

US EPA ARCHIVE DOCUMENT

Partial*
Interim Reregistration Eligibility Decision
for
Phosmet

Case No. 0242

*Includes only kiwifruit, peas (dry and green), sweet potatoes, alfalfa, blueberries, cherries (sweet and tart), cotton, cranberries, potatoes, pine seed orchards, ornamental nursery stock, household uses (ornamentals and fruit trees), domestic pet uses, and fire ants.

TABLE OF CONTENTS

Executive Summary	3
I. Introduction	6
II. Chemical Overview	8
A. Regulatory History	8
B. Chemical Identification	8
C. Use Profile	9
D. Estimated Usage of Pesticide	10
III. Summary of Phosmet Risk Assessment	13
A. Human Health Risk Assessment	13
1. Dietary Risk from Food	14
a. Toxicity	14
b. FQPA Safety Factor	14
c. Population Adjusted Dose (PAD)	15
d. Exposure Assumptions	15
e. Food Risk Characterization	16
2. Dietary Risk from Drinking Water	16
a. Surface Water	17
b. Ground Water	17
c. Drinking Water Levels of Comparison (DWLOCs)	18
3. Occupational and Residential Risk	19
a. Toxicity	19
b. Exposure	22
c. Occupational & Residential Handler Risk Summary	24
1) Occupational Handler Risk	25
2) Post-Application Occupational Risk	47
3) Residential (Homeowner) Handler Risk	52
4) Residential Post-Application Risk	54
4. Aggregate Risk	55
5. Incident Data Review	56
B. Environmental Risk Assessment	56
1. Environmental Fate and Transport	57
2. Risk to Birds and Mammals	57
3. Risk to Aquatic Species	58
4. Risk to Honey Bees	58

- IV. Interim Risk Management and Reregistration Decision for 17 Uses 58
 - A. Determination of Interim Reregistration Eligibility 58
 - B. Summary of Phase 5 Comments and Responses 59
 - C. Regulatory Position 60
 - 1. Tolerance Summary 61
 - 2. Human Health Risk Mitigation 61
 - a. Dietary (food and water) Risk Mitigation 61
 - b. Residential Risk Mitigation 61
 - c. Occupational Risk Mitigation 62
 - 3. Environmental Risk Mitigation 79
- V. What Registrants Need to Do: 80
- VI. Related Documents and How to Access Them: 80

PHOSMET TEAM

Office of Pesticide Programs:

Health Effects Risk Assessment

Jerome Blondell

Jeffrey Dawson

Virginia Dobozy

Christina Swartz

Linda Taylor

Environmental Fate Risk Assessment

Sid Abel

Dana Spatz

Use and Usage Analysis

Jihad Alsadek

William Gross

Registration Support

Richard Gebken

Risk Management

Diane Isbell

GLOSSARY OF TERMS AND ABBREVIATIONS

AGDCI	Agricultural Data Call-In
ai	Active Ingredient
aPAD	Acute Population Adjusted Dose
AR	Anticipated Residue
BCF	Bioconcentration Factor
CFR	Code of Federal Regulations
cPAD	Chronic Population Adjusted Dose
CSF	Confidential Statement of Formula
CSFII	USDA Continuing Surveys for Food Intake by Individuals
DCI	Data Call-In
DEEM	Dietary Exposure Evaluation Model
DFR	Dislodgeable Foliar Residue
DWLOC	Drinking Water Level of Comparison.
EC	Emulsifiable Concentrate Formulation
EEC	Estimated Environmental Concentration
EPA	Environmental Protection Agency
EUP	End-Use Product
FDA	Food and Drug Administration
FFDCA	Federal Food, Drug, and Cosmetic Act
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FOB	Functional Observation Battery
FQPA	Food Quality Protection Act
G	Granular Formulation
GENEEC	Tier I Surface Water Computer Model
GLN	Guideline Number
HAFT	Highest Average Field Trial
IR	Index Reservoir
LC ₅₀	Median Lethal Concentration. A statistically derived concentration of a substance that can be expected to cause death in 50% of test animals. It is usually expressed as the weight of substance per weight or volume of water, air or feed, e.g., mg/l, mg/kg or ppm.
LD ₅₀	Median Lethal Dose. A statistically derived single dose that can be expected to cause death in 50% of the test animals when administered by the route indicated (oral, dermal, inhalation). It is expressed as a weight of substance per unit weight of animal, e.g., mg/kg.
LOAEL	Lowest Observed Adverse Effect Level
LOC	Level of Concern
LOD	Limit of Detection
MATC	Maximum Acceptable Toxicant Concentration
mg/kg/day	Milligram Per Kilogram Per Day
mg/L	Milligrams Per Liter
MOE	Margin of Exposure
MRID	Master Record Identification (number). EPA's system of recording and tracking studies submitted.
MUP	Manufacturing-Use Product
NA	Not Applicable
NAWQA	USGS National Water Quality Assessment
NOAEL	No Observed Adverse Effect Level
NPDES	National Pollutant Discharge Elimination System

NR	Not Required
OP	Organophosphate
OPP	EPA Office of Pesticide Programs
OPPTS	EPA Office of Prevention, Pesticides and Toxic Substances
PAD	Population Adjusted Dose
PCA	Percent Crop Area
PDP	USDA Pesticide Data Program
PHED	Pesticide Handler's Exposure Data
PHI	Preharvest Interval
ppb	Parts Per Billion
PPE	Personal Protective Equipment
ppm	Parts Per Million
PRZM/EXAMS	Tier II Surface Water Computer Model
Q₁*	The Carcinogenic Potential of a Compound, Quantified by the EPA's Cancer Risk Model
RAC	Raw Agriculture Commodity
RED	Reregistration Eligibility Decision
REI	Restricted Entry Interval
RfD	Reference Dose
RQ	Risk Quotient
SAP	Science Advisory Panel
SCI-GROW	Tier I Ground Water Computer Model
SF	Safety Factor
SLC	Single Layer Clothing
SLN	Special Local Need (Registrations Under Section 24(c) of FIFRA)
TGAI	Technical Grade Active Ingredient
TRR	Total Radioactive Residue
UF	Uncertainty Factor
USDA	United States Department of Agriculture
USGS	United States Geological Survey
UV	Ultraviolet
WPS	Worker Protection Standard
µg/g	Micrograms Per Gram
µg/L	Micrograms Per Liter

Executive Summary

EPA has completed its review of public comments on the revised risk assessments and is issuing a partial risk management decision for phosmet. The decisions outlined in this document do not include all uses, nor do they include the final tolerance reassessments for all uses of phosmet; however, they do include some tolerance actions that will be undertaken prior to completion of the final tolerance reassessments. Five tolerances will be revoked when the IRED is issued, for citrus and corn, because the registrant is not supporting these uses. The final tolerance reassessment decisions for this chemical will be issued once the cumulative assessment for all of the organophosphates is considered. The Agency may need to pursue further risk management measures for phosmet once the cumulative assessment is finalized.

The revised risk assessments are based on review of the required target data base supporting the use patterns of currently registered products and new information received. The Agency invited stakeholders to provide proposals, ideas or suggestions on appropriate mitigation measures before the Agency issued its risk mitigation decision on phosmet. After considering the revised risks, as well as mitigation proposed by Gowan Company, the technical registrant of phosmet, and comments and mitigation suggestions from other interested parties, including Wellmark International, the Natural Resources Defense Council, several grower organizations, and an agricultural extension agent, EPA developed its risk management decision for uses of phosmet that pose risks of concern. Seventeen decisions are discussed fully in this document. Risk management decisions on the remaining 28 phosmet uses will be discussed in a future document.

Phosmet is an organophosphate insecticide used to control a variety of insects, first registered in 1966 for use on the following crops: Fruit trees (apple, apricot, crabapple, nectarine, peach, pear, plum/prune, cherry (tart and sweet) and nut trees (almond, beechnut, Brazil nut, butternut, cashew, chestnut, chinquapin, filbert, hickory, macadamia, pecan, pistachio, walnut), grapes, kiwifruit, blueberries (highbush and lowbush), cranberries, peas (fresh and dried), potato, sweet potato (foliar and post-harvest) alfalfa, cotton and clover. In addition, phosmet is registered for direct animal treatments to control fleas, lice, hornflies, sarcoptic mange, and ticks on cattle, swine, and dogs. There are other uses such as in forestry, pine seed orchards, pine seedlings, fire ants and for ornamentals, including residential sites, that can be treated by professional applicators. Phosmet can also be used by homeowners to treat trees, shrubs, ornamental plants, pets (dogs only) and home gardens. Use data from 1988 to 1997 indicate an average of approximately 1,000,000 lbs of phosmet are applied to approximately 402,000 acres per year.

Overall Risk Summary

EPA's human health risk assessment for phosmet indicates some risk concerns. Food risk, both acute and chronic, is well below the Agency's level of concern. Similarly, drinking water risk estimates based on screening models, from both ground and surface water for acute and chronic

exposures, are not of concern for all populations. There are, however, concerns for workers who mix and load phosmet ("handlers") in the wettable powder form for aerial and chemigation applications to fruit/nut trees, field and vegetable crops, grapes, and ornamental plants and forestry. Worker handler risks are largely due to estimated dermal exposures. Following application of phosmet, there are also concerns for workers re-entering treated fields. Additionally, there are concerns for homeowners who apply phosmet to ornamental plants and fruit trees with a low pressure hand wand, and for adults and youths harvesting and maintaining these fruit trees. There are significant risk concerns for toddlers exposed to phosmet residues following contact with treated dogs. In addition, there are concerns for continuous exposure to adults and youths in residential settings if exposure extends over a period of time (greater than 30 days) following application to home gardens.

Phosmet was found to be moderately to practically non-toxic to avian species on an acute basis; however, the application rates for some crops result in levels of concern that are slightly exceeded. Use on most crops appears to pose a chronic risk to birds and for all crops, there is a high chronic risk for mammals. For mammals, the acute levels of concern are exceeded mainly on short grass for smaller animals. Acute and chronic risk to both freshwater and estuarine/marine fish is relatively low. The acute risk to both freshwater and estuarine/marine invertebrates are of concern for some crops. Use of phosmet on all crops (with potential for marine exposure) appear to pose a chronic concern for marine invertebrates. Use of phosmet on many crops appears to pose a chronic risk to freshwater invertebrates. In addition, phosmet is highly toxic to honey bees, and incidents of honey bee toxicity have been reported.

To mitigate risks of concern posed by the uses of phosmet, EPA considered the mitigation proposal submitted by the technical registrant, as well as comments and mitigation ideas from other interested parties, and has decided on risk mitigation measures to address the worker, residential, and ecological concerns for 17 phosmet use sites. Results of the risk assessments are presented in this partial interim RED. Revised labeling and other actions needed to implement risk mitigation for all phosmet uses will be outlined in a future document.

Dietary Risk

Acute and chronic dietary risk assessments for food and drinking water are not of concern; therefore, no mitigation is warranted at this time for any dietary exposure to phosmet.

Occupational Risk

Occupational exposure to phosmet is of concern to the Agency, and it has been determined that a number of mitigation measures are necessary. For the agricultural uses of phosmet, the Agency has risk concerns, i.e., MOEs are less than 100, for occupational handlers mixing and loading wettable powder products for aerial and chemigation applications to fruit and nut trees, field and vegetable crops, grapes, ornamental plants, and forestry. The EPA believes most of these risks can be mitigated

with the following label restrictions: addition of personal protective equipment, and the use of closed systems, in addition to label restrictions and amendments detailed in this document. The Agency has concerns about workers re-entering the agricultural field within 24 hours after treatment with phosmet, which is the restricted entry interval on current labels. There are some remaining phosmet uses with risks of concern, even after taking into account all feasible mitigation for these uses, EPA has conducted a benefits assessment, and considered the benefits of continued use, as well as the risks, in its risk management decisions. The benefits associated with these uses are discussed in Section IV of this partial interim RED.

Residential Risk

Based on the phosmet use pattern, residential handler exposure is expected to occur through either treatment of a dog or use in a home garden. The residential handler scenarios that involve the use of a low-pressure handwand are of concern. There are concerns for continuous post-application exposure to adults and youth in residential settings over an extended period of time (greater than 30 days); however, there is little information to determine if such extended exposures actually occur. There are also concerns for short-term exposure to adults and youths harvesting and maintaining fruit trees. In addition, there are significant risk concerns for toddlers exposed to phosmet residues following contact with treated dogs, regardless of the duration of exposure. To mitigate the residential risks of concern, the registrant has agreed to cancel all products that are used in or around the home or on pets.

Ecological Risk

The Agency has some concerns with the estimated ecological risks. Studies suggest that on certain crops, where there is a high application rate and frequent application of phosmet, expected environmental concentrations can lead to acute risk for mammals; chronic risk for birds and mammals; and acute and chronic risks to invertebrates. In addition, phosmet is highly toxic to honey bees.

With the implementation of the mitigation measures detailed in this document, the Agency has determined that, until the cumulative risks for all of the organophosphates has been considered, kiwi, peas (dry and green), sweet potatoes, alfalfa, blueberries, cherries (sweet and tart), cotton, cranberries, potatoes, pine seed orchards, ornamental (nursery stock) and fire ant uses of phosmet may continue; the use on dogs and the homeowner use of phosmet on ornamentals and fruit trees will be voluntarily canceled.

The Agency is issuing this partial interim Reregistration Eligibility Document (RED) for phosmet, as announced in a Notice of Availability published in the *Federal Register*. Because of extensive public interest in phosmet, EPA is providing a 60-day comment period for this partial interim decision document.

No action is needed by registrants until EPA has completed its risk management decisions for all phosmet uses and issues a complete IRED with time lines and instructions for complying with the DCIs and other provisions of the IRED. Neither the tolerance reassessment nor the reregistration eligibility decision for phosmet can be considered final, however, until the cumulative risks for all organophosphate pesticides are considered. The cumulative assessment may result in further risk mitigation measures for phosmet.

I. Introduction

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) was amended in 1988 to accelerate the reregistration of products with active ingredients registered prior to November 1, 1984. The amended Act calls for the development and submission of data to support the reregistration of an active ingredient, as well as a review of all submitted data by the U.S. Environmental Protection Agency (referred to as EPA or “the Agency”). Reregistration involves a thorough review of the scientific database underlying a pesticide’s registration. The purpose of the Agency’s review is to reassess the potential hazards arising from the currently registered uses of the pesticide; to determine the need for additional data on health and environmental effects; and to determine whether the pesticide meets the “no unreasonable adverse effects” criteria of FIFRA.

On August 3, 1996, the Food Quality Protection Act of 1996 (FQPA) was signed into law. This Act amends FIFRA to require tolerance reassessment of all existing tolerances. The Agency had decided that, for those chemicals that have tolerances and are undergoing reregistration, the tolerance reassessment will be initiated through this reregistration process. FQPA also requires that by 2006, EPA must review all tolerances in effect on the day before the date of the enactment of the FQPA. FQPA amends the FFDCA to require a safety finding in tolerance reassessment based on factors including an assessment of cumulative effects of chemicals with a common mechanism of toxicity. Phosmet belongs to a group of pesticides called organophosphates, which share a common mechanism of toxicity - they all affect the nervous system by inhibiting the enzyme cholinesterase. Although FQPA significantly affects the Agency’s reregistration process, it does not amend any of the existing reregistration deadlines. Therefore, the Agency is continuing its reregistration program while it resolves the remaining issues associated with the implementation of FQPA.

This document presents the Agency’s revised human health and ecological risk assessments, and a partial interim decision on the reregistration eligibility of phosmet. It is intended to be only the first set of reregistration decisions for phosmet. The Agency will eventually proceed with its risk management decisions for all phosmet uses and its assessment of the cumulative risk of the OP pesticides and issue a final reregistration eligibility decision for phosmet.

The implementation of FQPA has required the Agency to revisit some of its existing policies relating to the determination and regulation of dietary risk, and has also raised a number of new issues for which policies need to be created. These issues were refined and developed

through collaboration between the Agency and the Tolerance Reassessment Advisory Committee (TRAC), which was composed of representatives from industry, environmental groups, and other interested parties. The TRAC identified the following science policy issues it believed were key to the implementation of FQPA and tolerance reassessment:

- C Applying the FQPA 10-Fold Safety Factor;
- C Whether and How to Use "Monte Carlo" Analyses in Dietary Exposure Assessments ;
- C How to Interpret "No Detectable Residues" in Dietary Exposure Assessments;
- C Refining Dietary (Food) Exposure Estimates;
- C Refining Dietary (Drinking Water) Exposure Estimates;
- C Assessing Residential Exposure;
- C Aggregating Exposure from all Non-Occupational Sources;
- C How to Conduct a Cumulative Risk Assessment for Organophosphate or Other Pesticides with a Common Mechanism of Toxicity;
- C Selection of Appropriate Toxicity Endpoints for Risk Assessments of Organophosphates; and
- C Whether and How to Use Data Derived from Human Studies.

The process developed by the TRAC calls for EPA to provide one or more documents for public comment on each of the policy issues described above. Each of these issues is evolving and in a different stage of refinement. Some issue papers have already been published for comment in the Federal Register and others will be published shortly.

In addition to the policy issues that resulted from the TRAC process, the Agency issued, on September 29, 2000, a Pesticide Registration Notice (PR 2000-9) that presents EPA's approach for managing risks from organophosphate pesticides to occupational users. The Worker PR Notice describes the Agency's baseline approach to managing risks to handlers and workers who may be exposed to organophosphate pesticides, and the Agency expects that other types of chemicals will be handled similarly. Generally, basic protective measures such as closed mixing and loading systems, enclosed cab equipment, or protective clothing, as well as increased reentry intervals will be necessary for most uses where current risk assessments indicate a risk and such protective measures are feasible. The policy also states that the Agency will assess each pesticide individually, and based upon the risk assessment, determine the need for specific measures tailored to the potential risks of the chemical. The measures included in this interim RED are consistent with the Worker Pesticide Registration Notice.

This document consists of six sections. Section I contains the regulatory framework for reregistration/tolerance reassessment as well as descriptions of the process developed by TRAC for public comment on science policy issues for the organophosphate pesticides and the worker risk management PR notice. Section II provides a profile of the use and usage of the chemical. Section III gives an overview of the revised human health and environmental effects risk assessments resulting from public comments and other information. Section IV presents the Agency's partial interim decision on

reregistration eligibility and risk management decisions for some phosmet uses. Section V usually summarizes the label changes necessary to implement the risk mitigation measures outlined in Section IV. However, for this partial decision document it is included only as a place holder. Instructions and time lines for complying with the provisions of the IRED will be provided when EPA completes its risk management decisions for all uses of phosmet and issues a complete IRED. Section VI provides information on how to access related documents. Finally, no appendices are included in this document. The complete IRED for phosmet will include appendices that list the uses that will be eligible for reregistration, pending the cumulative assessment for the organophosphate pesticides, data that support these decisions and Data Call-In (DCI) information.

The revised risk assessments and related addenda are not included in this document, but are available on the Agency's web page www.epa.gov/pesticides/op, and in the OPP Public Docket located in Room 119, Crystal Mall #2, 1921 Jefferson Davis Hwy., Arlington, VA.

II. Chemical Overview

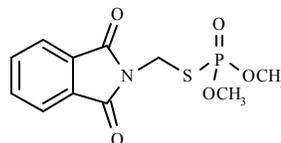
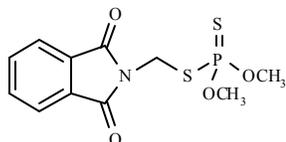
A. Regulatory History

Phosmet was first registered in the United States in 1966 as a broad-spectrum insecticide for control of a wide variety of pests including the alfalfa weevil, boll weevil, codling moth, grape berry moth, leafrollers, plum curculio, and oriental fruit moth. In addition, phosmet is registered for direct animal treatments to control fleas, lice, hornflies, sarcoptic mange, and ticks on cattle, swine and dogs. There are other uses such as in forestry and for ornamental plants, including residential sites that can be treated by professional applicators. Phosmet can also be used by homeowners to treat trees, shrubs, ornamental plants, home gardens and dogs.

Although there are existing tolerances for residues in sweet corn and citrus, the registrant has indicated these uses will not be supported and they have been excluded from the risk assessment. The associated tolerances will be revoked.

B. Chemical Identification

N-(mercaptomethyl) phthalimide-S-(O,O-dimethyl phosphorodithioate):



Phosmet

Phosmet oxon

! Common Name:	Phosmet	
! Chemical Name:	N-(mercaptomethyl) phthalimide-S-	(O,O-
	dimethyl phosphorodithioate):	
! Chemical family:	Organophosphate	
! Case number:	0242	
! CAS registry number:	732-11-6	
! OPP chemical code:	059201	
! Empirical formula:	C ₁₁ H ₁₂ NO ₄ PS ₂	
! Molecular weight:	317.32	
! Trade and other names:	Imidan	
! Basic manufacturer:	Gowan Company and Schering-Plough Animal Health Inc.	

Technical phosmet is a pink to white crystalline solid with a melting point of 66-69 C. Phosmet is slightly soluble in water (20 mg/L at 20-25 C), more soluble in ethanol and kerosene (<1.0 g/100 mL), and readily soluble in acetone, chloroform, and xylene (>100 g/100 mL). Phosmet has a relatively low vapor pressure of 3.72×10^{-7} mm Hg at 25 C.

C. Use Profile

The following information is based on the currently registered uses of phosmet.

Type of Pesticide: Insecticide.

Summary of Use Sites:

Food and Feed: Fruit trees (apple, apricot, crabapple, nectarine, peach, pear, plum/prune, cherry (tart and sweet) and nut trees (almond, beechnut, Brazil nut, butternut, cashew, chestnut, chinquapin, filbert, hickory, macadamia, pecan, pistachio,

walnut), grapes, kiwifruit, blueberries (highbush and lowbush), cranberries, peas (fresh and dried), potato, sweet potato (foliar and post-harvest) alfalfa, cotton and clover.

Residential: Ornamentals, fruit and nut trees, blueberries, grapes, peas (fresh and dried), potatoes, and pets (dogs only).

Public Health: Fire Ants.

Other Nonfood: Evergreen trees, nursery stock, pine seed orchards, and pine seedlings. Direct animal treatments to cattle, swine, and dogs.

Target Pests: Moths, beetles, weevils, leafrollers, navel orangeworm, peach twig borer, plum curculio, San Jose scale, lice, flies, ticks and sarcoptic mange.

Formulation Types Registered: Dust, emulsifiable concentrate, soluble concentrate, and wettable powder.

Method and Rates of Application:

Equipment - In agriculture, groundboom, airblast and aerial applications. Other applications, dusting equipment, handheld equipment such as low pressure handwand sprayers and backpack sprayers. Post-harvest application to sweet potatoes can be made by hand held dusting equipment. Direct dermal application to livestock is permitted via sprays and a backrubber. Dogs can be treated with a dip or a dust.

Method and Rate - In agriculture, use rates range from 0.7 to 6 lbs ai/A, depending on the crop. Multiple foliar applications can be made to some crops in a growing season. Applications can generally be made up to 7 to 14 days prior to harvest. Post-harvest application of a dust formulation to sweet potatoes is permitted, using 0.0125 lb ai/50 lb bushel. Direct dermal applications to livestock range from 0.4 - 2.0 lb ai/100 gallons spray. Backrubber application to cattle rate is 1 lb ai/50 gallons fuel oil. The use rate for dusting dogs is 0.5 g dust/kg animal weight. The use rate for dipping dogs is 0.0076 lb ai/gallon dip solution.

Timing - Delayed dormant, foliar applications for agricultural crops and post-harvest use on sweet potatoes.

Use Classification: General classification.

D. Estimated Usage of Pesticide

This section summarizes the best estimates available for many of the pesticide uses of phosmet, based on available pesticide usage information for 1988 to 1997. A full listing of all uses of phosmet, with the corresponding use and usage data for each site, has been completed and is in the “Quantitative Use Assessment” document, which is available in the public docket. The data, reported on an aggregate and site (crop) basis, reflect annual fluctuations in use patterns as well as the variability in using data from various information sources. Approximately 1,000,000 lbs active ingredient (a.i.) of phosmet are used annually, according to Agency and registrant estimates.

Table 1. Phosmet Estimated Annual Usage for Representative Sites

Crop	Lbs. Active Ingredient Applied (Wt. Avg.) ¹	Percent Crop Treated (Likely Maximum)	Percent Crop Treated (Wt. Avg.)
Blueberries	19,000	30	20
Apples	420,000	37	23
Apricots	10,000	28	21
Cherries	35,000	26	15
Kiwifruit	54	4	1
Nectarines	13,000	27	14
Peaches	110,000	23	13
Pears	54,000	33	20
Plums & Prunes	15,000	7	4
Grapes	21,000	5	2
Almonds	61,000	9	4
Pecans	30,000	10	3
Walnuts	87,000	25	9
Potatoes	28,000	4	1
Sweet Potatoes	14,000	7	4
Peas, Dry	12,000	27	13
Peas, Green	7,000	6	3
Alfalfa	37,000	0.5	0.2
Cotton	2,000	0.18	0.04
Other Crops	5,000	-	-
Woodland	0	0.02	0.01
Canine (Dog)	10,000	-	-
Cattle & Swine	19,000	-	-
Beef Cattle	-	0.22	0.11
Dairy Herd	-	0.56	0.28

¹ Weighted Average is based on data for 1988 to 1997; the most recent years and more reliable data are weighted more heavily.

III. Summary of Phosmet Risk Assessment

Following is a summary of EPA's revised human health and ecological risk findings and conclusions for the organophosphate pesticide phosmet, as fully presented in the documents, "Phosmet (Chemical ID No. 059201/List A Reregistration Case No. 0242). HED Revised Human Health Risk Assessment for the Reregistration Eligibility Decision Document (RED). DP Barcode No. D262365," dated February 9, 2000; "Phosmet: Revised Occupational Post-Application Exposure and Risk Calculations [DP Barcode D268141, Chemical Code 059201, Case 818976]," dated August 15, 2000; and "Environmental Fate and Effects Division RED Chapter for Phosmet," dated April 24, 1998. The purpose of this summary is to assist the reader by identifying the key features and findings of these risk assessments, and to better understand the conclusions reached in the assessments.

These risk assessments for phosmet were presented at a February 10, 2000 Technical Briefing in Pasco, WA, which was followed by an opportunity for public comment on risk management for this pesticide. The risk assessments presented here form the basis of the Agency's risk management decision for phosmet only; the Agency must complete a cumulative assessment of the risks of all the organophosphate pesticides before any final decisions can be made.

A. Human Health Risk Assessment

EPA issued its preliminary risk assessments for phosmet on January 15, 1999, (Phase 3 of the TRAC process). In response to comments and studies submitted during Phase 3, the risk assessments were updated and refined. Major revisions to the human health risk assessment include recalculation of restricted entry intervals based on new data from the Agricultural Reentry Task Force (ARTF) and inclusion of a worker risk assessment for the liquid formulations.

The Agency has reviewed all toxicity studies submitted and has determined that the toxicity database is complete, and that it supports an interim reregistration eligibility determination. Further details on the toxicity of phosmet can be found in the February 9, 2000, Human Health Risk Assessment.

Cancer Risk

Based on all available data for phosmet, the HED Cancer Assessment Review Committee (CARC) concluded that phosmet should be classified as having "suggestive evidence of carcinogenicity, but not sufficient to assess human carcinogenic potential". In a mouse carcinogenicity study, phosmet caused increases in liver carcinomas/adenomas in males and increased mammary gland tumors in females. Phosmet was not carcinogenic in rats. The CARC conducted a weight-of-evidence evaluation of the mutagenicity and carcinogenicity data for phosmet (in accordance with the 1997 draft Cancer Guidelines) on September 1, 1999. Additional data regarding tumor counts in the mouse carcinogenicity study were discussed along with additional mutagenicity data submitted by the registrant. The CARC recommended against completing a quantitative cancer risk assessment for

phosmet. This recommendation is consistent with the previous recommendation to use the reference dose (RfD) approach, in which chronic risks assessed using the RfD are considered to be protective of any carcinogenic effect, as well as any systemic or other chronic effects.

Human Data

The Agency is currently evaluating an acute (ascending single oral dose) study with phosmet in humans that was conducted by Inveresk Research in Scotland in 1999. The following observations can be made on the potential impact of these data on the phosmet risk assessment. Because the study is a single oral dose, it could be used in a weight-of-evidence approach to inform the selection of the inter-species uncertainty factor for acute risk assessments. That is, assuming it was conducted according to appropriate scientific and ethical standards, the acute human study could be compared to existing acute animal data to determine if the full ten-fold inter-species uncertainty factor is needed to account for variation between species in the acute dietary assessment for phosmet and could provide a basis for reduction of the uncertainty factor for acute dietary risk. However, because of its limited duration, the human study would not likely be appropriate for use in short-term or intermediate-term assessments, such as those used to estimate worker risk from phosmet use, nor would it be appropriate for the chronic dietary assessment.

1. Dietary Risk from Food

a. Toxicity

A brief overview of the studies used for the dietary risk assessment is outlined in Table 2 below.

b. FQPA Safety Factor

The FQPA Safety Factor was reduced to 1 X. The toxicity database includes an acceptable two-generation reproduction study in rats and acceptable prenatal developmental toxicity studies in rats and rabbits. These studies show no increased sensitivity to phosmet among fetuses as compared to maternal animals following acute in utero exposure in the developmental rat and rabbit studies and no increased sensitivity among pups as compared to adults in a multi-generation reproduction study in rats. There was no evidence of abnormalities in the development of the fetal nervous system in the pre/post natal studies. In the subchronic neurotoxicity study in rats, an increase in the neuropathological changes, characterized by digestion chamber in the sciatic and peroneal nerves, was seen in high dose male rats. When compared to the controls, these changes could not be ruled out as a treatment-related effect. Adequate actual data, surrogate data, and/or modeling outputs are available to satisfactorily assess dietary and residential exposure and to provide a screening level drinking water exposure assessment. The assumptions and models used in the assessments do not underestimate the potential risk for infants and children. Therefore, the 10X factor as required by FQPA was reduced to 1, for both acute and chronic risk assessments for all subpopulations. A developmental neurotoxicity study (DNT) study has been required and is considered confirmatory.

c. Population Adjusted Dose (PAD)

The PAD is a term that expresses the dietary risk of a chemical, and reflects the Reference Dose, (RfD) either acute or chronic, that has been adjusted to account for the FQPA safety factor (i.e., RfD/FQPA safety factor). In the case of phosmet, the FQPA safety factor is 1; therefore, the acute or chronic RfD is equal to the acute or chronic PAD. A risk estimate that is less than 100% of the acute or chronic PAD does not present a risk of concern.

Table 2. Summary of Toxicological Endpoints and Other Factors Used in the Human Dietary Risk Assessment of Phosmet

Assessment	Dose	Endpoint	Study	UF	FQPA Safety Factor	PAD
Acute Dietary	LOAEL of 22.5 mg/kg/day NOAEL of 4.5 mg/kg/day	Red blood cell, plasma and brain cholinesterase inhibition and decreased motor activity	Oral Acute Neurotoxicity Study on Rats	100	1	0.045 mg/kg/day
Chronic Dietary	LOAEL of 1.8 mg/kg/day NOAEL of 1.1 mg/kg/day	Red blood cell, and serum cholinesterase inhibition	Oral Chronic Toxicity/ Carcinogenicity Study on Rats	100	1	0.011 mg/kg/day

d. Exposure Assumptions

Revised acute and chronic dietary risk analyses for phosmet were calculated using the Dietary Exposure Evaluation Model (DEEM™). The regulated residues consist of parent phosmet and its metabolite, phosmet oxygen analog (oxon). For the revised phosmet risk assessment, the Agency conducted highly refined (Tier 3) acute (probabilistic) and chronic dietary exposure analyses which were based almost entirely on the available monitoring data, and incorporated additional refinements such as processing and cooking factors and percent of crop treated. The DEEM analysis evaluated the individual food consumption as reported by respondents in the USDA’s 1989-91 Continuing Surveys of Food Intakes by Individuals (CSFII) and accumulated exposure to the chemical for each commodity. Typically, the Agency will not use monitoring data which do not include all residues of toxicological concern. Although both the PDP and FDA monitoring programs reported data for parent phosmet only, these data have been used in the revised risk assessment for the following reasons: (i) field trial data indicate that oxon residues, when detected, are generally an order of magnitude lower than parent residues; (ii) residues in both PDP and FDA monitoring samples were significantly less than tolerance-level residues; and (iii) phosmet oxon is relatively unstable in numerous commodities. Using the monitoring data in acute and chronic dietary exposure analyses is not expected to underestimate risk.

The acute dietary risk analyses for phosmet were calculated using a probabilistic analysis (Monte Carlo), incorporating percent crop treated data, USDA's Pesticide Data Program data (PDP monitoring data), the Food and Drug Administration's monitoring data, residue field trial data, cooking study data, and processing factors, where available. Chronic dietary risk was calculated by using the average consumption and residue values for foods.

e. Food Risk Characterization

Generally, a dietary risk estimate that is less than 100% of the acute or chronic Population Adjusted Dose does not exceed the Agency's risk concerns. The phosmet acute dietary risk from food is well below the Agency's level of concern; i.e., less than 100% of the acute PAD. For example, for the most exposed subgroups, children (1-6 years) and infants (<1 year), the % acute PAD values are 7.5% and 6.5%, respectively, at the 99.9th percentile of exposure, based on food alone.

The chronic dietary risk from food alone is well below the Agency's level of concern. For the most exposed subgroup, children (1 - 6 years), the % chronic PAD value is 0.7%.

The Agency has refined the dietary (food) analyses to the extent currently possible.

2. Dietary Risk from Drinking Water

Drinking water exposure to pesticides can occur through ground water and surface water contamination. EPA considers both acute (one day) and chronic (lifetime) drinking water risks and uses either modeling or actual monitoring data, if available, to estimate those risks. Modeling is considered to be an unrefined assessment and provides a high-end estimate of risk. In the case of phosmet, only limited monitoring data for either ground or surface water were available; therefore, modeling was used to estimate drinking water risks from these sources.

The PRZM-EXAMS model was used to estimate surface water concentrations, and SCI-GROW was used to estimate groundwater concentrations. Both models are considered to be screening models, with the PRZM-EXAMS model being somewhat more refined than SCI-GROW.

Phosmet oxon is the only degradate of toxicological concern and was identified in a number of the environmental fate studies that were conducted. Phosmet oxon appears to be less mobile than phosmet, as evidenced by its absence in leachates in the aged and unaged mobility study. In addition phosmet oxon was limited to the upper soil layer in the field studies while phosmet was detected as low as the 10.5-inch soil layer. Phosmet was found to be moderately mobile to mobile in four different soil classes.

The estimated concentrations for drinking water are for phosmet only. Phosmet oxon, which has been included in the tolerance expression, is not included in the modeling due to the absence of fate information. Considering the limited presence of phosmet oxon in the laboratory and field studies (soil

extract of the mobility study and upper 0 - 3-inch soil layer in the field dissipation studies), phosmet oxon should not add appreciably to the concentration of parent compound in ground or surface water in most use areas.

a. Surface Water

A Tier II PRZM-EXAMS screening model was used to estimate the upper-bound concentrations of phosmet in drinking water derived from surface water. This model, in general, is based on more refined, less conservative assumptions than the Tier I GENECC screening model.

Phosmet can contaminate surface water via runoff if runoff-producing rain events occur within the first few days to weeks post application. Phosmet's water solubility (25 mg/l) and its partition coefficient ($K_{ads} = 1.17 - 15.8$) suggest that it will enter surface water via runoff. It appears that the persistence of phosmet in surface water may be limited by its susceptibility to biodegradation especially in water with moderate to high microbial activity and by abiotic hydrolysis under neutral to alkaline conditions. In flowing water, its persistence is limited by the flow rate of the system more than by either metabolism or hydrolysis. However, its persistence in lakes and reservoirs will be greater and controlled more by metabolism and hydrolysis.

Limited monitoring data indicate that phosmet has been detected in surface water in known use areas. However, these data suggest that phosmet concentrations do not exceed the very low ppb range, well below the DWLOC. The three crops with the highest phosmet surface water concentrations are pears, kiwi and cotton applied at 5, 2 and 1 lb ai/A, respectively. The estimated environmental concentrations (EECs) range from 0.4 ppb for application to apples at the western-low rate (1.5 lb ai/A) to 140 ppb for application to pears (5 lb ai/A).

b. Ground Water

A Tier I screening model, SCI-GROW, was used to estimate the upper-bound drinking water concentrations of phosmet in ground water. The SCI-GROW model is based on the fate properties of the pesticide, the annual application rate, and the existing body of data from small-scale ground water monitoring studies. The model assumes that the pesticide is applied at its maximum rate in areas where ground water is particularly vulnerable to contamination. In most cases, a considerable portion of any use area will have ground water that is less vulnerable to contamination than the areas used to derive the SCI-GROW estimates. The estimated maximum concentration derived using these modeled estimates should be considered a high-end to bounding estimate of acute and chronic exposure.

The maximum concentration (acute and chronic) for parent phosmet estimated using SCI-GROW is approximately 0.4 ppb. No phosmet residues were reported in ground water monitoring data at concentrations above the detection limits of 0.1 and 10 ppb. Phosmet is not expected to pose a threat to ground water resources.

c. Drinking Water Levels of Comparison (DWLOCs)

To determine the maximum allowable contribution of pesticide residues from drinking water permitted in the diet, EPA first looks at how much of the overall allowable risk is contributed by food (and if appropriate, residential uses) then determines a “drinking water level of comparison”(DWLOC) to determine whether modeled or monitored levels exceed this level. The Agency uses the DWLOC as a surrogate to capture risk associated with exposure from pesticides in drinking water. The DWLOC is the maximum concentration in drinking water which, when considered together with dietary exposure from food, does not exceed a level of concern.

The results of the Agency’s drinking water analysis are summarized here. Details of this analysis, which used screening models, are found in the HED Human Health Risk Assessment, dated February 9, 2000.

For acute risk, the potential drinking water exposure derived from either ground or surface water is not of concern for all populations. The table below presents the calculations for the acute drinking water assessment.

Table 3. Summary of DWLOC Calculations for Phosmet Acute Risk

Population Subgroup	Ground Water EECs (ppb) (SCI-GROW)	Surface Water EECs (ppb) (PRZM-EXAMS)	DWLOC (ppb)
U.S. Population	0.4	3 - 140	1523
Females 20+	0.4	3 - 140	1308
Children 1-6	0.4	3 - 140	416

For chronic risk, potential exposure to drinking water derived from either groundwater or surface water is not of concern for all populations. The table below presents the calculations for the chronic drinking water assessments.

Table 4. Summary of DWLOC Calculations for Phosmet Chronic Risk

Population Subgroup	Ground Water EECs (ppb) (SCI-GROW)	Surface Water EECs (ppb) (PRZM-EXAMS)	DWLOC (ppb)
U.S. Population	0.4	1	384
Children 1 - 6	0.4	1	110
Females 13 - 19	0.4	1	330

3. Occupational and Residential Risk

Workers can be exposed to a pesticide through mixing, loading, applying a pesticide, and/or re-entering treated sites. Residents or homeowners can be exposed to a pesticide through mixing, loading, applying a pesticide, entering a treated area or performing other activities in a treated area. Occupational handlers of phosmet include: individual farmers or growers who mix, load, or apply pesticides, and professional or custom agricultural applicators. Residential handlers include homeowner applicators treating their own home garden or dog. Risk for all of these potentially exposed populations is measured by a Margin of Exposure (MOE) which determines how close the occupational or residential exposure comes to a No Observed Adverse Effect Level (NOAEL). Generally, MOEs greater than 100 do not exceed the Agency’s risk concern.

a. Toxicity

The toxicity of phosmet is integral to assessing the occupational and residential risk. All risk calculations are based on the most current toxicity information available for phosmet, including a 21-day dermal toxicity study. An acceptable dermal absorption study conducted in rats indicates a dermal absorption factor of 10 percent is appropriate for the phosmet risk assessment. The toxicological endpoints, and other factors used in the occupational and residential risk assessments for phosmet are listed below.

In the preliminary risk assessment for phosmet, the Agency selected a LOAEL of 1.5 mg/kg/day established in the subchronic oral neurotoxicity study in rats for the intermediate-term dermal and inhalation exposures of >30 days in duration. In this study, a NOAEL was not established at the termination of the study. Therefore, the Agency used the LOAEL in the risk assessment and added an uncertainty factor of 3. The use of this uncertainty factor established the target MOE of 300 for these assessments and lead to a value (0.5 mg/kg/day) lower than the one used for the chronic dietary RfD (1.1 mg/kg/day). Based on a consideration of the entire toxicity database, EPA determined that the 0.5 mg/kg/day value was not a representative subchronic endpoint. For this reason, the Agency selected

the chronic rat study with a NOAEL of 1.1 mg/kg/day for the intermediate term >30 days exposure in the risk assessment. This is appropriate because the same endpoint (cholinesterase inhibition) was observed in both studies in the same species (rat) and the LOAEL of 1.5 mg/kg/day in the subchronic study is comparable to the LOAEL of 1.8 mg./kg/day in the chronic study.

Table 5a. Summary of Toxicological Endpoints and Other Factors Used in the Human Occupational and Residential Risk Assessments for Phosmet

Assessment	Dose	Endpoint	Study	Absorption Factor
Short-term dermal (Up to 7 days)	NOAEL = 15 mg/kg/day	Cholinesterase Inhibition [brain (females), plasma (males)] at the LOAEL of 22.5 mg/kg/day	21-Day Dermal Toxicity in Rats	Not Relevant
Intermediate-term dermal (>7 and #30 days)	NOAEL = 15 mg/kg/day	Cholinesterase Inhibition [brain (females), plasma (males)] at the LOAEL of 22.5 mg/kg/day	21-Day Dermal Toxicity in Rats	Not Relevant
Intermediate-term dermal (>30 days)	NOAEL = 1.1 mg/kg/day	Cholinesterase Inhibition (RBC and Serum) at the LOAEL of 1.8 mg/kg/day	Oral Chronic Toxicity/ Carcinogenicity in Rats	10%
Short-term inhalation (Up to 7 days)	NOAEL= 4.5 mg/kg/day	Cholinesterase Inhibition (Plasma, RBC, Brain) and Decreased Motor Activity at the LOAEL of 22.5 mg/kg/day	Oral Acute Neurotoxicity in Rats	100 %
Intermediate-term inhalation (>7 and # 30 days)	NOAEL= 1.5 mg/kg/day (At 3 week interval)	Cholinesterase Inhibition [brain (females), plasma (males)] at the LOAEL of 2.7 mg/kg/day	Oral Subchronic Neurotoxicity in Rats	100 %
Intermediate-term inhalation (>30 days)	NOAEL= 1.1 mg/kg/day	Cholinesterase Inhibition (RBC and Serum) at the LOAEL of 1.8 mg/kg/day	Oral Chronic Toxicity/ Carcinogenicity in Rats	100 %
Non-dietary ingestion - Acute (children)	NOAEL = 4.5 mg/kg/day	Cholinesterase Inhibition (Plasma, RBC, Brain) and Decreased Motor Activity at the LOAEL of 22.5 mg/kg/day	Oral Acute Neurotoxicity in Rats	Not Relevant
Non-dietary ingestion - Chronic (children)	NOAEL = 1.1 mg/kg/day	Cholinesterase Inhibition (RBC and Serum) at the LOAEL of 1.8 mg/kg/day	Oral Chronic Toxicity/ Carcinogenicity in Rats	Not Relevant

In acute toxicity studies, phosmet exhibits moderate toxicity via the oral and inhalation routes of exposure. Phosmet is not acutely toxic in rats via the dermal route, is non-irritating to the skin, and is not an eye irritant in the rabbit.

Table 5b. Acute Toxicity Profile for Phosmet

Guideline No.	Study Type	MRIDs #	Results	Toxicity Category
870.1100/§81-1	Acute Oral - rat	00046189	LD ₅₀ = 113 mg/kg	II
870.1200/§81-2	Acute Dermal - rabbit	00046190	LD ₅₀ >5000 mg/kg	III
870.1300/§81-3	Acute Inhalation - rat	00063197	LC ₅₀ >0.152 mg/L	II
870.2400/§81-4	Primary Eye Irritation	00046192	moderate eye irritant	III
870.2500/§81-5	Primary Skin Irritation	00046191	not a skin irritant	IV
870.2600/§81-6	Dermal Sensitization	no study		N/A
870.6100/§81-7	Delayed Neurotoxicity	44587601	unsteadiness, subdued behavior, recumbency, salivation; no ataxia; no decreases in brain or spinal cord NTE; brain ChE decreased 63%; no neuropathology. [All hens were dosed at 600 mg/kg by oral gavage]	N/A
870.6200/§81-8	Acute Neurotoxicity	44673301	NOAEL 4.5 mg/kg LOAEL 22.5 mg/kg, based on cholinesterase inhibition [plasma, RBC, brain] and decreased motor activity in both sexes.	N/A

b. Exposure

Chemical-specific exposure data were not available for phosmet, so risks to pesticide handlers were assessed using data from the Pesticide Handlers Exposure Database (PHED). The quality of the data and exposure factors represents the best sources of data currently available to the Agency for completing these kinds of assessments; the application rates are derived directly from phosmet labels. The exposure factors (e.g., body weight, amount treated per day, protection factors, etc.) are all standard values that have been used by the Agency over several years, and the PHED unit exposure values are the best available estimates of exposure. Some PHED unit exposure values are high quality while others represent low quality, but all are the best available data. The quality of the data used for each scenario assessed is discussed in the Human Health Assessment document for phosmet, which is available in the public docket.

Anticipated use patterns and application methods, range of application rates, and daily amount treated were derived from current labeling. Application rates specified on phosmet labels range from 0.7 to 6 pounds of active ingredient per acre in agricultural settings. For agricultural applications, the Agency typically uses acres treated per day values that are thought to represent 8 hours of application work for specific types of application equipment. Phosmet may be used for direct animal treatments on livestock and dogs. The application rates for the farm animal spray range from 0.4 to 2.0 lb ai per 100 gallons. For the cattle backrubber, the application rate is 1 lb ai per 50 gallons of fuel oil. Dogs may be treated by either a dust or a dip solution. For the dog dust, the application rate is 0.5 grams of formulated dust per kilogram of animal body weight. For the dog dip, the application rate is 0.0076 lb ai per gallon of dip solution.

For homeowner application, the rates are: 0.0098 lb ai per gallon and 10 gallons of water per fruit and nut tree; 0.012lb ai per 100 square feet for vegetables; 0.0075 lb ai per gallon on ornamental plants; and 0.009 lb ai per square foot of fire ant mound. In addition, dogs may be treated by homeowners; for the dust, the application rate is 0.5 grams of formulated dust per kilogram of animal body weight and for the dog dip, the application rate is 0.0076 lb ai per gallon of dip solution.

Occupational handler exposure assessments are conducted by the Agency using different levels of personal protection. The Agency typically evaluates all exposures with minimal protection and then adds additional protective measures using a tiered approach to obtain an appropriate MOE (i.e., going from minimal to maximum levels of protection). The lowest tier is represented by the baseline exposure scenario, followed by, if required (i.e., if MOEs are less than 100), increasing levels of risk mitigation (personal protective equipment (PPE) and engineering controls (EC)). The levels of protection that formed the basis for calculations of exposure from phosmet activities include:

- Baseline: Long-sleeved shirt and long pants, shoes and socks.
- Label: Long-sleeved shirt and long pants, waterproof gloves, shoes plus socks, chemical resistant headgear for overhead exposure, and dust/mist filtering respirator (most labels).
- Minimum PPE: Baseline + chemical resistant gloves and a respirator.
- Maximum PPE: Coveralls over long-sleeved shirt and long pants, chemical resistant gloves, chemical-resistant footwear plus socks, chemical resistant headgear for overhead exposures, and a respirator if risk is driven by inhalation.
- Engineering controls: Engineering controls such as a closed cab tractor for application scenarios, or a closed mixing/loading system such as a closed mechanical transfer system for liquids or a packaged based system (e.g., water soluble packaging for wettable powders). Some engineering controls are not applicable for certain scenarios (e.g., for handheld application methods there are no known devices that can be used to routinely lower the exposures).

In addition to the tasks and activities associated with pesticide application and post-application exposures, the Agency considers the expected duration and route of exposure and the associated potential toxic effects as determined in the required toxicity testing. Based on the phosmet use pattern, short- and intermediate-term exposures are expected to occur. For the phosmet risk assessment, short-term exposures are from one to seven days; intermediate-term exposures were separated into two distinct time-frames of between eight and thirty days and greater than thirty days in duration. The reason for these distinctions is that the results of the toxicity testing indicate that effects associated with exposure to phosmet become more severe over time (greater than 30 days).

For the residential handler risk assessment, all application of phosmet by homeowners to fruit and nut trees, ornamental plants, vegetable plants, fire ant mounds and dogs is considered to be short-term, and assumes that no protective clothing is used. The Agency does not require protective clothing for residential handlers because there is no mechanism to ensure that the protective clothing is cleaned and maintained appropriately or that it would routinely be used.

Finally, exposure to workers through entry into agricultural fields treated with phosmet, and post-application exposure to homeowners entering treated areas, harvesting or maintaining fruit or nut trees, or gardens are expected to occur. In addition, toddlers and others could be exposed to phosmet after coming in contact with a treated dog.

c. Occupational & Residential Handler Risk Summary

Based on the phosmet use pattern, a total of 23 occupational handler scenarios were identified. No chemical-specific handler exposure data were submitted for phosmet, and therefore daily dermal and inhalation handler doses were calculated using data from the *Pesticide Handlers Exposure Database (PHED), Version 1.1*. The database contains exposure values for over 1,700 monitored exposure events, which have been evaluated by the Agency in order to characterize the quality of the data.

Assumptions regarding the application rate and acres treated (including an assumption of an 8-hour workday for occupational scenarios) were used in conjunction with the PHED unit exposure values to determine phosmet handler exposures. For agricultural handler scenarios, the number of acres treated per day assumed in the phosmet risk assessment are those typically used in risk assessments. For pet handler exposures (vets and professional groomers), the Agency assumed that a maximum of 8 dogs/day are dipped/dusted; risks were calculated for a range of dog body weights (5-120 lbs). In addition, it was assumed that 10% of the active ingredient applied during dipping/dusting represented the total dose; this is a standard assumption taken from the 1997 *Draft Standard Operating Procedures (SOPs) for Residential Exposure Assessment*. The average body weight of an adult handler was assumed to be 70 kg, which is standard for these risk assessments. The hose-end sprayer data were used to assess exposures associated with the fire ant mound treatment scenario. Since there were no data to assess potential handler exposure associated with “charging” the cattle

backrubber, data for open mixing of liquids were used; however, the Agency believes this approach may underestimate exposure, based on information submitted by the registrant (Schering-Plough Animal Health Inc.) about the operation of the cattle backrubber.

1) Occupational Handler Risk

The occupational handler scenarios are listed below:

Mixing/Loader

- (1a) mixing/loading liquid formulations for high pressure handwand applications;
- (1b) mixing/loading liquid formulations for airblast sprayer application;
- (1c) mixing/loading liquid formulations for groundboom sprayer;
- (1d) mixing/loading liquid formulations for aerial application;
- (2) mixing/loading wettable powders for treating pine seedlings
- (2a) mixing/loading wettable powders for aerial application and chemigation;
- (2b) mixing/loading wettable powders for groundboom application
- (2c) mixing/loading wettable powders for airblast sprayer application;
- (2d) mixing/loading wettable powders for high pressure handwand applications;

Applicator

- (3) applying sprays with an airblast sprayer;
- (4) applying sprays with a groundboom sprayer;
- (5) aerial application of sprays with a fixed wing aircraft (fixed wing aircraft also accounts for helicopter pilot exposure);
- (6) applying using a high-pressure handwand;
- (7) applying using a right-of-way sprayer;
- (8) dipping pine seedlings;

Mixer/Loader/Applicator

- (9) mixing/loading/applying with a power duster;
- (10) dusting a dog;
- (11) dipping a dog;
- (12) use of a cattle backrubber;
- (13a) mixing/loading/applying liquids with a backpack sprayer;
- (13b) mixing/loading/applying wettable powders with a backpack sprayer;
- (14a) mixing/loading/applying liquids with a low pressure handwand;
- (14b) mixing/loading/applying wettable powders with a low pressure handwand;
- (15) mixing/loading/applying soluble concentrates for sprinkling; and

Flagger

(16) flagging for aerial spray application.

The Agency conducts occupational handler exposure assessments using different levels of personal protection. Minimal protection is assumed at first, and a tiered approach to adding protective measures is used until an appropriate MOE is obtained, or until all options are exhausted. The lowest tier is defined as the baseline exposure scenario; higher tiers include measures such as personal protective equipment (PPE, e.g., gloves, extra clothing, and respirators) and engineering controls (e.g., closed cabs and closed loading systems). The most practical option for risk reduction is generally considered to be the minimal level of protection adequate to address the risks identified in the risk assessment. MOE calculations are shown in the table below. The footnotes describe the level of PPE used in the assessment.

Table 6. Occupational Uses: Risk Estimates (combined dermal & inhalation MOEs)

Exposure Scenario	Crop Type or Target	Acres Treated or Gallons per Application	Application Rate (lbs ai/A)	Combined MOEs (dermal and inhalation)			Necessary level of PPE or Engineering Controls
				Short Term < 7 days	Intermediate Term < 30 days	Intermediate Term > 30 days	
Occupational Mixer/Loader Estimates for MOE 100 or Highest Achievable MOE							
(1a) mixing/loading liquid formulations for high pressure handwand applications	livestock	1000 gal	0.004	9722 ¹	7500 ¹	5500 ¹	Baseline + Gloves
	livestock	1000 gal	0.02	1994 ¹	1500 ¹	1100 ¹	Baseline + Gloves
	ornamentals	400gal	0.008	121 ¹	120 ¹	7333 ¹ + gloves	Baseline + Gloves

1 Baseline PPE which represents typical work clothing with no respiratory protection. No chemical-resistant gloves are included in this scenario.
 2 Minimum PPE which represents the baseline scenario with the use of chemical-resistant gloves and a dust/mist respirator with a protection factor of 5 (dust-mist respirator).
 3 Maximum PPE which represents the baseline scenario with the use of an additional layer of clothing, chemical-resistant gloves, and an air purifying respirator with a protection factor of 10 (OV respirator).
 4 Engineering controls which represent the use of an appropriate engineering control such as a closed tractor cab or closed loading system for granulars or liquids. Engineering controls are not applicable to handheld application methods.

Exposure Scenario	Crop Type or Target	Acres Treated or Gallons per Application	Application Rate (lbs ai/A)	Combined MOEs (dermal and inhalation)			Necessary level of PPE or Engineering Controls
				Short Term < 7 days	Intermediate Term < 30 days	Intermediate Term > 30 days	
(1b) mixing/loading liquid formulations for airblast sprayer application	ornamentals	50	0.06	121 ¹	120 ¹	7333 ¹ + gloves	Baseline + Gloves
(1c) mixing/loading liquid formulations for groundboom application	blueberries	80	0.47	1034 ¹ + gloves	798 ¹ + gloves	585 ¹ + gloves	Baseline + Gloves
	blueberries	80	0.94	517 ¹ + gloves	399 ¹ + gloves	293 ¹ + gloves	Baseline + Gloves
	potatoes, alfalfa, cotton	80	1.02	477 ¹ + gloves	368 ¹ + gloves	270 ¹ + gloves	Baseline + Gloves
	alfalfa	80	0.78	623 ¹ + gloves	481 ¹ + gloves	353 ¹ + gloves	Baseline + Gloves
	alfalfa	200	0.78	249 ¹ + gloves	192 ¹ + gloves	141 ¹ + gloves	Baseline + Gloves
	alfalfa, cotton	200	1.02	191 ¹ + gloves	147 ¹ + gloves	108 ¹ + gloves	Baseline + Gloves

1 Baseline PPE which represents typical work clothing with no respiratory protection. No chemical-resistant gloves are included in this scenario.

2 Minimum PPE which represents the baseline scenario with the use of chemical-resistant gloves and a dust/mist respirator with a protection factor of 5.

3 Maximum PPE which represents the baseline scenario with the use of an additional layer of clothing, chemical-resistant gloves, and an air purifying respirator with a protection factor of 10.

4 Engineering controls which represent the use of an appropriate engineering control such as a closed tractor cab or closed loading system for granulars or liquids. Engineering controls are not applicable to handheld application methods.

Exposure Scenario	Crop Type or Target	Acres Treated or Gallons per Application	Application Rate (lbs ai/A)	Combined MOEs (dermal and inhalation)			Necessary level of PPE or Engineering Controls
				Short Term < 7 days	Intermediate Term < 30 days	Intermediate Term > 30 days	
	Cotton	80	0.23	2114 ¹ + gloves	1630 ¹ + gloves	1196 ¹ + gloves	Baseline + Gloves
	Cotton	200	0.23	845 ¹ + gloves	652 ¹ + gloves	478 ¹ + gloves	Baseline + Gloves
(1d) mixing/loading liquid formulations for aerial application	Blueberries	350	0.47	236 ¹ + gloves	182 ¹ + gloves	134 ¹ + gloves	Engineering Controls
	Blueberries	350	0.94	118 ¹ + gloves	126 ²	115 ² + double layer	Engineering Controls
	Potatoes, Cotton, Alfalfa	350	1.02	109 ¹ + gloves	116 ²	106 ² + double layer	Engineering Controls
	Alfalfa	350	0.78	143 ¹ + gloves	110 ¹ + gloves	111 ²	Engineering Controls
	Alfalfa	1200	0.78	126 ⁴	119 ⁴	87 ⁴	Engineering Controls

1 Baseline PPE which represents typical work clothing with no respiratory protection. No chemical-resistant gloves are included in this scenario.

2 Minimum PPE which represents the baseline scenario with the use of chemical-resistant gloves and a dust/mist respirator with a protection factor of 5.

3 Maximum PPE which represents the baseline scenario with the use of an additional layer of clothing, chemical-resistant gloves, and an air purifying respirator with a protection factor of 10.

4 Engineering controls which represent the use of an appropriate engineering control such as a closed tractor cab or closed loading system for granulars or liquids. Engineering controls are not applicable to handheld application methods.

Exposure Scenario	Crop Type or Target	Acres Treated or Gallons per Application	Application Rate (lbs ai/A)	Combined MOEs (dermal and inhalation)			Necessary level of PPE or Engineering Controls
				Short Term < 7 days	Intermediate Term < 30 days	Intermediate Term > 30 days	
	Alfalfa, Cotton	1200	1.02	97 ⁴	91 ⁴	67 ⁴	Engineering Controls
	cotton	350	0.23	483 ¹ + gloves	373 ¹ + gloves	273 ¹ + gloves	Engineering Controls
	cotton	1200	0.23	141 ¹ + gloves	109 ¹ + gloves	110 ²	Engineering Controls
(2) mixing/loading wettable powders for high pressure handwand application	pine seedlings	100	0.35	151 ²	117 ²	103 ² + OV respirator	Minimum + OV Respirator
(2a) mixing/loading wettable powders for aerial application and chemigation	various nut trees	350	5.95	23 ⁴	22 ⁴	16 ⁴	Engineering Controls
	pears	350	5	28 ⁴	26 ⁴	19 ⁴	Engineering Controls
	fruit & nuts	350	3	46 ⁴	43 ⁴	31 ⁴	Engineering Controls

1 Baseline PPE which represents typical work clothing with no respiratory protection. No chemical-resistant gloves are included in this scenario.

2 Minimum PPE which represents the baseline scenario with the use of chemical-resistant gloves and a dust/mist respirator with a protection factor of 5 (dust-mist respirator).

3 Maximum PPE which represents the baseline scenario with the use of an additional layer of clothing, chemical-resistant gloves, and an air purifying respirator with a protection factor of 10 (OV respirator).

4 Engineering controls which represent the use of an appropriate engineering control such as a closed tractor cab or closed loading system for granulars or liquids. Engineering controls are not applicable to handheld application methods.

Exposure Scenario	Crop Type or Target	Acres Treated or Gallons per Application	Application Rate (lbs ai/A)	Combined MOEs (dermal and inhalation)			Necessary level of PPE or Engineering Controls
				Short Term < 7 days	Intermediate Term < 30 days	Intermediate Term > 30 days	
	grapes, fruit trees & vegetables	350	1.5	92 ⁴	86 ⁴	63 ⁴	Engineering Controls
	grapes, & fruit trees	350	1	138 ⁴	128 ⁴	94 ⁴	Engineering Controls
	cranberries	10	1	529 ²	410 ²	301 ²	Engineering Controls
	cranberries	25	1	211 ²	164 ²	120 ²	Engineering Controls
	cranberries	80	1	1238 ⁴	1076 ⁴	789 ⁴	Engineering Controls
	cranberries	10	2.8	189 ²	147 ²	107 ²	Engineering Controls
	cranberries	25	2.8	104 ³	1230 ⁴	902 ⁴	Engineering Controls

1 Baseline PPE which represents typical work clothing with no respiratory protection. No chemical-resistant gloves are included in this scenario.

2 Minimum PPE which represents the baseline scenario with the use of chemical-resistant gloves and a dust/mist respirator with a protection factor of 5 (dust-mist respirator).

3 Maximum PPE which represents the baseline scenario with the use of an additional layer of clothing, chemical-resistant gloves, and an air purifying respirator with a protection factor of 10 (OV respirator).

4 Engineering controls which represent the use of an appropriate engineering control such as a closed tractor cab or closed loading system for granulars or liquids. Engineering controls are not applicable to handheld application methods.

Exposure Scenario	Crop Type or Target	Acres Treated or Gallons per Application	Application Rate (lbs ai/A)	Combined MOEs (dermal and inhalation)			Necessary level of PPE or Engineering Controls
				Short Term < 7 days	Intermediate Term < 30 days	Intermediate Term > 30 days	
	cranberries	80	2.8	442 ⁴	384 ⁴	282 ⁴	Engineering Controls
	cotton	1200	0.4	100 ⁴	94 ⁴	69 ⁴	Engineering Controls
	pine seed orchards	150	1	660 ⁴	574 ⁴	421 ⁴	Engineering Controls
	pine seed orchards	300	1	330 ⁴	287 ⁴	210 ⁴	Engineering Controls
	forestry	1200	1	40 ⁴	37 ⁴	27 ⁴	Engineering Controls
(2b) mixing/loading wettable powders for groundboom application	noncrop/ field perimeters	10	2	168 ¹ + gloves	205 ²	150 ²	Engineering Controls
	grapes, vegetables, etc.	80	1.5	401 ⁴	374 ⁴	274 ⁴	Engineering Controls

1 Baseline PPE which represents typical work clothing with no respiratory protection. No chemical-resistant gloves are included in this scenario.

2 Minimum PPE which represents the baseline scenario with the use of chemical-resistant gloves and a dust/mist respirator with a protection factor of 5. (dust-mist respirator).

3 Maximum PPE which represents the baseline scenario with the use of an additional layer of clothing, chemical-resistant gloves, and an air purifying respirator with a protection factor of 10. (OV respirator).

4 Engineering controls which represent the use of an appropriate engineering control such as a closed tractor cab or closed loading system for granulars or liquids. Engineering controls are not applicable to handheld application methods.

Exposure Scenario	Crop Type or Target	Acres Treated or Gallons per Application	Application Rate (lbs ai/A)	Combined MOEs (dermal and inhalation)			Necessary level of PPE or Engineering Controls
				Short Term < 7 days	Intermediate Term < 30 days	Intermediate Term > 30 days	
	grapes, vegetables, etc.	80	1	602 ⁴	561 ⁴	411 ⁴	Engineering Controls
	cotton	200	0.4	602 ⁴	561 ⁴	411 ⁴	Engineering Controls
(2c) mixing/loading wettable powders for airblast sprayer application	various nut trees	40	5.95	202 ⁴	189 ⁴	138 ⁴	Engineering Controls
	pears	40	5	241 ⁴	224 ⁴	165 ⁴	Engineering Controls
	fruit & nut trees	40	3	401 ⁴	374 ⁴	274 ⁴	Engineering Controls
	grapes, fruit trees & vegetables	40	1.5	110 ² + double layer	101 ³	548 ⁴	Engineering Controls
	grapes, tree fruit, etc.	40	1	132 ²	103 ²	111 ³	Engineering Controls

1 Baseline PPE which represents typical work clothing with no respiratory protection. No chemical-resistant gloves are included in this scenario.

2 Minimum PPE which represents the baseline scenario with the use of chemical-resistant gloves and a dust/mist respirator with a protection factor of 5. (dust-mist respirator).

3 Maximum PPE which represents the baseline scenario with the use of an additional layer of clothing, chemical-resistant gloves, and an air purifying respirator with a protection factor of 10.(OV respirator).

4 Engineering controls which represent the use of an appropriate engineering control such as a closed tractor cab or closed loading system for granulars or liquids. Engineering controls are not applicable to handheld application methods.

Exposure Scenario	Crop Type or Target	Acres Treated or Gallons per Application	Application Rate (lbs ai/A)	Combined MOEs (dermal and inhalation)			Necessary level of PPE or Engineering Controls
				Short Term < 7 days	Intermediate Term < 30 days	Intermediate Term > 30 days	
	ornamentals	50	0.06	1117 ¹ + gloves	583 ¹ + gloves	428 ¹ + gloves	Engineering Controls
(2d) mixing/loading wettable powders for high pressure handwand applications	ornamentals	400	0.008	1117 ¹ + gloves	583 ¹ + gloves	428 ¹ + gloves	Baseline + Gloves

1 Baseline PPE which represents typical work clothing with no respiratory protection. No chemical-resistant gloves are included in this scenario.

2 Minimum PPE which represents the baseline scenario with the use of chemical-resistant gloves and a dust/mist respirator with a protection factor of 5. (dust-mist respirator).

3 Maximum PPE which represents the baseline scenario with the use of an additional layer of clothing, chemical-resistant gloves, and an air purifying respirator with a protection factor of 10.(OV respirator).

4 Engineering controls which represent the use of an appropriate engineering control such as a closed tractor cab or closed loading system for granulars or liquids. Engineering controls are not applicable to handheld application methods.

Exposure Scenario	Crop Type or Target	Acres Treated or Gallons per Application	Application Rate (lbs ai/A)	Combined MOEs (dermal and inhalation)			Necessary level of PPE or Engineering Controls
				Short Term < 7 days	Intermediate Term < 30 days	Intermediate Term > 30 days	
Occupational Applicator Estimates							
(3) applying sprays with an airblast sprayer	various nut trees	40	5.95	215 ⁴	188 ⁴	138 ⁴	Engineering Controls
	pears	40	5	256 ⁴	223 ⁴	164 ⁴	Engineering Controls
	fruit & nuts trees	40	3	427 ⁴	372 ⁴	273 ⁴	Engineering Controls
	grapes, fruit trees & vegetables	40	1.5	854 ⁴	745 ⁴	546 ⁴	Engineering Controls
	grapes & tree fruit	40	1	103 ¹ + gloves	105 ²	819 ⁴	Engineering Controls
	ornamentals	50	0.06	933 ¹	864 ¹	634 ¹	Engineering Controls

1 Baseline PPE which represents typical work clothing with no respiratory protection. No chemical-resistant gloves are included in this scenario.

2 Minimum PPE which represents the baseline scenario with the use of chemical-resistant gloves and a dust/mist respirator with a protection factor of 5. (dust-mist respirator).

3 Maximum PPE which represents the baseline scenario with the use of an additional layer of clothing, chemical-resistant gloves, and an air purifying respirator with a protection factor of 10. (OV respirator).

4 Engineering controls which represent the use of an appropriate engineering control such as a closed tractor cab or closed loading system for granulars or liquids. Engineering controls are not applicable to handheld application methods.

Exposure Scenario	Crop Type or Target	Acres Treated or Gallons per Application	Application Rate (lbs ai/A)	Combined MOEs (dermal and inhalation)			Necessary level of PPE or Engineering Controls
				Short Term < 7 days	Intermediate Term < 30 days	Intermediate Term > 30 days	
	pine seed orchards	10	1	5122 ⁴	4468 ⁴	3277 ⁴	Engineering Controls
	pine seed orchard	40	1	1280 ⁴	1117 ⁴	819 ⁴	Engineering Controls
(4) applying sprays with a groundboom sprayer	noncrop/ field perimeters	10	2	3188 ¹	2453 ¹	1799 ¹	Baseline
	grapes, fruit trees & vegetables	80	1.5	531 ¹	409 ¹	300 ¹	Baseline
	grapes & vegetables	80	1	797 ¹	613 ¹	450 ¹	Baseline
	cotton	200	0.4	797 ¹	613 ¹	450 ¹	Baseline
	blueberries	80	0.47	1696 ¹	1305 ¹	957 ¹	Baseline
	blueberries	80	0.94	848 ¹	653 ¹	479 ¹	Baseline

1 Baseline PPE which represents typical work clothing with no respiratory protection. No chemical-resistant gloves are included in this scenario.

2 Minimum PPE which represents the baseline scenario with the use of chemical-resistant gloves and a dust/mist respirator with a protection factor of 5. (dust-mist respirator).

3 Maximum PPE which represents the baseline scenario with the use of an additional layer of clothing, chemical-resistant gloves, and an air purifying respirator with a protection factor of 10. (OV respirator).

4 Engineering controls which represent the use of an appropriate engineering control such as a closed tractor cab or closed loading system for granulars or liquids. Engineering controls are not applicable to handheld application methods.

Exposure Scenario	Crop Type or Target	Acres Treated or Gallons per Application	Application Rate (lbs ai/A)	Combined MOEs (dermal and inhalation)			Necessary level of PPE or Engineering Controls
				Short Term < 7 days	Intermediate Term < 30 days	Intermediate Term > 30 days	
	cranberries	10	1	6377 ¹	4907 ¹	3598 ¹	Baseline
	cranberries	25	1	2551 ¹	1963 ¹	1439 ¹	Baseline
	cranberries	80	1	797 ¹	613 ¹	450 ¹	Baseline
	cranberries	10	2.8	2277 ¹	1752 ¹	1285 ¹	Baseline
	cranberries	25	2.8	911 ¹	701 ¹	514 ¹	Baseline
	cranberries	80	2.8	285 ¹	219 ¹	161 ¹	Baseline
	potatoes, alfalfa, cotton	80	1.02	781 ¹	601 ¹	441 ¹	Baseline
	alfalfa	80	0.78	1022 ¹	786 ¹	577 ¹	Baseline
	alfalfa	200	0.78	409 ¹	315 ¹	230.6	Baseline
	alfalfa, cotton	200	1.02	313 ¹	241 ¹	176 ¹	Baseline
	cotton	80	0.23	3466 ¹	2667 ¹	1956 ¹	Baseline

1 Baseline PPE which represents typical work clothing with no respiratory protection. No chemical-resistant gloves are included in this scenario.

2 Minimum PPE which represents the baseline scenario with the use of chemical-resistant gloves and a dust/mist respirator with a protection factor of 5. (dust-mist respirator).

3 Maximum PPE which represents the baseline scenario with the use of an additional layer of clothing, chemical-resistant gloves, and an air purifying respirator with a protection factor of 10.(OV respirator).

4 Engineering controls which represent the use of an appropriate engineering control such as a closed tractor cab or closed loading system for granulars or liquids. Engineering controls are not applicable to handheld application methods.

Exposure Scenario	Crop Type or Target	Acres Treated or Gallons per Application	Application Rate (lbs ai/A)	Combined MOEs (dermal and inhalation)			Necessary level of PPE or Engineering Controls
				Short Term < 7 days	Intermediate Term < 30 days	Intermediate Term > 30 days	
	cotton	200	0.23	1386 ¹	1067 ¹	782 ¹	Baseline
(5) aerial application of sprays with a fixed wing aircraft (fixed wing aircraft also accounts for helicopter pilot exposure)	various nut trees	350	5.95	97 ⁴	89 ⁴	65 ⁴	Engineering Controls
	pears	350	5	115 ⁴	106 ⁴	78 ⁴	Engineering Controls
	fruit & nut trees	350	3	191 ⁴	176 ⁴	129 ⁴	Engineering Controls
	grapes, fruit trees & vegetables	350	1.5	383 ⁴	352 ⁴	258 ⁴	Engineering Controls
	grapes & fruit trees	350	1	574 ⁴	528 ⁴	387 ⁴	Engineering Controls

1 Baseline PPE which represents typical work clothing with no respiratory protection. No chemical-resistant gloves are included in this scenario.

2 Minimum PPE which represents the baseline scenario with the use of chemical-resistant gloves and a dust/mist respirator with a protection factor of 5. (dust-mist respirator).

3 Maximum PPE which represents the baseline scenario with the use of an additional layer of clothing, chemical-resistant gloves, and an air purifying respirator with a protection factor of 10. (OV respirator).

4 Engineering controls which represent the use of an appropriate engineering control such as a closed tractor cab or closed loading system for granulars or liquids. Engineering controls are not applicable to handheld application methods.

Exposure Scenario	Crop Type or Target	Acres Treated or Gallons per Application	Application Rate (lbs ai/A)	Combined MOEs (dermal and inhalation)			Necessary level of PPE or Engineering Controls
				Short Term < 7 days	Intermediate Term < 30 days	Intermediate Term > 30 days	
	cotton	1200	0.4	418 ⁴	385 ⁴	282 ⁴	Engineering Controls
	forestry	1200	1	167 ⁴	154 ⁴	113 ⁴	Engineering Controls
	blueberries	350	0.47	1221 ⁴	1124 ⁴	824 ⁴	Engineering Controls
	blueberries	350	0.94	611 ⁴	562 ⁴	412 ⁴	Engineering Controls
	potatoes, alfalfa, cotton	350	1.02	563 ⁴	518 ⁴	380 ⁴	Engineering Controls
	alfalfa	350	0.78	736 ⁴	677 ⁴	497 ⁴	Engineering Controls

1 Baseline PPE which represents typical work clothing with no respiratory protection. No chemical-resistant gloves are included in this scenario.

2 Minimum PPE which represents the baseline scenario with the use of chemical-resistant gloves and a dust/mist respirator with a protection factor of 5. (dust-mist respirator).

3 Maximum PPE which represents the baseline scenario with the use of an additional layer of clothing, chemical-resistant gloves, and an air purifying respirator with a protection factor of 10.(OV respirator).

4 Engineering controls which represent the use of an appropriate engineering control such as a closed tractor cab or closed loading system for granulars or liquids. Engineering controls are not applicable to handheld application methods.

Exposure Scenario	Crop Type or Target	Acres Treated or Gallons per Application	Application Rate (lbs ai/A)	Combined MOEs (dermal and inhalation)			Necessary level of PPE or Engineering Controls
				Short Term < 7 days	Intermediate Term < 30 days	Intermediate Term > 30 days	
	alfalfa	1200	0.78	215 ⁴	198 ⁴	145 ⁴	Engineering Controls
	alfalfa	1200	1.02	164 ⁴	151 ⁴	111 ⁴	Engineering Controls
	cotton	350	0.23	2496 ⁴	2296 ⁴	1684 ⁴	Engineering Controls
	cotton	1200	0.23	728 ⁴	670 ⁴	491 ⁴	Engineering Controls
	pine seed orchards	150	1	1339 ⁴	1232 ⁴	904 ⁴	Engineering Controls
	pine seed orchards	300	1	670 ⁴	616 ⁴	452 ⁴	Engineering Controls

1 Baseline PPE which represents typical work clothing with no respiratory protection. No chemical-resistant gloves are included in this scenario.

2 Minimum PPE which represents the baseline scenario with the use of chemical-resistant gloves and a dust/mist respirator with a protection factor of 5. (dust-mist respirator).

3 Maximum PPE which represents the baseline scenario with the use of an additional layer of clothing, chemical-resistant gloves, and an air purifying respirator with a protection factor of 10. (OV respirator).

4 Engineering controls which represent the use of an appropriate engineering control such as a closed tractor cab or closed loading system for granulars or liquids. Engineering controls are not applicable to handheld application methods.

Exposure Scenario	Crop Type or Target	Acres Treated or Gallons per Application	Application Rate (lbs ai/A)	Combined MOEs (dermal and inhalation)			Necessary level of PPE or Engineering Controls
				Short Term < 7 days	Intermediate Term < 30 days	Intermediate Term > 30 days	
	cotton	1200	1.02	164 ⁴	151 ⁴	111 ⁴	Engineering Controls
(6) applying using a high-pressure handwand	livestock	1000	0.004	127 ¹	101 ¹	135 ¹ + gloves	Maximum
	livestock	1000	0.02	127 ² + double layer	101 ² + double layer	88 ³	Maximum
	ornamentals	400	0.008	170 ¹	135 ¹	188 ¹ + gloves	Maximum
(7) applying using a right-of-way sprayer	ornamentals	400	0.008	267 ¹	261 ¹	192 ¹	Baseline
(8) dipping pine seedlings	pine seedlings	100	0.35	no data	no data	no data	Maximum
Occupational Mixer/Loader/Applicator Estimates							

1 Baseline PPE which represents typical work clothing with no respiratory protection. No chemical-resistant gloves are included in this scenario.

2 Minimum PPE which represents the baseline scenario with the use of chemical-resistant gloves and a dust/mist respirator with a protection factor of 5. (dust-mist respirator).

3 Maximum PPE which represents the baseline scenario with the use of an additional layer of clothing, chemical-resistant gloves, and an air purifying respirator with a protection factor of 10.(OV respirator).

4 Engineering controls which represent the use of an appropriate engineering control such as a closed tractor cab or closed loading system for granulars or liquids. Engineering controls are not applicable to handheld application methods.

Exposure Scenario	Crop Type or Target	Acres Treated or Gallons per Application	Application Rate (lbs ai/A)	Combined MOEs (dermal and inhalation)			Necessary level of PPE or Engineering Controls
				Short Term < 7 days	Intermediate Term < 30 days	Intermediate Term > 30 days	
(9) mixing/loading/applying with a power duster	sweet potatoes	no data	0.0131b/ai/ bushel	no data	no data	no data	Maximum
(10) dusting on animal	dog	8 animals	0.003	468,750 ¹	468,750 ¹	343,750 ¹	Use Canceled
	dog	8 animals	0.066	19,886 ¹	19,886 ¹	14,583 ¹	Use Canceled
(11) dipping a dog	dog	8 animals	0.0076	172,697 ¹	172,697 ¹	126,645 ¹	Use Canceled
(12) use of a cattle backrubber	cattle	50 animals	0.02	362 ¹	361 ¹	264 ¹	Baseline
(13a) mixing/loading/applying liquids with a backpack sprayer	livestock	100 animals	0.004	26,250 ¹	8750 ¹	6417 ¹	Baseline
	livestock	100 animals	0.02	5250 ¹	1750 ¹	1283 ¹	Baseline
	ornamentals	40	0.008	35,000 ¹	11,667 ¹	8556 ¹	Baseline

1 Baseline PPE which represents typical work clothing with no respiratory protection. No chemical-resistant gloves are included in this scenario.

2 Minimum PPE which represents the baseline scenario with the use of chemical-resistant gloves and a dust/mist respirator with a protection factor of 5. (dust-mist respirator).

3 Maximum PPE which represents the baseline scenario with the use of an additional layer of clothing, chemical-resistant gloves, and an air purifying respirator with a protection factor of 10.(OV respirator).

4 Engineering controls which represent the use of an appropriate engineering control such as a closed tractor cab or closed loading system for granulars or liquids. Engineering controls are not applicable to handheld application methods.

Exposure Scenario	Crop Type or Target	Acres Treated or Gallons per Application	Application Rate (lbs ai/A)	Combined MOEs (dermal and inhalation)			Necessary level of PPE or Engineering Controls
				Short Term < 7 days	Intermediate Term < 30 days	Intermediate Term > 30 days	
(13b) mixing/loading/applying wettable powders with a backpack sprayer	ornamentals	40	0.008	35,000 ¹	11,667 ¹	8556 ¹	Baseline
(14a) mixing/loading/applying liquids with a low pressure handwand	livestock	100	0.004	4953 ¹	3596 ¹	2637 ¹	Baseline + Gloves
	livestock	100	0.02	991 ¹	719 ¹	527 ¹	Baseline + Gloves
	ornamentals	40	0.008	6604 ¹	4795 ¹	3516 ¹	Baseline + Gloves
(14b) mixing/loading/applying wettable powders with a low pressure handwand	ornamentals	40	0.008	285 ¹	179 ¹	131 ¹	Baseline + Gloves
(15) mixing/loading/applying soluble concentrates for sprinkling	fire ants	24	0.009	158 ¹	158 ¹	115 ¹	Baseline

1 Baseline PPE which represents typical work clothing with no respiratory protection. No chemical-resistant gloves are included in this scenario.

2 Minimum PPE which represents the baseline scenario with the use of chemical-resistant gloves and a dust/mist respirator with a protection factor of 5. (dust-mist respirator).

3 Maximum PPE which represents the baseline scenario with the use of an additional layer of clothing, chemical-resistant gloves, and an air purifying respirator with a protection factor of 10.(OV respirator).

4 Engineering controls which represent the use of an appropriate engineering control such as a closed tractor cab or closed loading system for granulars or liquids. Engineering controls are not applicable to handheld application methods.

Exposure Scenario	Crop Type or Target	Acres Treated or Gallons per Application	Application Rate (lbs ai/A)	Combined MOEs (dermal and inhalation)			Necessary level of PPE or Engineering Controls
				Short Term < 7 days	Intermediate Term < 30 days	Intermediate Term > 30 days	
Occupational Flagger Estimates							
(16) flagging for aerial spray application.	various nut trees	350	5.95	2072 ⁴	1739 ⁴	1275 ⁴	Engineering Controls
	pears	350	5	2466 ⁴	2069 ⁴	1517 ⁴	Engineering Controls
	fruit & nut trees	350	3	4110 ⁴	3448 ⁴	2529 ⁴	Engineering Controls
	grapes, fruit trees & vegetables	350	1.5	164 ¹	138 ¹	101 ¹	Engineering Controls
	grapes & fruit trees	350	1	247 ¹	207 ¹	152 ¹	Engineering Controls
	cotton	1200	0.4	180 ¹	151 ¹	111 ¹	Engineering Controls
	forestry	1200	1	3596 ⁴	3017 ⁴	2213 ⁴	Engineering Controls

Exposure Scenario	Crop Type or Target	Acres Treated or Gallons per Application	Application Rate (lbs ai/A)	Combined MOEs (dermal and inhalation)			Necessary level of PPE or Engineering Controls
				Short Term < 7 days	Intermediate Term < 30 days	Intermediate Term > 30 days	
	blueberries	350	0.47	525 ¹	440 ¹	323 ¹	Engineering Controls
	blueberries	350	0.94	262 ¹	220 ¹	161 ¹	Engineering Controls
	potatoes	350	1.02	242 ¹	203 ¹	149 ¹	Engineering Controls
	alfalfa	350	0.78	316 ¹	265 ¹	195 ¹	Engineering Controls
	alfalfa	1200	0.78	4610 ⁴	3868 ⁴	2837 ⁴	Engineering Controls
	alfalfa	350	1.02	242 ¹	203 ¹	149 ¹	Engineering Controls

1 Baseline PPE which represents typical work clothing with no respiratory protection. No chemical-resistant gloves are included in this scenario.

2 Minimum PPE which represents the baseline scenario with the use of chemical-resistant gloves and a dust/mist respirator with a protection factor of 5. (dust-mist respirator).

3 Maximum PPE which represents the baseline scenario with the use of an additional layer of clothing, chemical-resistant gloves, and an air purifying respirator with a protection factor of 10.(OV respirator).

4 Engineering controls which represent the use of an appropriate engineering control such as a closed tractor cab or closed loading system for granulars or liquids. Engineering controls are not applicable to handheld application methods.

Exposure Scenario	Crop Type or Target	Acres Treated or Gallons per Application	Application Rate (lbs ai/A)	Combined MOEs (dermal and inhalation)			Necessary level of PPE or Engineering Controls
				Short Term < 7 days	Intermediate Term < 30 days	Intermediate Term > 30 days	
	alfalfa	1200	1.02	3525 ⁴	2958 ⁴	2169 ⁴	Engineering Controls
	cotton	350	0.23	1072 ¹	900 ¹	660 ¹	Engineering Controls
	cotton	1200	0.23	313 ¹	262 ¹	192 ¹	Engineering Controls
	cotton	350	1.02	242 ¹	203 ¹	149 ¹	Engineering Controls
	cotton	1200	1.02	3525 ⁴	2958 ⁴	2169 ⁴	Engineering Controls

1 Baseline PPE which represents typical work clothing with no respiratory protection. No chemical-resistant gloves are included in this scenario.

2 Minimum PPE which represents the baseline scenario with the use of chemical-resistant gloves and a dust/mist respirator with a protection factor of 5. (dust-mist respirator).

3 Maximum PPE which represents the baseline scenario with the use of an additional layer of clothing, chemical-resistant gloves, and an air purifying respirator with a protection factor of 10.(OV respirator).

4 Engineering controls which represent the use of an appropriate engineering control such as a closed tractor cab or closed loading system for granulars or liquids. Engineering controls are not applicable to handheld application methods.

2) Post-Application Occupational Risk

The post-application occupational risk assessment considered exposures to workers entering treated sites in agriculture. All of the post-application risk calculations for handlers completed in this assessment are included in the HED chapter and the August 15, 2000 update entitled “Phosmet: Revised Occupational Post-Application Exposure and Risk Calculations (DP Barcode D268141, Chemical Code 059201, case 818976)”, which takes into account the most recent revisions of the policy on agricultural transfer coefficients; the revisions to the post-application exposure and risk calculations, dated August 20, 2001; and information recently collected by the Gowan Company with regard to post-application exposures.

Based on the phosmet use pattern, there is potential for both short-and intermediate-term (< 30 days) post-application exposure to phosmet residues for workers. Only dermal exposures were considered in the post-application assessment, since the physical properties of phosmet suggest post-application inhalation exposures would be minimal.

Agricultural post-application scenarios assessed for phosmet consist of adults harvesting and maintaining fruit trees, grapes, and field and vegetable crops. The MOEs were calculated using chemical specific data for pears and grapes. All of the chemical-specific data generated for post-application exposure and risk assessment included residues of phosmet and the oxygen analog metabolite, which were assumed to be equivalent in terms of toxicity. The results of the revised post-application assessment are summarized in Tables 7 through 13, this assessment reflects the updated transfer coefficients as established in the *HED Science Policy for Exposure 3.1: Agricultural Transfer Coefficients*, dated August 7, 2000. These calculations indicate a concern for workers reentering treated fields following the 24-hour REI on current labels for some scenarios.

Occupational Reentry Risk Estimates for Phosmet

Low Berry Transfer Coefficient Group:

Table 7: Post-application Risks For Phosmet On Low Bush Blueberries and Cranberries

Days After Treatment (DAT)	Dislodgeable Foliar Residue Source	Pre-Harvest Interval on Current Label (days)	MOEs (100 target)	
			Low Exposure Activities: scouting, hand weeding, irrigation (early season, low foliage), hand pruning (early season, low foliage), and thinning (early season, low foliage)	High Exposure Activities: hand pruning (late season, full foliage) and hand harvesting.
Low Bush Blueberries and Cranberries				
0	Grape data at 1 lb ai/acre, not adjusted for application rate	Blueberries - 3 Cranberries - 14	193	52 (blueberries only)
10				102 (blueberries only)
Cranberries				
0	Grape data at 1 lb ai/acre, adjusted for application rate of 4 lb ai/acre	Cranberries - 14	48	Not Applicable
11			102	Not Applicable

Field/Row Crop Transfer Coefficient Group (low/medium height):

Table 8: Post-application Risks For Phosmet on Alfalfa, Cotton and Peas

Days After Treatment (DAT)	Dislodgeable Foliar Residue Source	Pre-Harvest Interval on Current Label (days)	MOEs (100 target)		
			Low Exposure Activities: irrigation and scouting of immature plants	Medium Exposure Activities: irrigation and scouting of mature plants	High Exposure Activities: hand harvesting
0	Grape data at 1 lb ai/acre, not adjusted for application rate	Alfalfa 7 - 14 Cotton - 21 Peas - 7	772	52	31
10				102	61
18					105

Deciduous Tree Fruit Transfer Coefficient Group:

Table 9: Post-application Risks For Phosmet On Deciduous Tree Fruit Transfer Coefficient Group

Crop	Days After Treatment (DAT)	Dislodgeable Foliar Residue Source	Pre-Harvest Interval on Current Label (days)	MOEs (100 target)			
				Very Low Exposure Activities: propping	Low Exposure Activities: irrigation & scouting	High Exposure Activities: hand harvesting	Very High Exposure Activities: hand thinning
Pears	0	Pear data at 5 lb ai/acre, not adjusted for application rate	7	260	26	9	3
	21				105		
	37					101	
	52						102
West Coast Apples	0	Pear data at 5 lb ai/acre, adjusted for application rate of 4 lb ai/acre	7	325	33	11	4
	17				100		
	34					103	
	49						104
Apricots, nectarines, peaches, plums/prunes	0	Pear data at 5 lb ai/acre, adjusted for application rate of 3 lb ai/acre	Apricots - 14 Nectarines - 14 Peaches - 14 Plums - 7 Prunes - 7	434	43	15	5
	13				103		
	30					105	
	45						107
East Coast Apples	0	Pear data at 5 lb ai/acre, adjusted for application rate of 1.5 lb ai/acre	7	868	87	29	11
	3				106		
	19					102	
	34						103

Evergreen Tree Transfer Coefficient Group:

Table 10: Post-application Risks For Phosmet On Christmas Trees

Days After Treatment (DAT)	Dislodgeable Foliar Residue Source	Pre-Harvest Interval on Current Label (days)	MOEs (100 target)		
			Low Exposure Activities: Irrigation, scouting, hand weeding, thinning small trees	Medium Exposure Activities: pruning, thinning, cone pruning, cone harvesting	High Exposure Activities: hand harvesting, shaking, topping, training
0	Pear data at 5 lb ai/acre, adjusted for application rate of 1 lb ai/acre	Not Specified	130	43	16
13				103	
28					104

Tree Nut Transfer Coefficient Group:

Table 11: Post-application Risks For Phosmet on Tree Nut Transfer Coefficient Group

Crop	Days After Treatment (DAT)	Dislodgeable Foliar Residue Source	Pre-Harvest Interval on Current Label (days)	MOEs (100 target)	
				Low Exposure Activities: irrigation and scouting	High Exposure Activities: hand harvesting, poling, pruning
Beech nut, brazil nut, butternut, cashew, chestnut, macadamia, walnuts	0	Pear data at 5 lb ai/acre, adjusted for application rate of 5.95 lb ai/acre	14	44	9
	13			104	
	37				101
Almonds, pistachios, pecans	0	Pear data at 5 lb ai/acre, adjusted for application rate of 3 lb ai/acre	Almonds - 30 Pistachios - 14 Pecans - 14	87	17
	3			106	
	27				104

Root Vegetable Transfer Coefficient Group:

Table 12: Post-application Risks For Phosmet On Potatoes and Sweet Potatoes

Days After Treatment (DAT)	Dislodgeable Foliar Residue Source	Pre-Harvest Interval on Current Label (days)	MOEs (100 target)		
			Low Exposure Activities: irrigation and scouting of immature plants	Medium Exposure Activities: irrigation and scouting of mature plants	High Exposure Activities: hand harvesting only for sweet potatoes
0	Grape data at 1 lb ai/acre, not adjusted for application rate	Potatoes - 7	257	52	31
10				102	
18					105

Vine/trellis Transfer Coefficient Group:

Table 13: Post-application Risks For Phosmet On Highbush Blueberries, Grapes, Kiwi, and Trellised Sweet Peas

Days After Treatment (DAT)	Dislodgeable Foliar Residue Source	Pre-Harvest Interval on Current Label (days)	MOEs (100 target)			
			Low Exposure Activities: hedging, irrigation, scouting blueberries, hand weeding, training/tying blueberries	Medium Exposure Activities: grape/kiwi scouting, training grapes, tying kiwi	High Exposure Activities: hand harvesting, thinning, pruning, training/tying grapes	Very High Exposure Activities: grape girdling and cane turning
0	Grape data at 1 lb ai/acre, not adjusted for application rate	Blueberries 3	154	77	15	8
4		Grapes 7 - 14		101		
28		Kiwi 21			104	
38		Sweet Peas 7				103

3) Residential (Homeowner) Handler Risk

For homeowner handler exposure assessments, the Agency does not believe a tiered mitigation approach like that used for assessing occupational handler risk is appropriate. Homeowners often lack

access to personal protective equipment (PPE) and also do not possess expertise in the proper use of PPE. As a result, homeowner handler assessments are completed using a single scenario based on the use of short-sleeved shirts and short pants (i.e., common homeowner attire during the pesticide application season). In addition, only short-term exposures were assessed, as the Agency does not believe homeowners who apply phosmet will be exposed for more than 7 days. The exposure scenarios are:

Residential (homeowner) Direct Animal Treatments:

- (1) dusting a dog;
- (2) dipping a dog;

Residential (homeowner) Use on Terrestrial Crops:

- (3b) mixing/loading/applying wettable powders with a backpack sprayer;
- (4b) mixing/loading/applying wettable powders with a low pressure handwand sprayer;
- (5b) mixing/loading/applying wettable powders with a hose-end sprayer;

Residential (homeowner) Treatments on Ornamental Plants:

- (3a) mixing/loading/applying liquids with a backpack sprayer;
- (3b) mixing/loading/applying wettable powders with a backpack sprayer;
- (4a) mixing/loading/applying liquids with a low pressure handwand sprayer;
- (4b) mixing/loading/applying wettable powders with a low pressure handwand sprayer;
- (5a) mixing/loading/applying liquids with a hose-end sprayer;
- (5b) mixing/loading/applying wettable powders with a hose-end sprayer; and
- (6) mixing/loading/applying soluble concentrates to fire ant mounds.

Combined dermal and inhalation MOEs for mixing/loading/applying phosmet to fruit trees and ornamentals using a low pressure handwand were of concern (42 and 83, respectively). Very limited data were available to assess exposure risks for handlers for the direct application to dogs scenario (dip/dust); therefore, data and procedures specified in the 1997 SOPs for Residential Exposure Assessment were used. The SOPs assume combined dermal and inhalation exposure of 10% of the amount applied. This assessment estimated that handler risks for direct application to dogs (dip/dust) were not a concern.

Table 14. Estimated Risks from Residential Uses of Phosmet

Phosmet MOEs Attributable to Combined Short-term Homeowner Handler Dermal and Inhalation Exposures						
Scenario	Scenario Description	Assumptions Used in Assessment	Crop Type or Target	Dermal MOEs (Target 100)	Inhalation MOEs (Target 100)	Combined MOEs (Target 100)
1	Dusting an Animal	1 dog/day	Dog	3,750,000	No Data	No Data
		1 dog/day	Dog	159,091	No Data	No Data
2	Dipping a Dog	1 dog/day	Dog	1,381,579	No Data	No Data
3a	Mixing/loading/applying Liquids With a Backpack Sprayer	5 gallons	Ornamentals	5,490	280,000	5,385
3b	Mixing/loading/applying Wettable Powders With a Backpack Sprayer	5 gallons	Ornamentals	4,118	210,000	4,038
		150 ft ²	Peas	11,438	583,333	11,218
		250 ft ²	Potatoes	11,438	583,333	11,218
		10 gallons	Fruit Trees	2,101	107,143	2,060
4a	Mixing/loading/applying Liquids With a Low Pressure Handwand	5 gallons	Ornamentals	280	280,000	280
4b	Mixing/loading/applying Wettable Powders With a Low Pressure Handwand	5 gallons	Ornamentals	84	5,727	83
		150 ft ²	Peas	233	15,909	230
		250 ft ²	Potatoes	233	15,909	230
		10 gallons	Fruit Trees	43	2,922	42
5a	Mixing/loading/applying Liquids With a Garden Hose-End Sprayer	5 gallons	Ornamentals	933	884,211	932
5b	Mixing/loading/applying Wettable Powders With a Garden Hose-End Sprayer	5 gallons	Ornamentals	700	663,158	699
		150 ft ²	Peas	1,944	1,842,105	1,942
		250 ft ²	Potatoes	1,944	1,842,105	1,942
		10 gallons	Fruit Trees	357	338,346	357
6	Mixing/loading/applying Soluble Concentrates For Sprinkling	20 gallons (5 - 2 ft ² mounds at 4 gallons per mound)	Fire Ants	389	368,421	388

4) Residential Post-Application Risk

Phosmet can be used on residential fruit and nut trees, home gardens, ornamental plants, and dogs where exposure to adults and children may occur. Exposure may result from entering the treated garden;

maintaining fruit or nut trees; harvesting fruits, nuts or vegetables; or petting treated dogs. As a result, both toddler and adult risks were considered in the risk assessment.

Residential post-application scenarios assessed for phosmet consist of adults and children (aged 10-12) harvesting and maintaining pears and apples at maximum application rates, and toddlers after dermal contact with treated dogs, including incidental hand-to-mouth transfer. There are concerns for continuous post-application exposure to adults and youth in residential settings over an extended period of time (greater than 30 days); however, there is little information to determine if such extended exposures actually occur. There are also concerns for short-term post-application exposure to adults and youths harvesting and maintaining fruit trees. In addition, there are significant risk concerns for toddlers exposed to phosmet residues following contact with treated dogs, regardless of the duration of exposure.

For short- and intermediate-term (less than 30 days) exposures to adults and youths harvesting and maintaining apples and pears in home gardens, the MOEs were less than 100 on the day of phosmet application, with the exception of apples treated at 1.5 lb a.i./A. An MOE greater than 100 was achieved 4-8 days after application for adults and 3-6 days after application for youths. For this residential post-application scenario, the Agency assumes that home gardening activities would take place for 0.67 hours per day. The Agency does not have enough information to determine if intermediate-term (more than 30 days) exposures to phosmet occur in home gardens. However, empirical dissipation data suggest that phosmet residues persist, and that it may be possible for individuals to be exposed over an extended period of time.

The Agency has concerns for short- and immediate-term (less than 30 days) post-application risk for toddlers exposed to phosmet through dermal contact with treated dogs, as well as through non-dietary ingestion of residues associated with hand-to-mouth behaviors. For this assessment, the Agency has assumed that toddlers would engage in hand-to-mouth activity for 2 hours per day. The Day 0 MOEs calculated for petting small and large dogs ranged from <1 to 8, with the target MOE being 100. An MOE of more than 100 was not achieved even after 30 days, when re-treatment could occur. For toddler mouthing behaviors, as well as for combined exposure to dogs (i.e., dermal + hand-to-mouth exposures), Day 0 MOEs were 1 or less than one after contact with small and large dogs, and did not go above 100 after 30 days. Intermediate-term (more than 30 days) aggregate (i.e., dermal + hand-to-mouth) MOEs calculated for toddlers following contact with treated dogs were <1.

4. Aggregate Risk

An aggregate risk assessment looks at the combined risk from dietary exposure (food and drinking water routes) and residential exposure (dermal exposure, inhalation exposure for homeowner applicators, and incidental oral exposure for toddlers who pet treated dogs and engage in hand-to-mouth activities).

The aggregate dietary (food and water) risks are not of concern. Generally, all risks from these exposures must have MOEs of greater than 100 to be not of concern to the Agency.

Results of the aggregate risk assessment are summarized here, and are discussed extensively in the HED chapter, dated February 9, 2000. Aggregate risks including food, water, and residential exposure were not of concern except for the following residential scenarios: toddler contact with treated dogs; harvesting from home gardens treated at higher application rates; and homeowners applying wettable powder to ornamentals and fruit trees using low-pressure handwand sprayers.

5. Incident Data Review

Incidents involving exposure to phosmet are reported in the four sources reviewed; OPP's Incident Data System (IDS), Poison Control Centers (PCC), California Department of Pesticide Regulation (CDPR), and the National Pesticides Telecommunications Network (NPTN). In addition, the EPA has reviewed several literature studies, two of which describe an exposure incident in detail, and one which consists of a telephone survey of animal groomers/veterinary workers to determine the type of products used, PPE used, and incidents associated with exposure to flea control products.

- The Agency is concerned about exposures associated with treatment of dogs because the majority of the serious cases reported in the incident data involved systemic illnesses to pet owners, groomers and veterinary assistants.
- EPA's comparative analysis of incident data shows that residential exposures to phosmet were more likely to result in treatment in a health care facility than other organophosphate insecticides; phosmet ranked third for hospitalizations, and first for admission to intensive care units.

In 1996 several mitigation measures were implemented in an attempt to reduce the number of incidents to homeowners, veterinary workers and pets, associated with the use of phosmet. Specifically, product labels were amended to discourage application to certain dog breeds, and to smaller dogs and specifically exclude use on cats.

B. Environmental Risk Assessment

A summary of the Agency's environmental risk assessment is presented below. For detailed discussions of all aspects of the environmental risk assessment, see the Environmental Fate and Effects Division chapter, dated April 24, 1998, available in the public docket.

To estimate potential ecological risk, EPA integrates the results of exposure and ecotoxicity using the quotient method. Risk quotients (RQs) are calculated by dividing exposure estimates by ecotoxicity

values, both acute and chronic, for various species. Risk characterization provides further information on the likelihood of adverse effects occurring by considering the fate of the chemical in the environment, communities and species potentially at risk, their spatial and temporal distributions, and the nature of the effects observed in studies. The higher the RQ the greater the concern. Reported incidents to nontarget organisms, such as fish and birds, involving the use of a pesticide can provide meaningful information to confirm the results of risk assessments and to help characterize ecological risks.

1. Environmental Fate and Transport

Phosmet is stable to soil photolysis and appears to be stable to aqueous photolysis. Phosmet is subject to rapid hydrolysis under alkaline and neutral conditions and to a much lesser extent, under acidic conditions. Microbial degradation is a major route of dissipation. In soils where microbial activity is minimal, leaching may be a significant route of dissipation for this chemical. Phosmet degrades rapidly under aerobic conditions in soil (3 days) and more slowly under anaerobic conditions (15 days). Phosmet was not detected below the 10.5-inch soil layer in any of three field dissipation studies and dissipated to, or below, the level of detection prior to the study's completion.

Phosmet oxon is the only known degradate of toxicological concern identified in a number of environmental fate studies conducted. Studies have indicated that phosmet oxon is less mobile than phosmet because it was not detected in the leachate in aged and unaged mobility studies. In addition, phosmet oxon was limited to the upper soil layer in field studies while phosmet was detected as low as the 10.5-inch soil layer.

Based on laboratory studies and field studies, phosmet and phosmet oxon might appear to pose a threat to groundwater resources. However, the short time-frame in which these chemicals degrade, reduces the migration in most microbially active soils and it does not appear that phosmet or phosmet oxon will pose a significant threat to ground water resources. Phosmet and possibly phosmet oxon, may contaminate surface waters in the dissolved phase, mainly as a result of runoff-producing storm events shortly after field applications. Surface and ground water monitoring data were very limited for phosmet and were not used in the risk assessment.

2. Risk to Birds and Mammals

Phosmet was found to be moderately to practically non-toxic to avian species (acute). However, the application rates and number of applications for various crops have produced acute RQ values that are in the 0.3 to 2.9 range. Use on most crops appears to pose a chronic risk to birds with RQ values that range from 0.3 (for alfalfa seed) to 19.9 (for apples at high rates in short grass).

For mammals, the acute levels of concern are exceeded mainly on short grass for smaller animals. The highest acute RQs are for pears (RQ = 10) and walnuts (RQ = 12). The application rates and

frequency of applications result in high chronic risk concerns for all crops (RQs for short grass, the worst scenario, range from 13 - 73).

3. Risk to Aquatic Species

Acute and chronic risk to both freshwater and estuarine/marine fish is relatively low. The highest RQ is 3.4, for chronic risk to estuarine/marine fish, using the eastern apple high application rates.

The RQs for acute risk to both freshwater and estuarine/marine invertebrates range from 0.2 for apples (low western rate) to 13.4 for apples (high eastern rate), excluding the two highest values. The two highest RQ values are 68.7 and 70 for acute risk to freshwater invertebrates for application to kiwifruit and pears, respectively. It should be noted that use on kiwifruit is extremely low (54 lbs/year)

All crops, which have the potential to expose marine environments, appear to be a chronic concern for marine invertebrates (except alfalfa and cherries) with RQs ranging from 0.39 to 10.5. Chronic risk to freshwater invertebrates appears to be of concern for the following crops: apples, grapes, kiwifruit, peaches, pears, pecans and sweet potatoes.

4. Risk to Honey Bees

Phosmet is highly toxic to honey bees. Incidents of toxicity to honey bees have been reported.

IV. Interim Risk Management and Reregistration Decision for 17 Uses

A. Determination of Interim Reregistration Eligibility

Section 4(g)(2)(A) of FIFRA calls for the Agency to determine, after submissions of relevant data concerning an active ingredient, whether products containing the active ingredient are eligible for reregistration. The Agency has previously identified and required the submission of the generic (i.e., active ingredient specific) data required to support reregistration of products containing phosmet as an active ingredient.

The Agency has completed its assessment of the occupational and ecological risks associated with the use of pesticides containing the active ingredient phosmet, as well as a phosmet-specific dietary (food + water) risk assessment that has not considered the cumulative effects of organophosphates as a class. Based on a review of these data and public comments on the Agency's assessments for the active ingredient phosmet, EPA has sufficient information on the human health and ecological effects of phosmet to make a partial interim decision on 17 uses as part of the tolerance reassessment process under FFDCFA and reregistration under FIFRA, as amended by FQPA.

Although the Agency has not yet completed its cumulative risk assessment for the organophosphates, the Agency is issuing this partial interim decision now in order to identify risk reduction measures that are necessary to support the continued use of phosmet for 17 uses discussed in Table 15.

Because this is a partial interim RED, the Agency will take further actions to finalize the reregistration eligibility decision for the remaining 28 phosmet uses after completing its risk/benefit deliberations.

Because the Agency has not yet completed the cumulative risk assessment for the organophosphates, this reregistration eligibility decision does not fully satisfy the reassessment of the existing phosmet food residue tolerances as called for by the Food Quality Protection Act (FQPA). When the Agency has completed the cumulative assessment, phosmet tolerances will be reassessed in that light. At that time, the Agency will reassess phosmet along with the other organophosphate pesticides to complete the FQPA requirements and make a final reregistration eligibility determination. By publishing this partial interim decision on reregistration eligibility and requesting mitigation measures now for the 17 uses identified in this partial IRED, the Agency is not deferring or postponing FQPA requirements; rather, EPA is taking steps to assure that uses which exceed FIFRA's unreasonable risk standard do not remain on the label indefinitely, pending completion of assessment required under the FQPA. This decision does not preclude the Agency from making further FQPA determinations and tolerance-related rulemakings that may be required on this pesticide or any other in the future.

If the Agency determines, before finalization of the RED, that any of the determinations described in this partial interim RED are no longer appropriate, the Agency will pursue appropriate action, including but not limited to, reconsideration of any portion of this partial interim RED.

B. Summary of Phase 5 Comments and Responses

When making its partial interim reregistration decision, the Agency took into account all comments received during Phase 5 of the OP Pilot Process. These comments in their entirety are available in the docket. A brief summary of the comments and the Agency response is noted here.

Fifty two comments were received during the public comment period. Of these, comments specific to phosmet were received from the registrants (Gowan Company and Wellmark International Corporation), and the remaining fifty comments were from various organizations and private citizens. Many of these comments were testimonials to the effectiveness of phosmet. Commentors emphasized that phosmet is an important tool for integrated pest management, and that without it, resistance would develop quickly because of limited effective alternatives. Many commentors indicated that phosmet is not harmful to beneficial insects. In addition, the Natural Resources Defense Council submitted comments that were specific to phosmet, but also included comments on other OPs and any pesticide used on food.

Specifically, comments were received from the USA Dry Pea and Lentil Council; several sweet potato farmers, sweet potato industry representatives and academia; the Wild Blueberry Commission of Maine; a cherry farmer, Oregon Cherry Growers Association, the Cherry Marketing Institute; and Oregon State University Hermiston Agricultural Research and Extension Center.

C. Regulatory Position

EPA has determined that the continued use of phosmet on the uses discussed below is warranted under the conditions specified in this document. Dietary (food and drinking water) risks are not of concern. Residential risks have been addressed by voluntary cancellation of phosmet uses in the home. Further, the Agency finds that the risks posed to workers and the environment by the uses addressed in this document are acceptable taking into account mitigation measures and the benefits of phosmet use. In arriving at these decisions, EPA has considered all relevant risk mitigation options. In addition to personal protective equipment and engineering controls for workers, EPA has considered reductions in the rate and frequency of applications and precautionary labeling.

According to EPA's worker risk management policy (PR Notice 2000- 9), when calculated MOEs are below the target MOE after all baseline mitigation has been considered, in this case 100, EPA will characterize uncertainties in the risk assessment, assess the potential of additional data to reduce the uncertainty, and consider benefits, i.e., the cost, availability and relative risk of alternatives in making its regulatory decisions. These factors are addressed below and deal primarily with risks related to re-entry workers, since some MOEs for re-entry tasks are less than 100.

Uncertainty in the Occupational Risk Assessment

In the case of phosmet, the uncertainty associated with its toxicity is low. For example, the endpoint used for the reentry worker assessment is cholinesterase inhibition in both blood and brain. The 21-day dermal rat study that was used for this assessment is appropriate both in terms of route and duration of likely exposures. There is less than a 2-fold difference between the LOAEL (22.5 mg/kg/day) and the NOAEL (15 mg/kg/day). Additional toxicity data are not likely to impact the hazard assessment.

On the exposure side, EPA's assessment reflects the most recently updated transfer coefficients based on the Agricultural Reentry Task Force data and dislodgeable foliar residue (DFR) data from a phosmet-specific study. Additional DFR data are not likely to impact the exposure assessment. However, there are some protective assumptions built into the post-application exposure assessment for phosmet. For example, EPA assumes that no protective clothing is worn, that workers are exposed for up to 30 days, and that every field a worker enters has been treated with phosmet at the same maximum rate. User survey information provided by the registrant and others indicates that the actual frequency and duration of the post application activities of concern for the uses discussed below may be more intermittent, i.e., generally less than standard assumptions, and that maximum application rates are not always used.

Benefits

Table 15 contains a brief summary of benefits information for each site and proposed decision. The complete benefits assessments are available in the OPP public docket and on the Internet. In general, EPA's assessments have found little or no impact on crop production from the measures proposed in this document. However, USDA, the registrant and others have voiced the concern that extending the REI for some uses could have the effect of growers shifting to more hazardous alternatives. Stakeholders are urged to provide EPA with factual information related to potential shifts in use and the impacts of these shifts, e.g., increased cost, increased pesticide use, environmental impacts, etc., as well as any appropriate documentation.

EPA is providing a 60-day public comment period on the risk management decisions contained in this Partial IRED. Any comments on the benefits assessments supporting these decisions and future phosmet decisions should be provided to the Agency as soon as possible to ensure their consideration.

1. Tolerance Summary

The Agency will commence proceedings to revoke the five existing tolerances for phosmet use on citrus and corn and related animal feed at a future date, after the IRED is issued. The corn and citrus uses are not on any current product labels. The establishment of new tolerances or raising existing tolerances will be deferred, pending consideration of the cumulative assessment.

2. Human Health Risk Mitigation

a. Dietary (food and water) Risk Mitigation

Taking into account all currently registered uses of phosmet, dietary (food and water) risks are not of concern. No risk mitigation is necessary. However, additional studies will be required to reassess the tolerance for residues in sweet potatoes following post harvest application of the dust formulation.

b. Residential Risk Mitigation

The registrant has agreed to voluntarily cancel all products used in the home gardens, all products used on dogs, and prohibit use of fire ant treatment products in a residential setting except for fire ant mound drenches for public health purposes by licensed applicators.

c. Occupational Risk Mitigation

The risks associated with the dipping of pine seedlings and post harvest application to sweet potatoes have not been quantified, but the registrants have agreed that it is prudent to require handlers to wear a

long-sleeved shirt and long pants, shoes, an additional layer of clothing, socks, chemical-resistant gloves, and an air purifying (OV) respirator to mitigate risks.

To reduce risks to workers harvesting potatoes and sweet potatoes, the registrant agreed to require that phosmet is only to be used on potatoes that will be harvested by machine.

The registrant has agreed to limit use of liquid products to the following crops: alfalfa, cotton, blueberries, and potatoes.

EPA has determined that worker risks from exposure to phosmet in the scenarios listed below would be adequately mitigated through use of the following PPE: long-sleeved shirt and long pants, shoes and socks.

- Applying sprays with a groundboom sprayer;
- Applying using a right-of-way sprayer;
- Use of a cattle backrubber
- Mixing/loading/applying liquids with a backpack sprayer;
- Mixing/loading/applying wettable powders with a backpack sprayer;
- Mixing/loading/applying soluble concentrates for sprinkling.

EPA has determined that worker risks from exposure to phosmet in the scenarios listed below would be adequately mitigated through use of the following PPE: long-sleeved shirt and long pants, shoes, socks and chemical-resistant gloves.

- Mixing/loading liquid formulations for high pressure handwand application;
- Mixing/loading liquid formulations for airblast sprayer application;
- Mixing/loading liquid formulations for groundboom application;
- Mixing/loading/applying wettable powders with a low pressure handwand; and
- Mixing/loading/applying liquids with a low pressure handwand.

EPA has determined that worker risks from exposure to phosmet in the scenarios listed below would be adequately mitigated through use of the following PPE: long-sleeved shirt and long pants, shoes, additional layer of clothing, socks, chemical-resistant gloves, and an air purifying respirator (OV) to mitigate risks from exposure to phosmet.

- Applying using a high-pressure handwand;
- Dipping pine seedlings;
- Mixing/loading wettable powders for high pressure handwand application; and
- Mixing/loading/applying a dust formulation.

EPA has determined that worker risks from exposure to phosmet in the scenarios listed below would be adequately mitigated through use of engineering controls such as a closed tractor cab or closed loading system for granulars or liquids.

- Mixing/loading wettable powders for aerial application and chemigation;
- Mixing/loading wettable powders for groundboom application;
- Mixing/loading wettable powders for airblast sprayer application;
- Mixing/loading liquids for aerial application;
- Applying sprays with an airblast sprayer;
- Aerial application of sprays with a fixed wing aircraft (fixed wing aircraft also accounts for helicopter pilot exposure); and
- Flagging for aerial spray application.

The only mixer/loader/applicator scenarios that remain of concern after the standard mitigation of PPE and engineering controls are considered include:

- mixing/loading liquid formulations for aerial application; and
- mixing/loading wettable powder formulations for aerial application and chemigation.

These uses are discussed in the table below with the relevant crops.

In considering worker risks and benefits, the Agency considered the timing of field activities that are critical to crop production. For many of the phosmet uses discussed below, scouting and irrigation are critical activities in crop production, and these activities routinely need to be performed no later than three days after application. In evaluating the restricted entry intervals, the Agency considered the exceptions to the Worker Protection Standard that could inform the decision. EPA's proposed REIs take into account the flexibility already provided by these exceptions. Scouting is a handler activity under the WPS, so anyone performing this activity may legally enter the treated field during the REI provided they use the handler personal protective equipment (PPE) specified on the label. In addition, if the scout is a certified crop advisor as defined in the WPS (40CFR170.112(e)), the individual can determine the appropriate PPE to be used. For many of these crops, irrigation equipment is not routinely moved by hand. For these methods, the primary activity involves entering the field to turn the watering equipment on and off. This activity is allowed during the REI under the no contact exception to WPS (40CFR170.112(b)). This exception applies to mechanical harvesting and often applies to mowing. Should irrigation equipment need unexpected repairs during the REI, WPS allows workers to enter a treated field provided early entry PPE is used (40CFR170.112(c)).

Table 15. Occupational Risk Mitigation and Rationale

The following is a summary of the rationale for managing risks associated with 17 uses of phosmet.

Crop	Current PHI	Risks of Concern	Benefits	Proposed Mitigation
Kiwifruit	21	<p>High exposure activities (hand harvesting): MOE = 17 at current REI of 24 hours MOE 100 @ 28 days MOE 65 @ 21 days</p> <p>Medium exposure activities (scouting and tying kiwifruit): MOE = 83 at current REI of 24 hours MOE 100 @4 days</p>	<p>Because the boxelder bug is an early season pest, a 28-day pre-harvest interval (PHI) is not expected to have an impact on kiwifruit production.</p>	<p>28-day PHI (high exposure: harvesting), MOE >100)</p> <p>7-day REI (medium. exposure: scouting and tying, MOE > 100)</p>
<p>Rationale: For Kiwifruit, handler risks are not of concern provided engineering controls are employed; that is, water soluble bags for wettable powder formulations and closed mixing/loading systems for liquid formulations.</p> <p>The boxelder bug sporadically appears in kiwifruit (CA), and no alternative controls exist. This pest can cause bud and fruit drop and malformation to the fruit, resulting in yield and quality losses. Because of the low volume of use, benefits are generally considered to be low; however, for one sporadic but serious pest, there is no similarly efficacious alternative.</p> <p>With a 28-day pre-harvest interval, risks from harvesting are not of concern. With a 7-day REI for the remaining activities, risks from postapplication exposures are not of concern.</p>				

Crop	Current PHI	Risks of Concern	Benefits	Proposed Mitigation
Peas (Green)	7	<p>High exposure activities (hand harvesting): MOE = 33 at current REI of 24 hours MOE 100 @ 18 days</p> <p>Medium exposure activities (irrigation and scouting of mature plants): MOE = 55 at current REI of 24 hours MOE = 100 @ 10 days</p>	<p>Little phosmet use is reported on this crop. Extending the PHI to 18 days is expected to have little impact on harvesting of green peas. Increasing the REI to 5 days for all activities other than hand harvesting is expected to have little impact on the crop.</p>	<p>18 day PHI (MOE>100)</p> <p>5-day REI (MOE = 72 for irrigation, scouting, all other worker activities >100)</p>

Rationale:

For green peas, handler risks are not of concern provided engineering controls are employed; that is, water soluble bags for wettable powder formulations and closed mixing/loading systems for liquid formulations. With a 18-day PHI and a 5-day REI, risks from postapplication exposures are not of concern.

Stakeholder comments have suggested that scouts have minimal contact with treated foliage because of use of all terrain vehicles during scouting activities. However, the Agency has received a study conducted in conjunction with the Agricultural Re-entry Task Force (ARTF) that indicates that there is exposure to scouts performing those activities. Therefore, scouting and irrigating mature plants is considered a "medium" exposure activity in the risk mitigation.

Under the Worker Protection Standard, scouting is a handler activity which means that scouting can be performed during the REI provided the appropriate handler PPE is used. In addition, certified crop advisors can determine the appropriate level of PPE used during the REI. Irrigation is often fixed in place, which is a no contact activity as defined by the Worker Protection Standard.

Crop	Current PHI	Risks of Concern	Benefits	Proposed Mitigation
Peas (Dry)	7	<p>High exposure activities (hand harvesting): MOE = 33 at current REI of 24 hours MOE 100 @ 18 days</p> <p>Medium exposure activities (irrigation and scouting of mature plants): MOE = 55 at current REI of 24 hours MOE = 100 @ 10 days</p>	<p>Use of phosmet on dry peas (ID) has high benefits for control of the pea weevil and the pea leaf weevil.</p> <p>Increasing the REI to 5 days is expected to have little impact on the crop.</p>	5-day REI (MOE = 72 for irrigation and scouting of mature plants, all other worker activities >100)

Crop	Current PHI	Risks of Concern	Benefits	Proposed Mitigation
<p>Rationale: For dry peas, handler risks are not of concern provided engineering controls are employed; that is, water soluble bags for wettable powder formulations and closed mixing/loading systems for liquid formulations. With a 5-day restricted entry interval, risks from postapplication exposures are not of concern.</p> <p>Phosmet controls the pea weevil and the pea leaf weevil. Adult leaf weevils cause significant damage and economic loss by damaging leaves, terminate buds, and ultimately destroying the plants.</p> <p>Stakeholder comments have suggested that scouts have minimal contact with treated foliage because of use of all terrain vehicles during scouting activities. However, the Agency has received a study conducted in conjunction with the Agricultural Re-entry Task Force (ARTF) that indicates that there is exposure to scouts performing those activities. Therefore, scouting mature plants is considered a "medium" exposure activity in the risk mitigation.</p> <p>Phosmet use will be limited to dry peas that are mechanically harvested, which is a no contact activity as defined by the Worker Protection Standard Under the Worker Protection Standard. Scouting is a handler activity which means that scouting can be performed during the REI provided the appropriate handler PPE is used. In addition, certified crop advisors can determine the appropriate level of PPE used during the REI. Irrigation is often fixed in place, which is a no contact activity as defined by the Worker Protection Standard.</p>				

Crop	Current PHI	Risks of Concern	Benefits	Proposed Mitigation
Sweet Potatoes	7	<p>Medium exposure activities (irrigation scouting of mature plants)</p> <p>MOE = 55 at current REI of 24 hours</p> <p>MOE 100 @ 10 days</p>	<p>Benefits very high - for control of the white fringe weevil, spotted and banded cucumber beetle. Quarantine use: for control of the sweet potato weevil.</p> <p>Increasing the REI to 5 days is expected to have little impact on the crop.</p>	<p>5-day REI (medium. exposure: irrigation and scouting of mature plants, MOE = 72)</p>

Crop	Current PHI	Risks of Concern	Benefits	Proposed Mitigation
<p>Rationale: For sweet potatoes, handler risks are not of concern provided engineering controls are employed; that is, water soluble bags for wettable powder formulations and closed mixing/loading systems for liquid formulations.</p> <p>Because sweet potatoes are mechanically harvested, the estimated risk for hand harvesting is not considered for setting the REI; therefore, exposures to individuals performing scouting tasks on mature plants have calculated MOEs <100. However, EPA believes a 5-day REI is acceptable with an MOE of 72 because of the low volume of phosmet use and scouting activities occur intermittently.</p> <p>Phosmet is essential in controlling the sweet potato weevil, white fringe weevil, banded and spotted cucumber beetle. All other worker exposures have MOEs over 100 and thus are not of concern.</p> <p>Phosmet is also used post-harvest on stored sweet potatoes for controlling the sweet potato weevil, a quarantine pest. The risks associated with the post-harvest application to sweet potatoes have not been quantified, but the registrants have agreed that it is prudent to require handlers to wear long-sleeved shirt and long pants, shoes, additional layer of clothing, socks, chemical-resistant gloves, and an air purifying (OV) respirator to mitigate applicator risks associated with the use of the 5% dust product.</p> <p>All sweet potatoes are mechanically harvested, which is a no contact activity as defined by the Worker Protection Standard. Under the Worker Protection Standard, scouting is a handler activity which means that scouting can be performed during the REI provided the appropriate handler PPE is used. In addition, certified crop advisors can determine the appropriate level of PPE used during the REI. Little irrigation is needed for sweet potatoes.</p>				

Crop	Current PHI	Risks of Concern	Benefits	Proposed Mitigation
Alfalfa	7-14	M/L Aerial MOE=67-97 @ 1 lbs. Medium exposure activities (irrigation and scouting of mature plants) MOE = 55 at current REI of 24 hours MOE 100 @ 10 days	Usage of phosmet on this field crop is extremely low. Increasing the REI to 5 days is expected to have little impact on crop production.	5-day REI (medium exposure: scouting and irrigation of mature plants, MOE = 72)
<p>For alfalfa, handler risks are not of concern provided engineering controls are employed; that is, water soluble bags for wettable powder formulations and closed mixing/loading systems for liquid formulations. For mixing and loading for aerial application, it is unlikely that the use of phosmet would exceed 7 days (MOE = 97) because of the low volume of phosmet used. Therefore, risks to mixers and loaders are not of concern.</p> <p>With a 5-day restricted entry interval (MOE=72), risks from postapplication exposures (scouting and irrigation of mature plants) are not of concern because phosmet is not frequently used on alfalfa and most of the irrigation systems used are stationary thus resulting in no worker contact with treated foliage, allowing re-entry consistent with the Worker Protection Standard. No impact on alfalfa production is expected from extending the REI to 5 days because of the limited use and few hand activities that would occur during this period.</p>				

Crop	Current PHI	Risks of Concern	Benefits	Proposed Mitigation
Blueberries (lowbush)	3	High exposure activities (hand harvesting) MOE = 55 at current REI of 24 hours MOE 100 @ 10 days	Benefits are high to medium high, because alternatives are less effective than phosmet.	7-day PHI (high exposure: hand harvesting MOE = 83) 3-day REI (MOE>100 for remaining activities)
<p>For lowbush blueberries, handler risks are not of concern provided engineering controls are employed; that is, water soluble bags for wettable powder formulations and closed mixing/loading systems for liquid formulations.</p> <p>Growers have indicated a need to re-enter treated fields to monitor pest infestations and replace pheromone traps, consistent with Integrated Pest Management Programs and that the use of alternatives (malathion and carbaryl) requires more frequent treatments.</p>				

Crop	Current PHI	Risks of Concern	Benefits	Proposed Mitigation
Cherries, Sweet	7	<p>M/L Aerial MOE = 63-92 High exposure activities (hand harvesting): MOE = 31 at current REI of 24 hours MOE 100 @ 19 days</p> <p>Low exposure activities (irrigation and scouting): MOE = 93 at current REI of 24 hours MOE 100 @ 3 days</p>	<p>Benefits are high to growers in OR for Syneta beetle use. Limited alternatives. (24(c) registration in OR)</p> <p>Increasing the PHI to 19 days and the REI to 3 days is expected to have little impact on crop production.</p>	<p>19-day PHI (MOE > 100)</p> <p>3-day REI (remaining activities, MOE >100)</p>
<p>Aerial application (using engineering controls) only occurs when rain has softened the orchard floor to the extent that a tractor could not pass through the orchard without damaging the orchard. Given that aerial applications are rarely performed, and when aerial applications are performed, it is unlikely that they would occur for up to seven consecutive days, actual risk is anticipated to be lower than the calculated short-term MOE of 92. Therefore, risks to mixers and loaders are not of concern.</p> <p>Damage from syneta beetle is fruit-scarring, and causes deformed fruit. Application to control this beetle is early-season (end of bloom). Because critical activities are not anticipated in the early season, a 19-day pre-harvest interval is not expected to have an impact on sweet cherry production. With a 3-day REI, the risks are not of concern for all other activities. The 3-day REI is not expected to have any impact on sweet cherry production.</p>				

Crop	Current PHI	Risks of Concern	Benefits	Proposed Mitigation
Cherries, Tart	7	<p>M/L Aerial MOE = 63-92 High exposure activities (hand harvesting): MOE = 31 at current REI of 24 hours MOE 100 @ 19 days</p> <p>Low exposure activities (irrigation and scouting): MOE = 93 at current REI of 24 hours MOE 100 @ 3 days</p>	Benefits are high for the use of phosmet in tart cherries. Pests are the cherry fruit flies.	3 day REI (low exposure: irrigation and scouting) for all activities -no hand harvesting, MOE >100
<p>Aerial application (using engineering controls) only occurs when rain has softened the orchard floor to the extent that a tractor could not pass through the orchard without damaging the orchard. Given that aerial applications are rarely performed, and when aerial applications are performed, it is unlikely that it would occur for up to seven consecutive days, actual risk is anticipated to be lower than the calculated MOE of 92. Therefore, risks to mixers and loaders are not of concern.</p> <p>Pests are the cherry fruit flies. Truckloads with maggots are rejected at the distributor level. Many alternatives are less efficacious.</p> <p>Exposure to workers is limited because all tart cherries are mechanically harvested. Consequently, the re-entry exposures of concern are scouting and irrigation. With a 3-day REI, these risks are not of concern and the increased REI is not expected to have any impact on tart cherry production.</p>				

Crop	Current PHI	Risks of Concern	Benefits	Proposed Mitigation
Cotton	21	Aerial MOE M/L 67-97 @ 1 lb a.i./A Medium exposure activities (irrigation and scouting of mature plants): MOE = 55 at current REI of 24 hours MOE 100 @ 10 days	Usage of phosmet on cotton is extremely low. No impact on cotton production is expected from extending the REI to 5 days.	5-day REI (medium. exposure: scouting and irrigation, MOE = 72)
<p>Only 5000 acres are treated with phosmet. There is an interest in keeping for over wintering boll weevil. For cotton, handler risks are not of concern provided engineering controls are employed; that is, water soluble bags for wettable powder formulations and closed mixing/loading systems for liquid formulations. For mixing and loading for aerial application, it is unlikely that the use of phosmet would exceed 7 days (w/ MOE=97) because of the limited use. Therefore, risk to mixers and loaders are not of concern.</p> <p>No field activities are critical within 5 days after application. Because of the extremely low use of phosmet, it is unlikely that a individual would be engaged in scouting and irrigation activities in phosmet treated fields for a number of consecutive days for eight hours a day, so the calculated MOE of 72 probably overstates the actual risk for this crop. No impact on cotton production is expected from extending the REI to 5 days because of the limited use and few hand activities that would occur during this period.</p>				

Crop	Current PHI	Risks of Concern	Benefits	Proposed Mitigation
Cranberries	14	All activities (2.8 lbs a.i./A rate): MOE = 74 at current REI of 24 hours MOE 100 @ 6 days MOE 85 @ 3 days	New use registered in 2000. EPA has no data to determine the importance of phosmet in cranberries.	3-day REI (all activities, MOE = 85)
<p>For cranberries, handler risks are not of concern provided engineering controls are employed; that is, water soluble bags for wettable powder formulations and closed mixing/loading systems for liquid formulations. With a 3-day restricted entry interval, risks from postapplication exposures are not of concern. The calculated MOE of 85 is based on the maximum rate of 2.8 pounds a.i. per acre. This is a new registration and EPA does not have use data for phosmet. Phosmet may be applied at a lower rate, which would result in lower worker exposure (MOEs > 85). The phosmet labeled use rates range from 0.93 to 2.8 lbs a.i. per acre.</p>				

Crop	Current PHI	Risks of Concern	Benefits	Proposed Mitigation
Potatoes	7	Medium exposure activities (scouting and irrigation of mature plants): MOE = 55 at current REI of 24 hours MOE 100 @ 10 days	Usage of phosmet is low. No impact on potato production is expected from extending the REI to 5 days.	5-day REI (medium. exposure: irrigation and scouting of mature plants, MOE =72)
<p>For potatoes, handler risks are not of concern provided engineering controls are employed; that is, water soluble bags for wettable powder formulations and closed mixing/loading systems for liquid formulations. Because potatoes are mechanically harvested, the estimated risk for hand harvesting is not considered for setting the REI; therefore, exposures to individuals performing scouting tasks on mature plants have the risk of greatest concern.</p> <p>The Agency has received comments indicating that scouting has limited exposure because the workers drive around the perimeter of the field, stopping to sample for pests at 3 or 4 sites. Therefore, EPA believes that the calculated MOE of 72 at 5 days may overstate the actual risk to scouts. In addition, comments have indicated that the warm climate would prohibit workers from wearing full PPE to enter treated fields for scouting and irrigating purposes as provided for by the existing low contact exemption in the Worker Protection Standard. No impact on potato production is expected from extending the REI to 5 days.</p>				

Crop	Current PHI	Risks of Concern	Benefits	Proposed Mitigation
Pine Seed Orchards	NA	<p>High exposure activities (hand pollination, harvesting, staking, topping, and training): MOE = 17 at current REI of 24 hours MOE 100 @ 28 days</p> <p>Medium exposure activities (pruning, thinning, cone pruning, and cone harvesting): MOE = 46 at current REI of 24 hours MOE 100 @ 13 days</p>	New use registered in 2001. EPA has no data to determine the importance of phosmet in pine seed orchards.	28-day REI
<p>For pine seed orchards, handler risks are not of concern provided engineering controls are employed; that is, water soluble bags for wettable powder formulations and closed mixing/loading systems for liquid formulations. These estimates are based on the value for aerial application of 150 - 300 acres treated per day which is a reasonable high-end estimate of the number of acres treated.</p> <p>With a 28-day restricted entry interval, risks from postapplication exposures are not of concern. In pine seed orchards, mowing is a no contact activity and thus could be performed during the REI. The Agency understands that there are some critical low exposure activities that may need to be performed during the 28-day REI. Such activities will be considered in the final decision for this use.</p>				
Ornamental (Nursery)	NA	MOE \geq 100 at current REI of 24 hours for low exposure activities	Not assessed - risks not of concern.	Acceptable with engineering controls
<p>For ornamental trees in nurseries, handler risks are not of concern provided engineering controls are employed; that is, water soluble bags for wettable powder formulations and closed mixing/loading systems for liquid formulations. Postapplication risks are not of concern at the current 24 hour REI.</p>				

Crop	Current PHI	Risks of Concern	Benefits	Proposed Mitigation
Fire Ant Control	NA	Mixer/loader MOEs on day of treatment range from 115 - 158	Public health use.	Retain this use on agricultural label, limited to use by a certified pest control operator
Voluntary Use Cancellation				
Household Ornamental	NA	Mixing/loading/applying wettable powders with a low pressure handwand: MOEs = 42 - 83	Not assessed	Accept cancellation
Household Fruit Tree	NA	Mixing/loading/applying wettable powders with a low pressure handwand: MOEs = 42 - 83	Not assessed	Accept cancellation
Domestic Pet		Post application risk to children is high.	Not assessed	Accept cancellation

3. Environmental Risk Mitigation

To reduce ecological exposure, the Agency usually requests that registrants assess the maximum treatments allowed on product labels by evaluating the amount of pesticide applied either per season or per application and treatment intervals. The phosmet registrant has agreed to limit applications for the crops in this partial IRED, as indicated in the list below and to add a precautionary statement on all labels indicating that phosmet is highly toxic to bees.

The following are maximum use rates or intervals proposed for labels:

- Cherries - 5.25 lbs a.i. per acre per season,
- Deciduous Shade and Ornamental Trees - 3 applications per season
- Woody Evergreens - 3 applications per season
- Pine Trees - 3 applications per season

The following statements will be added to end use product labels:

“This pesticide is toxic to fish and aquatic invertebrates. Do not apply directly to water or to areas where surface water is present or to intertidal areas below the mean high-water mark. Drift and runoff may be hazardous to aquatic organisms in neighboring areas. Do not contaminate water when disposing of equipment washwater or rinsate.”

“This product is highly toxic to bees exposed directly to treatment of residues on crops. Do not apply this product or allow it to drift to blooming crops or weeds if bees are visiting the treatment area. Protective information may be obtained from your cooperative Agricultural Extension Service.”

“This chemical can contaminate surface water through aerial and ground spray applications. Under some conditions, it may also have a high potential for runoff into surface water after application. These include poorly draining or wet soils with readily visible slopes toward adjacent surface waters, frequently flooded areas, areas overlying extremely shallow ground water, areas with in-field canals or ditches that drain to surface water, areas not separated from adjacent surface waters with vegetated filter strips, and areas overlying tile drainage systems that drain to surface water.”

The following statements will be added to manufacturing use product labels:

“This pesticide is toxic to fish and aquatic invertebrates. Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans or other waters unless the action is in accordance with the requirements of a National Pollutant Discharge Elimination System (NPDES) permit and the permitting authority has been notified in writing prior to the discharge.

Do not discharge effluent containing this product to sewer systems without previously notifying the local sewage treatment plant authority. For guidance, contact your State Water Board or Regional Office of the EPA.”

The uses addressed in this partial decision are generally low volume, i.e., on the average less than 40,000 lbs a.i. applied annually. Because of the low volume of usage, the potential exposure to non-target organisms is somewhat less than for the major uses of phosmet, such as orchard crops. Additional ecological mitigation may be warranted when these larger volume uses are considered.

V. What Registrants Need to Do:

When the Agency completes the IRED for phosmet, a complete set of instructions for complying with the necessary risk mitigation, label amendments and data call-in will be issued at that time.

VI. Related Documents and How to Access Them:

This partial interim Reregistration Eligibility Document is supported by documents that are presently maintained in the OPP docket. The OPP docket is located in Room 119, Crystal Mall #2, 1921 Jefferson Davis Highway, Arlington, VA. It is open Monday through Friday, excluding legal holidays from 8:30 am to 4 pm.

The docket initially contained preliminary risk assessments and related documents as of January 15, 1999. Sixty days later the first public comment period closed. The EPA then considered comments, revised the risk assessment, and added the revised risk assessment to the docket on March 20, 2000.

All documents, in hard copy form, may be viewed in the OPP docket room or downloaded or viewed via the Internet at the following site: "<http://www.epa.gov/pesticides/op>."

Supporting Documents for the Phosmet Partial Interim Reregistration Eligibility Decision

Human Health Risk Assessment, Issued in February 2000

“Phosmet - Review of Incident Reports for ProTICall® Derma-Dip (Reg. No. 773-79),” [V. Dobozy memorandum dated 4/17/97, DP Barcode No. D234382].

“Revised Product and Residue Chemistry Chapters of the HED RED,” [C. Swartz memorandum dated 11/23/98, DP Barcode No. D250029].

“Review of Phosmet Incident Reports,” [J. Blondell memorandum dated 12/7/98, DP Barcode No. D251247].

“Phosmet-Report of the FQPA Safety Factor Committee,” [B. Tarplee memorandum dated 7/21/99].

“Phosmet Toxicology Chapter for the HED RED,” [L. Taylor memorandum dated 7/26/99, DP Barcode No. D257925, HED Document No. 013586].

“HED Response to Public Comments on the Preliminary Human Health Risk Assessment,” [C. Swartz memorandum dated 7/29/99, DP Barcode No. D258140].

“HED Review of the Gowan Co. Probabilistic (Monte Carlo) Acute Dietary Exposure and Risk Assessment,” [C. Swartz memorandum dated 7/30/99, DP Barcode No. D254657].

“Phosmet: Revised Report of the Hazard Identification Assessment Review Committee,” [L. Taylor memorandum dated 8/4/99, HED Document No. 013604].

“Phosmet: Revised Dietary Exposure and Risk Analyses for the HED Human Health Risk Assessment,” [C. Swartz memorandum dated 9/8/99, DP Barcode No. D258080].

“The Revised Occupational and Residential Exposure Aspects of the HED Chapter of the Reregistration Eligibility Document (RED) for Phosmet,” [J. Dawson memorandum dated 1/27/00, DP Barcode No. D262366].

“Cancer Assessment Document: Evaluation of the Carcinogenic Potential of Phosmet (3rd Review),” [S. Diwan memorandum dated 9/30/99].

“Phosmet: Revised Report of the Hazard Identification Assessment Review Committee,” [L. Taylor memorandum dated 12/20/99, HED Document No. 013921].

Updates to the Human Health Risk Assessment:

"Phosmet: Revised Occupational Postapplication Exposure and Risk Calculations," [J. Dawson memorandum dated 8/15/2000, DP Barcode No. D268141].

"Phosmet: Response to Comments from Stakeholder Organizations on Phosmet Risk Assessment," [J. Dawson memorandum dated 9/14/2000, DP Barcode No. D268565].

"Phosmet: Response to Comments from The Gowan Chemical Company on Phosmet Risk Assessment," [J. Dawson memorandum dated 9/14/2000, DP Barcode No. D268563].

"Response to Comments from The Wellmark Chemical Company on Phosmet Risk Assessment," [J. Dawson memorandum dated 9/28/2000, DP Barcode No. D266418].

"Review of Wellmark International's Response to USEPA HED Phase 4 Human Health Risk Assessment concerning: Memorandum: Review of Phosmet Incidence Reports" [J. Blondell memorandum dated September 25, 2000, DP Barcode No.269221].

"Phosmet: Toxicology Chapter for RED - Revised" [L. Taylor memorandum dated July 13, 2000, DP barcode No. D266419].

"Response to National Resources Defense Council (NRDC) Comments on Phosmet Risk Assessment Included as Docket #OPP-34173B," [J. Dawson/C. Swartz/L. Taylor memorandum dated 11/27/2000, DP Barcode No. D266418].

"Phosmet - Addenda to Previous Occupational and Residential Risk Assessment Completed on January 27, 2000," [J. Dawson memorandum dated 2/6/2001, DP Barcode No. D271240].

"Phosmet: Further Revisions to the Occupational Exposure and Risk Calculations" [J. Dawson memorandum dated 8/20/01, DP Barcode No. D277160].

"Phosmet: Cranberry and Forestry Occupational Exposure and Risk Calculations" [J. Dawson memorandum dated August 31, 2001, DP Barcode No. D277440].

Ecological Risk Assessment, Issued April 24, 1998:

"Environmental Fate and effects Division RED Chapter for Phosmet" [S. Abel/M. Rexrode/D. Spatz/T. Steeger, memorandum dated 4/24/1998, DP Barcode Numbers D188325, D187058, D236030].

“Phosmet Tier II EECs,” [S. Abel memorandum dated 8/9/99].