HQ-OPP-2013-0296):

- *Captan: EFED Response to Comments on the Proposed Interim Decision (PID) for Registration Review*, March 23, 2023;
- *Captan. Response to Comments for the Second Addendum to the Human Health Draft Risk Assessment in Support of Registration Review*, December 12, 2023; and
- *BEAD Response to Comments on the Proposed Interim Decision (PID) for Captan*, February 1, 2024.
- *Amended BEAD Response to Comments on the Amended Proposed Interim Decision (PID) for Captan*, February 19, 2024.

The Agency has not yet fully evaluated captan's risks to federally listed species. However, consistent with its obligations under the Endangered Species Act (ESA),³ EPA will complete its listed-species assessment and any necessary consultation with the Services before completing the captan registration review. For more information on the listed-species assessment for the captan registration review, see Appendix C.

EPA continues to work with the Services to improve the consultation process for pesticides in registration review. In April 2022, EPA released its ESA Workplan, which outlines strategies and actions for the Agency to meet its ESA obligations for FIFRA actions.⁴ Consistent with the ESA Workplan, EPA is focused on steps it will take during registration review to reduce exposure for listed species as it moves toward fulfilling its ESA obligations and making final registration review decisions. In November 2022, EPA released its first ESA Workplan Update.⁵ As part of this update, EPA announced that, going forward, EPA may include a variety of FIFRA IEM measures in its registration review decisions that seek to reduce exposures for nontarget organisms based on its FIFRA ecological risk assessment(s). EPA expects that this mitigation may also reduce pesticide exposures for listed species.

² All antimicrobial uses of captan were voluntarily cancelled at the beginning of this registration review under the provisions of FIFRA § 6 (f). Use of captan on turf was also voluntarily canceled and removed from all captan product labels.

³ Endangered Species Act (ESA) § 7, 16 U.S.C. § 1536.

⁴ *Balancing Wildlife Protections and Responsible Pesticide Use* (Apr. 2022), https://www.epa.gov/system/files/documents/2022-04/balancing-wildlife-protection-and-responsible-pesticide-use_final.pdf.

⁵ *ESA Workplan Update: Nontarget Species Mitigation for Registration Review and Other FIFRA Actions* (Nov. 2022), <https://www.epa.gov/system/files/documents/2022-11/esa-workplan-update.pdf>.

As part of this amended PID, EPA has considered a variety of FIFRA IEM measures based on the risks and benefits of captan to reduce exposures to nontarget organisms, including listed species, while the Agency works toward a final registration review decision. While these mitigation measures do not satisfy EPA's ESA obligations, EPA believes that early mitigation may shorten the consultation process and improve protections for listed species from currently registered pesticide products. EPA also believes that the FIFRA IEM measures that the Agency is proposing for captan in this amended PID (Section IV.B) would fulfill EPA's obligations under Section 711 of the Consolidated Appropriations Act, PL-117-328 (Dec. 29, 2022). Among other things, Section 711 requires EPA to "include, where applicable, measures to reduce the effect of the applicable pesticide on" listed species and designated critical habitats in any Interim Decision (ID) noticed⁶ in the *Federal Register* between December 29, 2022, and October 1, 2026, for which EPA has not "made effects determinations or completed any necessary consultation under [ESA Section 7(a)(2)]."

Before completing registration review, EPA will also address its Federal Food, Drug, and Cosmetic Act (FFDCA) section 408(p)(6)-related commitments and obligations to ensure the protection of public health for captan.⁷ For more information on EPA's review of captan under this FFDCA provision, see Appendix D.

This document is organized into five sections:

- *Introduction* (summarizing the registration review milestones, responding to public comments, and providing updates since issuance of the PID);
- *Use and Usage* (discussing how and where captan is used);
- *Scientific Assessments* (summarizing EPA's risk and benefits assessments, updating or revising previous risk assessments, and discussing risk characterization);
- *Amended Proposed Interim Registration Review Decision* (presenting revisions to EPA's proposed decision, regulatory rationale, and mitigation measures to address risks of concern); and
- *Next Steps and Timeline* (discussing how and when EPA intends to complete this registration review).

A. Updates to the 2022 Proposed Interim Decision

In this amended PID, the Agency has made several changes to the 2022 PID to further reduce ecological risks of concern, including potential exposure to listed species. As stated in the updated ESA workplan, EPA is proposing FIFRA IEM measures in advance of any national consultation process with the Services. For captan, these proposed changes include revised language requiring users to consult EPA's *Bulletins Live! Two* system prior to captan application, revised incident reporting language, additional spray drift reduction measures (requiring measurement of wind speed), modifications to the proposed rain restriction, additional labeling for treated seeds and revised seed bag tag labeling, and a risk advisory for

⁶ This statutory language refers to the formal publication of Notifications of Interim Registration Review Decisions (IDs) in the *Federal Register*.

⁷ Federal Food, Drug, and Cosmetic Act (FFDCA) § 408(p), 21 U.S.C. § 346a(p).

insect pollinators. Detailed information regarding FIFRA IEM for captan can be found in Section IV.B of this amended PID. Comments made on the 2022 Updated Workplan for Endangered Species⁸ have been incorporated into the FIFRA IEM included in this amended PID.

In addition, EPA received several public comments on the 2022 PID, which cited negative economic impacts associated with proposed rain restrictions, proposed application rate reductions for grapes, proposed limits to amounts handled per day and/or limits to how many acres could be treated per day using an open cab and PF10 respirator as mitigation measures. EPA has amended the captan PID to incorporate new information submitted by stakeholders during the public comment period. These include the following:

- EPA is withdrawing the proposed national rain restrictions prohibiting application within 48 hours of a predicted rainfall. However, the Agency is maintaining regional rain restrictions specified in the formal Biological Opinion on Pacific Salmonids (Salmonid BiOp)⁹ issued by the National Marine Fisheries Service (NMFS). These will be implemented through *BulletinsLive! Two*.
- EPA is withdrawing the proposal to reduce the maximum application rate for wine and juice grapes from 2 lbs. a.i./A to 1.75 lbs. a.i./A. The Agency will retain the current application rate of 2 lbs. a.i./A, with a 3- or 5-day restricted-entry interval (REI) for high contact activities.
- EPA is withdrawing the proposal allowing growers to apply captan by airblast to an area less than 40 acres/day in an open cab and wearing PF10 respirators. The Agency is now proposing to require that all airblast applications occur in an enclosed cab.
- EPA is withdrawing the proposal to limit amount handled for application using mechanically pressurized handguns. The Agency is now proposing to limit all application of captan using mechanically pressurized handguns to spot treatments, such as application to row ends that can't be effectively treated with airblast equipment.

The Agency welcomes comments on the revised mitigation proposals.

In January 2022, after the completion of the captan human health risk assessments supporting the captan PID, EPA updated the science policies¹⁰ related to evaluation of occupational exposure and risk related to pesticide seed treatment based on new worker exposure data. Because these new data and updated science policies are also being applied in other multisite fungicide cases currently undergoing registration review, EPA revised the seed treatment aspects of the captan human health risk assessment. Specifically, the Agency incorporated worker exposure monitoring data submissions for seed treatment activities¹¹ from the Agricultural Handlers Exposure Task Force (AHETF), the revised *Standard Operating*

⁸ <https://www.epa.gov/system/files/documents/2022-11/esa-workplan-update.pdf>

⁹ *Endangered Species Act Section 7 Consultation Biological Opinion Environmental Protection Agency Registration of Pesticides 2,4-D, Triclopyr BEE, Diuron, Linuron, Captan, and Chlorothalonil*. National Marine Fisheries Service. June 30, 2011. <https://www3.epa.gov/pesticides/endanger/litstatus/final-4th-biop.pdf>

¹⁰ <https://www.epa.gov/pesticide-science-and-assessing-pesticide-risks/occupational-pesticide-exposure-seed-treatment>

¹¹ These data are from commercial and on farm seed treatment studies conducted between 1999 and 2014.

*Procedures for Seed Treatment (Policy 14.1)*¹², and revised *Standard Values for Amount of Seed Treated and/or Planted Per Day (Policy 15.2)*¹³ into the human health risk assessment. Thus, the revised seed treatment assessment incorporated recent worker exposure monitoring data for seed treatment activities submitted by the AHETF in 2014 as well as survey data.¹⁴ EPA is modifying the proposed mitigation for seed treatment uses as a result of the revised risk assessment.

B. Summary of Captan Registration Review

On June 26, 2013, the Agency formally initiated registration review for captan with the opening of the registration review docket for the case.¹⁵ The following summary highlights the docket opening and other significant milestones that have occurred thus far during the registration review of captan:

- June 2013 – EPA posted the [Captan Preliminary Work Plan \(PWP\)](#) (June 19, 2013), [Captan: Human Health Risk Seeping Document in Support of Registration Review](#) (May 1, 2013), and [Registration Review Problem Formulation for Captan](#) (May 2, 2013) to the public docket for a 60-day public comment period.
- December 2013 – EPA posted the [Captan Final Work Plan \(FWP\)](#) (December 19, 2013) and the antimicrobial problem formulation ([Captan - Anticipated Antimicrobial Risk Assessments and Data Needs for Registration Review](#), December 9, 2013) to the public docket. The Agency received six comments on the PWP. None of these comments resulted in changes to the captan registration review schedule, risk assessment needs, or the anticipated data requirements in the FWP. Additional data were necessary to evaluate both the conventional and antimicrobial uses of captan.
- May 2014 – EPA issued two generic data call-ins (GDCIs) for captan to obtain data needed to conduct the registration review risk assessments (DCI GDCI-0810301-1381, to support antimicrobial uses, and GDCI-081301-1383, to support conventional uses). The requirements of GDCI-081301-1381 were waived after all captan technical registrants amended their registrations to delete all antimicrobial uses of captan. GDCI-081301-1383 included data requirements to address risk from conventional uses of captan, and all required studies, except for a turf transferable residue study were submitted.¹⁶ The DCIs are posted together in the docket, EPA-HQ-OPP-2013-0296-0022. For more information, see Sections III.A.4 and III.B.3 of this document.

¹² *Policy 14.1*. Science Advisory Council for Exposure (ExpoSAC), Health Effects Division, Office of Pesticide Programs, Office of Chemical Safety and Pollution Prevention, U.S. Environmental Protection Agency, January 2022.

¹³ *Policy 15.2*. ExpoSAC, Health Effects Division, Office of Pesticide Programs, Office of Chemical Safety and Pollution Prevention, U.S. Environmental Protection Agency, January 2022.

¹⁴ These survey data include the November 2020 *Small Seeded Vegetable Use and Usage Report* (Report No. AHE189) and the July 2013 *Survey Results of Commercial and Downstream Treatment Facilities* (MRID 49185401).

¹⁵ 40 C.F.R. § 155.50

¹⁶ EPA expects to waive this study requirement when all turf-related uses are deleted from product labels.

- November 2018 – EPA posted [Captan. Human Health Draft Risk Assessment in Support of Registration Review](#) (2018 HHRA) and [Captan: Preliminary Ecological Risk Assessment for Registration Review](#) (2018 ERA) for a 60-day public comment period. This comment period was extended for 45 days at the request of the Captan Task Force. The Agency received 210 comments, which did result in changes to the risk assessments and registration review timeline for captan. Both the human health and ecological risk assessments were amended to incorporate new data and other information submitted during and after the public comment period.
- March 2019 to July 2021 – The Captan Task Force submitted numerous voluntary captan studies to EPA, including *in vitro* dermal penetration studies, *in vivo* dermal absorption studies for captan and folpet, and dislodgeable foliar residue (DFR) dissipation studies. The Task Force also submitted published literature articles on dermal toxicokinetics and five white papers¹⁷ to inform various aspects of the human health risk assessment for captan. The Agency reviewed these submissions and incorporated the new data into the human health risk assessment as appropriate. EPA posted two addenda to the human health risk assessment and numerous supporting review documents to the public docket. These include the following:
 - [USDA Response to EPA Inquiry on Captan Usage, Application Methods, and Benefits for Multiple Crops and Ornamentals](#). (December 7, 2020).
 - [Captan. Review and Fitting of Kinetic Dissipation Models for Dislodgeable Foliar Residues](#) (March 1, 2021);
 - [Captan. Addendum to the Human Health Draft Risk Assessment in Support of Registration Review with Updated Occupational and Residential Exposure Assessment](#) (March 2, 2021);
 - [Farm and Field Size Data for Ginseng and Strawberry Use sites for Characterization in the Second Addendum to the Human Health Draft Risk Assessment for Captan](#) (October 29, 2021); and
 - [Captan. Second Addendum to the Human Health Draft Risk Assessment in Support of Registration Review with Updated Occupational and Residential Exposure Assessment](#). (November 3, 2021).
- November 2021 – EPA finalized the voluntary cancellation of one residential end-use product (EPA Reg. No. 4-459) and use termination for residential home and garden sublabels for several additional captan end-use products (EPA Reg. Nos. 19713-385, 19713-405, 19713-646, and 19713-652), all containing 49-80% of captan active ingredient. The Agency published a notice of receipt of these voluntary cancellation

¹⁷ These white papers included submissions on (1) the dermal toxicokinetics to refine dermal absorption estimates for captan and (2) use of new DFR data to calculate re-entry risks of captan, both submitted with the public comments on the captan risk assessments, (3) the inhalation exposure potential of captan's dry flowable (DF) and water dispersible granular (WDG) formulations, (4) use of Multiple Path Particle Dosimetry (MPPD) modeling to inform inhalation exposure and risk estimates for captan, and (5) Captan and Folpet Dermal Penetration.

requests in the Federal Register on September 2, 2021 (86 FR 49,327), and the final cancellation and use deletion order published on November 15, 2021 (86 FR 63,019).

- April 2022 – EPA released a [PID](#) for captan with supporting documents, listed below, for a 60-day comment period. This comment period, which started on April 27, 2022, was extended for an additional 30 days, until July 27, 2022. The Agency has summarized and responded to these comments in Section I.C. of this document. Stakeholder comments did change the risk mitigation and registration review timeline for captan.
 - [Captan: Addendum to the Draft Ecological Risk Assessment for Registration Review Based on a New Honey bee Larval Acute Toxicity Study](#) (August 15, 2019)
 - [Captan Screening Level Usage Analysis \(SLUA\)](#) (July 8, 2020)
 - [Captan SIAB Use and Usage Matrix](#). (June 13, 2018, amended March 25, 2021)
 - [Captan: Second Addendum to the Draft Ecological Risk Assessment for Registration Review](#) (May 4, 2021)
 - [Captan. Health Effects Division Response to Public Comments](#) (November 3, 2021)
 - [Captan: Tier I Update Review of Human Incidents and Epidemiology for Proposed Interim Decision](#) (February 16, 2022).
 - [Use, Usage, Benefits, Impacts of Potential Risk Mitigation and Summary of Public Comments for Captan Use in Strawberry](#) (March 8, 2022)
 - [Amended Captan Usage and Pest Management Benefits on Ginseng and Ornamentals](#). (March 17, 2022)
 - [Assessment of Usage, Benefits and Impacts of Proposed Mitigation in Stone Fruit Production for the Fungicide Captan](#) (March 18, 2022)
 - [Benefits of Captan in Caneberries, Blueberry, and Grape, and Impacts of Potential Mitigation](#) (March 23, 2022)
 - [Captan Usage, Pest Management Benefits and Impacts of Possible Mitigation on Pome Fruits](#) (March 30, 2022).
 - [Captan. Review of Risk Estimates from Proposed Mitigation Measures for Select Crops](#) (March 30, 2022)
- September 12, 2023 – EPA posted the revised human health risk assessment for captan’s seed treatment uses in the public docket. The August 15, 2023, memo, [Captan. Third Addendum to the Human Health Draft Risk Assessment in Support of Registration Review with Updated Occupational and Residential Exposure Assessment for Seed Treatment Uses](#) may be found at EPA-HQ-OPP-2013-0296-0334.
- December 2023 – EPA finalized the voluntary cancellation of the last captan home garden product in the Federal Register (*See* 88 FR 71356 and 88 FR 89447).
- March 2024 – EPA completed an amended PID for captan to address stakeholder comments, policy changes, additional baseline ecological effects mitigation and

human health risks and mitigation for seed treatment uses with the following support memos. EPA will post the amended PID in the captan docket for a 60-day public comment period.

- *Captan: EFED Response to Comments on the Proposed Interim Decision (PID) for Registration Review* (March 23, 2023).
- *Captan. Response to Comments for the Second Addendum to the Human Health Draft Risk Assessment in Support of Registration Review* (December 12, 2023).
- *Amended BEAD Response to Comments on the Amended Proposed Interim Decision (PID) for Captan* (February 19, 2024).

C. Summary of Public Comments on the 2022 PID and EPA Responses

During the public comment period for the Captan Proposed Interim Decision (PID) (April 27, 2022, to July 27, 2022), the Agency received 32 public comments, which resulted in changes to the proposed interim decision. The 60-day comment period was extended by 30 days.

Comments were received from ADAMA, the Captan Task Force, the Almond Alliance of California, the Center for Biological Diversity, Clemson University, the Florida Strawberry Growers Association, the National Agricultural Aviation Association, Northwest Horticultural Council, Purdue University, the University of California at Riverside, the University of Florida, the University of Georgia, USDA's Office of Pest Management Policy, the South Carolina Peach Council, numerous individual fruit growers, grower associations, crop advisors, and a number of anonymous commenters.

Comments of a technical nature concerning the draft captan risk assessments are summarized and addressed in the following documents: *Captan: EFED Response to Comments on the Proposed Interim Decision (PID) for Registration Review* dated March 23, 2023, and *Captan. Response to Comments for the Second Addendum to the Human Health Draft Risk Assessment in Support of Registration Review* dated December 12, 2023.

Comments related to the benefits of captan in orchard crops, berries, grapes, and other crops as well as the impacts of mitigation that was proposed in the 2022 PID, are summarized and addressed in the *Amended BEAD Response to Comments on the Amended Proposed Interim Decision (PID) for Captan*, February 19, 2024.

Additional substantive comments, comments of a broader regulatory nature, and the Agency's responses to those comments are summarized below.

Comments Submitted by Purdue University and the University of California Riverside in EPA-HQ-OPP-2013-0296-0303, -307, and -0317, respectively.

Comment: Purdue stated that the EPA/USDA request for information about captan in December 2020 did not go out to all of the necessary people in the small fruit grower community. The commentor identified specific university cooperative extension staff who

should have been contacted. The University of California stated that EPA needs to communicate more effectively with stakeholders before requesting public comment.

Response: EPA sometimes communicates with stakeholders in the agricultural community with assistance from its federal partner, the U.S. Department of Agriculture's (USDA) Office of Pest Management Policy (OPMP). For captan, EPA worked with USDA to develop specific questions for some growers related to captan use practices in late 2020. USDA provided a summary of stakeholder responses and feedback in early 2021; this is in the captan docket.¹⁸ This information was used in the development of the 2022 PID.

In addition, there are multiple opportunities for stakeholders to participate in the registration review process. All interested individuals and groups are welcomed to participate in our pesticide reevaluation programs through providing public comment on various different documents that are placed in a pesticide's registration review docket throughout the registration review process. For more information, please refer to the following website:
<https://www.epa.gov/pesticide-reevaluation/opportunities-participate-pesticide-reevaluation>

As requested by the commenters, EPA has shared Purdue's list of university extension staff with USDA OPMP to facilitate future engagement with these specific stakeholders. Stakeholders may obtain information on EPA's registration review of specific pesticide chemicals, such as captan, by (1) following the registration review schedule¹⁹ published on EPA's website, (2) setting an alert on the chemical docket using Regulations.gov, and (3) subscribing²⁰ to the daily Federal Register ListServ.

Comments Submitted by Purdue University in EPA-HQ-OPP-2012-0296-0303.

Comment: The commenter addressed the proposed captan rate reduction on Eastern wine grapes. Purdue recommends that growers apply captan at the current maximum label rate (2.5 lbs product per acre, 2.04 lbs active ingredient (ai) per acre) early in the season when there is heavy disease pressure. Many single-site chemistries are not effective against Phomopsis. The commentator expressed concern about loss of efficacy with a reduced rate and directed EPA to the Midwest Fruit Pest Management Guide for fungicide efficacy evaluations. Last, the commentator stated that growers who use lower rates have higher risks of early crop failure when temperatures are cool and wet. Late season applications of captan may interfere with fermentation.

EPA Response: The new information provided by this commentator has resulted in a change to the proposed mitigation for grapes. The Agency proposed a lower application rate in the 2022 PID because (1) national use survey data showed most growers applied captan at or below the proposed rate and (2) a lower rate is associated with lower risks for re-entry workers and a potentially longer restricted entry interval (REI) for high-contact activities, such as hand

¹⁸ *USDA Response to EPA Inquiry on Captan Usage, Application Methods, and Benefits for Multiple Crops and Ornamentals*. December 7, 2020, available at <https://www.regulations.gov/document/EPA-HQ-OPP-2013-0296-0276> in the public docket.

¹⁹ <https://www.epa.gov/pesticide-reevaluation/upcoming-registration-review-actions>

²⁰ <https://public.govdelivery.com/accounts/GOVENGAGE/subscriber/new>

harvesting grapes. If captan application to wine grapes is limited to the early season, then EPA expects lower risk to re-entry workers who are hand harvesting grapes.

Comments Submitted by the University of Georgia, the University of California Riverside, Titan Farms, the Almond Alliance of California, and Clemson University in EPA-HQ-OPP-2013-0296-0301, -0306, -0316, -0319, and -0326, respectively.

Comment: The proposed rain restriction prohibiting captan application within 48 hours of a forecasted rain even is problematic for growers. Both the University of Georgia and Clemson University specifically recommend preventative captan application prior to rain events. Clemson University mentioned that captan must be applied to control the population of viable *Monilinia fructicola*²¹ inoculum prior to rainstorms, which serve as infection events. The commentors argue that fungicides work best for disease management when applied before rain, with time to dry (and become rainfast) to control fungal inoculum before it has an opportunity to infect fruit. Commentors emphasized that rainfall events are the primary driver for applications of fungicides and that it is therefore critical for growers to apply captan just before rainfall.

EPA Response: The Agency has reconsidered the proposed rain restriction after reviewing the new information provided in these comments and the environmental fate properties of captan. Because captan hydrolyzes rapidly in water, EPA does not anticipate risk from stormwater runoff following captan application. Therefore, the Agency is no longer proposing to require a national rain restriction. However, because the regional rain restrictions listed among the “reasonable and prudent measures” in the NMFS Biological Opinion (BiOp) on Pacific Salmonids, it will remain. Therefore, EPA proposes to limit the 48-hour rain restriction to Pesticide Use Limitation Areas (PULAs) in California, Idaho, Oregon, and Washington, which will be specified in the *Bulletins Live! Two* system.

Comment: The commentors wanted EPA to provide mitigation options for growers using various levels of personal protective equipment (PPE).

EPA Response: In the five human health risk assessments supporting this registration review, EPA considered various PPE and engineering controls to determine effective risk mitigation for occupational handlers mixing, loading, and/or applying captan. This information is summarized in Appendix F of this document. EPA also considered the economic impact of various mitigation measures, which are summarized in Section IV.B. of this document. Because captan has both high risks and high benefits, the Agency considers numerous options and public comments in the development of mitigation. EPA has changed its proposed mitigation as a result of this comment; however, the PPE requirements remain. For more information, see the captan registration review docket, EPA-HQ-OPP-2013-0296, especially the March 30, 2022, memo, *Captan. Review of Risk Estimates from Proposed Mitigation Measures for Select Crops*,²² and the various benefits assessments for captan.

²¹*Monilinia fructicola* is the pathogen causing brown rot of peaches and other stone fruit.

²² <https://www.regulations.gov/document/EPA-HQ-OPP-2013-0296-0298>

Comments Submitted by the National Agricultural Aviation Association (NAAA) in EPA-HQ-OPP-2013-0296-0307.

Comment: NAAA requested clarification regarding the proposed windspeed limitations for aerial application because both 10 and 15 mile per hour (mph) windspeed restrictions were mentioned in the PID. NAAA supports a 15 mph windspeed restriction but opposes a 10 mph restriction because windspeeds can commonly exceed 10 mph during critical portions of the application season in certain areas of the country. NAAA is concerned that aerial application during low wind speeds (less than 4 mph) could inadvertently result in spraying into a temperature inversion. NAAA also recommended that if the windspeed is greater than 15 mph, the boom length must be 65% or less of the wingspan for fixed wing aircraft and 75% or less of the rotor diameter for helicopters. Otherwise, the boom length must be 75% or less of the wingspan for fixed-wing aircraft and 90% or less of the rotor diameter for helicopters. If the windspeed is 10 miles per hour or less, applicators must use ½ swath displacement upwind at the downwind edge of the field. When the windspeed is between 11 and 15 miles per hour, applicators must use ¾ swath displacement upwind at the downwind edge of the field.

EPA Response: The Agency is now proposing a maximum windspeed of 15 mph for aerial and ground applications of captan, except for Pesticide Use Limitation Areas (PULAs) related to the 2011 Salmonid BiOp, which specifies a 10 mph windspeed restriction. The 10 mph restriction will apply to specific regions of California, Idaho, Oregon, and Washington. These PULAs will be listed in *BulletinsLive! Two*, which pesticide applicators must consult within 6 months of application. As for the boom length and swath displacements, EPA is adopting NAA's recommendations for aerial application of captan, as described in Section IV.A.8. of this document.

Comment: NAAA recommended that the proposed label language which states "Do not apply during temperature inversions" be amended to specify an altitude at which a temperature inversion should be avoided. NAAA stated clarification is needed because there are often temperature inversions well above where the application is being made, and that while these high-altitude temperature inversions have no impact on pesticide applications, the proposed label directions could cause confusion when it comes to label enforcement. NAAA noted that only low-level temperature inversions near the ground and within the application zone will impact pesticide drift.

EPA Response: Given the difficulty of defining the altitude where inversion conditions may not impact drift, EPA cannot specify an altitude where a temperature inversion should be avoided. The Agency welcomes any additional data or information that could inform the inclusion of an appropriate height for consideration in future decisions.

Comment: NAAA proposes a daily acreage treated limit of 80 A/day and a maximum application rate of 2.4 lbs. a.i./A for applying dry flowable/water-dispersible granule (DF/WDG) and wettable powder (WP) by air. They support EPA's proposal to require a PF50 respirator for mixer/loaders supporting aerial application.

EPA Response: The Agency has reviewed its 2022 proposal to limit area treated and is withdrawing it in response to feedback received during the comment period. EPA is now proposing limits on area treated for high benefits uses only where there is an existing mechanism in place to clearly document the amount of pesticide handled and applied. The Agency has not found high benefits associated with aerial application of captan, given its limited use. EPA appreciates NAAA's support of the proposal to require PF50 respirators for mixers and loaders supporting aerial application.

Comment: NAAA disagrees with EPA's exposure modeling methodology, which assumes that a higher level of risk is associated with mixing, loading, or applying a pesticide to more acres or applying a higher rate of a pesticide compared to mixing, loading, or applying to fewer acres or using a lower application rate. If the maximum PPE and engineering controls are used, mixing and loading for more acres and at the higher use rates should not automatically be assumed to increase the exposure, especially if closed mixing and loading systems and the necessary PPE are worn.

EPA Response: EPA estimates exposures based to pesticide handlers on the magnitude, frequency, and duration of human exposure to a pesticide product(s). Occupational handler exposures are based on several factors, including the pesticide formulation, the application rate, the area treated per day, and the unit exposure. EPA uses the maximum registered application rate for each formulation and registered use. EPA derives generic unit exposure values from exposure monitoring data developed by industry task forces. Unit exposure values are based on the amount of pesticide handled which is specific to the use pattern, pesticide formulation, and personal protective equipment (PPE). As these inputs increase, the resulting exposure for occupational handlers increases. Estimated exposure is compared to a toxicity point of departure to calculate a Margin of Exposure (MOE) which is then compared to the Level of Concern (LOC), with higher exposures resulting in higher risk.

Comments Submitted by the Florida Fruit and Vegetable Association (FFVA) (Docket ID: EPA-HQ-20213-0296-0309) and the Florida Strawberry Growers Association (Docket ID EPA-HQ-20213-0296-0318).

Comment: Both commentors stressed the importance of captan as an efficacious multisite fungicide to the Florida strawberry industry, its use to control specific fungal pathogens, and its residual activity. They mention use of specific spray schedules and the University of Florida Strawberry Advisory system, which reduces the number of fungicide applications without loss in efficacy. They apply captan to strawberries throughout the bloom period and need it to remain available for application during bloom. They are concerned about EPA's conclusions regarding potential impacts to pollinators, especially since Florida has a managed Pollinator Protection Program.

EPA Response: The Agency has considered these comments and is amending the captan PID to incorporate new information submitted during the public comment period. Although EPA has identified potential risks to pollinators, and is proposing a new pollinator hazard statement, it is also proposing new advisory labeling describing best management practices, including state pollinator protection plans, such as Florida's Managed Pollinator Protection Program.

Comment: The commentors raised concern about a perceived requirement for pesticide applicators to wear personal protective equipment while inside a tractor cab. They also raised concerns with the proposed requirement for mixers and loaders to wear an increased level of respiratory protection (PF50 respirators rather than PF10 respirators) due to high costs of these respirators and replacement cartridges.

EPA Response: In this amended PID, EPA is clarifying that no PPE are required for applicators while inside an enclosed cab. In accordance with the Worker Protection Standard, appropriate PPE are still required when a worker exits an enclosed cab during treatment. For strawberries, EPA is proposing to require a respirator for most mixers/loaders; EPA is proposing to require PF10 respirators for WP formulations and PF50 respirators for DF/WDG formulations. This proposal is supported by the human health risk assessments for captan.

Comment: FFVA commented that U.S. tolerances that are not aligned with MRLs for primary trading partners, which poses challenges for Florida blueberry and strawberry growers. Specifically, Canada has MRLs for blueberry and strawberry that are lower than US tolerances. FFVA asks EPA to harmonize tolerances whenever possible.

EPA Response: Canada has an established MRL on strawberry and blueberry at 5 ppm, whereas Codex has established MRLs on strawberry at 15 ppm and on blueberry at 20 ppm. The established U.S. tolerance for captan in/on strawberry is 20 ppm. Although EPA harmonizes tolerance levels with international MRLs whenever possible, in the case of captan, harmonization is not possible for strawberry because the Canadian MRL of 5 ppm and the Codex MRL of 15 ppm are both lower than the established U.S. tolerance of 20 ppm. The established U.S. tolerance for captan in/on blueberry is 20 ppm and is harmonized with Codex. Before EPA can revise the U.S. strawberry tolerance to harmonize with the Canadian MRL, a tolerance petition and appropriate field trial data must be submitted by the technical registrant or a grower representative, such as the IR-4 Project.

Comments Submitted by ADAMA (Docket ID: EPA-HQ-OPP-2013-0296-0314).

Comment: ADAMA asked EPA to reduce the dermal absorption factor used in the human health risk assessment from 3% to 1%. The company submitted a detailed rationale supporting this request, arguing that several test strips from the voluntary *in vitro* dermal penetration study for captan (MRID 51633709) should not be included in the derivation of the dermal absorption factor used in the risk assessment because (1) most captan penetrates skin within the first eight hours of the study, (2) they calculate absorbable dose differently than EPA, (3) the maximum flux (penetration rate) measured in the dermal absorption study shows that skin penetration of captan is extremely slow, and (4) the 2001 OECD²³ guidance notes on the evaluation and interpretation of *in vitro* dermal absorption data recommend specific criteria for considering permeation to be complete. If one followed the OECD criteria, several test strips would not be included because the dermal permeation was incomplete.

²³ Organisation for Economic Co-operation and Development

EPA Response: The Agency has reviewed the additional information ADAMA provided regarding the voluntary, nonguideline *in vitro* dermal penetration data package submitted in June 2021. The Agency reviewed ADAMA's rationale for reducing the dermal absorption factor from 3 to 1%; however, EPA takes a more conservative approach in evaluating dermal penetration studies. The Agency included all samples in its calculation of a dermal absorption factor because the data show that captan can penetrate the skin, and residues in various layers of skin can potentially be absorbed. In addition, OECD recently updated its guidance notes on *in vitro* dermal penetration data and the update has been accepted by the Working Group of National Coordinators of the Test Guidelines Programme. This update clarifies that application of its guidance on *in vitro* dermal absorption data is used by some jurisdictions (OECD member countries in Europe) but not by all jurisdictions (U.S.). Therefore, EPA does not believe it is appropriate to follow the OECD dermal absorption guidance or to use a lower dermal absorption factor at this time. For additional details, see the December 12, 2023, memo, *Captan, Response to Comments for the Second Addendum to the Human Health Draft Risk Assessment in Support of Registration Review*.

Comments Submitted by Center for Biological Diversity (CBD) (Docket ID: EPA-HQ-OPP-2013-0296-0315)

Comment: Although cancelling certain consumer uses of captan is a step in the right direction, CBD requests that EPA cancel all remaining residential uses of captan. They state that the benefits of captan's residential uses do not outweigh its risks.

EPA Response: All captan end-use products registered for residential use have now been canceled (or residential use has been deleted from the product labels). Specifically, captan registrants voluntarily canceled all but one captan end use product registered for residential use or amended product registrations to delete residential uses before completion of the 2022 PID. In 2023, the registrant of the last captan residential use product requested voluntary cancellation of their product. EPA published a Notice of Receipt of this request in the *Federal Register* on October 16, 2023, for a 30-day comment period, and a final cancellation order for this product on December 27, 2023. See 88 FR 71356 and 88 FR 89447.

Comment: CBD's comments focus on EPA's obligation under the Endangered Species Act Section 7 (ESA § 7) to conduct a nationwide consultation with the Services on the registration review of captan. They also want EPA to implement the 2011 National Marine Fisheries Biological Opinion on the effects of captan on Pacific Salmonids. Although they support the mitigation proposed in the 2022 PID, including termination of all use on turf, prohibitions on aerial spraying, lowering application rates, and implementing Bulletins Live language on all captan labels, they believe that further mitigations would be more protective of listed and non-listed wildlife.

CBD's comments also mention various aspects of the risk assessment process (e.g., use of the best available data), including ensuring submission of necessary data and studies (e.g., those necessary to develop listed-species risk assessments), and evaluation of effects on listed species and their designated critical habitat. CBD also expresses concern about the effects of captan on pollinators and other beneficial insects, possible endocrine disruption effects on human health

and environmental safety, and any additive, cumulative and synergistic effects from the use of captan.

EPA Response: EPA has reviewed CBD's comments and will address many of the concerns regarding listed species as part of its ongoing collaborative work with the Services and USDA to improve the consultation process for listed species for pesticides in accordance with the ESA § 7. See Listed Species Assessment in Appendix C of this document for more information. EPA has not completed an assessment of potential effects to listed species or their designated critical habitat from current uses of captan. However, consistent with the ESA Workplan Update, in this amended PID, EPA is proposing to incorporate interim ecological mitigation measures to further protect all nontarget organisms, including threatened and endangered species, as detailed in Section IV.B of this document. While these mitigation measures do not completely satisfy EPA's ESA obligations, EPA believes that early mitigation may improve protections for listed species from currently registered pesticide products. The Agency's proposal to require *BulletinsLive! Two* language on all captan labels will expedite protection of endangered and threatened species when EPA completes the consultation process. *BulletinsLive! Two* will also serve as the mechanism for implementing the Pacific Salmonid BiOp.

EPA is addressing concerns specific to captan, particularly regarding ESA, in connection with the development of its final registration review decision for this pesticide. See Section III.B. and Appendix C of this document for more information regarding endangered species. EPA is currently developing an Agency policy on how to consider claims of synergy being made by registrants in their patents. Before completing registration review, EPA will also address its Federal Food, Drug, and Cosmetic Act (FFDCA) section 408(p)(6)-related commitments and obligations to ensure the protection of public health for captan. For more information on EPA's review of captan under this FFDCA provision, see Appendix D. On September 9, 2019, EPA released an interim process for public comment, available at www.regulations.gov in docket EPA-HQ-OPP-2017-0433. Once that policy has been finalized, EPA intends to consider its implications on the Agency's final registration review decision for captan.

Comments Submitted by the University of California, Riverside (Docket ID: EPA-HQ-OPP-2013-0296-0317).

Comment: The commentor is opposed to cancellation of WP, WDG, and WP formulations for aerial application because liquid formulations do not store well, creating an economic hardship for growers who cannot order and store enough liquid product to allow effective and timely aerial application. The commentor is also opposed to the rate reductions proposed for apples, peaches, and nectarines based on concerns that this will impact captan's efficacy and put more pressure on single site fungicides that are more prone to resistance issues. Reducing the application rate for captan will result in an increased frequency of applications and increase grower costs.

EPA Response: According to both USDA National Agricultural Statistical Survey (NASS) data and other stakeholder comments, very little captan is applied by air (<1% on a national basis, and <5% in California). Low usage implies low benefits. EPA's risk assessment shows high

inhalation risks for mixers and loaders who are supporting aerial application of the DF/WDG and WP formulations, making it difficult to make safety finding for aerial application of these formulations.

Comment: For airblast application, the captan label should have personal protective equipment options for both open and closed cabs.

EPA Response: EPA proposed personal protective equipment for applicators using open cabs. Applicators using closed cabs are not required to wear personal protective equipment inside the cab. However, they are required to wear long sleeve shirts, long pants, shoes, and socks inside the cab and to wear appropriate personal protective equipment when they are working with captan outside the cab. This amended PID clarifies PPE requirements for both open and closed cabs.

Comments Submitted by the Almond Alliance of California (Docket ID: EPA-HQ-OPP-2013-0296-0319).

Comment: The commentor states that almond growers apply captan once during bloom and that almonds are susceptible to several diseases that affect bloom. These include brown rot (*Monilinia*), leaf blight (*Seimatosporium lichenicola*), anthracnose, shot hole (*Wilsonomyces carpophilus*), scab (*Fusicladium carpophilum*), and jacket also known as green fruit rot (*Botrytis cinerea*, *Monilinia laxa*, *Sclerotinia sclerotiorum*). Most fungicide application to almonds occurs post bloom. A single application of captan is applied at 3-4.5 lbs. a.i./A with airblast sprayers after growers have applied other fungicides. Growers use captan in rotation with other fungicides during the critical bloom period.

EPA Response: EPA did not conduct a detailed benefits assessment for almonds for the 2022 PID because fewer than 1% of all U.S. almonds are treated with captan. However, the Agency has incorporated information submitted by the Almond Alliance of California on the use of captan to control early season pathogens on almonds into this amended PID. EPA appreciates the information submitted by the Almond Alliance on the importance of captan to California almond growers as well as the use pattern in California almonds.

Comment: The commentor asked for clarification of the spray drift assumptions used for the non-target species assessments, particularly to whether spray drift was modeled for a dormant-season, young orchard or when there is a canopy in the trees. The commentor asked whether limits to captan use after leaf-out in almonds would reduce some of the nontarget risks of concerns related to spray drift. Leaf out starts during full bloom, so leaves are out by the time bloom has ended (petal fall). The current most common applications timings in almonds, from mid to late-March, are to trees with a canopy.

EPA Response: EPA has determined that airblast application to a mature tree canopy may reduce offsite spray drift and exposure to nontarget organisms by as much as 47% after a single application, as described in the March 23, 2023, memo, *Captan: EFED Response to Comments on the Proposed Interim Decision (PID) for Registration Review*. However, application to mature canopy may not reduce spray drift from aerial application. In addition, application to a

mature crop canopy would not change on-field exposure or risk to mammals foraging in treated areas. EPA requests additional information on changes in application parameters that would both mitigate risk and effectively address pest pressures in almonds.

II. USE AND USAGE

As summarized in the 2022 PID, captan is registered for foliar use on fruit and nut trees, grapes, berries, ginseng, and ornamentals and seed treatment use on vegetables, corn, soybeans, cereal grains, and forage crops. Captan is also registered for use as a preplant root dip for ornamental tubers and bulbs, peach trees, and strawberry plants and as a post-harvest fruit dip for apples, cherries, and pears. Although captan was registered for residential use, the sole registered home and garden product was cancelled on December 27, 2023. (*See* 88 FR 19447.)

Captan is a “multi-site” fungicide, acting on multiple biochemical sites in a pathogen, in contrast to many other fungicides which act on a single biochemical site. Captan is a contact, protectant, fungicide, meaning it stays on the surface of the treated area and prevents fungal infections.

As summarized in the 2022 PID, captan is formulated as a dry flowable (DF)/water dispersible granule (WDG), liquid concentrate, flowable concentrate, and wettable powder (WP). It may be applied by air, ground, or dip tank for use in agriculture and on ornamentals. Although ground application is typically conducted with an airblast rig or ground boom, captan may also be applied with a mechanically pressurized handgun, low-pressure handwand, or backpack sprayer. Post-harvest fruit treatment and seed treatment with captan use specialized application equipment.

Most captan product labels require pesticide handlers (mixers, loaders, applicators, and other handlers) to wear a single layer of protective clothing (i.e., long-sleeved shirt, long pants, shoes and socks) and personal protective equipment (PPE) including chemical-resistant aprons, coveralls (double layer), chemical-resistant gloves, protective eyewear, and/or a PF10 respirator. The current restricted entry intervals (REIs) range from 12 to 96 hours, and the pre-harvest interval (PHI) ranges from 0 to 30 days.

The greatest usage of captan has been reported on fruit, especially apples, stone fruits, and berries. Between 2009 and 2018, an annual average of 1,600,000 pounds (lbs.) of captan active ingredient was applied to apples, 400,000 lbs. were applied to strawberries, and 300,000 lbs. were applied to peaches. In terms of percent crop treated, 65% of strawberries, 50% of blueberries, and 40% of apples were treated with captan during this time period.

Captan is registered as a seed treatment for several crops including alfalfa, cereal grains (barley, rye, oats, wheat), corn, cotton, peanuts, pulse crops (beans and peas), sorghum, soybean, sugar beet, sunflower as well as an assortment of vegetable and forage crops. Captan seed treatment products are formulated as liquids and dusts and registered for commercial use, on farm use, or both. From 2017 to 2021, captan’s usage as a seed treatment decreased in terms of pounds of

active ingredient (lbs. a.i.) applied per year, according to the limited available survey data.²⁴ Captan was not among the top fungicide seed treatments in terms of pounds applied of active ingredient per year for any surveyed crops.²⁵

Captan seed treatment usage was reported on cereal grains (barley, oats, rye, and wheat), pulses (edible dried legumes including dry beans & peas, chickpeas, and lentils), and soybeans from 2017 to 2021.^{24,25} Among these crops with reported usage of captan as a seed treatment, the highest usage (in terms of pounds of active ingredient) was reported on soybeans. In terms of dollar amount of sales, captan was not among the top ten fungicide seed treatment active ingredients for cereals grains, pulses, and soybeans.²⁴

Seed treatment fungicide use on corn, cotton, peanuts, sorghum, sugar beets, and sunflower was surveyed from 2017 to 2021; however, no captan usage was reported on these crops, suggesting captan is not widely used as a seed treatment for these agricultural sites.²⁴ EPA does not have available sources of seed treatment data on other sites registered for captan seed treatment, including grasses and vegetables. However, the absence of such data should not be interpreted as lack of usage.

Additional information on the usage of captan may be found in the July 8, 2020, memo, *Screening Level Usage Analysis*, and in the benefits memos for different crops. These documents may be found in the captan registration review docket (EPA-HQ-OPP-2013-0296).

III. SCIENTIFIC ASSESSMENTS

A. Human Health Risks

EPA completed a human health risk assessment (HHRA) for captan, titled [*Captan. Human Health Draft Risk Assessment in Support of Registration Review*](#), in September 2018 and accepted comments on it for 60 days. The 2018 HHRA identified potential inhalation risk concerns for pesticide handlers who mix, load, or apply captan as part of their work, and potential dermal risk concerns for handlers who treat seed with captan. The 2018 HHRA also identified potential dermal risk concerns for agricultural workers who enter fruit orchards treated with captan for as long as 30 days after captan application. The assessment also identified risk concerns for adults who apply captan to home gardens and orchards and for both adults and children who enter home gardens after they have been treated with captan. The 2018 HHRA assumed a 10% dermal absorption factor based on the best scientific information available at the time.

After publication of the 2018 HHRA, the Captan Task Force submitted additional DFR studies on orchard crops. EPA reviewed these data to determine whether they were appropriate for use in the captan re-entry assessment. The Agency also conducted a kinetic modeling exercise to

²⁴ Ben Kirk. 2022. United States Seed Treatment Product and Brand Historical Database. Database Subset: 2017-2021. Accessed September 2023.

²⁵ Kline and Company. 2019. Global Seed Treatment 2018: United States Market Analysis and Opportunities. Accessed September 2023.

determine whether the data from multiple studies could be combined. In 2021, the Agency updated the dermal absorption factor to 7% based on available data on folpet, a close structural analogue of captan. EPA then incorporated the new DFR data, as appropriate, and the 7% dermal absorption factor into an HHRA Addendum released to the docket in March 2021. This HHRA, [Captan. Addendum to the Human Health Draft Risk Assessment in Support of Registration Review with Updated Occupational and Residential Exposure Assessment](#) (first addendum) continued to show potential inhalation and dermal risk concerns for pesticide handlers, as described above. However, this first HHRA addendum showed potential dermal risk concerns handlers for workers who re-enter orchards, vineyards, and ornamental nurseries to perform high contact activities for as long as 10 days after captan application.

In June 2021, the Captan Task Force submitted *in vitro* dermal penetration studies data for both folpet and captan, which EPA reviewed. The Agency determined that the *in vitro* data could be used to derive a 3% dermal absorption factor and incorporated these data into the second HHRA Addendum released in November 2021, titled [Captan. Second Addendum to the Human Health Draft Risk Assessment in Support of Registration Review with Updated Occupational and Residential Exposure Assessment](#). With a revised dermal absorption factor (DAF) of 3%, EPA continued to have potential dermal risk concerns for re-entry workers performing high contact activities in orchards, vineyards, and ornamental nurseries for as long as 8 days after captan application. In March 2022, the Agency completed an additional HHRA, titled [Captan. Review of Risk Estimates from Proposed Mitigation Measures for Select Crops](#) to illustrate how various mitigation measures could impact risk estimates. The 2021 second HHRA addendum and March 2022 HHRA, [Captan. Review of Risk Estimates from Proposed Mitigation Measures for Select Crops](#), served as the basis for the 2022 captan PID.

In August 2023, EPA completed an additional HHRA addendum, titled [Captan. Third Addendum to the Human Health Draft Risk Assessment in Support of Registration Review with Updated Occupational and Residential Exposure for Seed Treatment Uses](#) to incorporate new data and updated science policies. The November 2021, March 2022, and August 2023 HHRA and addenda serve as the basis for the human health aspects of this amended PID. For additional details, see the HHRA documents in the registration review docket for captan. A summary of the Agency's current conclusions regarding human health risk from use of captan is presented below.

1. Risk Summary and Characterization

a. Hazard Evaluation

EPA reviewed its robust toxicological database for captan to determine the effects associated with captan exposure in toxicology studies conducted in animals. The Agency determined the studies and effects most appropriate for use in the captan HHRA. EPA also determined the appropriate safety factors to account for extrapolation from animal studies to humans (intraspecies variability), variability within a population (interspecies variability), and any special susceptibility of infants and children (FQPA safety factor). The Agency also reviewed captan's absorption and metabolism in the body and degradation in the environment. Captan

and its structural analogue, folpet, share a common degradate, thiophosgene (THPI), which is one of the major captan metabolites and degradates.²⁶

To estimate risks from acute and chronic dietary, incidental oral, and short- and intermediate-term dermal exposure to captan, EPA used data from a multigeneration reproductive toxicity study in rats, showing skeletal malformations and decreased body weights in offspring, to derive a point of departure (POD). For dermal and oral exposure, the level of concern (LOC) is 100, based on safety factors of 10X for interspecies variability, 10X for intraspecies variability, and a 1X FQPA safety factor. The Agency also used a dermal absorption factor of 3%, based on human *in vitro* dermal absorption data submitted in 2021.

To estimate risks from inhalation exposure to captan, EPA used data from a 90-day subchronic inhalation study in rats, showing upper respiratory tract effects to both the larynx and the esophagus. The Agency used the more sensitive laryngeal effects to derive the POD for inhalation risk assessment. For the inhalation route, the LOC is 30, based on safety factors of 3X for interspecies extrapolation, 10X for intraspecies sensitivity, and a 1X FQPA safety factor. Because animals and humans have differences in both respiratory tract structure and breathing rates, EPA also calculated the human equivalent concentration (HEC) for captan.

Captan is considered to be a threshold carcinogen. EPA classified it as "likely to be carcinogenic to humans following prolonged, high-level exposures causing cytotoxicity and regenerative cell hyperplasia in the proximal region of the small intestine (oral exposure) or the respiratory tract (inhalation exposure), but not likely to be a human carcinogen at dose levels that do not cause cytotoxicity and regenerative cell hyperplasia" and "not likely to be carcinogenic to humans via the dermal exposure route." Although tumors were observed in a mouse study, they were attributed to a non-genotoxic mode of action (i.e., the tumors were a response to local irritation and cytotoxicity). The current captan reference dose (RfD) is expected to be protective of the cytotoxicity and other effects that potentially result in tumors. Therefore, the non-cancer endpoint for captan is expected to be protective of potential carcinogenic effects and a separate cancer assessment is not necessary.

b. Dietary (Food + Water) Risks

The Agency conducted a highly refined acute and chronic dietary assessment for captan residues in food and drinking water, using percent crop treated data, USDA Pesticide Data Program monitoring data²⁷, residue data from representative commodities, and anticipated residues for livestock commodities (based on field trial data). The drinking water component of the assessment was based on the most conservative modeled daily drinking water estimates. The captan dietary and drinking water assessments are unchanged from the 2018 HHRA.

EPA has not identified acute or chronic dietary risk concerns for residues of captan or its degradates in food or drinking water. The Agency's level of concern is exposure greater than

²⁶ PAI and PI are the other major captan metabolites and degradates.

²⁷ US Department of Agriculture's Pesticide Data Program monitors residues of pesticides on numerous raw agricultural commodities. USDA samples on farm, before shipping to distributors, and analyzes the samples for pesticide residues. Therefore, PDP is an excellent data source of measured pesticide residues in food and feed.

the Population Adjusted Dose or PAD (>100% acute or chronic PAD). At the 99.9th percentile, acute dietary exposure from food and drinking water comprises 29% of the acute population adjusted dose (aPAD) to the most sensitive population: women of childbearing age (females 13-49 years old). Chronic dietary exposure to children 1-2 years old, the highest exposed subgroup, comprises 2.0% of the chronic PAD (cPAD). Chronic dietary exposure for the general U.S. population and all other population subgroups comprises <1.0% of the cPAD.

c. Residential Handler and Post-Application Risks

When the 2022 PID was completed, the sole captan product registered for residential use was a fruit tree spray for use in home gardens (11.76% captan, co-formulated with two other active ingredients).²⁸ Although EPA had no risk concerns for this captan product, the registrant requested voluntary cancellation of this product in 2023, in accordance with FIFRA Section 6(f), as noted in Section I.C.3.b. of this document, and its cancellation was finalized in the December 27, 2023, *Federal Register*. (See 88 FR 71356 and 88 FR 89447.)

d. Bystander Risks

The Agency evaluated risk from inhalation, dermal, and incidental oral exposure to adults and children living adjacent to agricultural fields treated with captan. In the second 2021 HHRA addendum, EPA refined the bystander assessment, using a 3% dermal absorption value, to re-evaluate spray drift exposure. To evaluate inhalation exposure, based on the potential for captan to volatilize, EPA used data developed by the California Air Resources Board in Tulare County, California following application of captan to agricultural fields. EPA estimated inhalation exposure and risk for people living next to a treated field with potential exposure to a peak concentration of captan and its THPI degrade volatilizing off a treated field for 24-hour period. Because the inhalation MOE for this scenario is 86, which is greater than LOC of 30, the Agency has not identified an inhalation risk concern for bystanders. To estimate dermal exposure, EPA used the AgDRIFT model to estimate residues of captan that might be deposited on lawns adjacent to treated fields from spray drift. The Agency calculated dermal MOEs from 910 to 1,700 for adults and combined dermal and incidental oral MOEs from 270 to 520 for children, for groundboom and airblast application, respectively. Because these MOEs are greater than the LOC of 100 for dermal and incidental oral exposure, EPA has not identified any potential dermal or incidental oral risk concerns for bystanders.

e. Aggregate Risks

In an aggregate assessment, EPA considers the combined pesticide exposures and risks from three major sources: food, drinking water, and residential exposures. When aggregating exposures and risks from various sources, EPA considers both the route and duration of exposure. Although the Agency previously determined that the oral and dermal routes of exposure could be aggregated because they share a common toxicity endpoint, this is no longer necessary due to the cancellation of the last remaining residential product. Therefore, the

²⁸ All other captan products registered for residential use have either been cancelled or amended to remove the home and garden sublabel. See 86 FR 49327 and 86 FR 63019.

aggregate exposure and risk for captan (from food and drinking water) is equivalent to chronic dietary risk. EPA does not have aggregate risk concerns for captan.

f. Cumulative Risks

Unlike other pesticides for which EPA has followed a cumulative risk approach based on a common mechanism of toxicity, EPA has not made a common mechanism of toxicity finding for captan and any other substances. Although captan and folpet (a structurally similar fungicide) both produce the same toxic metabolite and degradate, thiosphosgene, this toxic metabolite is short lived, hydrolyzing almost instantaneously in water. Therefore, for the purposes of this amended PID, captan has not been identified as a member of a cumulative group of pesticides sharing a common mechanism of toxicity. EPA has premised this amended PID and the underlying risk assessments on the understanding that captan does not have a common mechanism of toxicity with other substances.

g. Occupational Handler Risks

EPA has identified potential risk concerns for occupational handlers who mix, load, and apply captan to orchard crops, berries and grapes, and ornamentals. The Agency has also identified risk concerns for use of captan as a seed treatment and as a post-harvest fruit dip. For orchard crops, grapes, and berries, EPA has identified potential inhalation risk concerns for handlers using DF/WDG and WP formulations for the numerous scenarios, described herein. In general, the highest risks are associated with inhalation exposure to DF/ WDG and WP formulations, for mixers and loaders who are supporting aerial application. The Agency's risk estimates, including 2023 HHRA updates, are summarized below and in Appendix F of this document.

Current captan product labels require all handlers to wear single-layer baseline clothing (i.e., long-sleeved shirt, long pants, shoes and socks) as well as PPE consisting of chemical-resistant gloves and protective eyewear. Some product labels also require use of a PF10 respirator. In addition, some captan product labels require use of coveralls or a chemical-resistant apron and a chemical-resistant hat for high contact activities.

Orchard Crops. For orchard crops (fruit and nut trees), risk estimates vary by application method, application rate, formulation, and amount of PPE. Captan is applied to orchard crops primarily by airblast, with use of mechanically pressurized handguns to treat areas that are missed by airblast application, such as the ends of tree rows (row ends). Captan may also be applied by air, groundboom, other handheld equipment (i.e., backpack sprayer and mechanically pressurized handguns), and chemigation. EPA has identified potential inhalation risk concerns for mixers and loaders handling DF/WDG and WP formulations, especially those supporting aerial and chemigation application, even with the use of current label PPE.

Inhalation MOEs for mixers and loaders who are wearing a PF10 respirator range from <1 (for mixer/loaders supporting aerial and chemigation applications of DF/WDG applied to almonds at 4.5 lbs. a.i./A) to 580 (for mixer/loaders supporting airblast and groundboom applications of liquid formulations to apricots at 2.5 lbs. a.i./A); the inhalation LOC is 30. However, with the addition of a PF50 respirator, the same scenarios result in inhalation MOEs for mixers and

loaders ranging from 4.5 (for mixers and loaders supporting aerial and chemigation applications of 4.5 lbs. a.i./A DF/WDG and WP captan to almonds) to 2,900 (for mixers and loaders supporting airblast application of 2.5 lbs. a.i./A of liquid captan to apricots). For applicators, EPA has identified potential inhalation risk concerns for airblast application, even when a PF10 respirator is worn, with MOEs ranging from 15 to 27, less than the inhalation LOC of 30. When airblast applicators use enclosed cabs, all inhalation MOEs are above the LOC, and not of concern to the Agency. EPA has not identified any potential dermal risk concerns for airblast mixers/loaders or applicators who are wearing single-layer clothing and current label PPE of eye protection and chemical-resistant gloves.

The Agency has identified potential inhalation risk concerns for mixing, loading, and applying captan using a mechanically pressurized handgun for all formulations; inhalation MOEs range from 6.6 (for almonds) to 12 (for apricots) when a PF10 respirator is worn. EPA has not calculated MOEs for workers wearing PF 50 respirators because the Agency believes this level of PPE is not tenable for pesticide applicators. Dermal MOEs (for all captan formulations) for mixer/loader/applicators using a mechanically pressurized handgun are above the dermal LOC of 100 for application rates below 0.158 lbs. a.i./gal (3.16 lbs. a.i./A). For rates greater than 0.158 lbs. ai/gal (3.16 lbs. a.i./A), the dermal MOE is 72 or (below the LOC of 100) and is of concern. The risk estimates for mixers, loaders, and applicators using mechanically pressurized handguns assume that 1000 gallons of solution are applied per applicator per day. EPA understands that in practice, applicators may treat fewer acres per day using this application method. The Agency welcomes public comments on use of mechanically pressurized handguns in orchards, especially comments on use practices and amount handled.

Last, the Agency has identified inhalation risk concerns for both mixers and loaders and fruit packing house workers when captan is used as a post-harvest fruit dip for apples, cherries, and pears. When EPA assumes that fruit is dipped in 25,000 gallons of captan at a rate of 0.0128 lbs. a.i./gal, inhalation MOEs are as follows. For mixers/loaders using the DF/WDG formulation and wearing a PF10 respirator, the inhalation MOE is 4.5 (LOC is 30); the MOE is 22 with use of a PF50 respirator. For mixers/loaders using the liquid formulation and wearing a PF10 respirator, the inhalation MOE is 180 (LOC is 30). For mixers/loaders using the WP formulation and wearing a PF10 respirator, the MOE is 15; the MOE is 73 with use of a PF50 respirator. For fruit packing workers who are sorting or packing treated fruit, the inhalation MOE is 1.3 with no respirator, 13 with a PF10 respirator, and 63 with a PF50 respirator. For fruit packing workers involved in other activities, the inhalation MOE is 28 with no respirator and 280 with a PF10 respirator. There are no dermal risk concerns associated with the use of captan as a post-harvest fruit dip.

Berries and Grapes. The Agency has risk concerns for mixer/loaders handling the DF/WDG formulations to support airblast or groundboom applicators, but no risk concerns for mixer/loaders handling liquid or WP formulations, provided a PF10 respirator is worn. The inhalation MOE for mixers/loaders handling the DF/WDG formulations to support airblast or groundboom applicators range from 14 (at 2.50 lbs. a.i./A for blueberries) to 18 (at 2.00 lbs. a.i./A for caneberries) with a PF10 respirator and 71 to 89 with a PF50 respirator. The MOEs for an airblast applicator wearing a PF10 respirator range from 27 to 33. EPA does not have risk concerns (MOEs > LOC of 30) for mixers/loaders or applicators who are applying any

formulation of captan to blueberries, caneberries, and grapes using groundboom equipment. For additional details, see Appendix F to the March 2021 HHRA addendum,²⁹ the March 2022 memo, *Captan. Review of Risk Estimates from Proposed Mitigation Measures for Select Crops*, and the December 12, 2023, memo, *Captan. Response to Comments for the Second Addendum to the Human Health Draft Risk Assessment in Support of Registration Review*.

For mixer/loader/applicators applying any formulation of captan using mechanically pressurized handguns, inhalation risk estimates range from 12 (at 0.125 lbs. a.i./gal for blueberries) to 37 (at 0.04 lbs. a.i./gal for caneberries) with PF10 respirator; the LOC is 30. EPA has identified inhalation risk concerns for mixer/loader/applicators using a mechanically pressurized handgun to treat blueberries, assuming use of a PF10 respirator and application of 1000 gal³⁰ of solution containing 0.125 lbs. a.i./gal captan (all formulations). This can be addressed by limiting the amount of solution handled to spot treatments, as described in Sections IV.A.4. and IV.B.1. of this document.

For grapes, EPA identified potential risk concerns for inhalation exposure to pesticide handlers using the DF/WDG formulation workers when any formulation of captan is applied at the maximum rate of 2.04 lbs. a.i./A. For mixers and loaders supporting airblast and groundboom application of the DF/WDG while wearing a PF10 respirator, the MOE 18, which is below the inhalation LOC of 30 and is of risk concern. However, with use of a PF50 respirator, the MOE is 87 and is not of concern.

For strawberries, EPA identified potential inhalation risk concerns (MOEs < LOC of 30) for mixer/loaders who are supporting aerial and chemigation applications of DF/WDG and WP formulations, assuming 350 acres are treated daily. For DF/WDG formulations, the inhalation MOE is 1.4 with a PF 10 respirator and 6.8 with a PF50 respirator. For WP formulations, the inhalation MOE is 4.4 with a PF10 respirator and 22 with a PF50 respirator. However, there is no inhalation risk concern (MOEs > LOC of 30) for mixer/loaders supporting aerial application of liquid formulations.

For mixers/loaders who are supporting groundboom application to strawberries (with the default assumption of 80 acres treated per day), EPA has identified potential risk concerns for DF/WDG and WP formulations but not for liquid formulations. Specifically, the MOE for mixers/loaders of DF/WDG is 5.9 when a PF10 respirator is worn and 30 when a PF50 respirator is worn. For the WP formulation, the MOE is 19 with a PF10 respirator and 97 with a PF50 respirator.

For the 2022 PID, EPA refined the risk estimates for strawberries using farm size data from USDA's National Agricultural Statistics Service 2017 Agricultural Census and the USDA Farm Service Agency (FSA). These data showed that the majority (96%) of strawberry farms are 15 acres or less, and the 90th percentile farm size is 48 acres. However, larger growers, with farm sizes ranging from 50 to over 100 acres produce the majority of strawberries sold in the U.S.

²⁹ *Captan. Addendum to the Human Health Draft Risk Assessment in Support of Registration Review with Updated Occupational and Residential Exposure Assessment*. March 2, 2021.

³⁰ This is EPA's default estimate of the volume that could be applied in a day. This assumes application of 20 gal of solution to 50 acres in a day.

Therefore, for this amended PID, EPA is presenting strawberry MOEs for handlers treating 15, 48, or 80 acres per day. No exposure scenarios were of concern when 15 acres are treated per day while wearing a PF10 respirator. However, when 48 acres are treated daily, the inhalation MOE for mixers/loaders of DF/WDG formulations supporting groundboom is 9.9 with a PF10 respirator and 50 with a PF50 respirator. When 80 acres are treated daily, EPA has inhalation risk concerns for mixers/loaders who are wearing a PF10 respirator when mixing and/or loading DF/WDG and/or WP formulations (MOE of 5.9 with PF10 respirator; MOE of 30 with PF50). As previously noted, the inhalation MOEs are above the LOC when a PF50 respirator is worn.

Ginseng. EPA's 2018 HHRA and 2021 HHRA addenda evaluated ginseng as both a typical field crop, assuming 80 acres treated per day, and as a field-grown ornamental crop, assuming 40 acres treated per day. These HHRA also assumed that captan and other pesticides are applied to the crop by groundboom. However, information from USDA^{31,32} and other stakeholders indicated that ginseng is not a typical field crop. The vast majority (88%) of ginseng is grown on small farms of 10 acres or less,³³ under shade lath. Growers typically apply captan and other chemicals using custom-made boom sprayers which hold approximately 100 gallons of spray solution and travel low to the ground. Assuming an area treated of 10 or fewer acres, inhalation MOEs for mixers, loaders, and applicators who are wearing the required PF10 respirator range from 48 to 1,900, all greater than the LOC of 30. Dermal MOEs for workers who are wearing the required single layer of protective clothing and chemical-resistant gloves range from 540 (for handlers using mechanically pressurized handgun and assuming 1,000 gallons solution handled) to nearly 70,000 (for aerial applicators), all greater than the LOC of 100. Therefore, if captan application to ginseng is limited to small farms of 10 acres or less, there are no occupational risk concerns. However, if captan is applied to ginseng grown on farms of 33 acres (the 90th percentile farm size), then EPA has inhalation risk concerns for the DF/WDG formulation, with an MOE of 14 with a PF10 respirator and an MOE of 72 with a PF50 respirator. The inhalation MOEs for the liquid and WP formulations are above the LOC of 30 when a PF10 respirator is worn and are not of risk concern.

Ornamentals. Because little information is available on the use of captan on ornamentals, EPA's HHRA and HHRA addenda used the best available information and standard default assumptions to estimate worker risk using a variety of application methods. The Agency identified potential inhalation risk concerns for pesticide handlers applying captan to ornamentals. For pesticide handlers applying captan to ornamentals, inhalation MOEs range from 3.6 to 230 for workers wearing PF10 respirators, depending on the formulation and specific worker activities (LOC is 30). In general, EPA has identified potential inhalation risk concern for the DF/WDG and WP formulations and for mixers/loaders supporting groundboom application. For mixers/loaders handling DF/WDG formulations, the inhalation MOE is 3.6 for workers wearing a PF10 respirator and 18 for workers wearing a PF50 respirator. For mixers and loaders handling WP formulations, the inhalation MOE is 12 for workers wearing a PF10

³¹ *USDA Response to EPA Inquiry on Captan Usage, Application Methods, and Benefits for Multiple Crops and Ornamentals*. December 7, 2020. See EPA-HQ-OPP-2013-0296-0276 in the public docket.

³² USDA-FSA. 2010-2014. *Crop Acreage Data. Data from the USDA FSA on Field Size*, obtained through a Freedom of Information Act request. <https://www.fsa.usda.gov/news-room/efoia/electronic-reading-room/frequently-requested-information/crop-acreage-data/index>.

³³ The 90th percentile ginseng farm size is 33 acres.

respirator and 59 for workers wearing a PF50 respirator. Dermal MOEs are ≥ 810 (LOC is 100) for workers wearing single layer clothing and chemical-resistant gloves; therefore, EPA has no potential risk concern for dermal exposure.

Seed Treatment. As mentioned in Section I.A. of this document, on August 15, 2023, EPA revised the HHRA for captan's seed treatment uses to incorporate new data and updated science policies. This revised HHRA assumed that workers are wearing long sleeves, long pants, shoes, and socks as well as the following PPE (required on product labels): chemical-resistant gloves, protective eyewear, a chemical-resistant apron, and in some cases, a respirator. EPA estimated worker exposures and risks with and without the use of a PF10 respirator because it is not currently required for all captan seed treatment products. Worker exposure is based on the pesticide application rate, the amount of seed handled or planted, unit exposure for each activity type, PPE worn, and duration of exposure. For details, see the document, *Captan. Third Addendum to the Human Health Draft Risk Assessment in Support of Registration Review with Updated Occupational and Residential Exposure Assessment for Seed Treatment Uses.*³⁴

Overall, the 3rd addendum to the HHRA showed inhalation risk concerns for both commercial and on farm seed treatment, specifically for pesticide handlers involved in one or more of the following activities: treating seeds, packaging treated seed, cleaning equipment, loading planters, and planting treated seed. In general, the Agency has greater concerns for risk from inhalation exposure than dermal exposure for captan seed treatments.

For commercial seed treatment, EPA assumed use of closed loading systems, because no exposure monitoring data for commercial seed treatment were available for open loading systems; both inhalation and dermal risks would be higher with open loading. Inhalation risk estimates (expressed as margins of exposure or MOEs) range from 0.50³⁵ to 95,000³⁶ for commercial seed treatment uses, with an LOC of 30. Numerous seed crops have at least one exposure scenario with an inhalation risk concern, even with the addition of a PF10 respirator. With the use of a PF10 respirator, the following seed crops do not have inhalation risks of concern: cucumber, cantaloupe, and muskmelon (but not other cucurbits); lentils; and sunflowers.

Dermal MOEs range from 73 to 23,000,000, with an LOC of 100. The only scenario with a dermal risk concern is equipment cleanout after treatment of onion seeds (for both bulb and green onions), with a dermal MOE of 73 for workers wearing single layer clothing (long sleeve shirt, long pants, shoes, and socks) and PPE consisting of chemical-resistant gloves or 80 for workers wearing single layer clothing and PPE consisting of a double layer (e.g., coveralls), and chemical-resistant gloves.

For on farm seed treatment, EPA assumed use of open loading systems, because no exposure monitoring data for on farm seed treatment were available for closed loading systems. Worker exposures and risks would be lower with closed loading systems; however, workers may be involved in additional activities, beyond loading chemicals into seed treatment equipment, such

³⁴ <https://www.regulations.gov/document/EPA-HQ-OPP-2013-0296-0334>.

³⁵ Planting commercially treated soybean seeds at a rate of 50,000,000 seeds per day, without use of a respirator.

³⁶ Pelleted seeds of crucifers (e.g., mustard), treated.

as loading treated seeds into a planter and planting seeds. Inhalation MOEs ranged from 0.056 (for soybean) to 23,000 (for cauliflower) for on farm seed treatment uses, with an LOC of 30. Numerous seed crops have at least one exposure scenario with an inhalation risk concern. Dermal MOEs range from 120 to 12,000,000 with single layer clothing and PPE consisting of chemical-resistant gloves, are above the LOC of 100, and are not of concern. EPA has inhalation risk concerns for all dust products, even when workers wear a PF10 respirator; all inhalation MOEs are below the LOC of 30.

h. Occupational Post-Application Risks for Re-Entry Workers

EPA has identified potential dermal risk concerns for agricultural workers who enter orchards, vineyards, and ornamental nurseries after captan application due to contact with captan residues remaining on foliage after application. The 2018 HHRA showed potential dermal risk concerns (i.e., MOEs below the LOC of 100) for numerous crops 30 days or more after captan application. The Agency estimated post-application risks using dislodgeable foliar residue dissipation (DFR) data, the application rate, the dermal POD, and the dermal absorption factor. Following publication of the HHRA in 2018, the Captan Task Force submitted additional DFR data for captan use on orchard crops. EPA used these data and the previously submitted DFR data for captan to determine the best-fit residue decline curve.³⁷ The Agency also used new *in vitro* dermal penetration studies for captan and folpet to derive a dermal absorption factor of 3%. This enabled the Agency to refine the post-application risk estimates for captan. The November 2021 HHRA addendum and the March 2022 memo, [Captan. Review of Risk Estimates from Proposed Mitigation Measures for Select Crops](#), show lower potential re-entry risk concerns and identify fewer crops with risk concerns, as described below.

For most crops, there are no potential post-application risks at the current REI because re-entry risks (MOEs) were greater than the LOC for worker activities involving little or no contact with treated foliage. However, EPA has identified risks of concern for workers involved in high contact activities for a few crops. The Agency has potential risk concerns for hand thinning of apples, nectarines, peaches, and cherries, girdling and turning table grapes (a cultural practice unique to this crop), leaf pulling, tying/training, and hand harvesting wine and juice grapes, and adjusting, maintaining, or repairing handset irrigation equipment in ornamental nurseries.

Specifically, the November 2021 HHRA addendum shows that there are potential risk concerns (i.e., MOEs below the LOC) associated with hand thinning apples, peaches, and nectarines for 6 days after treatment. In addition, there are potential risk concerns for hand thinning cherries for 1 day after treatment; for tying, training, hand harvesting, and leaf pulling wine and juice grapes for 3 days after treatment; for turning and girdling table grapes for 8 days after treatment; and for working with handset irrigation equipment in ornamentals for 10 days after treatment. However, with application rate reductions, the risk concern for hand-thinning orchard fruit can be addressed, as described in Section IV.A.4 of this document. In addition, grape growers are changing horticultural practices to use new Y-shaped trellis systems that make turning and

³⁷ For more information on how EPA modeled the best fit residue decline curve, see the March 1, 2021, memo, *Captan. Review and Fitting of Kinetic Dissipation Models for Dislodgeable Foliar Residues* (March 1, 2021).

girdling unnecessary for table grapes.³⁸ Last, EPA understands that ornamental growers seldom use handset irrigation. Appendix F of this document summarizes EPA's revised post-application risk estimates for current registered uses of captan on orchard and vineyard crops.

As mentioned above, EPA considered rate reductions to address re-entry risk concerns. For example, for grapes, EPA identified a dermal risk concern for re-entry workers following captan application at the current maximum rate of 2.04 lbs. a.i./A; MOEs were below the LOC of 100 for workers turning and girdling table grapes until 8 days after application and hand harvesting wine and juice grapes for 3 days application. The re-entry risks for all grapes were lower when the application rate was reduced to 1.75 lbs. a.i./A and could be mitigated with slightly longer re-entry intervals. For wine grapes and juice grapes, the re-entry workers MOEs involved with tying, training, hand harvesting, and leaf pulling were below the LOC for 3 days at the 2.04 lbs. a.i./A rate, necessitating a 3-day REI. At the 1.75 lbs. a.i./A application rate, the MOE reached the LOC 2 days following captan application.

2. Human Incidents and Epidemiology

EPA reviewed the captan incidents reported to OPP Incident Data System (IDS) and the Centers for Disease Control and Prevention/National Institute for Occupational Safety and Health (CDC/NIOSH) Sentinel Event Notification System for Occupational Risk-Pesticides (SENSOR). The purpose of this database search was to identify potential patterns in the frequency and severity of the health effects attributed to captan exposure. Three reviews of the incident data were conducted: (1) in January 2018, (2) in January 2022, and (3) in January 2024. An IDS analysis from January 1, 2013, to January 30, 2024, reported five cases involving a single active ingredient and one case involving multiple active ingredients in the Main IDS and nine cases to the Aggregate IDS. A search of SENSOR-Pesticides data from 2010 to 2014 identified 12 cases involving captan. Three of the 12 cases involved a single active ingredient and nine cases involved multiple active ingredients. One case was high in severity, one case was moderate in severity, and ten cases were low in severity. Six cases were associated with occupational use of captan and six cases with residential use. Five of the residential cases involved illness without a violation of the pesticide labeling; these five cases were low in severity. The most frequently reported symptoms were dizziness, nausea, and burning/prickling sensation. A second search of the SENSOR-Pesticides database from 2015 to 2017 identified a total of seven case reports involving exposure to multiple pesticide active ingredients including captan. Most cases (6 of 7) involved homeowner exposure to the pesticide, some to existing stocks of canceled products. One case involved deliberate ingestion of a pesticide product containing captan. Five cases were low in severity and two cases were moderate in severity, with symptoms similar to the incidents reported previously. The third search of the SENSOR-Pesticides database from 2018 to 2024 did not contain any additional data.

Captan was included in the Agricultural Health Study (AHS), a multi-year, federally funded study that evaluates associations between pesticide exposures and cancer and other health outcomes. The Agency conducted Tier I reviews of published epidemiological studies in both

³⁸ See the August 23, 2021 memo, *Grapevine Cane Turning and Girdling in Modern Production of Table Grapes – Prevalence and Potential Worker Exposure to Pesticides*, available in the captan docket, EPA-HQ-OPP-0296-0283.

2018 and 2022. In the 2022 updated Tier I review, EPA identified 36 epidemiologic publications on the AHS and on the broader epidemiology literature that considered captan exposure and adverse health effects. Although some of these studies reported a positive association between captan exposure and various health effects, at this time, there is insufficient evidence to suggest a clear associative or causal relationship between exposure to captan and the adverse health effects in the studies reviewed by EPA. As of January 2024, the Agency found no additional relevant data for captan in the AHS.

The Agency intends to monitor human incidents for captan and will conduct additional analyses if necessary. EPA also intends to continue to monitor the results of the AHS study, publications using AHS study data, and other studies in the published literature for positive associations between captan exposure and adverse health outcomes. See EPA's August 13, 2018, incident memo, *Captan: Tier I Update Review of Human Incidents and Epidemiology* (EPA-HQ-OPP-2013-0296-0045) and the February 16, 2022, memo, [*Captan: Tier I Update Review of Human Incidents and Epidemiology for Proposed Interim Decision*](#) for additional details.

3. Tolerances

Captan is registered for uses that result in residues in or on food. Generally, a tolerance or tolerance exemption must cover the residues, or the affected food is considered adulterated.³⁹ EPA believes that all of the necessary tolerances are in place to cover residues resulting from legal uses of captan. EPA has established tolerances in 40 CFR §180.103 (a)(1) for direct residues of captan resulting from application to growing crops and in 40 CFR §180.103 (a)(2) for indirect residues of captan in livestock commodities resulting from application to feed crops. During the captan registration review, the Agency has identified necessary and appropriate changes to the tolerance expression, to specific tolerance values, and to definitions of commodity groups (crop groups). As part of this registration review, EPA also looked for opportunities to harmonize the U.S. tolerances for captan with Codex and/or Canadian MRLs, as required by treaty with the World Trade Organization. These proposed changes, described in detail in both the 2018 HHRA and in Section IV of this document, will be implemented through a formal rulemaking process at the conclusion of this captan registration review.

4. Human Health Data Needs

The human health database for captan is considered complete, with the exception of a turf transferable residue study. The captan technical registrants have chosen to amend their registrations to delete the turf use from their labels rather than develop these data. However, a few captan end-use products still allow use on lawn seed beds, ornamental grasses, groundcovers such as dichondra, and other turf-like uses. The requirement for the turf transferable residue study will be waived when all captan product labels are amended to delete these turf and turf related uses. There are no other human health data gaps.

B. Ecological Risks

³⁹ 21 U.S.C. §§ 342, 346(a).

EPA used the most current science policies and risk assessment methodologies to prepare an ecological risk assessment in support of the captan registration review. The Agency amended the Ecological Risk Assessment (ERA) in 2019 to incorporate a captan honey-bee-larvae acute toxicity study and again in 2021 to address errors in both the maximum application rate for an agricultural crop and the mammalian chronic effects endpoint used for risk assessment. For additional details on the 2018 ERA, see [Captan: Preliminary Ecological Risk Assessment for Registration](#) (September 26, 2018). For additional details on the 2019 ERA addendum, see [Captan: Addendum to the Draft Ecological Risk Assessment for Registration Review Based on a New Honey Bee Larval Acute Toxicity Study](#) (August 15, 2019) and for details on the 2021 ERA addendum, see [Captan: Second Addendum to the Draft Ecological Risk Assessment for Registration Review](#) (May 4, 2021)⁴⁰ in EPA's public docket (EPA-HQ-OPP-2013-0296).

Although EPA has not yet conducted a nationwide endangered species assessment for captan as part of this registration review, in 2003 the Agency conducted a focused biological evaluation (BE) for Pacific salmonids and initiated a formal consultation with the National Marine Fisheries Service (NMFS) in response to litigation. NMFS completed a Biological Opinion (BiOp) on the effects of captan on Pacific salmonids in 2011. EPA has summarized the captan 2018 ERA, the 2019 and 2021 ERA addenda, and the Pacific salmonids BiOp below. The salmonid BiOp, *National Marine Fisheries Service Endangered Species Act Section 7 Consultation. Biological Opinion. Environmental Protection Agency Registration of Pesticides 2,4-D, Triclopyr BEE, Linuron, Captan, and Chlorothalonil*⁴¹ may be found on the NMFS website.

1. Risk Summary and Characterization

EPA has identified potential chronic risks for non-listed mammals and acute risks to honey bee larvae for all captan uses. Although the Agency initially identified acute risks to freshwater fish associated with captan runoff from treated orchards, this was based on an incorrect maximum application rate of 6 lbs. a.i./A. When EPA estimated acute aquatic risks using the correct maximum application rate of 4.5 lbs. a.i./A, there was no acute risk for freshwater fish. The risk estimates are based on the current registered uses of captan, the available ecotoxicity data, and the environmental fate properties. EPA compares the risk estimates (Risk Quotients, or RQs) with EPA's Level of Concern (LOC) for non-listed species; EPA has a risk concern when RQs are greater than the LOC. For scenarios in which RQs could not be calculated, EPA compared the estimated environmental concentrations (EECs) of captan with the appropriate toxicological endpoint. No potential risk concerns were identified for aquatic invertebrates (water-column and benthic), freshwater and estuarine/marine fish, aquatic plants, terrestrial plants, birds, and the taxa they represent.

a. Terrestrial Risks

EPA estimated the potential risk associated with captan use for birds, mammals, honeybees, plants, and the taxa they represent. For birds and mammals, the acute and chronic LOCs are 0.5

⁴⁰ These are described as the 2019 EERA addendum and the 2021 EERA addendum.

⁴¹ The captan salmonid BiOp may be found at https://media.fisheries.noaa.gov/dam-migration/63806559pesticide_opinion4.pdf

and 1.0 respectively; for plants the LOC is 1.0. For bees, the acute and chronic LOCs are 0.4 and 1.0, respectively.

Mammals. The 2018 ERA did not identify potential acute risk concerns for mammals for any registered uses of captan. However, chronic LOC exceedances were reported for mammals in the 2018 ERA and in the 2019 ERA addendum. The 2021 addendum revised mammalian risk estimates for captan to incorporate changes to the chronic mammalian effects endpoint⁴² and to correct the application rates⁴³ modeled. As summarized in the 2021 ERA addendum, chronic dose-based RQs (upper bound Kenaga) range from 0.1 to 38 for a single application and from 0.41 to 134 for multiple applications. Chronic dietary-based RQs for a single application range from 0.11 to 4.3 (upper bound Kenaga) or from <1 to 1.5 (mean Kenaga). The chronic mammalian RQs exceed the LOC for both single and multiple captan applications at the minimum and maximum agricultural application rates of 1.88 and 4.5 lbs. a.i./A, respectively. RQs continued to exceed the LOC at the Lowest-Observed-Adverse-Effect-Level (LOAEL), providing additional support for chronic risk concerns to mammals.

Chronic mammalian dose-based RQs for small mammals consuming short grass (most conservative estimate) exceeded the NOAEL from 140 days (single application to caneberries at 1.88 lbs. a.i./A) to 269 days (4.5 lbs. a.i./A to almonds, multiple applications) after the initial captan application.⁴⁴ In addition, EPA identified potential chronic risk concerns for mammals ingesting seeds treated with captan (RQs ranged from 3.6 to 39). The number of ingested seeds required to reach the chronic LOC for captan range from 1 seed (for small mammals ingesting large seeds such as cowpeas, sweet corn, and peanuts) to 3000 seeds (for larger mammals ingesting smaller seeds for crops including rye, lettuce, and kale).

EPA also conducted spray drift modeling to evaluate off-field chronic risks for mammals. For captan ground applications, drift distances range from 6.6 feet (assuming one application at 1.88 lbs. a.i./A with low boom, fine to medium droplets) to 322 feet (assuming multiple applications at 4.5 lbs. a.i./A with high boom, very fine to fine droplets). For captan aerial applications, drift distances range from 151 feet (assuming one application at 1.88 lbs. a.i./A) to >1000 feet off the field (for multiple applications at 4.5 lbs. a.i./A for fine to medium droplets). Although application to mature crop canopies via airblast application reduces the spray drift distance (and resulting risk concern), EPA still has risk concerns for mammals foraging on-field (and off field).

Birds, Reptiles, and Terrestrial-Phase Amphibians. The 2018 ERA did not identify any potential acute risk concerns for nontarget exposure to birds and the taxa they represent (*i.e.*, reptiles and terrestrial-phase amphibians). In avian acute toxicity studies, no effects were seen at the highest dose tested (10,000 mg a.i./kg-diet, a non-definitive endpoints). Captan EECs did not exceed non-definitive acute avian toxicity endpoints for both foliar applications and seed

⁴² The correct NOAEL of 12.5 mg a.i./kg body weight is from a multi-generation rat study that showed decreases in pup litter weight in the first and second generations (MRIDs 00120315 and 00125293). These endpoints are 20 times higher than the previous values, resulting in lower RQs.

⁴³ The previous assessment erroneously modeled a maximum application rate of 6 lbs. a.i./A for apples, rather than the maximum orchard crop rate of 4.5 lbs. a.i./A for almonds.

⁴⁴ These estimates assume that captan has a 35-day foliar dissipation half-life.

treatments. Chronic avian reproductive testing showed no adverse effects at doses up to 1,000 mg a.i./kg-diet (non-definitive endpoints).

EECs for some foliar and seed treatment uses exceed the highest tested concentration in avian chronic studies; therefore, at concentrations above 1000 mg a.i./kg-diet, risk is uncertain. For seed treatment uses, several EECs for seeds treated with captan at rates of 3.2 fl oz/100 lbs. seeds exceeded the non-definitive avian No Adverse Effect Concentration (NOAEC) of 1000 mg a.i./kg-diet from a chronic mallard study. Therefore, the Agency cannot preclude risk concerns for seed treatment applications at rates above 3.2 fl. oz/100 lbs. seed due to a lack of information on captan toxicity at corresponding doses greater than 1000 mg a.i./kg-diet. No potential risk concerns were identified for scenarios with EECs less than 1000 mg a.i./kg-diet (associated with application rates below 3.2 fl. oz per 100 lbs. seed).

Terrestrial Invertebrates. Captan is a non-systemic broad-spectrum fungicide registered on a variety of agricultural and non-agricultural crops, some of which are bee attractive and require the use of managed pollinators. Tier I toxicity data for captan are available for acute exposure for adult and larval honey bees; however, no chronic toxicity data are available for adults or larvae. The Tier I pollinator assessment, based on the available data, concluded that acute risk of mortality to adult honey bees is low; nonetheless, there are potential risk concerns for larvae on an acute exposure basis at the maximum agricultural (almonds) and non-agricultural (ornamentals) application rates (RQs ranged from 4.3 to 10.2). An incident involving captan described honey bee brood losses and deformities associated with application to almonds in California. This incident was classified with a certainty index of ‘probable,’ although the legality of the use was undetermined. There was no information on reported use of other pesticides that could be potentially associated with this incident.

EPA proposes that Tier 1 larval and adult honey bee chronic toxicity data are needed for captan. Pending the results of the chronic larval and adult honey bee Tier I studies, additional higher-tier data (e.g., nectar and pollen residue data and/or semi-field studies at environmentally relevant concentrations) may be useful for refining the understanding of potential exposure of bees from these uses, and the extent of risk at the colony level.

Terrestrial Plants. EPA has not identified any potential risks of concern for terrestrial plants associated with use of captan. The available terrestrial plant toxicity studies for captan showed no adverse effects at the highest tested treatment level (4.55 lbs. a.i./A). The current maximum application rate for captan to an orchard crop is 4.5 lbs. ai/A (for almonds). When EPA assumes exposure to the highest tested concentration, the resulting RQs do not exceed the LOC.

b. Aquatic Risks

EPA estimated the potential risk associated with captan use for both freshwater and estuarine/marine fish, invertebrates, and aquatic plants. Risk estimates (RQs) were compared with EPA’s Level of Concern (LOC) for non-listed species. The acute and chronic LOCs for fish and aquatic invertebrates are 0.5 and 1.0 respectively, and for aquatic plants the LOC is 1.0.

In the 2018 ERA, EPA identified potential acute risk concerns for freshwater fish exposed to captan from aerial application to orchards and from aerial and ground applications to apples. The RQs ranged from 0.02 to 0.53, with an LOC of 0.5. However, these risk estimates were based on an incorrect maximum application rate of 6 lbs. a.i./A for apples. When the Agency corrected the maximum single application rate for agricultural uses, there were no LOC exceedances associated with the apple use. EPA did not identify any potential risk concerns for aquatic invertebrates (either benthic or water-column) or aquatic plants (vascular and non-vascular). Due to the rapid degradation of captan in water by hydrolysis, chronic exposure in aquatic environments is expected to be low.

In 2003, EPA initiated formal consultation with NMFS on the effects of captan and other pesticides on Pacific salmonids through the transmittal⁴⁵ of a final Biological Evaluation⁴⁶ NMFS issued a formal Biological Opinion in 2011, concluding that continued use of pesticide products containing captan would not jeopardize listed Pacific salmonids or destroy or adversely modify their designated critical habitats. Nevertheless, the 2011 BiOp described reasonable and prudent measures, which are listed in Section IV of this document, to minimize unintentional harm or death that could result from the legal use of captan to individuals of these listed species and their critical habitats.

2. Ecological Incidents

EPA reviewed OPP's Incident Data System (IDS) on November 15, 2023, for ecological incidents associated with use of captan. Between 1967 and 2023, the IDS reported a total of 14 such incidents, with certainty categories of possible, probable, or highly probable. These incidents were considered as part of the weight of the evidence for captan and they support the risk conclusions for nontarget organisms. Incidents classified as unlikely or unrelated to captan exposure were excluded from this total. The aggregate IDS reported 38 minor plant incidents associated with captan use. Based on the low frequency of captan incidents and probability of their occurrence in nontarget organisms, EPA is not concerned that captan presents an imminent risk at this time. The Agency intends to monitor ecological incidents for captan and will conduct additional analyses if necessary. Specific incidents are summarized below. For details, see the August 21, 2018, ERA, *Captan: Preliminary Ecological Risk Assessment for Registration Review*.

3. Ecological and Environmental Fate Data Needs

At this time, the ecological effects and environmental fate database for captan is considered substantially complete for the purposes of this registration review. The available fate and effects data were sufficient to conduct the 2018 ERA and the 2019 and 2021 ERA addenda and are adequate to support this PID. The final required study, an additional environmental chemistry analytical method for water, has been submitted and is under EPA review.

⁴⁵ See <https://www3.epa.gov/pesticides/endanger/litstatus/effects/captan-letter.pdf>

⁴⁶ See Captan Analysis of Risks to Endangered and Threatened Salmon and Steelhead (December 2003) at <https://www3.epa.gov/pesticides/endanger/litstatus/effects/captan-analysis.pdf>

However, there are some uncertainties in the existing data. Additional data are necessary to clarify avian toxicity, because the highest dose tested in two avian chronic toxicity studies for captan was lower than EECs for some seed treatment uses. Therefore, EPA proposes to issue a future DCI for an additional avian chronic toxicity study (OSCPP Guideline 850.2300) that covers avian dietary concentrations up to the maximum application rate for seed treatment (12 fl. oz/100 lb seed or 3750 mg a.i./kg-diet).

New requirements for pollinator data were established after issuance of the DCIs for this registration review. Given the uncertainties surrounding potential risks to terrestrial invertebrates, EPA is proposing that additional data are necessary to fully evaluate risks to nontarget terrestrial invertebrates, especially pollinators. Although the Agency identified the need for certain data to evaluate potential effects to pollinators when initially scoping the registration review for captan, the problem formulation and registration review DCI for captan were both issued prior to the June 2014 *Guidance for Assessing Pesticide Risks to Bees*⁴⁷. This 2014 guidance lists pollinator studies that were not included in the DCI.

At this time, EPA is proposing that additional Tier 1 larval and adult honey bee chronic toxicity data be required through EPA’s DCI authority. After receiving and reviewing the Tier 1 studies, EPA will determine whether additional higher tier pollinator data, such as the Tier 2 nectar and pollen residue data and/or semi-field studies, are needed for captan. The additional environmental effects studies that could be required for captan are listed in Table 1.

Table 1: Potential Data Requirements for Captan

Guideline #	Study
<i>Terrestrial Vertebrates</i>	
850.2300	Avian Chronic Toxicity
<i>Terrestrial Invertebrates</i>	
Pollinator Tier 1	
Non-Guideline	Honey bee adult chronic oral toxicity
Non-Guideline	Honey bee larvae chronic oral toxicity
Pollinator Tier 2 [†]	
Non-Guideline	Field trial of residues in pollen and nectar
Non-Guideline (OECD 75)	Semi-field testing for pollinators
Pollinator Tier 3 [†]	
850.3040	Full-Field testing for pollinators

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

C. Benefits Assessment

Captan is a phthalimide fungicide classified within Group M04 by the Fungicide Resistance Action Committee (FRAC) (FRAC, 2021). It acts on multiple biochemical sites within target pests, so it is also known as a multi-site fungicide, in contrast to many other fungicides, which act on a single biochemical site within the pest. Captan is often used alone or in tank mixtures

⁴⁷https://www.epa.gov/sites/production/files/201406/documents/pollinator_risk_assessment_guidance_06_19_14.pdf

with single-site fungicides as part of a resistance management plan. Because captan has a multi-site mode of action, it is less prone to fungicide resistance, unlike fungicides with a single site of action. There have been no reports of fungicide resistance associated with captan since it was first registered in 1951. Depending on the crop, other multi-site fungicides may also be available: primarily chlorothalonil and mancozeb. However, these other multi-site fungicides may not always be appropriate substitutes for captan due to various factors such as restrictions on the timing of applications or effectiveness against a particular target pest in a given crop.

Captan is also a protectant fungicide, a term referring to its ability to protect plants from fungal infections when applied prior to the manifestation of infection symptoms. It suppresses fungal growth by direct contact with spores on plant foliage or fruit. The benefits of captan for specific use sites are summarized herein. These sites include orchard crops (i.e., almonds, pome fruit, and stone fruit), berries (i.e., blueberries, caneberries, and strawberries), grapes, ornamentals, ginseng, and seed treatment. Additional details may be found in the supporting documents located in the captan public docket, EPA-HQ-OPP-2013-0296 at www.regulations.gov.

1. Orchard Crops

a. Pome Fruits (Apples and Pears)

Captan is registered for use as a summer cover spray in apple orchards and as a post-harvest fruit dip for apples and pears. Its use in pome fruit is concentrated in eastern apple production in the U.S.; it is not frequently used in western apple production or as a foliar application to pears⁴⁸ due to lack of pest pressure. Captan has a long history as an effective control for apple scab and is a backbone of the apple disease control spray programs for this pest, so the benefit of captan use for apple production is significant. Captan also controls anthracnose, flyspeck, powdery mildew, rot, rust, and sooty blotch in apples. In apples, captan is the leading fungicide, in terms of acreage treated, for control of apple scab. Apple scab is the most common serious disease of apple in the U.S. and is a major disease for eastern apple growers. The apple scab pathogen may cause significant defoliation and infected fruit are unfit for fresh market.

The timing of captan applications depends on apple scab disease pressure and weather conditions, and captan is commonly applied as a summer cover spray. One of captan's benefits is that it has a rain-fast quality that can persist during rainy, wet periods. It is important in fungicide resistance management for apple scab, which has a propensity to develop resistance against fungicides having a single-site mode of action. Although two other multi-site fungicides, mancozeb and ziram, are registered for use on apples, they are not as effective as captan for apple scab control. In addition, mancozeb has a long pre-harvest interval and is limited to early season use. EPA has proposed cancellation of use of ziram on apples in the Proposed Interim Decision for that chemical.⁴⁹

Last, although captan is labeled as a post-harvest fruit dip treatment for apples and pears, multiple alternative fungicides that are more efficacious in controlling fungal decay of fruit

⁴⁸ Captan is registered for use as a post-harvest fruit dip for pears and is used on pears destined for cold storage.

⁴⁹ See docket EPA-HQ-2015-0528 for the Ziram Proposed Interim Decision. The Agency has proposed canceling all conventional agricultural uses of ziram.

during storage are available and preferred by fruit packing houses. This is supported by extension literature. Use of captan as a post-harvest fruit dip is limited; the only reported usage is on pears destined for cold storage. For more details, please see the March 23, 2022, [Captan Usage, Pest Management Benefits, and Impacts of Possible Mitigation on Apple](#) and the February 19, 2024, *Amended BEAD Response to Comments on the Proposed Interim Decision (PID) for Captan* in the public docket.

b. Stone Fruit

In stone fruit, captan is used from bloom to harvest but is most important as a “cover spray” that is applied after bloom until harvest. In some regions, cooperative extension recommends application of captan within 48 hours of predicted rainfall⁵⁰ to suppress fungal spores. Captan provides benefits to stone fruit growers in terms of reduced fungal control costs and fungicide resistance management for blossom blight/brown rot (*Monilinia spp.*), peach scab (*Cladosporium carpophilum*), and cherry leaf spot (*Blumeriella jaapii*) in peaches and tart cherries. In warm and humid climates, brown rot is the most important disease of stone fruit and the primary reason for fungicide application. If captan were not available, peach and tart cherry growers would need to use more expensive alternative fungicides; plum/prune growers would have alternative fungicides available with similar efficacy and cost. In addition, if captan were not available, resistance to some of the likely single-site MOA alternative fungicides could develop rapidly, particularly with the brown rot pathogens, a genus that is well known for developing resistance. Although captan is also labeled as a post-harvest fruit treatment for cherries, multiple alternative fungicides that are more efficacious in controlling fungal decay of fruit during storage are available and preferred by packing houses. For more details, please see the March 18, 2022, *Assessment of Usage, Benefits and Impacts of Potential Mitigation in Stone Fruit Production for the Fungicide Captan* and the February 19, 2024, *Amended BEAD Response to Comments on the Amended Proposed Interim Decision (PID) for Captan* in the public docket.

c. Almonds

Captan is applied to almonds for control of blossom blight/brown rot (*Monilinia spp.*), scab, and other diseases. According to extension literature,⁵¹ captan’s efficacy against these target pathogens ranges from “moderate and variable” to “good and reliable;” therefore, its primary use is likely resistance management for these pests. Captan may be important in almond production in California for treating these diseases, especially during the bloom period, and for resistance management. While the benefit of resistance management is important in any crop, the recent relatively low usage of captan (i.e., less than 5% crop treated) in California almonds suggests that growers are mitigating resistance development without the use of captan and/or are satisfied with the disease control provided by first using other more effective single and

⁵⁰ Clemson University and the University of Georgia extension bulletins both recommend application of captan within 48 hours of predicted rainfall.

⁵¹ Adaskaveg, J. E., T. Michailides, and A. Eskalen. 2022. Fungicides, Bactericides, Biocontrols, and Natural Products for Deciduous Tree Fruit and Nut, Citrus, Strawberry, and Vine Crops in California. <https://ucanr.edu/sites/eskalenlab/files/390488.pdf>

multisite fungicides. Therefore, the Agency considers captan to have low benefits in almond production. For more details, please see the February 19, 2024, *Amended BEAD Response to Comments on the Proposed Interim Decision (PID) for Captan* in the public docket.

2. Berries and Grapes

a. Blueberries

In blueberry, captan is used in disease management programs throughout the growing season for mummy berry, *Botrytis* fruit and flower blight, *Exobasidium* leaf and fruit spot, Anthracnose leaf spot and ripe rot, blueberry rust, *Alternaria* rot, and *Phomopsis* cane blight. As blueberries are most valuable when sold for fresh-market consumption, diseases that cause fruit damage, such as mummy berry, *Botrytis*, *Exobasidium*, Anthracnose, and *Alternaria* fruit rots, are important to prevent, as fruit damage can cause the harvest to be unmarketable. Foliar diseases, such as Anthracnose and *Exobasidium* leaf spots and blueberry rust, can result in defoliation that leads to poor bud and fruit development, reducing yields. *Phomopsis* twig blight is also important to control, as it can cause loss of twigs and subsequent yield losses or, when severe, death of entire plants. Fungicide resistance is a concern, particularly in *Botrytis*; therefore, captan, as a multisite fungicide, is an important tank-mix addition to delay the development of pathogen populations with resistance to single-site fungicides. Other multisite fungicides registered in blueberry are chlorothalonil, lime sulfur, and ziram; however, chlorothalonil and lime sulfur can only be applied after harvest and during the dormant period, and ziram has low efficacy compared to captan and cannot be used later than 3 weeks after full bloom. Moreover, EPA has proposed cancelling the use of ziram on blueberry⁵². Thus, captan is particularly important for resistance management in blueberry because it is the only efficacious multisite fungicide available during the growing season. For more details, please see the March 23, 2022 memo, [Benefits of Captan in Caneberries, Blueberry, and Grape, and Impacts of Potential Mitigation](#) in the public docket.

b. Caneberries

Captan is applied to caneberries (e.g., raspberry, blackberry) primarily to control diseases caused by the fungal pathogen *Botrytis cinerea*, including gray mold, fruit rot, and blossom blight. Captan is also applied to caneberries for management of *Anthracnose*, consistent with recommendations from university extension. Because caneberries are most valuable when sold for fresh-market consumption, it is important to prevent diseases that cause fruit damage, such as *Botrytis* and anthracnose. Fruit damage from disease can cause a crop to be unmarketable, resulting in economic losses. *Botrytis* blossom blight is also important to prevent, as blighted flowers will not produce fruit and will sporulate, leading to subsequent fruit rots and yield losses. Although captan may not be as effective as newer site-specific fungicides for management of *Botrytis* diseases, it has the lowest risk of resistance development and thus is important to quell development of resistance to single-site fungicides in fungal populations. Other multisite fungicides registered in caneberry are lime sulfur, sulfur, and copper. Sulfur and

⁵² See docket EPA-HQ-2015-0528 for the Ziram Proposed Interim Decision. The Agency has proposed canceling all conventional agricultural uses of ziram.

copper both have low or no efficacy on captan's target diseases. Lime sulfur, while efficacious on most of captan's target diseases, is substantially more expensive than captan, cannot be used on caneberries during the growing season, and is not recommended for management of *Botrytis* diseases, rendering it an insufficient alternative to captan in most scenarios. For more details, please see the March 23, 2022, memo, [Benefits of Captan in Caneberries, Blueberry, and Grape, and Impacts of Potential Mitigation](#) in the public docket.

c. Strawberries

Captan is effective against important fungal pathogens of strawberry including gray mold (*Botrytis cinerea*), anthracnose (*Colletotrichum* spp.), and leaf spot disease (*Mycosphaerella fragariae*). *Botrytis cinerea* infections can kill blossoms and can infect fruits resulting in rot during storage. *Colletotrichum* spp. infects strawberry foliage, runners, crowns and fruits which can result in reduced fruit yields and fruit rot during storage. *Mycosphaerella* spp. infects leaves, fruits, and runners. The most noticeable symptoms are small round spots on strawberry leaves; leaf spot disease can result in significant yield losses under high disease pressure. Captan is a desirable fungicide for strawberry producers for its multisite mode of action, low risk of resistance development in fungal pathogens, and affordability relative to registered alternative fungicides used by growers. Thiram is the only other registered multisite fungicide for strawberry, but EPA has proposed to cancel the foliar use of thiram on strawberry.⁵³ As with the other crops discussed in this section, it can also be an important rotational component for fungicide resistance management programs to help delay/prevent resistance development against single-site mode of action fungicides that are used during the strawberry season. For more details, please see the March 8, 2022, memo, [Use, Usage, Benefits, Impacts of Potential Risk Mitigation and Summary of Public Comments for Captan Use in Strawberry](#) and the February 19, 2024, *Amended BEAD Response to Comments on the Proposed Interim Decision (PID) for Captan* in the public docket.

d. Grapes

In East Coast grape production, captan has good to excellent efficacy on *Phomopsis* cane and leaf spot and downy mildew; the *2017 Pest Management Strategic Plan for Grapes in the Northeast* indicates that captan is a standard material for management of *Phomopsis* cane and leaf spot. The University of California (UC) Integrated Pest Management (IPM) program and Purdue University both recommend that growers use protectant fungicides, such as captan, to prevent fungal trunk diseases, such as esca or *Phomopsis*. Surveys of California growers indicate that captan is used in wine and table grapes exclusively for control of esca. Trunk diseases of grape are important to prevent, because once an infection is established within a plant, fungicides cannot eradicate it, and the plant must be pruned or removed, depending on the location and severity of the infection. Downy mildew is also an important pathogen of grape, as it can infect leaves, inflorescences, and young berries, and lead to significant yield losses if not managed by fungicides such as captan. Other multisite fungicides registered in grape include coppers, mancozeb, sulfur, lime sulfur, and ziram; however, these multisite fungicides are

⁵³ EPA has proposed to cancel all foliar uses of thiram in strawberry. See *Thiram Proposed Interim Decision* in docket EPA-HQ-OPP-2015-0433.

generally regarded as inferior to captan for pest control, efficacy, crop safety, and/or length of preharvest interval. Furthermore, EPA has proposed cancelling the use of ziram on grapes.⁵⁴ For more details, please see the March 23, 2022, memo, [Benefits of Captan in Caneberries, Blueberry, and Grape, and Impacts of Potential Mitigation](#) in the public docket.

3. Ginseng and Ornamentals

a. Ginseng

Captan is considered an essential chemical for commercial ginseng production, offering unique benefits to users by providing effective protection against major fungal diseases impacting ginseng production, which include *Phytophthora* root and crown rot, *Alternaria* leaf and stem blight, and *Botrytis* blight. The dry flowable (DF) captan formulation is preferred in commercial ginseng production and is typically applied by groundboom at the labeled maximum single application rate of 3 lbs. ai/acre, with re-application intervals of every two to three weeks, and six total applications per season. Growers use captan to maintain a constant fungicidal protective coverage throughout ginseng's multi-year growing season. In the absence of captan, users would most likely experience crop yield losses due to disease pressure, because currently available fungicides registered for ginseng to treat the same target pests as captan are already being used with captan, have seasonal label application restrictions, and/or have a higher risk of developing disease resistance. These alternatives, which include mandipropamid, fluopicolide, oxathiapiprolin, chlorothalonil, and mancozeb, are currently used alongside captan. For more information, please see the March 17, 2022, memo, [Amended: Captan Use, Usage, and Pest Management Benefits, and Impacts of Potential Mitigation on Ginseng and Ornamental Use Sites](#), available in the public docket.

b. Ornamentals

In ornamental use sites, captan is labeled to treat a range of fungal diseases in a variety of ornamental crops, including those in residential use sites. Target diseases include damping-off, petal blight, tuber rot, *Alternaria* leaf spot, rust, *Botrytis* flower blight, *Septoria* leafspot, black spot, and white mold. However, based on feedback received from stakeholders, captan provides low benefits to the production of ornamentals as it has been displaced in the ornamental industry by newer and more effective fungicidal active ingredients to treat target pests, limiting its use to treat younger plants and seedling in commercial production, and to personal use in residential ornamentals.

4. Seed Treatment

No recent university extension recommendations for fungicide seed treatment include captan, with many lists omitting it altogether. EPA searched the last 15 years of extension literature. Therefore, the Agency considers captan to have low benefits as a seed treatment. However, EPA encourages stakeholders to submit information on usage and benefits of captan seed treatment

⁵⁴ See *Ziram Proposed Interim Decision* in docket EPA-HQ-2015-0568.

during the public comment period. The Agency has general questions related to seed treatment use, which are listed in Appendix G of this document.

IV. AMENDED PROPOSED INTERIM REGISTRATION REVIEW DECISION

The Agency is issuing this amended PID in accordance with 40 CFR §§ 155.56 and 155.58. Based on the Agency's review of captan at this time in the registration review process, EPA is proposing certain changes to the affected registrations and their labeling. EPA proposes that the mitigation measures identified in Section IV.A., IV.B, and Appendices A and B will address specific risks of concern identified at this stage of registration review.

At the end of the registration review process, EPA will decide whether each captan pesticide registration "continues to satisfy the FIFRA standard for registration."⁵⁵ However, the mitigation proposed in this amended PID may not be sufficient for EPA to determine that captan registrations continue to satisfy the FIFRA standard for registration. EPA may determine that additional mitigations or other measures are necessary in subsequent interim decisions or in its final registration review decision. For captan, EPA has identified in this amended PID additional information that is needed to complete registration review and will issue a DCI for that information, as discussed in Sections III.B.3 and IV.E. of this document.

The Agency has not completed a national ESA effects determination for captan registrations. However, EPA completed a limited ESA assessment focused on Pacific Salmonids in response to litigation; this led to the development of a formal BiOp, as summarized in Section II.B. of this document. Nonetheless, the Agency proposes that the mitigation in this amended PID will reduce environmental exposure to captan and may reduce effects on listed species whose range or critical habitat co-occur with the use of captan. Moreover, EPA is proposing FIFRA IEM measures in Section IV.B of this amended PID; these measures are intended to reduce effects to nontarget organisms, including listed species. EPA also believes that the FIFRA IEM measures proposed in Section IV.B would fulfill EPA's obligations under Section 711 of the Consolidated Appropriations Act, PL-117-328 (Dec. 29, 2022). Section 711 requires EPA to "include, where applicable, measures to reduce the effect of the applicable pesticide on" listed species and designated critical habitats in any ID noticed in the Federal Register⁵⁶ between December 29, 2022, and October 1, 2026, for which EPA has not "made effects determinations or completed any necessary consultation under [ESA Section 7(a)(2)]." Section 711 also requires EPA to "take into account the input" of the Secretary of Agriculture and other members of the Interagency Working Group (IWG), established under FIFRA Section 3(c)(11), in developing

⁵⁵ 40 C.F.R. §§ 155.40(a), 155.57; 7 U.S.C. § 136a(g); *see also* 7 U.S.C. §§ 136a(c)(5) (FIFRA registration standard), 136(bb) (defining "unreasonable adverse effects on the environment" as encompassing both "any unreasonable risk to man or the environment, taking into account the economic, social, and environmental costs and benefits of the use of any pesticide" [FIFRA's risk-benefit standard] and "a human dietary risk from residues that result from a use of a pesticide in or on any food inconsistent with the [FFDCA safety standard]"). This document is not a "registration review decision" within the meaning of FIFRA Section 3(g) and 40 C.F.R. § 155.57.

⁵⁶ "Noticed in the Federal Register" is statutory language meaning publication of a formal Notice of Availability of these regulatory documents.

such measures. EPA has taken into account input from USDA and other members of the IWG in developing the FIFRA IEM measures. EPA is also requesting public input on the FIFRA IEM measures described in this amended PID. The Agency will complete effects determinations and any necessary Endangered Species Act (ESA) Section 7 consultation with the Services before issuing a final registration review decision for captan. For more information, see Appendix C of this document.

A. Proposed Risk Mitigation and Regulatory Rationale

EPA has determined that there are potential human health risk concerns, including risk concerns for pesticide handlers and re-entry workers who are exposed to captan through their work in agriculture, nurseries and greenhouses, fruit packing houses, in seed and seed piece treatment facilities, and during on-farm seed treatment. The Agency also identified potential risk concerns associated with residential use products, but this has been addressed by registrants through voluntary cancellation of consumer products and/or deletion of home and garden sublabels. The Agency also identified potential risks to nontarget mammals, birds, and insect pollinators associated with use of captan. The Agency proposes that these potential risks to both human health and nontarget organisms must be mitigated to meet the FIFRA and FFDCA registration standard for captan based on the risk summary and characterization in Sections III.A. and III.B. of this document. EPA considered the current use patterns, risks, and benefits associated with registered uses of captan in developing risk mitigation, as described in Section III.C. of this document, in accordance with the risk-benefit provisions of FIFRA.

Although there are risks of concern associated with the use of captan, with the adoption of the proposed mitigation measures, the benefits associated with the use of captan, including its efficacy, its multisite mode of action, and its role in resistance management, are sufficient to balance the remaining risks to occupational handlers, re-entry workers, and nontarget organisms. Given the extent of the risks identified, and in consideration of the benefits of captan, EPA is proposing the following mitigation measures to address risks to occupational handlers, re-entry workers, and nontarget organisms.

To mitigate potential occupational risk concerns for pesticide handlers and re-entry workers, EPA is proposing label changes that would eliminate or significantly reduce aerial application of the DF/WDG and WP formulations of captan on certain crops; reduce application rates for apples, peaches, nectarines, and cherries; specify additional personal protective equipment, engineering controls; and change REIs.⁵⁷ For growers who are unable to reduce application rates, alternative mitigation includes longer REIs for high contact activities, such as hand thinning fruit and hand harvesting, or restrictions on the timing of application.

To mitigate risks associated with seed treatment uses of captan EPA is proposing to terminate most registered uses, including all uses of dust formulations registered for use as a seed treatment. To mitigate inhalation risks associated with the remaining seed treatment uses, the Agency is proposing to require use of PF10 respirators during all activities, including mixing,

⁵⁷ Because captan is a corrosive eye irritant (Toxicity Category I), the default REI assigned under WPS is 48 hours. See 40 CFR 156.208(c)(2). This is the minimum REI that could be assigned to captan.

loading, and applying captan to treated seed, packaging treated seed in commercial facilities, planting treated seed, and cleaning seed treatment and planting equipment after use.

To mitigate potential risk concerns for nontarget organisms, the Agency is proposing to prohibit aerial application of the WP and DF/WDG formulations of captan on orchard, berry, and vineyard crops, which constitute the majority of captan usage; reduce application rates for apples, peaches, nectarines, and cherries; the addition of mandatory and advisory spray drift statements and mandatory environmental hazard statements to captan labels; and that seed treatment product labels contain instructions to label treated seed with bag tags. In addition, EPA is proposing additional FIFRA Interim Ecological Mitigation (IEM) for captan, including modifications to the proposed rain restriction, spray drift mitigation, *BulletinsLive! Two* labeling, and incident reporting and the addition of mandatory pollinator stewardship. EPA is also proposing to terminate all use of captan on turf and similar use sites, including grasses, grass substitutes, groundcovers, and lawn seedbeds for all registered captan products. Last, EPA is in the process of implementing the 2011 NMFS BiOp describing the impacts of captan on salmonids in Pesticide Use Limitation Areas (PULAs) in the Pacific Northwest states of California, Idaho, Oregon, and Washington and listing specific mitigation for PULAs in the *BulletinsLive! Two*. The Captan Task Force has been informed of this mitigation.

Although EPA expects that there will be some risks of concern for captan, even after implementation of these risk mitigation measures, the Agency proposes that the high benefits of captan outweigh the risks and that the remaining risks are not unreasonable considering the high benefits of captan, especially to growers of orchard crops, berries, grapes, and ginseng. EPA has not found significant benefits of captan for either commercial or on-farm seed treatment and proposes that the risk of adverse effects from the use of captan as a seed treatment is unreasonable.

A detailed list of proposed mitigation is provided below, with the expected impacts of the proposed mitigation on captan users. This mitigation has been modified for some uses based on comments submitted on the 2022 PID. For a crop-specific summary of risk mitigation, see Section IV.B. of this document. EPA encourages submission of comments about these and any other possible impacts of the proposed mitigation to the public docket for this PID, EPA-HQ-OPP-2013-0296.

1. Limitation on Percent Active Ingredient in Consumer Products

As discussed in Section III.A of this amended PID, EPA identified potential residential and aggregate risk concerns associated with captan home and garden products containing more than 12% active ingredient; therefore, all registrants of products containing more than 12% captan active ingredient voluntarily cancelled these products or amended the product registrations, effective November 15, 2021. (See 86 FR 63,019.) EPA approved these label amendments in February 2022. Subsequent to publication of the 2022 PID, registrants of the last captan consumer product voluntarily cancelled it through the FIFRA 6(f) process. These cancellations and amended product registrations completely address the risk concerns EPA identified for consumer home and garden products containing more than 12% active ingredient. Because the Agency does not have risk concerns for consumer products containing less than 12% active

ingredient, it is proposing a limit of 12% active ingredient on any future registrations of consumer products containing captan. All consumer product registrations containing captan have been voluntarily canceled.

2. Termination of Uses and Application Methods

a. All Turf Uses

To address a data deficiency, potential risk to adults and children (both residents and bystanders), and potential risks to nontarget organisms, EPA proposes to terminate all remaining registered uses of captan on turf-related use sites including all grasses, grass substitutes, and lawn seed beds. These include but are not limited to dichondra, St. Augustine grass, lawn seedbeds, and ornamental grasses. The registration review DCI for captan included a requirement for a turf transferable residue (TTR) study. However, the technical registrants chose not to develop the data necessary to support the turf use and instead opted to remove most, but not all, turf uses from the captan product labels. Therefore, given the potential risk concerns identified for the remaining use of captan on turf, ornamental grasses, grass substitutes, and lawn seedbeds, dichondra, and other turf-like⁵⁸ uses, as well as potential risk concerns for nontarget organisms, the Agency is proposing to terminate all remaining turf-like uses described above. These uses were not assessed in the HHRA, ERA, or the HHRA and ERA addenda because most of the turf uses had been voluntarily removed from product labels before EPA initiated the captan risk assessment process; however, the Agency anticipates risk concerns for any remaining turf uses.

b. Aerial Application with Certain Formulations

To mitigate potential occupational risk concerns for pesticide handlers and to limit spray drift to nontarget organisms, EPA is proposing label changes that would eliminate aerial application of the DF/WDG and WP formulations of captan on certain crops. Specifically, to address potential inhalation risk concerns for captan mixers and loaders who are supporting aerial application of DF/WDG and WP formulations, EPA is proposing that this application method be prohibited and removed from captan DF/WDG and WP product labels for almonds, apples, apricots, blueberries, cherries, grapes, nectarines, peaches, plums/prunes, and strawberries. This prohibition will completely mitigate risk concerns for mixers/loaders who support aerial applicators. The aerial application prohibition for DF/WDG and WP formulations will also partially mitigate concerns for chronic risk to mammals by reducing environmental exposure. Aerial application will continue to be allowed, unrestricted, for liquid formulations because there were no occupational risks identified for this formulation.

Impacts. Because very little captan is currently applied by air⁵⁹ and because the proposal allows growers to continue to apply liquid captan products by air, EPA expects the impacts of this mitigation measure on users to be minor.

⁵⁸ Including but not limited to lawns, lawn seed beds, ornamental grasses, and grass substitutes such as dichondra.

⁵⁹ Approximately 1% of captan is applied via aerial applications. Kynetec USA, Inc. 2020. AgroTrak® Study. iMap Software. Database Subset: 2015-2019. [Accessed January 2021].

c. Mechanically Pressurized Handguns

To address handler inhalation risks associated with mixing, loading, and applying captan using mechanically pressurized handguns, EPA is proposing to limit this application method to spot treatment, such as treatment of orchard row ends. With application of 1000 gallons of captan per day by mechanically pressurized handguns, inhalation MOEs range from 6.6 (for almonds) to 14 (for grapes). With limitation of this application method to spot treatment, EPA expects the inhalation MOE to be above the LOC of 30 for all crops. This is a change from EPA's 2022 proposal.

Impacts. For orchard and berry crops, the Agency anticipates minimal impacts for most operations because the most likely situation under which captan would be applied by mechanically pressurized handgun is in small orchards or plantings under severe pest pressure when dilute spraying is necessary.

d. Certain Seed Treatment Products and Use Sites

On Farm Seed Treatment. To address inhalation risk concerns associated with on farm seed treatment using captan dust formulations and certain uses of liquid formulations, EPA is proposing to cancel all end-use dust products and prohibit certain uses of liquid products registered for seed treatment. For dust products, inhalation MOEs range from 0.56 (for soybeans) to 13 for sweet corn, even with the use of a PF10 respirator, and are of risk concern. For liquid products, inhalation MOEs range from 10 (snap beans and peanuts) to 23 (sugar beets) and are of risk concern. (The inhalation LOC is 30.) Therefore, EPA is proposing to terminate the following on farm uses of liquid formulations: barley, oat, rye, and wheat; bean, dry and succulent; sugar beet; field and sweet corn; garden pea; peanut; and soybean. EPA does not consider use of PF50 respirators to be practical for activities other than mixing and loading. This is a change from EPA's 2022 proposal.

Commercial Seed Treatment. To address inhalation risk concerns associated with commercial seed treatment that cannot be addressed with additional PPE, EPA is now proposing termination of most commercial seed treatment uses. These include the following: alfalfa, clover, *Lespedeza*, and trefoil; barley, oats, rye, sorghum, and wheat; beans, dry, snap, and succulent; beets, garden and sugar beets; Swiss chard; field corn and sweet corn; bluegrass; grass for forage, fodder, and hay; cotton and flax; oats; onion, both green and dry bulb; peanut; garden pea; spinach; pumpkin; summer and winter squash, and watermelon; soybean; spinach; and strawberry. These uses have inhalation MOEs ranging from 5.2 (for packing sorghum seeds) to 27 (for treating strawberry seeds and planting bluegrass and other grasses for forage, fodder and hay), even when a PF10 respirator is worn. This is a change from EPA's 2022 proposal.

Impacts. Benefits of captan use in both commercial and on farm seed treatment are low. The Agency does not anticipate impacts from cancelation of seed treatment uses because captan is not frequently used as a seed treatment, and because recent recommendations for fungicide seed treatments do not recommend captan. However, EPA is requesting stakeholder comments on the proposed mitigation and answers to the questions in Appendix G. The Agency reviews all comments and information submitted during the public comment period. EPA may reevaluate

the impacts of this proposed mitigation after the comment period on this amended PID, before it issues an interim decision.

e. Post-harvest Fruit Dip Use

EPA is now proposing to terminate the post-harvest fruit dip use of captan because the inhalation risks cannot be mitigated with a PF10 respirator and a PF50 respirator is considered too burdensome for fruit packing workers. For mixers/loaders using the DF/WDG formulation and wearing a PF10 respirator, the inhalation MOE is 4.5 (LOC is 30). For mixers/loaders using the liquid formulation and wearing a PF10 respirator, the inhalation MOE is 180 (LOC is 30). For mixers/loaders using the WP formulation and wearing a PF10 respirator, the MOE is 15. For fruit packing workers who are sorting or packing treated fruit, the inhalation MOE is 1.3 with no respirator and 13 with a PF10 respirator. For fruit packing workers involved in other activities, the inhalation MOE is 28 with no respirator and 280 with a PF10 respirator. Fruit packing house workers are not protected by the Worker Protection Standard (WPS). This is a change from the 2022 proposal to require PF50 respirators for fruit packing house workers.

Impacts. Extension literature indicates that there are multiple alternative fungicides that are more efficacious in controlling fungal decay of fruit during storage are available and preferred by fruit packing houses. Use of captan as a post-harvest fruit dip is limited; the only reported usage is on pears destined for cold storage. EPA requests comments on this proposal.

3. Personal Protective Equipment (PPE) and Engineering Controls

a. PF50 Respirator Requirement for Certain Handlers

To address inhalation risk concerns for pesticide mixers and loaders, EPA is proposing to increase the level of respiratory protection from a PF10 respirator to a PF50 respirator for mixers and loaders for certain formulations and exposure scenarios. These include:

- Mixing and loading the DF/WDG formulation to support airblast and groundboom applications to orchard crops (when workers wear a PF10 respirator, MOEs range from 8 to 18, but are all greater than the LOC of 30 with a PF50 respirator);
- Mixing and loading the DF/WDG formulations to support groundboom applications to strawberries (with a PF10 respirator, the inhalation MOE for mixers/loaders is 9.9, and with a PF50 respirator, it is 50, greater than the LOC of 30); and
- Mixing and loading the DF/WFG formulations to support groundboom applications to blueberries (with a PF10 respirator, the inhalation MOE for mixers/loaders is 14, and with a PF50 respirator, the MOE is 71).

The MOEs resulting from the use of a PF50 respirator for these activities can be found in the second HHRA addenda as well as the March 30, 2022, HHRA memo showing how various mitigation measures address risk concerns specific crops.⁶⁰

⁶⁰ *Captan. Review of Risk Estimates from Proposed Mitigation Measures for Select Crops*, in the captan docket, <https://www.regulations.gov/document/EPA-HQ-OPP-2013-0296-0298>

Impacts. EPA anticipates impacts to captan users associated with the requirement of a PF50 respirator for mixers and loaders of DF/WDG and WP formulations. Respirator costs are extremely variable depending upon the protection level desired, disposability, comfort, and the kinds of vapors and particulates being filtered. Additionally, the Worker Protection Standard (WPS) requires users of respirators to have a fit test done annually; in 2024, EPA estimated this procedure to cost about \$350.⁶¹ If a pesticide handler currently using captan does not have a respirator, then this person will have to purchase a respirator, hire a professional applicator who already has this PPE, or use an alternative fungicide, such as those listed in Section III.C. of this document, that does not have this requirement. Costs may be different if a handler typically uses other chemicals requiring a respirator in their production system or as part of the business. This would eliminate the cost of additional fit testing, but there would be an increased cost of purchasing filters for the respirator more frequently. Also, wearing a respirator during physical labor can reduce the productivity of handlers as they may need to take frequent breaks to avoid heat related stress caused by wearing a respirator in certain situations (e.g., high temperatures) compared to those handlers that are unencumbered by a respirator. The increased time due to taking breaks is likely to increase the time required to complete pesticide applications, reducing productivity.

b. PF10 Respirator Requirements for Certain Workers

To address potential inhalation risk concerns for pesticide applicators who are applying captan to crops by groundboom or other ground equipment or other workers who are involved in treating seeds with liquid products either in a commercial facility or on farm, workers must wear a PF10 respirator for certain formulations and activity scenarios. These include:

- Mixing/loading WP and liquid formulations of captan;
- Applying captan to blueberries using groundboom equipment (unless the applicator is inside an enclosed tractor cab);
- Applying captan to large strawberry farms using groundboom equipment (unless the applicator is inside an enclosed tractor cab);
- Mixing/loading WP/WDG formulations for application to ginseng and strawberries;
- Applying captan to ginseng using mechanically pressurized handguns; and
- Applying captan to ornamentals using ground equipment.

To address potential inhalation risk concerns for both commercial and on farm seed treatment (using liquid products), PF10 respirators must be worn during the following activities for the following seed types:

- Commercial seed treatment activities⁶² including treating and packaging seed, cleaning equipment, and loading and planting treated seed (for the subset of seeds listed below)
 - *Brassica*
 - Cucumber, cantaloupe, and musk melon,
 - Lentil and other pulses, and

⁶¹ Smearman, S., D. Berwald. 2024. Estimates by the Biological and Economic and Analysis Division, Office of Pesticide Programs, Environmental Protection Agency and available upon request.

⁶² Although current commercial seed treatment products require baseline attire, gloves, and eye protection, not all product labels require use of PF10 respirators.

- Sunflower
- On farm seed treatment, including treating and planting seed (for the subset of seeds listed below).
 - Alfalfa, clover, and trefoil;
 - Garden beets (but not sugar beets);
 - *Brassica* (including Cole crops, radish, and turnips);
 - Canola;
 - Grain sorghum;
 - Cucumber, cantaloupe, musk melon, watermelon, pumpkin, summer/winter squash;
 - Cotton and flax;
 - Spinach and Swiss chard; and
 - Sunflowers.

Impacts. Respirator costs are extremely variable depending upon the protection level desired, disposability, comfort, and the kinds of vapors and particulates being filtered. Additionally, the Worker Protection Standard (WPS) requires users of respirators to have a fit test done annually; in 2024, EPA estimated this procedure to cost about \$350.⁶³ If a pesticide handler currently using captan does not have a respirator, then this person will have to purchase a respirator, hire a professional applicator who already has this PPE, or use an alternative fungicide that does not have this requirement. Costs may be different if a handler typically uses other chemicals requiring a respirator in their production system or as part of the business. This would eliminate the cost of additional fit testing but there would be an increased cost of purchasing filters for the respirator more frequently.

d. Enclosed Cabs for Airblast Applicators

Orchard Crops. To address dermal and inhalation risk concerns for pesticide handlers who apply captan to certain orchard crops.⁶⁴ using airblast equipment at rates of 3 lbs. a.i./A or above, the Agency is proposing to require use of an enclosed tractor cab. Use of enclosed cabs for orchard crops would result in a change to inhalation MOEs from 15-23, when captan is applied at 3 lbs. ai/A and above with open cabs and a PF10 respirator, to MOEs greater than the LOC of 30. (See Table 1 in Appendix F for details.) This enclosed cab mitigation would completely address EPA's risk concerns. This is a change from EPA's 2022 proposal, which provided an alternative option of limiting area treated. The Captan Task Force has been informed of this mitigation proposal.

Impacts. For apples, the Agency expects this mitigation to impact about 13% of the apple acres using captan to control apple scab at a rate higher than 3.0 lbs. a.i./A.⁶⁵ Growers who currently use higher rates of captan on their apple acres might face impacts from switching to a more

⁶³ Smearman, S., D. Berwald. 2024. Estimates by the Biological and Economic and Analysis Division, Office of Pesticide Programs, Environmental Protection Agency. Available upon request.

⁶⁴ Orchard crops with an application rate of 3 lbs. ai/A or higher include almonds, apples, cherries, nectarines, and peaches.

⁶⁵ For details, see the March 30, 2022, memo, *Captan Usage, Pest Management Benefits and Impacts of Proposed Mitigation for Use on Pome Fruit*, available in the public docket (EPA-HQ-OPP-2013-0296).

expensive, alternative multisite fungicide like copper as a replacement for late season applications. For early season applications, the likely alternative is mancozeb which is similar in cost per acre; low to no grower impacts would be expected. EPA initially estimated that about 8% of peach growers might be impacted, especially those in the Southeast. Public comments on the 2022 PID from growers and university extension noted a potential issue with close row spacing that would not allow room for passage of an enclosed cab. The Agency reviewed the publicly available information, which seems to indicate that tree row spacing in commercial orchards is adequate for an enclosed cab and airblast rig to apply pesticides. Because this information is limited, EPA requests specific comments related to orchard row spacing, tractor cab sizes, enclosed cab sizes and heights, the size of airblast rigs, and the cost to growers to replace, retrofit, or upgrade equipment. For more details, please see the February 19, 2024, *Amended BEAD Response to Comments on the Amended Proposed Interim Decision (PID) for Captan* in the public docket.

Blueberries and Caneberries. To address inhalation risk concerns for pesticide handlers who use airblast equipment to apply captan to highbush blueberries and caneberries, EPA is proposing to require use of an enclosed tractor cab. This mitigation would completely address EPA's risk concerns.

Impacts. This requirement would affect caneberry and blueberry growers who do not already own enclosed cabs. Growers who do not already have the appropriate equipment would either have to purchase the equipment, hire a commercial firm to make captan applications, likely at an increased cost, or find an alternative fungicide which could be more expensive and/or less efficacious.

e. Enclosed Cabs for Ground Boom Application

Strawberries. To address inhalation risk concerns for commercial strawberry operations larger than 48 acres, in cases where applicators are unable to wear a PF10 respirator, EPA is proposing to require use of enclosed cabs. PPE are not required while applicators are inside an enclosed cab.

Impacts. This proposed requirement may not affect strawberry operations in California and Florida because these growers likely already use enclosed cabs.

f. Chemical-resistant Eyewear

To address known hazards with eye injury associated with use of captan, EPA is proposing to continue the requirement for applicators to wear chemical-resistant eyewear. This will completely address potential eye injury, as demonstrated by a decrease in incident reports associated with eye injury. Applicators who are using an enclosed cab are not required to wear chemical-resistant eyewear when they are inside the enclosed cab.

4. Label Updates

a. Updated Respirator Statement

In addition to proposing the requirement for a PF10 or PF50 respirator, EPA continues to propose updating the respirator statement currently on captan product labels (see Appendix B). The proposed clarification does not fundamentally change the PPE that workers currently must use.

EPA's HHRA's incorporate National Institute for Occupational Safety and Health (NIOSH) protection factors⁶⁶ in both estimates of the inhalation risks and potential risk reduction associated with different respirators.⁶⁷ If the respirator does not fit properly, EPA's proposed PPE mitigation for captan may not reduce risks as detailed above and may result in unreasonable adverse effects for the pesticide handler.

b. Updated Glove Statement

EPA is proposing to update the gloves statements on all captan labels to be consistent with Chapter 10 of the Label Review Manual.⁶⁸ The glove statements should no longer include any references to specific categories in EPA's chemical-resistance category selection chart and should specify the appropriate type of chemical resistant glove for use with each captan product.⁶⁹

c. Water Soluble Packaging

EPA is proposing updated directions for use language be added to labels for captan products in water-soluble packaging. These updated directions for use are expected to improve label clarity, ensure proper use of these products, and minimize exposure to occupational handlers.

d. Concentrated Liquid Products – Extraction Probes

Results from a 2019 study by the Agricultural Handler Exposure Task Force (AHETF), a consortium of pesticide manufacturing companies, indicate that incorrect probe extraction for suction/extraction systems, resulted in direct exposure to liquid chemical concentrate for mixers and loaders. This monitoring data measured high exposure to the liquid concentrate, when mixers/loaders removed chemical extraction probes in suction/extraction systems, without rinsing them prior to removal from the pesticide container. The AHETF submitted the dataset to the Agency that excludes monitoring of those workers who handled unrinsed chemical extraction probes and recommended that the Agency take additional regulatory actions to ensure workers do not remove and handle chemical extraction probes still coated with the concentrated liquid formulation. Reflecting the results of the 2019 task force data and to ensure that all mixers and loaders of liquid formulations are protected from direct exposure to liquid

⁶⁶ NIOSH protection factors assume that respirators are used according to OSHA's standards.

⁶⁷ Proper fit and use of respirators are essential to accomplish the protections respirators are intended to provide. Respirator fit tests are currently required by the Occupational Safety and Health Administration (OSHA) for other occupational settings to ensure proper protection. 29 C.F.R. § 1910.134.

⁶⁸ Label Review Manual, <https://www.epa.gov/pesticide-registration/label-review-manual>.

⁶⁹ For specific label language, see Appendix B.

concentrate, the following label language is proposed to be included on all liquid formulation product labels for mixers and loaders:

“Removable chemical extraction probes (also known as “stingers”) used in suction/extraction systems must be rinsed within the pesticide container prior to removal.”

5. Reduced Application Rates

a. Orchard Crops

To address both inhalation risk to pesticide handlers and post-application dermal risk to workers re-entering treated areas, the Agency is proposing application rate reductions for apples, cherries, peaches, and nectarines, to a maximum application rate of 3 lbs. ai/A for these crops. These rate reductions, combined with the requirement for a PF10 or PF50 respirator and/or an enclosed cab, will reduce inhalation risk for these crops to above EPA’s level of concern (LOC of 30), as shown in Appendix F of this document. These proposed rate reductions would also reduce dermal risks to workers re-entering treated areas, allowing shorter restricted entry intervals (REIs) for high contact activities. Last, the proposed rate reductions will mitigate both on field and off field risk to nontarget organisms.

Impacts. In the 2022 PID, EPA anticipated that most stone fruit growers would be unaffected by the rate reduction, based on national use survey data showing application rates at or below the proposed lower rates. For example, national use survey data show that the application rates for tart cherries, the main type of cherry for which captan is used, are already below the proposed maximum rate of 3 lbs. a.i./A. For peaches and nectarines, EPA anticipated that approximately 8% of treated acres would be affected by the rate reduction because they are currently treated at a rate greater than 3 lbs. ai/A. The primary impact anticipated for growers having to lower rates would be reduced control of pathogens that could cause crop damage. Growers could use captan or combine captan with alternative fungicides at increased costs and the potential for enhanced resistance among pathogens because most/all alternative fungicides are single site chemistries.

70

Because national use survey data showed that only a small amount of almond acreage is treated with captan (1-3% crop treated) and because effective alternatives to captan are available, EPA initially anticipated little to no grower impacts. In public comments, the Almond Alliance of California stated that captan is used on less than 5% of California almond acreage in their public comments on the 2022 PID, and that it is applied once, at 3 to 4.5 lbs. a.i./A following application of other fungicides during bloom in early spring. EPA still anticipates little impacts for most growers, though some almond growers may need to use additional fungicides at an additional cost if they currently use the higher application rate to achieve pest control.

b. Grapes

⁷⁰ For details, see the March 18, 2022, memo, *Assessment of Usage, Benefits and Impacts of Proposed Mitigation in Stone Fruit Production for the Fungicide Captan*.

The 2022 captan PID proposed reducing the application rate for grapes, from 2.04 lbs. a.i./A to 1.75 lbs. a.i./A. However, after reviewing stakeholder comments on reductions in efficacy for early season pest control in wine grapes, EPA is now proposing to retain the application rate of 2.04 lbs. a.i./A for grapes and to extend the REI for high contact activities in grapes as described in Section IV.A.5. of this document. The Agency is requesting stakeholder comments on this revised proposal.

Impacts. EPA anticipated that in most situations, grape growers who currently use captan would be unaffected by the proposed rate reduction; however, the Agency acknowledged that the proposed rate might be ineffective in the face of high disease pressure, especially near the end of the growing season. Stakeholder comments indicated that the current maximum application rate is needed for efficacious control in some regions where there is high early season disease pressure. If the captan rate were lowered, growers might see reduced disease control from captan applications and may need to supplement with another fungicide, most likely in a tank mix with captan to avoid any development of fungicide resistance in captan's target pest(s).

6. Changes to Restricted-entry Intervals (REIs)

EPA is proposing changes to REIs to protect re-entry workers performing high-contact activities for orchard crops, grapes, and ornamentals, including hand thinning, girdling and turning vines for table grapes, leaf pulling and hand harvesting grapes, and working with handset irrigation used in ornamental nurseries following captan application. The Agency is not proposing to change REIs for strawberries from current labels because no re-entry risks were identified for this use pattern.

a. Orchard Crops

For orchard crops, a longer REI is not needed, if application rate reductions are implemented as described in sections IV.A.4.a. of this document. EPA is proposing to continue the current REIs for orchard crops, almonds, and berries. The Agency is requesting stakeholder feedback on this proposal.

In the absence of the proposed reduction in application rates as described in Section IV.A.4. of this document, EPA would propose the following REIs for high contact activities:

- 6-day REI for hand thinning apples, peaches, and nectarines, and
- 24-hour REI for hand thinning cherries.

The Agency is requesting stakeholder feedback on this potential alternative mitigation proposal during the 60-day public comment period on this amended PID.

Impacts. For apples, EPA expects the longer REIs for hand thinning to have little to no impacts on growers because most growers use chemical thinning. For cherries, the REI of 24 hours should have little to no impacts on growers. For peaches and nectarines where hand thinning is more common, a 6-day REI would have high impacts on growers. With a maximum application rate of 3.0 lbs. a.i./acre, however, EPA can maintain the existing REI.

b. Grapes

For table grapes, EPA is proposing a 5-day REI for girdling and turning when table grapes are grown on T-shaped trellises. The MOE is 96 on the 5th day after captan application. The Agency is not proposing any change to the REI for table grapes grown on newer Y-shaped trellises. For wine and juice grapes, the Agency is proposing a 3-day REI for high-contact activities, including tying and training vines as well as hand harvesting and leaf pulling. Stakeholder comments mentioned the need to maintain the 2 lbs. a.i./A application rate for Eastern wine grapes for effective pest control. The comments also mentioned viticulture practice of applying captan to wine grapes early in the season because it interferes with fermentation. Therefore, EPA is proposing longer REIs for wine and juice grapes (rather than reducing application rates). Although these proposed activity-based REIs for grapes result in MOEs less than the LOC of 100, these longer REIs will address most risk concerns for re-entry workers exposed to captan on foliage. The Agency is requesting comments on this revised proposal, including information on the timing of captan application to wine and juice grapes relative to harvest.

Impacts: For grapes, the Agency expects minor impacts from the lengthened REIs as the affected re-entry activities either no longer occur in commercial grape production, or do not occur during the time when growers would apply captan. EPA understands that turning and girdling table grapes, a practice related to use of T-shaped trellises is no longer common practice. In addition, stakeholder comments indicate that captan is not applied to wine grapes near harvest because it interferes with fermentation. Last, the Agency believes that restricting re-entry activities with longer REIs while maintaining the current maximum application rate would have fewer impacts on growers than the previously proposed rate reduction.

c. Ornamentals

For ornamentals, EPA is proposing an 8-day REI for work on handset irrigation. The MOE is 92 on the 8th day after captan application (and 100 on the 10th day). Although the proposed activity-based REI for ornamentals would still result in MOEs less than the LOC of 100, these longer REIs will address most risk concerns for re-entry workers exposed to captan on foliage.

Impacts. Impacts on ornamentals will be negligible because handset irrigation is seldom used. EPA is requesting comments from ornamental growers and nurseries on the impact of an 8-day REI for handset irrigation activities.

6. Endangered Species: Implementation of the 2011 Salmonid BiOp

EPA is proposing to implement the 2011 NMFS BiOp on the effects of captan on endangered and threatened Pacific salmonids (Salmonid BiOp) through use of the *BulletinsLive! Two* system. The Salmonid BiOp lists the following Reasonable and Prudent Measures (RPMs), which are mandatory mitigation measures to reduce off-target movement of captan to salmon-bearing waters in California, Idaho, Oregon, and Washington and minimize jeopardy to endangered Pacific salmonids. These RPMs will apply only within the Pesticide Use Limitation Area(s) (PULAs) specified in *BulletinsLive! Two*. This is a change from the Agency's proposal in the 2022 captan PID to include this language on all product labels. EPA has reconsidered that

proposal after reviewing public comments on the 2022 PID. The Agency is now proposing the following label requirements to implement the RPMs from the 2011 Salmonid BiOp:

- **Windspeed restrictions** – “Do not apply when wind speeds exceed 10 mph.”
- **Rain restrictions:** “Do not apply during rain. Do not apply when soil in the area to be treated is saturated (if there is standing water on the field or if water can be squeezed from soil) or if NOAA/National Weather Service predicts a total rainfall of 1 inch or greater over the 48 hours following the day of application, only considering a 48-hour period when, at any point during the 48-hour period, the precipitation potential is 50% or greater. Detailed National Weather Service forecasts for local weather conditions should be obtained on-line at: www.weather.gov or by contacting your local National Weather Service Forecasting Office.”

EPA is continuing to discuss with NMFS other aspects of the 2011 BiOp and will consider comments on this amended PID in the context of such discussions.

Impacts. EPA expects the 48-hour restriction on applications prior to rainfall potentially to be highly impactful to users of captan near Salmonid habitat in California, Idaho, Oregon, and Washington, because periods of wet weather are when plants are most vulnerable to foliar diseases. Coating plants with a protective fungicide such as captan prior to rain events helps to prevent the initiation and spread of disease; for this reason, fungicide applications are commonly recommended to be applied before a rainfall event.⁷¹ Restricting captan applications 48 hours before a rain event would limit users’ flexibility in using captan to protect crops against fungal diseases during vulnerable wet weather events, which could lead to suboptimal disease control and/or prompt users to switch to an alternative fungicide. If switching to an alternative, users may need to apply more than one active ingredient in order to achieve the same level of control as with captan and manage for resistance, which would increase costs.

7. Nontarget Organism Spray Drift Advisory

EPA is proposing nontarget organism advisory statements to reduce nontarget risk concerns for captan products applied as a liquid spray. This advisory label language will also educate growers about potential adverse effects from spray drift, including risk concerns for nontarget terrestrial organisms, such as mammals, birds, and pollinating insects. Based on the existing ecological effects database, EPA is uncertain how much risk captan presents to pollinators, which may be exposed to captan from residues in pollen or nectar through spray drift. EPA prioritizes protecting pollinators, including by reducing spray drift and educating growers about potential indirect adverse effects of pesticides (including captan) on foliage and habitat of nontarget organisms. Therefore, the Agency is proposing to require interim pollinator protection labeling for all registered captan end-use products. This proposed mandatory and advisory labeling is described in detail in Section IV.B.4. of this document. EPA prioritizes protecting

⁷¹ Egel, D. 2021. Fungicide Applications During Rainy Weather. Purdue University cooperative Extension Service. <https://vegcropshotline.org/article/fungicide-applications-during-rainy-weather/>.

pollinators, including by reducing spray drift and educating growers about potential indirect adverse effects.

8. Spray Drift Management

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

EPA is proposing the following spray drift mitigation language to be included on labels for all captan products applied as a liquid spray. The proposed spray drift language is intended to be mandatory and enforceable and to supersede any existing language already on product labels (either advisory or mandatory) covering the same topics. The Agency is also providing recommendations which allow captan registrants to standardize all advisory language on captan product labels. Registrants must ensure that any existing advisory language left on labels does not contradict or modify the new mandatory spray drift statements proposed in this amended PID, once effective.

- Applicators must not spray during temperature inversions.
- Do not apply when wind speeds exceed 15 mph at the application site. This is a change from the 2022 PID, which prohibited application at wind speeds exceeding 10 mph.
- If the windspeed is 10 miles per hour or less, applicators must use at least $\frac{1}{2}$ swath displacement upwind at the downwind edge of the field. When the windspeed is between 11 and 15 miles per hour, applicators must use at least $\frac{3}{4}$ swath displacement upwind at the downwind edge of the field.
- For aerial application, if the windspeed is greater than 10 mph, the boom length must be 65% or less of the wingspan for fixed wing aircraft and 75% or less of the rotor diameter for helicopters. Otherwise, the boom length must be 75% or less of the wingspan for fixed-wing aircraft and 90% or less of the rotor diameter for helicopters.
- For aerial applications, the release height must be no higher than 10 feet from the top of the crop canopy or ground, unless a greater application height is required for pilot safety.
- For ground boom applications, apply with the release height no more than 4 feet above the ground or crop canopy.
- For ground applications, do not apply when wind speeds exceed 15 mph at the application site.
- For ground boom and/or aerial applications, applicators must select nozzle and pressure that deliver medium size droplets in accordance with American Society of Agricultural & Biological Engineers Standard 641 (ASABE S641).
- For airblast applications, nozzles directed out of the orchard must be turned off in the outer row.
- For air blast applications, applications must be directed into the canopy foliage.

In addition to including the spray drift restrictions on captan labels, all references to volumetric mean diameter (VMD) information for spray droplets are proposed to be removed from all

captan labels where such information currently appears. The proposed new language above, which cites ASABE S572.3, eliminates the need for VMD information.

Impacts. Prohibiting applications during temperature inversions could result in delays to intended applications and, more generally, reduce the amount of time for users to apply captan. Management of production activities would be more complex. Mitigations associated with aerial application are expected to have low to no impact on growers. Aerial application of captan is rare across the majority of crops with any captan usage reported. Less than 1% of all captan applications are made by air. However, blueberry growers may be impacted, since stakeholder comments indicate that aerial applications of captan to blueberries are not as rare as in all other crops.

Currently, there are no wind speed restrictions for ground or aerial applications on the most used products that contain captan, so establishing a maximum windspeed restriction is likely to have impacts to users. Mandatory wind speed restrictions complicate weed and crop management by reducing the available time to make applications and make it more likely that a grower needs to alter pest control plans, possibly at the time of application.⁷² Iowa state⁷³ documented that a wind speed restriction could significantly reduce the number of hours that applications can be made. Once the window of application passes, the biology of the pest may be such that an application is no longer effective. Additionally, the damage and/or yield losses may have already occurred. Alternatively, a grower may develop another pest control strategy. However, changing plans may be more costly given that a different, more expensive fungicide(s) may be used, or multiple applications or multiple active ingredients may be needed to achieve the same level of broad-spectrum control as captan. If applications were not made in a timely manner, pest control could decline, possibly leading to additional fungicide applications and/or yield and quality losses. Impacts to captan users are less for maximum windspeed restrictions at 15 miles per hour because the higher windspeed provides greater flexibility in application timing, compared to the maximum windspeed restriction of 10 miles per hour. Windspeed restrictions may be more burdensome in areas with regularly high winds and in areas with highly variable weather.

Wind conditions vary across the U.S. and wind speed restrictions could prevent timely applications of captan. However, it is already a best management practice for pesticide applicators using airblast sprayers to apply at wind speeds less than 10 mph. Due to the fine nature of the droplets produced by airblast sprayers, high wind speeds greatly reduce the coverage and consequently the efficacy of a pesticide. EPA expects the impact of the wind speed restriction for ground applications to be minor.

For airblast applications, the requirement to turn off the nozzles directed out of the orchard and requiring applications to be directed into the canopy foliage is expected to have little impact on growers, as these are already standard practices.

10. Resistance Management

⁷² <https://crops.extension.iastate.edu/blog/bob-hartzler/hours-available-apply-dicamba-based-wind-restrictions>

⁷³ <https://crops.extension.iastate.edu/blog/bob-hartzler/hours-available-apply-dicamba-based-wind-restrictions>

The Agency proposes adding resistance-management language to captan labels to reduce the development of pesticide resistance. Consistent with EPA's Pesticide Registration Notice (PRN) on general pesticide resistance management, EPA intends to propose pesticide resistance measures for existing chemicals during registration review and for new chemicals and new uses at the time of registration. To combat pesticide resistance, resistance management experts recommend using pesticides with different chemical modes of action against the same target pest population as part of integrated pest management (IPM) programs. This approach may prevent or delay target pest populations from developing resistance to a particular mode of action without resorting to increased rates and frequency of application, possibly prolonging the useful life of pesticides.

Adding this language will provide pesticide users with easy access to important information on maintaining the effectiveness of pesticides—including captan—thereby preserving the benefits of captan and other useful pesticides. EPA does not expect this language to affect the risks or benefits of captan.

B. FIFRA Interim Ecological Mitigation (IEM)

The ESA Workplan Update Appendix includes a menu of FIFRA IEM measures, some of which are included in this amended PID. EPA previously sought public comment on the full suite of FIFRA IEM measures, available in the ESA Workplan Docket ([EPA-HQ-OPP-2022-0908-0002](https://www.regulations.gov/docket/EPA-HQ-OPP-2022-0908-0002)), at www.regulations.gov. EPA updated some of the FIFRA IEM measures after considering public comments on the November 2022 ESA Workplan Update and additional EPA and interagency review of the mitigations. The FIFRA IEM measures proposed for captan in this amended PID reflect these revisions.

EPA developed the FIFRA IEM measures to reduce exposure to nontarget organisms, including listed species, based on the risks and benefits of captan.⁷⁴ EPA is proposing the following FIFRA Interim Ecological Mitigation measures for captan:

- Surface water protection statement,
- Spray drift reduction measures, in addition to those in Section IV.A.8.,
- Treated seed language for all relevant labels,
- Pollinator stewardship advisory language for all labels,
- Ecological incident reporting label language for all labels, and
- *Bulletins Live! Two* (BLT) language for all labels.

The proposed FIFRA IEM in this amended PID is not designed to fully address EPA's ESA obligations for captan during registration review. Rather, the mitigation measures are initial steps under FIFRA that are designed to reduce exposure to all non-target organisms, including listed species, while EPA continues to work towards meeting its ESA obligations during registration review before issuing a final registration review decision. EPA may subsequently propose additional mitigation measures for captan during registration review, such as

⁷⁴ See the *ESA Workplan Update: Nontarget Species Mitigation for Registration Review and Other FIFRA Actions* (Nov. 2022), <https://www.epa.gov/system/files/documents/2022-11/esa-workplan-update.pdf>.

mitigations developed as part of its various ESA initiatives.⁷⁵ Additional measures may also be necessary when EPA conducts effects determinations and, if necessary, consults with the Service(s) on captan.

1. Surface Water Protection Statement (Rain Restriction)

To reduce the potential for transport off the field of captan via soil erosion and reduce risk to non-target organisms, EPA is proposing a surface water protection statement for captan for products delivered via liquid spray to crops. The Agency has modified the surface water protection statement proposed in 2022 to incorporate public comments on both the 2022 PID and the proposed FIFRA IEM. The modification addresses stakeholder comments and concerns related to application restrictions close to predicted rainfall. Therefore, to reduce the potential for surface water runoff and protect non-target organisms, EPA is proposing the following surface water protection statement for captan products delivered via liquid spray to crops.

“Do not apply during rain. Do not apply when soil in the area to be treated is saturated (if there is standing water on the field or if water can be squeezed from soil).”

The surface water protection statement is intended to reduce the amount of pesticide that moves off a treated field via erosion during a rain event. Applying pesticides when it is not raining is a common-sense measure that ensures the pesticide application will be effective against the target pest while reducing ecological risks from erosion.

EPA is no longer proposing a national rain restriction for captan application within 48 hours of a predicted rainfall, as described in Section IV.A.6. and Appendix B of the 2022 captan PID. EPA is continuing to propose a regional 48-hour rain restriction in specific Pesticide Use Limitation Areas (PULAs) in the states of California, Idaho, Oregon, and Washington, to implement the 2011 Salmonid BiOp. PULAs will be specified in *Bulletins Live! Two* as described in Section IV.A.6 of this document.

Impacts. The Agency does not anticipate that a restriction that does not allow captan applications while it is raining will affect users. While fungicide applications may be made prior to a rainfall event, growers would not apply during a rainfall event as this would not be desirable for the product staying in place and preventing disease.

EPA also expects few impacts from a restriction on applying captan to saturated soil for most users. Users are more likely to apply captan prior to a known rain event and not after (when soils are more likely to be saturated). For some users with certain soil types, this prohibition would limit the available window users have to make time sensitive applications as some soil types retain water for longer periods of time. For example, users operating on soil with a greater clay content are expected to experience more noticeable impacts from this restriction than those operating on sandier soils, as clay soils retain water longer. In such cases, the application window for captan would be narrower and users may have to resort to an alternative fungicide

⁷⁵ <https://www.epa.gov/endangered-species/implementing-epas-workplan-protect-endangered-and-threatened-species-pesticides>

without saturated soil restrictions. Switching fungicides may result in increased fungicide costs and may complicate pest management programs.

2. Spray Drift Reduction Measures

For captan, spray drift risks of concern were identified for mammals. In section IV.A.7. and Appendix B of the 2022 captan PID, EPA proposed spray drift management measures related to maximum wind speed, aerial release height, aerial swath displacement, aerial boom length, ground boom height, and other application parameters to reduce exposure and risk to non-target organisms from spray drift. EPA also proposed advisory spray drift measures. These are now described in section IVA.6. of this document.

In accordance with the FIFRA IEM, EPA is now proposing to modify the spray drift reduction measures to further reduce off-field spray drift exposure to non-target organisms, including endangered and threatened species. The proposed changes, described below, include application restrictions related to sustained wind speed, requirements to measure of wind speed and direction at or above the height of pesticide release, and, for aerial application, specific requirements to relevant to boom length and swath displacement.

a. Proposed Mandatory Spray Drift Reduction Measures

EPA is proposing the following additional mandatory spray drift reduction measures for captan application by air, airblast, or groundboom:

- *“During application, the Sustained Wind Speed, as defined by the National Weather Service (standard averaging period of 2 minutes) must register between 3 and 15 miles per hour.*
- *“Wind speed must be measured on location using a windsock, an anemometer, or an aircraft smoke system.”*
- *“Wind speed must be measured at the release height or higher, in an area free from obstructions such as trees, buildings, and farm equipment.”*

Impacts. Growers who do not currently own a device to measure sustained wind speed and direction will have to purchase and/or install a windsock, an anemometer (which may be handheld or mounted on application equipment), or an aircraft smoke system. There are likely differences in cost in purchasing each of these technologies. The Agency expects that purchasing and installing a windsock is the least expensive option of these three, followed by a handheld anemometer and a device on application equipment (e.g., aircraft smoke system). There are likely minimal differences in the complexity to interpret the wind speed or direction outputs generated by these technologies. The Agency does not anticipate impacts to users of captan who already own and use a windsock, an anemometer, or a device mounted on application equipment to detect the sustained wind speed and direction at the application site.

b. Proposed Advisory Spray Drift Reduction Measures

EPA is proposing additional advisory spray drift reduction measures describing Best Management Practices (BMPs) for measuring wind speed and direction of wind. Additional proposed advisory spray drift reduction measures for captan application by air, airblast, or groundboom include the following:

“MEASURING WIND SPEED AND WIND DIRECTION

Best Management Practices for measuring wind speed and direction of wind:

- *Applicators should check and acquire the predicted wind speed and direction for the application site within 12 hours prior to conducting applications to determine the time periods wind speed is likely to fall outside the applicable thresholds.*
- *Applicators should reassess wind speed and direction at the application site every 15 minutes while applications are in progress.*
- *Measuring wind speed and direction can be done by:*
 - *Relying on equipment on the application equipment that measures wind speed (e.g., aerial equipment).*
 - *Using a tower anemometer with telemetry or handheld anemometer. Users should read user manual on how to calibrate, operate and interpret the output from an anemometer. Ground applicators should stop every 15 minutes to take a reading with a tower anemometer with telemetry or handheld anemometer. Some anemometers may have software that would allow users to view wind measurements in real time while making an application, and, those cases, applicators would not have to stop to take measurements.*
 - *Using a windsock. Wind can be estimated with a windsock using the strips on a windsock. The applicator should consult the user manual for the windsock on wind speed estimation and direction of wind. Applicators should look at the sock at least every 15 minutes to estimate wind speed and direction.*
 - *Using an aircraft smoke system. Laying down several puffs of smoke along different lines using an aircraft smoke system can provide an accurate view of what the wind speed and direction for the application.*
 - *Checking behind the spray rig at least every 15 minutes to see if the spray has changed direction from when the application started.”*

3. Treated Seed Labeling

The ecological risk assessment for captan identified chronic risks of concern to birds and mammals consuming treated seeds. Chronic RQs exceeded the LOC for birds and mammals consuming treated seeds. To reduce exposure to non-target organisms which may ingest treated seed, the Agency is proposing labeling for seeds treated on-farm and not sold and distributed and for seeds treated on-farm or in commercial facilities for sale and distribution. In general, the proposed seed labeling instructions address the proper storage, planting, and disposal of treated seeds and provide other common sense best management practices to instruct the user on ways to prevent exposure to non-target wildlife.

EPA solicited comment on the proposed label language in the ESA Workplan Update. The Agency received comments specific to treated seed on the ESA Workplan Update, concerning

the planting depth, the burial depth and disposal of excess treated seeds, and reducing pesticide dust-off. EPA considered the comments and amended the language regarding treated seed.

Consistent with EPA's September 28, 2022, response to the treated seed petition filed by Center for Food Safety,⁷⁶ these proposed treated seed labeling instructions will continue to be updated as EPA reviews currently registered pesticides. EPA also issued an advanced notice of proposed rulemaking (ANPRM)⁷⁷ (See 88 FR 70625, October 12, 2023) to solicit comment on the use and usage of treated seed, including storage, planting, and disposal of treated seed, which will further inform the labeling instructions.

For captan specifically, EPA is continuing its proposed labeling for seed treatment products and its proposed seed bag tag labeling for treated seeds from the March 2022 captan PID. In this amended PID, EPA is proposing additional seed bag tag labeling to address the proper storage and disposal of treated seeds and provides other common sense best management practices to instruct the user on ways to prevent exposure to non-target wildlife.

a. Dye Statement

EPA is continuing to propose that all seed treatment products bear the following dye statement:

“Seed treated with this product must be visually identifiable from untreated seed by the use of an approved colorant or dye to prevent accidental use of treated seed as food for humans or feed for animals. Refer to 21 CFR, Part 2.25. Any colorant or dye added to treated seed must be cleared for use in accordance with 40 CFR, Part 153.155(c).”

b. Labeling instructions for seeds treated on-farm and not for distribution or sale of the seed)

The proposed seed treatment labeling for products allowed for on-farm seed treatment (not for distribution or sale of the seed) is as follows:

“Use of On-Farm Treated Seed (when treated seeds are not for sale or distribution)

Treated seed sold or distributed for a use not permitted by the following labeling does not qualify as an exempted treated article under 40 CFR 152.25(a) and is therefore sale or distribution of an unregistered pesticide, pursuant to FIFRA section 12.

- Store treated seed away from food and feedstuffs.
- Do not allow children, pets, or livestock to have access to treated seeds.
- Treated seeds are for planting purposes only. Do not use for food, feed, or oil purposes. Do not use treated seeds for fuel or ethanol production purposes.

⁷⁶ <https://www.regulations.gov/document/EPA-HQ-OPP-2018-0805-0104>

⁷⁷ <https://www.regulations.gov/document/EPA-HQ-OPP-2023-0420-0001>

- Do not plant treated seed by broadcasting to the soil surface. Ensure that all planted seeds are thoroughly incorporated by the planter during planting. Additional incorporation may be required to thoroughly cover exposed seeds.
- Treated seeds exposed on the soil surface may be hazardous to wildlife. Cover or collect treated seeds spilled during loading and planting (such as in row ends).
- Manage excess treated seeds (e.g., spilled, unused, or expired treated seeds) by one or more of the following methods:
 - Collect excess treated seeds for reuse for planting.
 - Bury excess treated seeds (only allowed if totalling 1 pound or less) at least 30 feet away from bodies of water at a depth of 6 inches or double the planting depth, whichever is greater.
 - Dispose of excess treated seed by placing them in a landfill in accordance with applicable laws in your state.
 - Excess treated seeds may be returned to the supplier if permitted by the state.
- Do not contaminate bodies of water when disposing of equipment wash water.

ADVISORY DUST-REDUCING TECHNIQUE

The use of seed flow lubricants or polymer coatings may help decrease the amount of dust released during planting. Follow the recommendations of the planter manufacturer regarding the use of talc, graphite, or other seed flow lubricants.”

The Agency is also proposing that all other requirements regarding the use of the treated seed, which include, but are not limited to, instructions relating to endangered species protection, environmental hazard statements, maximum use rates, soil incorporation depth, plant back intervals, personal protective equipment, and storage and disposal statements, remain and must be listed.

c. Seed bag/container labeling instructions for seeds treated in commercial facilities or on-farm and for sale or distribution

The proposed seed bag/container labeling for pesticide products allowed for both commercial and on-farm seed treatment use, where the treated seed product is for sale or distribution, is as follows:

“Seed Treatment in Commercial Facilities or Seed Treatment On-Farm (when treated seeds are to be sold or distributed) – Seed Bag Labeling Requirements

The Federal Seed Act requires that bags containing treated seeds shall be labeled with the following statements:

- This seed has been treated with (insert name of active ingredient of pesticide).
- Do not use for food, feed, or oil purposes.”

“The U.S. Environmental Protection Agency requires that bags containing treated seeds shall be labeled with the following statements. Any seed treated with [PRODUCT NAME] that is sold or distributed without these statements or that is sold or distributed for a use not permitted by

the following labeling does not qualify as an exempted treated article under 40 CFR 152.25(a) and is therefore sale or distribution of an unregistered pesticide, pursuant to FIFRA section 12(a)(1)(A).

This seed has been treated with [INSERT PRODUCT NAME(s) (EPA REG. NO(s))] containing [INSERT NAME(S) OF ACTIVE INGREDIENT(S)]. Any seed treated with [PRODUCT NAME] that is sold or distributed for a use not permitted by the following labeling does not qualify as an exempted treated article under 40 CFR 152.25(a) and is therefore sale or distribution of an unregistered pesticide, pursuant to FIFRA section 12(a)(1)(A).

- The contents of this bag are for planting purposes only. Do not use for food, feed, or oil purposes. Do not use for fuel or ethanol production purposes.
- Store treated seed away from food and feedstuffs.
- Do not allow children, pets, or livestock to have access to treated seeds.
- Do not plant treated seed by broadcasting to the soil surface. Ensure that all planted seeds are thoroughly incorporated by the planter during planting, additional incorporation may be required to thoroughly cover exposed seeds.
- Treated seeds exposed on the soil surface may be hazardous to wildlife. Cover or collect treated seeds spilled during loading and planting (such as in row ends).
- Manage excess treated seeds (e.g., spilled, unused, or expired treated seeds) by one or more of the following methods:
 - Collect excess treated seeds for reuse for planting.
 - Bury excess treated seeds (only allowed if totalling 1 pound or less) at least 30 feet away from bodies of water at a depth of 6 inches or double the planing depth, whichever is greater.
 - Dispose of excess treated seeds by placing them in a landfill in accordance with applicable laws in your state.
 - Excess treated seeds may be returned to the supplier if permitted by the state.
- Do not contaminate bodies of water when disposing of equipment wash water.
- Dispose of seed packaging or containers in accordance with local requirements.

ADVISORY DUST-REDUCING TECHNIQUE

The use of seed flow lubricants or polymer coatings may help decrease the amount of dust released during planting. Follow the recommendations of the planter manufacturer regarding the use of talc, graphite, or other seed flow lubricants.”

The Agency is also proposing that all other requirements regarding the use of the treated seed, which include, but are not limited to, instructions relating to endangered species protection, environmental hazard statements, maximum use rates, soil incorporation depth, plant back intervals, personal protective equipment, and storage and disposal statements, remain and must be listed on the seed bag tag.

4. Proposed Mandatory and Advisory Pollinator Stewardship Language

Captan is applied to pollinator attractive crops such as apples, almonds, stone fruits, grapes, and berries. In the March 2022 PID, EPA identified potential acute risks to honeybee larvae from

application of captan to almonds and ornamental. In addition, an incident involving captan described honeybee brood losses and deformities associated with application to almonds in California.

Therefore, EPA is proposing to include advisory language for insect pollinators. This advisory language distills the most important information growers need to know to voluntarily reduce risk to insect pollinators. The language is intended to raise awareness of potential hazard to bees and other insect pollinators. Although this language is advisory, the goal is to promote BMPs for applicators to consider in order to reduce exposures to bees, particularly managed pollinators. This language is consistent with EPA's pollinator protection strategic plan.⁷⁸

The proposed pollinator hazard statement is as follows:

“Pollinator Hazard Statement

This product is moderately toxic to bees and other pollinating non-target insects exposed to direct treatment on blooming crops or weeds.”

EPA is proposing to apply the pollinator hazard statement above for products with labeled agricultural uses. The language is derived from EPA's Label Review Manual and appears on many labels already and should not have adverse impacts to the user. Best management practices (BMPs) describe ways to manage pesticide applications in order to protect non-target organisms and mitigate environmental impacts. The Agency is proposing the following labeling to highlight pollinator best management practices:

“Advisory Best Management Practices for Pollinator Protection

The following best management practices (BMPs) can help reduce risk to pollinators:

- *Develop and maintaining clear communication with local beekeepers to help protect bees. To the extent possible, advise beekeepers within a 1-mile radius 48-hrs in advance of the application, and confirm hive locations before spraying.*
- *Avoid applications when bees are actively foraging.*
- *Avoid applying pesticides to plants in bloom, including flowering weeds.*
- *Apply pesticides in the evening or at night when fewer bees are foraging.*
- *Use Pollinator Protection Plans when they are available. These plans may be available from state lead agencies and promote communication between growers, landowners, farmers, beekeepers, pesticide users, and other pest management professionals to reduce exposure of bees and other pollinators to pesticides.*
- *Use integrated pest management to prevent or mitigate potential negative effects to pollinators and consider multiple pest management options before resorting to a pesticide application.*
- *Mowing understory weeds or cover crops in orchards and vineyards before blooming can prevent flowering of weeds and reduce exposure to bees where and when pesticides are applied.*

⁷⁸ <https://www.epa.gov/pollinator-protection/pollinator-protection-strategic-plan>

The following BMPs can help promote the health and habitat of ground-nesting bees:

- *For uncultivated land, leaving large undisturbed patches of land un-mowed and untilled can provide nesting and forage sites.*
- *For uncultivated land, mowing at the highest cutting height possible (minimum of 8-10 inches if possible) can increase and diversify food sources.*

For additional resources on pollinator BMPs and Pollinator Protection Plans, visit <https://www.epa.gov/pollinator-protection/find-best-management-practices-protect-pollinators>."

This advisory language distills the most important information growers need to know to voluntarily reduce risk to insect pollinators. The language is intended to raise awareness of potential hazard to bees and other insect pollinators. Although this language is advisory, its goal is to promote best management practices for applicators to reduce pesticide exposures to bees, particularly managed pollinators, consistent with EPA's pollinator protection strategic plan.⁷⁹

The mandatory pollinator hazard statement below applies to pesticides with agricultural uses classified as moderately to highly toxic via acute oral or acute contact toxicity to honeybees, including captan. The language in the statement is derived from language in EPA's Label Review Manual and appears on many labels already.

Impacts. EPA does not expect this language to affect the risks or benefits of captan.

5. Ecological Incident Reporting Label Language

EPA has proposed and subsequently required ecological incident reporting language on some labels in the past, and ecological incident reporting has been included as a reasonable and prudent measure (RPM) in Biological Opinions issued by the Services, including the Salmonid BiOp. The Agency anticipates the need to add incident reporting labeling as part of any necessary ESA consultation. EPA is proposing incident reporting labeling to provide consistent information to pesticide users on how to report ecological incidents and to expedite any ESA necessary consultation. The proposed incident reporting language is as follows:

“REPORTING ECOLOGICAL INCIDENTS: *For guidance on reporting ecological incidents, including death, injury, or harm to plants and animals, including bees and other non-target insects, see EPA's Pesticide Incident Reporting website: <https://www.epa.gov/pesticide-incidents> or call (registrant phone number).”*

Impacts. This is a minor change to the incident reporting language proposed in the 2022 PID. It is not expected to impact growers.

⁷⁹ <https://www.epa.gov/pollinator-protection/pollinator-protection-strategic-plan>

6. *Bulletins Live! Two* Labeling

ESA mitigation can take the form of nationwide restrictions on the general pesticide product labeling or geographic-specific restrictions located in Endangered Species Protection Bulletins (hereafter referred to as Bulletins), which are extensions of the general labeling accessed through a website. EPA is using a web-based system, *Bulletins Live! Two* (*BLT*), to provide timely protections for listed species and to minimize pesticide product labeling changes. EPA uses *BLT* when mitigation applies to a particular geographic region where listed species are present, in some cases, during only certain times of the year. *BLT* simplifies compliance by offering a tool for users to identify where and when they are subject to the mitigation. When directed by product labeling, pesticide applicators are required to visit the *BLT* online database, and follow any mitigation specified in a Bulletin for the application area.

Captan does not currently have any listed species bulletins, but the Agency will be developing bulletins to implement the Salmonid BiOp. Nonetheless, EPA is proposing to require the addition of *BLT* language to all captan end-use product labels. This proposed language instructs pesticide users to check the *Bulletins Live! Two* website⁸⁰ before they use any pesticide product to determine whether any pesticide use restrictions apply to that product at the time of application. Including this language on product labels will help streamline implementation of risk reduction measures related to the Salmonid BiOp as well as any additional risk reduction measures that may be identified during future ESA consultation(s) for captan.

“ENDANGERED AND THREATENED SPECIES PROTECTION REQUIREMENTS:
Before using this product, you must obtain any applicable Endangered Species Protection Bulletins (‘Bulletins’) within six months prior to or on the day of application. To obtain Bulletins, go to Bulletins Live! Two (BLT) at <https://www.epa.gov/pesticides/bulletins>. When using this product, you must follow all directions and restrictions contained in any applicable Bulletin(s) for the area where you are applying the product, including any restrictions on application timing if applicable. It is a violation of Federal law to use this product in a manner inconsistent with its labeling, including this labeling instruction to follow all directions and restrictions contained in any applicable Bulletin(s). For general questions or technical help, call 1-844-447-3813, or email ESPP@epa.gov.”

Although the *BLT* system has been in place for many years, there may be applicators who are not familiar with this system. Using the online tool to determine if mitigation is required for a particular treatment area may be a new step that many users will need to take prior to an application. However, the Agency anticipates that over time, with wider implementation, *BLT* will become a familiar tool that is integrated into a user’s planning process for pesticide applications. In February 2022, EPA released an improved version of *BLT*, which allows users to more easily find the information they need for a particular pesticide product. The Agency has also developed both a tutorial⁸¹ and a webinar⁸² explaining how to use the *BLT* system. In

⁸⁰ <https://www.epa.gov/endangered-species/endangered-species-protection-bulletins>

⁸¹ <https://www.epa.gov/endangered-species/bulletins-live-two-blt-tutorial>

⁸² EPA held a webinar for stakeholders on the use of *BulletinsLive! Two* on November 9, 2023. The webinar recording may be accessed at <https://www.youtube.com/watch?v=o0UQCTwjfNI> and other information may be found at <https://www.epa.gov/endangered-species/endangered-species-protection-bulletins>.

addition, the general label language referring users to *BLT* provides a phone number and email address for those needing technical assistance.

EPA is currently working on several ESA strategies, such as the Vulnerable Species Pilot⁸³ and the Herbicide Strategy,⁸⁴ to expedite and streamline the ESA consultation process and provide protections for listed species. Pesticide Use Limitation Areas (PULAs) and the associated geographically specific mitigation (i.e., bulletins) are not yet available under these efforts. While the BLT language above is being proposed to be added to the pesticide label without being linked to PULAs or bulletins for captan at this time, pesticide users should be aware that as various ESA pilot efforts are finalized, EPA expects to add new PULAs and new bulletins to BLT. Before new PULAs and bulletins are added in BLT, EPA will notify stakeholders and provide an opportunity for public comment. See Appendix C: Listed Species Assessments for more information.

C. Summary of Mitigation for Specific Crops and Use Sites

EPA's mitigation proposals for major agricultural crops treated with captan and other registered uses of captan are summarized below. The mitigation proposals are listed by the major types of formulated captan products: DF/WDG, liquid, and WP. The mitigation proposal for each of the following crops and other registered uses describes the risk issues to be addressed, the specific mitigation and any necessary clarification, whether the mitigation completely addresses the risk, and the potential impacts of the mitigation. The anticipated impacts of the proposed mitigation are described in sections IV.A. and B. of this document.

1. Proposed Mitigation for Orchard Crops

a. Fruit and Nut Trees

EPA's revised mitigation proposal for orchard crops (almonds, apples, apricots, cherries, nectarines, peaches, plums, and prunes) is as follows:

- Prohibit aerial application of DF/WDG and WP formulations;
- Reduce maximum application rate for apples, peaches, and nectarines, from 4 to 3 lbs. ai/A;
- Reduce maximum application rate for almonds from 4.5 to 3 lbs. a.i./A;
- Reduce maximum application rate for cherries from 3.16 to 3 lbs. a.i./A;
- Require PF50 respirator, single layer protective clothing,⁸⁵ and chemical-resistant gloves for handlers mixing/loading DF/WDG and WP formulations for airblast application;
- Require enclosed cabs and single layer protective clothing for airblast applicators;

⁸³ <https://www.regulations.gov/docket/EPA-HQ-OPP-2023-0327>

⁸⁴ <https://www.regulations.gov/docket/EPA-HQ-OPP-2023-0365>

⁸⁵ Single layer protective clothing refers to long sleeve shirt, long pants, shoes, and socks. In the 2022 PID, this was incorrectly referenced as single-layer PPE.

- Require enclosed cabs and single layer protective clothing for groundboom applicators treating orchard crops *or* PF10 respirator, chemical-resistant gloves, and single layer protective clothing; and
- Limit application with mechanically pressurized handgun to spot treatment of areas missed with other application equipment, such as application to row ends.
- There are no proposed changes to the current REIs on captan product labels.

b. Post-application Fruit Dip

For the post-harvest use of captan as a fruit dip for apples, cherries, and pears, fruit sorters and packers must wear a PF50 respirator, chemical resistant gloves, and single layer protective clothing (long sleeve shirt, long pants, shoes, and socks). All other packing house workers must wear single layer protective clothing and a PF10 respirator. Inhalation MOEs range from 1.3 (with no respirator) to 63 (with a PF50 respirator), and the LOC is 30. Therefore, this mitigation will completely address inhalation risk concerns from this scenario.

2. Proposed Mitigation for Berries and Grapes

The Agency has revised its mitigation proposal for berries and grapes to incorporate new information provided in public comments and to clarify certain changes to label mitigation. EPA's revised mitigation proposal for berries is as follows:

a. All Berries

- Prohibit aerial application of DF/WDG and WP formulations but allow aerial application for liquid formulations and
- Require PF50 respirator, chemical-resistant gloves, and single layer protective clothing for mixing and loading DF/WDG and WP formulations to be applied by airblast or groundboom.
- *Note:* For strawberries, EPA is proposing to require the PF50 respirator only for large growers whose operations are greater than 80 acres to protect mixers/loaders.
- There are no changes to the REI for any berries; the REIs on current labels are sufficient.

b. Blueberries

- Airblast applicators must use enclosed cabs and single layer protective clothing for treating blueberries.
 - Alternative option: applicator may use an open cab, PF10 respirator, single layer protective clothing, and chemical resistant gloves.
- Groundboom applicators must wear single-layer clothing, a PF10 respirator, and chemical-resistant gloves for groundboom application to blueberries.
- Applicators using mechanically pressurized handguns must wear a PF10 respirator, single layer clothing, and chemical-resistant gloves and limit application to spot treatments, such as treatment of row ends.

c. Caneberries

- Airblast applicators must use enclosed cabs and wear single layer protective clothing (when outside the cab).
- Groundboom applicators must wear PF10 respirator, chemical resistant gloves, and single layer clothing.
- Applicators using mechanically pressurized handguns must wear a PF10 respirator, chemical resistant gloves, and single layer clothing and limit application to spot treatments.

d. Strawberries

EPA is revising the mitigation proposed in the 2022 PID to clarify that (1) the proposed PPE is not required for applicators who are in enclosed cabs and (2) there is no proposed change to the REI. The proposed mitigation for strawberries is as follows:

- Aerial application is prohibited for DF/WDG and WP formulations. Liquid formulations may be applied by air.
- For large farms, over 80 acres in size, mixers/loaders supporting groundboom application must wear a PF50 respirator, chemical-resistant gloves, and single layer clothing. This PPE is required only for DF/WDG and WP formulations (not for liquid formulations).
- Groundboom applicators must wear single-layer clothing, a PF10 respirator, and chemical-resistant gloves for groundboom application to strawberries. No additional PPE are required for applicators while using an enclosed cab.
- The current REI for strawberries remains unchanged.
- For use of captan as a preplant root dip, no changes are proposed for mixers/loaders or applicators involved in dipping strawberry crowns prior to planting.

e. Grapes

EPA's revised mitigation proposal for grapes is as follows:

- The maximum application rate will remain unchanged, at 2 lbs. ai/A. EPA is withdrawing its proposed rate reduction to 1.75 lbs. ai/A.
- Airblast application:
 - Require PF50 respirator for mixing/loading DF/WDG formulation only for airblast application, chemical resistant gloves, as well as single-layer clothing.
 - Require PF10 respirator for mixing/loading WP and liquid formulations, chemical resistant gloves, and single layer clothing.
 - Require single-layer PPE, gloves, and PF10 respirator for airblast applicators. Alternatively, applicators may use enclosed cabs.
- Mechanically pressurized handgun:
 - For all formulations, mixers/loaders/and applicators must wear a PF10 respirator and chemical-resistant gloves.
 - Limited to spot treatments.
- Post-application:
 - Workers who are girdling and turning table grapes must observe a 5-day REI.

3. Proposed Mitigation for Ginseng and Ornamentals

The Agency has revised its mitigation proposals for ginseng and ornamentals to correct inadvertent omissions in the 2022 PID and to clarify other mitigation. Specifically, EPA is adding mitigation for application of captan to ornamentals using handheld equipment, such as backpack sprayers and mechanically pressurized handguns. The Agency is also correcting the omission of mitigation for ginseng and clarifying that a PF50 respirator is not needed for ginseng.

The 2022 captan PID did not present a separate mitigation proposal for ginseng. EPA's mitigation proposal for ginseng is as follows:

- For ground application of with a boom sprayer, mixers and loaders using the DF/WDG, liquid, and WP formulations must wear a PF10 respirator, single layer PPE, and chemical-resistant gloves. This is a continuation of mitigation on current captan product labels. This applies to the vast majority of small ginseng growers, who have farms of 10 acres or less.

EPA's revised mitigation proposal for ornamentals is as follows:

- For groundboom application, mixers and loaders using the DF/WDG and WP formulations must wear a PF50 respirator, single layer PPE, and chemical-resistant gloves. The PF50 respirator will increase inhalation MOEs for mixers/loaders using DF/WDG formulations from 5.5 to 27; for workers using WP formulations, the PF50 respirator increases the inhalation MOE from 18 to 89. The level of concern is 30.
- Groundboom applicators (for all formulations) must wear a PF10 respirator, single layer, gloves (current label PPE) OR use enclosed cabs and wear single layer PPE.
- For application with a backpack sprayer, mixer/loader/applicator must wear single layer clothing, gloves, PF10 respirator (current label PPE) and limit application to spot treatment for greenhouse and nursery ornamentals.
- Application with mechanically pressurized handguns is prohibited because inhalation risk cannot be mitigated with a PF10 respirator and a PF50 respirator is not considered feasible.
- Application of captan as a soil drench is limited to spot treatment.
- For seed piece treatment of tubers, bulbs, and corms, hand dipping is prohibited.
- For post-application re-entry activities:
 - Workers must observe an 8-day REI for handset irrigation.
 - There is no change to the existing REI for other activities.

4. Proposed Mitigation for Seed Treatment

EPA has revised its mitigation proposal for seed treatment uses of captan, in addition to the FIFRA IEM. The mitigation varies depending on whether captan is used for commercial or on farm seed treatment. The revised mitigation proposal is described below. The proposed FIFRA IEM for captan seed treatment described in Section IV.B. of this document includes specific labeling for use of dye to indicate treated seed, bag tags, and instructions to dispose of excess or

spilled treated seed. In addition, the Agency is requesting generic information for seed treatment uses. Please see Appendix G for additional information.

a. Commercial Seed Treatment

To address inhalation and dermal risk concerns associated with commercial seed treatment, EPA is proposing to require long sleeve shirts, long pants, shoes, socks (collectively described as baseline attire), and PPE consisting of chemical-resistant gloves, eye protection, and PF10 respirators⁸⁶ for liquid products registered for the following uses: Cole crops/crucifers/*Brassica* (including mustard, radish, and turnip); pepper; cucumber, cantaloupe, and muskmelon (but not other cucurbits); lentil; and sunflower. Although current commercial seed treatment products require baseline attire, gloves, and eye protection, not all product labels require use of PF10 respirators.

To address inhalation risk concerns that cannot be addressed with the addition of a PF10 respirator (MOEs ranging from <1 to 28) to the required single layer clothing, eye protection, and gloves, EPA is proposing termination of captan for treatment of the following types of seeds: alfalfa, clover, *Lespedeza*, and trefoil; barley, oats, rye, sorghum, and wheat; beans, dry, snap, and succulent; beets, garden and sugar beets; Swiss chard; field corn and sweet corn; bluegrass; grass for forage, fodder, and hay; cotton and flax; oats; onion, both green and dry bulb; peanut; garden pea; spinach; pumpkin; summer and winter squash, and watermelon; soybean; spinach; and strawberry. Benefits of captan use in commercial seed treatment are considered to be low, with no recent mention in extension recommendations, as explained in Section III.3. of this document. However, EPA encourages stakeholders who use captan as a seed treatment to comment on this proposal and to respond to the relevant questions listed in Appendix G during the public comment period. This is important for those who desire to maintain these uses.

b. On Farm Seed Treatment

Dust Formulations. To address inhalation risk concerns associated with on farm seed treatment using dust formulations, EPA is proposing to cancel all end-use captan dust products registered for seed treatment. The Agency does not anticipate impacts from cancelation of seed treatment uses because captan is not frequently used as a seed treatment, and because recent recommendations for seed treatments do not recommend captan, although many other fungicides are recommended. The Agency encourages stakeholders who use captan as a seed treatment to respond to the relevant questions listed in Appendix G during the public comment period.

Liquid Formulations. To address inhalation risk concerns associated with on farm seed treatment using liquid formulations, EPA is proposing to require single layer protective clothing and PPE consisting of gloves, eye protection, and PF10 respirators for treatment of the following seed types: Alfalfa/clover/trefoil; Garden beets (but not sugar beets); Broccoli, Brussel sprouts, cabbage, and other Cole crops/crucifers/ *Brassica*; Canola; Sweet corn and field

⁸⁶ A PF10 respirator reduces workers inhalation exposure by 90%.

corn; Cantaloupe, Muskmelon, cucumber, watermelon, pumpkin, summer and winter squash; Cotton; Flax; Bluegrass; Grasses/forage/hay; Onions (both green and dry bulb); Peppers; Radish; Sorghum, grain; Spinach; Swiss chard; Sunflowers; and Turnips.

To address inhalation risk concerns that cannot be addressed with the addition of a PF10 respirator, EPA is proposing to terminate the following on farm uses of liquid formulations: barley, oat, rye, and wheat; bean, dry and succulent; sugar beet; field and sweet corn; garden pea; peanut; and soybean.

The Agency encourages submission of information on seed treatment uses of captan, to answer the questions listed in Appendix G, if stakeholders desire to maintain these uses.

c. All Seed Treatment.

To address the potential nontarget risks to wildlife who consume seeds treated with captan, EPA is modifying its proposal to include additional language on seed bag tags to align it with the FIFRA IEM and the October 12, 2023, Advanced Notice of Proposed Rulemaking [on the treated article exemption]. *See* 88 FR 70625. The Agency is still proposing to require the addition of language to labels of captan products registered for seed treatment using commercial equipment⁸⁷ to ensure that bag tags are printed to accompany commercially treated seed and that such bag tags include the following labeling:

- *This seed expires on [insert date] and may not be stored for use past this date.*
- *Consistent with USDA requirements under the Federal Seed Act,*
 - *All seeds treated with a Toxicity Category I product (EPA signal word DANGER) must be labelled with “POISON” in red letters and skull and crossbones.*
 - *This seed has been treated with captan [list all active ingredients, specific product(s) used to treat seed and the EPA registration number(s)].*
 - *Do not use for food, feed, or oil purposes.*

All other label requirements related to personal protective equipment, storage, and disposal of treated seeds remain and must be listed on the seed bag tag. EPA is proposing that captan products registered for both commercial and on-farm seed treatment using commercial equipment must comply with these requirements, which are best practices consistent with Chapter 18 of the *EPA Pesticide Label Review Manual*.⁸⁸ If seed treated with captan is distributed or sold without such bag tags labeled as described above, the seed would not meet the conditions of the FIFRA treated article exemption because the pesticide used to treat the seed requires such language on the bag tags. Therefore, the distribution and sale of such seed would be distribution and sale of an unregistered pesticide, a violation of FIFRA section 12.

⁸⁷ This applies to any seeds treated with commercial equipment that are packaged for sale or distribution, whether in a commercial facility or on farm.

⁸⁸ https://www.epa.gov/sites/production/files/2017-10/documents/chap-18-sep-2013_0.pdf

D. Environmental Justice

EPA seeks to achieve environmental justice, the fair treatment and meaningful involvement of all people, regardless of race, color, national origin, or income, in the development, implementation, and enforcement of environmental laws, regulations, and policies. Throughout the registration review process, EPA has sought to include all communities and persons, including minority, low-income, and indigenous populations who may be disproportionately overburdened by the exposure to captan.

One community which may experience disproportionate exposure to pesticides is agricultural farmworkers. EPA has conducted assessments of risks to farmworkers who handle captan or may be exposed to captan when mixing, loading, or applying captan to orchard crops, berries and grapes, ornamentals and ginseng. In addition, farmworkers may be exposed to captan during on-farm seed treatment or the planting of commercially treated seed. The Agency has also found risks of concern for occupational pesticide handlers and fruit packers in fruit packing houses workers. These risks are described in detail in Section III.A. of this document. EPA has also evaluated the risks to people living adjacent to treated fields, which may include many farmworker families, but it has not found risks of concern for captan from spray drift of captan from treated orchards and fields. With the mitigation described in Sections IV.A. and IV.B. of this document, EPA is addressing the risks of concern according to the FQPA and FIFRA standards. The risks and benefits of captan relative to the FIFRA standard for worker risk are described in detail in Sections III.C. and IV.A. and IV.B. of this document.

The Agency requests information on any other groups or segments of the population who, as a result of their proximity and exposure to pesticides, unique exposure pathway (e.g., as a result of cultural practices), location relative to physical infrastructure, exposure to multiple stressors and cumulative impacts, lower capacity to participate in decision making, or other factors, may have unusually high exposure to captan compared to the general population or who may otherwise be disproportionately affected by the use of captan as a pesticide.

E. Tolerance Actions

1. Tolerance Expression

The Agency plans to exercise its FFDCA authority to update the tolerance expression to appropriately cover the metabolites and degradates of captan and to specify the residues to be measured for each commodity for enforcement purposes. EPA anticipates amending the tolerance expression to read as follows:

§180.103(a)(1) *General*. Tolerances are established for residues of captan, including its metabolites and degradates in and on the commodities in the table below. Compliance is to be determined by measuring only captan, (3a,4,7,7a-tetrahydro-2-[(trichloromethyl)thio]-1*H*-isoindole-1,3(2*H*)-dione).

§180.103(a)(2) Tolerances are established for residues of captan, (3a,4,7,7a-tetrahydro-2-[(trichloromethyl)thio]-1*H*-isoindole-1,3(2*H*)-dione) including its metabolites and

degradates. Compliance is to be determined by measuring only the metabolite tetrahydrophthalimide, (4,5,6,7-tetrahydro-1*H*-isoindole-1,3(2*H*)-dione).

2. Changes to Commodity Definitions and Tolerance Levels

EPA also plans to exercise its FFDCa authority to update commodity definitions, crop groups, and tolerance levels, for captan through future rulemaking. The Agency expects to propose the changes to captan tolerances summarized in Table 2 below after implementation of the mitigation measures described in this document. In addition, if seed treatment uses of captan are terminated as proposed, EPA anticipates revoking the associated tolerances at the conclusion of this registration review.

Table 2. Captan 40 CFR §180.103 Summary of Anticipated Tolerance Actions			
Commodity	Established Tolerance (ppm)	Recommended Tolerance (ppm)	Comments <i>Correct Commodity Definition</i>
Raw Agricultural Commodities in 40 CFR §180.103 (a)(1)			
Almond	0.25	0.3	Increase to harmonize with Codex
Almond, hulls	75.0	75	Change to Rounding
Apple	25.0	25	Change to Rounding
Raw Agricultural Commodities			
Apple	25.0	25	Change to Rounding
Apricot	10.0	10	Change to Rounding
Blueberry	20.0	20	Change to Rounding
Caneberry subgroup 13-07A	--	25	Establish new tolerance for <i>Caneberry subgroup 13-07A</i> ; concomitant with revoking tolerance for <i>Caneberry subgroup 13A</i> ; Change to Rounding
Caneberry subgroup 13A	25.0	Revoke	
Cherry, sweet	50.0	50	Change to Rounding
Cherry, tart	50.0	50	Change to Rounding
Grape	25.0	25	Change to Rounding
Nectarine	25.0	25	Change to Rounding
Okra	0.05	Revoke	Move to <i>Crop Group 8-10</i>
Peach	15.0	20	Increase to Harmonize with Codex
Pear	25.0	25	Change to Rounding
Plum, prune, fresh	10.0	10	Change to Rounding
Strawberry	20.0	20	Change to Rounding
Vegetable, leafy, except Brassica, group 4	0.05	Revoke	Crop group update
Vegetable, <i>Brassica</i> head and stem, group 5-16	--	0.05	Establish new tolerance for vegetable, <i>Brassica</i> , head and stem, group 5-16 concomitant with revocation of tolerance for <i>vegetable, Brassica, leafy, group 5</i>
Vegetable, <i>Brassica</i> leafy, group 5	0.05	Revoke	
Vegetable, bulb, group 3-07	--	0.05	Crop group conversion/revision
Vegetable, bulb, group 3	0.05	Revoke	

Table 2. Captan 40 CFR §180.103 Summary of Anticipated Tolerance Actions			
Commodity	Established Tolerance (ppm)	Recommended Tolerance (ppm)	Comments <i>Correct Commodity Definition</i>
Vegetable, fruiting, group 8-10	--	0.05	Crop Group Update
Vegetable, fruiting, group 8	0.05	Revoke	
Vegetable, leaf petiole, subgroup 22B	--	0.05	Establish new tolerance for crop group 22B to cover residues on celtuce and Florence fennel (These were previously covered by a crop group tolerance for <i>subgroup 4B</i>)
Vegetable, leafy, group 4-16	--	0.05	Establish new tolerance for <i>vegetable, leafy, except Brassica, group 4</i>
Vegetable, leafy, except <i>Brassica</i> , group 4	0.05	Revoke	
Livestock Feed Commodities			
Cattle, meat	0.20	0.2	Conformation with OECD rounding classes
Cattle, meat byproducts	0.30	0.3	
Goat, meat	0.30	0.3	
Goat, meat byproducts	0.30	0.3	
Hog, meat	0.20	0.2	
Hog, meat byproducts	0.30	0.3	
Horse, meat	0.20	0.3	
Horse, meat byproducts	0.30	0.3	
Milk	0.10	0.1	
Sheep, meat	0.20	0.2	
Sheet, meat byproducts	0.30	0.3	

3. International Harmonization

The U.S. tolerance expression for captan (parent captan for raw agricultural commodities) is harmonized with Canadian and Codex MRLs. However, because the U.S. tolerance expression for livestock commodities includes captan and its degradate THPI, it cannot be harmonized.

Codex has established Maximum Residue Levels (MRLs) for captan residues in/on almonds; blueberries; cherries; cucumber; dried grapes (including currants, raisins, and sultanas); grapes; melons, except watermelon; nectarine; peach; plums (including fresh prunes); pome fruits; potato; raspberries, red, black; spices, roots and rhizomes; strawberry; and tomato.

EPA plans to increase the tolerance for captan residues in or on almonds from 0.25 to 0.3 ppm and the tolerance for peach from 15 to 20 ppm to harmonize with Codex. The tolerance for captan on *vegetable, root and tuber, group 1*, is harmonized with the Codex MRL for potato at 0.05 ppm. However, Codex does not have MRLs for carrot, radish, or sugar beet, which are also included in *vegetable, root and tuber, group 1*. EPA is unable to harmonize the U.S. tolerances for captan with Codex MRLs for blueberries, cherries, cucumber, dried grapes, (fresh) grapes, melons, nectarines, plums, pome fruits, potato, raspberries, and strawberries for various reasons.

These are summarized in the detailed analysis of differences between U.S. tolerances for captan and the Codex and Canadian MRLs in Appendix E.

F. Proposed Data Requirements

EPA proposes that registrants submit an additional avian chronic toxicity study (OSCPP Guideline 850.2300) and additional Tier 1 larval and adult honey bee chronic studies. EPA will determine if additional Tier 2 data are needed after the evaluation of Tier 1 data. However, the Agency anticipates issuing a DCI including all potentially necessary pollinator data, in keeping with current practice.

V. Proposed Interim Registration Review Decision for Captan

EPA is issuing this amended PID in accordance with 40 C.F.R. §§ 155.56 and 155.58. The Agency has made the following proposed interim decision for captan: (1) EPA proposes that additional Tier 1 larval and adult bee chronic toxicity data and avian chronic tox data are required at this time and (2) EPA proposes that captan does not meet the registration standard without changes to the affected registrations and their labeling. EPA has determined that the mitigation proposed in Sections IV.A. and IV.B. of this document and Appendices A and B are sufficient to address certain risk concerns.

The Agency conducted several detailed draft HHRA and ERA for captan. In these risk assessments, EPA identified several risks associated with continuing to register captan, including potential risks to residential handlers and adults and children entering residential areas treated with captan,⁸⁹ potential occupational handler and post-application risks, and potential risk to birds, mammals, and pollinating insects. To address the potential risks of concern, registrants voluntarily canceled or amended the associated product registrations. In addition, EPA is proposing to prohibit the use of home and garden products containing more than 12% captan, to require label changes that would terminate aerial application of the WP and DF/WDG formulations of captan for certain crops, and to require additional personal protective equipment and changes to REIs, environmental hazard and spray drift statements to captan labels, label changes to address generic labeling requirements for all registered captan products and uses. The Agency is proposing to require specific local pesticide use limitations to implement the 2011 Salmonid BiOp. Last, EPA is proposing to apply FIFRA interim ecological mitigation to further address protect nontarget organisms, including threatened and endangered species. These measures are described in detail in Section IV of this document. Any remaining risks associated with use of captan are outweighed by the benefits of captan as described below and in Section III.C.

EPA also proposes that continuing to register captan provides high benefits to growers, especially for orchard crops, berries, ginseng, and grapes. Captan is a multi-site phthalamide fungicide classified within FRAC Group M4. It controls/suppresses fungal growth by direct contact with foliage or fruit. Because captan has multi-site and protectant modes of action, it is

⁸⁹ As described in Section I.A. of this document, registrants voluntarily canceled or amended product registrations associated with the residential risk concerns prior to completion of this PID.

not associated with fungicide resistance, unlike most other fungicides registered on the same crops. There have been no reports of fungicide resistance associated with captan since it was first registered in 1951. Although there are other multi-site fungicides registered for these crops, they may be limited by application timing (mancozeb) or other restrictions and/or have lower efficacy against the pathogens targeted by captan. In addition, captan is less expensive than many other fungicides. Therefore, captan has high benefits when used in or on orchard crops, berries, and ginseng.

During registration review, EPA considers whether a pesticide registration “continues to satisfy the FIFRA standard for registration.”⁹⁰ Here, EPA proposes that captan does not meet the FIFRA registration standard without the changes to the affected registrations and their labeling described in Section IV.A. of this document and in Appendices A and B. These changes are necessary to mitigate unreasonable adverse effects on human health and the environment. The proposed changes to handler PPE and REIs for re-entry mitigate EPA’s risk concerns for adverse effects on human health described in Section III of this document. The proposed restrictions on aerial application mitigate adverse effects to both human health and the environment. The proposed environmental hazard statements and revisions to spray drift labeling also mitigate adverse effects on the environment. Although some ecological risks may remain after implementation of these measures, the Agency believes that the benefits of captan use to agriculture (described in Section III.D. of this document) outweigh its risks.

During registration review, EPA also considers whether a pesticide continues to meet the FFDCA standard of a “reasonable certainty of no harm.” Section III.A. of this document summarizes the Agency’s assessment of risks from aggregate exposure to captan via residues in food and drinking water or from bystander exposure or residential use. It also addresses whether captan is a member of a class of chemicals sharing a common mechanism of action (as defined by FQPA) and whether a cumulative risk assessment is necessary. Section IV.A.1. of this document describes registrant actions and an EPA proposal to address the residential and aggregate risk concerns identified. Therefore, in this PID, EPA proposes to determine that there is no human dietary risk from registered uses of captan that is inconsistent with the FFDCA safety standard. Taking into consideration the available information on toxicity and exposure, EPA assessed captan’s potential aggregate risks, from dietary exposure to captan residues in food and drinking water. The Agency determined that there are no risk concerns for aggregate exposure to food and drinking water. Therefore, EPA proposes to conclude that there is a reasonable certainty that no harm would result from aggregate exposure to captan, including all anticipated dietary exposures and all other exposures for which there is reliable information and that captan’s residues are safe. EPA intends to retain the captan tolerances and

⁹⁰ 40 C.F.R. § 155.40(a); 7 U.S.C. § 136a(c)(5); *see also* 7 U.S.C. §§ 136(bb) (defining “unreasonable adverse effects on the environment” as encompassing both “any unreasonable risk to man or the environment, taking into account the economic, social, and environmental costs and benefits of the use of any pesticide” (FIFRA’s risk-benefit standard) and “a human dietary risk from residues that result from a use of a pesticide in or on any food inconsistent with the FFDCA safety standard”). In a PID, EPA sets out a proposed interim decision that includes EPA’s “proposed findings with respect to the FIFRA standard for registration and describe the basis for such proposed findings.” 40 C.F.R. §§ 155.56, 155.58(b)(1).

to proceed with the tolerance actions⁹¹ identified in Table 2, as EPA's analysis indicates that such modifications would also be safe.

In this PID, EPA is not making a complete endangered species finding, although the proposed mitigation is expected to reduce the extent of environmental exposure and may reduce risk to listed species whose range or critical habitat co-occur with the use of captan. The Agency will complete a nationwide listed-species assessment and any necessary Endangered Species Act (ESA) Section 7 consultation with the Services before issuing a final registration review decision for captan. For more information, see Appendix C.

EPA previously required data to support antimicrobial uses of captan in GDCI-081301-1381. After the captan technical registrants amended product registrations to delete these uses, the Agency waived the antimicrobial data requirements. EPA also required a turf transferable residue study in a separate DCI for conventional uses of captan, GDCI-081301-1383. The registrants have not fulfilled this data requirement; instead, they requested a data waiver, and most registrants amended their product registrations to delete all turf and turf-like uses.⁹² EPA has waived the TTR data requirement⁹³ for registrants who have amended their labels. As part of this proposed interim decision, EPA is proposing that any remaining products containing turf and turf-like uses be amended to delete these uses.

Through this registration review, the Agency has identified the need for additional honey bee data to evaluate risk to insect pollinators. Therefore, at this time, EPA proposes that registrants submit additional Tier 1 chronic toxicity data for both larval and adult honey bees. The Agency will issue a DCI to establish a timeline for submitting this data.

VI. NEXT STEPS AND TIMELINE

A Federal Register Notice will announce the availability of this amended Captan PID and open a 60-day comment period on the PID, including all appendices. The Agency may issue an Interim Registration Review Decision (ID) for captan after the close of this comment period if commenters do not submit significant comments or additional information that lead the Agency to change the proposed interim decision in Section IV.C, above. EPA may make a final registration review decision for captan without previously issuing an ID. The Agency will make a final registration review decision for captan only after EPA completes a nationwide endangered species determination and any necessary consultation with the Services. The captan registrants must submit amended product labels, which include the label changes described in Appendices A and B and requests for amendment of their product registrations within 60 days of publication of the ID.

⁹¹ Tolerance changes will be implemented through a future rulemaking in accordance with FFDCA § 408.

⁹² During registration review, the registrants may request a waiver of data requirements by requesting an extension of an existing waiver or by requesting a new waiver from EPA. 40 C.F.R. § 152.91.

⁹³ Letters waiving the TTR data requirement may be found in the captan docket, EPA-HQ-OPP-2013-0296.

Appendix A: Summary of Proposed Actions for Captan

Registration Review Case #: 0120 PC Code: 081301 Chemical Type: Fungicide Chemical Family: Phthalamide Mode of Action: FRAC Group M4						
Affected Population(s)	Source of Exposure	Route of Exposure	Duration of Exposure	Potential Risk(s) of Concern	Proposed Actions	Comment
• Occupational handler	Handling products and applying spray solution containing product	Dermal Inhalation	Short Term	Reproductive toxicity Respiratory effects	Reduce application rates Prohibit aerial application of DF/WDG and WP products Additional PPE Engineering controls Limit application by mechanically pressurized handgun to spot treatments	Mitigation varies by crop, formulation, and application method
• Occupational post application	Residues on treated foliage	Dermal	Short Term	Severe acute toxicity (eyes and skin) Reproductive toxicity Respiratory effects	Longer REI for high contact activities or reduced application rates Continue PPE for early entry	REI varies by crop and activity
• Nontarget organisms	Spray drift and treated seeds	Dermal Ingestion	Acute Chronic	Reproductive toxicity Indirect effects	Mandatory and advisory spray drift measures Prohibit aerial applications of DF/WDG and WP Require burial or disposal of treated seed spilled on field	Different wind speed requirements for ESA (Salmonid BiOp)
• Nontarget organisms and threatened and endangered species	Spray drift, runoff, consumption of treated seeds	Dermal Ingestion	Acute Chronic	Reproductive toxicity Indirect effects	FIFRA Interim Ecological Mitigation	
• Endangered Species (Pacific salmonids in CA, OR, WA, and ID)	Residues in surface water from runoff and spray drift	Ingestion	Acute Chronic	Reproductive toxicity Indirect effects	Implement 2011 NMFS Salmonid BiOp RPMs	Implementation via <i>BulletinsLive! Two</i>

Appendix B: Proposed Labeling Changes for Captan Products

Description	Proposed Label Language for Captan Products	Placement on Label
Technical and Manufacturing Use Products		
Use prohibitions	<p>“Do not formulate into products labeled for use on turf, St Augustine grass or any other lawn or ornamental grasses, lawn seed beds, or dichondra.”</p> <p>“Do not formulate into products labeled for antimicrobial use.”</p> <p>“Do not formulate into dust products for seed treatment.”</p>	Use Restrictions Prohibitions
Use Restriction Consumer products	This product may only be formulated into consumer products containing less than 12% captan active ingredient.	Use Restrictions Formulation of Consumer Products
Endangered Species Protections	<p>“This product may only be formulated into end-use products that contain the following language on their labeling when they are released for shipment: <i>“ENDANGERED SPECIES PROTECTION REQUIREMENTS”</i> (to be placed at the beginning of the Directions for Use section of all end-use product labels) <i>“It is a Federal offense to use any pesticide in a manner that results in an unauthorized “take” (e.g., kill or otherwise harm) of an endangered species, and certain threatened species, under the Endangered Species Act Section 9. When using this product, you must follow the measures contained in the Endangered Species Protection Bulletin for the area in which you are applying the product. You must obtain a Bulletin no earlier than six months before using this product. To obtain Bulletins, consult http://www.epa.gov/espp/, call 1-844-447-3813, or email ESPP@epa.gov. You must use the Bulletin valid for the month in which you will apply the product.”</i></p>	Use Restrictions Endangered Species Protection
End Use Products		
Mode of Action Group Number	<p>Note to registrant:</p> <ul style="list-style-type: none"> • Include the name of the ACTIVE INGREDIENT in the first column. • Include the word “GROUP” in the second column. • Include the MODE/MECHANISM/SITE OF ACTION CODE in the third column (for fungicides this is the FRAC Code, and for insecticides this is the Primary Site of Action; for Herbicides this is SITE OF ACTION). • Include the type of pesticide (i.e., FUNGICIDE in the fourth column. All text should be black, bold face and all caps on a white background, except the mode of action code, which should be white, bold face and all caps on a black background; all text and columns should be surrounded by a black rectangle. 	Front Panel, upper right quadrant.

Description	Proposed Label Language for Captan Products				Placement on Label
	CAPTAN	GROUP	M04	FUNGICIDE	
Application Prohibitions	“Not for use on dichondra, grasses or grass substitutes, groundcovers, lawns, lawn seed beds, turf, or turf-like grasses.”				Use Restrictions
Application Prohibitions WP and DF/WDG products only	“Do not apply by air or chemigation.”				Use Restrictions
Use of Extraction Probes (Stingers) For all liquid concentrates	“Removable chemical extraction probes (also known as “stingers”) used in suction/extraction systems must be rinsed within the pesticide container prior to removal.”				Use Restrictions
Updated Gloves Statement	Update the gloves statements to be consistent with Chapter 10 of the Label Review Manual. In particular, remove reference to specific categories in EPA’s chemical-resistance category selection chart and list the appropriate chemical-resistant glove types to use.				Personal Protective Equipment (PPE)
Updated Respirator Statement PF10 respirators	<p><i>Note to registrant: If your end-use product only requires protection from particulates only (low volatility), use the following language:</i> “Wear a minimum of a NIOSH-approved particulate filtering facepiece respirator with any N*, R or P filter; <u>OR</u> a NIOSH-approved elastomeric particulate respirator with any N*, R or P filter; <u>OR</u> a NIOSH-approved powered air purifying respirator with HE filters.”</p> <p><i>Note to registrant: For respiratory protection from organic vapor and particulates (or aerosols), use the following language:</i> “Wear a minimum of a NIOSH-approved elastomeric half mask respirator with organic vapor (OV) cartridges and combination N*, R, or P filters; <u>OR</u> a NIOSH-approved gas mask with OV</p>				Personal Protective Equipment (PPE) within the Precautionary Statements

Description	Proposed Label Language for Captan Products	Placement on Label
	<p>canisters; <u>OR</u> a NIOSH-approved powered air purifying respirator with OV cartridges and combination HE filters.”</p> <p>*Drop the “N” option if there is oil in the product’s formulation and/or the product is labeled for mixing with oil-containing products.</p>	
<p>Updated Respirator Statement PF50 Respirators</p>	<p><i>Note to registrant: If your end-use product only requires protection from particulates only (low volatility), use the following language:</i> “Wear a minimum of a NIOSH-approved elastomeric full face particulate respirator with any N*, R or P filter.”</p> <p><i>Note to registrant: For respiratory protection from organic vapor and particulates (or aerosols), use the following language:</i> “Wear a minimum of a NIOSH-approved elastomeric full mask respirator with organic vapor (OV) cartridges and combination N*, R, or P filters; <u>OR</u> a NIOSH-approved full face gas mask with OV canisters.”</p> <p>*Drop the “N” option if there is oil in the product’s formulation and/or the product is labeled for mixing with oil-containing products.</p>	<p>Personal Protective Equipment (PPE) within the Precautionary Statements</p>
<p>Respirator Fit NonWPS Uses</p>	<p>“Respirator fit testing, medical qualification, and training Using a program that conforms to OSHA’s requirements (see 29 CFR Part 1910.134), employers must verify that any handler who uses a respirator is:</p> <ul style="list-style-type: none"> • Fit-tested and fit-checked, • Trained, and • Examined by a qualified medical practitioner to ensure physical ability to safely wear the style of respirator to be worn. A qualified medical practitioner is a physician or other licensed health care professional who will evaluate the ability of a worker to wear a respirator. The initial evaluation consists of a questionnaire that asks about medical conditions (such as a heart condition) that would be problematic for respirator use. If concerns are identified, then additional evaluations, such as a physical exam, might be necessary. The initial evaluation must be done before respirator use begins. Handlers must be reexamined by a qualified medical practitioner if their health status or respirator style or use conditions change. <p>Upon request by local/state/federal/tribal enforcement personnel, employers must provide documentation demonstrating how they have complied with these requirements.”</p>	<p>Personal Protective Equipment (PPE) within the Precautionary Statements</p>
<p>PF50 Respirator Commercial Use Labels,</p>	<p>Note to registrant: Pesticide handlers mixing and loading WP and DF/WDG formulations for airblast and groundboom application must wear a PF50 respirator to address inhalation risk concerns. Either a</p>	<p>Directions for Use</p>

Description	Proposed Label Language for Captan Products	Placement on Label
DF/WDG and WP formulations only (Does not apply to liquid formulations)	full- or half-face elastomeric respirator, with appropriate cartridges, which reduce inhalation exposure by 99%, may be used to fulfill this proposed requirement.	
PF10 Respirator Seed Treatment Labels Only <i>For Seed Treatment Using Commercial Equipment</i>	Note to Registrant: In commercial seed treatment facilities and for on-farm treatment using commercial equipment, pesticide handlers using captan who are treating the following seeds must wear a PF10 respirator to address inhalation risk concerns:	Personal Protective Equipment (PPE)
PF10 Respirator Seed Treatment Labels Only	Note to Registrant: All commercial seed treatment facilities and for on-farm treatment using commercial equipment, pesticide handlers using captan in seed treatment facilities who are performing only one activity in a day must wear a PF10 respirator	Personal Protective Equipment (PPE)
Seed Treatment Products <i>Commercial Seed Treatment</i>	Not for use on alfalfa, clover, <i>Lespedeza</i> , and trefoil; barley, oats, rye, sorghum, and wheat; beans, dry or succulent; beets, garden and sugar beets; Swiss chard; field corn and sweet corn; bluegrass; grass for forage, fodder, and hay; cotton and flax; oats; onion, both green and dry bulb; peanut; garden pea; spinach; pumpkin; summer and winter squash, and watermelon; soybean; spinach; and strawberry.	Use Restrictions
Seed Treatment Products <i>On Farm Seed Treatment</i>	Not for use on barley, oat, rye, or wheat; beans, dry or succulent;	Use Restrictions
Pollinator Hazard Statement For all products applied to agricultural crops.	“This product is moderately toxic to bees and other pollinating non-target insects exposed to direct treatment on blooming crops or weeds.”	Environmental Hazards under the Heading “POLLINATOR HAZARD STATEMENT”

Description	Proposed Label Language for Captan Products	Placement on Label
<p>Pollinator Protection Best Management Practices</p> <p>For all products applied to agricultural crops</p>	<p><i>“Advisory Best Management Practices for Pollinator Protection</i></p> <p><i>The following best management practices (BMPs) can help reduce risk to pollinators:</i></p> <ul style="list-style-type: none"> • <i>Develop and maintain clear communication with local beekeepers to help protect bees. To the extent possible, advise beekeepers within a 1-mile radius 48-hrs in advance of the application, and confirm hive locations before spraying.</i> • <i>Avoid applications when bees are actively foraging.</i> • <i>Avoid applying pesticides to plants in bloom, including flowering weeds.</i> • <i>Apply pesticides in the evening or at night when fewer bees are foraging.</i> • <i>Use Pollinator Protection Plans when they are available. These plans, which may be available from state lead agencies, promote communication between growers, landowners, farmers, beekeepers, pesticide users, and other pest management professionals to reduce exposure of bees and other pollinators to pesticides.</i> • <i>Use integrated pest management (IPM) to prevent or mitigate potential negative effects to pollinators and consider multiple pest management options before resorting to a pesticide application.</i> • <i>Mowing understory weeds or cover crops in orchards and vineyards before they bloom can prevent flowering of weeds and reduce exposure to bees where and when pesticides are applied.</i> <p><i>The following BMPs can help promote the health and habitat of ground-nesting bees:</i></p> <ul style="list-style-type: none"> • <i>For uncultivated land, leaving large undisturbed patches of land un-mowed and untilled can provide nesting and forage sites for pollinators.</i> • <i>For uncultivated land, mowing at the highest cutting height possible (minimum of 8-10 inches if possible) can increase and diversify food sources.</i> <p><i>For additional resources on pollinator BMPs and Pollinator Protection Plans, visit https://www.epa.gov/pollinator-protection/find-best-management-practices-protect-pollinators.”</i></p>	<p>Environmental Hazards under the Heading “POLLINATOR HAZARD STATEMENT”</p>
<p>Endangered Species Protection (All end-use products)</p>	<p><i>“Endangered Species Protection Requirements: It is a Federal offense to use any pesticide in a manner that results in an unauthorized “take” (e.g., kill or otherwise harm) of an endangered species and certain threatened species, under the Endangered Species Act section 9. When using this product, you must follow the measures contained in the Endangered Species Protection Bulletin for the area in which you are applying the product. You must obtain a Bulletin no earlier than six months before using this product. To obtain Bulletins, consult http://www.epa.gov/espp/, call 1-844-447-3813, or email ESPP@epa.gov. You must use the Bulletin valid for the month in which you will apply the product.”</i></p>	<p>Environmental Hazards under the heading “Endangered Species Protection”</p>

Description	Proposed Label Language for Captan Products	Placement on Label
Water Protection Statements For all products delivered via liquid spray applications	“WATER PROTECTION STATEMENT <ul style="list-style-type: none"> Do not apply during rain. Do not apply when soil is saturated.” 	Directions for Use –Under the Restriction or Use Restriction Section
Non-target Organism Advisory (All Commercial Product Labels)	“For terrestrial uses: Do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean high-water mark. Do not contaminate water when disposing of equipment washwater or rinsate.” “This pesticide is toxic to fish and aquatic invertebrates.” “Drift and runoff may be hazardous to aquatic organisms in water adjacent to treated areas.”	Environmental Hazards
Non-target Organism Advisory (Seed Treatment Products)	<ul style="list-style-type: none"> Treated seeds exposed on the soil surface may be hazardous to wildlife. Cover or collect treated seeds spilled during loading and planting (such as in row ends). Do not plant treated seed by broadcasting to the soil surface. Ensure that all planted seeds are thoroughly incorporated by the planter during planting. Additional incorporation may be required to thoroughly cover exposed seeds. 	Environmental Hazards on bag tag for treated seed (Seed treatment products only)
Endangered Species Protection Requirements	“ENDANGERED AND THREATENED SPECIES PROTECTION REQUIREMENTS: Before using this product, you must obtain any applicable Endangered Species Protection Bulletins (‘Bulletins’) within six months prior to or on the day of application. To obtain Bulletins, go to Bulletins Live! Two (BLT) at https://www.epa.gov/pesticides/bulletins . When using this product, you must follow all directions and restrictions contained in any applicable Bulletin(s) for the area where you are applying the product, including any restrictions on application timing if applicable. It is a violation of Federal law to use this product in a manner inconsistent with its labeling, including this labeling instruction to follow all directions and restrictions contained in any applicable Bulletin(s). For general questions or technical help, call 1-844-447-3813, or email ESPP@epa.gov .”	Directions for Use , at the beginning under the heading “ENDANGERED AND THREATENED SPECIES PROTECTION REQUIREMENTS”
Ecological Incidents Statement	“REPORTING ECOLOGICAL INCIDENTS: For guidance on reporting ecological incidents, including death, injury, or harm to plants and animals, including bees and other non-target insects, see EPA’s Pesticide Incident Reporting website: https://www.epa.gov/pesticide-incidents or call (registrant phone number)”.	Directions for Use , under the heading “REPORTING ECOLOGICAL INCIDENTS”

Description	Proposed Label Language for Captan Products	Placement on Label
Restricted Entry Interval (REI)	<p>“Do not enter or allow workers to enter during the restricted-entry interval (REI). The REI and exceptions are listed in the Directions for Use associated with the crop.”</p> <p>“Notify workers of the exception (including when entry is permitted for each of the tasks named in the exception).”</p>	AGRICULTURAL USE REQUIREMENTS Box
Restricted Entry Interval (REI) Wine and Juice Grapes	“Do not enter or allow workers to enter treated areas during the restricted entry interval (REI) of 3 days for hand harvesting or leaf pulling.”	DIRECTIONS FOR USE Below GENERAL USE PRECAUTIONS (List under specific crops)
Restricted Entry Interval (REI) Table Grapes	“Do not enter or allow workers to enter treated areas during the restricted entry interval (REI) of 5 days for girdling and turning table grapes grown on T trellises.”	DIRECTIONS FOR USE Below GENERAL USE PRECAUTIONS (List under specific crops)
Restricted Entry Interval (REI)	“Do not enter or allow workers to enter treated areas during the restricted entry interval (REI) of 8 days for handling, maintaining, moving, or repairing handset irrigation for ornamental crops.”	
Rate Reductions	<p>Orchard Crops</p> <ul style="list-style-type: none"> Reduce maximum application rate for apples, peaches, and nectarines from 4 to 3 lbs. ai/A. Reduce maximum application rate for cherries from 3.16 to 3 lbs. ai/A. <p><u>Grapes</u></p> <ul style="list-style-type: none"> Reduce maximum application rate from 2 to 1.75 lbs. ai/A. <p>Specify new maximum rate in both terms of lbs. ai/A and product to be applied</p>	
Engineering Controls Enclosed Cabs (Airblast application to orchard crops)	<p><u>Orchard Crops</u></p> <ul style="list-style-type: none"> Airblast Applicators must use an enclosed cab. 	DIRECTIONS FOR USE Below GENERAL USE PRECAUTIONS Engineering Controls (List under specific crops)
Engineering Controls Enclosed Cabs (Airblast application to	<p><u>Blueberries</u></p> <ul style="list-style-type: none"> Airblast Applicators must use an enclosed cab. Alternatively, airblast applicators may use an open cab, but must wear a PF10 respirator, chemical-resistant gloves, and long sleeve shirt, long pants, shoes, and socks. 	DIRECTIONS FOR USE Below GENERAL USE PRECAUTIONS Engineering Controls (List under specific crops)

Description	Proposed Label Language for Captan Products	Placement on Label
blueberries and caneberries)		
Application with Mechanically pressurized handgun to fruit and nut crops	<ul style="list-style-type: none"> • Applicators must wear a PF10 respirator, chemical-resistant gloves, long sleeves, long pants, shoes, and socks. • Application is limited to spot treatment. 	Directions for Use (List under specific crops)
Application with Mechanically pressurized handgun to ornamentals	<ul style="list-style-type: none"> • Application is limited to spot treatment. 	Directions for Use
Root Dip (For peach trees, roots, and tubers)	<ul style="list-style-type: none"> • Hand dipping is prohibited 	Directions for Use (List under specific crops)
Seed Treatment Dye Statement	<p>“REQUIRED DYE STATEMENT</p> <p>Seed treated with this product must be visually identifiable from untreated seed by the use of an approved colorant or dye to prevent accidental use of treated seed as food for humans or feed for animals. Refer to 21 CFR, Part 2.25. Any colorant or dye added to treated seed must be cleared for use in accordance with 40 CFR, Part 153.155(c).”</p>	Directions for Use section of the FIFRA registered pesticide label (and on the seed bag tag if the seed has not been dyed before distribution)
Treated Seed Product - Instructions for treated seed products produced using on-farm seed treatment (not for	<p>“Use of On-Farm Treated Seed (when treated seeds are not for sale or distribution)</p> <p>Treated seed sold or distributed for a use not permitted by the following labeling does not qualify as an exempted treated article under 40 CFR 152.25(a) and is therefore sale or distribution of an unregistered pesticide, pursuant to FIFRA section 12.</p> <ul style="list-style-type: none"> • Store treated seed away from food and feedstuffs. • Do not allow children, pets, or livestock to have access to treated seeds. 	

Description	Proposed Label Language for Captan Products	Placement on Label
<p>distribution or sale of the seed) with a FIFRA registered pesticide</p>	<ul style="list-style-type: none"> • Treated seeds are for planting purposes only. Do not use for food, feed, or oil purposes. Do not use treated seeds for fuel or ethanol production purposes. • Do not plant treated seed by broadcasting to the soil surface. Ensure that all planted seeds are thoroughly incorporated by the planter during planting. Additional incorporation may be required to thoroughly cover exposed seeds. • Treated seeds exposed on the soil surface may be hazardous to wildlife. Cover or collect treated seeds spilled during loading and planting (such as in row ends). • Manage excess treated seeds (e.g., spilled, unused, or expired treated seeds) by one or more of the following methods: <ul style="list-style-type: none"> ○ Collect excess treated seeds for reuse for planting. ○ Bury excess treated seeds (only allowed if totalling 1 pound or less) at least 30 feet away from bodies of water at a depth of 6 inches or double the planting depth, whichever is greater. ○ Dispose of excess treated seed by placing them in a landfill in accordance with applicable laws in your state. ○ Excess treated seeds may be returned to the supplier if permitted by the state. • Do not contaminate bodies of water when disposing of equipment wash water. <p>ADVISORY DUST-REDUCING TECHNIQUE The use of seed flow lubricants or polymer coatings may help decrease the amount of dust released during planting. Follow the recommendations of the planter manufacturer regarding the use of talc, graphite, or other seed flow lubricants.”</p> <p>NOTE TO REGISTRANT: All other requirements regarding the use of the treated seed, which include, but are not limited to, instructions relating to endangered species protection, environmental hazard statements, maximum use rates, soil incorporation depth, plant back intervals, personal protective equipment, and storage and disposal statements, remain and must be listed.</p>	

Description	Proposed Label Language for Captan Products	Placement on Label
<p>Treated Seed Product – Required Seed Bag/Container Labeling Instructions -</p> <p>For pesticide products allowed for use to treat seeds in commercial facilities or on-farm where the treated seed product is intended for sale or distribution (instructions must appear on seed bag tags when treated seeds are to be sold or distributed)</p>	<p>“Seed Treatment in Commercial Facilities or Seed Treatment On-Farm (when treated seeds are to be sold or distributed) – Seed Bag Labeling Requirements”</p> <p>“The Federal Seed Act requires that bags containing treated seeds shall be labeled with the following statements:</p> <ul style="list-style-type: none"> • This seed has been treated with (insert name of active ingredient of pesticide). • Do not use for food, feed, or oil purposes.” <p>“The U.S. Environmental Protection Agency requires that bags containing treated seeds shall be labeled with the following statements. Any seed treated with [PRODUCT NAME] that is sold or distributed without these statements or that is sold or distributed for a use not permitted by the following labeling does not qualify as an exempted treated article under 40 CFR 152.25(a) and is therefore sale or distribution of an unregistered pesticide, pursuant to FIFRA section 12(a)(1)(A).</p> <p>This seed has been treated with [INSERT PRODUCT NAME(s) (EPA REG. NO(s))] containing [INSERT NAME(S) OF ACTIVE INGREDIENT(S)]. Any seed treated with [PRODUCT NAME] that is sold or distributed for a use not permitted by the following labeling does not qualify as an exempted treated article under 40 CFR 152.25(a) and is therefore sale or distribution of an unregistered pesticide, pursuant to FIFRA section 12(a)(1)(A).</p> <ul style="list-style-type: none"> • The contents of this bag are for planting purposes only. Do not use for food, feed, or oil purposes. Do not use for fuel or ethanol production purposes. • Store treated seed away from food and feedstuffs. • Do not allow children, pets, or livestock to have access to treated seeds. • Do not plant treated seed by broadcasting to the soil surface. Ensure that all planted seeds are thoroughly incorporated by the planter during planting, additional incorporation may be required to thoroughly cover exposed seeds. • Treated seeds exposed on the soil surface may be hazardous to wildlife. Cover or collect treated seeds spilled during loading and planting (such as in row ends). • Manage excess treated seeds (e.g., spilled, unused, or expired treated seeds) by one or more of the following methods: <ul style="list-style-type: none"> ○ Collect excess treated seeds for reuse for planting. ○ Bury excess treated seeds (only allowed if totalling 1 pound or less) at least 30 feet away from bodies of water at a depth of 6 inches or double the planting depth, whichever is greater. 	

Description	Proposed Label Language for Captan Products	Placement on Label
	<ul style="list-style-type: none"> ○ Dispose of excess treated seed by placing them in a landfill in accordance with applicable laws in your state. ○ Excess treated seeds may be returned to the supplier if permitted by the state. • Do not contaminate bodies of water when disposing of equipment wash water. • Dispose of seed packaging or containers in accordance with local requirements. <p>ADVISORY DUST-REDUCING TECHNIQUE The use of seed flow lubricants or polymer coatings may help decrease the amount of dust released during planting. Follow the recommendations of the planter manufacturer regarding the use of talc, graphite, or other seed flow lubricants.”</p> <ul style="list-style-type: none"> • [NOTE TO REGISTRANT: All other requirements regarding the use of the treated seed, which include, but are not limited to, instructions relating to endangered species protection, environmental hazard statements, maximum use rates, soil incorporation depth, plant back intervals, personal protective equipment, and storage and disposal statements, remain and must be listed on the seed bag tag. All seed bag tags must be legible and set in at least 8-point font size.] 	
<p>Resistance-management for fungicides and bactericides</p> <p>The pesticide resistance management labeling applies to all conventional outdoor pesticide products.</p>	<p><i>Note to registrants:</i> Include resistance management label language for fungicides/bactericides from PRN 2017-1 (https://www.epa.gov/pesticide-registration/pesticide-registration-notice-year). See section 3 (Scope) of the PRN to determine whether the resistance management measures outlined in the PRN apply to your product.</p>	<p>Directions for Use, prior to directions for specific crops</p>
<p>Spray Drift Management Application Restrictions (Liquid formulations only)</p>	<p>“MANDATORY SPRAY DRIFT MANAGEMENT <u>Aerial Applications:</u></p> <ul style="list-style-type: none"> • Do not release spray at a height greater than 10 ft above the ground or vegetative canopy unless a greater application height is necessary for pilot safety. • Applicators must select nozzle and pressure that deliver medium or courser droplets in accordance with American Society of Agricultural & Biological Engineers Standard 641 (ASABE S641). If the windspeed is 10 miles per hour or less, applicators must use ½ swath displacement upwind at the downwind edge of the field. When the windspeed is between 11- 	<p>Directions for Use, below the AGRICULTURAL USE REQUIREMENTS box Under the heading “MANDATORY SPRAY DRIFT MANAGEMENT”</p>

Description	Proposed Label Language for Captan Products	Placement on Label
<p>Registrants: Remove this text from labels for DF/WDG and WP Formulations</p>	<p>15 miles per hour, applicators must use ¾ swath displacement upwind at the downwind edge of the field.</p> <ul style="list-style-type: none"> Do not apply when wind speeds exceed 15 mph at the application site. If the windspeed is greater than 10 mph, the boom length must be 65% or less of the wingspan for fixed wing aircraft and 75% or less of the rotor diameter for helicopters. Otherwise, the boom length must be 75% or less of the wingspan for fixed-wing aircraft and 90% or less of the rotor diameter for helicopters. <p>Do not apply during temperature inversions.”</p>	<p>Placement for these statements should be before crop-specific directions for use.</p>
<p>Spray Drift Management Application Restrictions for all products that allow airblast applications</p>	<p>“MANDATORY SPRAY DRIFT MANAGEMENT Airblast applications:</p> <ul style="list-style-type: none"> Sprays must be directed into the canopy. Do not apply when wind speeds exceed 10 miles per hour at the application site. User must turn off outward pointing nozzles at row ends and when spraying outer row. Do not apply during temperature inversions.” 	<p>Directions for Use, below the AGRICULTURAL USE REQUIREMENTS box Under the heading “MANDATORY SPRAY DRIFT MANAGEMENT”</p>
<p>Spray Drift Management Application Restrictions for all products that are applied as liquids and allow ground boom applications</p>	<p>“MANDATORY SPRAY DRIFT MANAGEMENT Ground Boom Applications:</p> <ul style="list-style-type: none"> User must only apply with the release height recommended by the manufacturer, but no more than 4 feet above the ground or crop canopy. Applicators must select nozzle and pressure that deliver medium or courser droplets in accordance with American Society of Agricultural & Biological Engineers Standard 572 (ASABE S572). Do not apply when wind speeds exceed 15 mph at the application site. <p>Do not apply during temperature inversions.”</p>	<p>Directions for Use, below the AGRICULTURAL USE REQUIREMENTS box Under the heading “MANDATORY SPRAY DRIFT MANAGEMENT”</p>
<p>Advisory Spray Drift Management Language for all products delivered via liquid spray application</p>	<p>“SPRAY DRIFT ADVISORIES THE APPLICATOR IS RESPONSIBLE FOR AVOIDING OFF-SITE SPRAY DRIFT. BE AWARE OF NEARBY NON-TARGET SITES AND ENVIRONMENTAL CONDITIONS.</p> <p>IMPORTANCE OF DROPLET SIZE An effective way to reduce spray drift is to apply large droplets. Use the largest droplets that provide target pest control. While applying larger droplets will reduce spray drift, the potential for drift will be greater if applications are made improperly or under unfavorable environmental conditions.</p> <p>Controlling Droplet Size – Ground Boom (<i>note to registrants: remove if ground boom is prohibited on product labels</i>)</p>	<p>Directions for Use, below the AGRICULTURAL USE REQUIREMENTS box and the “MANDATORY SPRAY DRIFT MANAGEMENT” labeling</p>

Description	Proposed Label Language for Captan Products	Placement on Label
	<ul style="list-style-type: none"> • Volume - Increasing the spray volume so that larger droplets are produced will reduce spray drift. Use the highest practical spray volume for the application. If a greater spray volume is needed, consider using a nozzle with a higher flow rate. • Pressure - Use the lowest spray pressure recommended for the nozzle to produce the target spray volume and droplet size. • Spray Nozzle - Use a spray nozzle that is designed for the intended application. Consider using nozzles designed to reduce drift. <p>Controlling Droplet Size – Aircraft <i>(note to registrants: remove if aerial application is prohibited on product labels)</i></p> <ul style="list-style-type: none"> • Adjust Nozzles - Follow nozzle manufacturers’ recommendations for setting up nozzles. Generally, to reduce fine droplets, nozzles should be oriented parallel with the airflow in flight. <p>BOOM HEIGHT – Ground Boom <i>(note to registrants: remove if ground boom is prohibited on product labels)</i> For ground equipment, the boom should remain level with the crop and have minimal bounce.</p> <p>RELEASE HEIGHT - Aircraft <i>(note to registrants: remove if aerial application is prohibited on product labels)</i> Higher release heights increase the potential for spray drift.</p> <p>SHIELDED SPRAYERS Shielding the boom or individual nozzles can reduce spray drift. Consider using shielded sprayers. Verify that the shields are not interfering with the uniform deposition of the spray on the target area.</p> <p>TEMPERATURE AND HUMIDITY When making applications in hot and dry conditions, use larger droplets to reduce effects of evaporation.</p> <p>TEMPERATURE INVERSIONS Drift potential is high during a temperature inversion. Temperature inversions are characterized by increasing temperature with altitude and are common on nights with limited cloud cover and light to no wind. The presence of an inversion can be indicated by ground fog or by the movement of smoke from a ground source or an aircraft smoke generator. Smoke that layers and moves laterally in a concentrated cloud (under low wind conditions) indicates an inversion, while smoke that moves upward and rapidly dissipates indicates good vertical air mixing</p>	

Description	Proposed Label Language for Captan Products	Placement on Label
	<p>WIND Drift potential generally increases with wind speed. AVOID APPLICATIONS DURING GUSTY WIND CONDITIONS. Applicators need to be familiar with local wind patterns and terrain that could affect spray drift.”</p>	
<p>Advisory Spray Drift Management Language for all products that allow liquid applications with handheld technologies</p>	<p>“SPRAY DRIFT ADVISORIES <u>Handheld Technology Applications:</u></p> <ul style="list-style-type: none"> • Take precautions to minimize spray drift.” 	<p>Directions for Use, just below the Spray Drift box, under the heading “Spray Drift Advisories”</p>
<p>Additional Required Labelling Action Applies to all products delivered via liquid spray applications</p>	<p>Remove information about volumetric mean diameter from all labels where such information currently appears.</p>	<p>DIRECTIONS FOR USE SPRAY DRIFT MANAGEMENT</p>
<p>Prohibition of Aerial Application to captan DF/WDG and WP products</p>	<p>“Do not apply by air.”</p>	<p>Directions for Use, Directly Above Spray Drift Management</p>
<p>Directions for mixing/loading products packaged in water soluble bags</p>	<p>Instructions for Introducing Water Soluble Packages Directly into Spray tanks: “Soluble Packages (WSPs) are designed to dissolve in water. Agitation may be used, if necessary, to help dissolve the WSP. Failure to follow handling and mixing instructions can increase your exposure to the pesticide products in WSPs. WSPs, when used properly, qualify as a closed mixing/loading system under the Agricultural Worker Protection Standard [40 C.F.R. 170.607(d)].</p>	<p>Directions for Use</p>

Description	Proposed Label Language for Captan Products	Placement on Label
	<p>Handling Instructions Follow these steps when handling pesticide products in WSPs.</p> <ol style="list-style-type: none"> 1. Mix in spray tank only. 2. Handle the WSP in a manner that protects package from breakage and/or unintended release of contents. If package is broken, put on PPE required for clean-up and then continue with mixing instructions. 3. Keep the WSP in outer packaging until just before use. 4. Keep the WSP dry prior to adding to the spray tank. 5. Handle with dry gloves and according to the label instructions for PPE. 6. Keep the WSP intact. Do not cut or puncture the WSP. 7. Reseal the WSP outer packaging to protect any unused WSP(s). <p>Mixing Instructions Follow the steps below when mixing this product, including if it is tank-mixed with other pesticide products. If being tank-mixed, the mixing directions 1 through 9 below take precedence over the mixing directions of the other tank mix products. WSPs may, in some cases, be mixed with other pesticide products so long as the directions for use of all the pesticide product components do not conflict. Do not tank-mix this product with products that prohibit tank-mixing or have conflicting mixing directions.</p> <ol style="list-style-type: none"> 1. If a basket or strainer is present in the tank hatch, remove prior to adding the WSP to the tank. 2. Fill tank with water to approximately one-third to one-half of the desired final volume of spray. 3. Stop adding water and stop any agitation. 4. Place intact/unopened WSP into the tank. 5. Do not spray water from a hose or fill pipe to break or dissolve the WSP. 6. Start mechanical and recirculation agitation from the bottom of tank without using any overhead recirculation, if possible. If overhead recirculation cannot be turned off, close the hatch before starting agitation. 7. Dissolving the WSP may take up to 5 minutes or longer, depending on water temperature, water hardness and intensity of agitation. 8. Stop agitation before tank lid is opened. 9. Open the lid to the tank, exercising caution to avoid contact with dusts or spray mix, to verify that the WSP has fully dissolved and the contents have been thoroughly mixed into the solution. 10. Do not add other allowed products or complete filling the tank until the bags have fully dissolved and pesticide is thoroughly mixed. 	

Description	Proposed Label Language for Captan Products	Placement on Label
	<p>11. Once the WSP has fully dissolved and any other products have been added to the tank, resume filling the tank with water to the desired level, close the tank lid, and resume agitation.</p> <p>12. Use the spray solution when mixing is complete.</p> <p>13. Maintain agitation of the diluted pesticide mix during transport and application.</p> <p>14. It is unlawful to use any registered pesticide, including WSPs, in a manner inconsistent with its label.”</p> <p>For Toxicity Category I and II products:</p> <p>“ENGINEERING CONTROLS STATEMENT Water soluble packets, when used correctly, qualify as a closed mixing/loading system under the Worker Protection Standard [40 CFR 170.607(d)]. Mixers and loaders handling this product while it is enclosed in intact water soluble packets may elect to wear reduced PPE of long-sleeved shirt, long pants, shoes, socks, a chemical-resistant apron, and chemical-resistant gloves. When reduced PPE is worn because a closed system is being used, handlers must be provided all PPE specified above for “applicators and other handlers” and have such PPE immediately available for use in an emergency, such as a spill or equipment break-down.”</p> <p>For Toxicity Category III and IV products:</p> <p>“ENGINEERING CONTROLS STATEMENT Water soluble packets, when used correctly, qualify as a closed mixing/loading system under the Worker Protection Standard [40 CFR 170.607(d)]. Mixers and loaders handling this product while it is enclosed in intact water soluble packets may elect to wear reduced PPE of long-sleeved shirt, long pants, shoes, socks. When reduced PPE is worn because a closed system is being used, handlers must be provided all PPE specified above for “applicators and other handlers” and have such PPE immediately available for use in an emergency, such as a spill or equipment break-down.”</p>	

Appendix C: Listed-Species Assessment

This Appendix provides general background about the Agency’s assessment of risks from pesticides to endangered and threatened (listed) species under the Endangered Species Act (ESA). Additional background specific to captan appears at the conclusion of this Appendix.

Developing Approaches for ESA Assessments and Consultation for FIFRA Actions

In 2015, EPA, along with the Services—the U.S. Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS)—and the United States Department of Agriculture (USDA) (referred to as “the agencies”) released their joint Interim Approaches⁹⁴ for assessing the effects of pesticides to listed species. The agencies jointly developed these Interim Approaches in response to the 2013 National Academy of Sciences’ recommendations that discussed specific scientific and technical issues related to the development of assessments of pesticides’ effects to listed species. Since that time, the agencies have been continuing to work to improve the approaches for assessing effects to listed species. After receiving input from the Services and USDA on proposed revisions to the interim method and after consideration of public comments received, EPA released an updated *Revised Method for National Level Listed Species Biological Evaluations of Conventional Pesticides* (“Revised Method”) in March 2020.⁹⁵

The agencies also continue to work collaboratively through a FIFRA Interagency Working Group (IWG). The IWG was created under the 2018 Farm Bill to recommend improvements to the ESA section 7 consultation process for FIFRA actions and to increase opportunities for stakeholder input. This group is led by EPA and includes representatives from NMFS, FWS, USDA, and the Council on Environmental Quality (CEQ). The IWG outlines its recommendations and progress on implementing those recommendations in reports to Congress.⁹⁶

Consultation on Chemicals in Registration Review

EPA initially conducted biological evaluations (BEs) using the interim method on three pilot chemicals representing the first nationwide pesticide consultations (final pilot BEs for chlorpyrifos, malathion, and diazinon were completed in January 2017). These initial pilot consultations were envisioned as the start of an iterative process. Later that year, NMFS issued a final biological opinion for these three pesticides. In 2019, EPA requested to reinitiate formal consultation with NMFS on malathion, chlorpyrifos and

⁹⁴ <https://www.epa.gov/endangered-species/interim-approaches-pesticide-endangered-species-act-assessments-based-nas-report>.

⁹⁵ <https://www.epa.gov/endangered-species/revised-method-national-level-listed-species-biological-evaluations-conventional>.

⁹⁶ <https://www.epa.gov/endangered-species/reports-congress-improving-consultation-process-under-endangered-species-act>.

diazinon to consider new information that was not available when NMFS issued its 2017 biological opinion. EPA received a final malathion biological opinion⁹⁷ from FWS in February 2022 and a final biological opinion from NMFS on malathion, chlorpyrifos and diazinon in June 2022.⁹⁸ In August 2023, the Agency implemented the FWS malathion biological opinion by issuing Endangered Species Protection Bulletins⁹⁹ and approving malathion label amendments¹⁰⁰ to incorporate measures to protect listed species. EPA plans to implement the NMFS biological opinion on malathion, chlorpyrifos and diazinon according to the 18-month timeframes specified in the biological opinion.

In 2020, EPA released draft BEs for the first two chemicals conducted using the 2020 Revised Method—carbaryl and methomyl. Subsequently, EPA has used the Revised Method to complete final BEs for carbaryl, methomyl, atrazine, simazine, glyphosate, clothianidin, imidacloprid, and thiamethoxam. EPA is currently in consultation with the Services on these active ingredients.

EPA's New Actives Policy and the 2022 Workplan

In January 2022, EPA announced a policy¹⁰¹ to evaluate potential effects of new conventional pesticide active ingredients to listed species and their designated critical habitat and initiate consultation with the Services, as appropriate, before registering these new pesticides. Before the Agency registers new uses of pesticides for use on pesticide-tolerant crops, EPA will also continue to make effects determinations. If these determinations are likely to adversely affect determinations, the Agency will not register the use unless it can predict that registering the new use would not have a likelihood of jeopardizing listed species or adversely modifying their designated critical habitats. EPA will also initiate consultation with the Services as appropriate.

In April 2022, EPA released a comprehensive, long-term approach to meeting its ESA obligations, which is outlined in *Balancing Wildlife Protections and Responsible Pesticide Use*.¹⁰² This workplan reflects the Agency's most comprehensive thinking to date on how to create a sustainable ESA-FIFRA program that focuses on meeting EPA's ESA obligations and improving protection for listed species while minimizing regulatory impacts to pesticide users and collaborating with other agencies and stakeholders on implementing the plan.

⁹⁷ <https://www.epa.gov/endangered-species/biological-opinions-available-public-comment-and-links-final-opinions>.

⁹⁸ <https://www.epa.gov/endangered-species/biological-opinions-available-public-comment-and-links-final-opinions>.

⁹⁹ <https://www.epa.gov/endangered-species/endangered-species-protection-bulletins>

¹⁰⁰ <https://www.regulations.gov/document/EPA-HQ-OPP-2009-0317-0154>

¹⁰¹ <https://www.epa.gov/newsreleases/epa-announces-endangered-species-act-protection-policy-new-pesticides>.

¹⁰² <https://www.epa.gov/endangered-species>.

On November 16, 2022, EPA released the *ESA Workplan Update: Nontarget Species Mitigation for Registration Review and Other FIFRA Actions*.¹⁰³ As part of this update, EPA announced its plan to consider and include, as appropriate, a menu of FIFRA Interim Ecological Risk Mitigation intended to reduce off-target movement of pesticides through spray drift and runoff in its registration review and other FIFRA actions. These measures are intended to reduce risks to nontarget organisms efficiently and consistently across pesticides with similar levels of risks and benefits. EPA expects that these mitigation measures may also reduce pesticide exposures to listed species.

The *ESA Workplan Update* also discussed additional efforts to expedite and streamline ESA consultation, including the Vulnerable Species Pilot, regional strategies (i.e., a Hawaii strategy), approaches for specific niche pesticide uses (e.g., mosquito adulticide applications), and programmatic approaches to consultation (e.g., the Herbicide Strategy).

In June 2023, EPA announced proposed mitigation for the Vulnerable Species Pilot, an implementation plan, and information on potential expansion of the pilot.¹⁰⁴ EPA also published interactive maps (StoryMaps) for the 27 pilot species to convey geospatial information about the location of the affected species and the location of draft pesticide application minimization and avoidance zones to protect these species.¹⁰⁵ Visit the public docket for more information about the Vulnerable Species Pilot (docket EPA-HQ-OPP-2023-0327 at www.regulations.gov).

In July 2023, EPA published the framework of the draft Herbicide Strategy¹⁰⁶ for public comment along with various supporting documents. For more information about the Herbicide Strategy, visit the public docket (docket EPA-HQ-OPP-2023-0365 at www.regulations.gov).

EPA continues to work on these pilot efforts and once finalized, expects to implement these through registration review and new active ingredient registration.

ESA Assessments or Biological Opinions Impacting Captan

In 2011, NMFS released a Biological Opinion specific to listed Pacific salmon and steelhead species for various pesticides, including captan. EPA is in the process of implementing this Biological Opinion (BiOp) as part of its registration review process. In 2007, the

¹⁰³ <https://www.epa.gov/system/files/documents/2022-11/esa-workplan-update.pdf>.

¹⁰⁴ <https://www.regulations.gov/document/EPA-HQ-OPP-2023-0327-0002>

¹⁰⁵ View the StoryMaps for the 27 pilot species here: <https://storymaps.arcgis.com/collections/896d140363174c9d8ee78e4c471bd7fd>

¹⁰⁶ <https://www.regulations.gov/document/EPA-HQ-OPP-2023-0365-0009>

Agency transmitted its final biological evaluation and initiated formal consultation with FWS on the effects of captan on the California Red Legged Frog. EPA has not yet received a biological opinion from FWS. The Agency will complete a nationwide listed species assessment and any necessary consultation with the Services before completing the captan registration review.

Appendix D: Endocrine Disruptor Screening Program (EDSP)

The Federal Food Drug and Cosmetic Act (FFDCA) §408(p) requires EPA to develop a screening program to determine whether certain substances (including pesticide active and other ingredients) may have an effect in humans similar to an effect produced by a “naturally occurring estrogen, or other such endocrine effects as the Administrator may designate.” (21 U.S.C. 346a(p)). In carrying out the Endocrine Disruptor Screening Program (EDSP), FFDCA section 408(p)(3) requires that EPA “provide for the testing of all pesticide chemicals,” which includes “any substance that is a pesticide within the meaning of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), including all active and pesticide inert ingredients of such pesticide.” (21 U.S.C. 231(q)(1) and 346a(p)(3)). However, FFDCA section 408(p)(4) authorizes EPA to, by order, exempt a substance from the EDSP if the EPA “determines that the substance is anticipated not to produce any effect in humans similar to an effect produced by a naturally occurring estrogen.” (21 U.S.C. 346a(p)(4)).

The EDSP initiatives developed by EPA in 1998 includes human and wildlife testing for estrogen, androgen, and thyroid pathway activity and employs a two-tiered approach. Tier 1 consists of a battery of 11 screening assays to identify the potential of a chemical substance to interact with the estrogen, androgen, or thyroid pathways. Tier 2 testing is designed to identify any adverse endocrine-related effects caused by the substance and establish a dose-response relationship for any adverse estrogen, androgen, or thyroid effect. If EPA finds, based on that data, that the pesticide has an adverse endocrine effect on humans, FFDCA § 408(p)(6) also requires EPA, “... as appropriate, [to] take action under such statutory authority as is available to the Administrator ... as is necessary to ensure the protection of public health.” (21 U.S.C. 346a(p)(6))¹⁰⁷.

Between October 2009 and February 2010, EPA issued Tier 1 test orders/data call-ins (DCIs) for its first list of chemicals (“List 1 chemicals”) for EDSP screening and subsequently required submission of EDSP Tier 1 data for a refined list of these chemicals. EPA received data for 52 List 1 chemicals (50 pesticide active ingredients and 2 inert ingredients). EPA scientists performed weight-of-

¹⁰⁷ For additional details of the EDSP, please visit <https://www.epa.gov/endocrine-disruption>.

evidence (WoE) analyses of the submitted EDSP Tier 1 data and other scientifically relevant information (OSRI) for potential interaction with the estrogen, androgen, and/or thyroid signaling pathways for humans and wildlife.¹⁰⁸

In addition, for FIFRA registration, registration review, and tolerance-related purposes, EPA collects and reviews numerous studies to assess potential adverse outcomes, including potential outcomes to endocrine systems, from exposure to pesticide active ingredients. Although EPA has been collecting and reviewing such data, EPA has not been explicit about how its review of required and submitted data for these purposes also informs EPA's obligations and commitments under FFDCA section 408(p). Consequently, on October 27, 2023, EPA issued a Federal Register Notice (FRN) providing clarity on the applicability of these data to FFDCA section 408(p) requirements and near-term strategies for EPA to further its compliance with FFDCA section 408(p). This FRN, entitled *Endocrine Disruptor Screening Program (EDSP): Near-Term Strategies for Implementation' Notice of Availability and Request for Comment* (88 FR 73841) is referred to here as EPA's EDSP Strategies Notice. EPA also published three documents supporting the strategies described in the Notice:

- *Use of Existing Mammalian Data to Address Data Needs and Decisions for Endocrine Disruptor Screening Program (EDSP) for Humans under FFDCA Section 408(p)*;
- *List of Conventional Registration Review Chemicals for Which an FFDCA Section 408(p)(6) Determination is Needed*; and,
- *Status of Endocrine Disruptor Screening Program (EDSP) List 1 Screening Conclusions* (referred to here as List 1 Screening Conclusions).

The EDSP Strategies Notice and the support documents are available on www.regulations.gov in docket number EPA-HQ-OPP-2023-0474. As explained in these documents, EPA is prioritizing its screening for potential impacts to the estrogen, androgen, and thyroid systems in humans, focusing first on conventional active ingredients. Although EPA voluntarily expanded the scope of the EDSP to screening for potential impacts to the estrogen, androgen, and thyroid systems in wildlife, EPA announced that it is not addressing this discretionary component of the EDSP at this time, considering its current focus on developing a comprehensive, long-term approach to meeting its Endangered Species Act obligations (See EPA's April 2022 ESA Workplan¹⁰⁹ and November 2022 ESA Workplan Update¹¹⁰). However, EPA notes that for 35 of the List 1 chemicals (33 active ingredients and 2 inert ingredients), Tier 1 WoE memoranda¹¹¹ indicate that available data were sufficient for FFDCA section 408(p) assessment and review for potential adverse effects to the estrogen, androgen, or thyroid pathways for wildlife. For the remaining 17 List 1 chemicals, Tier 1 WoE memoranda

¹⁰⁸ Summarized in *Status of Endocrine Disruptor Screening Program (EDSP) List 1 Screening Conclusions*; EPA-HQ-OPP-2023-0474-0001; <https://www.regulations.gov/document/EPA-HQ-OPP-2023-0474-0001>

¹⁰⁹ https://www.epa.gov/system/files/documents/2022-04/balancing-wildlife-protection-and-responsible-pesticide-use_final.pdf

¹¹⁰ <https://www.epa.gov/system/files/documents/2022-11/esa-workplan-update.pdf>

¹¹¹ <https://www.epa.gov/endocrine-disruption/endocrine-disruptor-screening-program-tier-1-screening-determinations-and>

made recommendations for additional testing. EPA expects to further address these issues taking into account additional work being done in concert with researchers within the EPA's Office of Research and Development (ORD).

As discussed in EPA's EDSP Strategies Notice and supporting documents, EPA will be using all available data to determine whether additional data are needed to meet EPA's obligations and discretionary commitments under FFDCA section 408(p). For some conventional pesticide active ingredients, the toxicological databases may already provide sufficient evaluation of endocrine potential for estrogen, androgen, and/or thyroid pathways and EPA will generally not need to obtain any additional data to reevaluate those pathways, if in registration review, or to provide an initial evaluation for new active ingredient applications. For instance, EPA has endocrine-related data for numerous conventional pesticide active ingredients through either a two-generation reproduction toxicity study performed in accordance with the current guideline (referred to here as the updated two-generation reproduction toxicity study; OCSPP [870.3800 - Reproduction and Fertility Effects](#)) or an extended one-generation reproductive toxicity (EOGRT) study ([OECD Test Guideline 443 - Extended One-Generation Reproductive Toxicity Study](#)). In these cases, EPA expects to make FFDCA 408(p)(6) decisions for humans without seeking further estrogen or androgen data. However, as also explained in the EPA's EDSP Strategies Notice, where these data do not exist, EPA will reevaluate the available data for the conventional active ingredient during registration review to determine what additional data, if any, might be needed to confirm EPA's assessment of the potential for impacts to estrogen, androgen, and/or thyroid pathways in humans. For more details on EPA's approach for assessing these endpoints, see EPA's EDSP Strategies Notice and related support documents.

Also described in the EPA's EDSP Strategies Notice is a framework that represents an initial approach by EPA to organize and prioritize the large number of conventional pesticides in registration review. For conventional pesticides with a two-generation reproduction toxicity study performed under a previous guideline (i.e., an updated two-generation reproduction toxicity study or an EOGRT is not available), EPA has used data from the Estrogen Receptor Pathway and/or Androgen Receptor Pathway Models to identify a group of chemicals with the highest priority for potential data collection (described in EPA's EDSP Strategies Notice as Group 1 active ingredients). For these cases, although EPA has not reevaluated the existing endocrine-related data, EPA has sought additional data and information in response to the issuance of EPA's EDSP Strategies Notice to better understand the positive findings in the ToxCast™ data for the Pathway Models and committed to issuing DCIs to require additional EDSP Tier 1 data to confirm the sufficiency of data to support EPA's assessment of potential adverse effects to the estrogen, androgen, and/or thyroid pathways in humans and to inform FFDCA 408(p) data decisions. For the remaining conventional pesticides (described in EPA's EDSP Strategies Notice as Group 2 and 3 conventional active ingredients), EPA committed to reevaluating the available data to determine what additional studies, if any, might be needed to confirm EPA's assessment of the potential for impacts to endocrine pathways in humans.

Captan is on List 1. In 2015, EPA published the Tier 1 WoE analyses for captan, and that evaluation determined that no further data to assess the potential for impacts on the estrogen, androgen, or thyroid pathways are needed for humans or wildlife¹¹². Based on that evaluation, EPA has concluded at this time that the points of departure for human health risk assessment to evaluate the EPA-registered uses and established tolerances of captan are protective of potential adverse estrogen, androgen, and thyroid effects in humans. There were no adverse estrogen, androgen, or thyroid hormone-related effects observed for captan in the absence of overt toxicity. Therefore, EPA has completed its FFDCFA section 408(p)(6)-related commitments and obligations “to ensure the protection of public health” at this time. For additional information, please see the List 1 Screening Conclusions.

Appendix E: Tolerance Harmonization

EPA has treaty obligations with the World Trade Organization to harmonize U.S. pesticide tolerances with Codex MRLs wherever possible. For captan, the Agency has conducted an analysis to determine differences between U.S. tolerances established in 40 CFR §180.302 and the MRLs established by Codex Alimentarius, to support harmonization between U.S. tolerances and Codex MRLs, and to explain why certain US tolerances can't be harmonized with Codex. A summary of this analysis is provided below.

EPA is unable to harmonize the U.S. tolerances in 40 CFR §180.302 for fruiting vegetables or for cucurbits because the current tolerance is significantly lower than the Codex and Canadian MRLs. The U.S. tolerance for vegetable, fruiting crop group 8, which includes tomato, pepper, eggplant, and related commodities, is 0.05 ppm, and cannot be harmonized with the Canadian and Codex tolerance of 5 ppm on tomato. Likewise, EPA is not able to harmonize the U.S. tolerance of 0.05 ppm for cucurbit crop group with the Codex MRLs of 3 ppm for cucumber or 10 ppm for melon (except watermelon). Canada does not have established MRLs on these commodities, and neither Canada nor Codex have MRLs on summer squash.

The Agency is unable to harmonize U.S. tolerances for captan in or on apple, apricot, blueberry, caneberry, sweet and tart cherry, grape, nectarine, plum, or strawberry with both Codex and Canada because the U.S. tolerance values are significantly higher than MRLs established by Canada and Codex. Canada has an established apple MRL at 5.0 ppm, and Codex has an established apple MRL at 15 ppm. The established U.S. tolerance is 25 ppm. Therefore, EPA is not able to harmonize the U.S. apple tolerance with the international MRLs.

¹¹² <https://www.regulations.gov/document/EPA-HQ-OPP-2013-0296-0023>

Canada has established an apricot MRL at 5.0 ppm. The established U.S. tolerance is 10 ppm. Therefore, EPA is not able to harmonize the U.S. apricot tolerance with the Canadian MRL.

Canada has established blueberry MRLs at 5.0 ppm each for both highbush and lowbush blueberries; the Codex MRLs are 20 ppm on these same commodities. The established U.S. tolerance of 20 ppm on blueberry is harmonized with Codex.

The Agency is unable to harmonize the U.S. tolerance of 25 ppm on Caneberry, crop subgroup 13-07A, with the Codex MRL of 20 ppm or the Canadian MRL of 5 ppm on raspberry. Neither Canada nor Codex have MRLs established on blackberry.

Canada has established MRLs on sweet cherry and tart cherry at 5.0 ppm each. Codex has established MRLs on sweet cherry and tart cherry at 25 ppm each. The established U.S. tolerances on sweet and tart cherries are 50 ppm each. Because the international MRLs are lower than the established U.S. tolerances for cherries, EPA is unable to harmonize these tolerances.

Canada has an established MRL on grape at 5.0 ppm. Codex has an established MRL on grape at 25 ppm. The established U.S. tolerance on grape of 25 ppm is harmonized with Codex.

Canada has an established MRL on nectarine at 5 ppm. Codex has an established MRL for nectarine at 3.0 ppm. The established U.S. tolerance for nectarine is 25 ppm. Therefore, EPA unable to harmonize the nectarine tolerance.

Canada has an established MRL on grape at 5.0 ppm. Codex has an established MRL on grape at 25 ppm. The established U.S. tolerance on grape of 25 ppm is harmonized with Codex.

Canada has an established MRL on strawberry at 5.0 ppm. Codex has an established MRL for strawberry at 15 ppm. The established U.S. tolerance is 20 ppm. Because the international MRLs are lower than EPA tolerances, the Agency is unable to harmonize the strawberry tolerance.

The U.S. tolerance of 10 ppm on plums is harmonized with Codex (plums, including fresh prunes) but not with Canada; the Canadian MRL is 5 ppm.

For all other individual crops, crop groups, and livestock commodities with U.S. tolerances; neither Codex nor Canada have established MRLs; therefore, harmonization is not possible. For complete details of the international MRL levels and harmonization recommendations, see *Captan. Human Health Draft Risk Assessment in Support of Registration Review and Draft Human Health Risk Assessment (Appendix E)* in the public docket, EPA-HQ-OPP-2013-0296.

Appendix F: Summary of Captan Worker Risk Estimates After Mitigation

Table 1. Summary of Captan Risk Estimates for Occupational Handlers Showing Current Use and Proposed Mitigation

Crop	Amount Handled/ Area Treated ¹	Application Rate ²	Formulation ³	Dermal MOEs ⁴ (LOC = 100)			Inhalation MOEs ⁴ (LOC = 30)			
				Single Layer/ Gloves	Double Layer/ Gloves	Closed Cab/ No Gloves ⁵	PF10 Respirator	PF50 Respirator	Closed Cabs/ No Respirator ⁶	
Apples, Peaches, Nectarines	40 acres (Standard assumption)	4.00 lbs. a.i./A (Current rate) Airblast Mixer/loader (M/L)	DF/WDG	4,000	5,100	3,300	8.9	45	3.1	
			Liquid	5,500	7,100	6,900	370	1,800	730	
		WP	3,600	6,300	3,300	29	150	3.1		
		Airblast Applicator	Spray	130	140	14,000 (EC/Gloves)	17	85	120	
	40 acres	3.00 lbs. a.i./A (Reduced rate) Airblast M/L	DF/WDG	5,400	6,800	4,300	12	59	4.1	
			Liquid	7,400	9,500	9,100	490	2,400	970	
		WP	4,800	8,400	4,300	39	190	4.1		
		Airblast Applicator	Spray	170	190	19,000 (EC/Gloves)	23	110	160	
	350 acres	4.00 lbs. a.i./A (Current rate) Aerial M/L	Liquid only	630	820	780	42	210	83	
			Aerial Applicator	Spray	ND	ND	11,000(EC/G)	ND	ND	190
		3.00 lbs. a.i./A (Reduced rate) Aerial M/L	Liquid only	840	1,100	1,000	56	280	110	
			Aerial Applicator	Spray	ND	ND	15,000 (EC/G)	ND	ND	250
	Cherries	40 acres	3.16 lbs. a.i./A Airblast M/L	DF	5,100	6,400	4,100	11	56	3.9
				Liquid	7,000	9,100	8,700	460	2,300	920
WP				4,600	8,000	4,100	37	180	3.9	
Airblast Applicator			Spray	170	180	18,000 (EC/G)	22	110	150	
40 acres		3.00 lbs. a.i./A	DF	5,400	6,800	4,300	12	59	4.1	

Crop	Amount Handled/ Area Treated ¹	Application Rate ²	Formulation ³	Dermal MOEs ⁴ (LOC = 100)			Inhalation MOEs ⁴ (LOC = 30)			
				Single Layer/ Gloves	Double Layer/ Gloves	Closed Cab/ No Gloves ⁵	PF10 Respirator	PF50 Respirator	Closed Cabs/ No Respirator ⁶	
		Airblast M/L	Liquid	7,400	9,500	9,100	490	2,400	970	
			WP	4,800	8,400	4,300	39	190	4.1	
		Airblast Applicator	Spray	170	190	19,000 (EC/G)	23	110	160	
	350 acres	3.16 lbs. a.i./A Aerial M/L	Liquid only	800	1,000	990	53	260	100	
			Aerial Applicator	Spray	ND	ND	14,000 (EC/G)	ND	ND	240
		3.00 lbs. a.i./A Aerial M/L	Liquid only	840	1,100	1,000	56	280	110	
			Aerial Applicator	Spray	ND	ND	15,000 (EC/G)	ND	ND	250
	Grapes	40 acres	2.04 lbs. a.i./A Airblast and Groundboom M/L	DF	7,900	9,900	6,400	18	87	6
				Liquid	11,000	14,000	13,000	710	3,600	1,400
WP				7,100	12,000	6,400	57	290	6	
Airblast Applicator			Spray	260	280	28,000 (EC/G)	33	170	230	
Groundboom Applicator			Spray	25,000	32,000	80,000 (EC/G)	460	2,300	780	
40 acres		1.75 lbs. a.i./A Airblast and Groundboom M/L	DF	9,300	12,000	7,400	20	100	7	
			Liquid	13,000	16,000	16,000	840	4,200	1,700	
			WP	8,300	14,000	7,400	66	330	7	
		Airblast Applicator	Spray	300	320	33,000 (EC/G)	39	190	270	
Groundboom Applicator		Spray	29,000	38,000	93,000 (EC/G)	540	2,700	910		
350 acres		2.04 lbs. a.i./A Aerial M/L	Liquid only	1,200	1,600	1,500	82	410	160	

Crop	Amount Handled/ Area Treated ¹	Application Rate ²	Formulation ³	Dermal MOEs ⁴ (LOC = 100)			Inhalation MOEs ⁴ (LOC = 30)		
				Single Layer/ Gloves	Double Layer/ Gloves	Closed Cab/ No Gloves ⁵	PF10 Respirator	PF50 Respirator	Closed Cabs/ No Respirator ⁶
		Aerial Applicator	Spray	ND	ND	22,000 (EC/G)	ND	ND	370
		1.75 lbs. a.i./A Aerial M/L	Liquid only	1,400	1,900	1,800	95	480	190
		Aerial Applicator	Spray	ND	ND	26,000 (EC/G)	ND	ND	430
Almonds	40 acres (Standard assumption)	4.50 lbs. a.i./A Airblast M/L	DF/WDG	3,600	4,500	2,900	8	40	2.7
			Liquid	4,900	6,300	6,100	320	1,600	650
			WP	3,200	5,700	2,900	26	130	2.7
		Airblast Applicator	Spray	120	130	13,000 (EC/G)	15	75	100
Plums/Prunes	40 acres	3 lbs. a.i./A Airblast M/L	DF/WDG	5,400	6,800	4,300	12	59	4.1
			Liquid	7,400	9,500	9,100	490	2,400	970
			WP	4,800	8,400	4,300	39	190	4.1
		Airblast Applicator	Spray	170	190	19,000 (EC/Gloves)	23	110	160
	350 acres (Standard assumption)	Aerial/chemigation	Liquid only	630	820	780	42	210	83
Blueberries	40 acres (Standard assumption)	2.50 lbs. a.i./A Airblast and Groundboom M/L	DF	6,400	8,100	5,200	14	71	4.9
			Liquid	8,900	11,000	11,000	580	2,900	1,200
			WP	5,800	10,000	5,200	47	230	4.9
		Airblast Applicator	Spray	210	230	23,000 (EC/G)	27	140	190
		Groundboom Applicator	Spray	21,000	26,000	65,000 (EC/G)	380	1,900	640 ND
Apricots	40 acres	2.50 lbs. a.i./A	DF	6,400	8,100	5,200	14	71	4.9
			Liquid	8,900	11,000	11,000	580	2,900	1,200

Crop	Amount Handled/ Area Treated ¹	Application Rate ²	Formulation ³	Dermal MOEs ⁴ (LOC = 100)			Inhalation MOEs ⁴ (LOC = 30)		
				Single Layer/ Gloves	Double Layer/ Gloves	Closed Cab/ No Gloves ⁵	PF10 Respirator	PF50 Respirator	Closed Cabs/ No Respirator ⁶
	(Standard assumption)	Airblast M/L	WP	5,800	10,000	5,200	47	230	4.9
		Airblast Applicator	Spray	210	230	23,000 (EC/G)	27	140	190
		Groundboom Applicator	Spray	21,000	26,000	65,000	380	1,900	640
Ornamentals (Greenhouse)	175 gallons solution (Standard assumption)	0.0123 lb. a.i./gal Mechanically-Pressurized Handgun Mixer/loader/applicator (M/L/A)	DF/ Liquid/ WP	4,300	5,200	ND	13	66	ND
	78 gallons solution (Standard assumption)	0.0123 lb ai/gal Mechanically-Pressurized Handgun M/L/A	DF/ Liquid/ WP	9,600	12,000	ND	30	150	ND
Ornamentals (Nursery)	300 gallons solution (Standard assumption)	0.0123 lb ai/gal Mechanically-Pressurized Handgun M/L/A	DF/ Liquid/ WP	2,500	3,000	ND	7.8	39	ND
	78 gallons solution (Standard assumption)	0.0123 lb ai/gal Mechanically-Pressurized Handgun M/L/A	DF/ Liquid/ WP	9,600	12,000	ND	30	150	ND

Bold red indicates risks of concern.

¹ Exposure Science Advisory Council Policy #9.2.

² Assessment based on maximum registered application rates for each crop (refer to Table E.1. from the 1st addendum (B. Lee, *et al.*, 03/02/2021, D453333)).

³ DF = Dry flowable; WP = wettable powder. Aerial applications have not been assessed for DF or WP per PRD's request, based on PRD's proposed mitigation to prohibit those use patterns.

⁴ EC/No G = Engineering controls (water soluble packets) without gloves. For aerial applicators, EC/G = engineering control (enclosed cockpits) with gloves; data are not available for enclosed cockpits without gloves for aerial applicators.

⁵ EC/No G = Engineering controls (enclosed cabs) without respirator.

Table 2. Summary of Captan Inhalation Risk Estimates for Airblast Applicators with Reduced Application Rates

Crop	Application Rates	Area Treated ³	Inhalation MOEs ⁴ (LOC = 30)	
			PF10 Respirator	Engineering Controls/ No Respirator
Apples, Peaches, Nectarines	4.00 lbs. a.i./A ¹	40 acres	17	120
	3.00 lbs. a.i./A ²	40 acres	23	160
Cherries	3.16 lbs. a.i./A ¹	40 acres	22	150
	3.00 lbs. a.i./A ²	40 acres	23	160
Grapes	2.04 lbs. a.i./A ¹	40 acres	33	230
	1.75 lbs. a.i./A ²	40 acres	39	270

¹ Current maximum single application rates based on registered labels; refer to Table E.1. (B. Lee, *et al.*, 03/02/2021, D453333) and proposed reduced rates.

² Proposed application rates informed by BEAD division.

³ The standard assumptions for orchard/vineyard area treated is 40 acres.

⁴ Inhalation MOE = Inhalation POD (mg/kg/day) ÷ Inhalation Dose (mg/kg/day).

Table 3. Summary of Captan Risk Estimates for Strawberries and Ginseng, Comparing Farm Sizes

Exposure Scenario	Crop or Target	Maximum Application Rate ¹	Area Treated or Amount Handled Daily ²	Dermal MOEs ^{3,4} (LOC = 100)				Inhalation MOEs ^{3,4} (LOC = 30)			
				SL/No G	SL/G	DL/G	EC/No G	No R	PF10	PF50	EC/No R
Mixer/Loader											
Dry Flowable, Aerial & Chemigation, Broadcast	Field crop, typical	3 lbs. a.i./Acre	15 acres	3,300	14,000	18,000	12,000	3.2	32	160	11
Dry Flowable, Groundboom, Broadcast	Field-grown ornamental crops	3 lbs ai/acre	10 acres	4,900	22,000	27,000	17,000	4.8	48	240	16
Dry Flowable, Groundboom, Broadcast	Field crop, typical	3 lbs ai/acre	15 acres	3,300	14,000	18,000	12,000	3.2	32	160	11
Liquid, Aerial & Chemigation, Broadcast	Field crop, typical	3 lbs. a.i./Acre	15 acres	3,400	20,000	25,000	24,000	130	1,300	6,500	340
Liquid, Groundboom, Broadcast	Field-grown ornamental crops	3 lbs. a.i./Acre	10 acres	5,000	29,000	38,000	37,000	190	1,900	9,300	510
Liquid, Groundboom, Broadcast	Field crop, typical	3 lbs. a.i./Acre	15 acres	3,400	20,000	25,000	24,000	130	1,300	6,500	340
Wettable Powder, Aerial & Chemigation Broadcast	Field crop, typical	3 lbs. a.i./Acre	15 acres	9,500	13,000	23,000	12,000	10	100	520	11
Wettable Powder, Groundboom, Broadcast	Field-grown ornamental crops	3 lbs. a.i./Acre	10 acres	14,000	19,000	34,000	17,000	16	160	780	16
Wettable Powder, Groundboom, Broadcast	Field crop, typical	3 lbs. a.i./Acre	15 acres	9,500	13,000	23,000	12,000	10	100	520	11
Applicator⁵											
Spray, Aerial, Broadcast	Field crop, typical	3 lbs. a.i./Acre	15 acres	ND	ND	ND	360,000	ND	ND	ND	5,800
Spray, Groundboom, Broadcast	Field-grown ornamental crops	3 lbs. a.i./Acre	10 acres	14,000	69,000	38,000	220,000	130	1,300	6,300	2,100
Spray, Groundboom, Broadcast	Field crop, typical	3 lbs. a.i./Acre	15 acres	9,400	46,000	25,000	140,000	84	840	4,200	1,400
Mixer/Loader/Applicator											

Exposure Scenario	Crop or Target	Maximum Application Rate ¹	Area Treated or Amount Handled Daily ²	Dermal MOEs ^{3,4} (LOC = 100)				Inhalation MOEs ^{3,4} (LOC = 30)			
				SL/No G	SL/G	DL/G	EC/No G	No R	PF10	PF50	EC/No R
Dry Flowable, Mechanically-pressurized Handgun, Broadcast (foliar)	Field crop, typical	0.030 lbs. a.i./gallon solution	1,000 gallons solution	180	540	820	ND	4.9	49	250	ND
Dry Flowable, Mechanically-pressurized Handgun, Drench/Soil-/Ground-directed	Field crop, typical	0.015 lbs. a.i./gallon solution	1,000 gallons solution	370	1,100	1,600	ND	9.8	98	490	ND
Liquid, Mechanically-pressurized Handgun, Broadcast (foliar)	Field crop, typical	0.030 lbs. a.i./gallon solution	1,000 gallons solution	180	540	820	ND	4.9	49	250	ND
Liquid, Mechanically-pressurized Handgun, Drench/Soil-/Ground-directed	Field crop, typical	0.015 lbs. a.i./gallon solution	1,000 gallons solution	370	1,100	1,600	ND	9.8	98	490	ND
Wettable Powder, Mechanically-pressurized Handgun, Broadcast (foliar)	Field crop, typical	0.030 lbs. a.i./gallon solution	1,000 gallons solution	180	540	820	ND	4.9	49	250	ND
Wettable Powder, Mechanically-pressurized Handgun, Drench/Soil-/Ground-directed	Field crop, typical	0.015 Lbs. a.i./gallon solution	1,000 gallons solution	370	1,100	1,600	ND	9.8	98	490	ND

1 Assessment based on maximum registered application rate for each scenario.

2 Exposure Science Advisory Council Policy #9.2. Information about field sizes provided by BEAD: the majority (96%) of strawberry fields are 15 acres or less, and the majority (88%) of field grown ginseng (ornamental) fields are 10 acres or less. For food use ginseng, since the majority of fields are 10 acres or less, the strawberry field size is protective.

3 MOE = POD (mg/kg/day) ÷ Dose (mg/kg/day). Red, bold MOEs represent estimates of concern (LOC = 100 for dermal, 30 for inhalation).

4 Labels direct handlers to wear SL/G and a PF10 respirator.

5 EC values are based on unit exposures for EC with gloves as this was the only data available to assess dermal exposures.

* Based on the "Occupational Pesticide Handler Unit Exposure Surrogate Reference Table" (<https://www.epa.gov/pesticide-science-and-assessing-pesticide-risks/occupational-pesticide-handler-exposure-data>); Level of mitigation: for dermal assessment SL/No G = single layer with no gloves, SL/G = single layer with glove, DL/G = double layer with glove and EC = engineering control. Level of mitigation: for inhalation assessment, baseline inhalation No-R = no respirator, respirators with PF10, PF50, and EC.

** Dose = Unit Exposure (µg/lb ai) × Conversion Factor (0.001 mg/µg) × Application Rate (lb ai/ gal or lbs. a.i./A) × Area Treated or Amount Handled Daily (gal/day or A/day) ÷ BW (80 kg).

ND = No Data.

Table 4. Summary of Captan Dermal Risk Estimates for Re-entry Workers at Reduced Rates

Crop	Worker Re-entry Activity	Current Maximum Application Rates ¹	Timepoint when MOE ≥ LOC	Proposed Reduced Application Rate	Timepoint ² when MOE > LOC
Apples, Peaches, Nectarines	Hand thinning	4 lbs. a.i./A	Day 6	3 lbs. a.i./A	Day 0 (MOE = 100)
Cherries	Hand thinning	3.16 lbs. a.i./A	Day 1	2.05 lbs. a.i./A	Day 0 (MOE = 160)
Grapes, wine/juice	Tying, training, hand harvesting, leaf pulling ³	2.04 lbs. a.i./A	Day 3 (MOE =	1.75 lbs. a.i./A	Day 1 (MOE = 94) Day 2 (MOE = 110)
Grapes, table	Girdling and turning ⁴	2.04 lbs. a.i./A	Day 8 (MOE =	1.75 lbs. a.i./A	Day 5 (MOE = 96) Day 6 MOE = 110)

¹ Current maximum single application rates based on registered labels. ²Timepoint in days after captan application. Day 0 is day of application.

Appendix G: Seed Treatment Questions

In 2022, EPA updated its Seed Treatment Policy 14.1¹¹³ to incorporate more contemporary and reliable data than previous seed treatment worker exposure assessments. The update resulted in higher worker exposure estimates than in previous risk assessments. When all else is equal from previous assessments (e.g., toxicity reference values are the same), there has been a large increase in the estimated dermal and/or inhalation risks of concern for workers conducting seed treatment activities. The Agency has developed a list of questions for registrants and stakeholders to determine if chemical-specific use information aligns with the data and assumptions supporting the Policy 14 Update. The questions are divided by seed treatment risk scenario and include cleaning, treating, loading/planting, and packaging in commercial seed treatment facilities. Each scenario includes the description of the data used to assess the risk and is followed by a list of chemical-specific use questions.

Soliciting seed treatment information - for the *equipment cleaning scenario*

For captan, potential risks of concern have been identified for those who clean seed treatment equipment. This worker subset has not been systematically evaluated for pesticide exposure and risk by EPA in the past because sufficient data were not available on which to base such evaluations. Recently, data on the pesticide exposures of cleaners of seed treatment equipment became available and have been reviewed by the Agency. Based on data from these studies, the potential exposures of these workers, who we will refer to as “cleaners” are far greater than any other *commercial* seed treatment activity (mixer/loaders, treaters, and packagers).

The studies of exposure to cleaners of seed treatment equipment were based on:

- Closed system for treating seed:
 - Single batch treaters
 - Continuous-batch treaters
- Equipment had treated the following seed types before it was cleaned:
 - Cotton
 - Canola
 - Corn
 - Barley
 - Maize
 - Oats
 - Wheat

¹¹³ https://www.epa.gov/system/files/documents/2022-01/exposac-policy-14_seed-treatment-exposure-data.pdf

Risks of concern were identified for cleaners who clean equipment after the treatment of the following seed types: alfalfa, clover, trefoil; lespedeza; grasses/forage hay; bluegrass; beet, garden; Swiss chard; beet, sugar; cotton; onion, blub, dry and onion, green; peanut; sorghum, grain; and spinach.

Questions for stakeholders:

- Does your seed treatment equipment require cleaning? If so, describe in detail the process by which your machine to treat seeds is cleaned.
- How representative are the types of equipment used in the exposure studies to treat seeds in your area?
 - What other types of equipment are in use?
 - How do other types of equipment differ in how they are cleaned from single and continuous batch treaters?
 - Schematics, photos, and videos of the equipment are appreciated.
- Describe how seed treatment equipment differs, particularly with respect to how they are cleaned, that treat small seeds (e.g., many vegetables) and large seeds (e.g., cotton or corn).
- Describe the clothing and/or PPE that the cleaner wears when cleaning equipment and name/describe the type of seed treater.
- How many hours in one workday does a person spend cleaning equipment?
- How many days per year does a person spend cleaning equipment?
- Do you use the maximum application rate on the [type/use] seeds?
- What is the maximum rate used to treat [type/use] seeds?
- What is the average (“typical”) rate used to treat [type/use] seeds?
- What is the median rate (some XXth percentile) used to treat [type/use] seeds?

Soliciting seed treatment information - for the *seed treating scenario*

For captan, potential risks of concern have been identified for those individuals who treat seeds. Individuals who treat seeds with pesticides will be referred to as “treaters.” The treating scenario represents any possible commercial seed treatment (CST) workday during which CST worker exposure is the result of performing any combination of packaging, treating, or cleanout tasks, but not exclusively packaging or exclusively cleanout. This “treater” scenario includes several tasks that are very critical to the CST process and generally involve just a few specially trained workers at each facility, including mixing and loading chemical, calibrating the treater, treating/coating the seed and sampling “wet” treated seed. This worker subset has not been specifically evaluated for pesticide exposure and risk by EPA in the past because sufficient data were not available on which to base such evaluations. Recently, data on

the pesticide exposures of treaters became available and have been reviewed by the Agency and are now implemented in the updated Policy 14.

The studies of exposure to treaters were based on:

- Closed system for treating seed:
 - Continuous flow treaters
 - Single batch treaters
 - Continuous-batch treaters
- Treaters working with the following seed types (range of pounds of seed treated):
 - Barley (163,803 – 289,908)
 - Canola (29,829 – 142,378)
 - Corn (33,656 – 349,383)
 - Cotton (12,250 – 121,455)
 - Maize (58,422 – 96,562)
 - Oats (72,312)
 - Oilseed rape (19,511 – 62,082)
 - Wheat (61,895 – 189,597)
- Exposure to liquid formulations of fungicides and insecticides

Risks of concern were identified for treaters who had treated the following seed types: corn, sweet; oats; sorghum, grain; and strawberry.

Questions for stakeholders:

- How prevalent is the use of liquid versus solid (dust) formulations on each type of seed that you treat?
- Is one formulation preferred over the other? If so, why? Please list the type of seed when providing a preference for a formulation.
- Given that “treaters” who were monitored in exposure studies performed multiple activities that included some equipment cleaning and seed packaging as well as mixing and loading chemicals, calibrating the treater, treating/coating the seed, and sampling “wet” treated seed, please describe in detail all the activities performed by a worker who is a designated seed treater in your treatment facility. (Please do not include details for workers who exclusively clean equipment or package seeds.)
- Please describe the PPE worn by the worker who is the designated treater in your operation when they treat seed.
- Do you use the maximum label application rate for [type/use] seeds?
- What is the maximum rate used to treat [type/use] seeds?

- What is the average (“typical”) rate used to treat [type/use] seeds?
- What is the median rate (some XXth percentile) used to treat [type/use] seeds?
- For **small-seeded vegetables**, the Agency assumes that 3,000 pounds (lbs) of seed are treated per day by one worker. For the types of small-seeded vegetables that are treated in your facility, how many lbs of small-seeded vegetable seeds are treated by each worker in an eight-hour day? Please state the type of small-vegetable seed when providing an estimate of weight.
- For **large-seeded vegetables** (e.g., beans, squash, watermelon, pea, cowpea, and pumpkins), the Agency assumes that 339,500 lbs of seed are treated by each worker in one eight-hour day. For large-seeded vegetables treated in your facility, how many lbs of large-seeded vegetable seeds are treated by each worker in an eight-hour day? Please state the type of large-vegetable seed when providing an estimate of weight.
- For other non-vegetable seeds treated in your facility, please provide an estimate of weight treated by a worker in an eight-hour day. Please state the type of seed treated when providing your estimate.

Soliciting seed treatment information - for the *loading/planting scenario*

For captan, potential risks of concern have been identified for those individuals who load and plant treated seeds. Individuals who load and plant seeds with pesticides will be referred to as “loader/planters.” Workers in the exposure studies were monitored while both loading treated seed and planting the treated seed. Separate samples were not taken during each activity. Therefore, it is not possible to differentiate exposure from the loading versus the planting activity. Workers typically performed other tasks in addition to driving the tractor through the field while planting, such as making sure that the seed is properly planted (e.g., by checking seed depth and making adjustments or repairs as needed) or leveling the seed in the hopper as needed. It would also include any ‘background’ exposure such as contact with contaminated surfaces or equipment in the workday environment. This worker subset has not been specifically evaluated for pesticide exposure and risk by EPA in the past because sufficient data were not available on which to base such evaluations. Recently, data on the pesticide exposures of loader/planters became available and have been reviewed by the Agency and are now implemented in the updated Policy 14.

The studies of exposure to loader/planters were based on:

- Treated seed loading techniques:
 - forklift
 - manual pour
 - container lift
- Planting equipment:
 - pneumatic
 - conventional

- Workers loaded and planted the following seed types (acres planted by seed type).
 - Corn 13.6 – 101.6 acres
 - Wheat 12.4 – 46.9 acres

Risks of concern were identified for loader/planters who had loaded/planted the following seed types: alfalfa, clover, trefoil; cotton; barley; bean, dry; bean, snap; beet, garden; beet, sugar; grasses/forage/hay; bluegrass; Lespedeza; oat; onion, green; rye; pea, garden; peanut; soybean; and wheat.

Questions for stakeholders:

- Given that “loaders/planters” who were monitored in exposure studies performed multiple activities that included some short periods of equipment cleaning and repairing, checking seed planting depth, and leveling seed in the hopper, please list and describe in detail all the activities performed by a worker who is designated to load/plant in your operation.
- Describe how treated seeds are loaded into the planter in your operation. Please state the type of seed that is loaded with this method.
- Describe the planting equipment used to sow seeds. Please state the type of seed that is sown with this method.
- To the best of your knowledge, please describe how loading/planting treated corn and wheat seeds is **different** than loading/planting treated seeds in use in your operation. Please state the type of seed in your response.
- Do you use the maximum rate to treat [type/use] seeds?
- What is the maximum rate used to treat [type/use] seeds?
- What is the average (“typical”) rate used to treat [type/use] seeds?
- What is the median rate (some XXth percentile) used to treat [type/use] seeds?
- The Agency assumes that 61, 80, and 200 acres are planted by a loader/planter in one eight-hour day for potatoes, vegetables and other specialty annual crops, and large acreage field crops (i.e., alfalfa, some beans, sugar beets, canola, field and popcorn, cereal grains, cotton, mint, rice, and soybean), respectively. How many acres are planted by a loader/planter in your operation? Please state the type of seed planted.
- The Agency assumes a high-end seeding density (or number of seeds/acre) for each type of seed in its models of dermal and inhalation exposure to loader/planters. The current assumptions for seeding density are found in Table 3.1 (pages 16-18) in Policy 15: https://www.epa.gov/system/files/documents/2022-01/exposac-policy-15_amount-seed-treated-planted.pdf
 - There are more types of seeds with their associated seeding density listed in the worksheet named “Amount Seed Planted variables” in the seed treatment calculator (Microsoft Excel file). Look at values in Column ‘D’.
https://www.epa.gov/system/files/documents/2022-02/seed-treatment-and-planting-exposure_mar2022.xlsx
 - What is the highest seeding density used in your operation? Please state the type of seed planted at this density.

Soliciting seed treatment information – for the *packaging scenario*

For captan, potential risks of concern have been identified for those individuals who package treated seeds. Individuals who packaged treated seeds with pesticides will be referred to as “packagers.” The packaging scenario represents any possible commercial seed treatment (CST) workday during which CST worker exposure is the result of performing one or more packaging tasks, but none of the treating or cleanout tasks. The packaging-related tasks identified include bagging, closing/sewing, tagging, stacking, and moving packaged seed via forklift. Worker-day exposure associated with these scenario-specific tasks is expressed relative to the amount of active ingredient handled. Recently, data on the pesticide exposures of packers became available and have been reviewed by the Agency and are now implemented in the updated Policy 14.

The studies of exposure to packagers were based on:

- Types of packaging that contained treated seeds handled by workers:
 - small bags
 - mini-bulk containers
 - loose bulk containers
- Types of bagging/stacking systems
 - automated
 - semi-automated
 - manual
- Packagers working with the following seed types (range of pounds of seed treated):
 - Barley (163,803 – 289,908)
 - Canola (29,829 – 142,378)
 - Corn (33,656 – 349,383)
 - Cotton (12,250 – 121,455)
 - Maize (58,422 – 96,562)
 - Oats (72,312)
 - Oilseed rape (19,511 – 62,082)
 - Wheat (61,895 – 189,597)

Risks of concern were identified for treaters who had treated the following seed types: alfalfa, clover; trefoil; cowpea; grasses/forage/hay; Bluegrass; Lespedeza; soybean; barley; rye; bean, dry; wheat; bean, snap; cotton; pea, garden; corn, field; peanut; corn, sweet; flax; oat; pumpkin; squash, summer and winter; watermelon; strawberry; and sorghum, grain.

Questions for stakeholders:

- How prevalent is the use of liquid versus solid (dust) formulations on each type of seed that you treat?
- Is one formulation preferred over the other? If so, why? Please list the type of seed when providing a preference for a formulation.
- Given that “packagers” who were monitored in exposure studies performed multiple activities that included bagging, closing/sewing, tagging, stacking, and moving packaged seed via forklift, please describe in detail all the activities performed by a worker who is a designated packager in your treatment facility. (Please do not include details for workers who exclusively clean equipment or treat seeds.)
- Please describe the PPE worn by the worker who is the designated packager in your operation when they package seed.
- Please describe the type of packaging that contain treated seeds handled by the designated packager and state the type of seed in that packaging.
- Please describe the bagging/stacking (e.g., automated, semi-automated, manual) system in your operation and state the type of seed that uses this system.
- Do you use the maximum label application rate for [type/use] seeds?
- What is the maximum rate used to treat [type/use] seeds?
- What is the average (“typical”) rate used to treat [type/use] seeds?
- What is the median rate (some XXth percentile) used to treat [type/use] seeds?
- For **small-seeded vegetables**, the Agency assumes that 3,000 pounds (lbs) of seed are packaged per day by one worker. For the types of small-seeded vegetables that are packaged in your facility, how many lbs of small-seeded vegetable seeds are packaged by each worker in an eight-hour day? Please state the type of small-vegetable seed when providing an estimate of weight.
- For **large-seeded vegetables** (e.g., beans, squash, watermelon, pea, cowpea, and pumpkins), the Agency assumes that 339,500 lbs of seed are packaged by each worker in one eight-hour day. For large-seeded vegetables packaged in your facility, how many lbs of large-seeded vegetable seeds are packaged by each worker in an eight-hour day? Please state the type of large-vegetable seed when providing an estimate of weight.
- For other non-vegetable seeds treated in your facility, please provide an estimate of weight packaged by a worker in an eight-hour day. Please state the type of seed when providing your estimate.

Soliciting seed treatment info, for use in affected PIDs—for the *on farm treating/planting scenario*

For this [active ingredient], potential risks of concern have been identified for those individuals who are on farm to treat, load, and plant seeds. Seeds in this scenario are treated with a liquid or solid formulation of captan and are labeled as OFST-P/L or OFST-P/S, on-farm seed treatment and planting for products formulated as liquids (OFST/P-L) or for products formulated as solids (OFST/P-S). In the exposure studies, workers were monitored for pesticide exposure while treating, loading, and planting seeds. However, separate samples were not taken during each activity. Therefore, it is not possible to differentiate exposure from the treating, loading, and the planting activities. Workers often performed other tasks that may have included maintenance, cleaning of nozzles, checking seed depth at planting, among others. Recently, data on the pesticide exposures of OFST-P/L and OFST-P/S became available, have been reviewed by the Agency and are now implemented in the updated Policy 14.

Because the workers in the exposure study used open loading systems to treat seeds, the OFST/P-L and OFST/P-S dataset are used to represent **open loading systems** only.

The following seed types and amounts were used in the studies to measure on-farm worker exposure:

- Treating and planting **cotton** seeds (with solid formulation pesticide): 640 – 1,480 lbs. seed treated and 64 – 213 acres planted
- Treating and planting **wheat** seeds (with liquid formulation pesticide): 3,901 – 59,380 lbs. seed treated and 16 – 186 acres planted
- Treating activity only for **potato** seed pieces (with liquid formulation pesticide) (Amount of potato seed pieces treated was not documented in the study - no planting monitored in this study)

Risks of concern were identified for the OFST/P-S (solid formulations) for the following seed types: Barley; Bean, dry; Bean, snap; Corn, field; Corn, sweet; oat; pea, garden; soybean; and wheat.

Risks of concern were identified for the OFST/P-L (liquid formulations) for the following seed types: Barley; Bean, dry; Bean, snap; beet, sugar; oat; pea, garden; peanut; rye; soybean; and wheat.

Questions for stakeholders:

- Please list and describe in detail all the activities performed by a worker who is designated to treat on farm and then plant seeds in your operation. Please state the seed type in your response. Is a liquid or solid formulation of [active ingredient] in use for that seed type?
- Describe the pesticide loading system in your operation on farm to treat seed. Is this an open or closed loading system? Please state the type of seed in your response. Is a liquid or solid formulation of captan in use for that seed type?

- Describe the treating equipment used to treat seeds on farm. Please state the type of seed treated with this equipment. Is a liquid or solid formulation of [active ingredient] in use for that seed type?
- Describe the planting equipment used to sow seeds after they have been treated on farm. Please state the type of seed that is sown with this equipment.
- To the best of your knowledge, please describe how treating potato seeds and treating and planting cotton and wheat seeds on farm is **different** than treating and plantings seeds in your operation. Please state the type of seed in your response.
- Do you use the maximum rate to treat [type/use] seeds?
- What is the maximum rate used to treat [type/use] seeds?
- What is the average (“typical”) rate used to treat [type/use] seeds?
- What is the median rate (some XXth percentile) used to treat [type/use] seeds?
- The Agency assumes that 61, 80, and 200 acres are planted by a loader/planter in one eight-hour day for potatoes, vegetables and other specialty annual crops, and large acreage field crops (i.e., alfalfa, some beans, sugar beets, canola, field and popcorn, cereal grains, cotton, mint, rice, and soybean), respectively. How many acres are planted in one eight-hour day in your operation after you treat seeds on farm? Please state the type of seed planted.
- The Agency assumes a high-end seeding density (or number of seeds/acre) for each type of seed in its models of dermal and inhalation exposure to those workers who treat seeds on farm and then plant. The current assumptions for seeding density are found in Table 3.1 (pages 16-18) in Policy 15: https://www.epa.gov/system/files/documents/2022-01/exposac-policy-15_amount-seed-treated-planted.pdf
 - There are more types of seeds with their associated seeding density listed in the worksheet named “Amount Seed Planted variables” in the seed treatment calculator (Microsoft Excel file). Look at values in Column ‘D’.
https://www.epa.gov/system/files/documents/2022-02/seed-treatment-and-planting-exposure_mar2022.xlsx
 - What is the highest seeding density used in your operation? Please state the type of seed planted at this density.